Appendix A

WAPA's Construction Standards

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WAPA's Construction Standards

WAPA uses standards and specifications for constructing projects, including communications facilities. Standards addressing General Requirements (Standard 1), Sitework (Standard 2), Environmental Quality Protection (Standard 13), and Communications Facilities (Standard 14) are provided in this document; all WAPA construction standards can be found at the following webpage:

https://www.wapa.gov/DoingBusiness/SellingToWestern/Documents/ConstructionStandard2016.pdf

Standard 1

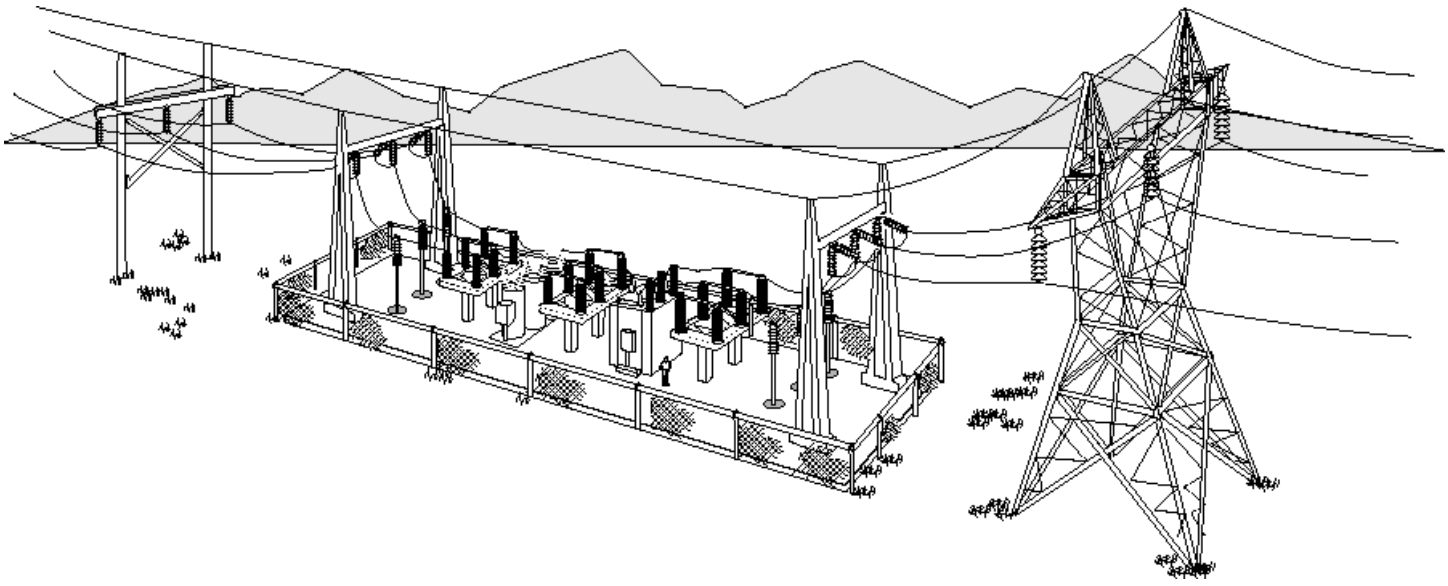
General Requirements

Western Area
Power Administration

CONSTRUCTION STANDARDS

STANDARD 1

GENERAL REQUIREMENTS



SAFETY
A HABIT TO LIVE BY

September 2016

STANDARD 1 – GENERAL REQUIREMENTS

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STANDARD 1 – GENERAL REQUIREMENTS

SECTION 1.1 – GENERAL CONDITIONS

1.1.1 STANDARDS AND PROJECT SPECIFICATIONS:

1. GENERAL: Western uses standards and project specifications for constructing substation and transmission line projects. The standards, project specifications, standard drawings, and project drawings together completely describe the project to be constructed.

2. STANDARDS: The standards contain general requirements for constructing substation and transmission line projects. The standards are specifications that describe material, standards of quality, and requirements that are applicable to Western construction projects.

3. PROJECT SPECIFICATIONS: Project specifications are issued for each project. The project specifications describe the specific requirements for the construction project, describe the work contained in Bidding Schedule items, and may specify measurement for payment. The project specifications may list requirements that are in addition to the standards and may list requirements that modify or take exception to the standards.

4. BIDDING SCHEDULE: The Bidding Schedule is listed in Section B of the contract. If the Bidding Schedule contains a single item for the entire project, then the cost of performing work under the contract shall be included in the single item. If the Bidding Schedule contains numerous items, then the cost of performing work shall be included in the appropriate items as listed in the project specifications. If work, required by the specifications and drawings, is not listed as included in a separate item, then the cost of the work shall be included in other Bidding Schedule items as applicable.

5. APPLICABILITY OF STANDARDS: Use only the portions of each standard that are relevant to work described in the project specifications.

6. CONFLICT IN REQUIREMENTS: If a conflict occurs between the project specifications and the standards, the project specifications shall govern.

1.1.2 GENERAL CONTRACT DEFINITIONS:

In addition to the terms and abbreviations covered in Section 1.2.4, “Reference Standards” and the “Definitions” and “Specifications and Drawings for Construction” Contract Clauses, the terms and definitions listed below apply:

“Western” or “Western Area Power Administration” as used herein means the Government.

“COR” as used herein means the person duly appointed as the Contracting Officer’s Representative.

“Approved” or “approval” as used herein shall mean approved by the COR, except where another specific authority is designated.

“Material” or “materials,” as used herein to denote items furnished by the Contractor or by Western, mean machinery, equipment, components, products, or any other item incorporated in the work.

“Provide” or “providing” as used herein shall mean “furnish and install” or “furnishing and installing,” including labor and material to construct or install an item complete and ready for use.

Where “provide,” “install,” “furnish,” “repair,” or words of similar import are used, it shall be understood that reference to the Contractor is intended unless clearly indicated otherwise.

"Section" as used in the standards shall mean written text designated by a section number (e.g., 1.1.6) and include subsections under the referenced designation.

"PCB" or "PCBs" as used herein shall mean polychlorinated biphenyl or polychlorinated biphenyls.

"Bidding Schedule" as used herein shall mean Section B of this solicitation.

"Removing" as used herein shall mean remove and dispose unless otherwise directed.

1.1.3 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK:

1. PROSECUTION OF THE WORK: The capacity of the Contractor's construction plant, sequence of operations, method of operation, and the forces employed shall be subject to the COR's approval and shall ensure the completion of the work within the specified period of time.

2. SAFETY AND HEALTH PROGRAM: Prior to start of field construction operations at the job site, submit a Safety and Health Program as specified under Section 1.4, "Safety and Health."

3. OUTAGE RESTRICTIONS: Western's substations and transmission lines are under the jurisdiction of Western's power operation and maintenance staff and are subject to their standard operating procedures and regulations. Provisions will be made to de-energize only those buses and circuits necessary to accomplish the work. Western will give outages based on system operating conditions at the time outages are requested. Time and length of outages will be at Western's discretion. Certain operating facilities will be released only at prescheduled times in order to maintain the continuity of commercial electrical service.

4. SUBMITTAL FORMAT AND APPROVAL TIME: All submittals shall include the Western contract number, Western project title, and the Bidding Schedule Contract Line Item Number (CLIN). The standards and project specifications list approval times for submittals. These review times apply to each separate submittal or resubmittal whether drawings or data are approved, not approved, or returned for revision. If Western uses time in excess of the above-stated number of days for reviewing any submittal or resubmittal, the excess time will be added to time allowed for completion of the work affected by such excess time; except, if the review of two or more separate submittals or resubmittals is late and results in concurrent days of excess time, such days will be counted only once in computing an extension of completion date. Number of calendar days required for review of drawings or data submitted or resubmitted for approval will include the date drawings or data are received by Western and will extend through date of return mailing to the Contractor.

1.1.4 CONSTRUCTION PROGRAM:

1. GENERAL: Submit a construction program for approval in accordance with the contract clause titled "Schedules for Construction Contracts". Pending approval of the program, proceed with work in accordance with the proposed construction program.

2. ESTIMATE OF EARNINGS: Construction program shall show the percentage of work for each line item or portion of work scheduled for completion each month and include an estimate of earnings by months.

   Program approval shall not obligate Western to provide funds in any manner other than as provided in the contract clauses and special contract requirements.

3. SUBMITTALS:

   (1) Form of Submittal: Submit three prints of construction program and each revised program.

   (2) Revisions: Revise construction program to keep it current; enter on program actual progress at end of each progress payment period, or at such other intervals as directed, and submit two marked prints of program to the COR.

4. FORMAT AND DETAIL: Construction program shall show in detail the Contractor's schedule of operations and shall provide for orderly performance of the work. Construction program shall show the following:

   (1) Sequence of operations.

   (2) Dates for commencing and completing work on the controlling features.

   (3) Order issue and delivery dates for Contractor-furnished material.

   (4) Lead times required for Government-furnished construction drawings. Lead times greater than 75-days shall be justified.

   (5) Dates Contractor-prepared drawings will be submitted for approval.

   (6) Dates and duration of required power outages.

1.1.5 CONSTRUCTION SURVEYS:

1. GENERAL: Conform to the requirements of the contract clause titled "Layout of Work" and to the following requirements:

   (1) Establish lines and grades from existing structures or survey control as directed by the COR for control and measurements at the site.

   (2) Establish lines and grades that control the work at the location so that they are set to the limit marks and tolerances identified in Section 1.1.5.11 “Degree of Accuracy" or as shown on the drawings.

   (3) No payment will be made for work necessary to correct misaligned tangent or facility structures or features in either the horizontal or vertical plane.

2. SUBMITTALS:

   (1) Prior to beginning any phase of the survey work, submit to the COR a proposed plan that demonstrates that the lines and grades, established by the Contractor for control of the work, will meet the requirements of the project specifications.

   (2) Submit data collector dump, computer printout, and field books to the COR.

3. PERSONNEL QUALIFICATIONS: Survey work shall be done under the direction of a qualified surveyor or engineer approved by the COR. The number of qualified surveying personnel required will vary with the workloads, and sufficient qualified survey personnel shall be available to perform the required work.

4. EQUIPMENT AND MATERIAL: Furnish labor, equipment, supervision, transportation, operation supplies, and incidentals for the work.

5. RECORDS: Survey notes that show field procedures and field data shall be recorded and certified by the person in responsible charge of the survey work.

6. DATA COLLECTORS: If data collectors are utilized in conjunction with total station equipment, the COR shall be provided with a certified copy of the data collector dump and the computer printout of the survey calculations showing initial and finalized data. The data collector dump shall be annotated to reflect, at each occupied station, the date and time data is collected, stations occupied, back sight, foresight, angle turned, distance measured, and difference in vertical elevation.

7. FIELD BOOKS: If field books are utilized in conjunction with conventional equipment, the original field notes, computations, and other records for the purpose of layout and quantity surveys shall be recorded in duplicating field books. Immediately upon completing and reducing the notes for a survey or portion of a survey, furnish a duplicate copy to the COR. Upon completing a field book, submit the original field survey book to the COR for filing.

8. DIFFERING CONDITIONS: Conditions encountered during construction that are different from those represented on the drawings shall be brought to the attention of Western's Field Representative. Once verified by Western's Field Representative, the Contractor shall accurately record the condition and furnish the corrected drawing to Western in accordance with Standard 15 - Drawings Section 15.2, "As-Built Drawings".

9. CLEANUP: Except for permanent survey markers and material that locate proposed facilities, stakes, pins, rebar, spikes, and other material shall be removed from the surface and within the top 15-inches of the topsoil as a part of final cleanup.

10. ACCESS ROADS: Stake and mark Western-provided access road rights-of-way in accordance with the legal descriptions and tract plats furnished by Western.

11. DEGREE OF ACCURACY: Provide the following:

    (1) Substations: Points for cross sections shall be located to the nearest 0.1 (1/10th) of a foot horizontally and vertically. Levels shall close within 0.05 (5/100th) of a foot times the square root of the length of the circuit in miles. Final grade stakes (blue tops) for concrete shall be set to 0.01 (1/100th) of a foot. Alignment of tangents and curves shall be within 0.1 (1/10th) of a foot. Points for structures shall be set to the nearest 0.01 (1/100th) of a foot, except where operational function of special features or installations of metalwork and equipment require closer tolerances.

    (2) Access Roads: On land in rural areas, establish the centerline of the access road with a horizontal positional closure of 1:2500 or better. On land in residential or commercial areas, establish the centerline of the access road with a horizontal positional closure of 1:5000 or better.

    (3) Transmission Lines:

        1) Lattice Steel Towers:

            Survey Marks for Points of Intersection (P.I.) and Tangent Transmission Line Structures: In grassland, pasture, desert, or grazing areas, the rebar is flush with the ground. In crop land, the rebar is buried 12-inches to 14-inches below ground surface. Western has located the center of each transmission line P.I. structure on the transmission line

centerline and marked it with a #5 rebar (5/8-inch) affixed with an aluminum cap imprinted with the survey control number and punch mark.

Western has located the center of each tangent transmission line structure on the transmission line centerline and marked it with a #4 rebar (1/2-inch). Western will only provide survey crew services to re-establish transmission line P.I.

a. Leg Extension Determination Sheets: After award of contract, the COR will provide the Contractor with copies of Western's "Leg Extension Determination Sheet."

b. Horizontal and Vertical Control: After award of contract, the COR will furnish the Contractor with data that may include a set of drawings titled "Schematic Control and Land Monumentation Diagram" which identifies the horizontal and vertical control network established by Western. Using the horizontal control at the P.I.'s furnished by Western:

   (a) Stake auger points for footings and construct the transmission line towers to plus or minus 1/10th foot of the base elevation shown on the plan and profile drawings.

   (b) Recover structure sites and verify or re-establish the horizontal location of tangent structures sites; and insure the centerline point of each transmission line structure site is within 0.2 foot of the true tangent line between P.I.'s and within plus or minus 1.0 foot of the correct centerline station.

   (c) Verify that the ahead and back span lengths at recovered tangent structure sites agree with the plan and profile drawings. The results, including the magnitude of any difference, shall be given to the COR prior to foundation construction.

2) Single Shaft Steel, H-Frame Steel Pole, Wood Pole Single, and Wood Pole H-Frame:

3) Steel Pole Structures, Light Duty Steel Pole Structures, and Wood Pole Structures:

Survey Marks for P.I. and Tangent Transmission Line Structures: In grassland, pasture, desert, or grazing areas, the rebar is flush with the ground. In crop land, the rebar is buried 12-inches to 14-inches below ground surface.

Western has located the center of each transmission line P.I. structure on the transmission line centerline and marked it with a #5 rebar (5/8-inch-diameter) affixed with an aluminum cap imprinted with the survey control number and punch mark. Western has located the center of each tangent transmission line structure on the transmission line centerline and marked it with a #4 rebar (1/2-inch-diameter). Western will only provide survey crew services to re-establish transmission line P.I.

c. Horizontal and Vertical Control: After award of contract, the COR will furnish the Contractor with data that may include a set of drawings titled "Schematic Control and Land Monumentation Diagram" which identifies the horizontal and vertical control network established by Western. Using the horizontal control at the P.I.'s furnished by Western:

   (a) Recover structure sites and verify or re-establish the horizontal location of tangent structure sites; and insure the centerline point of each transmission line structure site is within 0.2-foot of the true tangent line between P.I.'s and within plus or minus 1.0-foot of the correct centerline station.

(b) Verify that the ahead and back span lengths at recovered tangent structure sites agree with the plan and profile drawings. The results, including the magnitude of any differences, shall be given to the COR prior to foundation construction.

(c) Stake auger points for the footings or structures and, if required, the guys for tangent and P.I. structures. Guys shall be located with an accuracy of plus or minus 1-foot (1.0). The accuracies shall be measured from angle points shown on the plan and profile drawings.

(4) Microwave Stations: In remote areas, Western will locate and mark tower and support centers with #4 or #5 rebar. Western will provide a reference azimuth from the tower center.

1) In remote areas, establish three protected reference points for the Western-established tower or support center. These reference points shall be established outside of the area under construction.

2) Antennas shall be oriented within 1 degree, plus or minus, of the azimuth specified. Towers shall be constructed so the antenna is located within 6-inches (0.5-foot), plus or minus, of the height specified.

1.1.6 BREAKDOWN OF CONTRACT PRICES:

1. GENERAL: In addition to the requirements of the contract clause titled "Payments Under Fixed Price Construction Contracts", the Contractor shall submit a detailed breakdown of the total contract price.

2. SUBMITTALS: The price breakdown shall be submitted in triplicate to the COR designated in this contract within 30-calendar days after the date of notice to proceed.

3. FORMAT AND DETAIL: The breakdown of contract costs shall be arranged by bid item with a further, more detailed division into the various kinds of work which make up the bid item. Contract costs shall be furnished for each bid item detailing the various kinds of work covered in the technical paragraphs of the specifications. The cost breakdown shall show the quantities of each type of work, the unit prices for materials, labor, and equipment, as well as the total price. The Contractor shall obtain cost information from its subcontractor(s) as required, to provide the Government with a complete breakdown of the actual bid price.

4. FORMS: Western may furnish forms for the Contractors use in providing the cost breakdown.

SECTION 1.2 – MATERIAL

1.2.1 SECURITY REQUIREMENTS REGARDING MATERIAL AND EQUIPMENT STORAGE:

A 6-foot clear zone shall be maintained inside the perimeter. Outside the perimeter every attempt shall be made to maintain a 6-foot clear zone. This includes but is not limited to stored items such as insulators, conductors, poles, equipment, and vegetation.

1.2.2 GOVERNMENT-FURNISHED MATERIAL:

Government-furnished material shall be in accordance with the following:

1. ESTIMATED DELIVERY DATES: Estimated delivery dates are provided for developing a construction program. These delivery dates are not guaranteed, but Western will make reasonable efforts to secure delivery of the items within the time period shown.

2. ESTIMATED COSTS: Estimated costs are provided so bidders may include applicable Federal, State, and local taxes and duties on Government-furnished material. These costs are not guaranteed, but are Western's best estimates at time of bidding.

3. POINTS OF DELIVERY: Load and haul material from the delivery points to the work.

4. UNLOADING OF MATERIAL: Provide prompt unloading of material. Western will back charge the Contractor for demurrage charges incurred due to failure to unload trucks promptly. Report to the COR, in writing, within 24-hours after unloading, any shortage or damage to material when delivered.

5. DRAWINGS AND DATA: Western will furnish one print of wiring diagrams for Government-furnished control, metering, relaying, and communications equipment when the equipment is delivered.

1.2.3 CONTRACTOR-FURNISHED MATERIAL:

1. GENERAL: Furnish material for completing the work. Material shall be new and of current manufacture. Refer to the contract clause titled "Material and Workmanship" for additional material requirements.

2. DRAWINGS AND DATA: Western will furnish wiring diagrams of Contractor-furnished equipment 90-days after receipt of informational drawings and data as required in Standard 9 – Substation – Electrical, Section 9.1.3.

1.2.4 MATERIAL INSPECTION:

1. GENERAL: Submit purchase orders and advance notification as follows:

   (1) Purchase Orders: Submit purchase orders for the electrical equipment and for the steel structures. Within 10-working-days after purchase orders are awarded, submit one copy of electrical equipment purchase orders to the Electrical Engineer and one copy of steel structure purchase orders to the Civil Engineer. The purchase orders shall describe the material and give the Bidding Schedule item number. To permit scheduling of Government inspection, furnish the following information for each purchase order: the manufacturer, manufacturer location, name of contact and phone number, start date and duration of fabrication, applicable dates of testing, and shipping date.

(2) Advance Notification: To permit scheduling of Government inspection, provide at least 7-work-days' advance notification of when Government inspection of material or witness of test is required. Seven workdays' advance notification shall also be given prior to shipping material.

2. SUBSTITUTION OF MATERIAL: Provide the type and grade of material specified from any source. If the specified material is not available, substitute material, approved in writing, may be used. Adjustment will be made in favor of Western if the substitute material costs less to the Contractor than the material specified.

   If the substitution involves an adjustment in Western's favor, then a contract change will be issued in accordance with the "Changes" clause.

3. INSPECTION OF MATERIAL: Inspect material in accordance with the “Inspection of Construction” clause.

1.2.5 REFERENCE STANDARDS:

1. GENERAL: Reference to ANSI, ASTM, and other reference standards and codes shall be to the most current edition. If material is not specified by ANSI, ASTM, or other standards or codes, material furnished shall be of standard commercial quality. Where types, grades, or other options offered in the referenced specifications are not specified in these standards or project specifications, material furnished will be acceptable if in accordance with any one of the types, grades, or options offered.

2. OBTAINING REFERENCE STANDARDS: Standards, and codes published by associations or other standardizing agencies shall be obtained directly from those agencies.

3. ADDRESSES: Obtain other referenced specifications, standards, and codes from the addresses listed below. Information on specifications, standards, and codes not listed below may be obtained from the Civil or Electrical Engineer.

   AA-Aluminum Association, Inc., 900 19th Street NW., Suite 300, Washington, D.C. 20006-2168

   AAMA-American Architectural Aluminum Manufacturers Association, 1540 East Dundee Road, Suite 310, Palatine, IL 60067

   AASHTO-American Association of State Highway and Transportation Officials, 444 North Capitol Street NW., Suite 249, Washington, D.C. 20001

   ACI-American Concrete Institute, 22400 West 7 Mile Road, Detroit, MI 48219-1849

   AISC-American Institute of Steel Construction, 1 East Wacker Drive, Suite 3100, Chicago, IL 60601-2001

   AISI-American Iron and Steel Institute, 1101 17th Street NW., Suite 1300, Washington, D.C. 20036

   AMCA-Air Movement and Control Association, Inc., 30 West University Drive, Arlington Heights, IL 60004-1893

   ANSI-American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036

APA-American Plywood Association, 7011 South 19th Street, P.O. Box 11700, Tacoma, WA 98411-0700

ASHRAE-American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., 1791 Tullie Circle NE., Atlanta, GA 30329-2305

ASME-American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017

ASTM-American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187

AWI-Architectural Woodwork Institute, P.O. Box 1550, Centerville, VA 22020

AWPA-American Wood-Preservers' Association, P.O. Box 286, Woodstock, MD 21163-0286

AWS-American Welding Society, Inc., 550 NW. Le Jeune Road, P.O. Box 351040, Miami, FL 33125

AWWA-American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235

BIA-Brick Institute of America, 1750 Old Meadow Road, McLean, VA 22102

BuRec-Bureau of Reclamation, Engineering and Research Center, Denver Federal Center, Building 67, Denver, CO 80225

CFR-Consumer Product Safety Commission, Washington, D.C. 20207

CISCA-Ceilings and Interior Systems Contractors Association, 579 West North Avenue, Elmhurst, IL 60126

EIA-Electronic Industries Association, c/o Global Engineering, 15 Inverness Way East, Englewood, CO 80112-5704

EPA-Environmental Protection Agency, Washington, D.C.

FM-Factory Mutual Engineering and Research Corp., 1151 Boston-Providence Turnpike, Norwood, MA 02062

IBC-International Building Council, 500 New Jersey Avenue, NW, Sixth Floor, Washington D.C. 20001

IEEE-Institute of Electrical and Electronic Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331

IES-Illuminating Engineering Society, 345 East 47th Street, New York, NY 10017

IPCEA-Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664

JIC-Joint Industrial Council, 7901 Westpark Drive, McLean, VA 22101

LRFD - Load and Resistance Factor Design, AISC, Manual of Steel Construction, American Institute of Steel Construction, 1 East Wacker Drive, Suite 3100, Chicago, IL 60601-2001.

MBMA-Metal Building Manufacturers Association, Inc., 1300 Sumner Avenue, Cleveland, OH 44115

NAAMM-National Association of Architectural Metal Manufacturers, 600 South Federal Street, Suite 400, Chicago, IL 60605

NACE-National Association of Corrosion Engineers, 1440 South Creek Drive, P.O. Box 218340, Houston, TX 77218-8340

NEC-National Electrical Code, National Fire Protection Association, One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101

NEMA-National Electrical Manufacturers Association, 2101 L Street NW., Suite 300, Washington, D.C. 20037

NESC-National Electrical Safety Code, Institute of Electrical and Electronic Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331

NFPA-National Fire Protection Association, One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269

NFOPA-National Forest Products Association, 1619 Massachusetts Avenue NW, Washington, D.C. 20036

NKCA-National Kitchen Cabinet Association, P.O. Box 6830, Falls Church, VA 22046

NSF-NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140

OSHA-Occupational Safety and Health Administration, 3rd and Constitution Avenues, Washington, D.C. 20210

PCA-Portland Cement Association, Old Orchard Road, Skokie, IL 60076

PCI-Precast/Prestressed Concrete Institute, 175 West Jackson Boulevard, Suite 1859, Chicago, IL 60604

PS-Product Standard, U.S. Department of Commerce, Washington, DC 20203

RIS-Redwood Inspection Service, One Lombard Street, San Francisco, CA 94111

SAE-SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001

SDI-Steel Deck Institute, P. O. Box 9506, Canton, OH 44711-9506

SJI-Steel Joist Institute, 1205 48th Avenue North, Suite A, Myrtle Beach, SC 29577

SMACNA-Sheet Metal and Air-Conditioning Contractors National Association, Inc., 4201 Lafayette Center Drive, Chantilly, VA 22021

SSPC-Steel Structures Painting Council, 4516 Henry, Pittsburgh, PA 15213

TCA-Tile Council of America, Inc., P. O. Box 326, Princeton, NJ 08542-0326

TPI-Truss Plate Institute, Inc., 583 D'Onofrio Drive, Suite 200, Madison, WI 53719

UBC-Uniform Building Code, International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, CA 90601

UL-Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062

UPC-Uniform Plumbing Code-International Association of Plumbing and Mechanical Officials, 5032 Alhambra Avenue, Los Angeles, CA 90032

WWPA-Western Wood Products Association, 522 SW. 5th Avenue, Yeon Building, Portland,OR 97204-2122

SECTION 1.3 – LOCAL CONDITIONS

1.3.1 RIGHTS-OF-WAY:

Western will furnish the right-of-way or site for the work and the right-of-way for access to the work over routes established by Western.

1.3.2 ACCESS TO THE WORK AND HAUL ROUTES:

1. GENERAL: Rights-of-way for access to the work from existing roads will be provided as specified above. Perform work on the rights-of-way necessary for access to the site. Construct and maintain haul roads, access roads, bridges, and drainage structures required for construction operations.

2. INVESTIGATIONS: Investigate the condition and availability of public and private roads and clearances, restrictions, bridge-load limits, bond requirements, and other limitations that may affect transportation and ingress and egress at the job site. Unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time.

3. EXISTING ROADS: Existing roads are available subject to applicable restrictions. Meet conditions imposed upon the use of existing roads by those having jurisdiction, including seasonal environmental and other limitations or restrictions. Pay excess size and weight fees, and post bonds conditioned upon repair of road damage.

4. HAUL ROUTES: Intra job hauling over public highways, roads, and bridges shall be in accordance with applicable local regulations and shall minimize interference with local traffic. Where haul routes cross railroads, public highways or roads, provide barricades, flag persons, and other necessary precautions for safety of the public as required by Section 1.4, "Safety and Health."

1.3.3 USE OF LAND FOR CONSTRUCTION PURPOSES:

1. GOVERNMENT LAND: Government land, controlled by Western, may be used for field offices, storage yards, shops, and other facilities if such use will not interfere with work of other contractors or of the Government in the vicinity, or with reservations made by Western for use of the land. Refer to the contract clause titled "Operations and Storage Areas" for additional requirements. The COR's approval shall be obtained prior to use of Government land.

2. PRIVATE LAND: If private land is used, make necessary arrangements with the owner and pay rentals or other costs.

1.3.4 PROTECTION OF EXISTING INSTALLATIONS:

1. GENERAL: In addition to the contract clause titled "Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements," obtain the location of buried conduit, pipe, cable, ground mat, and other buried items prior to performing excavations in the existing installation. Use proper methods for protecting existing installations during excavating and backfilling operations and when installing equipment and material.

   Fences on right-of-way shall be removed where necessary and replaced to the original condition or better when the work is finished.

2. SUBMITTALS: Prior to starting excavation in an energized substation, submit to the COR for approval a cable location plan and print of locations. The plan shall give proposed methods of locating existing buried cable and include methods of identifying subsurface cable installations

within the work area and methods of surface marking of cable locations and lines of excavation. When locating cable, wires shall not be loosened or removed from the terminals, and signals shall not be induced into the control circuit. The substation shall remain operational and the methods used for cable location shall not interfere with operation of the substation. Excavation will not be allowed until cable location has been marked on the ground and the COR has received a marked print showing the cable location.

3. PROTECTIVE INSTALLATIONS: Protective installations shall permit operation of existing equipment and facilities while construction work is in progress. Remove protective installations after they have served their purpose. Material furnished to provide protection shall remain the Contractor's property.

   Where existing fences are removed to facilitate the work, temporary fence protection for lands adjacent to the right-of-way shall be provided at all times during the continuation of the contract. Such temporary fence protection shall be adequate to prevent public access to restricted areas. Temporary fencing constructed on the right-of-way shall be removed by the Contractor as part of the cleanup operations prior to final acceptance of the completed work.

4. CONTRACTOR'S NONCOMPLIANCE: If the Contractor does not provide the necessary fences and gates to adequately protect property adjacent to the right-of-way within a reasonable time after need for such protection arises, Western will have the work performed and back charge the Contractor.

1.3.5 RAILROADS, HIGHWAYS, AND UTILITY LINES:

1. GENERAL: Make necessary provisions and perform work required to avoid interference with the operation or maintenance of railroads, highways, and overhead utility lines, including transmission, telegraph, and telephone lines, in a manner satisfactory to the owners or operators thereof and to Western. If required, furnish liability insurance, indemnity and other bonds, and required permits.

2. PROTECTIVE MEASURES: Provide and maintain required watchmen, signals, guards, and temporary structures in accordance with Section 1.4.2, "Public Safety."

3. STRINGING OVER ENERGIZED POWER LINES: When stringing transmission line conductors or overhead ground wires over energized electric power lines, notify the owners or operators thereof of the period of time required for stringing, and obtain a written acknowledgment of such notice. Present the acknowledgment to the COR before stringing of the crossing span is started. Stringing operations shall conform to the applicable safety and transmission line stringing provisions of Section 1.4, "Safety and Health."

SECTION 1.4 – SAFETY AND HEALTH

1.4.1 SAFETY AND HEALTH, GENERAL:

1. GENERAL: In addition to the contract clause titled "Accident Prevention," conduct a Safety and Health Program and take necessary precautions to protect the safety and health of employees and members of the public and to prevent damage to public and private property. Do not allow employees, whether directly employed or employed through subcontract or onsite supply contract, to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to their health or safety.

   Western's commitment and policy concerning occupational safety and health is printed on the inside back cover of the project specifications. This statement is incorporated into these standards and shall be incorporated into the Contractor's safety program.

2. CONFLICT IN REQUIREMENTS: If there is a conflict between the requirements of the standards, project specifications, and applicable Federal, State, or local safety, health, or industrial regulations or codes, the more stringent requirements shall prevail.

3. COMPLIANCE WITH CODES AND STANDARDS: Comply with the latest effective Occupational Safety and Health Administration (OSHA) Standards 29 C.F.R. 1910 and 29 C.F.R. 1926 and other applicable Federal, State, and local regulations. In any State where the State OSHA's plan is accepted by the Federal Government, comply with the State OSHA regulations. Keep a copy of applicable OSHA standards at the job site. Certain OSHA standards have been referenced for emphasis. OSHA standards shall apply, whether referenced or not.

4. SUPERINTENDENT QUALIFICATIONS AND RESPONSIBILITIES:

   (1) General:

      1) De-energized Substation Construction: For work in a de-energized substation, the superintendent shall have a minimum of 3-years' experience as a superintendent or foreman in high-voltage substation construction.

      2) Energized Substation Construction: For work in an energized substation, the superintendent shall have a minimum of 3-years experience as a superintendent or foreman in high-voltage substation construction, including 1 year of experience in energized substations.

      3) Transmission Line Construction: The superintendent shall have a minimum of 3-years experience as a superintendent or foreman in high-voltage transmission line construction.

      4) General Construction: The superintendent shall have a minimum of 3-years experience as a superintendent or foreman in the type of construction contained in the project specifications.

      5) OSHA Knowledge: The superintendent shall have demonstrated knowledge of applicable OSHA construction safety standards.

   (2) Superintendent's Resume: The superintendent's resume shall be submitted as part of the Contractor's Safety and Health Program and shall include the following:

      1) Work history relating to above requirements.
      2) Three job-related references.
      3) Current first aid and CPR certificates.

4) Listing of safety and health training.

(3) Responsibilities: The superintendent's primary responsibilities shall be to provide oversight and supervision of onsite work activities. Superintendents shall be in a non-work status during work requiring a Hot Line Order, Clearance, or other critical phases of work as determined by the COR.

5. CONTRACTOR'S SAFETY AND HEALTH PROGRAM: Submit six printed copies or one electronic copy of a proposed Safety and Health Program (Program) to the COR for approval at least 10-days prior to start of construction operations. The Contractor will keep one hard copy of the approved Program on-site at all times. On-site construction operations shall not begin until approval of the Program. Approval of the Program, including amendments and supplements thereto, is for the purpose of determining compliance with the standards and project specifications only and shall not relieve the Contractor of the responsibility for the safety and health of persons and property. The Program shall include, but not be limited to, the following:

(1) Designation of the on-site superintendent to carry out the Program. Include superintendent's resume of qualifications and experience in the type of work to be performed and safety and hazard recognition training.

(2) Statement of company Safety and Health Policy encompassing compliance with applicable Federal, State, and local safety standards and the safety and health requirements of the standards and project specifications.

(3) Provision for first aid, medical care of injured employees, and emergency response telephone numbers as required by OSHA 1926.50, "Medical Services and First Aid." For fieldwork involving two or more employees at a work location, at least two trained persons shall be available. For fixed work locations, the number of trained persons available shall be sufficient to enable emergency treatment to begin within four minutes of an accident.

(4) Provision for training employees in the recognition and avoidance of unsafe conditions using methods such as new employee orientation, weekly "tool box" meetings, and job hazard analysis.

(5) Fire protection procedures and facilities, including requirements in OSHA 1926, Subpart F, "Fire Protection and Prevention."

(6) Health and sanitation facilities, including requirements in OSHA 1926.51, "Sanitation."

(7) Procedures for specific sequences of work to ensure adequate activity hazard analysis of hazards and provision of protective measures (e.g., demolition, excavation, structure erection, stringing operations, grounding, working adjacent to energized electrical equipment, etc.).

(8) Provisions for the use and furnishing of personal protective equipment.

(9) Procedures for protecting the public.

(10) Company policy and procedures for enforcing safety and health regulations.

(11) Copy of the current certificate of compliance with industrial compensation insurance statutes.

(12) Procedures as required by OSHA 1926, Subpart D, "Occupational Health and Environmental Controls".

(13) A comprehensive daily inspection program for inspecting tools, equipment, and facilities. The inspection program shall document observed hazards and the corrective actions taken.

(14) Fall protection policy and program identifying hazards and listing equipment and procedures the Contractor is planning on using for this specific project that meets the requirements of OSHA 1926 and applicable Western standards. A list of Contractor approved employees, to work at height when fall protection is required, shall be provided to the COR.

(15) Lockout/Tagout and Arc Flash Requirements: Submit a lockout/tagout program, specific to equipment and circuits being worked on, which complies with the requirements listed in OSHA 1926.417, "Lockout and Tagging of Circuits"; OSHA 1926.957, "Construction in Energized Substations"; OSHA 1910.269,and NFPA 70E.

(16) Provision for line-clearance tree trimming operations including requirements in OSHA 1910.266. “Logging operations” and 1910.269(r). “Electrical power generation, transmission, and distribution”. Include qualifications and certification of training.

6. JOB HAZARD ANALYSIS:

(1) A Job Hazard Analysis (JHA) is a study of a job or activity to identify hazards or potential accidents associated with each step or task, and develop solutions that will eliminate, modify, or prevent such hazards or accidents. For simple tasks, the JHA may be a thought process for a single employee task; it may be a verbal discussion as part of a tailgate safety meeting; or it may be a verbal discussion between a Supervisor and employee when work is assigned.

(2) For complex, high risk tasks, or as directed by the COR, a written JHA shall be prepared by the Supervisor in consultation with the employees. It also may involve second level or higher supervision, as in the case of a separate written work procedure. In all cases, the analysis shall include those participating in the task, and a signature or initials of all participants shall be required.

(3) The JHA shall consist of the following: date; identification of Employee Group(s); location and directions to the work site; narrative description of work to be accomplished; list of identified hazards and how to minimize or eliminate, including specific personal protective equipment; appropriate apparel; special instructions or limitations; list of all special equipment and tools; and sequence of steps, or, when required, a detailed step-by-step work procedure.

7. JOINT WESTERN AND CONTRACTOR SAFETY MEETINGS:

(1) Commencement of Construction: Prior to beginning onsite construction, a preconstruction safety meeting will be conducted with the Contractor's supervisory personnel and Western for review of the Contractor's Safety and Health Program.

(2) Management Safety Awareness Meeting: After commencement of construction, the Contractor's management, subcontractor's management, and Western's management shall conduct a management safety awareness meeting, including the Contractor's supervisors and work force. This meeting shall be for the purpose of demonstrating to project personnel that the Contractor and Western are totally committed to providing a safe work place.

Additional meetings will be required as necessary to ensure a majority of employees have participated.

(3) Periodic Joint Safety Meetings: Periodic joint safety meetings with the Contractor's supervisory personnel and Western will be conducted throughout the contract.

8. FAILURE TO COMPLY: Failure to implement, monitor, and enforce the Safety and Health Program and the requirements of the standards and project specifications may result in the Contracting Officer's directed removal of the job superintendent or may result in suspension of work as provided by the contract clause entitled "Accident Prevention", or both. Western's failure to order discontinuance of the Contractor's operations shall not relieve the Contractor of responsibility for the safety and health of personnel and property.

9. ACCIDENT RECORDS AND REPORTING: Maintain and furnish accurate records and reports to Western as directed by the COR. Verbal notifications are required immediately, and written reports are required within 48-hours on job-related deaths, occupational diseases, traumatic injuries to employees or the public, and property damage caused by an accident as follows:

   (1) Personal Injury/Illness:

      1) Job-Related Injuries/Illnesses: Job-related injuries/illnesses to Contractor employees shall be reported to the COR. Injuries/illnesses shall be posted to the OSHA 300 Log and OSHA Form 301 and shall be available for review by the COR.

      2) Public Injury: Injuries to the public arising out of this contract shall be reported to the COR.

   (2) Equipment and Motor Vehicle Accidents: Work site equipment and motor vehicle accidents, regardless of extent of injury or cost, shall be reported to the COR.

   (3) Property Damage: Property damage or loss in excess of $1,000 resulting from any accident shall be reported to the COR. Damage to Government or public property, regardless of cost, shall be reported to the COR.

   When requested by the COR, participate in any investigation of accidents or incidents, including near-miss-type incidents.

10. TESTING AND DATA: Prior to onsite use, furnish the COR with copies of certifications, test records, and technical data as follows:

   (1) Load performance tests in accordance with Section 1.4.11, "Lifting Devices."

   (2) Annual inspections for cranes and aerial lifts shall be performed by a qualified, independent party, accredited by the Crane Certification Association of America, or the manufacturer. Crane annual inspection records shall be in accordance with OSHA 1926 Subpart CC, “Cranes and Derricks in Construction”, and annual inspection reports of aerial lift equipment in accordance with ANSI A92. Copies of the reports and any deficiencies corrected for repairs made since the inspection was performed shall be provided to the COR. Copies of the reports and certifications shall also be maintained in the lifting device.

   (3) Brake performance test in accordance with Section 1.4.10 "Equipment."

   (4) Test results of protective ground leads in accordance with Section 1.4.14 "Grounds, Bonds, and Other Protective Devices."

   (5) Material Safety Data Sheets (MSDS) for each paint, oil, epoxy, insulating medium, curing compound, herbicide, and other hazardous material.

   (6) The manufacturer's load rating for each hoist and grip.

(7) Certification of fabricated mobile lifting devices and field-fabricated rigging devices in accordance with Section 1.4.11 "Lifting Devices."

(8) Medical Examiner's certificate in accordance with Section 1.4.3 "Employee Requirements."

(2) Data for excavation protective system in accordance with Section 1.4.5 "Excavation."

1.4.2 PUBLIC SAFETY:

1. ROADS: Roads subject to interference by the work shall be kept open without unreasonable delays or suitable detours shall be provided and maintained. Protection of the public shall be provided as required by OSHA 1926, Subpart G, "Signs, Signals, and Barricades," and by the public agency having law enforcement jurisdiction for the roadway.

2. RAILROADS: Provide, erect, and maintain barricades, flasher lights, flag persons, danger signals, and signs where access roads and haul routes cross railroads.

1.4.3 EMPLOYEE REQUIREMENTS:

1. GENERAL: Employees shall be qualified to perform their assigned duties. Employees shall not work while their ability or alertness is impaired because of fatigue, illness, medications, drugs or alcohol, or any other reason that may expose them or others to injury.

2. TRAINING: Ensure that each employee entering the work site has experience, training, and, where required, the certification, skills, and knowledge necessary to safely perform their assigned tasks. In addition, ensure each employee receives initial work site safety orientation and continued safety and health training addressing the hazards associated with the work and the measures necessary to control or eliminate the hazards.

3. PHYSICAL EXAMINATION: Each employee who operates the following listed equipment shall be given and pass a Department of Transportation (DOT 49 C.F.R. 391.43) physical examination once every 24-months:

   (1) Cranes.
   (2) Aerial lift equipment.
   (3) Other vehicles as required by Federal and State laws and regulations.

   A copy of the Medical Examiner's certificate shall be furnished to the COR prior to the employee operating the listed equipment. The certificate shall state that the physical examination met the requirements of DOT 49 C.F.R. 391.43.

4. OPERATORS: Employees operating motor vehicles and other equipment shall be licensed in accordance with applicable Federal and State laws and regulations.

   Provide the COR with assurance of competency of employees operating cranes, aerial lift equipment, heavy equipment, and other motor vehicles by documentation of their experience, training, and/or licensing. Qualified operators must meet ASME B30.5 (OSHA Ref. 29 C.F.R. 1926 Subpart CC, “Cranes and Derricks in Construction”).

1.4.4 PERSONAL PROTECTIVE EQUIPMENT:

1. GENERAL: Identify the need for personal protective equipment in work activities and require wearing of appropriate personal protective equipment in accordance with OSHA requirements and the following requirements.

2. MINIMUM WEARING APPAREL: Employees shall wear, as a minimum, full-length pants, short sleeve or T-shirt, and above-the-ankle leather work boots.

3. HARD HATS: Employees entering the area where construction work is in progress, with the exception of the parking area and the interior of shops and offices, shall wear hard hats. Provide hard hats for visitors entering hard hat areas. "Hard Hat Area" signs shall be furnished and erected.

4. HIGH-VISIBILITY CLOTHING: Personnel working on the ground on or near public thoroughfares, personnel working in areas open to big game hunting, and flag persons shall wear safety color fluorescent clothing with a reflective area of at least 400-square-inches above the waist.

5. FALL PROTECTION SYSTEMS: All employees working at elevated locations more than 4-feet above a lower level shall use a personal fall protection system, work-positioning equipment, or fall restraint system, as appropriate.

   Fall protection system shall be provided via the use of full-body harness, shock absorbing lanyards, retractable lanyards, shock absorbing "Y" lanyards, or other OSHA acceptable methods.

   (1) Substations, Transmission Lines, and Microwave Towers: Positioning straps and fall protection systems shall be worn and used in accordance with OSHA 1926.954(b) during construction of electric transmission and distribution lines, substations, and microwave towers. Using bushings on substation equipment for anchorage or climbing will not be allowed. Using step bolts and ladder rungs as an anchor point will not be allowed.

   (2) Aerial Devices: Transitioning to a structure will only be allowed if the aerial device has a door, or ladder designed for that purpose.

6. SCAFFOLDING: Scaffolding shall be in accordance with OSHA 1926, Subpart L, “Scaffolding”. Scaffolds shall be used in lieu of ladders for long-term work procedures.

7. LADDERS: Ladders shall be in accordance with OSHA 1926, Subpart X, "Stairways and Ladders”, and the following:

   (1) Suspended Ladders: Provide positive fall protection when climbing, moving, or working on suspended ladders.

   (2) Ladders of Conductive Material: Ladders with side rails constructed of conductive material shall not be used in substations or on transmission lines.

   (3) Ladder Stability: Ladders, except stepladders, shall be held or tied off when being climbed, when being worked from, or when a worker is getting on or off at an elevated position.

   (4) Ladder Rungs: Ladder rungs shall have skid-resistant surfaces and shall be maintained as such.

8. RESPIRATORY PROTECTION: Provide a respirator program that meets the requirements of OSHA 1926.103, "Respiratory Protection,” and OSHA 1910.134, "Respiratory Protection.” Employees exposed to airborne contaminants shall wear respirators. Examples of contaminants include, but are not limited to, asbestos, fumes released by welding and cutting on galvanized steel, and fiberglass insulation.

   A copy of the program required by OSHA 1910.134(b)(1) through 1910.134(b)(11) shall be submitted prior to use of chemicals or processes requiring respiratory protection, such as sandblasting, etc.

9. CHEMICAL PROTECTION EQUIPMENT: When exposed to chemicals or hazardous materials, employees shall wear personal protective equipment such as full face shield, chemical splash goggles, impermeable gloves and boots, disposable coveralls or impermeable clothing, respirators, and any other items recommended by the MSDS or label instructions. If impermeable clothing required for chemical application becomes contaminated on the inside, it shall be disposed of and not returned to service.

10. PROTECTIVE CHAPS: When using chain saws, protective chain saw chaps shall be worn. Chaps shall be constructed of four layers of Kevlar or ballistic nylon.

11. FOOT PROTECTION DURING CHAIN SAW USE: Use boots made with material (such as layered Kevlar) capable of meeting ASTM standard F1818 (Standard Specification for Foot Protection for Chain Saw Users).

1.4.5 EXCAVATION:

1. BURIED UTILITIES: Prior to excavation, examine the area and determine the location of buried utilities as required by OSHA 1926.651, "General Requirements," subparagraph (b). Utilities shall be identified with a marker denoting the type of service.

2. METHOD OF CABLE LOCATION: Prior to starting excavation in an energized substation, submit a plan to the COR, for approval giving proposed methods of locating existing buried cable. The plan shall include methods of identifying subsurface cable locations within the work area, and methods of surface marking of cable locations and lines of excavation. When locating control cable, wires shall not be loosened or removed from the terminals and signals shall not be induced into the control circuit. The substation shall remain operational and methods used for cable location shall not interfere with operation of the substation. Excavation will not be allowed until cable location has been marked on the ground and the COR has received a marked print showing the cable location.

   Hand dig to confirm the location and identities of the cable. Before digging in an existing substation, review as built drawings, cable trenches, any equipment not shown on the drawings, and terminal box inlets to identify any cables that may not be shown on a drawing.

   For work in an energized substation, have a cable locator onsite. Cable and magnetic locator equal to Model MAC-51B, as manufactured by Schonstedt Instrument Company, 1775 Wiehle Avenue, Reston, VA 22090, telephone (703) 471-1050.

3. UNATTENDED EXCAVATION: Protection of unattended excavations shall be as required by OSHA 1926, 501(b)(7)(ii).

4. EQUIPMENT ACCESS: Precautions shall be taken to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from adjacent traffic, the operation of equipment, or any other source. A spotter shall assist operators of trucks and equipment when adjacent to excavations as required by OSHA 1926.601, "Motor Vehicles."

5. EMPLOYEE PROTECTION: Protection of employees entering excavations shall be as required by OSHA 1926.651, "General Requirements," and OSHA 1926.652, "Requirements for Protective Systems." Select the protective system appropriate for the excavation and submit data relevant to selection of the protective system, including soil classification, qualifications for competent person, and any other data listed in OSHA 1926.652, "Requirements for Protective Systems."

1.4.6 EXPLOSIVES AND BLASTING:

1. GENERAL: Transportation, handling, storage, and use of explosives shall comply with OSHA 1926, Subpart U, "Blasting and the Use of Explosives." Blasting will be permitted only after adequate provisions have been made for the protection of persons, the work, and public or private property. Blasting shall be done between sunrise and sunset. Repair blasting damage to the work and public or private property.

2. BLASTING PLANS:

   (1) General: Submit three copies of a blasting plan to the COR for approval. No blasting activity shall begin prior to approval of the blasting plan and submission of individual shot plans.

   (2) Blasting Plan: Plan shall detail the Contractor's proposals for compliance with this section and shall detail the general concepts proposed to achieve the desired excavations using individual shot plans. In addition, the plan shall address proposed methods for controlling fly rock, for blasting warnings, and for use of electrical blasting systems. Provide data to support the adequacy of the proposed efforts regarding the safety of structures and slopes and to assure that an adequate foundation is obtained.

   (3) Shot Plans: Shot plans shall detail, including sketches, the drilling and blasting procedures; the number, location, diameter, and inclination of drill holes; the amount, type, and distribution of explosive per hole and delay; and pounds of explosive per square foot for pre-splitting and smooth blasting.

3. EXPLOSIVES: Explosive logs shall be available for review by the COR.

4. DRILLING DUST CONTROL: When drilling control the dust within safe hygienic limits as required by OSHA 1926.55, "Gases, Vapors, Fumes, Dusts, and Mists."

5. VIBRATION AND DAMAGE CONTROL: Blasting in the vicinity of buildings, structures, and other facilities susceptible to vibration or air blast damage shall be carefully planned and controlled to eliminate possibility of damage to such facilities and structures. Include in blasting plan provisions for control to eliminate vibration and air blast damage.

6. BLASTER CERTIFICATION: Blasters shall be qualified as required by OSHA 1926.901, "Blaster's Qualifications". In States having jurisdiction for enforcement and requirements for formal certification or licensing blasters and explosives purchasers, comply fully with those requirements. The blasting plan shall contain documentation of the blaster's certifications, qualifications, and experience.

1.4.7 MATERIAL HANDLING AND STORAGE:

1. GENERAL: Material handling and storage shall be as required by OSHA 1926, Subpart H, "Materials Handling, Storage, Use, and Disposal," and OSHA 1926, Subpart V, "Power Transmission and Distribution." Stack heavy material on adequate lagging to prevent shifting. Cylindrical-shaped material such as poles and pipe shall be handled with extra caution to prevent unplanned movement.

2. CRITICAL LIFTS: The contractor shall prepare a written plan for critical lifts. All personnel involved with the lift shall review and sign the Critical Lift Plan.

A critical lift is defined as a lift requiring detailed planning and additional safety precautions, including:

(1) Lifts being made under a hotline order next to energized conductors.

(2) Lifts made when the load is 75 percent or more than the rated capacity of the crane or hoisting device.

(3) When crane supported personal platforms are being used.

(4) Any lift the operator or COR believes critical.

The plan shall include, but is not be limited to:

1) Exact size and weight of the load, including the crane and rigging components.
2) Exact information about the sequence of the lift.
3) Rigging plans with lift points and hardware requirements.

1.4.8 STRUCTURE ERECTION:

1. GENERAL: Procedures for erecting structures shall be made a part of the Safety and Health Program. The structure erection plan shall include, but not be limited to, the following subjects: assembly, lifting, shoring, size and type of hoisting equipment, operator qualifications, crane signal/communication, connecting rigging, guying, moving equipment, and protection for adjacent energized power facilities.

   Structure and building assembly and erection shall be conducted with a minimum exposure to employees from overhead loads and work activities. No one shall be permitted under the load while it is being hoisted into position, except as required to secure the load being set. No one shall be allowed to ride the hook, line, or load.

2. COMMUNICATION: A two-way radio device shall be used to relay information between the spotter and the crane operator when vision is obstructed.

3. TEMPORARY STRUCTURE SUPPORT: Structures shall have adequate temporary guy cables or other structural support during erection procedures. Temporary structure support shall be approved by a registered Professional Engineer. Temporary guys or structural supports shall remain in place until the permanent guys or structural supports are in place.

4. TOOLS: Tools and material shall not be thrown or dropped from structures. Handlines and tool bags shall be used.

1.4.9 ELECTRICAL MINIMUM APPROACH DISTANCE:

Equipment, conductive objects, and personnel shall not be brought closer to energized high-voltage facilities (600 V or greater) than the distances listed in the applicable parts of OSHA 1910 and 1926 as listed below. Adequate means of preventing violations of the electrical minimum approach distances shall be used, such as spotters and equipment stops.

Cranes and Derricks shall comply with 1926 Subpart CC, “Cranes and Derricks in Construction”. A notice of the electrical minimum approach distance limitations required by the Standards shall be permanently posted in the operator’s cab of such equipment.

Other equipment, conductive objects, or personnel, shall not be brought closer to energized facilities than the electrical minimum approach distances established by OSHA 1910.269(k), “Materials, Handling, and

Storage". The less stringent equipment clearance distances established by OSHA 1926.950, "General Requirements", Table V-1, may only be used when approved in writing by the COR.

1.4.10 EQUIPMENT:

1. GENERAL: Equipment shall be designed, manufactured, maintained, and operated as required by OSHA 1926 and OSHA 1910 and the requirements contained in this section. Equipment shall be used only for the manufacturer's intended purpose.

   (1) Riding on Equipment: Riding on equipment is prohibited unless a safe place to ride is provided. A safe place to ride is defined as a permanently affixed seat with passenger restraint device. Getting on or off equipment while in motion is prohibited.

   (2) Brakes: When directed by the COR and when otherwise required, carry out a braking performance test on onsite equipment. Test shall be conducted in the presence of the COR and recorded on the form prescribed by the COR.

2. ROLLOVER PROTECTIVE STRUCTURES AND SEAT BELTS: Equipment defined by OSHA 1926.1000, "Rollover Protective Structures (ROPS) for Material Handling Equipment," shall be equipped with rollover protective structures (ROPS) meeting the performance requirements of OSHA 1926.1001, "Minimum Performance Criteria for Rollover Protective Structures for Designated Scrapers, Loaders, Dozers, Graders, and Crawler Tractors". Equipment defined by OSHA 1926.602, "Material Handling Equipment," shall be equipped with seat belts in accordance with the requirements of that section. Agricultural, industrial tractors, and off-road utility vehicles shall be equipped with the ROPS and seat belts, regardless of date of manufacture. Seat belts shall be worn when operating equipment that is required to be equipped with seat belts.

1.4.11 LIFTING DEVICES:

1. GENERAL: Lifting devices shall be designed and manufactured or fabricated for their intended use and shall conform to applicable ANSI standards; OSHA 1910, Subpart N, "Materials Handling and Storage"; OSHA 1926, Subpart N, "Cranes, Derricks, Hoists, Elevators, and Conveyors"; and the requirements of this section.

2. MOBILE CRANES: Crawler, truck, and wheel-mounted cranes shall conform to applicable requirements for design, inspection, construction, testing, maintenance, and operation as prescribed in ANSI B30. The exception in the last sentence of B30.15-0.1 shall not apply. Submit annual inspection records to the COR in accordance with ANSI B30.

3. AERIAL WORK DEVICES: Aerial work devices used to raise, shift, and lower personnel shall conform to applicable requirements for design, inspection, construction, testing, maintenance, and operation as prescribed by ANSI A92, regardless of date of manufacture. Submit annual inspection records to the COR in accordance with the applicable ANSI standard.

4. FORKLIFTS AS ELEVATED PLATFORMS: Forklifts used as elevated platforms will be subject to approval of the COR for each application. Forklifts and platforms will conform to B56.1.

5. WORK PLATFORMS: Work platforms suspended from crane load lines will be subject to the approval of the COR for each application. The design, use, and testing of the work platforms shall be in accordance with OSHA 1926 Subpart CC, "Cranes and Derricks in Construction".

6. FABRICATED MOBILE LIFTING DEVICES: Fabricated mobile lifting devices such as truck-mounted A-frames, gin poles, and similar equipment shall be designed, constructed, and certified based on the determinations of a registered Professional Engineer competent in this field. A written contract specific certification shall be provided to the COR. Design capacity shall be

posted at the operator's station.

7. LOAD PERFORMANCE TEST: Prior to initial use and following modification, alteration, or repair of any component, load test mobile cranes and fabricated mobile lifting devices at the job site and in the presence of the COR. Provide test results on forms supplied by Western. Load test shall involve lifting, swinging, and brake holding a load of 100 percent of the load chart rating for a specific configuration and load radius. Configuration, load radius, and test weight shall be chosen to prove the machine's capability and load chart accuracy for its anticipated use. Configuration shall provide a boom angle of at least 30 degrees above the horizontal.

8. REPAIRS: Repairs shall be in strict compliance with manufacturer's instructions. The manufacturer or a registered Professional Engineer shall certify repairs to structural load carrying parts competent in structural analysis. Submit certification to the COR.

9. RIGGING:

   (1) General: The handling, use, and inspection of rigging shall be in accordance with OSHA 1926.251, "Rigging Equipment for Material Handling."

   (2) Rigging Selection and Analysis: Analyze the requirements and select the rigging equipment appropriate for the load based upon thorough analysis of load data, rated capacities, and manufacturer's recommendations. A copy of the analysis and selection of equipment shall be submitted to the COR.

   (3) Field-Fabricated Devices: The design of field-fabricated rigging equipment and devices shall be certified by a registered Professional Engineer.

10. UNKNOWN LOADS: When lifting an unknown load or a load that cannot be calculated, a load indicating device shall be used.

1.4.12 CONDUCTOR OR OVERHEAD GROUND WIRE SUSPENDED WORK CARTS:

The use of work carts suspended from conductors or overhead ground wires will be subject to the approval of the COR for each application. A detailed work procedure shall be submitted for approval by the COR that, as a minimum, addresses the following:

1. DESIGN: Work cart design or modifications shall be certified by a registered Professional Engineer or the manufacturer. Cart capacity will be clearly displayed on the cart exterior. Cart design shall be such that no single component failure will separate cart from conductor or overhead ground wires.

2. HOISTING AND INSTALLING: Method of hoisting and installing the cart on the conductor and procedure for powering the cart along the conductor.

3. EXISTING FACILITIES: Prior to working on existing facilities, evaluate the condition of existing structures, conductors, suspension hardware, and overhead ground wires. Fall protection procedures will be used.

   The use of work carts will be approved only when less hazardous methods of performing the work are not feasible.

1.4.13 AVIATION:

1. GENERAL: Helicopter , fixed wing, and/or unmanned aerial vehicle (UAV) operations shall conform to applicable FAA standards contained in 14 C.F.R. 91, 133, and 135 and

OSHA 1926.551, "Helicopters." The Contractor shall select an aviation provider from the "Accepted Operator List" located on the Department of Energy (DOE) Office of Aviation Management (OAM) web site (https://powerpedia.energy.gov/wiki/CAS_Accepted_Operators_List) . The aviation contractor shall maintain "accepted" status throughout the performance period of the contract and immediately notify the COR of any aviation-related violations and/or accidents or incidents that may be in conflict with its current DOE-accepted aviation status.

2. PROGRAM REQUIREMENTS: Program submittals shall include copies of the following:

(1) Affidavit signed by the chief pilot of the aviation operator certifying credentials of pilot for the work to be performed addressing the following:

1) Evidence (e.g., pilot's log, resume, etc.) of experience in class load, make, and model of aircraft, including affidavit certifying currency of training in aircraft make and model. Training must have included emergency procedures, weight and balance computations, performance charts, and training in the approved flight manual.

2) If the pilot is not experienced in class load, make, and model, provide onsite training and supervision by the chief pilot until the pilot has demonstrated that they can perform the work safely. Minimum training period shall be at least ten (10) flying hours.

(2) Affidavit signed by the aviation operator certifying compliance with 14 C.F.R. 91, Subpart E, and possession of current:

1) Airworthiness Certificate.
2) Aircraft Registration.
3) Current Weight and Balance.
4) Operator's Manual.

(3) JHA's shall be submitted for procedures addressing the following concerns:

1) Emergency procedures.

2) Communications between pilot and ground.

3) Hazards involved in rigging components between the helicopter and any external loads (e.g., "weak link") in Class C loads, etc.

4) Hazards involving aircraft flight attitudes.

5) Hazards for load combinations that require hot-line crossings.

6) Static electricity discharge.

7) Refuling procedures and control of fuel planning.

8) An evaluation of the selection of the wire stringing direction that has considered direction of prevailing winds, relationship to adjacent lines, terrain, or other hazard factors.

(4) In addition, a JHA shall be performed and procedures established and submitted for those tasks identified as high risk or of a recurring nature (e.g., installing spacers, travelers, marker balls, conductor repair, etc., from the helicopter skid); Class B loads (e.g., hanging ladders, travelers, steel tower erection, concrete placement, etc.); and/or Class C loads (e.g., sockline and overhead ground wire stringing, center phase pass through, "needle" stringing for center

phase, tower catch off of sockline or overhead ground wire, etc.). These are examples of tasks requiring development and submittal of a job hazard analysis.

(5) External Load Operations:

1) A spotter shall be utilized during stringing operations to observe and warn the pilot of impending hazards during tower threading operations.

1.4.14 GROUNDS, BONDS, AND OTHER PROTECTIVE DEVICES:

1. GENERAL: Electrical circuits, equipment, and conductors; construction equipment; and other conductive apparatus used in proximity of energized facilities shall be considered an electrical hazard to personnel and shall be considered energized until grounded in an approved manner. No work shall be performed on energized equipment and circuits.

2. DEFINITIONS: The following definitions of terms apply to the protection of personnel from electrical shock:

(1) Approved Ground: Approved grounds shall be as follows:

1) A station ground mat.

2) An installed structure or electrical equipment ground.

3) 5/8-inch-diameter copperweld or galvanized rod driven or screwed to a depth of at least 5-feet. If a rod cannot be installed to a depth of 5-feet, install additional rods such that a total of at least 5 feet of rod is buried. Bond these rods together with grounding cables of adequate size based on maximum fault current.

4) In parallel conditions, or when energized lines are being crossed, ground rods shall be driven until the total resistance, between the grounding system and remote earth, falls below 50 ohms. If the grounding system does not result in less than 50 ohms, ground rods shall be driven until the reduction in worksite resistance is less than 10 ohms. Ground impedance shall be measured in accordance with IEEE Standard 81.

(2) Hot-Stick: A hot-stick is a nonconductive tool designed, certified, and approved by the manufacturer for the installation of protective ground leads in accordance with OSHA 1926.951, "Tools and Protective Equipment". Wood hot-sticks shall not be used.

(3) Protective Ground Leads: Protective ground leads (protective ground cable assemblies) are those utilized for grounding electrical apparatus and construction equipment. Protective ground leads shall be a minimum No. 1/0 AWG extra-flexible copper or equivalent. Some areas of work may require protective ground leads with greater current-carrying capacity than No. 1/0 AWG due to available fault current.

(4) Protective Ground Lead Connector: A protective ground lead connector is one designed for installation with an insulated hot-stick. A hot-stick may be an integral part of the connector, or the connector may be designed for use with a universal or utility-type hot-stick. Connectors shall be the self-cleaning clamp type and shall have a current-carrying capacity equal to the capacity of the protective ground lead.

(5) Grounding: Grounding is electrically connecting a conductive object to an approved ground with a protective ground lead.

(6) Bonding: Bonding is electrically connecting a conductive object to other conductive objects with a protective ground lead.

(7) Drag-Chain Ground Lead: A drag-chain ground lead is a steel, or steel alloy chain securely bolted to the chassis of rubber tired mobile construction equipment. Chain shall have links at least 1-inch in length, and the overall chain length shall be sufficient to provide 1-foot of ground contact when the equipment is not moving. A drag chain is allowable only when no other ground lead is feasible and equipment grounding is required.

(8) Three-Phase Grounded Short: Three-phase grounded short means bonding three (3) phases of an electrical circuit and connecting to a common approved ground.

(9) Barricades: A barricade is a highly visible physical obstruction intended to warn and limit access to a hazardous area. Construct barricades of high-visibility, weather-resistant material such as yellow 1 1/2-inch plastic tape or yellow synthetic fiber rope. Support barricades to avoid displacement and to maintain a height of approximately 42-inches above walking surface. Locate barricades in such a manner that persons obeying the barricade are restricted from contacting conductive objects within the barricade.

(10) Barriers: A barrier is a physical obstruction which is intended to prevent contact with energized lines or equipment and to physically prevent access to other hazardous areas. Barriers are intended to physically prevent children and livestock from entering an area and make the existence of a hazard apparent to other persons. Fence-type barriers shall be at least 48-inches high and supported to prevent displacement.

Supports shall be constructed and located so as to not enhance climbing. If constructed of conductive material, the barrier shall be connected to an approved ground with a protective ground lead. Signs shall be placed on the barrier and shall be 10-inches x 14-inches in size, visible from any direction, and read "Danger High Voltage."

(11) Grounded Travelers: Grounded travelers are stringing sheaves or blocks used to make electrical ground connection to conductors and conductive pulling lines. They shall be designed and constructed for this purpose. Western requires the use of grounded travelers that incorporate a separate spring-tensioned sheave to provide the contact surface. Grounded travelers shall not be used or considered as a personal protective ground.

(12) Isolation Platform: An isolation platform is a working or walking surface used to prevent personnel from contacting two conductive objects or a conductive object and the ground simultaneously. Isolation platforms shall be constructed of plastic or fiberglass, shall be at least 5-inches in height, have 9-square-feet of working surface, and shall be able to support dynamic loads up to 4,000 pounds. Wood platforms will not be allowed. Isolation platforms shall be maintained free of dirt, dust, and contamination. When used on wet or soft ground, additional supports shall be provided to ensure the entire platform stays above the ground surface.

(13) Electrical Insulating Boots: Electrical insulating boots shall not be used as a primary means of electrical protection unless other methods of performing the work are not feasible and they have been approved by the COR. If used as secondary protection, boots shall be dielectric rubber boots with an electrical insulation value equal to or greater than 18-kV as tested in accordance with ANSI Z41.4. A program shall be developed and implemented requiring daily inspection of the boots, the testing of the insulating property of the boots on a regular basis, boot replacement criteria, and the instruction of workers on the care and use of the boots.

(14) Grounded Work Mat: A grounded work mat is a working or walking surface used to eliminate step potentials in a work area. The mat may be constructed of woven wire fencing or concrete reinforcing mesh and shall be grounded to an approved ground within 10-feet of the mat. Access to the mat shall be accomplished with an isolation platform and barriers or barricades as required shall be installed.

3. TESTING AND CERTIFICATION:

(1) Protective Ground Leads: Each protective ground lead shall have a permanent identification tag with unique identification number, certified wire size, and test date. Each protective ground lead shall be tested complete with connectors, in accordance with ASTM F 2249. Protective ground leads shall be retested and recertified annually. A protective ground lead without an identification tag to relate it to the annual certification of that protective ground lead shall not be used. No protective ground lead shall be longer than 36 feet, unless approved by COR. Test results shall be submitted to the COR for approval prior to use of the grounds. When using the DC test method, the Contractor shall submit testing information in the format shown below in the Personal Protective Grounds Test Report. When using the AC test method, the Contractor shall submit testing information in accordance with the test set manufacturers recommendations.

Personal Protective Grounds Test Report

Project Title _____

Contract No. _____

Test Equipment _____

CABLE ID	CABLE SIZE	CABLE CONDITION	CABLE LENGTH		MEASURED RESISTANCE (mΩ)	ASTM 2249 RESISTANCE (mΩ)	PASS/FAIL
			FT	IN			

Tester's Signature _____

Test Temperature _____

Test Date _____

(2) Grounded Travelers: Grounded travelers with a separate spring-tensioned sheave shall be designed, installed, and tested to provide 1 ohm or less resistance between the moving conductor and the protective ground lead connection. Tests shall be performed at the work site in the presence of a Western representative before initial use of grounded travelers. Periodic retesting shall be performed as requested by the COR.

4. INSTALLATION AND REMOVAL OF PROTECTIVE GROUND LEADS: Installation and removal of protective ground leads shall be in accordance with OSHA 1926.962, "Grounding for Protection of Employees." While applying or removing the hot end of the personal protective grounds, workers shall not be in contact with the ground cable.

When two (2) or more sets of grounds are specified to be used, all cables shall be the same size and approximate length. These grounds shall be placed as close together as possible to minimize coupling and be bound or twisted together to maximize the current carrying capacity of the cable

set. Protective ground leads shall be constructed with commercial connectors installed in accordance with manufacturer's instructions.

1.4.15 CLEARANCES, HOT LINE ORDERS, AND SPECIAL WORK PERMITS:

1. GENERAL: Secure information concerning which facilities are energized at or near each work site. Take precautions for the safety of personnel, and keep employees fully informed of the work situation and safe work limits. Information concerning Western facilities or other facilities under the operational control of Western shall be obtained from the COR.

2. DEFINITIONS:

   (1) Clearance: Clearance is a procedure whereby energized electrical facilities are de-energized; and switches, disconnects, and circuit breakers are tagged or locked to prevent re-energization.

   (2) Hot Line Order: Hot Line Order is a procedure whereby adjacent electrical facilities may remain energized during Contractor operations, but provides that if any circuit breaker connected to the facility opens under fault conditions, it will not be reclosed until employees and equipment working in the area are determined to be in the clear.

   (3) Special Work Permit: Written permit issued by Western's Representative, indicating the limits of the work areas, restrictions, and conditions pertinent to the work. It is issued to the Contractor's authorized representative for Contractor activities on or near facilities under the operational control of Western. The Contractor's authorized representative shall be the superintendent or other supervisors designated by the superintendent in writing.

3. PROCEDURES TO OBTAIN CLEARANCES AND HOT LINE ORDERS:

   (1) Clearance and Hot Line Order requests shall be made in writing to the COR at least ten (10) working-days prior to the anticipated work. Special Work Permit requests shall be made in writing at least ten (10) working days prior to the anticipated work. Request shall include the plan of operation indicating the Contractor's authorized representative under whose direction the work will be performed, the work to be done, sequence of operations, time to start work, duration of work, number of employees and their classifications, safety precautions to be taken, type and location of barricades, warning signs, protective grounds, and description of equipment to be used in performing the work.

   (2) Following approval of the Contractor's plan of operation, and after obtaining a Clearance or Hot Line Order, Western's inspector will issue a Special Work Permit to the Contractor's authorized representative.

4. SPECIAL WORK PERMIT PROCEDURES:

   (1) Special Work Permit will indicate the limits of the work area, restrictions and conditions pertinent to the work including Clearance or Hot Line Order, or both issued by Western. Both the Contractor's authorized representative and Western's Representative shall sign the Special Work Permit and each retains a copy. The Contractor's authorized representative shall remain onsite when work is being performed under a Clearance or Hot Line Order.

   (2) Review the Special Work Permit and limits of the work area with employees before proceeding with the work, and as frequently thereafter as necessary to ensure that employees are knowledgeable of the work program and the required safety precautions.

(3) After receipt of a Special Work Permit for a Clearance and prior to commencement of any work, install 3-phase grounded shorts in the following sequence.

1) Using a hot-stick of sufficient length to maintain the electrical minimum approach distance contained in Table V-1 of OSHA 1926, Subpart V, "Power Transmission and Distribution," test the circuit to ascertain it is de-energized. The voltage detector shall be able to measure and display primary and induced voltages, and shall be equal to model number VDAH300 manufactured by The White Rubber Corporation, 835 Cleveland Road, P.O. Box 230, Ravenna OH 44266.

2) Install the protective ground leads by first attaching the leads to the approved ground.

3) Attach the protective ground leads to the de-energized circuit with a hot-stick maintaining electrical minimum approach distances contained in Table V-1 until ground leads are attached. This electrical minimum approach distance requirement shall be maintained between parts of the workman's body and the protective ground lead being attached.

4) Document location of protective ground leads on the Special Work Permit.

Additional grounding may be required depending on type and location of work being performed.

5. PROCEDURES FOR RELEASE OF A SPECIAL WORK PERMIT: After the work has been completed, advise Western's inspector and the following will occur:

(1) Western's inspector will check to determine that the equipment installed or modified is satisfactory for normal service or energization, or is in safe condition for the action to be released.

(2) Remove protective ground leads, bonds, and other protective devices in the reverse procedure specified in Section 4.(3) above.

(3) The Contractor's authorized representative holding the Special Work Permit shall sign both copies of the release of the Special Work Permit certifying that personnel and equipment are in the clear, and will remain in the clear, and that protective ground leads, bonds, and protective devices have been removed.

6. TRANSFER OF RESPONSIBILITY FOR SPECIAL WORK PERMIT: If necessary to transfer responsibility for work under a Special Work Permit from one Contractor's authorized representative to another, the following shall occur:

(1) A new Special Work Permit will be issued to the Contractor's new authorized representative by Western's Representative with an explanation of the limits of the work defined thereon.

(2) Western's Represntative and the Contractor's new authorized representative will review the location and integrity of protective ground leads, bonds, and other protective devices.

(3) The old Special Work Permit will then be released.

1.4.16 SUBSTATION SAFETY:

1. GENERAL: In addition to the requirements contained in OSHA 1926, Subpart V, "Power Transmission and Distribution," and other applicable OSHA requirements, the requirements contained in this section apply.

2. SUPERVISION AND AUTHORIZATION: Work shall be performed under the immediate supervision of the Contractor's superintendent. No work shall be performed in or near an energized facility that is under the operational control of Western until authorization to proceed and a Special Work Permit is obtained from Western's inspector, when appropriate.

   Provide documentation of obtaining protection and permission before performing any work on or near any electrical facility under the operational control of a non-Western agency or utility.

3. RESTRICTED AREAS: Areas of the substation other than de-energized areas and access ways specifically designated by Western's Representative shall be considered restricted areas and shall be barricaded. The Contractor's employees shall not enter a restricted area.

4. ELECTRICAL EQUIPMENT CONTAINING SF_6:

   (1) General: The SF_6 insulating gas in electrical equipment poses a potential health problem to exposed employees. In its pure state, SF_6 gas is about five times heavier than air and is a simple asphyxiate. Electrical arcing can cause SF_6 gas to separate into chemical components. When the arc is removed, the chemical components will recombine to form SF_6 gas but may leave extremely hazardous by-products. It is imperative to avoid skin contact with, inhalation of, and ingestion of these by-products. The solid portions of these by-products are usually in the form of a white or gray powder which may be found on the interior of gas confinement areas of the equipment.

   (2) Instructions and Standards: Prior to opening the SF_6 gas containment areas of the equipment, employees shall be informed of the pertinent sections of the MSDS for SF_6 gas and the manufacturer's instructions for equipment disassembly. Manufacturer's instructions on opening up the electrical equipment containing SF_6 gas shall be followed to prevent accidents from sudden release of high-pressure gas. Comply with OSHA 1926.21, "Safety, Training, and Education," subparagraph (b)(6), for confined space entry where employees must enter the electrical equipment.

   (3) Protective Equipment: Because of the danger to employees of SF_6 by-products, do not open any piece of electrical equipment containing SF_6 gas which has been exposed to electrical arcing unless the employees involved are protected with the equipment listed below. The protective equipment as specified in the MSDS and as listed below shall be worn until a thorough examination reveals that no SF_6 by-products are present.

      1) Either self-contained breathing apparatus or airline respirators supplying breathing quality air.

      2) Chemical safety goggles if eyes are not protected by the above mask.

      3) Impermeable gloves.

      4) Disposable coveralls.

   (4) Portable Eye Wash/Shower: A portable eye wash capable of 15 minutes of flushing at .4 gpm shall be located within 20 feet for emergency decontamination of employees.

   (5) Disposal of SF_6 By-Products: Disposal of SF_6 by-products shall be in accordance with Federal, State, and local regulations. Certificates of disposal shall be provided to the COR.

5. ADDITIONAL REQUIREMENTS:

   (1) Control Panels: Work on energized control panels shall be in accordance with OSHA 1926.957, "Construction in Energized Substations", and shall include the use of accident prevention tags.

   (2) Substation Fences: Obtain the COR's approval prior to removing substation fencing. Temporary protection for removed fences and controlled access to the substation shall be in accordance with OSHA 1926.957, "Construction in Energized Substations."

1.4.17 TRANSMISSION LINE SAFETY:

1. GENERAL: In addition to the requirements contained in OSHA 1926, Subpart V, "Power Transmission and Distribution," and other applicable OSHA requirements, the requirements contained in this section apply.

2. SUPERVISION AND AUTHORIZATION: Work shall be performed under the general supervision of the Contractor's superintendent. No work shall be performed in or near an energized facility that is under the operational control of Western until authorization to proceed and a Special Work Permit is obtained from Western's Representative, when appropriate.

   Provide documentation of obtaining protection and permission before performing any work on or near any electrical facility under the operational control of a non-Western agency or utility.

3. STRINGING PLAN: Procedures for stringing, including sagging and clipping operations, shall be made a part of the Safety and Health Program. The plan shall consist of a description of the stringing method proposed and include: the type of stringing equipment to be used; grounding and bonding devices and procedures; barrier and barricade design as applicable; isolation platform design and use; utility, highway, railway, and waterway crossing methods including guard structure design; clearances required; and locations and procedures for stringing adjacent to energized lines.

4. CONDUCTOR AND OVERHEAD GROUND WIRE STRINGING: Overhead ground wire and conductive pulling lines shall be considered the same as conductor in terms of required safety precautions during installation or removal. Stringing operations shall be in accordance with OSHA 1926.955, "Overhead Lines," and the following additional requirements:

   (1) Equipment and Pulling Operations:

      1) Pulling machines (tuggers), braking machines (tensioners), and reel jacks shall be in accordance with OSHA 1926.955, "Overhead Lines," subparagraph (c)(12), and the following additional requirements. Stringing equipment and catch off points shall be firmly anchored against displacement. Reels shall be firmly attached to the reel jacks, and the reel jacks shall be anchored to prevent displacement or overturning in the event of a fouled reel or brake lockup.

      2) The practice of rigging to an existing structure, not specifically designed for the load magnitude and direction of force, shall not be allowed without first completing a technical analysis by a Structural Engineer.

      3) Operators of pulling and braking machines shall be totally protected from contact with bullwheels, cable drums, and tension line snap back.

4) A designated person, in direct voice communication with the pulling machine operator, shall watch the attachment between the pulling line and the conductor as it travels through each stringing block.

5) If a conductor should catch under any firm object, the pulling shall stop and the tension shall be slacked off prior to attempting to free the conductor.

6) No person shall be allowed on any structure through which a conductor is being pulled (in continuous motion).

7) A barricade shall be used to enclose the area between the tensioner and reel setup. Entering the area will be permitted only with the knowledge of the tension and pulling machine operators and when pulling is stopped and undesired tension released.

(2) Grounding and Bonding:

1) General: Comply with OSHA 1926.954, "Grounding for Protection of Employees," and 1926.955, "Overhead Lines." The following additional requirements apply to stringing work:

2) Pulling equipment, reels, and tensioning equipment shall be grounded to an approved ground. Equipment that can be touched simultaneously at a work site shall be bonded together and grounded to a single approved ground.

3) A moving-type ground (traveling ground) shall be installed and attached to an approved ground at the tensioning setup or bonded to the tensioner.

4) A 3-phase grounded short shall be maintained on the last suspension structure on each end of each isolated line section and shall remain in place until aerial work is complete. These shall be progressively removed as part of the final aerial cleanup.

5) When splicing, making up jumpers, and working around unspliced conductors on sequential pulls, employees shall not contact two conductors simultaneously until both conductors are bonded together.

6) Dead end structure jumpers shall be left off (open) to isolate line sections, and grounds shall not be left in place on these structures. Jumpers may be installed when aerial cleanup is completed on adjacent line sections.

7) Clipping work shall be performed between 3-phase grounded shorts.

8) Insulated aerial lifts shall not be utilized as primary employee protection from sources of electrical hazard. When grounding is required, insulated aerial lifts shall be bonded and grounded the same as non-insulated aerial lifts.

9) Grounding and Bonding for Stringing Over Energized Line Crossings: Comply with subsection (a) above and the following:

a. Conductive pulling lines and conductors shall be grounded at each structure adjacent to energized line crossings. This shall be accomplished with grounded travelers during stringing operations. Prior to removal of grounded travelers for conductor clipping, protective grounds leads shall be installed. These protective ground leads shall remain until clipping is completed for that line section.

b. Conductor clipping shall be completed on structures adjacent to energized crossings, prior to clipping the remaining structures in that line section.

c. Employees shall not contact two (2) conductors simultaneously until both conductors are grounded to a common point, unless protective ground leads are installed and conductor clipping is completed on structures adjacent to energized line crossings.

d. Aerial lifts shall be grounded and bonded to the structure or conductor, as appropriate, until conductor clipping is completed on structures adjacent to energized crossings.

10) Grounding and Bonding for Stringing Adjacent to Energized Lines: Comply with Sections (a) and (b) above and the following:

e. Protective ground leads shall be placed at each structure during aerial work on conductors at that structure.

f. Aerial lifts shall be grounded and bonded to the structure or conductor as appropriate for aerial work.

g. When splicing, making up jumpers, and working around unspliced conductors on sequential pulls, employees shall not contact two conductors simultaneously until both conductors are bonded together and grounded to a common point.

(3) Crossing Energized Lines, Highways, Railroads, and Telephone Lines: The owner, utility, or authority having jurisdiction shall be notified in advance of making such crossings and necessary permits obtained. The following safety precautions and procedures shall be followed:

1) Prior to stringing over or under an existing power line, inform the owner or utility company and request the existing line be de-energized. Secure Hot Line Orders and/or Clearances from the respective utilities on non-Western lines. Western shall be kept fully informed, in writing, of such Hot Line Orders and Clearances or denials of such requests prior to the work being performed.

2) Protective guard structures shall be designed and installed at crossings to ensure that adequate clearance is continually maintained between the pulling lines or conductors and the facility being crossed. Clearances of guard structures, pulling lines, and conductors from energized lines shall be at least 5-feet but never less than the distance in Table V-1 of OSHA 1926, Subpart V, "Power Transmission and Distribution," for the voltage being crossed.

The protective guard structures shall be installed with the following minimum distances.

TYPE OF ROAD	*MINIMUM DISTANCE FROM EDGE OF ROAD
Gravel road	9-feet
Paved two lane road (county and State)	15-feet
Multilane road	30-feet
Railroad	As required by railroad agency

*If the agency in charge of the road to be crossed determines that greater minimum distances are needed, their minimum distance controls shall be used.

The protective guard structures shall not be removed until the adjacent transmission line structures are clipped in.

3) Ropes utilized as lead lines at energized crossings shall be nonconductive and shall be kept clean and dry to protect their dielectric strength.

4) Crossings shall be attended when wire is being pulled. Each attendant shall be provided a means of direct communication with the pulling and tensioning machine operator.

5) Equipment at the pulling and tensioning sites, catch off points, conductor tails, and splice areas shall be enclosed by a barricade with access to equipment or conductor accomplished by isolation platforms. When work procedures require contact with a conductor or anything bonded to the conductor, employees shall work from isolation platforms or grounded work mats. If left unattended, the barricades shall be replaced with barriers and access points closed. The above requirements apply until after conductor clipping is completed on the structures adjacent to the energized line crossing.

(4) Stringing Adjacent to Energized Lines: For stringing operations adjacent to energized lines, comply with OSHA 1926.955, "Overhead Lines," subparagraph (d), and the following additional requirements:

1) Requirements for stringing operations adjacent to energized lines shall apply until stringing operations have progressed beyond the adjacent energized line and the conductor being strung is isolated by open jumpers.

2) Equipment at the pulling and tensioning sites, catch off points, conductor tails, and splice areas shall be enclosed by a barricade with access to equipment or conductor accomplished by isolation platforms. When work procedures require contact with a conductor or anything bonded to the conductor, employees shall work from isolation platforms or grounded work mats. If left unattended, the barricades shall be replaced with barriers and access points closed.

3) Aerial lifts used for splicing or clipping shall be barricaded and an isolation platform used for access to the equipment.

4) Barrier and barricade placement shall be a minimum of 10 feet away from grounds, grounded equipment, and conductors.

5) Guy and guy anchors shall be grounded to the worksite ground.

1.4.18 REMOVAL OR UPGRADING OF EXISTING TRANSMISSION LINE:

Prior to removal or upgrading of the existing transmission line, submit for approval a detailed removal plan. Plan shall include at least the following: method, equipment, and safety precautions to be used in removing the line with specific attention given to condition of existing poles for climbing, including both shell rot and structural integrity; parallel energized facilities, other hot line crossings, and railroad and road crossings; method or procedure for releasing the tension on the conductor to prevent structural failure; and procedures for cross arm, pole, and anchor removal. Removal of existing conductor and overhead ground wire requires the same grounding and safety precautions as installing new conductor and overhead ground wire. Requirements contained in Section 1.4.17, "Transmission Line Safety."

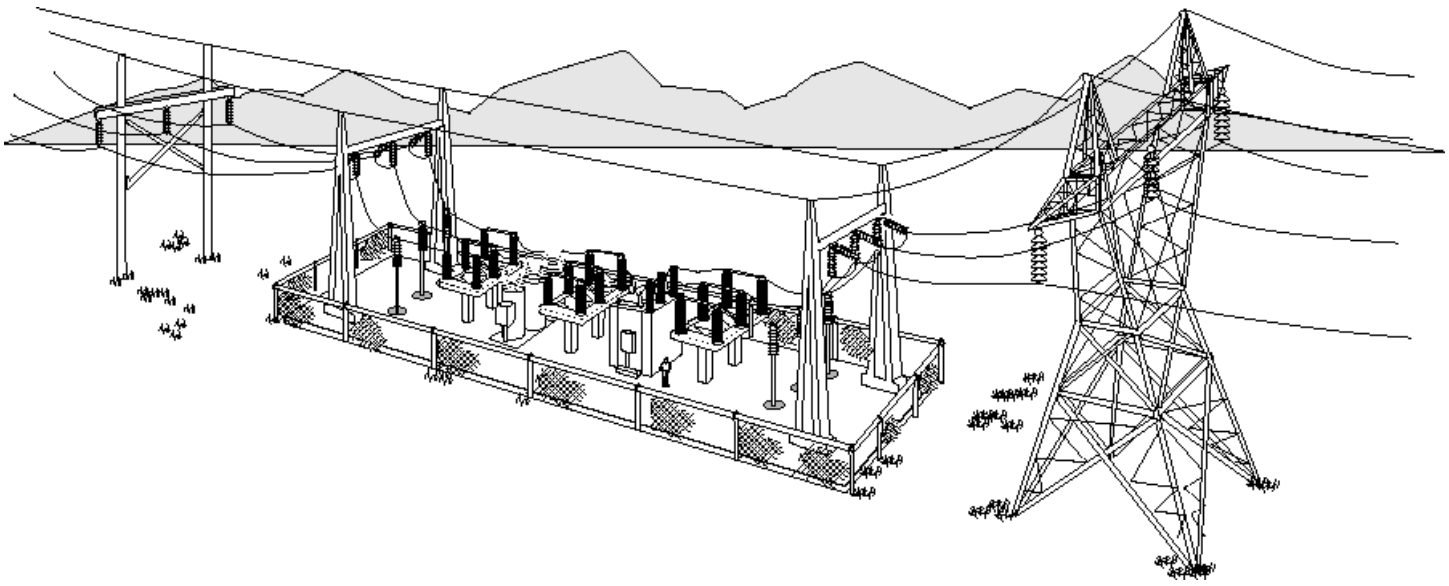
Standard 2

Sitework

Western Area
Power Administration

CONSTRUCTION STANDARDS

STANDARD 2
SITEWORK



SAFETY
A HABIT TO LIVE BY

September 2016

STANDARD 2 – SITEWORK

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STANDARD 2 – SITEWORK

SECTION 2.1 – GENERAL

2.1.1 CONTRACTOR-FURNISHED DRAWINGS AND DATA:

1. GENERAL: Use United States standard units of measurement and English words, signs, and symbols.

   Data and drawings shall be thoroughly checked for accuracy and completeness before submittal. Western will not check details and intermediate dimensions.

   Western will return one copy of each drawing and data sheet marked to indicate required changes and approved or not approved. Change the details which Western determines necessary to make the finished construction conform to these specifications.

   Western's review time is specified in the project specifications in the "Commencement, Prosecution, and Completion of Work" paragraph of Division 1 “General Requirements”. Western approval shall not relieve the Contractor from meeting the specifications requirements nor the responsibility for drawing correctness. Fabrication or material placement prior to approval will be at the Contractor's risk.

2. COMPACTING EARTH MATERIAL: Submit the following to the COR:

   (1) Name and qualifications of a testing laboratory at least 20 calendar days prior to start of compaction operations. The testing laboratory shall meet the requirements of ASTM D 3740.

   (2) Compaction test reports immediately after completion. Reports shall specify location by elevation and horizontal coordinates for each test taken. Testing requirements are provided in Section 2.7.1, “Compacting Earth Material”.

3. APPROVAL DRAWINGS FOR CATTLE GUARDS: Prior to providing the cattle guards, submit for approval two copies of the following drawings and data to the Civil Engineer and a copy of the transmittal letter to the COR:

   (1) Complete details covering the cattle guards to be furnished including length, width, and size of the foundation, framework, anchor bolts, end wings, and other items as appropriate.

   (2) Concrete compressive strength and type of reinforcement.

   (3) Type of finish for metal products.

   (4) Certifications and/or calculations showing that the foundation and framework are designed for the truck loading. Certifications and/or calculations shall include design loadings, foundation reactions, soil bearing pressure, and other appropriate design parameters.

4. GRAVEL SURFACING: Prior to placing, the Contractor shall certify material gradation with test data representing the gravel surfacing to be used. After placing, the Contractor shall certify in-place density and compaction with tests obtained from locations as determined by the COR. The in-place density test results shall be furnished to the COR within 7 days after completion of the tests. One test per 250 cubic yards of material, or fraction thereof, shall be performed for gradation, Atterberg Limits Tests, and density testing. The gradation analysis and the Atterberg Limits Tests shall be performed either at the batch plant or on the site, as directed by the COR.

5. SOIL-APPLIED HERBICIDE: Submit the following:

   (1) Herbicide Applicator's References: At least 30 calendar days prior to the date of intended application, submit two copies to the COR and one copy to the Environmental Specialist of a list of references. The list of references shall include clients (with telephone numbers) previously worked for during the past 2 years.

   (2) Herbicide Applicator's Certification/License: At least 30 calendar days prior to the date of intended application, submit to the COR one copy of the herbicide applicator's certification/license number for the State in which herbicides will be applied.

   (3) Herbicide Application Plan: At least 30 calendar days prior to the date of intended application, submit two copies to the COR and one copy to the Environmental Specialist of a written Herbicide Application Plan. The plan shall specify the following:

      1) Planned date of application.

      2) Herbicide products to be applied and planned application rates (pounds of active ingredient per acre or quantity of product per acre). Spray marking dye name and manufacturer.

      3) Method of application (equipment to be used to apply herbicide).

      4) Herbicide manufacturer's product specimen label (include directions for use of material, use precautions, and storage and disposal directions).

      5) Material Safety Data Sheets (MSDS).

      6) Safety procedures that will be followed (including safety equipment and clothing).

   (4) Final Report: Within 7 calendar days after each application, submit two copies to the COR and one copy to the Environmental Specialist of a written report which provides the record keeping information required by Federal and State regulations. The report shall include the following:

      1) A synopsis of the services provided.

      2) Date of application.

      3) Place (facility) and size of area (square feet or acreage) treated.

      4) Name and manufacturer of herbicide applied, together with the EPA pesticide registration number and product lot number from the labels. Include name and manufacturer of spray marking dye.

      5) Method of application (equipment used, carrier).

      6) Weather conditions at time of application (wind speed, wind direction, temperature, rainfall, and humidity).

      7) Quantity/rate of herbicide applied pounds of active ingredient per acre or quantity of product per acre.

8) Problems that occurred such as any health effects and noncompliance with environmental and health/safety laws or regulations.

9) Other information/data as required by applicable local, Federal and State regulations.

6. SEEDING: Submit two copies of the following to the COR prior to seeding:

(1) Seed Certification: For each seed type include botanical name; common name; percentage in mixture by weight; and percentage of purity, germination, and weed seed. Include all other data required by State seed regulations. Data for germination tests shall be dated no earlier than 3 months prior to seed delivery at job site.

(2) Fertilizer Certification: Certificate of inspection required by State seed regulations and manufacturer's or vendor's certified analysis of fertilizer material.

7. ASPHALT PAVING: The following shall be submitted to the COR for approval at least 20 days prior to placement of asphalt paving:

(1) Testing Laboratory: Submit name and qualifications of testing laboratory.

(2) Mix Design: Submit mix designs in accordance with Marshall Series ASTM D 1559 or Hveem ASTM D 1560.

(3) Asphalt Cement: Submit manufacturer's certification that asphalt cement grade specified meets the requirements of ASTM D 3381.

(4) Aggregate for Paving Courses: Submit certification showing that fine and coarse aggregates meet the requirements of ASTM D 692 and ASTM D 1073.

(5) Submit certification showing that the gravel base meets the requirements of ASTM D 2940.

(6) Submit batch certificate, including batch weight and time of batching to the COR when each load of asphalt is delivered.

STANDARD 2 – SITEWORK

SECTION 2.2 – DEMOLITION

2.2.1 REMOVING BURIED ITEMS, FENCING, AND GRAVEL SURFACING AND CUTTING OFF FOUNDATIONS:

1. CUTTING OFF FOUNDATIONS: Cut off foundations 30 inches below the ground surface.

2. EXCAVATION: Excavate as required for removal and cutting off operations.

3. FENCE AND GATE REMOVAL:

   (1) Chain Link Fence: Remove existing chain link fence in accordance with the Standard 1 - General Requirements, Section 1.4.16 "Substation Safety". It is a standard 7-foot-high chain link fence with a guard of three strands of barbed wire. The fence posts are set in concrete.

   (2) Disconnect ground cable risers from the fence and bury a minimum of 18 inches below finished grade.

   (3) Remove warning and safety signs and reinstall as directed by the COR.

   (4) Barbed Wire Fence: Existing barbed wire fence consists of three or four strands of barbed wire supported on wood or steel posts.

   Posts and concrete footings shall be completely removed. If fenceposts are reused, concrete or earth material adhering to the posts shall be removed prior to reinstallation.

4. REFILL: Remove loosened and disturbed earth material from the excavation resulting from removal or cutting off operations. Refill the excavation to the adjacent ground surface or subgrade with earth material approved by the COR. Compact the earth material in accordance with Section 2.8.1, "Placing and Compacting Backfill". Replacement of gravel surfacing shall be in accordance with Section 2.11.2, "Replacing and Protecting Gravel Surfacing". Refill for barbed wire fencepost holes need not be compacted but shall be mounded to allow for settlement.

5. EXISTING FACILITIES TO REMAIN: During removal or cutting off operations, take necessary precautions not to loosen or damage existing facilities that are to remain in place. Existing facilities that are loosened or damaged as a result of the Contractor's operations shall be replaced or repaired as approved by the COR.

6. MATERIAL DISPOSAL: Dispose of removed concrete, spalls, metalwork, fence, wood poles, guys, and anchors that are not reused, and other debris in accordance with Standard 13 – Environmental Quality Protection, Section 13.8 "Disposal of Waste Material".

2.2.2 REMOVING AND STORING STRUCTURES:

1. GENERAL: Removed material shall become the Contractor’s property and shall be promptly removed from the right-of-way by the Contractor.

2. STEEL STRUCTURE REMOVAL: Remove and store structures in accordance with Standard 4 - Substation Metalwork and Transmission Line Lattice Towers, Section 4.1.13 “Relocating, Modifying, and Storing Steel Structures and Towers”.

3. WOOD POLE REMOVAL: Completely remove wood poles. Completely remove guys and anchors or cut off the guys and anchors 30 inches below ground surface in cultivated areas and 12 inches below ground surface in uncultivated areas.

SECTION 2.3 – CLEARING AND GRUBBING FOR FACILITY SITES AND ACCESS ROADS

2.3.1 CLEARING AND GRUBBING:

1. CLEARING: Brush, trees, rubbish, and other objectionable matter shall be cleared. Trees designated by the COR shall be protected from damage. Clear to a minimum of 3 feet outside of the cut and fill slope lines, but not past the right-of-way.

2. GRUBBING: Ground surfaces under embankments and ground surfaces of excavations to be used for embankments or backfill material shall be cleared of stumps, roots, and vegetable matter. Stumps shall be removed and roots grubbed to a depth of 18 inches below ground surface.

3. REFILL: Refill holes resulting from stump and associated root removal with earth material approved by the COR.

   Compact the earth material in accordance with 2.8.1, "Placing and Compacting Backfill".

4. MATERIAL DISPOSAL: Burning or burying material on the right-of-way is not permitted. Disposal of cleared and grubbed material shall be in accordance with Standard 13 – Environmental Quality Protection, Section 13.8 "Disposal of Waste Material".

5. TIMBER UTILIZATION: In accordance with the Government's policy for maximum utilization of timber, the Contractor shall channel merchantable timber into beneficial use.

STANDARD 2 – SITEWORK

SECTION 2.4 – CLEARING FOR TRANSMISSION LINE RIGHT-OF-WAYS AND ACCESS ROADS

2.4.1 CLEARING, GENERAL:

1. GENERAL: Clearing shall be performed so as to minimize marring and scarring the countryside and preserve the natural beauty to the maximum extent possible. Except for danger trees, no clearing shall be performed outside the limits of the right-of-way.

2. DEFINITIONS: The word "trees" includes "brush" and "shrubs". The words "shelter belt" include grove of trees which has been purposely planted. The words "danger tree" mean a tree located within or adjacent to the easement or permit area that present an immediate hazard to the facility or have the potential to encroach within the safe distance to the conductor or structure as a result of bending, growing, swinging, or falling toward the conductor.

3. TREE REMOVAL: Trim or remove trees only as necessary to clear for access roads, including roads through shelter belts which extend across the right-of-way; to provide land access to transmission structures; to maintain electrical clearances to conductors; and to prevent structure damage due to falling danger trees.

   Trees which would require removing the major portion shall be completely removed. Trees which are removed shall be cut off at the ground surface. Operations for felling and removing trees shall be accomplished so as to protect and preserve trees which are to remain.

4. PINE NEEDLES: Excessive amounts of pine needles left by clearing of trees, as determined by the COR, shall be removed from the right-of-way and disposed of in a location to prevent harm to grazing domestic animals.

2.4.2 CLEARING CRITERIA:

1. ACCESS CLEARING: Clear a 15-foot-wide strip for access to structure sites which are in timbered areas. Trees shall be cleared to the minimum extent required to provide suitable access for construction equipment. Trees to be removed to provide access within the limits of the right-of-way shall be cut off at the ground surface to permit vehicular travel without causing vehicle damage. Stumps and root systems may remain in the traveled surface unless otherwise designated to be removed by the COR.

2. STRUCTURE VICINITY CLEARING: Trees adjacent to transmission line structures shall be removed to permit vehicular access and/or to minimize the possibility of structure damage due to falling trees. Except for danger trees, tree removal shall not extend beyond a 20-foot radius from any transmission structure member.

3. CONDUCTOR-TO-TREE CLEARANCE CLEARING: Remove trees to provide the vertical tree-to-conductor clearance over the width specified in the project specifications. From this width to the right-of-way edges, the elevation at the top of the trees will be allowed to increase at the rate of 1 foot for each foot increase in distance from the transmission line centerline. Table 2-1 provides the necessary tree-to-conductor clearance criteria for tree removal based on the distance from the nearest point on a tree to the conductor. If the distance is less than or equal to the distances specified for the voltage shown in table 2-1 below, the tree must be removed.

TABLE 2-1 TRANSMISSION LINE DANGER TREE REMOVAL REQUIREMENTS

LINE VOLTAGE (PHASE TO PHASE)	MINIMUM DISTANCE BETWEEN CONDUCTOR AND DANGER TREES (FT-IN)
69 kV and below	15’-0”
115 kV	15’-8”
138 kV	16’-4”
161 kV	16’-8”
230 kV	18’-0”
345 kV	20’-4”
500 kV	24’-0”

2.4.3 CLEARED MATERIAL DISPOSAL:

Cleared material shall be disposed of in accordance with Standard 13 – Environmental Quality Protection, Section 13.8 "Disposal of Waste Material”.

In accordance with the Government's policy for maximum utilization of timber, the Contractor shall channel merchantable timber into beneficial use.

2.4.4 QUALIFICATIONS FOR TREE TRIMMERS:

Certified personnel shall perform or supervise work involving tree trimming/felling activities. Certification shall ensure that an individual is knowledgeable and competent in performing the work. For work involving tree removal near energized equipment, certification shall include successful completion of a line clearance tree felling and trimming training program. For work involving tree removal absent of electrical hazards, certification shall include successful completion of a tree felling and trimming training program. Certification training shall include hands-on competency testing under the direction of an expert in the field. Submit qualifications certification of training to the COR.

SECTION 2.5 – EXCAVATION

2.5.1 EXCAVATION, GENERAL:

The Bidding Schedule items which contain excavation include segregating, loading, transporting, and temporarily stockpiling excavated material as needed; work and material necessary to maintain excavations during construction; and removing temporary construction when no longer required.

1. EXCAVATION SURFACES: Excavated surfaces, except surfaces of auger excavation, upon or against which concrete is to be placed, shall be finished to the dimensions required, moistened with water, and tamped or rolled to form firm and compact foundations for placing concrete structures. Special preparation of surfaces of auger excavations is not required. Auger excavations for structures shall be performed with earth augering equipment. Undercuts for bells shall be made in undisturbed material or compacted embankments.

   Where concrete is to be placed upon or against rock surfaces, the excavations shall be sufficient to provide the dimensions of concrete shown on the drawings or as specified in the Project Specifications; required dimensions being exceeded only as approved by the COR.

2. OVER EXCAVATION: Except where directed by the COR, over excavation and required concrete, gravelfill, sandfill, and compacted backfill due to such over excavation shall be at the Contractor's expense.

   If material is excavated or loosened beyond the excavation lines, remove loosened material and fill over excavation as follows:

   (1) With concrete where concrete structures or concrete backfill are required to be placed upon or against excavated surfaces.

   (2) With gravelfill where structures are required to be placed on gravelfill.

   (3) With sandfill where structures are required to be placed on sandfill.

   (4) With selected material approved by the COR for other over excavations.

   Selected material and gravelfill placed in over excavations shall be compacted in accordance with Section 2.7.1, "Compacting Earth Material". Concrete, gravelfill, and sandfill shall conform, respectively, to Standard - 3 Concrete and to Section 2.8.2, "Gravelfills and Sandfills".

   Where additional excavation is prescribed by the COR to remove unsuitable material, excavation, compacted backfill, gravelfill, sandfill, and concrete shall be in accordance with the applicable sections of these standards and be paid for in accordance with the contract clause titled "Changes".

2.5.2 GRADING FOR TRANSMISSION LINE TOWER SITES AND LINE CLEARANCE:

1. DRAINAGE AND LINE CLEARANCE: Perform grading, as shown on drawing 41 2017 and as directed by the COR, to provide adequate drainage around structure and tower sites and sufficient clearance under conductors. Spread excavated material around the site from which excavated. Pile topsoil separately and replace after work completion.

2. STRIPPING: Strip embankment areas to a depth of 6 inches. Stripped material, or as much as may be required, shall be used for the upper 6 inches of embankment slopes. Spread remaining stripped material where directed by the COR.

3. EMBANKMENTS: Construct embankments to the lines and grades shown on the drawings or prescribed by the COR. No embankment shall be made of frozen material or placed on frozen surfaces. Embankment material shall be suitable material, as determined by the COR, obtained from required excavations or from borrow, and of an acceptable gradation of material to provide compacted embankments in accordance with Section 2.7.1 "Compacting Earth Material".

2.5.3 STRIPPING:

Refer to Project Specifications, Drawings, and site-specific Geotechnical Engineering Report for requirements regarding stripping; unless noted otherwise in referenced documents, strip areas to a minimum depth of 6 inches. Stripped material, or as much as may be required, shall be used for the upper 6 inches of embankment slopes and excavated areas to be seeded. Remaining stripped material shall be wasted in accordance with Section 2.5.8, "Disposal of Excavated Material". When necessary, stripped material shall be temporarily stockpiled prior to final placement.

Except as provided above for embankment slopes and excavated areas that are to be seeded, stripped material shall not be used for backfill or constructing compacted embankments.

2.5.4 EXCAVATION FOR FACILITY SITES AND ACCESS ROADS:

Suitable material excavated during the regrading operations may be used for embankments and backfill. This excavated material shall not be used for gravelfills or gravel surfacing unless it is processed to meet applicable requirements of Sections 2.8.2, "Gravelfills and Sandfills" or 2.11.1, "Gravel Surfacing".

Grade to the lines, grades, and dimensions shown on the drawings. Drainage ditches shall be clear of obstructions and diverge sufficiently at the lower ends to prevent erosion.

2.5.5 EXCAVATION FOR FOUNDATIONS AND STRUCTURES:

1. GENERAL: Excavate for concrete foundations, slabs, buildings, cable entry boxes, gravelfills, structures, poles, fences, cattle guards, pull boxes, concrete vaults, removing concrete foundations, switch operating platforms, equipment cabinet platforms, or any other items requiring excavation to construct the facilities in the project specifications.

2. EXCAVATIONS: Excavations shall provide for concrete foundations and structure embedments as provided in the project specifications and as shown on drawing 41 2017. Protect the excavation to maintain a clean subgrade until the foundation is placed. Remove sand, mud, silt, and other objectionable material which may accumulate in the excavation before placing concrete.

2.5.6 EXCAVATION FOR TRENCHES:

1. GENERAL: Excavate for cables, conduits, drains, culverts, duct banks, utilities, grounding systems, buried fiber optic cables, and any other items requiring trenches to construct the facilities in the project specifications.

2. EXCAVATION:

   (1) Ground Cable, Conduit, and Insulated Cable: Excavation for electrical ground cable and conduit shall be to depths of not less than 18 inches in common material as measured from the subgrade elevation under gravel surfacing to bottom of the trenches. If rock is encountered prior to obtaining the 18-inch depth, excavation shall extend 6 inches into rock or the amount required to obtain an overall trench depth of 18 inches, whichever is less.

   Excavation for insulated electrical cable shall be made to lines and depths shown on Drawing 31 1006.

(2) Culvert and Pipe Trenches: Excavation shall be to depths and grades shown on the drawings. Culvert and pipe trenches shall be finished so that the pipe will be fully supported by unexcavated ground under the bottom quarter of the circumference. Excavation shall accommodate bells, couplings, fittings, and valves.

Where rock or other unsuitable material in the bottom of a trench might cause unequal settlement or provide unequal bearing for the culvert or pipe, the trench shall be over excavated to a depth of 6 inches if in rock and to depths sufficient to remove the other unsuitable material. The over excavated areas shall be backfilled and compacted in accordance with Section 2.8.1, "Placing and Compacting Backfill". Backfill material shall be shaped to fit the curvature of the culvert or pipe under the bottom quarter of its circumference.

2.5.7 EXCAVATION FROM BORROW:

1. OFF-GOVERNMENT PROPERTY AND RIGHTS-OF-WAY: Make arrangements for obtaining borrow material, off-Government property and rights-of-way, including transporting and stockpiling material prior to placement.

2. ON-GOVERNMENT PROPERTY: The COR will designate location of borrow pits in the borrow site from which material shall be obtained. Strip borrow pits of topsoil to a depth of approximately 6 inches. Stripped topsoil shall be stockpiled and, upon completion of borrow excavation, spread to a uniform depth of 6 inches over areas of borrow pits from which removed. Before replacing topsoil, excavated surfaces shall be reasonably smooth and uniformly sloped as approved by the COR. Bring sides of borrow pits to stable slopes with slope intersection shaped to carry the natural contour of adjacent undisturbed terrain into the pit to give a natural appearance.

   Surface of borrow pits shall be left reasonably smooth as approved by the COR. When necessary, as determined by the COR, borrow pits shall be drained by open ditches to prevent accumulation of standing water. Drainage shall be controlled as prescribed in Standard 13 - Environmental Requirements - Section 13.16 - “Prevention of Water Pollution”.

3. MATERIAL: Borrow material shall be suitable material, as determined by the COR, and be an acceptable gradation to provide compacted embankments in accordance with Section 2.6.1, "Constructing and Compacting Embankments". Borrow material shall contain sufficient clay to prevent excessive caving of auger-type excavations performed in the substation embankments.

2.5.8 DISPOSAL OF EXCAVATED MATERIAL:

1. GENERAL: Suitable material from excavations, as determined by the COR, shall be used for required earthwork. The excess material shall be disposed of in accordance with Standard 13 – Environmental Quality Protection, Section 13.8 "Disposal of Waste Material”.

2. TRANSMISSION LINE STRUCTURE SITES: Excavated material which is suitable for backfill shall be used for backfill at the site from which excavated. Except in cultivated fields, excess excavated material shall be spread evenly around or adjacent to the site as directed by the COR. In cultivated fields, excess excavated material shall be removed from the transmission line and access road right-of-ways. The Contractor shall make arrangements required for disposal of waste material in an approved landfill.

2.5.9 UNWATERING EXCAVATIONS:

1. INFORMATION ON WATER LEVEL: Available information on water level is shown on the geologic logs of subsurface exploration. However, water levels encountered at time of construction may vary considerably from water levels shown.

2. CONCRETE PLACEMENT: During concrete placement, water level shall be kept below top of concrete. When the COR determines that unwatering is impractical, place concrete under water in accordance with ACI 304R.

3. WATER POLLUTION PREVENTION: Unwatering excavations shall be in accordance with Standard 13 - Environmental Requirements - Section 13.16 - “Prevention of Water Pollution”.

2.5.10 CASING AUGER EXCAVATIONS:

Casing of an excavation shall be performed only if the COR determines the auger excavation cannot be made to the prescribed lines without using casing. The requirement for casing will depend on existing site conditions at time of auger excavation. The hole depth to be cased shall be as directed by the COR.

1. CONCRETE PLACEMENT: Casing shall be withdrawn as concrete is deposited, with the casing removed after concrete placement is finished. Concrete placement shall be maintained at a sufficient height within the casing to prevent earth infusion into the concrete or reduction in diameter by earth pressure on the fresh concrete.

   Concrete placed under water shall be in accordance with ACI 304R.

2.5.11 TRIAL AUGERING:

1. GENERAL: Trial augering includes auger excavations that are attempted and cannot be completed due to encountering unsatisfactory material.

2. AUGERING OPERATIONS: If unsatisfactory material, as determined by the COR, is encountered during augering that prevents excavating to required depths, then non-auger type foundations shall be substituted for the intended auger type. The substituted foundation shall be approved by the COR.

SECTION 2.6 – EMBANKMENTS

2.6.1 CONSTRUCTING AND COMPACTING EMBANKMENTS:

1. GENERAL: Embankments shall not be constructed in an area where clearing, grubbing, and stripping are required until that work has been completed. Maintain embankments to the proper elevations, dimensions, and slopes until final acceptance of all work.

2. PREPARING FOUNDATION MATERIAL UNDER EMBANKMENTS: After completing clearing, grubbing, and stripping and before the first layer of embankment is placed, the foundation material, other than rock surfaces, shall be scarified to a 6-inch minimum depth. The layer of scarified material shall be compacted in accordance Section 2.7.1, "Compacting Earth Material".

3. PLACING MATERIAL: Embankment material shall be suitable material, as determined by the COR, obtained from required substation site excavation. If sufficient suitable material is not available from required substation site excavation, additional suitable material shall be obtained from borrow areas as specified in, Section 2.5.7, "Excavation From Borrow". Embankment material obtained from borrow shall contain sufficient clay to prevent excessive caving of auger-type excavations.

   Stripped material shall not be used for constructing embankments, except for the upper 6 inches of material placed on embankment slopes to be seeded.

   Excavation operations for the compacted embankments shall result in an acceptable gradation of material to provide for stability when compacted. Distribution of material shall result in material being homogeneous and free from lenses, pockets, or streaks. Stones placed in compacted embankments shall not exceed 5 inches. Stones larger than 5 inches found in otherwise approved material shall be removed prior to compacting operations. Material used in constructing embankments shall be clean and free from vegetation, stumps, roots, pieces of timber, and other foreign material. Material shall not be placed in embankments when either the material or the surface on which it will be placed is frozen. Embankments shall be placed, moistened, and compacted in accordance with Section 2.7.1, "Compacting Earth Material".

SECTION 2.7 – COMPACTION

2.7.1 COMPACTING EARTH MATERIAL:

1. GENERAL: Where compacting earth material is required, material shall be deposited in horizontal layers and compacted as specified, except that the density and moisture requirements for gravel surfacing shall be in accordance with Section, 2.11.1, "Gravel Surfacing".

   Excavating, placing, moistening, and compacting operations shall result in material being uniformly compacted throughout the required section and homogeneous, free of lenses, pockets, streaks, or laminations.

2. TESTING:

   (1) Testing Laboratory: An approved testing laboratory shall be employed by the Contractor to perform compaction tests. The testing laboratory shall meet the requirements of ASTM D 3740.

   (2) Tests: Perform a minimum of one successful test for every 1,000 cubic yards, or fraction thereof, of embankment and for every 100 cubic yards, or fraction thereof, of backfill. Material samples for testing shall be obtained from locations as determined by the COR. A successful test is a test showing that the material has been compacted to the specified density and moisture. If a test is not successful, the Contractor shall perform additional tests and additional work as required in order to ensure that the specified density and moisture are achieved.

3. COMPACTING CLAYEY AND SILTY MATERIAL:

   (1) General: Thickness of horizontal layers after compaction shall not be more than 6 inches. Excavating and placing operations shall result in material, when compacted, being blended sufficiently to secure the highest practicable density, impermeability, and shear strength.

   (2) Moisture Content: Prior to and during compacting operations, material shall have a moisture content within plus or minus 2 percentage points of optimum moisture. Moisture content shall be uniform throughout each layer.

   If the moisture content is not within 2 percentage points of optimum, the compacting operations shall not proceed, except with the specific approval of the COR, until the material has been wetted or allowed to dry to obtain optimum moisture content within the tolerances. No adjustment in price will be made on account of wetting or drying the material or on account of delays occasioned thereby.

   (3) Compaction: When the material has been conditioned, it shall be compacted by rollers or by hand or power tampers. Where hand or power tampers are used in confined areas, they shall be equipped with suitably shaped heads to obtain the required density.

   (4) Soil Density: The density (dry) of the soil fraction in the compacted material shall not be less than 95 percent of the laboratory standard maximum soil density (dry) as determined by ASTM D 698, Method A, compaction test for the material being compacted. The standard maximum soil density is the dry weight per cubic foot of the soil compacted at optimum moisture content by laboratory procedure.

4. COMPACTING COHESIONLESS MATERIAL:

   (1) General: Thickness of horizontal layers after compaction shall not be more than 6 inches if compaction is by tampers or rollers; not more than 12 inches if compaction is by treads of crawler-type tractors, surface vibrators, or similar equipment; and not more than the penetrating depth of the vibrator if compaction is by internal vibrators. Water shall be added as required to obtain the specified density.

   (2) Relative Density: Relative density of the compacted material shall not be less than 70 percent as determined by ASTM D 4253 and ASTM D 4254.

SECTION 2.8 – BACKFILL

2.8.1 PLACING AND COMPACTING BACKFILL:

1. GENERAL: Place and compact backfill for excavations listed in Section 2.5.5, “Excavation for Foundations and Structures,” 2.5.6, “Excavations for Trenches,” and other work requiring backfill. Surface of compacted backfill shall slope away from a building a minimum of 4 inches in 10 feet.

2. MATERIAL:

   (1) General: Obtain backfill material from required excavations. If sufficient suitable material is not available from required excavations, obtain additional material from borrow areas as specified in Section 2.5.7, "Excavation From Borrow". Type of backfill material and amount shall be approved by the COR.

   (2) Backfill Near Electrical Conduit: Backfill within 2 inches of buried electrical conduit shall be sand or equally fine earth material. Sand backfill for buried insulated electrical cable is specified in Section 2.8.3, "Sand Backfill and Lumber Protection for Buried Insulated Electrical Cables".

   (3) Backfill Around PVC Piping: Material passing a 3/8-inch sieve shall be used around PVC piping to a height of 6 inches above the pipes.

   (4) Backfill Around Building Piping: Material passing a 3/4-inch sieve shall be used around building piping, to a height of 12 inches above the pipes.

   (5) Other Backfill: Other backfill material shall not contain stones larger than 3 inches in diameter, vegetation, stumps, roots, pieces of timber, and other foreign material.

3. PLACING: Manner of depositing backfill material shall be approved by the COR. Material shall not be placed when either the material or the surface on which it will be placed is frozen. Stripped material shall not be used for backfill.

   Backfill shall be placed and compacted about corrugated metal pipe culverts, concrete pipe culverts, corrugated metal pipe drains, and HDPE pipe drains and culverts in accordance with this section and Sections 2.9.1, "Corrugated Metal Pipes", 2.9.4, "Concrete Pipe Culverts", and 2.9.8, “High Density Polyethylene (HDPE) Pipe Drains and Culverts”.

   Sloping backfill shall be placed and compacted adjacent to transmission line structure foundations and poles to an elevation approximately 6 inches above the original ground surface and uniformly sloped away.

4. COMPACTING: Backfill shall be compacted in accordance with Section 2.7.1, "Compacting Earth Material".

2.8.2 GRAVELFILLS AND SANDFILLS:

1. MATERIAL:

   (1) Gravelfills: Gravelfill shall be composed of hard, dense, durable rock particles, and range from 3/16 inch to 3/4 inch.

   (2) Sandfills: ASTM C 33 for fine aggregate.

(3) Sheet Polyethylene: Six mils thick.

2. PLACING:

(1) General: Before gravelfill or sandfill is placed, the subgrade shall be leveled to a uniform cross section free from depressions and soft spots. Gravelfill or sandfill shall be placed to the lines and grades shown on the drawings.

(2) Building Piping: Building piping to be buried shall be laid prior to placing gravelfill.

(3) Building Floor Slabs: A layer of sheet polyethylene shall be placed over the gravelfill beneath the building floor slab. Prior to placing the sheet polyethylene, the surfaces of gravelfill shall be prepared to prevent damage to the covering. Sheet polyethylene shall be lapped 6 inches at ends and edges.

(4) Building and Concrete Foundations: Gravelfills for service building and for concrete foundations shall be deposited and compacted as specified in Section 2.7.1, "Compacting Earth Material".

(5) Sandfills: Sandfills in service building cable entry box, and in Type C cable trenches and pull boxes shall not be compacted.

2.8.3 SAND BACKFILL AND LUMBER PROTECTION FOR BURIED INSULATED ELECTRICAL CABLES AND CONDUITS:

1. MATERIAL:

(1) Sand: ASTM C 33 for fine aggregate.

(2) Lumber: Lumber shall be 2 inches x 8 inches, constructed of noncombustible recycled plastic, and equal to: Plastic Lumber by the Plastic Lumber Company, Inc., 540 South Main Street, Akron, OH 44311; Recycle made Plastic Lumber by Recycled Plastics Industries, Inc., 1820 Industrial Drive, Green Bay, WI 54302; Polywood by A.R.W. Polywood, Inc., 700 East Wayne Street, Lima, OH 45802.

2. PLACING BACKFILL AND LUMBER COVERS:

(1) Sand Backfill: The bottom portion of trenches for buried insulated electrical cables shall be backfilled with sand to provide 2 inches of sand both below and above the cables and a minimum of 2 inches of sand between the sides of the trench and the closest cable. Where there is more than one cable in a trench, the cables may be grouped together and need not be separated by sand.

(2) Lumber: Plastic lumber shall be placed lengthwise over the sand backfill to provide a continuous cover above the cables and conduits without spaces between ends of lumber. Sand backfill is not required for conduit installations.

(3) Soil Backfill: Backfill trench above the lumber with soil and compact in accordance with Section 2.7.1, "Compacting Earth Material".

SECTION 2.9 – SITE DRAINAGE

2.9.1 GENERAL SECURITY REQUIREMENTS:

All perimeter drainage culverts, drop inlets, drains, and manhole covers shall have measures (i.e., grills, rebar, locks) to prevent unauthorized entrance. Culvert passages shall be reduced to no more than 96-square-inch openings at any point. Refer to Project Specifications or details on Drawings for requirements.

2.9.2 CORRUGATED METAL PIPES:

1. GENERAL: Corrugated metal pipe drains include a flared-end section at inlets and corrugated metal pipe culverts include a flared-end section at each pipe end.

2. MATERIAL:

   (1) Corrugated Steel Pipe and Coupling Bands: ASTM A 929, zinc coated (galvanized), 16-gage minimum thickness, or approved equal.

   (2) Flared-End Sections: Galvanized-steel, flared-end sections by Armco Drainage and Metal Products, Inc., P.O. Box 800, Middletown, OH 45043; or equal.

3. HAULING AND HANDLING:

   (1) General: Haul and handle pipe with care to avoid damage to the galvanized coating. Rope, cable, or chain slings shall not be used for handling the pipe, but canvas slings not less than 12 inches in width may be used.

   (2) Repair: ASTM A 780, except that the coating thickness shall be a minimum of 3.0 mils. Pipe that is damaged beyond repair shall be replaced. Damaged pipe shall be removed from the work site.

4. INSTALLATION:

   (1) General: Corrugated metal pipe shall be laid at the locations and to the grades shown on the drawings and as directed by the COR. Trenches shall be excavated in accordance with Section 2.5.6, "Excavation for Trenches". Pipe shall be laid with outside laps of circumferential joints pointing upstream and with longitudinal joints at the sides. Fastenings shall be drawn tight. Pipe shall be laid so that the departure from and return to established alignment and grade shall not exceed 1/8 inch per foot of pipe, but with not more than a 1-inch total departure. Pipe shall be placed so as to be fully supported over the bottom quarter of the circumference. Coupling bands shall be used to join sections of pipe. Coupling bands shall be installed to ensure tight joints, with the joints between sections at the center of the coupling bands.

   (2) Grounding: Corrugated metal pipe drains shall be grounded in accordance with Standard 9 - Substation Electrical, Section 9.2.1 "Grounding System".

   (3) Backfill: As each section of pipe is laid, backfill material shall be placed and tamped about the pipe to hold it in place until the joints are completed. After the joints have been completed, backfill shall be placed and compacted in accordance with Section 2.8.1, "Placing and Compacting Backfill".

Equipment travel over the culverts shall not be permitted until backfill has been placed and compacted to the depth recommended by the pipe manufacturer, but not less than 1 foot above the culvert.

2.9.3 RIPRAP:

1. MATERIAL:

   (1) Riprap: Rock shall be hard, dense, and durable. Either quarried rock fragments or rounded cobbles and boulders may be used. Rock shall be reasonably well graded from a maximum size of 17 inches to a minimum size of 6 inches. "Reasonably well-graded" means that there should be a reasonably good distribution of sizes of particles from the coarsest to the finest and without a major deficiency of any size or group of sizes.

   (2) Sand and Gravel Bedding: Bedding shall be either a sand and gravel mixture or sand and crushed rock, reasonably well graded to a maximum size of 1 1/2 inches.

2. PLACING: Riprap shall be bedded in a continuous layer of sand and gravel. Riprap need not be hand placed, but may be dumped and smoothed by moving rocks into position so as to ensure the in-place material is stable and without tendency to slide and that there are no large unfilled spaces within the riprap. Inclusion of earth, sand, or rock dust in excess of 5 percent, by volume, is not permitted.

2.9.4 GRAVEL BLANKETS:

1. MATERIAL: Gravel for the blankets shall be pit-run, free-draining, gravelly material containing stones reasonably well-graded from a minimum size of 2 inches to a maximum size of 4 inches. The material shall be free from vegetation, pieces of timber, or other foreign matter.

2. PLACING: Distribute and grade material evenly over the required areas. Compaction will not be required.

2.9.5 CONCRETE PIPE CULVERTS:

1. MATERIAL:

   (1) Concrete Pipe: Reinforced concrete pipe shall conform to ASTM C 76, minimum Class III, with either A or B wall thickness. Pipe shall have either tongue-and-groove ends for packing with mortar or ends designed for use with rubber gaskets conforming to ASTM C 443.

   (2) Flared-End Sections: Shall be steel, cast-in-place concrete, or precast concrete.

      1) Steel end sections shall be galvanized-steel, flared-end sections by Armco Drainage and Metal Products, Inc., P.O. Box 800, Middletown, OH 45043; or equal.

      2) Cast-in-place concrete and precast concrete end sections shall be about 2 feet long, flare out to a width of about 2 feet, and have sidewalls formed to direct the water flow into the pipe drain. Wall and floor sections shall not be less than 2 inches thick for precast concrete and 4 inches thick for cast-in-place concrete.

   (3) Mortar: Mortar for pipe joints and connections to other drainage structures shall be composed of one part by volume of Portland cement and two parts of sand. Portland cement shall conform to ASTM C 150, Type IA or IIA. Sand shall conform to ASTM C 144.

Hydrated lime may be added to the mixture of sand and cement in an amount equal to 5 percent of the volume of cement used. Hydrated lime shall conform to ASTM C 207, Type N. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar, but shall not exceed 7 gallons of water per sack of cement.

2. INSTALLATION:

(1) General: Trenches shall be excavated in accordance with Section 2.5.6, "Excavation for Trenches". Holes for couplings shall be excavated and the pipe bedded so as to be fully supported over the bottom quarter of the circumference and so as to have uniform bearing for the full length of the pipe, except at joints.

(2) Joints: Joints shall be made in accordance with the instructions of the pipe manufacturer. Rubber gaskets shall be protected from the sun and heat prior to installation and show no sign of deterioration.

(3) Backfill: As each section of pipe is laid, backfill material shall be placed and tamped to a depth of 1 foot over the top of the pipe and the remaining backfill placed and compacted in accordance with Section 2.8.1, "Placing and Compacting Backfill".

(4) Connections: Connection between the pipe and the flared-end section shall be reasonably watertight and the method of coupling approved by the COR.

2.9.6 ROCK WATER CROSSING:

1. LAYOUT, SLOPE, AND LOCATION: The COR will designate the exact location for construction of the water crossing. The water crossing length shall be sufficient to cross the drainage channel at the high water elevation. The water crossing width shall be equal to the roadway width plus a minimum of 6 feet on either side of the roadway. The water crossing will require grading of the stream banks so approach slopes are not greater than 12 percent.

Water may be present in the stream crossing, and the depth will fluctuate with seasonal water flow. Crossings shall comply with Standard 13 - Environmental Requirements - Section 13.16 “Prevention of Water Pollution”.

Drawing 01 2005 shows the general shapes and dimensions to which all material is to be placed. It is not intended that special equipment be used to obtain the shapes and dimensions shown, but the shapes and dimensions should be achieved as nearly as practical through careful dumping procedures, travel over the material with haul equipment, and hand methods where necessary.

2. MATERIAL: Rock for the water crossing shall consist of hard, dense, durable, crushed rock fragments or graded stream channel rock.

(1) Rock material for the lower 18-inch layer of the water crossing and for the upstream and downstream sides of the crossing, on either side of the roadway, shall be reasonably well graded from a minimum of 4 inches to a maximum of 12 inches.

(2) Rock surfacing material for the upper 6-inch layer of the water crossing shall be reasonably well graded from a minimum of 2 inches to a maximum of 4 inches and shall be placed over the 4-inch to 12-inch rock material as shown on the drawing.

3. PLACEMENT: The stream bed shall be excavated, graded, and shaped prior to receiving the rock and rock surfacing material, as shown on drawing 01 2005.

   The rock and rock surfacing material shall be dumped and distributed, either by mechanical or hand methods, in such a manner as to achieve, as nearly as practical, the thickness and cross section shown on the drawing.

   The rock material, when in place, shall be stable and so arranged that no large voids exist between the rocks. Rock surfacing shall be compacted by equipment traveling over the surface.

2.9.7 CONCRETE TRENCH DRAINS:

1. MATERIAL:

   (1) Concrete: Concrete material and reinforcement shall be in accordance with Standard 3 - Concrete.

   (2) Drain Line:

      1) Pipe: PVC sewer pipe and fittings, ASTM D 3034.
      2) Pipe Joints and Fittings: ASTM D 2855.

   (3) Miscellaneous Metalwork:

      1) Trench Grate and Frame: Equal to Catalog No. R-4000 series, heavy-duty trench frame with grated cover as manufactured by Neenah Foundry Company. Specific catalog reference (or equivalent) shall be based on the size requirements of the grates and frames as shown on the drawings. Ductile Iron grates shall be used in place of Gray Iron in those areas that receive loads exceeding 16,000 pounds. Metalwork for trench grates and frames shall be grounded in accordance with Standard 9 - Substation Electrical, Section 9.4.1 "Grounding System".

2. FABRICATION: The quality of fabrication shall be in accordance with Standard 4 - Substation Metalwork and Transmission Line Lattice Structures, Section 4.1.5 "Quality Control".

3. INSTALLATION: Trench grate and frame shall be installed in those locations and as dimensioned as shown on the drawings. Material shall be embedded in concrete, set accurately in position, and held firmly in place until concrete has set.

2.9.8 PRECAST CONCRETE DROP INLETS:

1. GENERAL: Top of concrete elevations for the drop inlets shall be flush with the adjacent finish grade, unless otherwise shown.

2. MATERIAL: Concrete and reinforcement shall be manufacturer's standard. Precast concrete drop inlets, appurtenant metalwork, reinforcement, and other required accessories shall be equal to:

   (1) Miscellaneous Metalwork:

      1) Drop Inlet Grate and Frame: Equal to Catalog No. R-2000 series, frame with grated cover as manufactured by Neenah Foundry Company. Specific catalog reference (or equivalent) shall be based on the size requirements of the grates and frames as shown on the drawings. Weight of grate shall not exceed 135 pounds. Metalwork for grates and frames shall be grounded in accordance with the "Grounding System" paragraph of the "Electrical" Division.

2) Ladder Safety Post: Ladder-mounted, retractable, galvanized safety post as manufactured by Bilco Company, P.O. Box 1203, New Haven, CT 06505; or equal.

3) Ladder Rungs: Nonslip galvanized safety rungs, "Rugged Round Rung" as manufactured by Safe-Walk, Inc., P.O. Box 212, Leola, PA 17540; ore equal.

(2) Grout: Grout shall be "nonshrink" and be in accordance with ASTM C 1107 latest revision. Accelerating admixtures, including calcium chloride, shall not be used. Clean sufaces to be grouted, and remove all loose material, dirt, grease, and other foreign substances. Grout shall be mixed and placed in accordance with the manufacturer's recommendations. Water shall not be added to increase grout flowability that has been decreased due to delays.

3. FABRICATION: The quality of fabrication of miscellaneous metalwork shall be in accordance with Standard 4 - Substation Metalwork and Transmission Line Lattice Structures, Section 4.1.5 "Quality Control".

   Galvanizing shall be in accordance with Standard 4 - Substation Metalwork and Transmission Line Lattice Structures, Section 4.1.10 “Galvanizing and Painting”.

4. INSPECTION: Precast concrete drop inlets may be inspected at the place of manufacture or precasting. Notify the COR 2 weeks prior to precasting and furnish location and date of precasting. No precasting shall be performed unless a Western inspector is present or has waived the right for inspection.

2.9.9 HIGH DENSITY POLYETHYLENE (HDPE) PIPE DRAINS AND CULVERTS:

1. GENERAL: High Density Polyethylene (HDPE) corrugated and smooth-lined pipe drains include a flared-end section at inlets and culverts include a flared-end section at each pipe end. Pipes shall be of sizes, types, and dimensions shown on drawings.

2. MATERIAL:

   (1) HDPE corrugated and smooth-lined pipe sections including all related materials for construction of drains, culverts, side road pipes, storm sewers, stubs, and all related connections and fittings: ASTM F 2306, Type S with full circular cross section, outer corrugated pipe wall, and smooth inner wall.

   (2) HDPE connections and joints to new or existing pipes, storm sewer manholes, inlets, headwalls, flared-end sections, and other appurtenances required to complete the work: ASTM F 2306.

3. HAULING AND HANDLING:

   (1) General: Haul and handle pipe with care to avoid damage. Rope, cable, or chain slings shall not be used for handling the pipe, but canvas slings not less than 12 inches in width may be used.

   (2) Pipe that is damaged shall be replaced with new pipe. Damaged pipe shall be removed from the work site.

4. INSTALLATION:

(1) General: Installation of HDPE pipe drains and culverts shall be in accordance with ASTM D 2321 “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications”.

(2) HDPE pipe shall be laid at the locations and to the grades shown on the drawings, starting at the downstream end, and as directed by the COR. Trenches shall be excavated in accordance with Section 2.5.6, "Excavation for Trenches"; minimum width of trench shall be (1.25 x pipe outside diameter) plus 12 inches. Accessories and fastenings shall be drawn tight. Pipe shall be laid so that the departure from and return to established alignment and grade shall not exceed 1/8 inch per foot of pipe, but with not more than a 1-inch total departure. Pipe shall be placed so as to be fully supported over the bottom quarter of the circumference.

(3) High Groundwater: Install a soil filter fabric as required and provide restraint against flotation.

(4) Joints: Joints shall be installed such that connections between adjacent pipe sections form a continuous line free from irregularities in the flow line.

(5) Bedding and sides: ASTM D 2321 Class I or Class II material, minimum of 6-inches of 1-1/2” maximum granular size loosely compacted below pipe. Upon completion of joint and accessory installations, same material shall be placed and tamped about sides of pipe, extending to 6-inches above top of pipe.

(6) Final Backfill: Backfill shall be placed above bedding materials noted above, and shall be placed and compacted in accordance with Section 2.8.1, "Placing and Compacting Backfill".

Equipment travel over the pipe drains and culverts shall not be permitted until final backfill has been placed and compacted to the depth recommended by the pipe manufacturer, but not less than 24-inches above the top of the pipe drain or culvert.

SECTION 2.10 – FENCING

2.10.1 CHAIN LINK FENCE:

1. GENERAL:

   (1) Standard and high-security chain link fence with gates, guard of three strands of barbed wire, and security razor / concertina type wire are shown on drawings 31 2000, 31 2001, and 31 2038. Ground the fence and gate in accordance with Project Specifications, Project Drawings, and Standard Drawing 31 1501.

   (2) Standard chain link fence includes standard chain link fence with gates and guard of three strands of barbed wire; refer to Project Specifications for applicable requirements.

   (3) High-security chain link fence includes high security chain link fence with gates, one spool of security razor / concertina type wire on top of the fence in addition to the guard of three strands of barbed wire, and may include three spools of security razor / concertina type wire stacked inside and immediately adjacent to the fence at ground level; refer to Project Specifications for applicable requirements.

   (4) Openings in the substation fence shall be protected in accordance with the Standard 1 - General Requirements, Section 1.4.16 ”Substation Safety”.

2. MATERIAL: Match material in the existing fence as far as practicable with respect to type, size, and gage. Ferrous material shall be zinc-coated.

   (1) Standard Chain Link Fence Fabric: ASTM A 392, 2-inch mesh, 11-gage nominal wire diameter after coating, and 7 feet high.

   (2) High Security Chain Link Fence Fabric: ASTM A 392, 1-inch mesh, 9-gage nominal wire diameter after class 1 (1.20 oz / sf) zinc coating, and 7-feet high.

   (3) Security Razor / Concertina Type Wire: Provide in accordance with the manufacturer’s recommendations. Material shall be classified as medium security, shall be constructed of stainless steel, and shall be resistant to cutting with normal cutters. The single coil located on top of the fence shall be 24-inches in diameter. The three coils located at ground level shall be 30-inches in diameter. All coils shall protect the entire perimeter of the fence, with the exception that the three ground level coils are not required at the gate, as shown on the Drawings. The single coil on top of the fence shall be securely attached to the top and bottom barbed wire strands at an 18-inch maximum spacing, with a maximum gap of 2-inches between the bottom of coil and the top of chain link fence, and such that they will withstand 200 pounds (minimum) of pull load without becoming detached. The ground level coils shall be securely attached to the chain link fabric, and each other, at an 18-inch maximum spacing, and such that they will withstand 200 pounds (minimum) of pull load without becoming detached.

   (4) Bottom Tension Wire for use with High Security Chain Link Fence Fabric: ASTM A 392, 9-gage nominal wire diameter after class 1 (1.20 oz / sf) zinc coating.

   (5) Galvanized steel ties for use with High Security Chain Link Fence Fabric: ASTM F 626, 9-gage nominal wire diameter after class 1 (1.20 oz / sf) zinc coating

   (6) Fence Posts, Top rails, and Braces: ASTM F 1083, Schedule 40 steel pipe. Options shall be as shown on drawing 31 2000.

(7) Gates and Accessories: Except as shown on the drawings, gates and accessories shall be in accordance with ASTM F 900. Gates shall be swing-type with zinc-coated, round tubular frames. The zinc coating shall have an average weight of not less than 1.8 ounces per square foot of coated surface area. Gate fabric shall be the same as the fence fabric.

Each gate leaf shall be equipped with one pair of hinges that will allow a full gate opening between gate posts. Hinges shall allow the gate to be easily opened and closed by one person, and to swing a full 180 degrees without twisting or binding. Forked latch may be provided for the single gate less than 10 feet wide. Unless otherwise noted on the drawings, latch for double gate shall be of the "Double Gate Leaf Keeper" type or the plunger bar type of full gate height and arranged to engage the center stop. The latch shall have provisions for padlocking. The locking device shall be constructed so that the center drop rod or plunger bar cannot be raised when locked. Gate latch for gate shall be as shown on drawing 31 2001.

Gate hinges, latches, stops, keepers, and other accessories shall be zinc-coated, steel, ductile iron, or malleable iron except that wire ties, clip bolts, and nuts may be of aluminum alloy. Minimum weight of the zinc coating shall be 1.2 ounces per square foot of surface. Barbed wire guard at the gate top shall be as shown on the drawings.

(8) Chain Link Fence Accessories: Except as shown on the drawings, fence accessories shall be in accordance with ASTM F 626. Post caps, rail ends, and barbed wire support arms shall be zinc-coated, steel, malleable iron, or ductile iron except that post caps and rail ends may be of cast iron. Rail sleeves, wire ties and clips, clip bolts, nuts, brace bands, tension bands, reinforcing wire, and tension bars shall be zinc-coated, steel except that clip bolts, and nuts may be of aluminum alloy. Two 12 1/2-gage twisted, barbless, zinc-coated strands may be substituted for the 7-gage bottom reinforcing wire.

(9) Zinc-Coated Barbed Wire: Twelve-gage wire with 14-gage, four-point barbs, zinc-coated.

3. ERECTION:

(1) General: Brush, weeds, and other obstacles which interfere with proper fence erection shall be cleared and removed. Smooth ground irregularities (finished grade) and erect fence so that bottom of fabric is from 1 inch to 2 inches (maximum) above finished grade at all locations.

(2) Fence Posts: Perform all required excavating, backfilling, and compacting of backfill for fence posts. Posts shall be plumb, in alignment, and set in concrete as shown on the drawings. Cement quantity shall be not less than 5 1/2 bags per cubic yard of concrete. Placing, curing, and protection of concrete shall be in accordance with Standard 3 - Concrete.

(3) Damaged Galvanizing: Damaged areas of galvanizing shall be repaired in accordance with ASTM A 780.

2.10.2 BARBED WIRE FENCE:

1. MATERIAL:

(1) Line Posts: Painted steel, heavy duty, T-shaped with steel anchors, 7 feet 0 inches in length, 1 3/8 inches by 1 3/8 inches in cross section, and of 1/8-inch-thick material.

(2) Gate, Corner, and Braced Panel Posts: Well-seasoned cedar or wood pressure treated with preservative. Pressure-treated posts shall be Douglas Fir, Western Larch, Lodgepole Pine, or

Southern Yellow Pine. Gate posts shall be at least 7 inches diameter at the top. Corner and braced panel posts shall be 4 inches minimum diameter at top. Corner and braced panel posts shall be 8 feet 0 inches in length.

(3) Barbed Wire: Galvanized, 12 1/2-gage wire with four-point barbs.

(4) Stays and Fasteners: ASTM Specifications A121 and A702.

(5) Nails and Staples: Nails shall be bright, round nails. Staples shall be No. 9-gage galvanized-wire staples, not less than 1 1/2 inches long, and either U- or L-shaped with ringed shanks.

(6) Gates: Galvanized-steel tubular gate as shown drawing 41 9024. Set gates level and to swing in the direction as directed by the COR.

2. ERECTION: Remove brush and obstacles and level ground surface as required to erect fencing. Conduct all operations as directed by the COR. Existing fencing shall be connected to new fencing by placing a corner post at each junction and fastening the existing and new fence wire to the post. Finished fencing shall be in alignment, taut, solid at all points, and thoroughly braced.

Set gate, corner, and braced panel posts in 4-foot-deep post holes filled with concrete. Concrete shall contain not less than 5 1/2 bags of Portland cement per cubic yard of concrete.

Drive steel line posts not less than 3 feet 0 inches below ground surface.

Space barbed wire strands 8 inches center-to-center, with first strand 16 inches above ground. Wire shall be drawn tight and fastened securely to each post. Staples shall be driven diagonally to the grain of timber posts in a manner to hold wire securely without causing bends or nicks in the wire. Use wire stays to fasten barbed wire to steel posts.

Braced panels in line with fence and corner panels shall have panel posts spaced 8 feet 0 inches center-to-center with 4-inch x 4-inch horizontal wood bracing and cross-wire bracing similar to the gate braced panel shown on drawing 41 9024.

Barbed wire shall be placed on the side of the posts which is away from the substation site. At grade changes where stresses tend to pull posts from the ground, fencing shall be anchored as directed by the COR. Anchors shall consist of a double strand of No. 8-gage wire connecting each barbed wire strand to a "deadman" weighing not less than 100 pounds and buried in the ground not less than 2 feet.

2.10.3 CATTLE GUARDS:

1. DESIGN REQUIREMENTS: Design to support an AASHTO HS20 truck loading, with an allowable average soil pressure not to exceed 1,000 pounds per square foot. The horizontal framework members shall be spaced so as to prevent livestock from walking across the framework. The perimeter of the framework shall be supported by a continuous, reinforced concrete foundation. The framework shall be protected by a reinforced concrete header which is to be a part of the continuous foundation. To facilitate cleaning underneath, provide removable sections which shall fit flush with the surface of the framework. The end wings shall be sloping 45° from end of the steel framework and tie in securely to the adjacent fence.

2. MATERIAL:

(1) Framework and 45° End Wings: The framework and 45° end wings shall be constructed from standard commercial quality steel members (channels, pipe, light-gauge rails, or other suitable

shapes) and galvanized. Galvanizing shall be in accordance with Standard 4 – Substation Metalwork and Transmission Line Lattice Towers, Section 4.1.10 "Galvanizing and Painting". Painting shall be in accordance with the "Standard 12 - Painting.

(2) Concrete Foundation and Header: Reinforced concrete.

(3) Anchor Bolts: Anchor bolts, nuts, and washers shall be standard commercial quality, suitable for intended conditions of use.

3. CONSTRUCTION: Perform the required sitework in accordance with Section 2.5, "Excavation" and Section 2.8.1, "Placing and Compacting Backfill". Provide, place, cure, and finish concrete in accordance with the applicable sections of Standard 3 - Concrete. Fabricate, galvanize, and erect steel and other metalwork in accordance with Standard 4 - Substation Metalwork and Transmission Line Lattice Towers.

2.10.4 PERMANENT GATES IN EXISTING BARBED WIRE FENCES FOR TRANSMISSION LINE ACCESS ROADS:

1. MATERIAL: Material shall be in accordance with the details shown on the drawings and the following:

(1) Barbed Wire Gates: As shown on drawing 41 9002.
(2) Electric Barbed Wire Gates: As shown on drawing 41 9003.
(3) Prefabricated Tubular Steel Gates: As shown on drawing 41 9024.

2. INSTALLATION: Install gates in existing fences where directed by the COR.

2.10.5 FENCE GROUNDS FOR TRANSMISSION LINES:

1. MATERIAL: As shown on drawing 41 1011.

2. INSTALLATION:

(1) General: Install fence grounds in accordance with drawing 41 1011. Drive grounding rods to a depth of not less than 5 feet. Fasten fence wires securely to grounding rods with U-bolt clamps.

(2) Nonelectric Fences on Wood or Concrete Posts and Electric Fences: Ground with one grounding rod at hinge end of gates and one for each 1/8 mile of fence.

(3) Nonelectric Fences on Metal Posts: Ground with one grounding rod for each 1/4 mile of fence.

(4) Metallic Gates: Bond electrically to fence in accordance with drawing 41 9024.

(5) Fences Crossing Under Line: Ground with one grounding rod on each side of right-of-way.

SECTION 2.11 – SURFACING

2.11.1 GRAVEL SURFACING:

1. MATERIAL: Gravel surfacing material shall conform to the requirements for Type I, Gradation B, surface-course material, ASTM D 1241, with the following exceptions:

   (1) 100 percent shall pass the 1 1/2-inch screen.

   (2) 75-90 percent shall pass the 1-inch screen.

   (3) Minimum of 8 percent shall pass the No. 200 sieve in lieu of the minimum percentage shown in Table 1.

   (4) Fraction passing the No. 40 sieve shall have a maximum liquid limit of 35 and plasticity index range from 4 to 9 in lieu of the limits specified for fine aggregate. Liquid limit and plasticity index testing shall be in accordance with ASTM D 4318, Method A (Wet Preparation).

   (5) Minimum of 50 percent of material retained on the No. 4 screen shall have a minimum of one fractured face.

2. PLACING: Prior to placing, the subgrade shall be free from depressions and soft spots and conform to grades shown on the drawings. Gravel surfacing shall not be placed until the subgrade has been approved by the COR. Gravel surfacing thickness shall be greater than or equal to the thickness shown on the drawings after being compacted.

   Place, moisten, compact, and test gravel surfacing in accordance with Section 2.7.1, "Compacting Earth Material", with the following exceptions:

   (1) For gravel surfacing with more than 50 percent of the material passing the No. 4 screen, the density shall not be less than 90 percent.

   (2) For gravel surfacing with 50 percent or more of the material retained on the No. 4 screen, the density shall not be less than 85 percent.

   (3) Prior to and during compaction operations, the material shall have a moisture content of plus or minus 3 percent of optimum moisture.

   Surfaces of gravel surfacing shall be free from corrugations and waves.

2.11.2 ROAD BASE:

1. MATERIAL: Road base material shall conform to the following requirements (similar to Wyoming Department of Transportation for Grading L – Crushed Base, Well Graded Sand with Silt and Gravel):

   (1) 100 percent shall pass the 1 1/2-inch screen.

   (2) 90-100 percent shall pass the 1-inch screen.

   (3) 60-85 percent shall pass the 1/2-inch screen.

   (4) 35-55 percent shall pass the No. 4 sieve.

   (5) 25-50 percent shall pass the No. 8 sieve.

(6) 10-30 percent shall pass the No. 30 sieve.

(7) 3-15 percent shall pass the No. 200 sieve.

(8) Fraction passing the No. 40 sieve (for fine aggregate) shall have a maximum Liquid Limit of 25 (AASHTO T-89), and Plasticity Index range from 0 to 3 (AASHTO T-90). In lieu of AASHTO standards, Liquid limit and Plasticity Index testing may be in accordance with ASTM D 4318, Method A (Wet Preparation).

(9) Minimum of 50 percent of material retained on the No. 4 screen shall have a minimum of one fractured face.

2. PLACING: Prior to placing, the subgrade shall be free from depressions and soft spots and conform to grades shown on the drawings. Road base shall not be placed until the subgrade has been approved by the COR. Road base thickness shall be greater than or equal to the thickness shown on the drawings after being compacted.

   Place, moisten, compact, and test road base in accordance with Section 2.7.1, "Compacting Earth Material", with the following exceptions:

   (1) For road base with more than 50 percent of the material passing the No. 4 screen, the density shall not be less than 90 percent.

   (2) For road base with 50 percent or more of the material retained on the No. 4 screen, the density shall not be less than 85 percent.

   (3) Prior to and during compaction operations, the material shall have a moisture content of plus or minus 3 percent of optimum moisture.

   Surfaces of road base shall be free from corrugations and waves.

2.11.3 WASHED CRUSHED ROCK:

1. MATERIAL: Washed crushed rock material, of the thickness specified, shall be used as finished grade material placed over road base. Washed crushed rock material shall conform to the following requirements:

   (1) 100 percent shall pass the 1 1/2-inch screen.

   (2) 0 percent shall pass the 3/4-inch screen.

   (3) Washed crushed rock shall have a minimum of three fractured faces.

2. PLACING: Prior to placing the washed crushed rock, the road base shall be free from depressions and soft spots and conform to grades shown on the drawings. Washed crushed rock shall not be placed until the road base has been approved by the COR. Washed crushed rock thickness shall be greater than or equal to the specified thickness after being compacted.

   Place, moisten, compact, and test washed crushed rock in accordance with Section 2.7.1, "Compacting Earth Material". Final surfaces of washed crushed rock shall be free from corrugations and waves.

2.11.4 REPLACING AND PROTECTING GRAVEL SURFACING:

1. GENERAL: Replace existing gravel surfacing from removed areas. Add gravel surfacing required due to removing or cutting off existing concrete foundations, removing existing drains, and removing existing chain link fence. Existing gravel surfacing may be excavated separately in required excavation areas and reused if injurious amounts of earth, organic matter, and other deleterious material is removed prior to reuse.

   Before gravel surfacing is replaced or added, grade subgrade to conform to the required elevations and compact loose and disturbed material. Fill depressions in the subgrade with backfill material and compact in accordance with Section 2.8.1, "Placing and Compacting Backfill". Do not use gravel surfacing material for filling depressions.

   Provide additional gravel surfacing in accordance with Section 2.11.1, "Gravel Surfacing". Gravel surfacing shall be the same thickness as the existing adjacent gravel surfacing.

2. PROTECTING GRAVEL SURFACING: Protect existing gravel surfacing and subgrade in areas where equipment will operate. Use planking or other suitable material designed to spread the equipment loads to prevent damage.

   Repair damage to existing gravel surfacing and subgrade where such damage is due to the Contractor's operations. Grade and compact damaged subgrade areas as described in subsection 1 above before replacing gravel surfacing. Damaged gravel surfacing shall be restored to match the adjacent undamaged gravel surfacing and be the same thickness.

2.11.5 SOIL-APPLIED HERBICIDE:

1. GENERAL: Provide a broad spectrum, nonselective, soil-applied herbicide and submittals in accordance with Section 2.1.1.5 “Soil-Applied Herbicide”.

2. HERBICIDE APPLICATOR'S QUALIFICATIONS: The applicator shall be a dedicated industrial (noncrop) applicator with 2 years' experience applying commercial bare-ground, residual herbicides. Herbicide contractor shall be currently certified to apply herbicides for industrial (noncrop) weed control or rights-of-way.

3. REGULATIONS: Regulations and procedures are provided Standard 13 – Environmental Quality Protection – Section 13.11 “Pesticides”.

4. MATERIAL:

   (1) General: Soil-applied herbicides shall be of broad spectrum, nonselective type with a high residual soil activity. Herbicides shall be nonstaining and nonvolatile if applied in the vicinity of nontarget plants such as landscaping or field crops. Legible labels shall be maintained on all containers.

   (2) Storage: Herbicides shall not be stored on Government property without prior written approval from the COR. If the COR allows storage of herbicides, it shall be for no more than a 2-week period and in strict accordance with the storing of hazardous waste requirements of the applicable State Health and Safety Code and the COR's instructions.

5. APPLICATION:

   (1) General: Apply in strict accordance with the herbicide manufacturer's instructions and all Federal, State, and local codes and regulations. Soil-applied herbicide shall not be applied until the gravel surfacing has been placed.

(2) Weather Conditions: Apply herbicides only during periods of favorable weather conditions so that a major rainstorm, or rapid snow melt, does not occur and create surface runoff. If favorable weather conditions cannot be ensured, temporarily block drainage pipes through the fence, or other effective means as approved by the COR, to contain herbicide runoff inside the yard. Do not apply herbicide when winds could cause drifting of sprayed herbicide.

(3) Protective Equipment: The Contractor shall determine if personal protective equipment and other health and safety related equipment is required for performing the work covered by this section. The Contractor shall furnish all required equipment and ensure his employees use it. The Contractor shall provide all required medical monitoring, health physicals, and record keeping.

6. DAMAGE: Existing vegetation such as landscape plants, gardens, and field crops which, in the opinion of the COR, are damaged by the application of the soil-applied herbicide shall be replaced by the Contractor at his expense.

7. RELEASE OF HAZARDOUS SUBSTANCES: If a reportable release of hazardous substance occurs at the work site, the Contractor shall immediately notify the COR and all environmental agencies, as required by law. The Contractor shall be responsible for the cleanup.

8. WARRANTY: If vegetation occurs in the gravel surfaced area within 1 year following final acceptance of the work, the Contractor shall return and reapply herbicide as directed by the COR.

SECTION 2.12 – LANDSCAPING

2.12.1 SEEDING:

1. GENERAL: Seeding operations shall be undertaken only after the seeded areas will not be disturbed by other Contractor operations.

2. MATERIAL:

   Percent pure live seed shall be determined by the following formula:

   $$\text{Percent pure live seed} = \frac{\text{Percent of purity x percent of germination}}{100}$$

   Seed and seeding mixtures shall be free of prohibited noxious weed seed, quack grass (Agropyron repens), and Johnson grass (Sorghum halepense); not exceed the limits for restricted noxious weed seed; and not contain more than 4 percent of other weed seed. Prohibited and restricted noxious weeds are those classified by the State Seed Department.

   Seed containers shall be sealed and labeled to comply with State seed laws and regulations or in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act, if shipped in Interstate Commerce. For Montana, North Dakota, and South Dakota seed shall have been grown in the North American continent above 41° North latitude. Seeds shall be a standard grade adapted to State conditions.

   Different grass species shall be separately packaged and labeled so they can be uniformly and thoroughly mixed after receipt at the job site.

   If regrading is required, Western will test the soil in areas to be seeded after grading is complete. Based on the soil analysis, Western will determine the recommended fertilizer analysis and spread rate for fertilizer to be used.

   (1) Mulching Material: Dry hay or straw free from noxious weeds or foreign matter detrimental to plant life.

   (2) Protective Cover: Light, pervious burlap; jute matting; or standard commercial erosion net material which will protect against erosion and rapid moisture evaporation without preventing germination of seed or growth of grass.

   (3) Water: Free of matter harmful to plant growth.

3. PREPARATION:

   (1) Remove foreign material, stones, plants, and debris from areas to be seeded.

   (2) Protect existing underground improvements from damage.

   (3) Cultivate soil to a depth of 3 inches. Repeat cultivation in areas where equipment has compacted soil. The topsoil surface shall be relatively smooth with no ruts, furrows, or depressions that may cause erosion.

4. APPLICATION:

   (1) Fertilizing during seeding is acceptable provided the equipment is designed to evenly distribute fertilizer at the rate specified.

(2) Seeding: Provide uniform stands of grass on seeded areas. Reseed bare areas to obtain uniform stands.

Do not use wet seed or seed which is moldy or otherwise damaged. Do not sow immediately following rain, when ground is too dry, or during windy periods. Do not seed area in excess of that which can be mulched on same day.

1) Drill Seeding: Regulate drill to uniformly distribute seed and cover with soil to a depth not to exceed 1/2 inch. Dry fertilizer may be applied simultaneously with the drilling of seed if the drill is equipped with an attachment which will evenly distribute fertilizer at the rate specified.

2) Hydroseeding: Prepare slurry mixture immediately prior to application. Do not use slurry mixtures prepared more than 1 hour prior to application. Maintain uniform mixture of seed, fertilizer, and water. Cover seed with soil to a depth not to exceed 1/2 inch.

3) Mechanical or Hand Broadcasting: Method is acceptable for areas inaccessible to large equipment provided wind velocities permit uniform distribution of material. Cover seed with soil to a depth not to exceed 1/2 inch.

4) Mulching: Apply mulch to seeded areas and crimp into soil within 24 hours after seeding.

5) Slope Protection: For slopes steeper than 2:1, apply protective cover. Roll cover down over slopes without stretching or pulling. Bury top end of each section in narrow 6-inch trench.

Overlap 12 inches minimum from top roll over bottom roll. Overlap 4 inches minimum over adjacent section. Lightly dress slopes with topsoil to ensure close contact between cover and soil. In ditches, unroll cover in direction of flow. Overlap ends of strips 6 inches minimum with upstream section on top.

6) Maintenance: Water, mow, and apply weed control chemicals until date of final acceptance of work. The Contractor shall obtain uniform stands of grass on all seeded areas, reseeding bare areas as often as necessary to obtain uniform stands. Water to ensure uniform seed germination. Apply water slowly so that surface of soil will not puddle. Reseed and maintain damaged areas showing root growth failure, deterioration, bare spots, and eroded areas. Provide additional topsoil, where necessary, including areas affected by erosion.

SECTION 2.13 – ASPHALT PAVING

2.13.1 GENERAL:

1. QUALITY ASSURANCE:

   (1) Material and Producer: Supply source of asphalt paving material shall be approved by the COR before delivery.

   (2) Testing Laboratory: Shall meet the qualifications of ASTM D 3666.

2. MATERIAL:

   (1) Aggregate for Paving Courses: ASTM D 1073 for fine aggregate and ASTM D 692 for course aggregate; maximum nominal diameter 3/4 inch.

   (2) Gravel Base: ASTM D 2940.

   (3) Tack Coat: ASTM D 2397 for emulsified asphalt CSS-1H grade.

3. MIX DESIGN: The mix design shall meet the following requirements for Marshall Series ASTM D 1559 or Hveem Stabilometer ASTM D 1560:

   (1) Marshall Series:

   Minimum Stability, lbs.: 1,200
   No. of Blows: 50
   Flow, .01 in.: 8 to 16
   Air Voids %: 3.0 to 5.0% range, 4% target
   Minimum VMA %: 14 (bulk specific gravity of aggregate)

   (2) Hveem Stabilometer:

   Minimum Stabilometer Value: 35
   Maximum Swell (inches): 0.030
   Minimum Air Voids, %: 3.0 to 5.0% range, 4% target

4. BATCHING AND MIXING:

   (1) Comply with ASTM D 995 for material storage, control, mixing, and plant equipment and operation.

   (2) Aggregates: Deliver dry aggregate to mixer at recommended temperature to suit penetration grade and viscosity characteristics of asphalt, ambient temperature, and mixture work ability.

   (3) Mixing: Mix aggregates and asphalt to achieve coated particles in accordance with ASTM D 2489.

   (4) Transporting: Provide covers over mixture when transporting during rainy or cold weather. Mix shall be delivered at no less than 300°F.

5. TESTING: An approved testing laboratory shall be employed by the Contractor to perform asphalt paving tests. Obtain test samples in accordance with ASTM D 979. Perform tests as follows:

   (1) Bitumen Extraction: ASTM D 2172. One test per 500 tons or fraction thereof.

(2) Gradation Analysis: ASTM C 117 and ASTM C 136. One test per 500 tons or fraction thereof.

(3) Marshall Series ASTM D 1559 or Hveem Stabilometer ASTM D 1560: One test per 1,000 tons or fraction thereof.

(4) Density: ASTM D 2950.

(5) Bulk Specific Gravity and Compacted Density: ASTM D 2726. Two tests per 500 tons. Any fraction thereof will require one test.

6. PREPARATION OF SUBGRADE: Subgrade shall be compacted to a density of 95 percent of maximum dry density in accordance with Section 2.7.1 “Compacting Earth Material”. Before final rolling, shape entire section, and compact subgrade to provide grades, elevations, and cross section indicated on the drawings. Compact areas adjacent to structures and other areas not accessible to rollers with mechanical or hand tamping devices.

7. PLACING OF GRAVEL BASE:

(1) Place untreated aggregate base when the air temperature is above 30°F and rising.

(2) Spread untreated aggregate base material over prepared subgrade to compacted depth and grades shown on the drawings.

(3) Compact and moisten untreated aggregate base at optimum moisture content, ±1.5 percent to achieve a minimum density of 95 percent of maximum laboratory density in accordance with ASTM D 1557.

8. CONDITIONING OF ADJOINING SURFACES:

Construct structures adjacent to proposed asphalt pavement prior to placement of pavement. Surfaces in contact with the asphalt pavement shall be painted with a uniform tack coat prior to placing asphalt pavement.

9. SPREADING AND COMPACTING ASPHALT PAVING:

(1) General: Spread and compact asphalt paving in accordance with the "Spreading" and "Compaction" sections in Asphalt Institute Manual Series No. MS-8, "Asphalt Paving".

(2) Weather: Construct paving courses when air temperature is above 40°F, underlying base is dry, and weather is not rainy.

(3) Protection: Protect buildings and other facilities from asphalt splatter. Do not discharge unused paving material on the site.

(4) Compaction: Asphalt paving shall be compacted to a minimum of 93 percent of theoretical maximum specific gravity in accordance with ASTM D 2041.

Do not allow vehicular traffic on newly paved areas until surface has cooled to air temperature.

Ensure surface of completed pavement is true to lines, profiles, and elevations indicated, and is free from depressions.

10. TOLERANCES: After placement, asphalt paving shall be within the following tolerances:

    (1) Thickness of Asphalt Paving Courses: ±1/4 inch.

    (2) Smoothness of Asphalt Paving Courses: Free from depressions exceeding 1/4 inch when measured with a 10-foot straight-edge.

11. PAVEMENT MARKING MATERIAL: Material used shall be equal to Pro-Mar Water Borne Traffic Paint by Sherwin Williams Company; PPG Traffic and Zone Marking Paint by PPG Industries, Inc., Coatings and Resins; or Traffic Zone Paint by ICI Americas Inc./Glidden Company. Color shall be white or yellow.

    Paint stripes for parking lanes shall be 4 inches wide and sprayed or brushed at locations shown on the drawings. Provide handicap symbols in accordance with the International Symbol System. Spray or brush stripes at crosswalks and stop signs. Surface of pavement shall be thoroughly cleaned and dust free before painting.

2.13.2 ASPHALT PAVING RECYCLING:

1. GENERAL: Dispose of existing asphalt paving in accordance with Standard 13 – Environmental Quality Protection, Section 13.8 "Disposal of Waste Material". Recycled asphalt paving shall meet the requirements in Section 2.13.1, "Asphalt Paving, General".

2. HOT MIX RECYCLING: In accordance with Asphalt Institute Manual Series No. MS-20.

3. COLD MIX RECYCLING: In accordance with Asphalt Institute Manual Series No. MS-21.

2.13.3 GEOTEXTILE FABRIC:

Geotextile fabric shall be a woven, polypropylene fabric equal to Propex 2002 Construction Fabric by Amoco Fabric Company, 550 Interstate North Parkway, Atlanta, GA 30099. Geotextile fabric shall be black and have a fill tensile strength not less than 200 pounds, fill elongation not more than 20 percent, burst strength not less than 450 psi, and puncture strength not less than 75 pounds. Install geotextile fabric in accordance with manufacturer’s instruction.

Standard 13

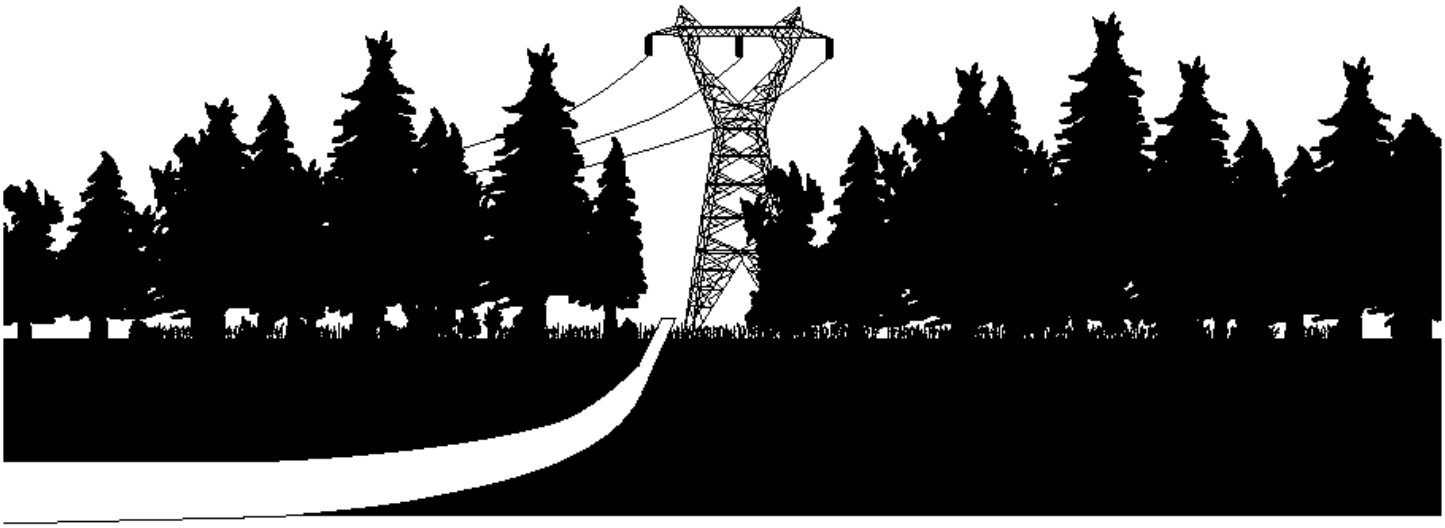
Environmental Quality Protection

Western Area
Power Administration

CONSTRUCTION STANDARDS

STANDARD 13

ENVIRONMENTAL QUALITY PROTECTION



September 2016

SAFETY
A HABIT TO LIVE BY

STANDARD 13 – ENVIRONMENTAL QUALITY PROTECTION

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SECTION 13.1 – REQUIRED SUBMITTALS, REPORTS, AND PLANS

1. FINAL PAYMENT: For each section below, final payment will be withheld until the referenced submittal, report, or plan is received.

SECTION 13.2 – CONTRACTOR FURNISHED DATA

1. RECYCLED MATERIALS QUANTITY REPORT: Submit quantities of recycled materials listed in Section 13.7, "Recycled Materials Quantities", to the COR prior to submittal of final invoice.

2. RECOVERED AND BIOBASED MATERIAL PRODUCTS REPORT: Provide the COR the following information for purchases of items listed in Section 13.8, "Use of Recovered Material and Biobased Material Products".

   (1) Quantity and cost of listed items with recovered or biobased material content and quantity and cost of listed items without recovered or biobased material content prior to submittal of final invoice.

   (2) Written justification of listed items if recovered material or biobased material products are not available: 1) competitively within a reasonable time frame; 2) meeting reasonable performance standards as defined in the Standards or Project Specifications; or 3) at a reasonable price.

3. REFRIGERANT RECEIPT: The contractor shall provide a record of all refrigerant usage, recycling, or disposal on WAPA HVAC systems. In the event refrigerant is either charged into or removed and reclaimed from a WAPA HVAC system, the contractor shall provide either a record of usage or a receipt from the EPA-certified refrigerant reclaimer including whether it was either added to or reclaimed from the equipment, the date, and the amount and type of refrigerant used to the COR prior to submittal of final invoice.

4. WASTE MATERIAL QUANTITY REPORT: Submit quantities of total project waste material disposal as listed below to the COR prior to submittal of final invoice in accordance with Section 13.9.8, “Waste Material Quantity Report”.

   (1) Unregulated Wastes (i.e., trash): Volume in cubic yards or weight in pounds.

   (2) Hazardous or Universal Wastes: Weight in pounds.

   (3) PCB Wastes: Weight in pounds.

   (4) Other regulated wastes (e.g., lead-based paint or asbestos): Weight in pounds (specify type of waste in report).

5. SPILL PREVENTION NOTIFICATION AND CLEANUP PLAN (Plan): Submit the Plan as described in Section 13.11.2, "Spill Prevention Notification and Cleanup Plan”, to the COR for review and comment 14 days prior to start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations.

6. TANKER OIL SPILL PREVENTION AND RESPONSE PLAN: Submit the Plan as described in Section 13.11.3, "Tanker Oil Spill Prevention and Response Plan”, to the COR for review and comment 14 days prior to start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations.

7. PESTICIDE USE PLAN: Submit a plan as described in Section 13.12.3, “Pesticide Use Plan”, to the COR for review and comment 14 days prior to the date of intended pesticide application. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations. Within seven days after application, submit a written report in accordance with Standard 2 – Sitework, Section 2.1.1_5, “Soil-Applied Herbicide”.

8. TREATED WOOD UTILITY POLES AND CROSSARMS RECYCLING - CONSUMER INFORMATION SHEET RECEIPT: Submit treated wood utility poles and crossarms - consumer information sheet receipts to the COR prior to submittal of final invoice (see 13.13, “Treated Wood Utility Poles and Crossarms Recycling or Disposal”).

9. PREVENTION OF AIR POLLUTION: Submit a copy of permits, if required, as described in 13.14, “Prevention of Air Pollution” to the COR 14 days prior to the start of work.

10. SULFUR HEXAFLUORIDE (SF6) EMISSIONS: A receipt from the SF6 gas supplier stating that the gas was reclaimed, the amount of SF6, and the date shall be submitted to the COR prior to submittal of final invoice in accordance with Section 13.14.4(3), “Certificates of Disposal and Receipts”.

11. ASBESTOS LICENSES OR CERTIFICATIONS: Submit a copy of licenses, certifications, Demolition and Renovation Notifications and Permits for asbestos work as described in 13.15,”Handling and Management of Asbestos Containing Material” to the COR 14 days prior to starting work. Submit copies of certificates of disposal and/or receipts for waste to the COR prior to submittal of final invoice.

12. LEAD PAINT NOTICES: Submit a copy of lead paint notices with contractor and recipient signatures as described in 13.16, “Material with Lead-based Paint” to the COR prior to submittal of final invoice. Submit copies of certificates of disposal and/or receipts for waste to the COR prior to submittal of final invoice.

13. WATER POLLUTION PERMITS: Submit copies of any water pollution permits as described in 13.17, “Prevention of Water Pollution” to the COR 14 days prior to start of work.

14. PCB TEST REPORT: Submit a PCB test report as described in 13.18, “Testing, Draining, Removal, and Disposal of Oil-filled Electrical Equipment”, prior to draining, removal, or disposal of oil or oil-filled equipment that is designated for disposal.

15. OIL AND OIL-FILLED ELECTRICAL EQUIPMENT RECEIPT: Obtain and submit a receipt for oil and oil-filled equipment transported and disposed, recycled, or reprocessed as described in 13.18, “Testing, Draining, Removal, and Disposal of Oil-filled Electrical Equipment”, to the COR prior to submittal of final invoice.

16. OSHA PCB TRAINING RECORDS: Submit employee training documentation records to the COR 14 days prior to the start of work as described in 13.19.1.

17. CLEANUP WORK MANAGEMENT PLAN: Submit a Cleanup Work Management Plan as described in 13.19, “Removal of Oil-contaminated Material” to the COR for review and comment 14 days prior to the start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations.

18. POST CLEANUP REPORT: Submit a Post-Cleanup Report as described in 13.19, “Removal of Oil-contaminated Material” to the COR prior to submittal of final invoice.

STANDARD 13 - ENVIRONMENTAL QUALITY PROTECTION

SECTION 13.3 – ENVIRONMENTAL REQUIREMENTS

Comply with Federal, State, and local environmental laws and regulations. The sections in this Standard further specify the requirements.

SECTION 13.4 – LANDSCAPE PRESERVATION

1. GENERAL: Preserve landscape features in accordance with the contract clause titled "Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements." Exercise care to preserve the natural landscape and conduct activities to prevent any unnecessary destruction, scarring, or defacing of the natural surroundings in the project vicinity. Except where clearing is required for permanent works, approved construction roads, or excavation operations, vegetation shall be preserved and shall be protected from damage by project operations and equipment.

2. CONSTRUCTION ROADS: Location, alignment, and grade of construction roads shall be subject to the COR's approval. When no longer required, surfaces of construction roads shall be scarified to facilitate natural revegetation, provide for proper drainage, and prevent erosion. If re-vegetation is required, use seed mixtures as recommended by Natural Resources Conservation Service or other land managing agency as appropriate.

3. CONSTRUCTION FACILITIES: Shop, office, material lay down and material and equipment storage areas, and yard areas shall be located and arranged in a manner to preserve trees and vegetation to the maximum practicable extent and prevent impact on sensitive riparian areas and flood plains. Storage and construction buildings, including concrete footings and slabs, shall be removed from the site prior to contract completion. The area shall be re-graded as required so that all surfaces drain naturally, blend with the natural terrain, and are left in a condition that will facilitate natural revegetation, provide for proper drainage, and prevent erosion or transport of sediment and pollutants. If re-vegetation is required, use seed mixtures as recommended by Natural Resources Conservation Service or other land managing agency as appropriate.

SECTION 13.5 – PRESERVATION OF CULTURAL AND PALEONTOLOGICAL RESOURCES

1. GENERAL: Do not, at any time, remove, disturb, or otherwise alter cultural artifacts or paleontological resources (fossils). Cultural artifacts may be of scientific or cultural importance and include, but are not limited to bones, pottery, projectile points (arrowheads), other stone or metal tools, surface features (stone circles, rock piles, etc.), glass, metal, ceramic, or other historic objects, structures and buildings (including ruins). Paleontological resources can be of scientific importance and include mineralized animals and plants or trace fossils such as footprints. Both cultural and paleontological resources are protected by Federal Regulations during Federal construction projects. Contractor shall restrict all ground disturbing activities to areas reviewed/investigated and approved WAPA by the Regional Preservation Officer (RPO) and as specified in accordance with Standard 1 – General Requirements, Sections 1.3.1 Rights-of-way and 1.3.2 Access to the Work and Haul Routes.

2. KNOWN CULTURAL OR PALEONTOLOGICAL SITES: The contractor shall ensure that all construction activities avoid the boundaries of specific cultural, historic, or scientific sites. Following issuance of notice to proceed, WAPAWAPA will provide drawings or maps that indicate the areas of avoidance in relation to the project area. Prior to any construction activity, the avoidance areas shall be marked on the ground in a manner approved by the COR in conjunction with the RPO. When avoidance is not possible, the Contractor shall provide WAPA a 90-day notice of their inability to avoid historic properties. WAPA will consult with the appropriate authorities and the contractor will not be permitted to work within or near the boundaries of the historic property until the RPO approves of the work and the COR directs the contractor to proceed. Instruct employees and subcontractors that vehicular or equipment access to these areas is prohibited. If access is absolutely necessary, first

obtain approval from the COR in conjunction with the RPO. WAPA will remove the markings during or following final cleanup.

3. WORKING WITH CULTURAL, PALEONTOLOGICAL, OR TRIBAL MONITORS: For some project work, WAPA will require an archaeological, paleontological or tribal monitor at or near cultural or paleontological site locations. The contractor, contractor's employees, and subcontractors shall work with the monitor to insure that sensitive areas are avoided. Where monitors are required, the monitor shall meet with the crew each morning to go over the day's work. The monitor will also conduct awareness training for all contractors prior to any work in the field. Untrained personnel shall not be allowed in the construction area. For sensitive areas requiring a monitor, the contractor may not access those areas without a monitor being present.

4. UNKNOWN CULTURAL OR PALEONTOLOGICAL SITES: On rare occasions cultural or paleontological sites may be discovered during excavation or other earth-moving or other construction activities.

   (1) Reporting: If evidence of a cultural or paleontological site is discovered, cease work in the area immediately and notify the COR of the location and nature of the findings. If a monitor is present, the monitor should also be notified. Stop all activities within a 200-foot radius of the discovery and do not proceed with work within that radius until directed to do so by the COR.

   (2) Care of Evidence: Protect the area. Do not remove, handle, alter, or damage artifacts or fossils uncovered during construction activities.

5. SPECIAL CONSIDERATIONS: Refer to Division 13 of the Project Specifications for site-specific requirements including, but not limited to, known and unknown cultural or paleontological resources.

SECTION 13.6 – NOXIOUS WEED CONTROL

Comply with Federal, State, and local noxious weed control regulations. At Contractor's expense, obtain required permits and conduct required notifications. Provide a "clean vehicle policy" while entering and leaving construction areas to prevent transport of noxious weed plants and/or seed. Transport only construction vehicles that are free of mud and vegetation debris to staging areas and the project right-of-way. All seed mixes and mulch used for reclamation activities will be certified weed-free.

SECTION 13.7 – RECYCLED MATERIALS QUANTITIES

1. GENERAL: All materials generated from the project that can be recycled, shall be recycled. Record quantities of material by category that is salvaged, recycled, reused, or reprocessed, including:

   (1) Transformers, Breakers: Weight without oil.

   (2) Aluminum Conductor – Steel Reinforced (ACSR): Weight in pounds or tons.

   (3) Steel: Weight in pounds or tons.

   (4) Aluminum: Weight in pounds or tons.

   (5) Copper: Weight in pounds or tons.

   (6) Other Metals: Weight in pounds or tons.

   (7) Oil: Gallons (separate by type - less than 2 ppm PCB, 2 to 50 ppm PCB, and 50 or greater ppm PCB).

(8) Gravel, Asphalt, Or Concrete: Weight in pounds or tons.

(9) Batteries: Weight in pounds.

(10) Treated Wood Utility Poles and Crossarms: Weight in pounds.

(11) Wood construction material: Weight in pounds.

(12) Cardboard: Weight in pounds.

(13) Porcelain Insulators: Weight in pounds.

(14) Glass: Weight in pounds.

(15) Fluorescent Bulbs: Weight in pounds.

(16) Ballasts: Weight in pounds.

2. RECYCLED MATERIAL QUANTITY REPORT: Submit quantities (pounds or metric tons) of all recycled material by category to the COR within 30 days of recycling and prior to submittal of final invoice.

SECTION 13.8 – USE OF RECOVERED MATERIAL AND BIOBASED MATERIAL PRODUCTS

1. RECOVERED MATERIAL PRODUCTS: If the products listed below or other products listed at https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program are obtained as part of this project, purchase the items with the highest recovered material content possible unless recovered material products are not available: 1) competitively within a reasonable time frame; 2) meeting reasonable performance standards as defined in the Standards or Project Specifications; or 3) at a reasonable price.

   Example include:

   (1) Building Insulation Products.

   (2) Carpet.

   (3) Carpet cushion.

   (4) Cement and concrete containing coal fly ash, ground granulated blast furnace slag, cenospheres, or silica fume.

   (5) Consolidated and reprocessed latex paint.

   (6) Floor Tiles.

   (7) Flowable fill.

   (8) Laminated Paperboard.

   (9) Modular threshold ramps.

   (10) Nonpressure pipe.

(11) Patio Blocks.

(12) Railroad grade crossing surfaces.

(13) Roofing materials.

(14) Shower and restroom dividers/partitions.

(15) Signage.

(16) Structural Fiberboard.

2. BIOBASED MATERIAL PRODUCTS: If the products listed at https://www.biopreferred.gov/BioPreferred/faces/pages/ProductCategories.xhtml are obtained as part of this project, purchase the items with the highest biobased content possible and no less than the percent indicated for each product unless biobased material products are not available: 1) competitively within a reasonable time frame, 2) meeting reasonable performance standards as defined in the Standards or Project Specifications, or 3) at a reasonable price.

   NOTE: All station service and pole mounted transformers will be bio-based oil. WAPA large transformers will be evaluated on a best value basis using life cycle cost analysis.

3. RECOVERED MATERIAL AND BIOBASED MATERIAL PRODUCTS REPORT: Provide the COR the following information for purchases of those items listed above:

   Quantity and cost of listed items with recovered or biobased material content and quantity and cost of listed items without recovered or biobased material content prior to submittal of final invoice.

   Written justification of listed items if recovered material or biobased material products are not available: 1) competitively within a reasonable time frame; 2) meeting reasonable performance standards as defined in the Standards or Project Specifications; or 3) at a reasonable price.

SECTION 13.9 – DISPOSAL OF WASTE MATERIAL

1. GENERAL: Dispose or recycle waste material in accordance with applicable Federal, State and local regulations and ordinances. In addition to the requirements of the Contract Clause “Cleaning Up”, remove all waste material from the construction site. No waste shall be left on WAPA property, right-of-way, or easement. Burning or burying of waste material is not permitted.

2. HAZARDOUS, UNIVERSAL, AND NON-HAZARDOUS WASTES: Manage hazardous, universal, and non-hazardous wastes in accordance with State and Federal regulations.

3. USED OIL: Used oil generated from the Contractor activities shall be managed in accordance with used oil regulations.

4. RECYCLABLE MATERIAL: Reduce wastes, including excess WAPA material, by recycling, reusing, or reprocessing. Examples of recycling, reusing, or reprocessing includes, but is not limited to, reprocessing of solvents; recycling cardboard; and salvaging scrap metals.

5. REFRIGERANTS AND RECEIPTS: Refrigerants from air conditioners, water coolers, refrigerators, ice machines and vehicles shall be reclaimed with certified equipment operated by certified technicians if the item is to be disposed. Refrigerants shall be reclaimed and not vented to the atmosphere. A

receipt from the reclaimer stating that the refrigerant was reclaimed, the amount and type of refrigerant, and the date shall be submitted to the COR prior to submittal of final invoice.

6. HALONS: Equipment containing halons that must be tested, maintained, serviced, repaired, or disposed must be handled according to EPA requirements and by technicians trained according to those requirements.

7. SULFUR HEXAFLUORIDE: SF_6 gas shall be reclaimed and shall not be vented to the atmosphere. See Section 13.14.4(3)

8. WASTE MATERIAL QUANTITY REPORT: Submit quantities of total project waste material disposal as listed below to the COR prior to submittal of final invoice.

   (1) Unregulated Wastes (i.e., trash): Volume in cubic yards or weight in pounds.

   (2) Hazardous or Universal Wastes: Weight in pounds.

   (3) PCB Wastes: Weight in pounds.

   (4) Other regulated wastes (e.g., lead-based paint or asbestos): Weight in pounds (specify type of waste in report).

SECTION 13.10 – CONTRACTOR'S LIABILITY FOR REGULATED MATERIAL INCIDENTS

1. GENERAL: The Contractor is solely liable for all expenses related to spills, mishandling, or incidents of regulated material attributable to his actions or the actions of his subcontractors. This includes all response, investigation, cleanup, disposal, permitting, reporting, and requirements from applicable environmental regulation agencies.

2. SUPERVISION: The actions of the Contractor employees and subcontractors shall be properly managed at all times on WAPA property or while transporting WAPA's (or previously owned by WAPA) regulated material and equipment.

SECTION 13.11 – POLLUTANT SPILL PREVENTION, NOTIFICATION, AND CLEANUP

1. GENERAL: Provide measures to prevent spills of pollutants and respond appropriately if a spill occurs. A pollutant includes any hazardous or non-hazardous substance that when spilled, will contaminate soil, surface water, or ground water. This includes any solvent, fuel, oil, paint, pesticide, engine coolants, and similar substances.

2. SPILL PREVENTION NOTIFICATION AND CLEANUP PLAN (Plan): Provide the Plan to the COR for review and comment 14 days prior to start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations. Include the following in the Plan:

   (1) Spill Prevention Measures: Describe the work practices or precautions that will be used at the job site to prevent spills. These may include engineered or manufactured techniques such as installation of berms around fuel and oil tanks; storage of fuels, paints, and other substances in spill proof containers; and management techniques such as requiring workers to handle material in certain ways.

(2) Notification: Most States and the Environmental Protection Agency require by regulation that anyone who spills certain types of pollutants in certain quantities notify them of the spill within a specific time period. Some of these agencies require written follow up reports and cleanup reports. Include in the Plan the types of spills for which notification would be made, the agencies notified, the information the agency requires during the notification, and the telephone numbers for notification.

(3) Employee Awareness Training: Describe employee awareness training procedures that will be implemented to ensure personnel are knowledgeable about the contents of the Plan and the need for notification.

(4) Commitment of Manpower: Equipment and Material. Identify the arrangements made to respond to spills, including the commitment of manpower, equipment and material.

(5) If applicable, address all requirements of 40CFR112 pertaining to Spill Prevention, Control and Countermeasures Plans.

3. TANKER OIL SPILL PREVENTION AND RESPONSE PLAN: Provide a Tanker Oil Spill Prevention and Response Plan as required by the Department of Transportation if oil tankers with volume of 3,500 gallons or more are used as part of the project. Submit the Tanker Oil Spill Prevention and Response Plan to the COR for review and comment 14 days prior to start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations.

SECTION 13.12 – PESTICIDES

1. GENERAL: The term “pesticide” includes herbicides, insecticides, rodenticides and fungicides. Pesticides shall only be used in accordance with their labeling and applied by appropriately certified applicators.

2. ENVIRONMENTAL PROTECTION AGENCY REGISTRATION: Use only EPA-registered pesticides that are approved for the intended use and location. Follow all applicable label directions.

3. PESTICIDE USE PROPOSAL: Provide a pesticide use proposal that contains: 1) pesticide(s) proposed (include mixtures and surfactants), 2) treatment site, 3) intended rate of application, 4) a copy of labels and Safety Data Sheets, and 5) a copy of required applicator certifications. Submit the pesticide use proposal to the COR for review and comment 14 days prior to the date of intended application. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations. Within seven days after application, submit a written final report to the COR, including the pesticide applicators report, in accordance with Standard 2 – Sitework, Section 2.1.1 5. “Soil-Applied Herbicide, (4) Final Report”.

SECTION 13.13 – TREATED WOOD UTILITY POLES AND CROSSARMS RECYCLING OR DISPOSAL

Whenever practicable, treated wood utility poles and crossarms removed during the project shall be recycled or transferred to the public for some uses. Treated wood utility poles and crossarms transferred to a recycler, landfill, or the public shall be accompanied by a written consumer information sheet for treated wood as provided by WAPA. Obtain a receipt, part of the consumer information sheet, from the recipient indicating that they have received, read, and understand the consumer information sheet. Treated wood products transferred to right-of-way landowners shall be moved off the right-of-way. Treated wood product scrap, poles, and crossarms that cannot be donated or reused shall be properly disposed in a landfill that

accepts treated wood and has signed WAPA's consumer information sheet receipt. Submit treated wood utility poles and crossarms consumer information receipts to the COR prior to submittal of final invoice.

SECTION 13.14 – PREVENTION OF AIR POLLUTION

1. GENERAL: Ensure that construction activities and the operation of equipment are undertaken to reduce the emission of air pollutants. Submit a copy of permits for construction activities, if required (e.g., "non-attainment" areas, State implementation plans, or Class I air-sheds), from Federal, State, or local agencies to the COR 14 days prior to the start of work. The contractor shall fulfill the conditions under any applicable locally prepared Environmental Impact Statements (EISs) or Environmental Assessments (EAs) conducted for the project under the National Environmental Protection Act (NEPA).

2. MACHINERY AIR EMISSIONS: The Contractor and subcontractor machinery shall have, and shall use the air emissions control devices required by Federal, State or Local Regulation or ordinance.

3. DUST ABATEMENT: Dust shall be controlled. Oil shall not be used as a dust suppressant. Dust suppressants shall be approved by the COR prior to use.

4. SULFUR HEXAFLUORIDE EMISSIONS:

   (1) GENERALGENERALGENERAL: WAPA complies with State, Federal, and local regulations regarding Mandatory Greenhouse Gas Reporting 40 CFR Part 98. The Contractor shall provide the information required by this section to the COR as described.

   (2) The Contractor shall record quantities of SF_6 gas, including:

      a. Nameplate capacity in pounds of SF_6 gas containing equipment.

      b. Record pounds of SF_6 gas stored in containers, before transferring into energized equipment.

      c. Record pounds of SF_6 gas left in containers, after transferring into energized equipment.

      d. Pounds of SF_6 gas purchased from equipment manufacturers or distributors.

      e. Pounds of SF_6 gas returned to suppliers.

      f. Scales used to weigh cylinders must be accurate to within +/- 2 pounds and must have current calibration sticker.

   (3) CONTRACTOR FIELD QUALITY TESTING AND SF_6 GAS HANDLING:

      a. The Contractor shall test all functions to verify correct operation and conduct a leak test. No SF_6 gas leakage shall be allowed from any equipment or storage containers.

      b. Atmospheric venting of SF_6 gas is not allowed.

      c. The Contractor shall remove all empty SF_6 gas cylinders and return to supplier.

   (4) CERTIFICATES OF DISPOSAL AND RECEIPTS FOR SF_6 GAS:

      a. The Contractor can use WAPA's Reporting Form for reporting quantities listed above.

b. The Contractor shall provide receipts of SF_6 gas returned to supplier.

c. The Contractor shall submit SF_6 gas Reporting Forms and copies of receipts to the COR prior to submittal of final invoice.

5. PROTECTION OF STRATOSPHERIC OZONE: The contractor shall comply with all State, Federal, and local regulations regarding ozone depleting substances and the Protection of Stratospheric Ozone, including, but not limited to 40 CFR 82. Contractors performing work on HVAC systems shall be trained and certified according to the regulations, and releases of ozone depleting substances to the atmosphere shall be prevented. The contractor shall provide reclaimed refrigerant receipts to the COR in accordance with section 13.2.3 of this document.

SECTION 13.15 – HANDLING AND MANAGEMENT OF ASBESTOS CONTAINING MATERIAL

1. GENERAL: Obtain the appropriate Federal, State, Tribal or local licenses or certifications prior to disturbing any regulated asbestos-containing material. If a building or portion of a building will be demolished or renovated, obtain an Asbestos Notice of and Permit for Demolition and Renovation from the State or Tribal Department of Environmental Quality, Division of Air Quality (or equivalent). The building(s) shall be inspected by a State-Certified or Tribal accepted Asbestos Building Inspector. The inspector shall certify the presence and condition of asbestos, or non-presence of asbestos, on site as directed on the State or Tribal Demolition and Renovation Notice/Permit. The inspections shall be performed and notifications shall be submitted whether asbestos is present or not. Submit a copy of licenses, certifications, Demolition and Renovation Notifications and Permits for asbestos work to the COR 14 days prior to work. Ensure: 1) worker and public safety requirements are fully implemented and 2) proper handling, transportation, and disposal of asbestos containing material.

2. TRANSPORTATION OF ASBESTOS WASTE: Comply with Department of Transportation, Environmental Protection Agency, and State and Local requirements when transporting asbestos wastes.

3. CERTIFICATES OF DISPOSAL AND RECEIPTS: Obtain certificates of disposal for waste if the waste is a hazardous waste or receipts from a landfill approved to accept asbestos if the waste is a non-hazardous waste. Submit copies to the COR prior to submittal of final invoice.

SECTION 13.16 – MATERIAL WITH LEAD-BASED PAINT

1. GENERAL: Comply with all applicable Federal, State and local regulations concerning work with lead-based paint, disposal of material painted with lead-based paint, and management of these materials. OSHA and General Industry Standards apply to worker safety and right-to-know issues. Federal EPA and State agencies regulate waste disposal and air quality issues.

2. TRANSFER OF PROPERTY: If lead-based paint containing equipment or material is to be given away or sold for reuse, scrap, or reclaiming, the contractor shall provide a written notice to the recipient of the material stating that the material contains lead-based paint and the Hazardous Waste regulations may apply to the waste or the paint in some circumstances. The new owner must also be notified that they may be responsible for compliance with OSHA requirements if the material is to be cut, sanded, abraded, or stripped of paint. Submit a copy of lead paint notices with contractor and recipient signatures to the COR prior to submittal of final invoice.

3. CERTIFICATES OF DISPOSAL AND RECEIPTS: Obtain certificates of disposal for waste if the waste is a hazardous waste or receipts from a landfill if the waste is a non-hazardous waste. Submit copies to the COR prior to submittal of final invoice.

STANDARD 13 - ENVIRONMENTAL QUALITY PROTECTION

SECTION 13.17 – PREVENTION OF WATER POLLUTION

1. GENERAL: Ensure that surface and ground water is protected from pollution caused by construction activities and comply with applicable regulations and requirements. Ensure that streams, waterways and other courses are not obstructed or impaired unless the appropriate Federal, State or local permits have been obtained.

2. PERMITS: Ensure that:

   (1) A National Pollutant Discharge Elimination System (NPDES) permit is obtained from the US Environmental Protection Agency or State as appropriate if the disturbed construction area equals 1 acre or more. Contractor is responsible for preparation and implementation of the associated Storm Water Pollution Prevention Plan (SWPPP). Disturbed areas include staging, parking, fueling, stockpiling, and any other construction related activities. Refer to https://www.epa.gov/npdes/npdes-stormwater-program for directions and forms.

   (2) A dewatering permit is obtained from the appropriate agency if required for construction dewatering activities.

   (3) Copies of permits and plans, approved by the appropriate regulating agencies, are submitted to the COR 14 days prior to start of work.

3. EXCAVATED MATERIAL AND OTHER CONTAMINANT SOURCES: Control runoff from excavated areas and piles of excavated material, construction material or wastes (to include truck washing and concrete wastes), and chemical products such as oil, grease, solvents, fuels, pesticides, and pole treatment compounds. Excavated material or other construction material shall not be stockpiled or deposited near or on streambanks, lake shorelines, ditches, irrigation canals, or other areas where run-off could impact the environment.

4. MANAGEMENT OF WASTE CONCRETE OR WASHING OF CONCRETE TRUCKS: Do not permit the washing of concrete trucks or disposal of excess concrete in any ditch, canal, stream, or other surface water. Concrete wastes shall be disposed in accordance with all Federal, State, and local regulations. Concrete wastes shall not be disposed of on any WAPA property, right-of-way, or easement; or on any streets, roads, or property without the owner's consent.

5. STREAM CROSSINGS: Crossing of any stream or other waterway shall be done in compliance with Federal, State, and local regulations. Crossing of some waterways may be prohibited by landowners, Federal or State agencies or require permits.

SECTION 13.18 – TESTING, DRAINING, REMOVAL, AND DISPOSAL OF OIL-FILLED ELECTRICAL EQUIPMENT

1. SAMPLING AND TESTING OF INSULATING OIL FOR PCB CONTENT: Sample and analyze the oil of electrical equipment (which includes storage tanks) for PCB's. Use analytical methods approved by EPA and applicable State regulations. Decontaminate sampling equipment according to documented good laboratory practices (these can be contractor developed or EPA standards). Use only laboratories approved by WAPA. The COR will furnish a list of approved laboratories.

2. PCB TEST REPORT: Provide PCB test reports that contain the information below for disposing of oil-filled electrical equipment. Submit the PCB test report for COR approval prior to draining, removal, or disposal of oil or oil-filled equipment that is designated for disposal.

   (1) Name and address of the laboratory.

(2) Copies of Chain of Custody Form(s).

(3) Description of the electrical equipment (e.g. transformer, breaker).

(4) Serial number for the electrical equipment.

(5) Date sampled.

(6) Date tested.

(7) PCB contents in parts per million (ppm) by Aroclor type.

(8) Unique identification number of container into which the oil was drained (i.e., number of drum, tank, tanker, etc.)

3. OIL CONTAINING PCB: Comply with the Federal regulations pertaining to PCBs found at Title 40, Part 761 of the U.S. Code of Federal Regulations (40 CFR 761).

4. REMOVAL AND DISPOSAL OF INSULATING OIL AND OIL-FILLED ELECTRICAL EQUIPMENT: Once the PCB content of the oil has been identified from laboratory results, the oil shall be transported and disposed, recycled, or reprocessed according to 40 CFR 761 (if applicable), Resource Conservation and Recovery Act (RCRA) "used oil", and other applicable regulations. Used oil may be transported only by EPA-registered used oil transporters. The oil must be stored in containers that are labeled "Used Oil." Use only transporters and disposal sites approved by WAPA.

5. OIL AND OIL-FILLED ELECTRICAL EQUIPMENT RECEIPT: Obtain and submit a receipt for oil and oil-filled equipment transported and disposed, recycled, or reprocessed to the COR prior to submittal of final invoice.

SECTION 13.19 – REMOVAL OF OIL-CONTAMINATED MATERIAL

1. GENERAL: Removing oil-contaminated material includes excavating, stockpiling, testing, transporting, cleaning, and disposing of these material. Personnel working with PCBs shall be trained in accordance with OSHA requirements. Submit employee training documentation records to the COR 14 days prior to the start of work.

2. CLEANUP WORK MANAGEMENT PLAN: Provide a Cleanup Work Management Plan that has been approved by applicable Federal, State, or Local environmental regulation agencies. Submit the plan to the COR for review and comment 14 days prior to the start of work. Review of the plan is for the purpose of determining compliance with the specifications only and shall not relieve the Contractor of the responsibility for compliance with all Federal, State, and Local regulations. The plan shall address on-site excavation of contaminated soil and debris and include the following:

(9) Identification of contaminants and areas to be excavated.
(10) Method of excavation.
(11) Level of personnel/subcontractor training.
(12) Safety and health provisions.
(13) Sampling requirements including quality control, laboratory to be used.
(14) Management of excavated soils and debris.
(15) Decontamination procedures for personnel and equipment.
(16) Disposal methods, including transportation to disposal.

3. EXCAVATION AND CLEANUP: Comply with the requirements of Title 40, Part 761 of the U.S. Code of Federal Regulations (40 CFR 761).

4. TEMPORARY STOCKPILING: Excavated material, stockpiled on site during construction, shall be stored on plastic with appropriate thickness and covered to prevent wind and rain erosion at a location designated by the COR.

5. SAMPLING AND TESTING: Sample contaminated debris and areas of excavation to ensure that contamination is removed. Use personnel with experience in sampling and, in particular, with experience in PCB cleanup if PCBs are involved. Use analytical methods approved by EPA and applicable State regulations.

6. TRANSPORTATION AND DISPOSAL OF CONTAMINATED MATERIAL: The Contractor shall be responsible and liable for the proper loading, transportation, and disposal of contaminated material according to Federal, State, and local requirements. Use only transporters and disposal sites approved by WAPA.

7. POST CLEANUP REPORT: Provide a Post-Cleanup Report that describes the cleanup of contaminated soils and debris. Submit the report to the COR prior to submittal of final invoice. The report shall contain the following information:

   (1) Site map showing the areas cleaned.

   (2) Description of the operations involved in excavating, storing, sampling, and testing, and disposal.

   (3) Sampling and analysis results including 1) Name and address of the laboratory, 2) sample locations, 3) sample dates, 4) analysis dates, 5) contents of contaminant (e.g. PCB or total petroleum hydrocarbons) in parts per million (ppm).

   (4) Certification by the Contractor that the cleanup requirements were met.

   (5) Copies of any manifests, bills of lading, and disposal certificates.

   (6) Copies of correspondence with regulatory agencies that support completion of the cleanup

SECTION 13.20 – CONSERVATION OF BIOLOGICAL RESOURCES

1. GENERAL: Federal law prohibits the “take” of endangered, threatened, proposed or candidate wildlife and plants, and destruction or adverse modification of designated Critical Habitat. Federal law also prohibits the “take” of birds protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. “Take” means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct with a protected animal or plant or any part thereof, or attempt to do any of those things without a permit from U.S. Fish and Wildlife Service. The Contractor will take precautions to avoid harming all wildlife species and native plants. Contractor shall restrict all ground disturbing activities to areas that have been surveyed by WAPA for natural resources and as specified in accordance with Standard 1 – General Requirements, Sections 1.3.1 Rights-of-way and 1.3.2 Access to the Work and Haul Routes.

2. KNOWN OCCURRENCE OF PROTECTED SPECIES OR HABITAT: Following issuance of the notice to proceed, and prior to the start of construction, WAPA will provide training to all contractor and subcontractor personnel and others involved in the construction activity if there is a known occurrence of protected species or habitat in the construction area. Untrained personnel shall not be allowed in the construction area. WAPA will provide drawings or maps showing sensitive areas located on or immediately adjacent to the transmission line right-of-way and/or facility. These sensitive areas shall be considered avoidance areas. Prior to any construction activity, the avoidance areas shall be

marked on the ground by WAPA. If access is absolutely necessary, the contractor shall first obtain written permission from the COR, noting that a WAPA and/or other Federal or State government or tribal agency biologist may be required to accompany personnel and equipment. Ground markings shall be maintained through the duration of the contract. WAPA will remove the markings during or following final inspection of the project.

3. UNKNOWN OCCURRENCE OF PROTECTED SPECIES OR HABITAT: On rare occasions a protected species or habitat may be discovered during the project. If evidence of a protected species is found in the project area, the contractor shall immediately notify the COR and provide the location, date and nature of the findings. The contractor shall stop all activity within 200 feet of the protected species or habitat and not proceed until directed to do so by the COR.

4. MIGRATORY BIRDS AND RAPTORS: Under the Migratory Bird Treaty Act of 1918, migratory bird species and their nests and eggs are protected from injury or death. Impacts to migratory bird nests shall be avoided during the nesting season(s) identified in Division 13 of the Project Specifications. If construction activities occur during the nesting season, WAPA will survey the construction area for migratory bird nests prior to construction activities and establish appropriate buffers around any nests that may potentially be disturbed. If work must be conducted within these buffers, a WAPA- supplied biological monitor will be on site for construction activities within the buffers. If the biological monitor determines that activities are likely to cause nest impacts or nest abandonment, then construction activities in the area shall be postponed until nestlings have fledged or the nest is no longer active.

5. SPECIAL CONSIDERATIONS: Refer to Division 13 of the Project Specifications for site-specific requirements including, but not limited to, known and unknown migratory birds and raptors.

Standard 14

Communication Facilities

Western Area
Power Administration

CONSTRUCTION STANDARDS

STANDARD 14

COMMUNICATION FACILITIES

SAFETY
A HABIT TO LIVE BY

September 2016

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SECTION 14.1 COMMUNICATION TOWER OR MONOPOLE

14.1.1 GENERAL:

1. GENERAL: Tower or Monopole shall be designed and furnished by a company regularly engaged in the manufacture of communication facilities.

2. REQUIREMENTS: Bolts, nuts, locknuts, antenna pipe mounts, climbing ladders including a safety climbing system, waveguide ladders, work platforms, rest platforms, embedded material, and other appurtenances including all associated hardware shall be considered as part of the communication tower or monopole.

14.1.2 CONTRACTOR-FURNISHED DRAWINGS AND DATA:

1. GENERAL: Before beginning fabrication of the material, furnish electronic drawings and data for the communication tower or monopole. Prior to shipment of material, furnish "Final Approval Electronic Drawings" for the communication tower or monopole. Before final payment is made, furnish "Final As-built Electronic Drawings" for the communication tower or monopole. Refer to the contract clause titled "Specifications and Drawings for Construction" for additional requirements, except that shop detail drawings may be considered proprietary data as outlined in 14.1.2.6 below.

2. CHANGES: Make all changes in Contractor-furnished electronic drawings, designs, and construction details which Western determines necessary to make the finished construction conform to these specifications. Revise the electronic drawings to reflect all changes.

3. APPROVAL TIME: Time allowed for approval of electronic drawings and data submitted to Western for approval is specified in Division 1 Specific Requirements paragraph "Commencement, Prosecution, and Completion of Work" paragraph of the "General Requirements" Division. The revised electronic drawings and marked up electronic data sheets will be returned to the Contractor marked to indicate required changes, if any, and whether the electronic drawings or data are approved or not approved. Western's approval shall not relieve the Contractor from meeting the specifications requirements nor the responsibility for design and drawing correctness. Refer to Division 1 of the Project Specifications regarding acceptable version and format of electronic AutoCAD drawings.

4. UNITS OF MEASUREMENT: Units of measurement shall be in United States Standard units; and all wording, signs, symbols, and other designations shall be in English.

5. DESIGN CALCULATIONS AND DATA: Submit for approval one electronic copy of the following design calculations and data for the communication tower or monopole:

   (1) General dimensions and weight.

   (2) Hand calculations of dead and live loads for all loading cases and points of application of all loads.

   (3) Member loads for each loading case and the capacity needed for and furnished by each member; ground line shears and axial loads; and all other design data required for the foundation design. Accuracy and correctness of the design is the sole responsibility of the Contractor.

   (4) Maximum deflection for all loading cases.

   (5) Maximum twist and sway at all initial and future antenna attachment points.

   (6) Size, description, and quantity of bolts at each connection.

   (7) Orientation referenced to true north.

(8) Computer analysis with complete description of the computer program used.

(9) Antenna and side strut layouts.

(10) Data certifying that the manufacturer has:

1) Successfully designed and manufactured similar items of comparable magnitude and purpose to those to be furnished under these specifications for a period of not less than 3 years.

2) Manufacturing facilities adequate for manufacturing the type and size of tower or monopole to be furnished under these specifications.

6. APPROVAL DRAWINGS: Submit an electronic copy of the following:

(1) Shop Detail Drawings:

1) Drawings: Shop detail drawings of all members, including climbing and waveguide ladders, safety-climbing device, work and rest platforms, pipe mounts, other appurtenances, and connections. Shop detail drawings may be stamped "Proprietary Data" and will be used only for repair, modification, or replacement of communication material provided under these specifications.

2) Proprietary Data: Shop detail drawings that the manufacturer considers proprietary data will only be used as specified in subparagraph 1) above. Proprietary data will not be disclosed for any reason, including disclosure under the Freedom of Information Act, without prior written approval from the manufacturer.

(2) Erection drawings for each type and height of structure showing the following:

1) Marking and position of each member and, for each bolted joint, the number and size of bolts and the number and size of any ring fills.

(3) Complete bill of materials, listing all material for the tower or monopole or the portion shown there on, including bolts. The bill of materials shall show the number of pieces required; the description of each piece, including size and length; the mark number of each piece; the weight of each piece; and the drawing number on which the shop detail of each piece can be found. The total weight shall be noted on the drawing.

(4) Mounting details of antennas and reflectors.

(5) Guys:

1) Guy pretension.
2) Guy location, attachment details and all hardware information.
3) Guy anchor and installation details.
4) Guy azimuth.

(6) Both the shop detail drawings and erection drawings shall show the following information:

1) Controlling dimensions of each structure.
2) Western specifications number, bid item number, and revision dates.
3) Western job title.
4) Type of material and finish.
5) Name of site.
6) Changes or revisions and revision date.

Check drawings for accuracy and completeness before being submitted. Western will not thoroughly check details and intermediate dimensions.

7. FINAL APPROVAL DRAWINGS: Prior to shipment of material, furnish an electronic copy of all drawings listed in 14.1.2.6 above. The drawings shall show all changes and revisions, with revision dates, made up to the time the material is ready for shipment.

8. FINAL AS-BUILT DRAWINGS: Before final payment is made under the contract, deliver to Western the final electronic copy of all drawings listed in 14.1.2.6 above, with all revisions found necessary to correct errors or reflect changes discovered during field erection.

9. DISTRIBUTION OF DRAWINGS AND DATA:

   (1) Design Calculations, Data, and Approval Drawings: Send one electronic copy to the Civil Engineer.

   (2) Final Approval Drawings: Send one (1) electronic copy to the Civil Engineer.

   (3) Final As-Built Drawings: Send one (1) electronic copy to the Civil Engineer.

14.1.3 DESIGN REQUIREMENTS:

1. DESIGN LOADINGS: Design to be reliable, serviceable, and to resist, without permanent distortion or excess sway and twist, all loading conditions and those loads required for manufacturing, handling, transporting, and installing. For the loading and twist and sway analysis, parabolic antennas shall be treated as solid antennas without radomes. All tower members shall be sized for wind loads acting both perpendicular to the tower face and to the apex of two faces. The azimuths of future antennas that produce the worst case conditions shall be used.

2. STRUCTURAL ANALYSIS AND DESIGN:

   (1) General: Design to withstand the maximum of all loads, specified in 14.1.3.1 above, without exceeding the allowable unit stresses in members. Design in accordance with the basic assumptions and the latest requirements of the following:

      1) TIA-222-G, "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures".

      2) EIA-195-C, "Electrical and Mechanical Characteristics for Terrestrial Microwave Relay System Antennas and Passive Reflectors".

      3) Andrew Bulletin No.1015F.

      4) AISC "Manual of Steel Construction, Latest Edition (Part 5, Specifications and Codes)".

      5) ASCE Standard 10, Latest Edition "Design of Lattice Steel Transmission Structures".

      6) ASCE Standard 48 Latest Edition – “Design of Steel Transmission Pole Structures".

      7) AISI "Specifications for the Design of Cold-Formed Structural Members".

      In the event of conflicting requirements in these standards, the more stringent shall apply.

   (2) Criteria: Design based on an analysis of stress and combination of stresses due to moment, shear, torsion, guys, and axial loads.

(3) Twist and Sway: Twist and sway, as defined in TIA-222-G, shall not exceed plus or minus 0.5 degree at the antenna attaching points with the loading in 14.1.3.1 above. In addition the tower shall not exceed the combined twist and sway requirement of 0.5 degrees under the full design wind speed loading in 14.1.3.1 above. Torsion stabilizers shall be provided as necessary for guyed towers.

(4) Designer's Qualifications: Design and drawings shall be supervised and certified by a registered Professional Engineer competent in structural analysis and communication facilities design. The designer shall also check and certify the shop detail and erection drawings.

(5) Shielding: Shielding will not be allowed on antennas, ladders, and waveguides.

3. COMPONENTS: Components shall meet the following minimum thickness requirements:

(1) Main Leg Members: 1/4 inch for rolled shapes; 3/16 inch for round, square, and rectangular tubes.

(2) Compression Members with Calculated Stress: 3/16 inch for rolled shapes; 1/8 inch for round, square, and rectangular tubes.

(3) Members with No Calculated Stress: 1/8 inch.

(4) Connection Bolts: Connection bolts shall not be less than 1/2 inch in diameter.

(5) Monopole: The monopole cross section may be circular or a regular polygon having not more than 12 sides.

4. DETAILS OF DESIGN:

(1) Self-Supporting Towers: Self-supporting towers shall be three-or four-legged towers with horizontal members at not more than 20-foot intervals on each tower face. Tower face width shall not be less than 56 inches between connection bolts. All load carrying members that are bolted should have a minimum of two bolts for each connection. Legs and diagonal bracing shall be angles or tubular. Ends of diagonal tube bracing shall be left open. Horizontal bracing shall be angle. Cover top of tube legs and provide a 1/2-inch-minimum-diameter drain hole at the base of each leg.

(2) Guyed Towers:

1) General: Guyed towers shall be triangular and have a minimum face width of 56 inches between connection bolts and shall be limited to bolted angular construction. Provide horizontal members at 4-foot maximum intervals on each face of the tower. The shaft of guyed towers shall be supported on a pivot mount to prevent bending forces from being transmitted to the foundation. Determine the number, size, and location of all guys and anchors required for the guyed towers. Guy anchors shall be at least 10 feet inside property lines. Prior to final tensioning, provide to the COR, data including tensioning procedures, sequences, and temperature corrections for initial tension values of all guy wire sizes. The temperature range of the guy chart shall be from 0° to 100°F in 10° increments.

2) Guy Design: Determine the guy size, location and arrangement best suited for each tower. Locate guys to provide minimum tower twist and sway. Guys shall have a minimum 3/8-inch diameter.

3) Structural Analysis and Design: Guys shall be treated as elastic members in the structural analysis of the towers. The modules of elasticity for guy material shall be taken as 23,000 ksi. Loads in the guys shall not exceed 60 percent of the minimum rated breaking strength of the guys.

   Guy tensions under conditions of no wind, no ice, and 90°F temperature shall be a minimum of 10 percent of the minimum rated breaking strength of the guy. Determine the tensions required under the wind and temperature conditions at the time of guy tensioning in order to meet this requirement.

4) Guy Hardware and Attachments: Guy hardware and attachments shall be capable of supporting the minimum rated breaking strength of the guys. Turnbuckles shall be used on the guy anchor plate end for cable adjustment. The turnbuckles shall have a working load that is 50 percent of the minimum rated breaking strength of the attached guy. Each guy shall be attached to the guy anchor plate in a separate hole. Provide two working holes in each guy anchor plate.

5) Guy Cable Markers: Provide high visibility guy cable markers at all locations where guy cables enter the ground. Guy cable markers shall extend a minimum of 10 feet up the guy cable.

(3) Pipe Mounts for Antennas: Provide standard 4 1/2 inch-outside-diameter, Schedule 80 pipe mounts, 60 inches long, for the attachment of the parabolic microwave antennas for the initial antennas and future antennas with azimuth assignments. Pipe mounts shall be designed and installed for the plumb position. Provide two 4 x 4 x 1/4 minimum side strut attachment angles for each parabolic microwave antenna. Connect side strut attachment angles to the legs with a minimum of two U-bolts. The angles shall have one leg down and the other leg out of the tower face for climbing purposes. Connection of the side strut mounting hardware shall be made to these separate angular members. Connecting the side struts directly to tower members will not be permitted. No side strut shall go through the face of a tower unless authorized by Western. All side strut pipes shall be installed within a plus or minus 30 degree angular limitation. Provide standard 2 7/8 inch-outside-diameter, Schedule 80 pipe mounts, 60 inches long, for the attachment of the VHF/UHF antennas for the initial and future antennas.

   The limit of movement of antenna pipe mounts shall not exceed plus or minus 0.1 degree for all antennas.

(4) Waveguide Ladder: Waveguide ladders shall be designed such that the maximum vertical spacing between cable attachment points is 4 feet. Use of tower legs or diagonals with beam clamps is not acceptable.

   Waveguide ladder cross-members shall be drilled to accept and support a minimum of eight elliptical waveguide hangers in a horizontal line at each attachment point. Unless otherwise approved, the holes shall be spaced at 4 inches on center.

(5) Waveguide Attachments: Drill holes at a vertical spacing of 4 feet to accept the 3/8-inch, stainless-steel threaded rods for waveguide hangers.

(6) Climbing Ladder: Provide an inside-mounted climbing ladder for the full height of the tower. Provide a face-mounted climbing ladder for the full height of the monopole complete with work rungs located 4 feet below and handholds located at the centerline of each parabolic antenna. The ladder shall be mounted as close to the building as possible and oriented so that the climber faces the building. Ladder, work rungs, and handholds, shall be designed to support a minimum of the current OSHA load and impact requirements. Ladder shall have round 3/4-inch diameter solid steps spaced at 12 inches center to center. Steps shall be corrugated, knurled, or dimpled to minimize slipping. Coating with skid-resistant material is not

acceptable. Spacing of side rails shall be 16-inch clear width. Provide a minimum of 7 inches clearance on the back side of the ladder between any structural member or appurtenance. Ladder shall be stabilized at the bottom end by means of a concrete foundation, unless on a guyed tower. The ladder shall be vertical, or can slope away from the climber as the climber ascends the ladder. On three-legged towers the ladder shall be corner mounted in the tower's apex. Ladder sections shall be spliced together to form a continuous ladder and be bolted to the tower every 5 feet. If no tower members are available to attach to every 5 feet then an additional support frame shall be provided, which is based on the unsupported distance between horizontal tower members. The ladder shall be attached every 5 feet to this ladder support frame and the frame attached to the horizontal tower members. The design for this shall be submitted with the tower design. Ladder side rails shall be made of flat plate and be a minimum size of 2 1/2 inches x 3/16 inch. For waveguide ladders attached to the climbing ladder, place holes for waveguide runs in the center of the side rail, midway between the ladder rungs. Ladder supports shall not protrude beyond the face of the ladder.

(7) Safety Climbing Device: Provide on the climbing ladder a fall prevention device consisting of a single; center-mounted 3/8 inch steel tensioned cable, running the entire length of the ladder. The device shall be designed to support the minimum of the current OSHA load and impact requirements. The device shall be securely fastened at the top and bottom of the ladder and at intervals in between using the appropriate cable retainers, per the manufacturer's instructions. The device shall allow at least two climbers to utilize the system at the same time. The device shall be attached at the top of the climbing ladder to a minimum of 4 ladder rungs for strength. Provide three safety sleeves or sliders that are detachable from the cable and have an anti-fall instant gripping locking mechanism. The sleeves shall be designed so that they cannot be installed on the cable incorrectly or upside down. The sleeves shall automatically travel around or through the cable attachments and guides. An acceptable safety device is the Vi-Go Climbing System, manufactured by Miller Fall Protection, or an approved equivalent. Rail or tube-type systems are not acceptable.

(8) Work Platforms: The platform shall encompass the entire interior area of the tower. Work platforms shall have a trap door providing a minimum 28-inch x 28-inch clear opening. The trap door shall be equipped with a securing device that locks automatically when the trap door is opened completely. This device shall ensure that the door remains in the open position and prevents it from being slammed shut accidentally by wind, personnel, or equipment. This device shall be easy to unlatch when the trap door is to be closed. The trap door shall be constructed such that it is easy for one person to open with one hand. Each work platform shall consist of a level welded rectangular steel grating inside the tower that will carry at least two people. The minimum safe concentrated load shall be 640 pounds, based on the unsupported span of the grating. In addition the deflection shall be 1/4 –inch or less under a uniform load of 100 pounds per square foot, or 1/2-inch or less under the concentrated loading of 640 pounds. Work platforms shall include handrails and toe boards around the perimeter that meet OSHA requirements.

(9) Rest Platforms: Rest platforms shall be placed at intervals no greater than 100 feet. Each rest platform shall consist of a level welded rectangular steel grating inside the tower that will allow sitting or standing room for at least one person with a minimum width of 15 inches. Work platforms may be used for rest platforms.

(10) Ice Shields: Ice shields shall be large enough to protect the feed horns and radomes. Use the same welded steel rectangular grating as the work and rest platforms.

(11) Passive Repeaters: Self-supporting steel structures shall have mounting units for alignment of reflectors. Each unit shall have maximum adjustment ranges of plus or minus 4 degrees about either axis and plus or minus 2 degrees about both axes simultaneously. The units shall be designed to meet rigidity specifications of EIA-195-C for the required operations.

(12)Connections:

1) General: The length of connection bolts under the head shall be long enough for full thread engagement of a heavy hex nut and either a palnut or MF locknut. Locknuts shall be provided for all bolts. Bolts, nuts, washers, and locknuts required for assembling the material in the field shall be furnished in quantities sufficient to compensate for normal field losses, provided the excess quantities do not exceed 2 percent of the actual requirement. All connections shall be designed to minimize eccentricities. For angle shapes, the bolt holes shall be placed as close to the heel of the angle as possible.

2) Bolt-Hole Spacing: Unless otherwise approved, the minimum spacing from center to center of bolt holes shall be as shown in Table 14-1. Where practical, the spacing shall be not less than three diameters. Wherever possible, the distance from the center of a bolt to the face of the outstanding leg of an angle or other member shall be such as to permit the use of a socket wrench in tightening the bolt.

3) Distance of Bolt Hole to Edge of Piece: Unless otherwise approved, the distance between the edge of any piece and the center of a bolt hole shall not be less than shown in Table 14-1, where applicable.

TABLE 14-1
BOLT HOLE CLEARANCES

SIZE OF BOLT (INCH)**	MINIMUM EDGE DISTANCE (INCH)		MINIMUM CENTER TO CENTER (INCH)
	ROLLED OR FLAME-CUT*	SHEARED	
1/2	3/4	7/8	1 1/4
5/8	7/8	1 1/8	1 1/2
3/4	1	1 1/4	1 7/8

*Where flame-cuts are made by mechanically guided torch.
**1/2-inch bolts can be used on guyed towers only.

In detailing the gaugelines, allowance shall be made for mill tolerances in the width of the legs or flanges to ensure that the specified minimum edge distances will be met.

4) Slip-Critical Connections: Bolts, if any, in slip-critical connections and in other connections requiring full pre-tensioning shall be noted in the design and identified on the erection drawings. Include requirement for providing full pretension on the erection drawings.

14.1.4 MATERIAL:

1. STRUCTURAL STEEL: All structural steel shall be galvanized.

2. STANDARD-STRENGTH STEEL: ASTM A 36.

3. STRUCTURAL STEEL PIPE: ASTM A 53, Grade B, or ASTM A501, Grade A or B.

4. HIGH-STRENGTH STEEL: ASTM A 572, Grade 50. High strength steel plate shall have minimum longitudinal impact strength of 15 foot-pounds at minus 20° F as determined by the Charpy "V" Notch Impact Test in accordance with ASTM A 67.

5. BOLTS AND NUTS: Bolts and nuts shall be galvanized and conform to ASTM A 394, Type 1, or ASTM A 325, Type 1.

6. WASHERS: Beveled washers shall be malleable iron or steel, galvanized. Other washers shall be steel or wrought-iron, galvanized.

7. LOCKNUTS: Square, regular Type MF No.1, or regular palnut locknuts. Locknuts shall be galvanized.

8. ARC-WELDING ELECTRODES: In accordance with the latest edition of AWS "Specifications for Iron and Steel Arc-Welding Electrodes" and suitable for the base material, positions, and other use conditions.

9. ZINC DUST-ZINC OXIDE PAINT: ASTM A 780. Zinc dust-zinc oxide paint shall have a minimum zinc content of 94 percent (dry film weight).

10. GRATING: Welded rectangular steel grating with a minimum 1 1/2-inch x 3/16-inch bearing bar and cross bars at a maximum 4-inch spacing that meets Federal Specification RR-G-661a. End banding bars are required.

11. GUY WIRES: ASTM A 475-89, extra-high-strength grade.

12. GUY HARDWARE, STEEL GUY ANCHOR SHAFT, AND ATTACHMENTS: Guy hardware and attachments shall be of the type and manufacturer's rated strength as specified on the approved shop detail and erection drawings. Steel guy hardware, steel guy anchor shaft, and attachments shall be galvanized.

13. GUY WIRE SLEEVES: Shall be "SiteGuard Guyline Guardians" as manufactured by Honeywell, or approved equal.

14. GALVANIZING AND DULLING: Shall be in accordance with Standards DIVISION 4 “SUBSTATION METALWORK AND TRANSMISSION LINE LATTICE STRUCTURES”.

14.1.5 QUALITY CONTROL, FABRICATION AND WELDING:

Shall be in accordance with the latest TIA-222-G and standards DIVISION 4 “SUBSTATION METALWORK AND TRANSMISSION LINE LATTICE STRUCTURES.

14.1.6 ERECTION:

1. GENERAL: Material shall be installed or erected in accordance with the erection drawings and these specifications. Erection and installation shall be in accordance with the applicable provisions of the AISC "Manual of Steel Construction, Ninth Edition (Part 5, Specifications and Codes)". No steel shall be erected on a foundation until 7 days after the last concrete placement in the foundation, nor until backfill has been placed and compacted where and as required.

2. ANCHOR BOLTS AND EMBEDDED MATERIAL: Set accurately to the grade and alignment designated on the approved drawings.

3. BASE PLATES: Set level, in exact position. Leveling shall be done in accordance with the Contractor's approved drawings. Where grout is required, the grout shall be in accordance with the "Grouting Mortar" paragraph of the "Concrete" Division.

4. STRUCTURAL STEEL: Transport and handle to avoid bending or damage to the material and galvanizing. Pieces bent in handling may be used only if they are straightened in a manner approved by the COR.

5. GUYED TOWERS: Guys and anchors shall be installed in the locations shown on the Contractor's approved drawings. Preforms shall be used to terminate the cables. "Haven" type grips with serrate jaws will damage cable and shall not be used to tension guy cable. Guys shall be pre-tensioned as shown on the Contractor's approved drawings. Guys shall be one continuous piece of cable. Splicing of guy cable will not be permitted.

   Turnbuckles shall provide a minimum of 16 inches of take-up and shall have not less than 2 inches of exposed threads inside the buckle body and provide a minimum of 6 inches of take-up after final tensioning. Turnbuckles shall be safetied to prevent movement exceeding one-half turn.

6. ERECTING TOWER: Tower may be erected by assembling in sections on the ground and hoisting successive sections into place or may be built up in place by individual members, at the option of the Contractor. If erected by assembling in sections, initial bolting shall be adequate for dead load, live load, and erection stresses, but shall not be so tight as to prevent aligning and fitting adjacent sections or members.

   A reasonable amount of drifting is allowed. "A reasonable amount of drifting" is defined as drifting without causing hole elongation or deformation of members. Reaming for correction of mismatched holes will not be permitted. If shop errors are discovered, the COR will decide whether the errors may be field-corrected or the members returned to the manufacturer for correction or replacement.

   Repair galvanizing damaged due to drifting, repair operations, or field-drilling in accordance with the "Galvanizing" paragraph of the "Metalwork" Division, and use the zinc dust-zinc oxide paint specified in the "Material" paragraph of this Subdivision.

   Misalignment or misfit of adjacent sections or members attributable to the adopted method of erection shall be corrected by adjusting erection methods as necessary to eliminate trouble.

   Slings or devices used for lifting tower sections or members shall be of such material or shall be protected in such a way as to prevent damaging or overstressing members.

   Erected tower shall have less than 1 inch of twist per 100 feet, and be within 3/4 inch of plumb per 100 feet of tower height.

7. BOLTING:

   (1) General: Bolts shall be torqued and locked within the shortest practicable time after all material has been installed. Connections shall lay flat where they are bolted together. No gaps between butt flanges or connections are acceptable after the bolts are tensioned. Where incomplete bolting is a major contributing factor to damage prior to final acceptance, repair or replace the material, as directed by the COR.

   (2) Torquing of Bolts: Connection bolts shall be entered clear to the head. Bolts shall be tightened to a torque as follows:

BOLT DIAMETER (INCH)	TORQUE (POUND-FEET)
1/2	35 to 45
5/8	70 to 100

BOLT DIAMETER (INCH)	TORQUE (POUND-FEET)
3/4	125 to 165

Bolts larger than 3/4-inch diameter in shear/bearing-type connections shall be tightened to the snug-tight condition. The snug-tight condition is defined as the tightness that exists when all plies in a joint are pulled into firm contact by the full effort of a man using an ordinary spud wrench. Bolts identified on the erection drawing in slip-critical and other connections requiring full pre-tensioning shall be tightened to the torque shown on the drawings.

(3) Locknuts: Type "MF" locknuts shall be tightened sufficiently to flatten its concave face to full contact against the structural nut. Palnut locknuts shall be given one-third turn beyond contact with the structural nut.

(4) Wrenches: Only wrenches approved by the COR shall be used on the work, and the use of any wrench which may deform the nut or cut or flake the galvanizing will not be permitted.

SECTION 14.2 FOUNDATIONS

14.2.1 GENERAL:

Design and construct reinforced concrete foundations required for communication tower or monopole, waveguide supports, and climbing ladder. Complete construction of the communication tower or monopole foundations prior to constructing the service building foundation. The concrete shall be in accordance with Division 3 “CONCRETE” and Standard 3 “CONCRETE”. All self-supporting or guyed tower foundations shall be drilled or augured shaft type, stem and pad type, or pad type, suitable for the structure type, loading, and soil conditions. All foundations shall have a vertical depth that extends below frost depth.

14.2.2 GUY ANCHORS:

Guy anchors shall be a concrete vertically drilled auger or dead man type. A belled shaft type is not acceptable. Dead man type shall have a concrete collar around the steel shaft from the anchor to 1’-0” above the ground surface to prevent corrosion of the steel. Guy anchors shall develop a minimum of 70 percent of the resultant of the minimum rated breaking strength of all attached guys. The design for the concrete anchor shall have careful consideration given to the uplift shear and moment capacities. Complete and comprehensive calculations shall be provided showing that the concrete guy anchor can reliably carry all design loads. The concrete guy anchor shaft shall be a steel framework embedded in the center auger. This steel guy anchor shaft shall transfer the load from the guy anchor plate to the concrete guy anchor.

SECTION 14.3 WAVEGUIDE BRIDGE, SUPPORTS, AND ENTRY PANELS

14.3.1 WAVEGUIDE BRIDGE AND SUPPORTS:

1. GENERAL: Design, provide, and install waveguide bridge and supports from the communication tower or monopole to the service building. Design for 50 psf ice loading.

   Submit drawings and data outlined in the "Contractor-Furnished Drawings and Data" paragraph of the "Communication Tower or Monopole" Subdivision.

2. WAVEGUIDE BRIDGE: The waveguide bridge shall be of the solid or grated type, to accommodate a minimum of six elliptical waveguides and waveguide hangers. The waveguide bridge shall be installed from the waveguide ladder to the waveguide entry port of the service building along the shortest route possible. At the tower, the waveguide bridge shall terminate at the waveguide ladder with an approximate 45 degree upward angle by means of a vertical hinge splice to accommodate the bending radius of the waveguide. The waveguide bridge shall be self-supporting and not attached to the building. It shall terminate within six inches of the exterior edge of the service building, centered directly above the top edge of the waveguide entry port. The waveguide bridge shall have a minimum of two supports, one near the tower and one near the building. Waveguide bridge shall be supported at maximum intervals of 10 feet and any single change in horizontal direction shall not exceed 45 degrees.

3. WAVEGUIDE BRIDGE SUPPORTS: The waveguide bridge supports shall consist of pipe columns, at the locations shown on the approved Contractor-furnished drawings. The pipe columns shall be an anchor-bolt type.

14.3.2 WAVEGUIDE ENTRY PANEL INTO SERVICE BUILDING:

1. GENERAL:

   (1) Exterior Wall Openings:

      1) Existing Buildings: Construct an opening in the exterior wall of the existing building in accordance with the architectural and structural drawings, of the dimensions required for installation of the waveguide entry panels. The opening shall be provided without damaging existing construction or compromising the structural integrity of the building. The waveguide entry panel shall be securely attached and sealed to the exterior wall surface.

      2) New Buildings: Construct an opening in the exterior wall of the new building in accordance with the architectural and structural drawings, of the dimensions required for installation of the waveguide entry panels. The waveguide entry panel shall be securely attached and sealed to the exterior wall surface.

   (2) Waveguide Entry Components:

      1) Panels: Install waveguide entry panels, with manufacturer’s standard power-coated finish, on the interior and exterior surfaces of the building wall. The installation shall be weathertight.

      2) Sealing Caps: Sealing caps shall be provided for all waveguide entry ports on the outside and inside waveguide entry panels.

      3) Boots for Entry Ports: Provide boots including plugs, jackets, donuts, clamps, and other accessories as required by the Project Specifications for a complete installation of the waveguide.

4) Insulation: Provide un-faced fiberglass batt insulation in all cavities, the full thickness of the wall.

5) Sealant: Use exterior grade sealant as specified in Division 11 or as approved by the COR. Sealant shall be applied to the back side of the waveguide entry panel such that it is compressed against the exterior wall surface, without voids, when the panel is fastened in place.

SECTION 14.4 TOWER LIGHTING

14.4.1 GENERAL:

Provide Obstruction Lighting (Federal Aviation Administration (FAA) Style A, D, or E, as indicated) for 24-hour operation on each tower, unless otherwise indicated in the specifications.

The lighting systems shall be in accordance with the latest edition of FAA Advisory Circular 70/7460 entitled "Obstruction Marking and Lighting". Wiring shall be in accordance with the latest edition of the National Electric Code.

The lighting systems shall include strobe beacons and side marker lights (as applicable), controllers, mounts, wiring, conduit, junction boxes, and all other accessories required for complete weatherproof enclosed lighting systems.

14.4.2 SUBMITTALS:

1. SHOP MANUALS: Two complete shop manuals shall be submitted to the COR for operation and maintenance procedures, including diagrams, schematics, and a complete parts list with manufacturer's part number and ordering information.

2. APPROVAL DATA: Approval data on the strobe beacons, side marker lights (as applicable), and controllers shall be submitted to the Civil Engineer and the COR.

14.4.3 MATERIAL:

1. OBSTRUCTION LIGHTS: Shall be Light Emitting Diode (LED) type strobes, beacons, and marker lights and have a warranted life of at least five years and a flash head life expectancy of at least ten years, including lightning damage.

   (1) Shall meet FAA AC No. 150/5345-43F requirements.

   (2) Shall be certified to meet Occupational Safety and Health Administration (OSHA) safety standards such as ETL or another OSHA Nationally Recognized Testing Laboratory (NRTL).

   (3) Shall not create appreciable electromagnetic interference (EMI) while in operation.

   (4) Shall operate in a temperature range of -40C to 55C.

   (5) Shall be designed with the obstruction lights alone placed on the tower with the remainder of the unit, including the power supply, controller, and separate photocell, placed at or near ground level.

   (6) Dialight Vigilant Series LED based L-864 Beacon, L-865/L-864 Dual (Red/White) Strobe, and L-810 Red Obstruction lights, or approved equals.

2. CONTROLLER: Shall be powered using standard 120/240VAC and/or 48V DC supply. The controller shall have available a dry contact output to support alarm functions. It shall also have an optional Simple Network Management Protocol (SNMP) interface or gateway (internal or external) capable of allowing remote monitoring of all controller dry contact alarms.

14.4.4 INSTALLATION:

1. OBSTRUCTION LIGHTS: Beacons, strobes, and side marker lights shall be mounted to provide 360 degree horizontal visibility.

2. CONTROLLER: The controller, power supply, and separate photocell shall be mounted at or near ground level.

14.4.5 ACCESSORIES AND EQUIPMENT:

Attach all obstruction lighting equipment, components, and accessories to the tower utilizing the manufacturer's approved method(s).

SECTION 14.5 GROUNDING SYSTEM

14.5.1 GENERAL:

Provide a complete grounding system for the communication tower, climbing ladder, waveguide bridge supports, propane fuel tanks, and new communications equipment buildings. Connect the ground system to the existing site ground system as indicated on the drawings.

14.5.2 TOWER, WAVEGUIDE SUPPORT, FUEL TANK, AND BUILDING GROUNDING:

The Contractor shall install the site grounding system consisting of ground rods, waveguide bridge support risers, building ground ring, fuel tank ring (where applicable), building risers, and interconnection to any existing station ground systems. Refer to grounding system standard drawings.

1. GROUNDING CABLE: All cable for the waveguide bridge support risers, building ground ring, fuel tank ring, building risers and interconnection to existing ground system will be 4/0 AWG bare copper. All buried grounding cable shall be a minimum of 18” below finished grade. All grounding system cable shall have a minimum bend radius of 8”.

2. GROUNDING RINGS: The grounding rings shall be installed around the perimeter of the building foundations. The grounding ring and associated grounding rods shall be a minimum of 2’ to the outside of the foundation (if allowed by respective foundation locations). Roads, driveways, and other obstructions may dictate the exact location of the grounding rings. Final location of the grounding system will be approved by the COR.

3. GROUNDING CABLE CONNECTIONS: All connections between grounding cable and grounding rods, other segments of grounding cable (i.e. risers, bus bar grounding straps, tower legs, bridge supports, etc.), and the existing station ground will be made using exothermic welds. See drawing 31 1060, “Substation Standards Grounding Details” for typical connections.

4. GROUNDING RODS: All grounding rods will be 5/8” x 10’ copper (Valmont Part No. B1382 or equal). As a minimum, grounding rods will be located at each building corner outside the foundation perimeter and spaced no more than 20’ apart. For buildings with a length of greater than 20’, additional grounding rods will be installed equidistant from any two grounding rods located at the building corners along the ground ring.

5. DAMAGE TO EXISTING GROUND CABLE: Existing ground cables are shown on the drawings in approximate locations. Use caution in excavating near the existing ground cables. Repair all ground cables damaged during construction as directed by the COR.

14.5.3 LIGHTNING PROTECTION:

Provide one lightning rod at the top of the tower or monopole, only if the tower or monopole is the tallest object (tower, tree, building, other structure, etc.) in an area around its base defined by a radius of half the height of the tower or monopole.

1. MATERIAL: The lightning rod shall be a 5/8 inch by 10’ galvanized steel rod attached to the top of one of the tower legs or the monopole.

2. INSTALLATION: Install the rod in accordance with the manufacturer's instructions and in a plumb position. When installed on a tower leg, it shall not be installed on the same leg with a current or proposed VHF/UHF mobile antenna also on it.

14.5.4 GROUNDING SYSTEM TESTING:

Ground system resistivity and continuity testing will be conducted by the contractor. Test results and a site report will be provided for each communications facility. Any discontinuity in the grounding system will be the responsibility of the contractor to repair.

1. GROUND MAT RESISTIVITY TEST: If the communication ground mat is not connected to any existing substation ground mat, the contractor shall test the overall ground mat resistivity using the industry standard fall of potential method. If the site ground mat is small (less than 100 feet measured diagonally), or a traditional fall of potential method is too difficult to perform due to terrain and other obstructions, the fall of potential method can be modified and the 62 percent method can be used. For example: If the remote current probe is 1000 feet from the communication site ground mat then the voltage probe shall be placed at 620 feet from the communication site grounding system. The remote current probe shall be located as far from the communication site as practicable. The COR shall be consulted to determine the best testing method based on site configuration and location.

   If the communication ground mat is attached to an existing substation ground mat, the COR shall be consulted before any ground mat testing is initiated.

2. GROUND BOND INTEGRITY TESTING: Since communication sites are typically single point grounded and all metal must be bonded together to insure that any GPR will not create a difference of potential that can harm communication equipment, all below grade bonding connections shall be electrically tested and verified that they have adequate connectivity with the ground mat. Below grade bonds should be at micro-ohm resistivity levels. Above grade bonding connections shall have a visual inspection to verify that bonding connections have proper exothermic weld or cold flow compression (where allowed) characteristics such as both metals (pigtail and weld or compression fitting) are homogeneous and having no voids or any evidence of corrosion or oxidation. Consult WAPA Power System Maintenance Manual (PSSM), Chapter 8, Section 4.1.3 as a reference and to provide context for below grade electrical continuity testing.

   NOTE: Electrical bonding continuity testing shall be performed by testing methods used in the WAPA PSMM Chapter 8, Section 4.1.3 and Section 4.12 or similar. The contractor may use AEMC clamp-on testers or similar, Ductor test equipment and methods or similar or any micro-ohm meter type device – it is the option of the contractor. No matter what method is chosen the contractor will provide WAPA micro-ohm readings of all the below grade ground riser connections.

SECTION 14.6 ANTENNA SYSTEM

14.6.1 GENERAL:

1. OPERATING ENVIRONMENT: All interior equipment shall operate to the guaranteed specifications over an ambient temperature range of 0ºC to 40ºC with non-condensing humidity of 95% at 40ºC. Storage temperature ranges of -40ºC to +65ºC shall not affect equipment operation.

2. POWER: Pressurization equipment shall operate on 120 VAC power with standby generator backup. The standby generator backup shall be provided by the Site Owner. The generator AC power voltage shall remain within ± 10% and frequency shall remain with ± 3 Hz.

3. SERVICE: The equipment shall be designed for a service lifetime of not less than 15 years.

4. SUBMITTALS: The drawings and data required for these specifications include form, fit, and function data and manuals, instructional material, and other drawings and data needed by Western for installation, operation, and routine maintenance. These drawings and data are included in the term "instruction book". All documents, including typical and contract-specific drawings and data shall be pre-punched and inserted into standard letter-sized 3-ring binders or equivalent binding. All documentation shall be submitted to the Communications Engineer and a copy of the transmittal letter to the COR.

   (1) Review documentation: The contractor shall provide two sets of drawings and instruction books for review and comment with the proposal. The information will be used to verify compliance with the requirements of this solicitation, specification, and resulting contract.

   (2) Final documentation: Complete sets of final instruction books and included drawings shall be shipped with the equipment. This includes one per site, one maintenance, and one engineering office copy.

   (3) The review and final documentation shall include:

      1) Antenna drawings and specifications.
      2) Waveguide/coaxial cable drawings and specifications.
      3) Pressurization equipment drawings and specifications.
      4) Miscellaneous equipment drawings and specifications.
      5) Installation instructions.
      6) Operating instructions.
      7) Trouble shooting guide.
      8) Replacement and replaceable parts list.

14.6.2 ANTENNAS AND MOUNTS:

1. ANTENNAS: All parabolic microwave antennas shall be standard FCC category A rated units with radomes unless otherwise specified. Antennas supplied shall be Andrew P series or equivalent. The antennas shall have a designed operating range of 4400-4940 MHZ for those specified as a 4 GHz antenna and an operating range of 7125-8400 MHz for those specified as a 7 GHz antenna. All antennas for operating in the VHF or UHF frequency bands will be furnished by Western unless otherwise specified.

2. ANTENNA MOUNTING: All parabolic microwave antennas shall be equipped with a minimum of one side strut, and for antennas greater than 8’ in diameter, a minimum of two side struts shall be utilized. The Contractor shall furnish miscellaneous material, including antenna mounts, tie-backs, struts, brackets, and other items required for assembling and installing the antennas. All mounting of antennas operating in the VHF or UHF frequency bands will be completed by Western unless otherwise specified.

3. ADJUSTMENT AND ALIGNMENT OF ANTENNAS: Antennas and mounting structures shall be installed in the center of their adjustment range for azimuth and elevation. Final alignment of the antennas will be performed by Western.

14.6.3 COMMUNICATION TRANSMISSION LINES:

1. WAVEGUIDE: Contractor shall supply and install premium elliptical waveguide with an operating range of 4400-4940 MHZ for antennas specified at 4 GHz and an operating range of 7125-8400 MHz for antennas specified at 7 GHz. Andrew EWP43 and EWP77, respective to the operating range specified, or equivalent premium waveguide shall be provided, unless otherwise specified.

2. COAXIAL CABLE: Contractor shall supply and install 1/2 inch foam dielectric 50 ohm coaxial cable with an operating range of 150 - 420 MHZ for antennas specified as operating in the VHF or UHF frequency bands. Andrew LDF4-50A or equivalent coaxial cable shall be provided, unless otherwise specified. Contractor shall supply and install 7/8 inch foam dielectric 50 ohm coaxial cable with an operating range of 820 - 960 MHZ for antennas specified as operating in the High UHF frequency bands. Andrew LDF5-50A or equivalent coaxial cable shall be provided, unless otherwise specified.

3. HARDWARE AND INSTALLATION: Contractor shall supply and install all necessary transmission line installation hardware and accessories, including without limitation waveguide connectors, pressure windows, hangers, grounding kits, adapters and miscellaneous installation hardware. The radio end of the waveguide will be connected directly to the radio if at all possible. In certain situations, a small section of flex may be required to make the connection from the waveguide to radio as approved by the COR. Bends and twists in the flex section will be minimized as to minimize losses. All installation materials and hardware shall be supplied in types and quantities sufficient to meet the requirements of the transmission line manufacturer and the project specifications for mounting and connection of premium transmission lines, including, without limitation, the observance of minimum bending radius.

4. COMMUNICATION TRANSMISSION LINE GROUNDING:

   (1) All waveguide and coaxial cable shields shall be grounded at three (3) locations (four or more on towers taller than 200 ft), using appropriate transmission line grounding kits:

      1) At the top of the vertical run 12” – 18” below the bend to the horizontal run to the antenna connector.

      2) At the bottom of the vertical run 12” – 18” above the bend to the horizontal run under the ice bridge.

      3) Just outside the building entrance.

      4) Midway on the vertical run when the vertical run is 200’, and every 75’ – 100’ on towers taller than 200’.

   (2) Where necessary, the contractor shall provide a main grounding bus bar to accommodate the connections described in 14.6.3.4.1.3 above. This copper bar shall be a minimum of 1/4" x 4" x 12" and have insulated standoffs. It shall be pre-drilled with 7/16" holes to accept lugs from the main ground wire (#4/0 provided by site owner) and the waveguide grounding kits. Refer to standard drawing 31 1503, detail A.

   (3) The waveguide ground clamp and ground strap are to be installed in such a manner that they make a connection to a continuous electrical conductor that shall have the least amount of bending possible (8” minimum) to reduce the impedance of the bend to lightening current.

(4) If bus bars are used to bundle multiple waveguide grounding straps, flat copper plate (1/4" minimum thickness) shall be used for the bus bars. The bus bar dimensions shall be large enough (height x width) such that the path of the current from the waveguide grounding straps to the grounding conductor shall comply with the 8" radius of bend rule. The bus bar shall be installed on an angle of approximately 45 degrees and the ground strap attachment point to the vertical waveguide shall be between 12 and 60 inches away from the start of the bend. Refer to standard drawing 31 1503, detail B.

5. TESTING: After all waveguide supports and clamps have been put in place and tightened, all antenna-feedline systems shall be sweep tested per Section 14.6.3.7.3 of this standard.

6. PRESSURIZATION EQUIPMENT:

(1) General:

1) Contractor shall supply and install automatic dehydrator/pressurization equipment at each site where required by the project specification. The dehydrator shall be the Andrew MT-300 or 600 series or equivalent, sized appropriately for the total current and future volume of the waveguide at the site it will service, and shall be installed on a suitable wall-mount shelf. The dehydrator shall be set to operate between 1.5 and 6.5 lbs./sq. in, and 115 VAC. Contractor shall provide all required pressurizing accessories including without limitation manifolds, fittings, hose, pressure gauge and shutoff valve for each waveguide run, and miscellaneous installation hardware including one extra change of desiccant.

2) Manifolds shall be sized to accommodate new and existing pressurized waveguides, as well as two additional spare ports.

3) Each pressurization system shall include sensors to provide separate dry form C or solid state contacts which will provide low pressure, high pressure, excess run, power failure, and humidity alarms. The high-pressure alarm contacts shall operate at pressures higher than 5 pounds per square inch. The alarm contacts shall be set for low alarm at 1.0 lbs./sq. in. and the high alarm shall be set for 7.0 lbs./sq. in.

(2) Testing: Each waveguide run shall be tested for leakage after installation. Pressurizer/dehydrator shall be operated until gauge pressure reaches between 6.5 and 8 psi for the waveguide under test and the line shutoff valve at the manifold shall then be closed. Loss of pressure shall not exceed 1 psi in 24 hours, corrected for variations caused by changes in temperature. After tests are completed, waveguide pressure should be set to 3 lbs/sq. in.

7. INSTALLATION, TURN-UP, AND TEST:

(1) General:

1) Contractor shall provide all materials, tools, test equipment, labor, supervision, shipping, travel and other items required to install, align, and test the equipment described in the project specification. Contractor shall supply adequate equipment spares to allow for failures during installation, turn-up and test without using Western's spare units supplied under the project specification.

2) Contractor shall submit to Western a detailed schedule for system installation, test and turn-up as specified in Section 1.1.4, "Construction Program". This schedule shall be coordinated with Western's COR.

3) Contractor shall follow the Original Equipment Manufacturer's initial start-up and test procedures. The original manufacturer's log shall be filled out completely. Where the

original equipment manufacturer's warranty exceeds the Contractor's warranty, the registration document required by the manufacturer shall be submitted by the Contractor on behalf of Western using Western's business address.

4) Any manufacturer's warranty voided by failure on the part of the Contractor to follow the Original Equipment Manufacturer's instructions shall become the Contractor's responsibility to fulfill.

(2) Installation: Equipment shall be installed in and on existing equipment shelters and towers. Specifics regarding exact antenna placement on towers (i.e. leg, azimuth, etc.) and location of racks in buildings will be provided in site specific drawings and data tables.

(3) Field Test And Alignment:

1) Contractor shall apply power to all equipment and perform manufacturer's required initial turn-up tests. Results of this testing shall be recorded and made part of the site records and the system test record. When the manufacturer's warranty exceeds the Contractor's warranty the Contractor shall comply with 14.6.3.7.1.

2) All antenna transmission line subsystems shall be sweep-tested for return loss and verified to be greater than 29 dB for no less than 80% of the frequency band of operation. Results of this testing shall be recorded and made part of the site records and the system test record. The center 100MHz of the operational frequency band of the waveguide shall be swept to produce a TDR report showing the effects of connectors, waveguide bends and other abnormalities in the overall waveguide system.

3) Antenna alignment shall be performed without the use of terminal equipment to be installed later.

4) A Spectrum Analyzer interference measurement shall be made at the radio end of the antenna-feeder subsystem, after antenna alignment, of the spectrum centered on the receiver frequencies and extending at least one radio channel-width above and below the assigned channels. A second measurement shall cover the frequency band of operation. This measurement shall be made with the lowest possible noise floor and recorded via photograph or plotter output and included in the test records.

5) Western representatives shall witness and participate in system testing as part of system acceptance and field training. Notification to Project Manager of scheduled start date of system testing shall be made in accordance with Standard 1 – General Requirements, Section 1.2.3 "Material Inspection".

6) Contractor shall submit a complete test report including results of testing within 30 days of successful test completion. The test report shall include original field test data, test data summaries for each site, evaluation of test data, overall evaluation of performance for each waveguide segment, description of all discrepancies noted during testing and measures taken for correction, and recommendations for system maintenance and operation.

SECTION 14.7 TOWER INSPECTION AND MAINTENANCE

14.7.1 GENERAL:

Furnish labor, materials, and equipment required for comprehensive inspection and maintenance of guyed and self-supported communication towers for Western.

1. INSPECTION AND ROUTINE MAINTENANCE: Perform inspections and routine maintenance in accordance with these specifications, to include but not limited to inspections of: the tower, guy wires, foundation and anchors, antenna system, electrical, lightning protection systems and grounding. Routine maintenance to be performed with inspections shall be conducted in accordance with 14.7.2.

2. NON-ROUTINE MISCELLANEOUS MAINTENANCE: If maintenance other than routine maintenance listed in 14.7.2 is required, the contractor shall provide a written estimate to the COR for review and approval prior to performing such maintenance to ensure adequate funding for obligation and payment purposes. The estimate shall include the applicable labor rate(s), multiplied by the estimated hours to perform the maintenance and any required materials at cost. No maintenance work shall be performed until approved by the COR.

3. REPORTS: An electronic copy of the inspection report only (PDF file format, no photographs) shall be provided via e-mail to the Project Communication Engineer as well as the COR at the e-mail addresses provided with the contact information for this project. Contractor shall also furnish a completed inspection report (PDF file format) with photos (JPEG file format), and a completed Tower Antenna Inventory Form for each tower, within 30 working days of inspection on Computer Disc (CD). The disc should be sent via U.S. mail to the Project Communication Engineer at the address provided.

14.7.2 INSPECTION AND MAINTENANCE WORK REQUIREMENTS:

1. FOUNDATIONS AND ANCHORS:

   (1) Inspect and note condition of concrete bases and anchor concrete.

   (2) Inspect and note anchor for erosion and creeping.

   (3) Visually inspect and note condition of anchor head welds.

   (4) Inspect and note anchor rod head for cracks, splits, bends, twist, or corrosion.

   (5) Excavate to a depth of 1 foot below the surface, inspect and note anchor rods not embedded in concrete for corrosion.

   (6) Inspect anchor fencing for damaged fabric, missing hardware, bent or broken posts, corrosion or missing locks or security issues.

   (7) Inspect guy anchors for vegetation overgrowth.

2. TOWER:

   (1) Measure and record plumb and twist.

   (2) Visually inspect all tower hardware. Replace missing hardware, broken clips, and tighten loose hardware (except antenna or reflector adjustments hardware and feed line hardware in WNMO), and check for air leaks. Hardware associated with antenna reflectors and feed lines found loose shall be documented in the inspection report.

(3) Hand-inspect 100% of bolted connections with a wrench, tighten and re-torque those found loose (note number of connections found loose), and re-torque a minimum of 10% of the bolts on the tower.

(4) Inspect for cracked, bent, twisted, or missing members and areas that show signs of fatigue.

(5) Inspect and note condition of tower main members and guy plates.

(6) Inspect and note condition of safety climbing device.

(7) Inspect and note galvanized finish for damage or fading. Repair damage to galvanized coating on tower structure members.

(8) Inspect and clean all weep holes in pipe legs and bracing for proper drainage.

(9) Inspect and note condition of work platforms and hatches.

3. GUY WIRES:

(1) Inspect and note broken strands, wear/abrasion, and/or corrosion.

(2) Inspect and note condition of thimbles, turnbuckles, and clamps.

(3) Inspect and note bolted clamps for tightness.

(4) Inspect and note condition of turnbuckles.

(5) Re-tension guys to appropriate specifications as to plumb the tower and eliminate twist according to tower erection section 14.1.6.(6).

4. ANTENNA SYSTEMS:

(1) Inspect and note visible damage or distortion.

(2) Inspect and note hardware conditions – do not adjust or tighten hardware that affects antenna adjustment (tilt and azimuth).

(3) Inspect radomes and note any visible damage and missing hardware. Replace missing radome hardware.

(4) Measure and note the resistance of radome heater(s), if equipped.

(5) Inspect and note waveguide/coaxial cable supports, ice/waveguide bridge, retainers, and grounds. Also inspect waveguide/coaxial cable for dents and condition of flex sections.

(6) Inspect reflectors and note visible damage, loose hardware, bent members, and tower attachment. Do not adjust reflector tilt or azimuth.

(7) Inspect and note condition of ice shields, if mounted.

5. ELECTRICAL:

(1) Inspect and note condition of electrical conduit, pull boxes, vents and drains, and mechanical connections of conduit system to tower.

(2) Inspect tower lights and note loose or missing mounting bolts, loose sockets, and inspect for proper operation of tower lights.

6. LIGHTNING PROTECTION SYSTEMS:

   (1) Inspect lightning protection systems on towers and note condition of rods or brushes, ground wires, and connection to ground cable at the base of the tower. Not all towers have lightning protection installed.

7. GROUNDING:

   (1) Inspect and note condition of all ground cable and ground connections above ground.

8. TOWER PHOTOGRAPHS AND INVENTORY FORM:

   (1) Contractor shall at a minimum, take the photographs listed below for each tower. Photographs shall be in full color and a minimum of 3 megapixels each. Photographs shall be included on the CD with completed inspection report submitted to the applicable Government point of contact as indicated in 14.7.1.3.

      1) Minimum of three photos at various angles and at a distance from the tower such that the entire tower is in a single frame.

      2) One photo taken directly up each face of the tower, showing the majority of the antennas on that face of the tower.

      3) One photo taken directly up the center of the tower.

      4) Photo(s) of waveguide/coax entry port(s) including associated ground bar/system taken from both inside and outside the building.

      5) One photo of the waveguide/coax ladder from each side of the ladder.

      6) One photo of foundation on tower or each leg.

      7) Photos of visible tower and waveguide grounding.

      8) One photo of each antenna.

      9) Photos of tower lighting (if applicable).

      10) One photo of tower light controller (if applicable).

      11) Photo of tower nameplate if found.

      12) Photos of any problems found.

      13) Photos of each guy point on the tower (if applicable).

      14) Photos of each guy anchor (if applicable).

   (2) Contractor shall complete the Tower Antenna Inventory Form upon completion of inspections and submit the completed form along with all tower photographs taken to the Project Communication Engineer no later than 30 days after completion of tower inspections.

14.7.3 INSPECTION AND MAINTENANCE PERFORMANCE:

1. GENERAL: The Contractor shall perform all the services described in Section 14.7 of this specification in compliance with accepted industry standards, guidelines, and practices and in accordance with any quality assurance program normally used by the Contractor.

2. STANDARD: The standards by which performance of the tower inspection and maintenance will be assessed are outlined in the guide paragraphs of the project specification for each site(s) involved in the project.

Tower Antenna Inventory Form

Site Name: _____ Date: _____

Number	Destination (if known)	Azimuth (est +/-15 deg)	Height (ft)	Diameter/ Length (ft)	Type *	Radome (Y/N)	Radome Heater (Y/N)	Feedline **	Leg ***
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									

* Antenna Types: Solid, Grid, Dipole, Yagi, Paraflector, Collinear

** Feedline Types: 1/2", 7/8", EW43, EW63, EW77

*** Legs are numbered starting from #1 at the first leg clockwise from true north and increasing in number while continuing clockwise around the tower.

SECTION 14.8 EMERGENCY AND STANDBY POWER SYSTEMS

14.8.1 GENERAL:

1. SCOPE. This portion of the standard covers performance requirements for emergency and standby power systems providing an alternate source of electrical power.

2. APPLICATION. This portion of the standard shall apply to the new installations of emergency and standby power systems. Existing systems shall not be required to be modified to conform unless the nonconformity presents a distinct hazard to life.

3. REFERENCED PUBLICATIONS. The documents or portions of publications that are referenced shall be considered part of the requirements of this standard.

   (1) National Fire Protection Association (NFPA) Publications:

      1) NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.

      2) NFPA 54, National Fuel Gas Code.

      3) NFPA 58, Liquefied Petroleum Gas Code.

      4) NFPA 70, National Electrical Code.

      5) NFPA 110, Emergency and Standby Power Systems.

4. DEFINITIONS. The following definitions shall apply to the terms used in this portion of the standard:

   (1) Battery, Lead-Acid.

   (2) Valve-Regulated (VRLA): A lead-acid battery consisting of sealed cells furnished with a valve that opens to vent the battery whenever the internal pressure of the battery exceeds the ambient pressure by a set amount. In VRLA batteries, the liquid electrolyte in the cells is immobilized in an absorptive glass mat (AGM cells or batteries) or by the addition of a gelling agent (gel cells or gelled batteries).

   (3) Vented (Flooded): A lead-acid battery consisting of cells that have electrodes immersed in liquid electrolyte. Flooded lead-acid batteries may have a provision for the user to add water to the cell and are equipped with a flame arresting vent which permits the escape of hydrogen and oxygen gas from the cell in a diffused manner such that a spark, or other ignition source, outside the cell will not ignite the gases inside the cell.

   (4) Emergency Power Supply (EPS). The source of electric power of the required capacity and quality for an emergency power supply system (EPSS).

   (5) Emergency Power Supply System (EPSS). A complete functioning EPS system coupled to a system of conductors, disconnecting means and over-current protective devices, transfer switches, and all control, supervisory, and support devices up to and including the load terminals of the transfer equipment needed for the system to operate as a safe and reliable source of electric power.

   (6) Switch: Automatic Transfer Switch (ATS), Self-acting equipment for transferring the connected load from one power source to another power source.

Bypass Isolation Switch. A manually operated device used in conjunction with an automatic transfer switch to provide a means of directly connecting load conductors to a power source and disconnecting the automatic transfer switch.

5. CLASSIFICATION OF EMERGENCY POWER SUPPLY SYSTEMS (EPSSs).

The EPSS shall provide a source of electrical power of required capacity, reliability, and quality to loads for a length of time as specified.

The class defines the minimum time, in hours, for which the EPSS is designed to operate at its rated load without being refueled or recharged. See Table 14.8.1(a).

The type defines the maximum time, in seconds, that the EPSS will permit the load terminals of the transfer switch to be without acceptable electrical power. See Table 14.8.1(b).

Table 14.8.1(a)
Classification of EPSSs

CLASS	MINIMUM TIME
Class 0.083	0.83 hr (5 min)
Class 0.25	0.25 hr (15 min)
Class 2	2 hr
Class 6	6 hr
Class 48	48 hr
Class X	Other time, in hours, as required by application, code or user

Table 14.8.1(b)
Designation Types of EPSSs

DESIGNATION TYPE	POWER RESTORATION
Type U	Basically uninterruptible (UPS systems)
Type 10	10 sec
Type 60	60 sec
Type 120	120 sec
Type M	Manual stationary or non-automatic – no time limit

This standard recognizes two levels of equipment installation, performance, and maintenance.

(1) Level 1 systems shall be installed where failure of the equipment to perform could result in loss of human life or serious injuries.

(2) Level 2 systems shall be installed where failure of the EPSS to perform is less critical to human life and safety.

All equipment shall be permanently installed.

14.8.2 EMERGENCY POWER SUPPLY:

1. ENERGY CONVERTERS: Energy converters shall consist only of rotating equipment. Rotating equipment shall consist of a generator driven by an Otto cycle (spark ignited) prime mover.

   Where used for Level 1 applications, the prime mover shall not mechanically drive any equipment other than its operating accessories and its generator.

   Seismic design category C, D, E, or F, as determined in accordance with ASCE 7, shall require a Level 1 EPSS Class X (minimum of 96 hours of fuel supply).

   The EPS shall be heated as necessary to maintain the water jacket and battery temperature determined by the EPS manufacturer for cold start and load acceptance for the type of EPSS.

   The energy converters shall have the required capacity and response to pick up and carry the load within the time specified in **Table 14.8.1(b)** after loss of primary power.

   Liquefied petroleum gas intended for Level 1 use shall not be used for any other purpose.

2. ROTATING EQUIPMENT: Prime movers and accessories shall comply with **NFPA 37**, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, except as modified in this standard.

   Proper derating factors, such as altitudes, ambient temperature, fuel energy content, accessory losses, and site conditions as recommended by the manufacturer of the generator set shall be used in determining whether or not brake power meets the connected load requirements.

   Solenoid valves, where used, both in the fuel line closest to the generator set and in the water-cooling lines, shall operate from battery voltage.

   Solenoid valves with electric operation shall include a manual bypass valve. The manual bypass valve shall be visible and accessible and its purpose identified. The manual bypass valve shall not be the valve used for malfunction or emergency shutdown.

   The prime mover shall be provided with the following instruments:

   (1) Oil pressure gauge to indicate lubricating oil pressure. Engines with splash-lubricated systems shall not require this gauge.

   (2) Temperature gauge to indicate cooling medium temperature. Air-cooled engines shall not require this gauge.

   (3) Hour meter to indicate actual total running time.

   (4) Battery-charging meter indicating performance of prime mover–driven battery charging means.

   (5) Other instruments as recommended or provided by the prime mover manufacturer where required for maintenance.

   The instruments shall be placed on an enclosed panel, located in proximity to or on the energy converter, in a location that allows maintenance personnel to observe them readily. The enclosed panel shall be mounted by means of anti-shock vibration mountings if mounted on the energy converter.

   The generator set shall be fitted with an integral accessory battery charger, driven by the prime mover and automatic voltage regulator, and capable of charging and maintaining the starting

battery unit (and control battery, where used) in a fully charged condition during a running condition.

A battery charger driven by the prime mover shall not be required, provided the automatic battery charger has a high–low rate capable of fully charging the starting battery during running conditions.

3. STARTING EQUIPMENT: Starting shall be accomplished using either an electric starter or a stored energy starting system.

A complete cranking cycle shall consist of an automatic crank period of approximately 15 seconds followed by a rest period of approximately 15 seconds. Upon starting and running the prime mover, further cranking shall cease.

Otto cycle prime movers of 15 kW and lower shall be permitted to use continuous cranking methods.

Each prime mover shall be provided with both of the following:

(1) Storage battery units as specified in **Table 14.8.2**.

(2) A storage rack for each battery or battery unit.

The battery units shall have the capacity to maintain the recommended cranking speed through two complete periods of cranking limiter time-outs as specified in **Table 14.8.2**.

Table 14.8.2
Starting Equipment

REQUIREMENTS	LEVEL 1	LEVEL 2
Battery Unit	X	X
Battery Certification	X	NA
Cycle Cranking	X	O
Cranking Limiter Time-outs		
Cycle Crank (3 cycles)	75 sec	75 sec
Continuous crank	45 sec	45 sec
Float-type Battery Charger	X	X
Recharge Time	24 hr	36 hr
Low Battery Voltage Alarm Contacts	X	X

X: Required, O: Optional, NA: Not applicable.

The batteries shall be of the nickel-cadmium or lead-acid type.

(3) Lead-acid batteries shall be furnished as charged when wet. Drain-dry batteries or dry-charged lead-acid batteries shall be permitted.

(4) When furnished, vented nickel-cadmium batteries shall be filled and charged and shall have listed flip-top, flame arrester vent caps.

(5) The manufacturer shall provide installation, operation, and maintenance instructions and for batteries shipped dry, electrolyte mixing instructions.

(6) Batteries shall not be installed until the battery charger is in service.

(7) All batteries used in this service shall have been designed for this duty and shall have demonstrable characteristics of performance and reliability acceptable to the authority having jurisdiction.

(8) Batteries shall be prepared for use according to the battery manufacturer's instructions.

In addition to the prime mover driven charger an automatic battery charger shall be supplied for recharging or maintaining a charge, or both, on the starting or control battery unit, or both.

The automatic battery charger output and performance shall be compatible with the batteries furnished.

4. CONTROL FUNCTIONS: A control panel shall be provided and shall contain the following:

(1) Automatic remote start capability

(2) Run-Off-Automatic switch

(3) Shut down under any of the following conditions:

1) Failing to start after specified cranking time
2) Over speed
3) Low lubricating-oil pressure
4) High engine temperature
5) Operation of remote manual stop station

(2) Individual alarm indication to annunciate any of the conditions listed

(3) Controls to shut down the prime mover upon removal of the initiating signal or manual emergency shutdown

(4) Instruments for Level 1 applications shall contain the following:

1) An AC voltmeter for each phase or a phase selector switch
2) An AC ammeter for each phase or a phase selector switch
3) A frequency meter
4) A voltage-adjusting rheostat to allow +-5 percent voltage adjustment

14.8.3 TRANSFER SWITCH EQUIPMENT:

1. GENERAL: Transfer switches shall transfer electric loads from one power source to another. The electrical rating shall be sized for the total load that is designed to be connected.

Each transfer switch shall be in a separate enclosure or compartment. The switch, including all load current-carrying components, shall be designed to withstand the effects of available fault currents. Each switch shall be listed for emergency service as a completely factory-assembled and factory-tested apparatus.

2. SOURCE MONITORING: Transfer to the EPS shall be inhibited until the voltage and frequency are within a specified range to handle loads to be served. Sensing equipment shall not be required in the transfer switch, provided it is included with the engine control panel. Frequency-sensing equipment shall not be required for monitoring the public utility source where used as an EPS.

A program timing device shall be provided to exercise the EPS. Transfer switches shall transfer the connected load to the EPS and immediately return to primary power automatically in case of an EPS failure. Exercising timers shall be permitted to be located at the engine control panel in lieu of in the transfer switches.

14.8.4 ENVIRONMENTAL CONSIDERATIONS:

1. GENERAL: When the normal power source is not available, the EPS shall be permitted to serve optional loads other than system loads, provided that the EPS has adequate capacity or automatic selective load pickup and load shedding are provided as needed to ensure adequate power to the Level 1 loads, the Level 2 loads and the optional loads, in that order of priority.

   When normal power is available, the EPS shall be permitted to be used for other purposes such as peak load shaving, internal voltage control, load relief for the utility providing normal power, or cogeneration.

2. LOCATION: The EPS shall be installed in a separate room for Level 1 installations. EPSS equipment shall be permitted to be installed in this room.

   The room shall have a minimum 2-hour fire rating or be located in an adequate enclosure located outside the building capable of preventing the entrance of snow or rain.

   No other equipment, including architectural appurtenances, except those that serve this space, shall be permitted in this room.

3. MOUNTING: Rotating energy converters shall be installed on solid foundations to prohibit sagging of fuel, exhaust, or lubricating oil piping and damage to parts resulting in leakage at joints.

   Such foundations or structural bases shall raise the engine at least 6 in. above the floor or grade level and be of sufficient elevation to facilitate lubricating-oil drainage and ease of maintenance.

   Vibration isolators shall be installed either between the rotating equipment and its skid base or between the skid base and the foundation or inertia base.

4. HEATING AND VENTILATING: With the EPS running at rated load, ventilation air flow shall be provided to prevent the EPS room temperature from exceeding 120°F.

   The ambient air temperature in the EPS equipment room or outdoor housing containing Level 1 rotating equipment shall be not less than 40°F.

   Ventilation air supply and discharge for radiator-cooled EPS shall have a maximum static restriction of 0.5 in. of water column in the discharge duct at the radiator outlet.

5. LIGHTING: The Level 1 or Level 2 EPS equipment location(s) shall be provided with battery-powered emergency lighting. This requirement shall not apply to units located outdoors in enclosures that do not include walk-in access.

   The emergency lighting charging system and the normal service room lighting shall be supplied from the load side of the transfer switch.

14.8.5 ROUTINE TESTING:

1. GENERAL: Consideration shall be given to temporarily providing a portable or alternate source whenever the emergency generator is out of service.

At least two sets of instruction manuals for all major components of the EPSS shall be supplied by the manufacturer(s) of the EPSS.

For Level 1 systems, instruction manuals shall be kept in a secure, convenient location, one set near the equipment, and the other set in a separate location.

Provide spare parts as recommended by the manufacturer.

2. MAINTENANCE AND OPERATIONAL TESTING: The EPSS shall be maintained to ensure to a reasonable degree that the system is capable of supplying service within the time specified for the type and for the time duration specified for the class.

   A routine maintenance and operational testing program shall be initiated immediately after the EPSS has passed acceptance tests or after completion of repairs that impact the operational reliability of the system.

   The operational test shall be initiated at an ATS and shall include testing of each EPSS component on which maintenance or repair has been performed, including the transfer of each automatic and manual transfer switch to the alternate power source, for a period of not less than 30 minutes under operating temperature.

   Transfer switches shall be subjected to a maintenance and testing program that includes all of the following operations:

   (5) Checking of connections.
   (6) Inspection or testing for evidence of overheating and excessive contact erosion.
   (7) Removal of dust and dirt.
   (8) Replacement of contacts when required.

   Storage batteries used in connection with systems shall be inspected weekly and maintained in full compliance with manufacturer's specifications.

   Maintenance of lead-acid batteries shall include the monthly testing and recording of electrolyte specific gravity. Battery conductance testing shall be permitted in lieu of the testing of specific gravity when applicable or warranted.

   Defective batteries shall be replaced immediately upon discovery of defects.

   Generator sets shall be exercised at least once a month with the available EPSS load for 30 minutes or until the water temperature and the oil pressure have stabilized.

SECTION 14.9 LIQUEFIED PETROLEUM GAS

14.9.1 GENERAL:

1. SCOPE. This portion of the standard applies to the storage, handling and use of LP-Gas.

2. APPLICATION. This portion of the standard shall apply to the installation of all LP-Gas systems including containers, piping and associated equipment, when delivering LP-Gas to a standby generator for use as fuel gas.

3. REFERENCED PUBLICATIONS. The documents or portions of publications that are referenced shall be considered part of the requirements of this standard.

   (1) National Fire Protection Association (NFPA) Publications:

      1) NFPA 13, Standard for the Installation of Sprinkler Systems.
      2) NFPA 54, National Fuel Gas Code.
      3) NFPA 58, Liquefied Petroleum Gas Code.
      4) NFPA 101, Life Safety Code.

   (2) American Petroleum Institute (API) Publications:

      1) API-ASME, Code for Unfired Pressure Vessels for Petroleum Liquids and Gases.

      2) API Publication 1632, Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems.

   (3) American Society of Mechanical Engineers (ASME) Publications:

      1) ASME Boiler and Pressure Vessel Code.
      2) ASME B31.3, Process Piping.

   (4) American Society for Testing and Materials International (ASTM) Publications:

      1) ASTM A 53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

   (5) Underwriters Laboratories Inc. (UL) Publications:

      1) ANSI/UL 21, Standard for LP-Gas Hose.

      2) ANSI/UL 125, Standard for Valves for Anhydrous Ammonia and LP-Gas (Other than Safety Relief).

      3) ANSI/UL 132, Standard for Safety Relief Valves for Anhydrous Ammonia and LP-Gas.

      4) ANSI/UL 144, Standard for LP-Gas Regulators.

4. DEFINITIONS: The following definitions shall apply to the terms used in this portion of the standard:

   (1) API-ASME Container: A container constructed in accordance with the pressure vessel code jointly developed by the American Petroleum Institute and the American Society of Mechanical Engineers.

   (2) ASME Code: The American Society of Mechanical Engineers Boiler and Pressure Vessel Code.

(3) ASME Container: A container constructed in accordance with the ASME Code.

(4) Container: Any vessel, including cylinders, tanks, portable tanks and cargo tanks, used for the transporting or storing of LP-Gases.

(5) Container Appurtenances: Devices installed in container openings for safety, control, or operating purposes.

(6) Fixed Piping System. Piping, valves, and fittings permanently installed in a location to connect the source of the LP-Gas to the utilization equipment.

(7) Liquefied Petroleum Gas (LP-Gas): Any material having a vapor pressure not exceeding that allowed for commercial propane that is composed predominantly of the following hydrocarbons, either by themselves or as mixtures: propane, propylene, butane (normal butane or isobutene), and butylenes.

(8) LP-Gas System: An assembly consisting of one or more containers with a means for conveying LP-Gas from a container to dispensing or consuming devices that incorporates components that control the quantity, flow, pressure, and physical state (liquid or vapor) of the LP-Gas.

(9) Maximum Allowable Working Pressure (MAWP): The maximum pressure at which a pressure vessel is to operate is described by the ASME Boiler and Pressure Vessel Code.

(10) Mounded Container: An ASME container designed for underground service installed above the minimum depth required for underground service and covered with earth, sand, or other material; or an ASME container designed for above-ground service installed above grade and covered with earth, sand, or other material.

(11) Piping Systems: Pipe, tubing, hose, and flexible rubber or metallic hose connectors with valves and fittings made into complete systems for conveying LP-Gas from one point to another in either the liquid or the vapor state at various pressures.

(12) Pressure Relief Device: A device designed to open in order to prevent the rise of internal pressure in excess of a specified value.

(13) PSI: Pounds per square inch.

(14) PSIA: Pounds per square inch, absolute.

(15) PSIG: Pounds per square inch gauge.

(16) Regulator:

1) First-Stage Regulator. A pressure regulator for LP-Gas vapor service designed to reduce pressure from a container to 10.0 psig or less.

2) Second-Stage Regulator. A pressure regulator for LP-Gas vapor service designed to reduce first-stage regulator outlet pressure to 14 in. water column (w.c.) or less.

(17) SCFM: Standard cubic feet per minute.

(18) Sources of Ignition: Devices or equipment that, because of their modes of use or operation, are capable of providing sufficient thermal energy to ignite flammable LP-Gas vapor–air mixtures when introduced into such a mixture or when such a mixture comes into contact with them and that will permit propagation of flame away from them.

(19) Standard Cubic Foot (SCF): The volume of gas in cubic feet at the standard atmospheric conditions for 60°F and 14.7 PSIA.

(20) Valve:

1) Emergency Shutoff Valve. A shutoff valve incorporating thermal and manual means of closing that also provides for remote means of closing.

2) Filler Valve. A valve that is designed to allow liquid flow into a container.

3) Pressure Relief Valve. A type of pressure relief device designed to both open and close to maintain internal fluid pressure.

(21) Water Capacity. The amount of water at 60°F required to fill a container.

14.9.2 CONTAINERS:

1. GENERAL: Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT); the ASME Boiler and Pressure Vessel Code, Section VIII, "Rules for the Construction of Unfired Pressure Vessels"; or the API-ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases, except forUG-125 through UG-136.

   Existing containers that show excessive denting, bulging, gouging, or corrosion shall not be utilized for service.

   ASME containers installed underground, partially underground, or as mounded installations shall incorporate provisions for cathodic protection and shall be coated with a material recommended for the service that is applied in accordance with the coating manufacturer's instructions.

2. SERVICE PRESSURE: The maximum allowable working pressure (MAWP) for ASME containers shall be in accordance with Table 14.9.2:

Table 14.9.2
Maximum Vapor Pressure and Maximum Allowable Working Pressure (MAWP)

MAXIMUM VAPOR PRESSURE	MAWP	MAWP
@ 100°F	ASME (CURRENT CODE)[a]	API-ASME (EARLIER CODE)
psig	psig	psig
80	100	100
100	125	125
125	156	156
150	187	187
175	219	219
215	250	250
215	312	312

[a] ASME Code, 1949 edition, paragraphs U-200 and U-201, and all later editions.

All ASME containers complying with the 1946 edition and paragraphs U-68 and U-69 of the 1949 edition shall be removed from service.

3. CONTAINER OPENINGS: ASME containers shall be equipped with openings for the service for which the container is to be used.

   ASME containers of more than 30 gal through 2000 gal water capacity that are designed to be filled volumetrically shall be equipped for filling into the vapor space.

   ASME containers of 125 gal through 2000 gal water capacity shall be provided with an opening for an actuated liquid withdrawal excess-flow valve with a connection not smaller than 3⁄4 in. national pipe thread (NPT).

   ASME containers in storage or use shall have pressure relief valve connections that have direct connection with the vapor space of the container.

   ASME containers to be filled on a volumetric basis shall be fabricated so that they can be equipped with a fixed maximum liquid level gauge(s) that is capable of indicating the maximum permitted filling level(s).

4. CONTAINER MARKING: The markings specified for ASME containers shall be on a stainless steel metal nameplate attached to the container, located to remain visible after the container is installed.

   (1) The nameplate shall be attached in such a way as to minimize corrosion of the nameplate or its fastening means and not contribute to corrosion of the container.

   (2) Where the container is buried, mounded, insulated, or otherwise covered so the nameplate is obscured, the information contained on the nameplate shall be duplicated and installed on adjacent piping or on a structure in a clearly visible location.

   (3) Stationary ASME containers shall be marked with the following information:

      1) Service for which the container is designed (e.g., underground, aboveground, or both).

      2) Name and address of container supplier or trade name of container.

      3) Water capacity of container in pounds or U.S. gallons.

      4) MAWP in pounds per square inch.

      5) Wording that reads “This container shall not contain a product that has a vapor pressure in excess of ___ psig at 100°F” (see Table 14.9.2).

      6) Outside surface area in square feet.

      7) Year of manufacture.

      8) Shell thickness and head thickness.

      9) OL (overall length), OD (outside diameter), and HD (head design).

      10) Manufacturer’s serial number.

      11) ASME Code symbol.

      12) Minimum design metal temperature ___°F at MAWP____ psi.

      13) Type of construction “W”.

14) Degree of radiography “RT-___”.

(4) Warning labels shall include information on the potential hazards of LP-Gas.

5. CONTAINER APPURTENANCES AND REGULATORS: Container appurtenances and regulators shall be fabricated of materials that are compatible with LP-Gas and shall be resistant to the action of LP-Gas under service conditions. The following materials shall not be used:

(1) Gray cast iron.

(2) Nonmetallic materials, for bonnets or bodies of valves or regulators

(3) Pressure-containing metal parts of appurtenances shall have a minimum melting point of 1,500°F, except for the following:

1) Fusible elements.

2) Approved or listed variable liquid level gauges used in containers of 3,500 gal water capacity or less.

(4) Container appurtenances shall have a service pressure of at least 250 psig.

(5) Gaskets used to retain LP-Gas in containers shall be resistant to the action of LP-Gas:

1) Gaskets shall be made of metal or other material confined in metal having a melting point over 1500°F or shall be protected against fire exposure.

2) When a flange is opened, the gasket shall be replaced.

3) Aluminum O-rings and spiral-wound metal gaskets shall be permitted.

4) Gaskets for use with approved or listed liquid level gauges for installation on a container of 3500 gal water capacity or less shall be exempt from the minimum melting point requirement.

ASME containers shall be equipped with one or more pressure relief valves that are designed to relieve vapor.

ASME containers for LP-Gas shall be equipped with direct spring-loaded pressure relief valves conforming with the applicable requirements of ANSI/UL 132, Standard for Safety Relief Valves for Anhydrous Ammonia and LP-Gas, or other equivalent pressure relief valve standards.

14.9.3 REGULATORS:

First-stage regulators shall have a maximum outlet pressure setting of 1.0 psig. Second-stage regulators and integral two-stage regulators shall have a maximum outlet pressure setting of 16 in. water column (w.c.).

Regulators shall be designed to drain condensate from the regulator spring case when the vent is directed vertically down. Pipe or tubing used to vent regulators shall be metal pipe or tubing.

14.9.4 PIPE, TUBING AND FITTINGS:

Piping, pipe fittings and valves shall comply with NFPA 54.

Piping shall be wrought iron or steel (black or galvanized), brass, copper, polyamide, or polyethylene. Tubing shall be steel, stainless steel, brass, copper, polyamide, or polyethylene.

Fittings for metallic pipe and tubing shall be steel, brass, copper, malleable iron, or ductile (nodular) iron. Fittings shall have a minimum pressure rating of 250 psig.

Fittings for polyamide and polyethylene pipe and tubing shall be heat fusion type, compression-mechanical type, or factory-assembled transition type.

14.9.5 VALVES OTHER THAN CONTAINER VALVES:

Pressure-containing metal parts of valves shall be of steel, ductile (nodular) iron, malleable iron, or brass. All materials used, including valve seat discs, packing, seals, and diaphragms, shall be resistant to the action of LP-Gas under service conditions.

Valves shall have a service pressure rating of 250 psig. Manual shutoff valves, emergency shutoff valves, excess-flow check valves, and backflow check valves used in piping systems shall comply with the provisions for container valves.

Valves shall be recommended for LP-Gas service by the manufacturer.

14.9.6 INSTALLATION OF LP-GAS SYSTEMS

1. GENERAL: LP-Gas containers shall be located outside of buildings. Containers shall be located with respect to the adjacent containers, important buildings, group of buildings, or line of adjoining property that can be built upon, in accordance with Table 14.9.6:

Table 14.9.6
Separation Distances Between Containers, Important Buildings, and Line of Adjoining Property That Can Be Built Upon

WATER CAPACITY PER CONTAINER	ABOVEGROUND CONTAINERS	BETWEEN CONTAINERS
GAL	MINIMUM DISTANCE (FT)	MINIMUM DISTANCE (FT)
125 - 250	10	0
251 - 500	10	3
501 - 2,000	25	3

The 25 feet minimum distance from ASME containers of 501 gal through 2000 gal water capacity to buildings, a group of buildings, or the line of adjoining property that can be built upon shall be reduced to 10 feet for a single ASME container of 1200 gal or less water capacity where such container is at least 25 feett from any other LP-Gas container of more than 125 gal water capacity.

Containers shall not be stacked one above the other. The area under containers shall be graded or shall have dikes or curbs installed so that the flow or accumulation of flammable liquids with flash points below 200°F is prevented.

LP-Gas containers shall be located at least 10 feet from the centerline of the wall of diked areas containing flammable or combustible liquids.

An aboveground LP-Gas container and any of its parts shall not be located within 6 feet of a vertical plane beneath overhead electric power lines that are over 600 volts, nominal.

2. CONTAINERS: Aboveground containers shall be painted.

   Containers shall be installed so that all container operating appurtenances are accessible.
   To prevent flotation due to possible high flood waters, aboveground containers shall be securely anchored.

Horizontal ASME containers shall be placed on masonry or other noncombustible structural supports located on concrete or masonry foundations with the container supports.

Containers of 2000 gal water capacity or less shall not be mounted with the outside bottom of the container shell more than 5 feet above the surface of the ground.

In locations where the monthly maximum depth of snow accumulation is more than the height of aboveground containers, excluding the dome cover, the following requirements shall apply:

(1) A stake or other marking shall be installed higher than the average snow cover depths, up to a height of 15 ft.

(2) The container shall be installed to prevent its movement resulting from snow accumulation.

3. CONTAINER APPURTENANCES: Pressure relief devices shall be installed so that the relief device is in direct contact with the vapor space of the container.

   Pressure relief devices shall be so installed that any gas released is vented away from the container upward and unobstructed to the open air.

   Shutoff valves shall not be installed between pressure relief devices and the container unless a listed pressure relief valve manifold is used.

   Shutoff valves shall not be installed at the outlet of a pressure relief device or at the outlet of the discharge piping where discharge piping is installed.

4. REGULATORS: All first-stage and second-stage regulators shall be designed, installed, or protected so their operation will not be affected by the elements (freezing rain, sleet, snow, ice, mud, or debris).

   Single-stage regulators shall not be installed in piping systems.

5. PIPE, TUBING AND FITTINGS: All metallic LP-Gas piping shall be installed in accordance with ASME B 31.3. Metallic pipe joints shall be permitted to be threaded, flanged, welded, or brazed. Metallic tubing joints shall be flared or brazed.

   Buried metallic pipe and tubing shall be installed underground with a minimum 12 inch of cover. The minimum cover shall be increased to 18 inch if external damage to the pipe or tubing from external forces is likely to result. If a minimum 12 inch of cover cannot be maintained, the piping shall be installed in conduit or shall be bridged (shielded). Buried metallic pipe shall not use as a grounding electrode.

   Polyamide and polyethylene pipe, tubing, and fittings shall be installed outdoors underground only.

   Polyamide and polyethylene pipe and tubing shall be installed underground with a minimum 12 inch of cover. The minimum cover shall be increased to 18 inch if external damage to the pipe or tubing from external forces is likely to result. If a minimum 12 inch of cover cannot be maintained, the piping shall be installed in conduit or shall be bridged (shielded).

   After assembly, piping systems (including hose) shall be tested and proven free of leaks at not less than the normal operating pressure. Piping shall be pressure tested in accordance with NFPA 54. Tests shall not be made with a flame.

SECTION 14.10 STATIONARY COMBUSTION ENGINES

14.10.1 GENERAL:

1. SCOPE. This portion of the standard establishes criteria for minimizing the hazards of fire during the installation and operation of stationary combustion engines.

2. APPLICATION. This portion of the standard shall apply to new installations and to existing equipment and installations that are modified. This annex also applies to portable engines that remain connected for use in the same location for a period of one week or more.

2. REFERENCED PUBLICATIONS. The documents or portions of publications that are referenced shall be considered part of the requirements of this standard.

   (1) National Fire Protection Association (NFPA) Publications:

      1) NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines.

      2) NFPA 54, National Fuel Gas Code.

      3) NFPA 58, Liquefied Petroleum Gas Code.

      4) NFPA 70, National Electrical Code.

      5) NFPA 110, Emergency and Standby Power Systems.

3. DEFINITIONS: The following definitions shall apply to the terms used in this portion of the standard:

   (1) Class I Fuel. For the purpose of this standard, any liquid fuel having a flash point below 100°F.

   (2) Enclosure: A cover intended to protect an engine and related equipment.

   (3) Engines: Prime movers such as internal combustion engines, external combustion engines, gas turbine engines, rotary engines, and free piston engines using either gaseous fuels or liquid fuels or combinations thereof.

      1) Engines for Emergency Use: Engines that operate under limited-use conditions to support critical operations in the protection of life, property, or both.

      2) Reciprocating Engines: An engine that uses a spark plug to ignite a fuel-air mixture (e.g., otto cycle engine).

   (4) Gas Train: The portion of the fuel gas supply piping starting with and including the equipment isolation valve and extending to the point at which the fuel enters the prime mover.

   (5) Hazardous Location: An area where flammable or combustible gases or liquids or combustible dusts or flyings usually exist.

   (6) Valve:

      1) Automatic Safety Shutoff Valve (ASSV): A valve that, upon shutdown conditions, will automatically stop the flow of gas to the engine or turbine.

2) Equipment Isolation Valve: The manually operated valve that isolates the balance of the gas train and the prime mover from the gas supply.

(7) Zero Governor Regulator: A gas pressure regulator equipped with a counter spring beneath the valve that requires an external impulse signal such as top loading with pressure or generating vacuum in the downstream piping.

14.10.2 ENGINE LOCATIONS:

1. GENERAL REQUIREMENTS: Engines shall be situated so that they are readily accessible for maintenance, repair and firefighting.

   The air supply shall be designed to meet at least the minimum requirements for combustion, cooling, and ventilation and to prevent flue gas products from being drawn from stacks or flues of boilers or other combustion devices.

   Combustible materials shall not be stored in rooms or enclosures housing engines.

2. ENGINE ROOMS: Engine rooms located within structures shall have interior walls, floors, and ceilings of at least 1 hour fire resistance rating.

   Engine rooms shall have ventilation that is adequate to prevent a hazardous accumulation of flammable vapors or gases, both when the engine is operating and when it is shut down.

   Openings from an engine room to other sections of the structure shall be provided with automatic or self-closing fire doors or dampers corresponding to the rating of the walls in which they are located.

   Rooms containing engines utilizing a Class I fuel shall be located on an exterior wall, the construction of which shall provide ready accessibility for fire-fighting operations through the provision of doors, access openings, windows, louvers, or lightweight, noncombustible wall panels.

   Dedicated detached structures shall be of noncombustible or fire-resistive construction.

   Dedicated detached structures shall be located at least 5 feet from openings in walls and at least 5 feet from structures having combustible walls. A minimum separation shall not be required where any of the following conditions exist:

   (1) The exposing wall of the detached structure has a fire resistance rating of at least 1 hour.
   (2) The exposed wall of the adjacent structure has a fire resistance rating of at least 1 hour.
   (3) The detached structure is protected by an automatic fire protection system.

3. ENGINES LOCATED OUTDOORS: Engines, and their weatherproof enclosures, that are installed outdoors shall be located at least 5 feet from openings in walls and at least 5 feet from structures having combustible walls. A minimum separation shall not be required where either of the following conditions exist:

   (1) The adjacent wall of the structure has a fire resistance rating of at least 1 hour.

   (2) The weatherproof enclosure is constructed of noncombustible materials and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure.

4. FOUNDATIONS: Engines shall be supported on foundations or secured to a noncombustible framework.

5. ELECTRICAL INSTALLATIONS: Electrical installations in rooms containing engines shall comply with NFPA 70, National Electrical Code.

   Engine rooms or other locations shall not be classified as hazardous locations as defined in Article 500 of **NFPA 70**, National Electrical Code, solely by reason of the engine fuel, lubricating oil, or hydraulic fluid.

14.10.3 FUEL SUPPLY

1. GAS PIPING: LP-Gas systems, whether liquid or vapor phase, shall be installed in accordance with the provisions of NFPA 58, Liquefied Petroleum Gas Code.

   Plastic pipe shall not be used to carry fuel within a room housing an engine(s).

   Approved metallic flexible connectors shall be permitted for protection against damage caused by settlement, vibration, expansion, contraction, or corrosion.

2. GAS TRAINS: Gas trains shall contain the following safety components:

   (1) An equipment isolation valve.

   (2) A regulator, if the prime mover does not operate at the gas supply pressure.

   (3) Two ASSVs.

   (4) A manual leak test valve for each ASSV or an alternative means of proving the full closure of the ASSV.

   (5) A low-pressure switch for engines with a 2.5 million Btu/hr full-load input or greater.

   (6) A high-pressure switch (manual reset) for engines with a 2.5 million Btu/hr full-load input or greater.

   (7) Any other components or equipment that the manufacturer requires for safe operation.

3. REGULATORS: A gas pressure regulator shall vent to atmosphere outside the structure at a point at least 5 feet away from any structure opening.

   The following devices shall not be required to be vented to the outside when installed in accordance with their listing:

   (1) Any regulator or zero governor that operates with gas pressure on both sides of the diaphragm.

   (2) A full lock-up regulator.

   (3) A regulator with a listed vent-limiting device.

   Such vents and any connected piping shall be sized to vent the required volume of gas.

4. VALVES:

   (1) Manual Shutoff Valves:

      1) Multiple manual shutoff valves shall be permitted in the gas train to allow additional isolation for maintenance reasons.

2) If the shutoff valve is locked open, the key shall be secured in a well-marked, accessible location near the valve.

3) A manual shutoff valve in a remote location shall be provided to isolate the fuel supply.

(2) Equipment Isolation Valves: In multiple-engine installations, the equipment isolation valve shall be located no further from the engine than the first takeoff or branch pipe that serves only that engine.

(3) Automatic Safety Shutoff Valves (ASSVs): The ASSVs shall stop the flow of fuel within 1 second in the event the engine stops from any cause. The ASSV shall fail closed without an externally applied source of power.

It shall be permissible to replace one of the ASSVs with one of the following devices, provided the device will automatically shut off the flow of fuel within 1 second if the engine stops from any cause:

1) Carburetion valve.

2) Zero governor-type regulating valve.

3) Auxiliary valve.

4) Where a carburetion valve or zero governor–type regulating valve is used as one of the required ASSVs, the downstream manual leak test valve shall not be required.

14.10.4 LUBRICATING SYSTEMS:

1. GENERAL REQUIREMENTS: Lubricating oil reservoirs shall include the following protective devices:

   (1) A flame arrester on the vent pipe, if the vent terminates in the exhaust gas path.

   (2) A high-oil-level alarm if the reservoir is filled automatically.

   (3) A remote shutdown switch for auxiliary lubricating oil pumps, if provided.

   The vent pipe shall not terminate in a location where the vapors can be drawn into the engine combustion air supply.

2. RECIPROCATING ENGINES: On engines where crankcase explosions can be a hazard, explosion venting shall be provided or means shall be used to maintain a nonflammable atmosphere in the crankcase.

   Auxiliary reservoir oil supply chambers, if used, shall be vented through either separate vents or a common venting system.

   Engines designed to operate with a negative pressure in the crankcase and equipped with a separate lubricating oil sump shall be provided with check valves in the venting system from the sump.

14.10.5 ENGINE EXHAUST SYSTEMS:

1. DESIGN AND CONSTRUCTION: Engine exhaust systems shall be designed and constructed such that the system can withstand the anticipated exhaust gas temperatures.

   Exhaust systems shall be designed and constructed to withstand the intended service.

Exhaust systems shall be designed and constructed to withstand forces caused by the ignition of unburned fuel or shall have provisions to relieve those forces without damaging the exhaust system.

Low points in exhaust systems shall have drains.

2. INSTALLATION: Exhaust systems shall be connected to the engine to prevent the escape of sparks, flame, or flue gas within the structure.

   Engine exhaust systems shall have one or more flexible connectors if necessary to minimize the risk of a leak in the engine exhaust system because of engine vibration or thermal expansion.

3. EXHAUST SYSTEM TERMINATION: Exhaust systems shall terminate outside the structure at a point where hot gases, sparks, or products of combustion will discharge to a safe location.

   Exhaust system terminations shall not be directed toward combustible material or structures or into atmospheres containing flammable gases, flammable vapors, or combustible dusts.

   Where necessary to prevent personnel burns, exhaust systems shall be guarded.

   Exhaust pipes and ducts passing directly through combustible roofs shall be guarded at the point of passage by ventilated metal thimbles that extend not less than 9 in. on each side (above and below) of roof construction and are at least 6 in. in diameter larger than the exhaust pipe or duct.

   Exhaust pipes and ducts passing directly through combustible walls or partitions shall be guarded at the point of passage by one of the following methods:

   (1) Metal ventilated thimbles not less than 12 in. larger in diameter than the exhaust pipe or duct.

   (2) Metal or burned fire clay thimbles constructed of brickwork or other approved fireproofing materials providing not less than 8 in. of insulation between the thimble and combustible material.

14.10.6 CONTROL AND INSTRUMENTATION

Each engine shall be equipped with an automatic engine speed control.

Engines of 7.5 kW (10 hp) or more shall be equipped with protective devices or with equivalent provisions to shut down the engine when any of the following conditions occur:

(1) Engine overspeed

(2) High jacket water temperature or high cylinder temperature

(3) Low lubricating oil pressure or, in the case of a splash-lubricated engine, low oil level

(4) High lubricating oil temperature

Each engine shall also have provision for shutting down the engine at the engine and from a remote location.

Engines that have lubricating oil pumps that are not directly driven by the engine shall also have provision for shutting down the lubricating pump from a remote location.

Appendix B

Biological Evaluation

Biological Evaluation

Crossman Peak Communications Facility Project

Prepared for:

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Blanket Purchase Agreement No.: DE-AB65-11WG90286
Task Order No.: 1118-024AS Task 3

March 2017

Errata Sheet

Revisions to the Biological Evaluation for the Crossman Peak Communications Facility Project (March 2017)

Added text is underlined; deleted text is ~~struck through~~.

Table 1 – To be consistent with BLM's Updated Sensitive Species List for Arizona (dated March 2017), the following species are removed: Arizona Bell's vireo (*Vireo bellii*) and Gila monster (*Heloderma suspectum*)

Table 1 – The following row is added to include monarch butterfly, which was added to BLM's Updated Sensitive Species List for Arizona (dated March 2017):

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
OTHER SPECIAL-STATUS SPECIES				
Monarch Butterfly *Danaus plexippus plexippus*	Widespread throughout North American; year-round resident of AZ. Occupies a variety of habitats, including desert scrub; caterpillars feed on milkweeds (*Asclepias* spp.).	Year-round	BLM: S	High; suitable habitat throughout; caterpillar host-species present.

Page 15 - Species Protected Under the Bald and Golden Eagle Protection Act reformatted as a heading.

…Raptor collision protection devices are not proposed distribution line is away from areas of high bird use or foraging area (i.e. wetlands, agricultural areas, and riparian habitat). If bird collision becomes problematic, then bird collision reducing devices may be added in areas with higher than expected collision rates.

Species Protected Under the Bald and Golden Eagle Protection Act

Under the BGEPA, the USFWS regulates activities that may take bald or golden eagles…

Page 19 – typo corrected to make "restrictions" plural

In addition the AGFD requests coordination and consultation for any work proposed from January 1 to January 31 and also from April 1 to April 30. These restrictions do not apply to travel on roads identified in BLM's Travel Management Plans, such as the existing road along the proposed distribution line corridor and the existing road leading up to the communications facility

Page 19 – Gila monster removed from consideration. This species is not included on the BLM's Updated Sensitive Species List for Arizona (dated March 2017).

Page 19 and 20 – Revised description of Joshua tree threats and distribution.

Joshua trees have a broad range in Arizona and grow in scattered locations throughout the northwest corner of the state. They were recently added to the BLMs list of sensitive species because they were petitioned to be listed under the federal Endangered Species Act due to ~~of~~ large scale removal for agriculture and other land use conversions. Joshua trees are most frequently found in large broad valley floors and occasionally on adjacent mountain slopes and foothills. Within the project area they were growing primarily on the steeper north-facing slopes just north of the communications site and in patches along the proposed distribution line corridor. Suitable habitat is present throughout much of the project area from Crossman Peak north to the end of the project area.

Page 21 – analysis of monarch butterfly added.

Monarch Butterfly (*Danaus plexippus*)

Monarch butterfly is recognized by the BLM as a sensitive species in Arizona. It can occur anywhere in the United States. Low and middle altitude deserts in Arizona, such as those in the Lake Havasu region, support more breeding monarchs in the fall, especially September, than the spring. During the time of the spring migration in late March through June, there are small numbers of breeding monarchs migrating through the lower deserts (Morris et al. 2015).

Milkweed is the exclusive food source for monarch caterpillars, although adults feed on the nectar of a variety of plants. Desert or rush milkweed (*Asclepias subulata*), which is used by the monarch butterfly for breeding (Morris et al. 2015), was an uncommon occurrence during surveys of the project area, primarily near the northern end of the proposed distribution line corridor. No monarch butterflies were observed during surveys, but they is high potential for them to occur in the Project area.

Primary threats to the species include habitat loss and degradation, pesticides, and climate change, which alters the timing of migration. Project activities may crush or damage host plants. Implementation of conservation measures would minimize damage to vegetation. Impacts to monarch butterflies from inadvertent damage to milkweed plants would be negligible given the relatively extensive suitable habitat in adjacent lands that would not be impacted by the Project.

Pages 21 and 22 – Conservation Measure #2 revised to clarify survey timing for Sonoran desert tortoise and remove Gila monster, which is no longer a BLM Sensitive Species.

Pre-activity clearance surveys: Due to the possibility that special-status species and nesting birds may be found in the Project area, a biologist will conduct pre-activity clearance surveys within up to 300 feet of the Project area. A smaller area may be surveyed if determined appropriate by the biologist in coordination with BLM and/or WAPA.

The biologist will survey for:

a. Sonoran desert tortoise and their burrows (year-round).

b. Burrowing owls and their burrows (year-round).

c. Nesting birds: Project activities that may disturb the ground or vegetation, from February 5 to June 30, will take place only after the work area has been surveyed for active bird nests. Pre-activity surveys will be conducted no more than seven days in advance of any ground- or vegetation-disturbing activities in any location. If active bird nests are found within the survey area, the biologist will establish a no-disturbance buffer around the active nests; buffer size

will be determined in coordination with the BLM and/or WAPA biologist Project activities conducted outside of the breeding season would not require nesting bird surveys.

d. Golden eagle: Project activities in the vicinity of the suitable golden eagle nesting habitat (approximately 400 feet east of Crossman Peak) will only take place after the biologist has determined that golden eagles are absent. If nesting is observed then no work will be permitted during the nesting season (January 15 to May 31).

e. Other special-status species such as Joshua tree and~~,~~ Parish's onion ~~and Gila monster~~.

Pages 22 and 23 – clarifying text added to Conservation Measure #3(c)

Special-status plants: The Biological Monitor will flag all species-status plants identified during the pre-activity clearance survey. These special-status plants will be avoided during all Project activities. If a plant recognized as a BLM sensitive species must be removed or relocated the BLM will be notified prior to removal. If a state or federally listed plant is identified it will not be allowed to removed. Plants that are classified as highly safeguarded species by the Arizona Department of Agriculture will be avoided or transplanted. The Biological Monitor will be responsible for monitoring the special-status plants throughout the Project and for removing the flagging after the Project construction is complete.

Page 26 – Added reference.

Gail M. Morris, Christopher Kline & Scott M. Morris. 2015. Status of Danaus plexippus in Arizona. Journal of the Lepidopterists' Society 69(2): 91–107.

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Executive Summary

This Biological Evaluation (BE) describes the biological resources present, or potentially present, within the proposed Crossman Peak Communications Site Project (Project) area and evaluates potential impacts to those resources. The proposed Project would include construction of approximately 14.6 miles of new 20.8 kilovolt (kV) distribution line and 4.6 miles of associated new spur routes, a 0.24-mile road extension, repairs and improvements to sections of existing access roads, and a new communications facility adjacent to an existing, privately-owned facility near Crossman Peak east of Lake Havasu City, Arizona.

The Project area is located in Mohave County, Arizona. It is located on public lands managed by the Bureau of Land Management (BLM) and Arizona State Land Department and on private lands (Figure 1). The distribution line would run from the Franconia Substation, near Interstate 40, south to the proposed Crossman Peak Communications Facility (facility). The access road and spur roads would run parallel to the distribution line alignment at most locations. A second existing access road, which would provide access to the facility, originates in the northeast corner of Lake Havasu City and ends at the facility.

No federally-listed or candidate species, or species proposed for listing, are present or potentially present in the Project area. The Project would not affect designated Critical Habitat for any federally-listed species. One non-listed special-status species, Desert bighorn sheep, is present in the Project area. Suitable habitat for several additional non-listed, special-status species is also present. Conservation Measures to avoid impacts to these species and to minimize impacts to their habitats are recommended. With implementation of Conservation Measures, including pre-activity clearance surveys and limiting the Project's schedule to when birds are not likely to be nesting, the Project is not likely to impact non-listed special-status species and migratory nesting birds.

Introduction

This Biological Evaluation (BE) was prepared at the direction of the Western Area Power Administration, Desert Southwest Region (WAPA) for the proposed Project. Aspen biologists reviewed information on biological resources of the surrounding area and visited the Project area to evaluate biological resources, assess habitat suitability for special-status species, and conduct a reconnaissance-level biological survey. The Project area refers to all areas that may be disturbed by Project activities (Figures 1 through 3). The reconnaissance-level biological survey included an assessment of the proposed communications facility, the proposed distribution line right-of-way (50-feet wide), and existing and proposed access/spur roads (20-feet wide) which are collectively referred to as the survey area in this BE. This BE summarizes the findings of the survey and addresses the potential for occurrence of federally-listed threatened or endangered species, as well as species that have been proposed for listing or identified as candidates for listing under the Federal Endangered Species Act (ESA), and other special-status plants and animals in the Project vicinity. In addition, this BE describes potential Project impacts to those species, and recommends measures to mitigate impacts. This BE will support WAPA's review of the Project under the ESA and the National Environmental Policy Act (NEPA).

Project Description

WAPA proposes to construct a new self-supporting communication tower at the existing Crossman Peak facility and improve the access road as part of the Project. In support of WAPAs Project UniSource Energy Services (UES) proposes to construct approximately 14.6 miles of 20.8-kV distribution line from the Franconia Substation, located just south of Interstate 40, to the proposed communications facility (Photo 1). The distribution line would include approximately 250 new poles. Access would also be needed along the distribution line route. Up to 4.6 miles of existing access road would be improved (if needed), 0.24 miles of new road would be built, and approximately 4.6 miles of new spur routes would be built, as needed, where trucks could not travel overland.

The Project area is located in Mohave County, Arizona. It is on public lands managed by the Bureau of Land Management (BLM) and Arizona State Land Department (ASLD), and on private lands. In advance of construction activities, WAPA would acquire right-of-way from the ASLD and BLM for use of the existing communications facility access road. WAPA would purchase and own 3,500 square-feet of privately-owned land where the communications facility would be built. UES would acquire right-of-way from BLM for the proposed distribution line and access road construction and improvements on BLM lands. UES would also request land owner permission for construction and operation of the distribution line on private lands.

Communications Facility Construction

WAPA proposes to construct the communications facility within a 50-foot by 70-foot area. WAPA would access work areas by construction vehicles via the existing unpaved access road. Equipment staging and storage would be confined to an adjacent 50-foot by 70-foot area and within a wide road shoulder located just south of the southern-most switchback (see Figure 3-2). WAPA would prepare the site for construction, including removal of vegetation (mainly shrubs) from the communications site and access road switchbacks. WAPA would also grade the immediate work zone within the 50-foot by 70-foot area around the communications site for safety.

To construct the communication facility, WAPA would install concrete slab foundations for the communications tower, equipment shelter, generator, and propane tank. WAPA would create an

underground connection between the propane tank and the generator. A grounding grid would be installed around the perimeter of the communications tower. To excavate the foundations for the tower, WAPA would auger holes four feet in diameter and up to 20 feet deep. A crane or helicopter would set the tower foundations in the excavated holes and the holes would be backfilled with concrete. Excess excavated material would be used to backfill holes or spread onsite. WAPA estimates the maximum ground disturbance area for the communications site would be the 50-foot by 70-foot (3,500 square-foot) area.

WAPA would improve the four degraded switchback curves located on private land nearest the facility. To complete this, WAPA would clear brush, perform minor grading, and compact the area. Water trucks would be used on the access road to control dust and to retain fine surface rock. The remainder of the existing access road would not be improved or maintained.

Distribution Line Construction

UES proposes to install approximately 250 distribution line poles. Most poles would be 45-feet tall and made of wood or steel poles; several 55- to 80-foot steel poles would be installed in the steep 2-mile section leading up to the communications facility shown as poles 243 through 248 on Figure 2-9. The poles and other components would be delivered to the Project staging area either at the disturbed Franconia Substation or along the distribution line right-of-way, at each proposed pole site. The structures and other components would be delivered to the installation locations using ground transport equipment suitable for the rugged terrain.

Installing the distribution line poles, conductor, and overhead ground wires would disturb the ground. The temporary disturbance area at each distribution line pole would be no more than 2,500 square feet and the permanent disturbance would be no more than two square feet. UES would conduct ground-disturbing activities within the proposed distribution line right-of-way. UES would also require up to 24 temporary, 50-foot by 100-foot, pulling/stringing areas at the turning structures along the distribution line that may be located adjacent to, but outside of the proposed right-of-way. Lastly, UES would build three temporary, 75-foot by 75-foot, work pads at the three, southern-most pole locations and construct those poles using a helicopter due to steep terrain.

To install poles, UES would use tracked or rubber-tire vehicles (i.e. front loader or backhoe) to level the ground and use an auger to excavate the foundations to a depth of up to 20 feet. Poles would be placed in the hole and temporarily supported by a crane while concrete is poured around the base. Excess excavated material would be used as backfill or removed from the site.

Conductor Stringing

UES proposes to string the conductor between structures by first running a “sock line” through a series of pullies and then running a lighter-weight rope back through the pullies by pulling on the sock line. The conductor would then be pulled into place and tensioned by pulling on the rope using pulling equipment at one end of the section and tensioning equipment at the other end. Once the correct tension has been reached, the conductor will be secured at each of the pulling segments using mechanical or compression dead-end devices. During the conductor stringing process, the conductor will only be allowed to contact the ground at pulling and tensioning locations. The work will be completed using lift equipment, by climbing the structure, or by helicopter.

Access Road Construction and Improvements

To improve and construct the access road for the distribution line, UES would clear brush and grade the existing road where necessary. UES would construct approximately 4.6 miles of new spur routes off the existing access road (where trucks would not be able to travel overland) and the existing road would be extended at the south end of the distribution line for approximately 0.24 miles. The spur routes would be cleared of vegetation and graded, where needed, to allow for construction access. Upon completion of construction all spur routes crossings of jurisdictional drainages would be returned to pre-construction elevations and contours. During construction UES would use water trucks on the access road to control dust and to retain fine surface rock. UES would implement a Stormwater Pollution Prevention Plan (SWPPP) during construction, per Arizona Department of Environmental Quality (ADEQ) guidelines. The SWPPP includes construction of dirt berms, installation of wildlife-friendly (i.e. non-plastic and biodegradable) and weed free straw wattles, etc. to prevent sediment flow into the washes. Any erosion control installation would be removed after construction.

Operation and Maintenance

WAPA proposes to operate the communications facility remotely from WAPA's Phoenix office and would only require occasional visits to the facility. WAPA personnel would conduct routine maintenance of the access road and communications equipment to assure the safe and reliable access to and operation of the proposed communications site. WAPA expects to inspect its facilities once or twice per year. WAPA proposes to perform the following:

- Maintain and inspect communication towers, antennae, and appurtenant equipment;
- Maintain foundations and footings;
- Refill propane tanks, and maintain associated gauges and switches;
- Install underground and/or overhead power, communication, ground electrical, or control lines (between propane tank, generator, and building) less than 100-feet long;
- Maintain the facility, e.g., maintain the generator and air conditioner, add or remove panels, and install or replace antennae;
- Apply herbicides (including pesticides) within the facility's fence;
- Maintain and repair the access road;
- Install and maintain a fence around the communication site; and
- Remediate small spills (up to 10 gallons) of oil and hazardous materials.

UES will not perform routine maintenance on the access roads or routes as it is not normally needed. UES expects to inspect the distribution line annually to identify maintenance needs. Normally no maintenance is needed for several years, even decades.

WAPA does not propose to install lighting on the communications tower, but does propose to install remotely-activated security lighting for safety. WAPA also proposes to install down-shielded maintenance lighting that would be controlled either by an on-site switch or remotely.

Project Schedule

WAPA would begin construction no later than February 15, 2018. WAPA's construction activity would occur over three to four months. All construction would occur during daylight hours, and night lighting

would not be required. WAPA would begin operation of the proposed communications facility no later than December 2018.

UES would begin construction no sooner than October 1, 2017. UES's construction activities would occur for up to six months. All construction would occur during daylight hours, and night lighting would not be required. UES would energize the distribution line in time to meet WAPA's operational target date of December 2018.

BLM would issue the right-of-way grants to WAPA and UES within the 30 days following BLM's approval of this Environmental Assessment, which, if approved, is expected to occur in the Summer of 2017.

Methods

Prior to field surveys, Aspen biologist Justin M. Wood reviewed available literature to identify special-status species potentially occurring in or near the Project area (see Species Identification section below). From November 1 through 3, 2016, Aspen biologists Jared Varonin and Wood conducted a reconnaissance-level biological survey of the Project area. The site visit also included mapping vegetation and habitat and assessing habitat suitability for special-status species within the Project area. All plant and animal species observed in the field were identified and recorded (Attachments 1 and 2). Plants that could not be identified in the field were collected and later identified using keys, descriptions, and illustrations in regional publications such as Kearney and Peebles (1951), FNA (1993+), and Baldwin et al. (2002).

Aspen biologists drove all access roads and conducted pedestrian surveys at various locations in the Project area that warranted closer examination. Aspen did not conduct BLM or USFWS protocol surveys for any wildlife or plant species. During the field surveys, Wood searched suitable habitat for burrowing owl burrows, inactive bird nests, and evidence of any other special-status species.

Following the field visit, Wood used 1-meter-pixel aerial imagery to digitize vegetation and land-use types within the Project area (Figure 2). The minimum mapping unit is approximately 0.25 acre (10,890 square feet). Vegetation was mapped according to the nomenclature and descriptions of Brown (1994); the Southwest Regional Gap Analysis Project (SWReGAP; Prior-Kagee et al., 2007) was also used to the greatest extent possible. Mapped vegetation boundaries are accurate to within approximately 10 feet.

Land Use, Vegetation, and Habitat

Crossman Peak is located northeast of Lake Havasu City in the Mohave Mountains of Mohave County, Arizona. The proposed communications site would be located approximately nine miles east of Highway 95 and 13 miles south of Interstate 40. The proposed facility would be located adjacent to an existing American Tower communications facility on private land. BLM-administered lands surround this private inholding and comprise the majority of the Project area. The BLM has designated a portion of the Project area as the Crossman Peak Area of Critical Environmental Concern (ACEC) for desert bighorn sheep habitat (Figure 1). The ACEC is important for foraging and dispersal habitat and certain portions of the ACEC are important during the lambing season (January 1 through June 30) (Figure 3). Elevation of the Project area ranges from approximately 1,260 to 4,700 feet above mean sea level. The project area is shown on the following USGS 7.5 minute topographic quads: Buck Mountains, Crossman Peak, and Lake Havasu City North.

Aspen identified five land use and vegetation types in the right-of-way; photographs of four of the five type are presented in Exhibit 1.

- **Sonoran-Mojave Creosotebush-White Bursage Desert Scrub.** This cover type is characterized by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Other species noted, much less frequently, include white rhatany (*Krameria grayi*), big galleta (*Pleuraphis rigida*), and pencil cholla (*Cylindropuntia ramosissima*). Larger shrubs are generally sparse, but annuals are seasonally abundant and dependent on rainfall. We observed annuals such as sandmat (*Chamaesyce* spp.), low woollygrass (*Dasyochloa pulchella*), three-awn grass (*Aristida* spp.), cryptanthas (*Cryptantha* spp.), and phacelias (*Phacelia* spp.). Within the Project area, this cover type is found primarily on the bajada surfaces along the northernmost portion of the alignment (Photo 2).
- **Sonoran Palo Verde-Mixed Cacti Desert Scrub.** This vegetation is characterized by yellow palo verde (*Parkinsonia microphylla*) and less-abundant species such as ocotillo (*Fouquieria splendens*), creosote bush, white bursage, chollas (*Cylindropuntia* spp.), and brittlebush (*Encelia farinosa*). South of Crossman Peak, yellow palo verde is relatively sparse and species such as buckhorn cholla (*Cylindropuntia acanthacarpa*), teddy-bear cholla (*Cylindropuntia bigelovii*), hedgehog cactus (*Echinocereus* spp.), California barrel cactus (*Ferocactus cylindraceus*), dollarjoint pricklypear (*Opuntia chlorotica*), Parry's beargrass (*Nolina parryi*), and desert agave (*Agave deserti*) are relatively more abundant. Along the southern access road, saguaro (*Carnegiea gigantea*) are also present. Within the washes and canyon bottoms, additional species such as common burrobrush (*Ambrosia salsola*), and Coues' cassia (*Senna covesii*), sweetbush (*Bebbia juncea*), and catclaw acacia (*Senegalia greggii*) are also present (Photos 3 through 5).
- **Mojave Mid-Elevation Mixed Desert Scrub.** This diverse shrubland is characterized by numeorus shrubs and trees such as crucifixion thorn (*Canotia holocantha*), Parry's beargrass, Joshua tree (*Yucca brevifolia*), turpentinebroom (*Thamnosma montana*), desert agave, and bladder-sage (*Salazaria mexicana*). In the canyon bottoms and washes, common burrobrush, desert baccharis (*Baccharis sergiloides*), Mojave rabbitbrush (*Ericameria paniculata*), and Coues' cassia are found. Within the Project area, this cover type is found on the northern slope of Crossman Peak from an elevation of about 2,700 feet up to the peak (Photos 6 and 7).
- **Great Basin Pinyon-Juniper Woodland.** This vegetation type is characterized by singleleaf pinyon (*Pinus monophylla*), a tree that grows up to thirty feet tall. In the Project area, this cover type was only found on the north slopes of Crossman Peak above an elevation of approximately 3,900 feet. Additional species such as Sonoran scrub oak (*Quercus turbinella*), an unidentified scrub oak (*Quercus* sp.) that may be *Q. john-tuckeri*, dollarjoint pricklypear, and Heermann's buckwheat (*Eriogonum heermanii*) are also present.
- **Developed and Disturbed.** Within the Project area are human-dominated land uses, including the existing communication facility, a small development, and the unpaved access roads. Vegetation (if present) is dominated by native and non-native ruderal (weedy) species.

Species Identification

Aspen biologist Wood reviewed the Arizona On-line Environmental Review Tool (AGFD, 2016a), the USFWS Information for Planning and Conservation (IPaC) on-line interface (USFWS, 2016), the Arizona Rare Plant Field Guide (Arizona Rare Plant Committee, 2001), and lists of BLM sensitive plants and animals (BLM, 2010) to identify all federally-listed endangered or threatened species, any candidate species or species proposed for listing, species designated as sensitive by the BLM, and species

protected under the Bald and Golden Eagle Protection Act (BGEPA). All species identified by this literature review and others known from the region are listed in Table 1. Special-status species with at least a moderate potential for occurrence within the Project area are discussed further in this BE. All species designated as sensitive by the BLM were evaluated during this review but many were not discussed any further in this BE because they have very limited ranges well outside of the Project area or they live in specialized habitats that are absent from the Project area.

Table 1. Special-status Species of Mohave County

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
FEDERALLY LISTED, PROPOSED FOR FEDERAL LISTING, AND CANDIDATE SPECIES				
Arizona cliffrose *Purshia subintegra*	Shrub that grows on limestone substrates in Sonoran desert scrub; scattered locations in central Arizona including eastern Mohave Co.	Year-round	Fed: END AZ: HS	None, no suitable limestone substrates; outside of known geographic range.
Bonytail chub *Gila elegans*	Colorado River from Parker Dam north through much of the upper watershed, riverine and lake habitats.	Year-round	Fed: END AZ: SGCN	None; no aquatic habitat.
California least tern *Sterna antillarum browni*	Bays and estuaries along the California coast and northern Mexico. Some observations along the Colorado River.	Spring-Summer	Fed: END	None; no aquatic or marine habitat.
Desert pupfish *Cyprinodon macularius*	San Felipe Creek and Salt Creek (Imperial Co.); also several refugia populations and in irrigation canals near Salton Sea; a few locations in Arizona and Mexico.	Year-round	Fed: END AZ: SGCN	None; no aquatic habitat.
Fickeisen plains cactus *Pediocactus peeblesianus* var. *fickeiseniae*	Gravelly limestone soils in alkali desert scrub and desert grasslands; endemic to northern Arizona including Coconino, Mohave, and Navajo Cos.	Spring-Summer	Fed: END AZ: HS	None; no suitable limestone substrate or habitat, well outside of known geographic range.
Gierisch mallow *Sphaeralcea gierischii*	Gypsum soils in warm desert scrub habitat; restricted to northern Mohave Co. in Arizona and southwestern Utah.	Spring-Summer	Fed: END AZ: HS	None; no suitable gypsum substrate, well outside of known geographic range.

Table 1. Special-status Species of Mohave County

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
Holmgren (paradox) milk-vetch *Astragalus holmgreniorum*	Well-drained shallow soils in Great Basin shrub communities; restricted to northern Mohave Co. in Arizona and southwestern Utah.	Spring	Fed: END AZ: HS	None; no suitable habitat, well outside of known geographic range.
Jones's cycladenia *Cycladenia humilis* var. *jonesii*	Perennial herb; saline soils in juniper woodlands; restricted to northern Mohave Co. in Arizona.	Spring - Summer	Fed: THR AZ: HS	None; no suitable saline substrates, well outside of known geographic range.
Northern Mexican gartersnake *Thamnophis eques megalops*	Cienegas, stock tanks, and river riparian habitat; Gila River in AZ and Mule Creek in NM. May also occur in additional drainages including the Bill Williams River.	Year-round	Fed: THR AZ: SGCN	None; no aquatic habitat.
Razorback sucker *Xyrauchen texanus*	Colorado River from Mexico border north through much of the upper watershed; riverine and lake habitats.	Year-round	Fed: END AZ: SGCN	None; no aquatic habitat.
Relict leopard frog *Lithobates onca*	Virgin River in SE NV and NW AZ. Previously believed to be extinct; rediscovered in the early 1990s and currently known from several small springs.	Year-round	Fed: Cand. AZ: SGCN	None; no aquatic habitat.
Roundtail chub *Gila robusta*	Colorado River from Parker Dam north through much of the upper watershed, riverine and lake habitats.	Year-round	Fed: Prop. THR AZ: SGCN	None; no aquatic habitat.
Siler pincushion cactus *Pediocactus sileri*	Cactus restricted to gypsiferoud badlands in northern Mohave Co. and into southwest Utah.	Spring - Summer	Fed: THR AZ: HS	None, no gypsum substrates; well outside known geographic range.
Southwestern willow flycatcher *Empidonax traillii extimus*	Breeds in dense riparian forests & shrublands; scattered locations in Arizona, California, and North Baja; near sea level to about 8000 ft. elevation; winters in Central America	Summer	Fed: END AZ: SGCN	None; no riparian habitat.

Table 1. Special-status Species of Mohave County				
Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
Sprague's pipit *Anthus spragueii*	Winters in grasslands of Arizona, primarily documented in the southeast but occasionally observed elsewhere.	Year-round	Fed: Cand. AZ: SGCN	None; no suitable grassland habitat.
Yellow-billed cuckoo *Coccyzus americanus,* Western U.S. population	Large patches of riparian forest and woodland, usually near surface water; historically common in floodplain habitats.	Spring–Summer	Fed: THR AZ: SGCN	None; no riparian habitat.
Yuma Ridgway's rail *Rallus obsoletus yumanensis*	Marshlands along the lower Colorado River and tributaries in Arizona, California, Nevada, and Utah.	Spring–Summer	Fed: END AZ: SGCN	None; no riparian or marsh habitat.
OTHER SPECIAL-STATUS SPECIES				
Allen's lappet-browed bat *Idionycteris phyllotis*	CA through AZ and parts of NM, UT and CO; generally in forested lands but also deserts; generally near cliffs and rock outcrops; day roosts in rocks, caves, mines.	Spring – Summer	BLM: S	Moderate (foraging only); suitable foraging habitat present in all segments
American peregrine falcon *Falco peregrinus anatum*	Nests on high cliffs, generally near water bodies; feed on birds (esp. shorebirds & waterfowl); widespread but rare worldwide	Spring-summer	Fed: Delisted BLM: S AZ: SGCN	High (foraging); suitable foraging habitat throughout. Low (nesting); suitable nesting habitat present just outside of the Project area.
Arizona Bell's vireo *Vireo bellii*	Willow and mesquite riparian; Sonoran desert along lower Colorado River.	Spring-summer	BLM: S	None; no riparian habitat.
Arizona myotis *Myotis occultus*	Pine forests, 6000-9000 ft. elev.; roosts in buildings, trees, rocks, etc.; feeds over water or open land; hibernates in winter; southeast Calif through AZ and NM.	Spring – Summer	BLM: S AZ: SGCN	High (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat near Crossman Peak.

Table 1. Special-status Species of Mohave County

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
Bald eagle *Haliaeetus leucocephalus*	Breeds in large trees, usually near major rivers or lakes; winters more widely; scattered distribution in North America including resident Sonoran Desert population.	Year-round	Fed: BGEPA BLM: S AZ: SGCN	Low; foraging habitat only.
California black rail *Laterallus jamaicensis coturniculus*	Marshlands with very shallow water (<2 inches) along the lower Colorado River and tributaries in Arizona, California, Nevada, and Utah.	Spring-summer	BLM: S AZ: SGCN	None; no suitable marsh habitat.
California leaf-nosed bat *Macrotus californicus*	Arid lowlands, southern California, southern and western Arizona, Baja California, and Sonora, Mexico; roost in mineshafts, forage over open shrub-lands.	Year-round	BLM: S AZ: SGCN	High (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat near Crossman Peak.
Cave myotis *Myotis velifer*	Mexico through Arizona, also southeastern US; generally roosts in caves; feeds over water or riparian vegetation	Spring - Summer	BLM: S AZ: SGCN	High (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat near Crossman Peak.
Desert bighorn sheep *Ovis canadensis nelsoni*	Open shrublands and conifer forest, remote mountains; scattered populations in desert mountains and surrounding ranges.	Year-round	BLM: S	Present; suitable habitat throughout much of the Project area. Tracks and scat observed in higher elevation portions of the Project area.
Desert mud turtle *Kinosternon sonoriense sonoriense*	Springs, seeps, and ponds; NM, AZ, and Mexico, in AZ restricted to the Gila River drainage in Pima and Yuma counties.	Year-round	BLM: S AZ: SGCN	None; no aquatic habitat.
Desert purple martin *Progne subis herperia*	Uses abandoned woodpecker nests in saguaro; Sonoran desert scrub; most of the desert southwest; winters in South America	Year-around	BLM: S	Moderate: suitable foraging and nesting habitat present in Project area.

Table 1. Special-status Species of Mohave County

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
Ferruginous Hawk *Buteo regalis*	Agricultural fields and native grasslands; western North America, in AZ nesting is restricted to the Colorado Plateau.	Year-round	BLM: S AZ: SGCN	Moderate (wintering); suitable foraging habitat throughout. None (nesting); well outside of nesting range.
Gila monster *Heloderma suspectum*	Sonoran Desert and edge of Mohave Desert; rocky foothills and bajadas in oak woodland and desert grasslands. NW AZ, CA, UT, and NV.	Year-round	BLM: S	Moderate; suitable habitat present in Project area.
Gilded flicker *Colaptes chrysoides*	Saguaro woodlands and riparian woodlands in the low deserts of southern Arizona, Baja, Sonora (Mexico); eastern California	Year-round	BLM: S AZ: SGCN	High; saguaros in the Project area provide suitable nesting habitat.
Golden eagle *Aquila chrysaetos*	Nests in remote trees and cliffs; forage over shrublands and grasslands; breeds throughout western North America, winters to east coast.	Year-round	Fed: BGEPA BLM: S AZ: SGCN	High (foraging); suitable foraging habitat throughout. Moderate (nesting); marginally suitable nesting habitat near Crossman Peak.
Greater western bonneted bat *Eumops perotis californicus*	Lowlands (with rare exceptions); central and southern California, southern Arizona, New Mexico, southwestern Texas, northern Mexico; roost in deep rock crevices, forage over wide area	Year-round	BLM: S AZ: SGCN	High (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat near Crossman Peak.
Joshua tree *Yucca brevifolia*	Valley floors and adjacent mountain slopes with desert scrub and desert woodland. NW Arizona, E California, NV, and UT.	Year-round	BLM: S	Present: Numerous Joshua trees observed within the Project area on the north-facing slope of Crossman Peak.
Le Conte's thrasher *Toxostoma lecontei*	Sparsely vegetated flats with creosote bush; S NV and UT through CA and AZ into northern Mexico.	Year-round	BLM: S	Low: Minimally suitable habitat present along the northern portion of the Project area. Very few records in vicinity.

Table 1. Special-status Species of Mohave County

Species Name	Habitat Requirements	Activity Season	Conservation Status	Potential to Occur
Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*	Many habitats throughout California and western North America, scattered populations in eastern North America; day roosts in caves, tunnels, mines; feed primarily on moths.	Year-round	BLM: S AZ: SGCN	High (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat near Crossman Peak.
Parish's onion *Allium parishii*	Bulb; granitic substrates in Joshua tree woodlands on north-facing slopes; CA and AZ, in AZ restricted to the Kofa Mtns. in Yuma Co. and the Mohave Mtns. in Mohave Co.	Spring-Summer	BLM: S AZ: SR	High; suitable habitat present, documented in immediate vicinity of the Project area in 2005 and 2008.
Pinyon jay *Gymnorhinus cyanocephalus*	Breeds in yellow pine forests and pinyon woodlands throughout much of the western US.	Year-round	BLM: S	Moderate: suitable habitat present at higher elevations within the Project area.
Sonoran desert tortoise *Gopherus morafkai*	Desert shrublands where soil suitable for burrows; Mojave and Sonoran deserts east and south of the Colorado River.	Spring-Summer	Fed: CCA BLM: S AZ: SGCN	Moderate; suitable habitat present throughout the Project area.
Spotted Bat Euderma maculatum	Many habitats throughout western North America; in AZ known from scattered locations throughout the state; roosts in rock crevices and cracks on cliff faces; primarily solitary; feed primarily on moths.	Year-round	BLM: S AZ: SGCN	Moderate (foraging and roosting); suitable foraging habitat throughout, suitable roosting habitat present near Crossman Peak.
Western burrowing owl *Athene cunicularia hypugaea*	Nests in rodent burrows, usually in grasslands; forages in open habitat; occurs through western US and Mexico.	Year-round	BLM: S AZ: SGCN	Moderate; suitable habitat at lower elevations of Project area.

General References: AGFD, 2016a; Baldwin et al., 2002; Brennan and Holycross, 2006; Gannon, 2003; Harvey et al., 2011; Moyle, 2002; Rosenberg et al., 1991; Wilson and Ruff, 1999.

Conservation Status

US Fish and Wildlife Service (Fed.) Designations:

END: Federally listed, endangered.

THR: Federally listed, threatened.

Cand. (Candidate): Sufficient data are available to support Federal listing, but not yet listed.

Prop. (Proposed): Candidate species that were found to warrant listing as either threatened or endangered and were officially proposed as such in a Federal Register notice after the completion of a status review and consideration of other protective conservation measures.

CCA (Candidate Conservation Agreement): Formal, voluntary agreements between the FWS and one or more parties to address the conservation needs of one or more candidate species or species likely to become candidates in the near future. Participants voluntarily commit to implement specific actions designed to remove or reduce threats to the covered species, so that listing may not be necessary.

BGEPA: Bald and Golden Eagle Protection Act.

Bureau of Land Management (BLM) Designations:

S (Sensitive): Species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. BLM Sensitive species also include all Federal Candidate species and federal Delisted species which were so designated within the last five years.

Arizona Department. of Game and Fish (AZ) Designations:

SGCN: Wildlife – Species of Greatest Conservation Need (AGFD, 2012). The occurrence of these wildlife species in Arizona is or may be in jeopardy, or with known or perceived threats or population declines

Arizona Department of Agriculture (AZ) Arizona Native Plant Law Designations:

HS: Highly safeguarded: no collection allowed.

SR: Salvage restricted: this large group of plants are subject to damage and vandalism. It is a large list of species with 32 plant families represented, the largest being numerous species of cacti.

Special-Status Species Evaluations

Listed Threatened or Endangered Species, Species Proposed for Listing, and Candidate Species

All listed threatened or endangered species identified in the literature review and others known from the region are listed in Table 1. Others that are proposed for listing as threatened or endangered species or are candidate species are also included in Table 1. None of the federally listed, proposed, or candidate species identified by the literature review have a potential to occur within the Project area or be impacted by Project activities.

Avian Power Line Interaction Committee Design Standards

Power lines can present an electrocution, collision, or entanglement risk to native birds, including some special-status birds. Large raptors including golden eagles, bald eagle, red-tailed hawks, prairie falcons, and other large birds such as turkey vultures, may be electrocuted by power lines because of their large size and proclivity to perch on tall structures. Structure design is a major factor in causing or preventing raptor electrocutions. Electrocution occurs when a perching bird simultaneously contacts two energized or grounded conductors, or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a structure with insufficient clearance between the conductors or grounds. The majority of raptor electrocutions are caused by distribution lines and relatively small transmission lines energized at voltage levels between 1 kV and 69 kV. The risk of electrocution by high-voltage transmission lines is lower because of increased spacing between the conductors and grounds. Electrocution can occur when horizontal separation is less than the wrist-to-wrist (flesh-to-flesh) distance of a bird's wingspan or where vertical separation is less than a bird's length from head to foot.

The largest bird that is likely to come in contact with the Project transmission lines is the golden eagle (wingspan to 7.5 feet; wrist-to-wrist length of 3.5 feet; height to 2.2 feet). The Avian Power Line Interaction Committee (APLIC, 2006) guidelines recommend 60 inch separations between energized conductors or hardware and grounded conductors or hardware to protect eagles and other birds of the area (e.g., red-tailed hawk, turkey vulture) from electrocution. The Project includes installation of approximately 250 new distribution line poles. Risk of bird electrocution is expected to be minimal with the implementation of Conservation Measures such as implementing APLIC construction guidelines to minimize potential electrocution risk.

Some power lines present collision risk to native birds, including some special-status birds. Songbirds and waterfowl tend to fly under power lines, while larger species generally fly over lines and risk

colliding with higher static lines (APLIC, 2012). All birds (songbirds, waterfowl, raptors, and others) have a potential for collisions with power lines. Power lines located near highly productive areas, such as riparian habitats, may pose greater exposure to collisions for some bird species (APLIC, 2012). Bird collisions are also higher in areas where power lines are located between feeding and foraging areas and tend to be less common in arid desert environments. Raptor collision protection devices are not proposed distribution line is away from areas of high bird use or foraging area (i.e. wetlands, agricultural areas, and riparian habitat). If bird collision becomes problematic, then bird collision reducing devices may be added in areas with higher than expected collision rates. Species Protected Under the Bald and Golden Eagle Protection Act

Under the BGEPA, the USFWS regulates activities that may take bald or golden eagles. "Take" is defined as "pursuing, shooting, shooting at, poisoning, wounding, killing, capturing, trapping, collecting, molesting, and disturbing" bald or golden eagles, and as activities causing: "(1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS, 2007a).

Bald eagle (*Haliaeetus leucocephalus*)

Bald eagles were listed as endangered in 1978, down-listed to threatened in 1995, and delisted in 2007 (USFWS, 1978; 1995; 2007b). In 2008, the Sonoran Desert population of bald eagle was relisted as a threatened Distinct Population Segment (DPS) and subsequently delisted in 2011 (USFWS, 2008a; 2011). Bald eagles are seen regularly and nearly year-round in the Colorado River Valley and over Lake Havasu. The nearest known nest site to the Project area is the "Mohave" nest location which was active in 2014 and is located approximately ten miles west of the Project area (AGFD, 2016b). While their nests are active, bald eagles forage in close proximity to their nest sites. Outside the nesting season, bald eagles forage over much wider areas. Even during the nesting season, bald eagles without nests (i.e., juveniles or unmated adults) may forage widely throughout the region.

Project activities would not affect nesting bald eagles or foraging activities within foraging range of potential nest sites because there is no suitable nesting habitat within five miles of the Project area.

This species may forage in or near the Project area throughout the year, especially during winter. Project activities would not cause long-term adverse effects to foraging habitat, such as habitat degradation or preclusion from foraging areas, but may temporarily cause bald eagles to avoid work areas due to noise and other Project activities. Given the small acreage to be impacted, the short duration of the construction phase, and the eagle's ability to move away from the Project area, effects to foraging behavior would be negligible and temporary.

Golden eagle (*Aquila chrysaetos*)

Golden eagles are year-around residents throughout most of their range in the western United States. In the southwest, golden eagles are more common during winter months because of an influx of migrants from other breeding areas. They breed from late January through August (Pagel et al., 2010). In the desert, they generally nest in steep, rugged terrain, often on sites with overhanging ledges, cliffs or large trees as cover. Golden eagles are wide-ranging predators, especially outside of the nesting season, when they have no need to return to eggs or young at their nests.

Suitable nesting habitat was observed approximately 400 feet to the east of the Project area on steep cliff faces just to the northeast of Crossman Peak (Photo 8). Additional suitable habitat is present within the vicinity of the Project area. Golden eagles are sensitive to human disturbances during the nesting

season. If there is an active nest nearby, then human activity and noise during Project construction could adversely affect golden eagle nesting success. Potential impacts to nesting golden eagles can be avoided by scheduling construction outside the breeding season (January 15 to May 31) or by confirming that there are no active nests on the cliff face prior to construction (see Conservation Measures).

Golden eagles are likely to forage in the vicinity of Project area. Project activities could cause them to temporarily move away from the area but this impact would be negligible and temporary.

Native Birds: Migratory Bird Treaty Act and Special-status Birds

The Migratory Bird Treaty Act (MBTA) prohibits take of any migratory bird, including active nests, except as permitted by regulation (e.g., waterfowl or upland game bird hunting). The MBTA broadly defines "migratory bird" as "any species or family of birds that live, reproduce or migrate within or across international borders at some point during their annual life cycle" and thus applies to most native bird species in North America except terrestrial gamebirds. Most of these species have no other special conservation status as defined in Table 1.

Aspen's field survey was not conducted during the nesting season, but numerous inactive nests were observed. Some of the nests observed included platform stick nests likely belonging to mourning doves, tree cavities likely belonging to Gila woodpeckers or other tree dwelling species, large stick nests on cliff faces likely belonging to common ravens or raptors, and numerous other small nests in cacti and shrubs likely belonging to wrens or other songbirds. None of these nests were mapped because they were all inactive and may not be reused in subsequent years. Project activities may disturb or damage bird nests in rock outcrops (e.g. rock wrens), on the ground (e.g., lesser nighthawks), or in vegetation. Any potential impacts to nesting birds would be avoided by scheduling Project activities outside of the breeding season or implementing nest avoidance measures (see Conservation Measures).

American peregrine falcon (*Falco peregrinus anatum*)

American peregrine falcon is recognized by the BLM as a sensitive species and is protected under the MBTA. It nests on cliffs near open water where it builds scrape nests that are a simple depression, usually with a rim sufficient to prevent eggs from rolling away (Ehrlich et al., 1988). It is known to nest along the Colorado River, roughly ten miles west of the Project area, and at the Bill Williams National Wildlife Refuge, roughly twenty miles southeast of the Project area (Abbate, 2012). It is also regularly documented along the Colorado River and over Lake Havasu (Ebird.org, 2016a). Suitable nesting habitat was observed on the cliff faces just northeast of Crossman Peak, but the distance to the nearest surface water makes this habitat less favorable (Photo 8). Any potential impacts to nesting peregrine falcon would be avoided by scheduling construction outside the breeding season or by confirming that there are no nests on the cliff face prior to construction (see Conservation Measures). Suitable foraging habitat is present throughout much of the Project area. Peregrine falcons may forage in the vicinity of Project area, and Project activities could cause them to temporarily move away from the area but this impact would not affect nesting or productivity.

Desert purple martin (*Progne subis hesperia*)

Desert purple martin is recognized by the BLM as a sensitive species and is protected under the MBTA. Desert purple martin generally use saguaro cactus for nesting. Desert purple martin are known from the vicinity of the project area and suitable nest sites (saguaro cacti) are present in the Project area.

Take of desert purple martin or their active nests would violate the MBTA. Any potential impacts to desert purple martin would be avoided by scheduling Project activities outside of the breeding season or implementing nest avoidance measures (see Conservation Measures).

Ferruginous Hawk (*Buteo regalis*)

Ferruginous hawk is recognized by the BLM as a sensitive species and is protected under the MBTA. Ferruginous hawks live in the open spaces of the west, in grasslands, prairie, sagebrush steppe, scrubland, and pinyon-juniper woodland edges. It also regularly forages in agricultural fields. This species nests on the Colorado Plateau in portions of northern Arizona. It winters throughout much of Arizona and are observed frequently along the Colorado River where agricultural areas provide suitable foraging habitat (Ebird.org, 2016d). Ferruginous hawks may forage in the Project area during migration or winter, but they are not likely to nest in the region. Project activities could cause them to temporarily move away from the area, but this impact would be negligible and temporary.

Gilded flicker (*Colaptes chrysoides*)

Gilded flicker is recognized by the BLM as a sensitive species and is protected under the MBTA. It excavates cavity nests in large trees and saguaro cacti (Rosenberg et al., 1991). Its primary habitat is cottonwood-willow riparian woodland and uplands with saguaro cactus stands. The gilded flicker is a year-round resident. Our surveys did not detect Gilded flickers, but the species is known to occur near the Project area (Ebird.org, 2016c). Saguaro cactus and larger trees in the desert washes (e.g. palo verde) may provide suitable nesting habitat. Numerous cavities were observed in the saguaros and palo verdes in the Project area and may have been created by gilded flickers, although other woodpeckers (that are also protected by MBTA) are also present in the Project area (Photo 9).

Take of gilded flickers or their active nests would violate the MBTA. Any potential impacts to gilded flicker would be avoided by scheduling Project activities outside of the breeding season or implementing nest avoidance measures (see Conservation Measures).

Pinyon jay (*Gymnorhinus cyanocephalus*)

Pinyon jay is recognized by the BLM as a sensitive species and is protected under the MBTA. It is a resident bird of the middle elevation areas throughout much of the western United States. It is strongly tied to pinyon-juniper woodland vegetation but also uses scrub oak and chaparral habitats. Our surveys did not detect Pinyon jays, but the species is known to utilize habitat types observed within the Project area near Crossman Peak. All areas mapped as

Take of pinyon jay or their active nests would violate the MBTA. Any potential impacts to pinyon jay would be avoided by scheduling Project activities outside of the breeding season or implementing nest avoidance measures (see Conservation Measures).

Western burrowing owl (*Athene cunicularia hypugaea*)

The burrowing owl is recognized by the BLM as a sensitive species and is protected under the MBTA. Burrowing owls are generally uncommon in desert habitats, but can be found in much higher densities near agricultural lands or riparian habitats where rodent and insect prey tend to be more abundant. Western burrowing owls typically use the burrows of ground squirrels and other rodents for shelter and nesting. They forage in open areas including agricultural fields, disturbed lands, and grasslands. During Aspen's reconnaissance-level survey, no active burrows or burrowing owl sign were identified, but suitable habitat was found throughout much of the Project area in the more open habitats. Burrowing

owls are known from numerous locations in and adjacent to Lake Havasu City, including at least one site within two miles of the Project area (Ebird.org, 2016b).

Project activities will cause habitat degradation, but these impacts will be minimal relative to the extensive natural lands suitable for burrowing owl nesting and foraging in the surrounding areas. Project activities may impact burrowing owls by crushing, damaging, or injuring an owl or its burrow during maintenance activities. With implementation of the Conservation Measures for migratory nesting birds and burrowing owl Project activities would avoid impacts to these species by requiring surveys to locate burrowing owls and nesting birds within the Project area. The Biological Monitor will also monitor the burrowing owl's activities and may alter the avoidance buffer as necessary to avoid or minimize impacts.

Other Special-Status Species

Bats

The BLM list of sensitive species includes several bat species that could occur in the Project area: Allen's lappet-browed bat, Arizona myotis, California leaf-nosed bat, cave myotis, greater western bonneted bat, pale Townsend's big-eared bat, and spotted bat. California leaf-nosed bats, Arizona myotis, and cave myotis roost in crevices, caves, mines, and buildings (Harvey et al., 2011). Allen's lappet-browed bat roosts in cliffs, pale Townsend's big-eared bat, greater western bonneted bat, and spotted bat, all roost in caves, mines, rocky cliffs, and crevices (Harvey et al., 2011). There are numerous mines, rocky crevices, and cliff faces in the Project area near Crossman Peak that provide suitable roosting habitat for these species (Photo 10). All special-status bats in the region are insectivorous, catching their prey either on the wing or on the ground. These species of bats all forage over open shrublands, such as those found in and around the Project area.

Project activities would cause some loss or degradation of foraging habitat but these impacts will be minimal because of the extensive natural lands surrounding the Project area that provide similar suitable foraging habitat. Because Project activities are not proposed to take place at night, bat foraging or flight behaviors will not be affected. Any impacts to bat roosting habitat would be minimized with the implementation of Conservation Measures, which recommend avoidance of mines and minimization of impacts to rocky outcrops and crevices.

Desert bighorn sheep (*Ovis canadensis nelsoni*)

Desert bighorn sheep are recognized as sensitive by the BLM. Desert bighorn sheep are known from the desert mountains of California, Nevada, Utah, and Arizona. This species typically inhabits rough, rocky canyons and washes vegetated with Joshua tree, creosote bush, and a variety of warm season grasses. In higher elevations, the vegetation in suitable habitat is dominated by pinyon-juniper woodlands. Bighorn sheep may be found in woodland habitats on canyon rims throughout the year.

During the hot summer months, bighorn sheep stay in shaded areas near water as much as possible and are seldom found more than three miles from a dependable water source such as a tinaja (ephemeral pools of water found in rock pockets). After rain or snow, bighorn sheep travel further distances from permanent water sources than they do during the drier portions of the year.

During the lambing season, females accompanied by young generally occur on the steepest and most rugged terrain within their home ranges as a means of enhancing the safety of themselves and their offspring (Bleich et al., 1997). The females with young are especially vulnerable to disturbance (Wehausen, 1980; King and Workman, 1986). The BLM Lake Havasu Field Office Resource Management

Plan restricts activities within desert bighorn sheep sensitive areas during the lambing season. For the proposed Project the BLM proposes a full work restriction within the lambing habitat from February 1 to March 30. In addition the AGFD requests coordination and consultation for any work proposed from January 1 to January 31 and also from April 1 to April 30. These restriction do not apply to travel on roads identified in BLM's Travel Management Plans, such as the existing road along the proposed distribution line corridor and the existing road leading up to the communications facility (Figure 3). The BLM may allow travel on proposed access road extension on BLM land and any new spur roads on BLM land once a National Environmental Policy Act (NEPA) analysis has been completed. It would also apply to the communication facility construction site if ownership transfers from private to government (i.e., WAPA).

Much of the Project area is suitable habitat for desert bighorn sheep (Figure 3-1). Suitable lambing habitat is limited to the higher elevation areas on and near Crossman Peak. During our survey we detected signs of bighorn sheep, including scat and tracks, in the steep, rocky canyon north of Crossman Peak (Photo 11).

Project activities will cause some habitat loss and degradation due to vegetation removal, introduction of non-native plants species, habitat fragmentation, and habitat conversion. Any effects to sheep would be minimal because they will be able to move into extensive natural lands to the east and west of the Project area that will not be impacted by the Project. Project activities could cause noise and human disturbance, which could cause bighorn sheep to temporarily leave the area. Conservation Measures such as pre-activity clearance surveys, seasonal work restrictions, training workers, prohibiting pets, limiting spread of invasive vegetation, and enforcing speed limits would minimize potential impacts to desert bighorn sheep.

Gila monster (*Heloderma suspectum*)

Gila monster is recognized by the BLM as a sensitive species is Arizona. They occur throughout much of western and central Arizona and into California, Utah, and Nevada. They are primarily found in Sonoran Desert scrub habitats and sometimes in desert-grassland and oak woodlands (AGFD, 2016a). They occur at elevation from o to 5,000 feet above sea level. Habitat throughout the Project area is suitable for Gila monster although the higher canyons and bajadas are more typically occupied. Gila monster have been documented within approximately five miles of the Project area (AGFD, 2016a). Gila monster have a moderate likelihood of being present within the Project area. We did not detect Gila monster in the Project area, but our surveys were conducted when they would likely be wintering in rocky outcrops. They are also a highly secretive species that are not typically detected during biological surveys.

Project activities may cause some habitat degradation and may impact Gila monster by crushing or injuring individuals, if present; however, these impacts would be minimized with the implementation of the Conservation Measures such as pre-activity clearance surveys, speed limits, and requirement to have a biological monitor present during initial disturbance.

Joshua tree (*Yucca brevifolia*)

Joshua trees have a broad range in Arizona and grow in scattered locations throughout the northwest corner of the state. They were recently added to the BLMs list of sensitive species because of large scale removal for agriculture and other land use conversions. Joshua trees are most frequently found in large broad valley floors and occasionally on adjacent mountain slopes and foothills. Within the project area they were growing primarily on the steeper north-facing slopes just north of the communications site.

Suitable habitat is present throughout much of the project area from Crossman Peak north to the end of the project area.

Parish's onion (*Allium parishii*)

Parish's onion is recognized by the BLM as a sensitive species in Arizona. Previously, the only known location in Arizona for this species was the Kofa Mountains (AGFD, 2005); however, in 2005 and 2008, it was found in the immediate vicinity of the Project area on granitic substrates on north- to northeast-facing slopes (SEINet, 2016). It typically grows in Joshua tree woodlands, but the two collections within the vicinity of the Project area noted species such as brittlebush, crucifixion thorn, catclaw acacia, and starry bedstraw (*Galium stellatum*), all of which are common in the Project area. Parish's onion has a high likelihood of being present within the Project area. The suitable habitat is limited to the north-facing slope of Crossman Peak north approximately four miles to the mouth of the canyon. We did not detect Parish's onion in the Project area, but our surveys were not conducted during the appropriate time of year to detect it.

Project activities may cause some habitat degradation and may impact Parish's onion by crushing, damaging, or injuring plants; however, these impacts would be minimal relative to the extensive suitable habitat in the adjacent lands that would not be impacted by the Project.

Sonoran desert tortoise (*Gopherus morafkai*)

In 2010 the Sonoran population of desert tortoise became a candidate for listing under ESA (USFWS, 2010b). In 2015, the USFWS determined that Sonoran desert tortoise did not warrant listing, in part because of the implementation of a Candidate Conservation Agreement for the species (USFWS et al., 2015).

The Sonoran desert tortoise lives primarily in upland and sloping bajada landforms, between about 500 and 4,100 feet in elevation, throughout much of southern and western Arizona and Sonora, Mexico. It is typically found in the Mojave Desert and the Arizona Upland and Lower Colorado River Valley subdivisions of the Sonoran Desert (USFWS et al., 2015).

Desert tortoises spend much of their time in burrows, either during inactive seasons or during inactive diurnal periods, for thermoregulation, nesting, and protection from predators. Thus, burrows, and soils suitable for burrowing, are an important habitat feature. Burrows are constructed below rocks, boulders, or shrubs on semi-open slopes or the banks of washes. Tortoises may also shelter in rocky crevices or shelves (e.g., caliche) in washes and packrat middens (USFWS et al., 2015).

Sonoran desert tortoises are active during spring and late summer (March 1 – November 1); however, they may be active (outside their burrows) for short periods at any time of year, depending on rainfall and temperature (AGFD, 2008). The primary activity season in late summer (late June through September) coincides with monsoonal rainfall, when water and new plant growth are available (USFWS et al., 2015).

Suitable desert tortoise habitat was observed throughout the Project area, with the exception of the steep higher elevation areas near the top of Crossman Peak. The entire Project area is within the elevation and geographic range of the species. The northernmost approximately twelve miles of the distribution line alignment provide the best quality habitat and have the highest likelihood of occurrence. The habitat along the existing access road southwest of Crossman Peak provides suitable habitat.

We did not detect desert tortoises or their sign (burrows, scat, shell fragment, etc.) during our survey; however, our survey did not conform to the AGFD survey guidelines (AGFD, 2010) because it was not conducted during the appropriate time of year and did not cover 100 percent of the suitable habitat within the Project area. Numerous areas with caliche shelters were observed (Photo 12), primarily along the access road southwest of Crossman Peak. There is a moderate potential for occurrence of Sonoran desert tortoise along the proposed distribution line and its access road as well as the access road southwest of Crossman Peak, but minimal potential for occurrence at the proposed communication facility.

The proposed work in the Project area may directly impact desert tortoises by crushing, damaging, or injuring a tortoise or its burrow during access road construction or improvements, distribution line construction, or future operations and maintenance activities. In addition, these activities may eliminate or degrade suitable habitat within the Project area by removing vegetation, degrading the landscape, introducing non-native plants, and by increasing predator activity in the area including common raven (*Corvus corax*), coyote (*Canis latrans*), and dogs (*Canis lupus familiaris*). Implementation of the recommended Conservation Measures would avoid and minimize potential impacts to the Sonoran desert tortoise by limiting disturbance areas, requiring recontouring of temporary impact areas, requiring regular clean-up of trash, refuse, concrete, and other materials, and by reducing the spread of non-native plants. Impacts to Sonoran desert tortoise would be minimal.

Conservation Measures

The following recommended conservation measures will avoid or minimize adverse Project impacts to biological resources. These conservation measures include AGFD recommendations for projects in Sonoran desert tortoise habitat (AGFD, 2008; 2014).

1. *Limit disturbance area*: At all proposed work areas, limit the mechanical disturbance of previously undisturbed habitats (including soils) to staked areas. Limit vehicle use to existing or designated Project routes. Flag or mark the extent of all disturbance areas on the ground prior to construction and ensure that work remains within these areas. Avoid or crush, rather than remove, non-special-status plants within impact areas where it doesn't compromise the safety or workability of the site.

2. *Pre-activity clearance surveys:* Due to the possibility that special-status species and nesting birds may be found in the Project area, a biologist will conduct pre-activity clearance surveys within up to 300 feet of the Project area. A smaller area may be surveyed if determined appropriate by the biologist in coordination with BLM and/or WAPA.

   The biologist will survey for:

   a. Sonoran desert tortoise and their burrows.

   b. Burrowing owls and their burrows (year-round).

   c. Nesting birds: Project activities that may disturb the ground or vegetation, from February 5 to June 30, will take place only after the work area has been surveyed for active bird nests. Pre-activity surveys will be conducted no more than seven days in advance of any ground- or vegetation-disturbing activities in any location. If active bird nests are found within the survey area, the biologist will establish a no-disturbance buffer around the active nests; buffer size will be determined in coordination with the BLM and/or WAPA biologist Project activities conducted outside of the breeding season would not require nesting bird surveys.

d. Golden eagle: Project activities in the vicinity of the suitable golden eagle nesting habitat (approximately 400 feet east of Crossman Peak) will only take place after the biologist has determined that golden eagles are absent. If nesting is observed then no work will be permitted during the nesting season (January 15 to May 31).

e. Other special-status species such as Joshua tree, Parish's onion and Gila monster.

3. *Biological monitor*: A Biological Monitor will be present during all vegetation clearing of non-special status plants and soil disturbance throughout the Project area. Once initial vegetation clearing and soil disturbance has been completed the Biological Monitor will be present at least one day per work week to inspect work areas and ensure conservation measures are being implemented. Frequency of monitoring will be determined in coordination with BLM and WAPA biologists, as appropriate. WAPA and UES will authorize the Biological Monitor to halt, temporarily, Project activities if needed to prevent potential harm to special-status species. The WAPA or UES work supervisor will coordinate with the Biological Monitor on planned or ongoing Project activities and the execution of any specific pre-activity surveys or monitoring requirements for each activity in work areas. The Biological Monitor will perform the following:

   a. Sonoran desert tortoise: The Biological Monitor will be the designated desert tortoise coordinator and will have appropriate education, training, and experience to conduct pre-activity clearance surveys, provide worker education programs, and supervise or implement other actions. The Biological Monitor will watch for tortoises wandering into construction areas, check under vehicles and equipment before they are moved, and inspect any excavations that might trap tortoises. If a Sonoran desert tortoise is observed, the Biological Monitor will facilitate modifying Project activities to avoid injuring or harming it. If a tortoise must be moved out of harm's way, relocation will adhere to BLM's "Guidelines for Handling Sonoran Desert Tortoises Encountered on Development Projects" and Arizona Game and Fish Department guidelines (AGFD, 2014).

   b. Birds protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act: If an active bird nest is located on or within the pre-construction survey area, a Biological Monitor will designate and flag an appropriate buffer area around the nest where Project activities will not be permitted. Buffer areas will be determined in consultation with WAPA and BLM biologists and will be based on the bird species' tolerance to disturbance, status of nesting, and nature of the Project activity. If a golden eagle nest is present near the Project area, BLM wildlife biologist and AGFD raptor biologists will be coordinated with to determine an appropriate buffer distance for proposed Project activities in the vicinity of the nest. Active burrowing owl burrows will be flagged for avoidance by the Biological Monitor and Project activities will not be permitted within this flagged area. Buffer areas will be determined in consultation with WAPA and BLM biologists and will be based on the status of nesting and the nature of the Project activity. The Biological Monitor will be responsible for monitoring the bird nests, owl burrows, and Project activities, and for removing the flagging after the nest has become inactive or after the Project construction is complete.

   c. Special-status plants: The Biological Monitor will flag all species-status plants identified during the pre-activity clearance survey. These special-status plants will be avoided during all Project activities. If a plant recognized as a BLM sensitive species must be removed or relocated the BLM will be notified. If a state or federally listed plant is identified it will not be allowed to removed. Plants that are classified as highly safeguarded species by the

Arizona Department of Agriculture will be avoided or transplanted. The Biological Monitor will be responsible for monitoring the special-status plants throughout the Project and for removing the flagging after the Project construction is complete.

4. *Bighorn sheep:* Project activities conducted during the most sensitive portion of the bighorn sheep lambing season (February 1 through March 31) within designated sensitive areas on BLM land will be limited to the following:

    a. Existing access roads identified by the BLM in its Travel Management Plan will be used for access only during Project construction and future operations and maintenance (no work will be permitted);

    b. New access roads will not be used for access, construction, or future operations and maintenance;

    c. No additional Project activities will be allowed; and

    d. The use of helicopter will be prohibited.

5. *Special-status bats*: Because special-status bats may roost in abandoned mines and rock outcrops in the Project area, the Biological Monitor will identify and mark (i.e., flag) mines, rocky outcrops, and crevices. WAPA and UES will work with the Biological Monitor to avoid and minimize impacts at these areas.

6. *Worker training*: WAPA and UES will conduct employee training to ensure that all workers on the Project site (including contractors) are aware of all applicable Conservation Measures for environmental resources. Specifically, workers will: (1) limit all activities to approved work areas; (2) report any desert tortoise, burrowing owl, or other special-status species or bird nest observation in the work areas and spur routes to the supervisor or Biological Monitor (if present on the site) and BLM wildlife biologist; (3) avoid contact with any wildlife that approach a work area and be aware of venomous reptiles and poisonous invertebrates; (4) pick up and properly dispose of any food, trash or construction refuse; and (5) report any spilled materials (oil, fuel, solvent, engine coolant, raw concrete, or other material potentially hazardous to wildlife) to the supervisor or on-site Biological Monitor and BLM hazmat specialist. During the training, the instructor will briefly discuss special-status species that may occur in the work areas, their habitats, and requirements to avoid or minimize impacts. In addition, all workers will be informed of civil and criminal penalties for violations of the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Any take that occurs with migratory birds and BLM sensitive species must be reported to the BLM wildlife biologist within 48 hours.

7. *Animals*: No pets will be permitted on the work site. Workers will not be permitted to feed, harm, approach, harass, or handle wildlife at any time, except to remove animals safely from work areas, as described above.

8. *Trash, refuse, concrete, and other materials*: All trash and food materials will be properly contained within vehicles or closed refuse bins while on the site, and will be regularly removed from the site (at least on a daily basis) for proper disposal. All refuse from Project activities will be removed from each work site upon completion of maintenance work. No raw cement, concrete or washings thereof, asphalt, paint, oil, solvents, or other petroleum products, or any other substances that would be hazardous to vegetation or wildlife resources, will be disposed of on-site or allowed to spill

onto soil. Cleanup of spilled material will begin immediately and the BLM hazmat coordinator will be contacted immediately to ensure cleanup methods are approved.

9. *Minimize standing water*: Within the Project area, apply the minimum amount of water to dirt roads and construction areas needed for dust abatement, safety standards, and air quality standards; applying excess water may form puddles which would attract wildlife to construction sites.

10. *Minimize wildlife entrapment*: Open trenches, foundation excavations, open pipes, etc., will be covered or modified to prevent entrapment of animals at the end of each day. After completion of the Project any trenches, pits, and other features in which wildlife would be entrapped or entangled, will be checked for wildlife then filled in, covered, or otherwise modified so they are no longer a hazard for wildlife. All water containers (i.e., tanks or trailers) will be securely covered to prevent wildlife from entering the containers and becoming trapped. All straw waddles used during the Project as erosion control will be weed free and will not create sites for possible wildlife entrapments.

11. *Conform to APLIC design guidelines:* Project construction will follow recommendations in WAPA's Avian Protection Plan (May 2016) and the Avian Power Line Interaction Committee's Reducing Avian Collisions with Power Lines (2012). To reduce the risk of electrocuting golden eagles or other large birds, energized and ground conductors and hardware will be separated by 60 inches or more, or will be covered.

12. *Invasive species*: Construction equipment will be cleaned prior to arrival in the Project area to reduce spread of invasive plant species.

13. *Work Area Restoration*: To improve access through a wash, native material will be pulled back, up, and out of the wash, rather than pushed into a wash. Within drainages, flow will not be altered and final elevations will not lead to advanced erosion. If grading is required at any sites, then six inches of topsoil will first be removed and stockpiled at the site. Once construction is complete the topsoil will be spread out over the graded area. Large rocks or boulders that were moved as part of Project activities will be strategically placed to replace wildlife habitat. Flow lines of all stream channels will be reconnected to ensure that water flows onto and off of impact areas as it did before the area was disturbed.

14. *Speed limit:* Limit speeds to 25 miles per hour on stabilized (wetted) unpaved roads within construction sites. Limit speeds to 10 miles per hour on un-stabilized (un-wetted) unpaved roads within construction sites. Travel speeds on all roads will be reduced below these levels if dust emissions are visible.

Determination

- The Project will neither adversely affect federally-listed species, candidate species, or species proposed for listing, nor affect designated or proposed Critical Habitat for any federally-listed species.

- With implementation of Conservation Measures, including conducting pre-activity clearance surveys and avoiding work during the bird nesting season or implementing appropriate bird nest buffers, the Project is not likely to adversely impact non-listed special-status species and nesting birds.

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Exhibit 1. Photographs

Photo 1: West-facing view of the Crossman Peak Communication Facility.

Photo 2: Northwest-facing view of part of the Project area characterized by sparse creosote bush and white bursage in the Sonoran-Mojave Creosotebush-White Bursage Desert Scrub cover type.

Photo 3: West-facing view of a section of the existing access road southwest of Crossman Peak. Photo shows the Paloverde–Cacti–Mixed Scrub, which is the most common vegetation in this portion of the Project area.

Photo 4: North-facing view of a section of the existing access road north of Crossman Peak. Photo shows the Paloverde–Cacti–Mixed Scrub, which is the most common vegetation in this portion of the Project area.

Photo 5: Southeast-facing view of a portion of the Project area just south of Crossman Peak. Photo shows the Paloverde–Cacti–Mixed Scrub, which is the most common vegetation in this portion of the Project area.

Photo 6: South-facing view of the Project area looking towards the communications facility in the distance. Photo shows the Mojave Mid-Elevation Mixed Desert Scrub, which is common on the upper slopes north of Crossman Peak.

Photo 7: North-facing view of the Project area from the existing communications facility. Photo shows the Mojave Mid-Elevation Mixed Desert Scrub, which is common on the higher elevation slopes north of Crossman Peak.

Photo 8: East-facing view of a vertical cliff face on the north slope of Crossman Peak. One large stick nest was observed on the cliff face (white arrow).

Photo 9: A cavity, created by a woodpecker, in one of the many saguaros in and adjacent to the Project area.

Photo 10: The entrance to a mine in the Project area, located several feet from the Crossman Peak access road.

Photo 11: We observed animal tracks, including those of desert bighorn sheep, in the drying sediment in the bedrock.

Photo 12: A caliche bank where Sonoran Desert tortoise burrows may be found. No live tortoises or their sign were observed during our survey.

Attachment 1 - Observed Plant Species

Latin Name	Common Name	Abundance
FLOWERING PLANTS		
FILICALES	FERN FAMILIES	
Cheilanthes parryi	Parry's lipfern	Uncommon
Pellaea truncata	Spiny cliffbrake	Scarce
EPHEDRACEAE	EPHEDRA FAMILY	
Ephedra aspera (?)	Rough jointfir	Uncommon
Ephedra nevedensis	Nevada jointfir	Occasional
PINACEAE	PINE FAMILY	
Pinus monophylla	Singleleaf pinyon	Uncommon
AMARANTHACEAE	AMARANTH FAMILY	
Amaranthus fimbriatus	Fringed amaranth	Scarce
Tidestromia oblongifolia	Arizona honeysweet	Uncommon
ANACARDIACEAE	SUMAC FAMILY	
Rhus aromatica	fragrant sumac	Scarce
APOCYNACEAE	DOGBANE FAMILY	
Asclepias subulata	Rush milkweed	Uncommon
Funastrum hirtellum	Hairy milkweed	Occasional
ASTERACEAE	ASTER FAMILY	
Acourtia wrightii	Brownfoot	Scarce
Ambrosia dumosa	White bur-sage	Common
Ambrosia salsola	Common burrobrush	Common
Baccharis sergiloides	Desert baccharis	Uncommon
Baileya multiradiata	Desert marigold	Uncommon
Bebbia juncea	Sweetbush	Common
Brickellia atractyloides	Spearleaf brickellbush	Occasional
Cirsium neomexicanum (?)	New Mexico thistle	Scarce
Encelia actonii	Acton's brittlebush	Uncommon
Encelia farinosa	Brittlebush	Uncommon
Ericameria laricifolia	Turpentine bush	Scarce
Ericameria paniculata	Mojave rabbitbrush	Uncommon
Machaeranthera pinnatifida	Lacy tansyaster	Scarce
Stephanomeria pauciflora	Wire-lettuce	Occasional
Viguiera parishii	Parish's goldeneye	Occasional
Xylorhiza tortifolia	Mojave woodyaster	Uncommon
BIGNONIACEAE	TRUMPET CREEPER FAMILY	
Chilopsis linearis	Desert willow	Uncommon
BORAGINACEAE	BORAGE or WATERLEAF FAMILY	
Amsinckia sp.	Unid. fiddleneck	Uncommon
Cryptantha sp.	Unid. annual cryptantha	Common
Phacelia sp.	Unid. phacelia	Scarce
BRASSICACEAE	MUSTARD FAMILY	
Arabis sp.	Unid. rockcress	Scarce
* *Brassica tournefortii*	Asian mustard	Scarce
Lepidium lasiocarpum	Shaggyfruit pepperweed	Uncommon

Latin Name	Common Name	Abundance
CACTACEAE	CACTUS FAMILY	
Carnegiea gigantea	Saguaro	Uncommon
Cylindropuntia acanthacarpa	Buckhorn cholla	Common
Cylindropuntia bigelovii	Teddy-bear cholla	Scarce
Cylindropuntia echinocarpa (?)	Silver cholla	Uncommon
Cylindropuntia ramosissima	Pencil cholla	Common
Echinocereus engelmannii	Engelmann's hedgehog cactus	Uncommon
Echinocereus triglochidiatus (?)	Kingcup cactus	Scarce
Ferocactus cylindraceus	California barrel cactus	Occasional
Mammillaria tetrancistra	Common fishhook cactus	Scarce
Opuntia basilaris var. *basilaris*	Beavertail cactus	Occasional
Opuntia chlorotica	Dollarjoint pricklypear	Uncommon
CELASTRACEAE	STAFF-TREE FAMILY	
Canotia holacantha	Crucifixion thorn	Occasional
CROSSOSOMATACEAE	CROSSOSOMA FAMILY	
Crossosoma bigelovii	Ragged rockflower	Scarce
EUPHORBIACEAE	SPURGE FAMILY	
Chamaesyce polycarpa	Smallseed sandmat	Uncommon
Chamaesyce setiloba	Yuma sandmat	Uncommon
Tetracoccus hallii (?)	Hall's shrubby-spurge	Scarce
FABACEAE	PEA FAMILY	
Marina parryi	Parry's false prairie-clover	Uncommon
Parkinsonia microphylla	Yellow palo verde	Abundant
Senegalia greggii	Catclaw acacia	Common
Senna covesii	Coues' cassia	Uncommon
FAGACEAE	OAK FAMILY	
Quercus sp.	Unid. scrub oak	Scarce
Quercus turbinella	Sonoran scrub oak	Uncommon
FOUQUIRIACEAE	OCOTILLO FAMILY	
Fouquieria splendens	Ocotillo	Common
KRAMERIACEAE	RHATANY FAMILY	
Krameria erecta	Littleleaf ratany	Occasional
LAMIACEAE	MINT FAMILY	
Hyptis emoryi	Desert lavender	Uncommon
Monardella arizonica (?)	Arizona monardella	Scarce
Salazaria mexicana	Bladder-sage	Occasional
Salvia columbariae	Chia	Uncommon
LOASACEAE	STICK LEAF FAMILY	
Mentzelia involucrate (?)	Whitebract blazingstar	Uncommon
MALVACEAE	MALLOW FAMILY	
Sphaeralcea ambigua	Desert globemallow	Uncommon
NYCTAGINACEAE	FOUR O'CLOCK FAMILY	
Allionia incarnata	Trailing windmills	Uncommon
Boerhavia triquetra	*Slender spiderling*	Scarce

Latin Name	Common Name	Abundance
Boerhavia wrightii	Largebract spiderling	Scarce
Mirabilis laevis (?)	Desert wishbone-bush	Uncommon
ONAGRACEAE	EVENING PRIMROSE FAMILY	
Camissonia californica (?)	California suncup	Scarce
POLYGONACEAE	BUCKWHEAT FAMILY	
Eriogonum deflexum	Skeleton weed	Uncommon
Eriogonum fasciculatum	Eastern Mojave buckwheat	Occasional
Eriogonum heermannii	Heermann's buckwheat	Uncommon
Eriogonum inflatum	Desert trumpet	Occasional
Eriogonum sp.	Unid. annual buckwheat	Uncommon
Eriogonum wrightii	Bastardsage	Scarce
RUBIACEAE	BEDSTRAW FAMILY	
Galium stellatum	Starry bedstraw	Occasional
RUTACEAE	RUE FAMILY	
Thamnosma montana	Turpentinebroom	Uncommon
SOLANACEAE	NIGHTSHADE FAMILY	
Lycium andersoni	Water jacket	Uncommon
Nicotiana obtusifolia	Desert tobacco	Uncommon
Physalis crassifolia	Yellow groundcherry	Occasional
TAMARICACEAE	TAMARISK FAMILY	
* *Tamarix ramosissima*	Tamarisk	Uncommon
VERBENACEAE	VERBENA FAMILY	
Glandularia gooddingii	Southwestern mock vervain	Scarce
VISCACEAE	MISTLETOE FAMILY	
Phoradendron californicum	Desert mistletoe (on *Senegalia greggii* and *Parkinsonia microphylla*)	Occasional
Phoradendron juniperinum	Juniper mistletoe (on *Pinus monophylla*)	Scarce
ZYGOPHYLLACEAE	CALTROP FAMILY	
Larrea tridentata	Creosote bush	Abundant
AGAVACEAE	AGAVE FAMILY	
Agave deserti	Desert agave	Common
Yucca brevifolia	Joshua tree	Uncommon
LILIACEAE	LILY FAMILY	
Nolina parryi	Parry's beargrass	Uncommon
POACEAE	GRASS FAMILY	
Achnatherum hymenoides	Indian ricegrass	Occasional
Achnatherum speciosum (?)	Desert needlegrass	Scarce
Aristida adscensionis	Sixweeks three-awn grass	Occasional
Aristida sp.	Unid. perennial three awn	Scarce
Bouteloua aristidoides	Needle grama	Occasional
Bouteloua barbata	Sixweeks grama	Uncommon
Bouteloua curtipendula	Sideoats grama	Scarce
* *Bromus madritensis*	Compact brome	Occasional

Latin Name		Common Name	Abundance
*	*Cynodon dactylon*	Bermudagrass	Uncommon
	Dasyochloa pulchella	Low woollygrass	Uncommon
	Hilaria rigida	Big galleta	Occasional
	Muhlenbergia microsperma	Littleseed muhly	Uncommon
	Tridens muticus	Slim tridens	Scarce

Introduced species that are becoming naturalized in Arizona are indicated by an asterisk. This list includes only species observed within the biological survey area. Others may have been overlooked or unidentifiable due to season (many plants are only detectable or identifiable in spring). Plants were identified using keys, descriptions, and illustrations in Kearney and Peebles (1951), Baldwin et al (2002), and Flora of North America (FNA: 1993+). Plant taxonomy and nomenclature generally follow USDA (2016).

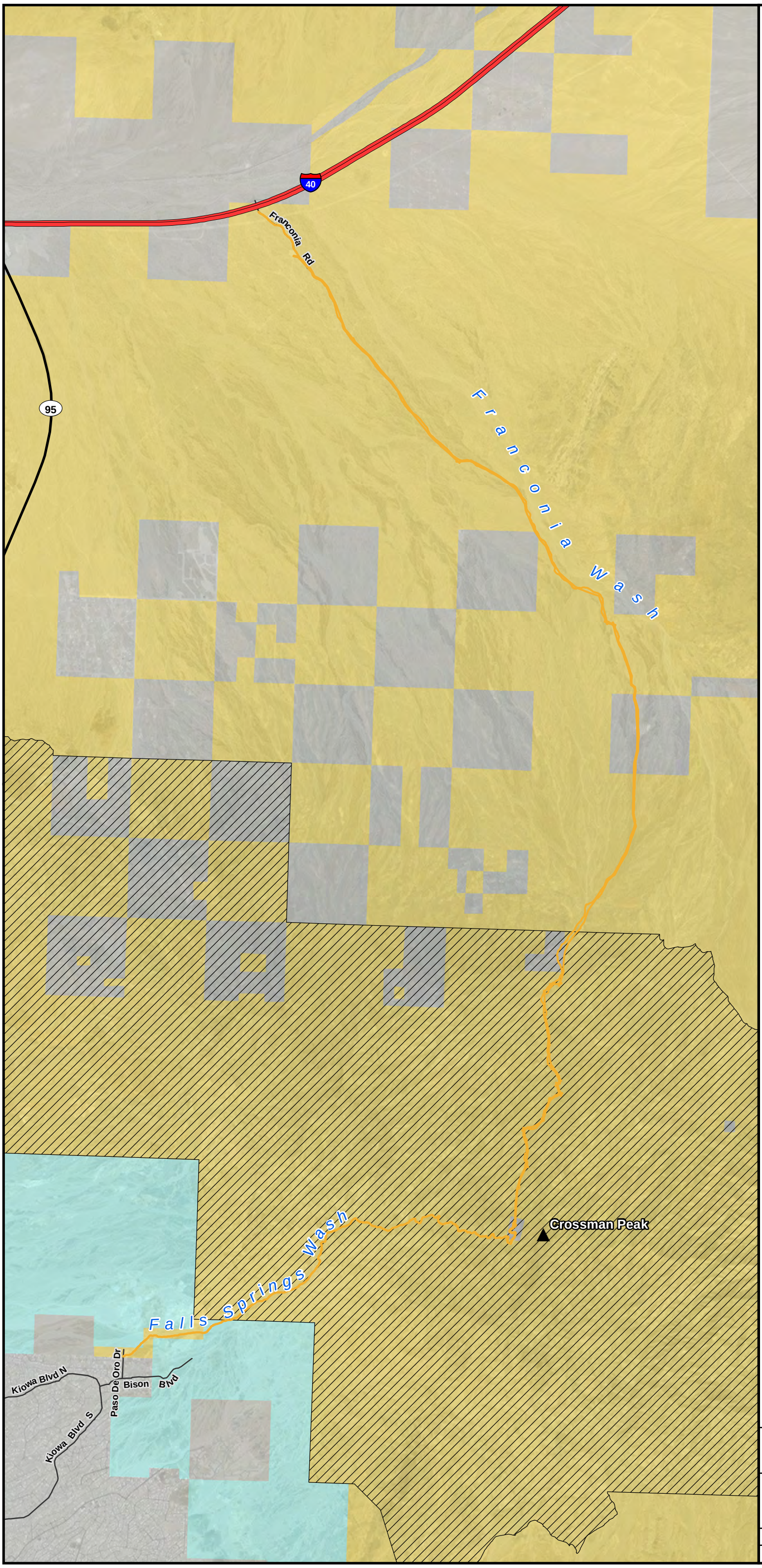
Attachment 2 - Observed Wildlife Species

Latin Name	Common Name	Abundance
VERTEBRATE ANIMALS		
REPTILIA	REPTILES	
IGUANIDAE	IGUANID LIZARDS	
Sceloporus magister	Desert spiny lizard	Scarce
Uta stansburiana	Side-blotched lizard	Occasional
TEIIDAE	WHIPTAILS	
Cnemidophorus tigris	Western whiptail	Uncommon
AVES	BIRDS	
PHASIANIDAE	GROUSE AND QUAIL	
Callipepla gambelii	Gambel's quail	Occasional
CATHARTIDAE	VULTURES	
Cathartes aura	Turkey vulture	Uncommon
ACCIPITRIDAE	HAWKS, EAGLES, HARRIERS	
Buteo jamaicensis	Red-tailed hawk	Uncommon
COLUMBIDAE	PIGEONS AND DOVES	
Zenaida macroura	Mourning dove	Occasional
TROCHILIDAE	HUMMINGBIRDS	
Calypte costae	Costa's hummingbird	Scarce
FALCONIDAE	FALCONS	
Falco sparverius	American kestrel	Occasional
LANIIDAE	SHRIKES	
Lanius ludovicianus	Loggerhead shrike	Uncommon
CORVIDAE	JAYS AND CROWS	
Corvus brachyrhynchos	American crow	Uncommon
Corvus corax	Common raven	Occasional
MIMIDAE	THRASHERS AND MOCKINGBIRDS	
Toxostoma curvirostre	Curve-billed thrasher	Scarce
TROGLODYTIDAE	WRENS	
Catherpes mexicanus	Canyon wren	Uncommon
Salpinctes obsoletus	Rock wren	Uncommon
MUSCICAPIDAE	THRUSHES AND ALLIES	
Poplioptila melanura	Black-tailed gnatcatcher	Uncommon
EMBERZIDAE	SPARROWS, WARBLERS, TANAGERS	
Melozone fusca	Canyon Towhee	Uncommon
FRINGILLIDAE	FINCHES	
Carpodacus mexicanus	House finch	Uncommon
MAMMALIA	MAMMALS	
SCIURIDAE	SQUIRRELS	
Ammospermophilus harrisii	Harris's Antelope Squirrel	Uncommon
CRICETIDAE	WOOD RATS AND PACK RATS	
Neotoma sp.	Unknown wood rat (middens)	Uncommon
LEPORIDAE	HARES AND RABBITS	
Lepus californicus	Black-tailed jackrabbit	Occasional

Latin Name	Common Name	Abundance
Sylvilagus audubonii	Desert cottontail	Uncommon
CANIDAE	DOGS, WOLVES, AND FOXES	
Canis latrans	Coyote (tracks)	Uncommon
FELIDAE	CATS	
Lynx rufus	Bobcat (tracks)	Scarce
BOVIDAE	SHEEP, GOATS, and CATTLE	
** *Ovis canadensis nelsoni*	Desert bighorn sheep (scat and tracks)	Scarce

Introduced species that are becoming naturalized are indicated by an asterisk. Special-status species are indicated by two asterisks. This list includes only species observed in the survey area. Others may have been overlooked or unidentifiable due to season (amphibians are active during rains, reptiles are active during summer, some migratory birds and bats may only be present seasonally, some mammals hibernate). Wildlife taxonomy and nomenclature generally follow Stebbins (2003) for amphibians and reptiles, AOU (1998) for birds, and Wilson and Ruff (1999) for mammals.

Attachment 3 – Figures



Survey Area

Area of Critical Environmental Concern

Land Ownership

Bureau of Land Management

State Trust

Private

Scale 1:75,000

0 0.5 1 2

Miles

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

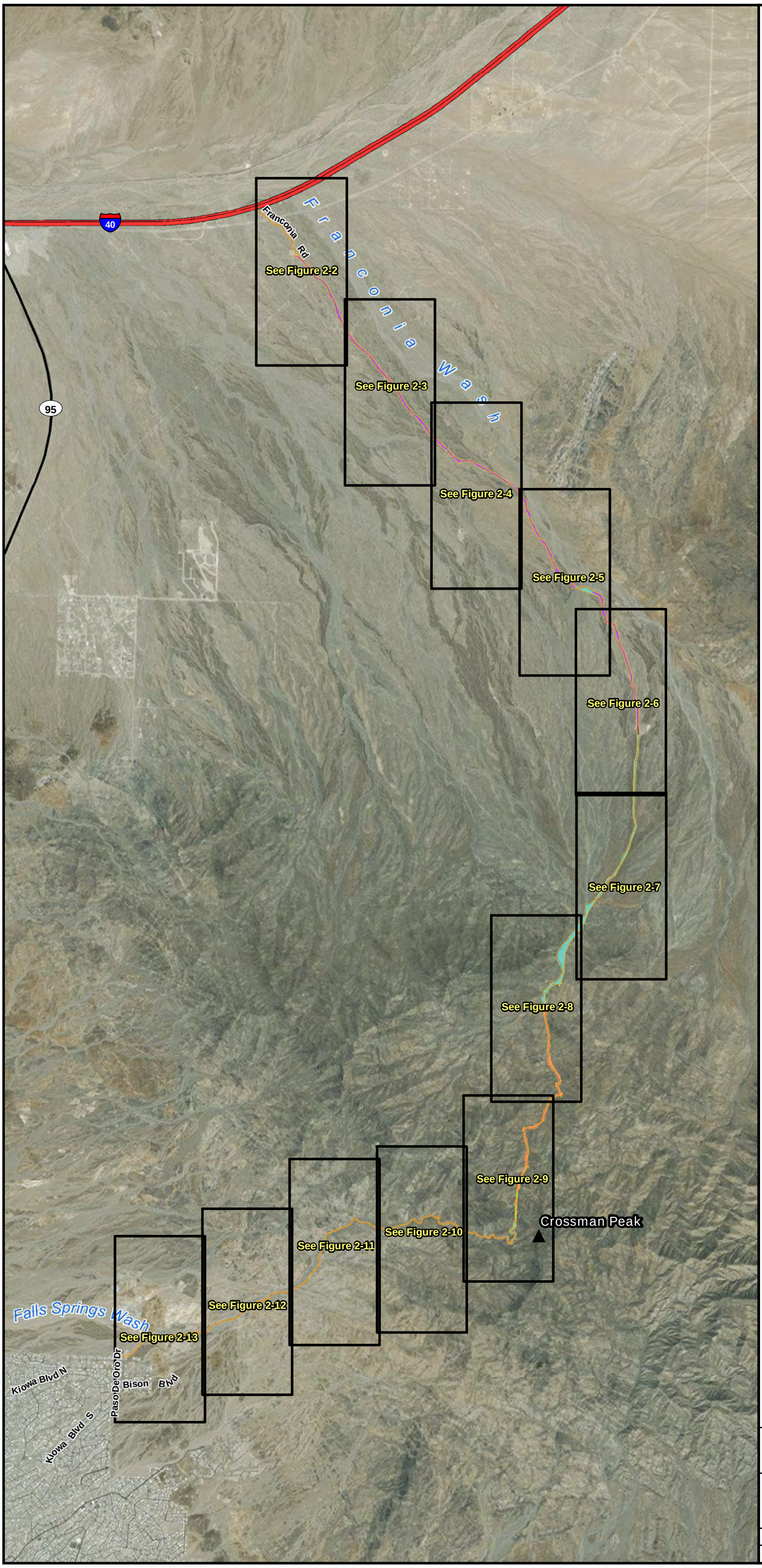
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Biological Report - Project Vicinity

Designed: Aspen EG Approved:

GIS	March 2017	Figure 1	



This cartographic product and GIS data were prepared in accordance with professional practice standards. The data represented on this map has been developed from the best available sources. Although efforts have been made to ensure that the data is accurate and reliable, errors may be reflected in the data. Users must be aware of these conditions and bear responsibility for the appropriate use of this map. The data on this map is for reference use only.

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WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - PHOENIX, ARIZONA

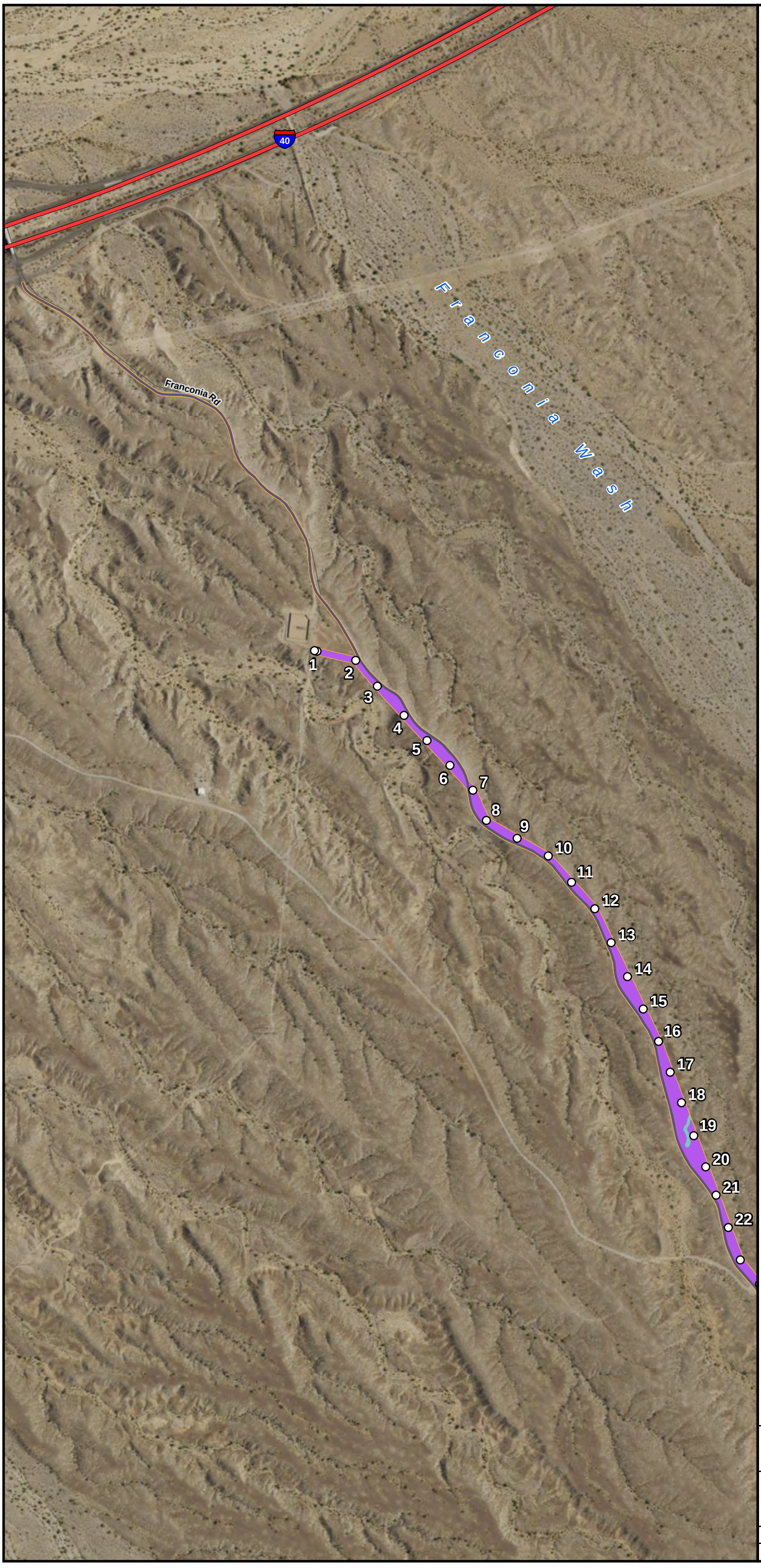
CROSSMAN PEAK
COMMUNICATIONS FACILITY

ARIZONA

Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-1



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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PHOENIX, ARIZONA

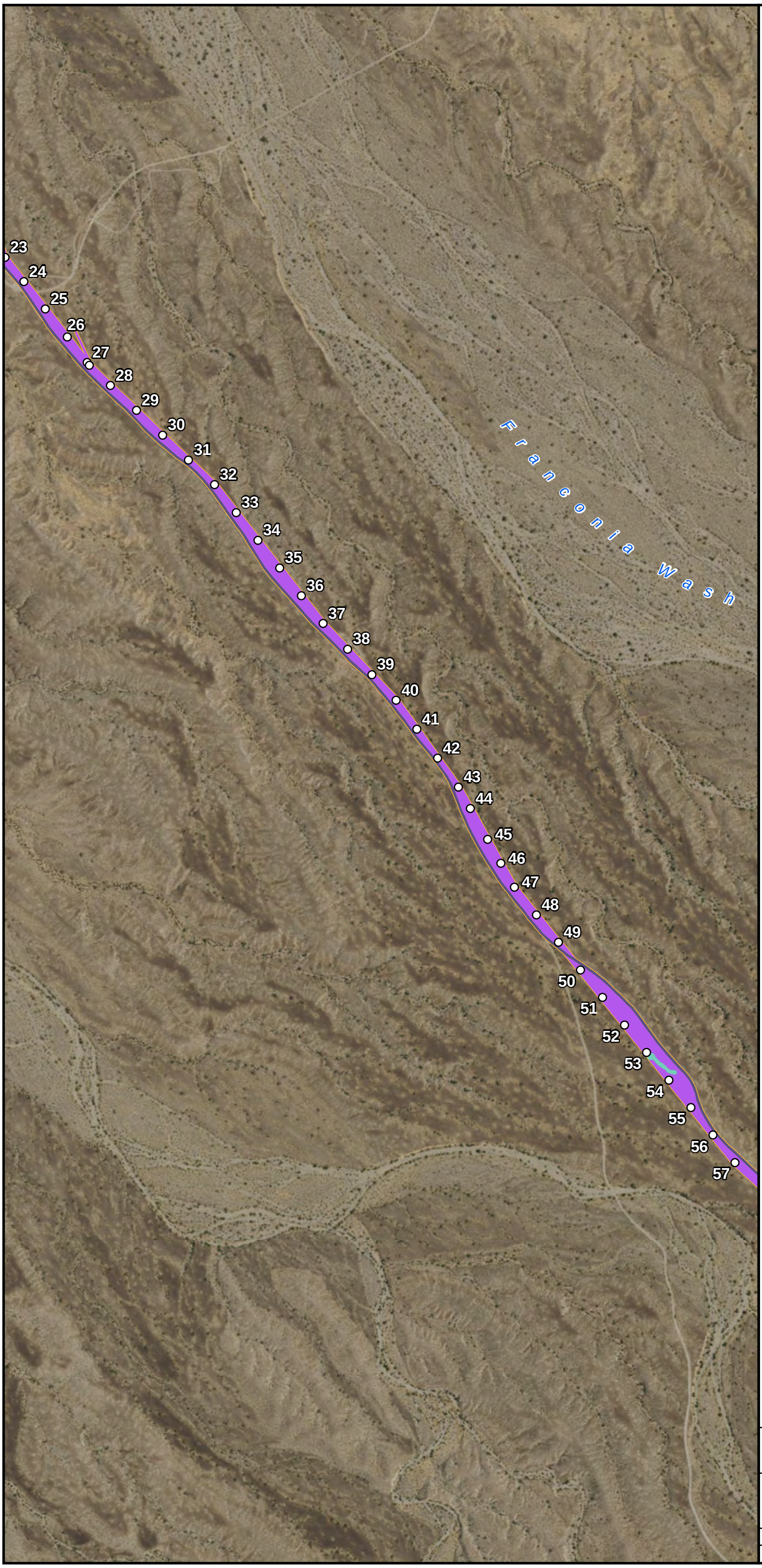
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-2	



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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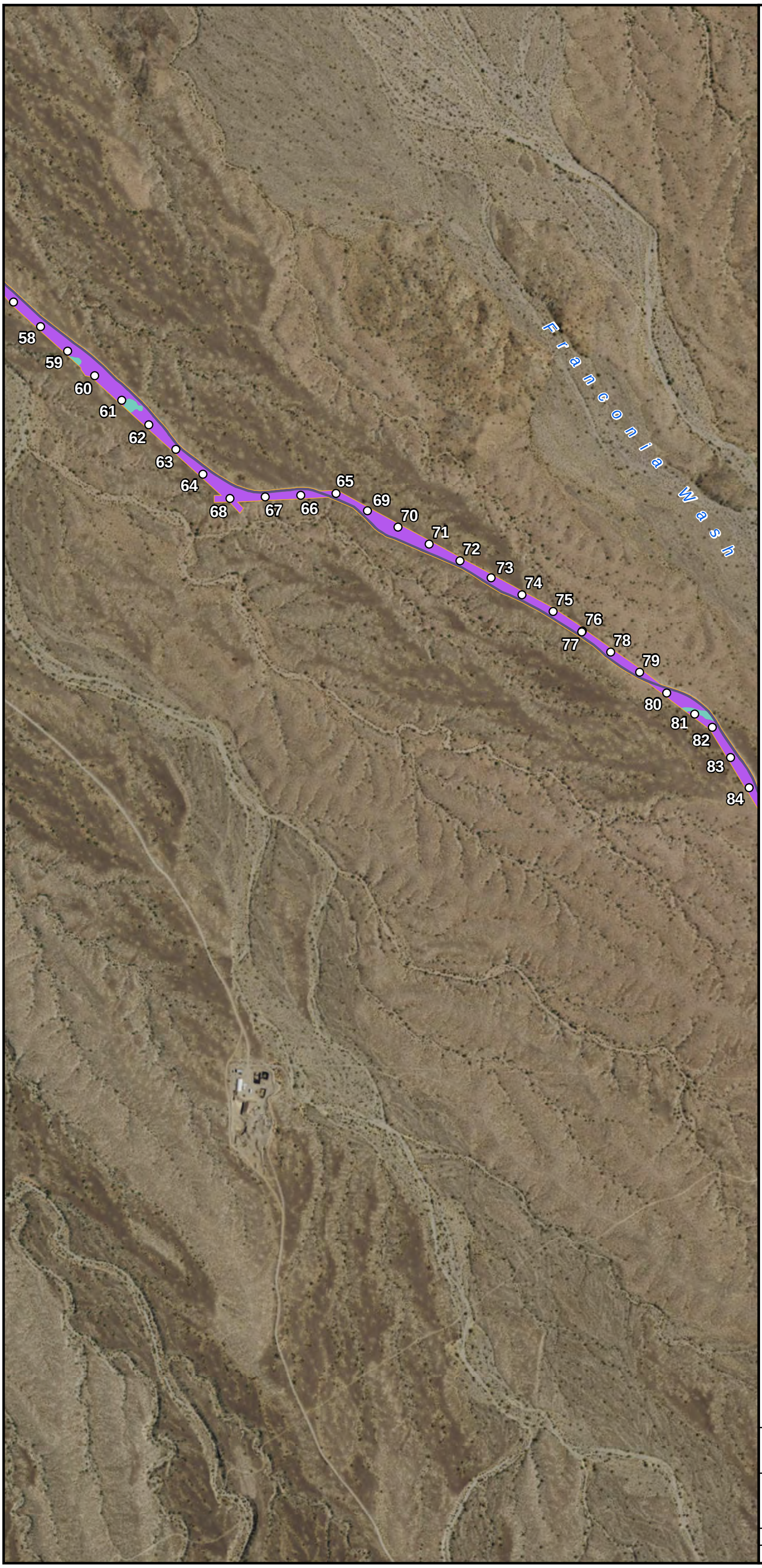
ARIZONA

Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-3	



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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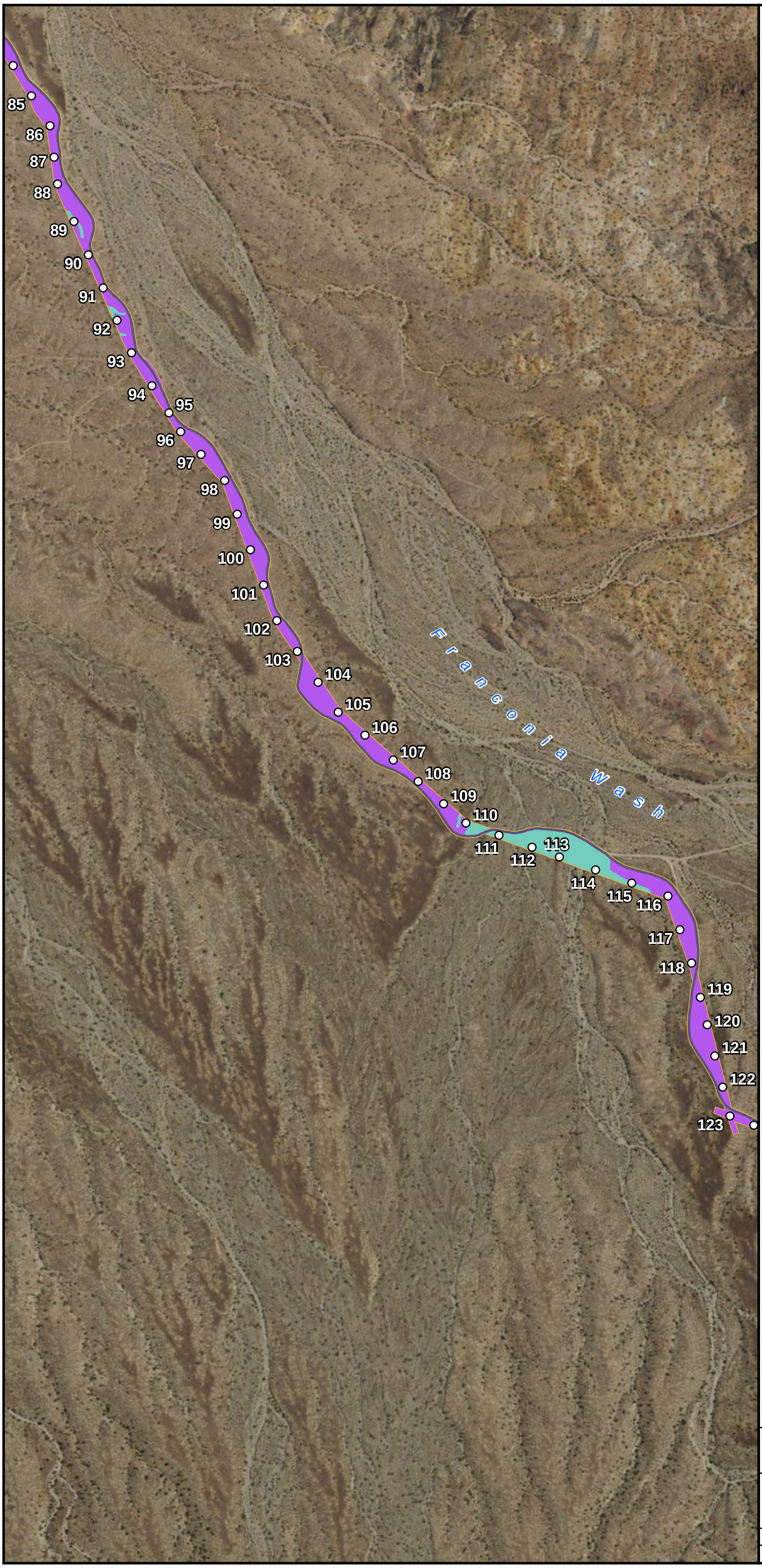
Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 2-4



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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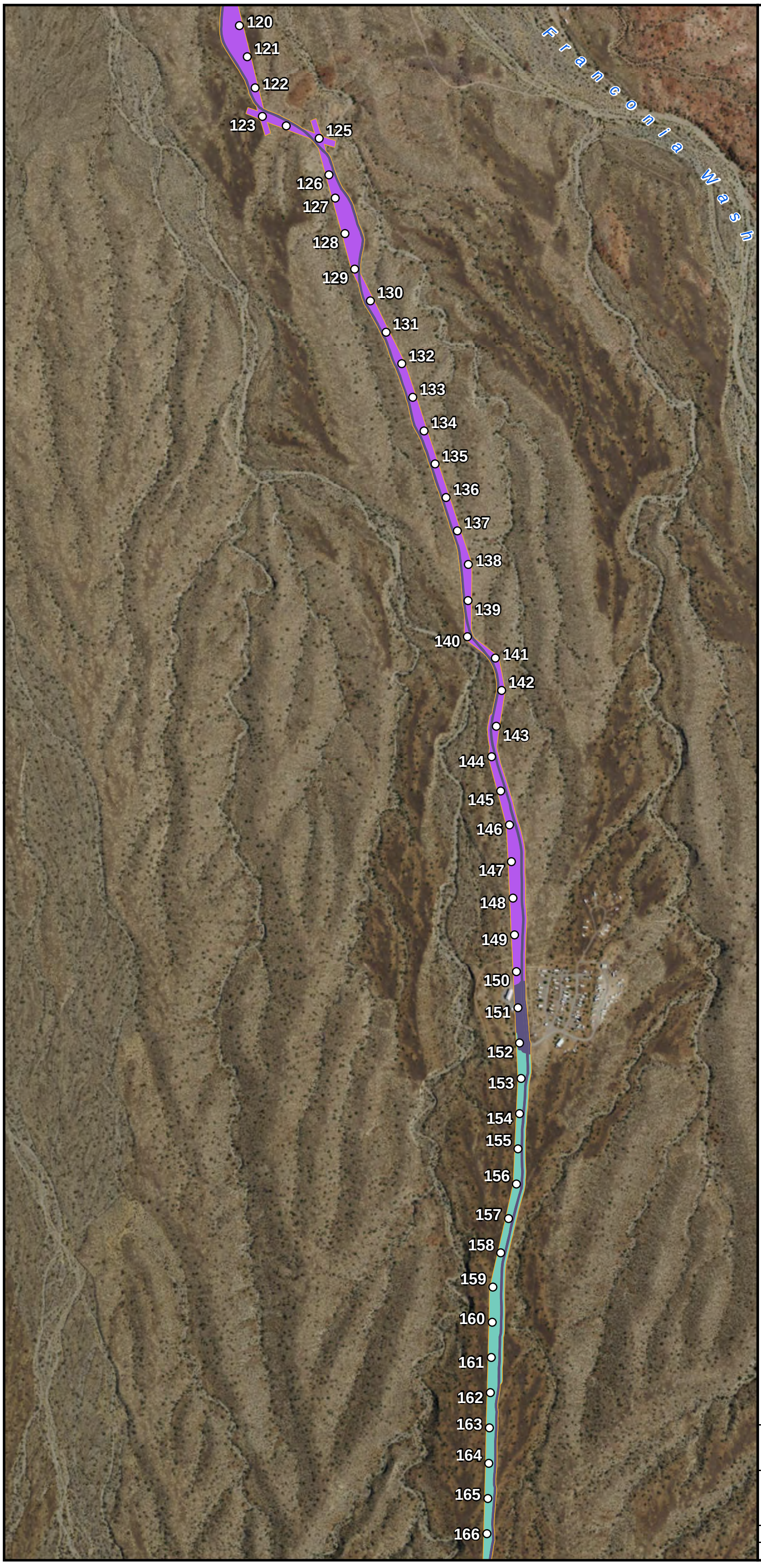
Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-5



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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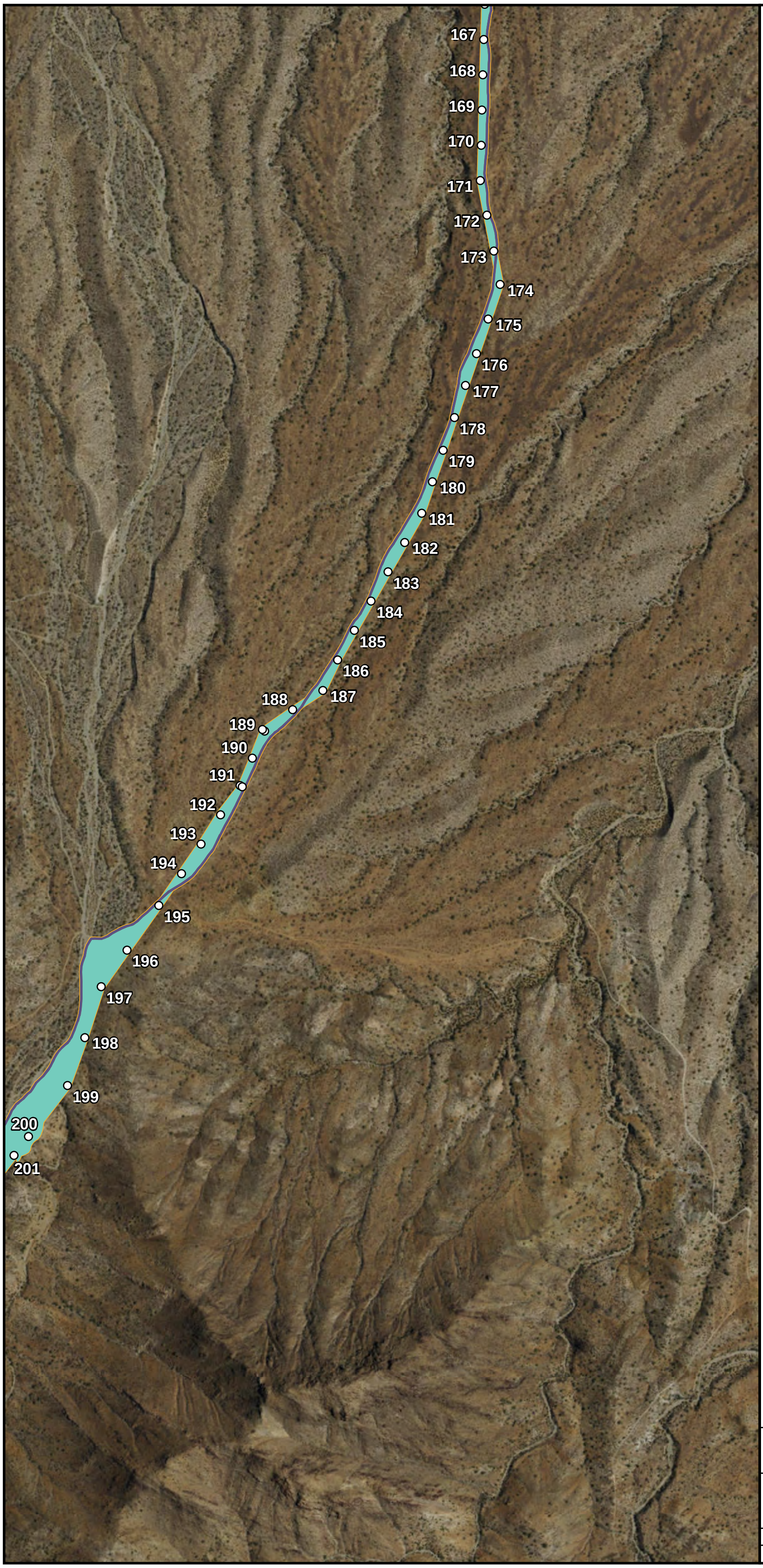
Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 2-6



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 2-7

Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Mojave mid-elevation mixed desert scrub

Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

March 2017 | Figure 2-8

Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

- Disturbed or developed
- Great Basin pinyon-juniper woodland
- Mojave mid-elevation mixed desert scrub
- Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-9	

Survey Area

Vegetation and Cover Type

Disturbed or developed

Scale 1:9,000

0 250 500 1,000

Feet

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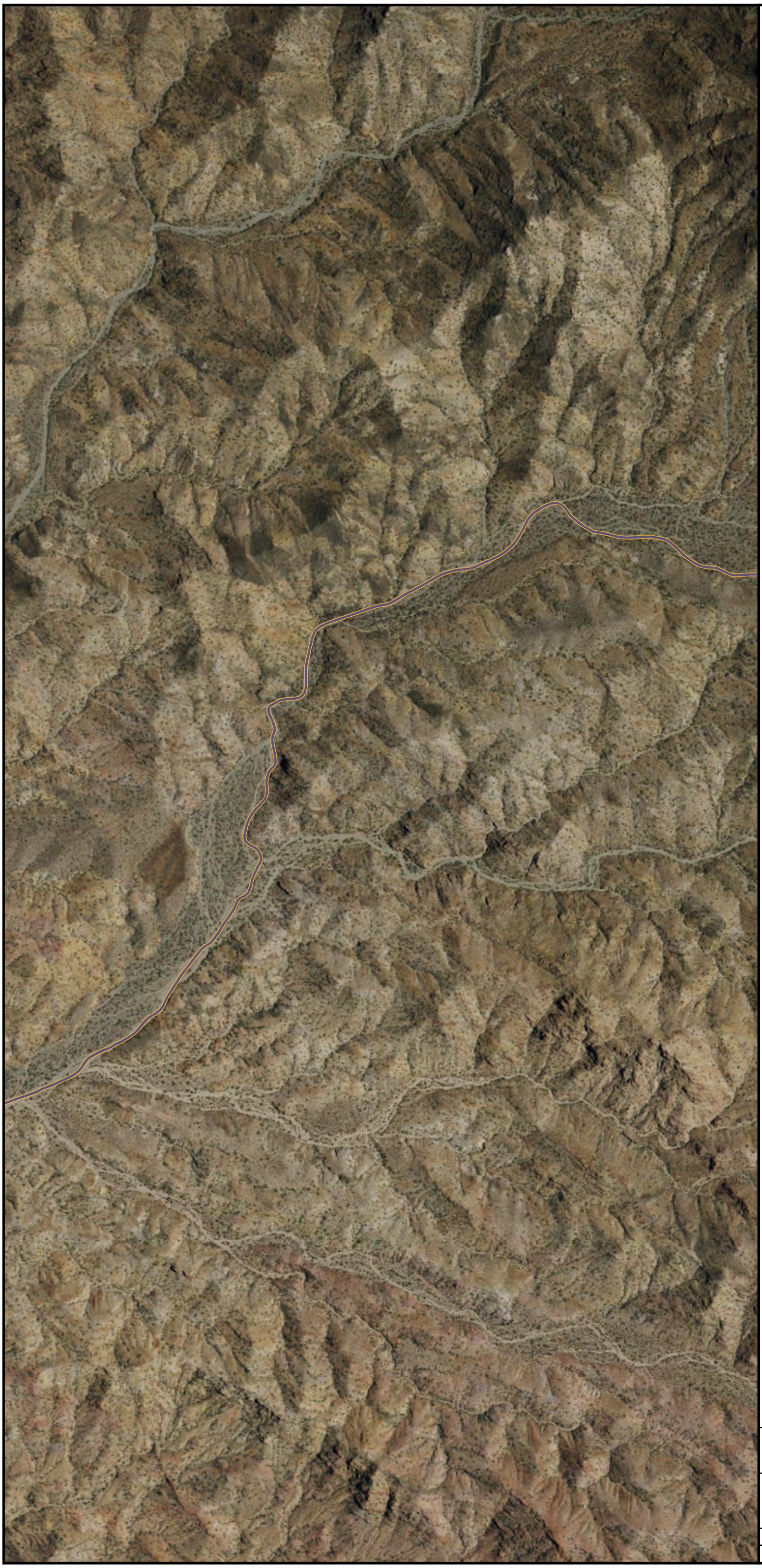
Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 2-10



Survey Area

Vegetation and Cover Type

Disturbed or developed

Scale 1:9,000

0 250 500 1,000

Feet

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Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-11	

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-
mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-12	

Survey Area

Vegetation and Cover Type

- Disturbed or developed
- Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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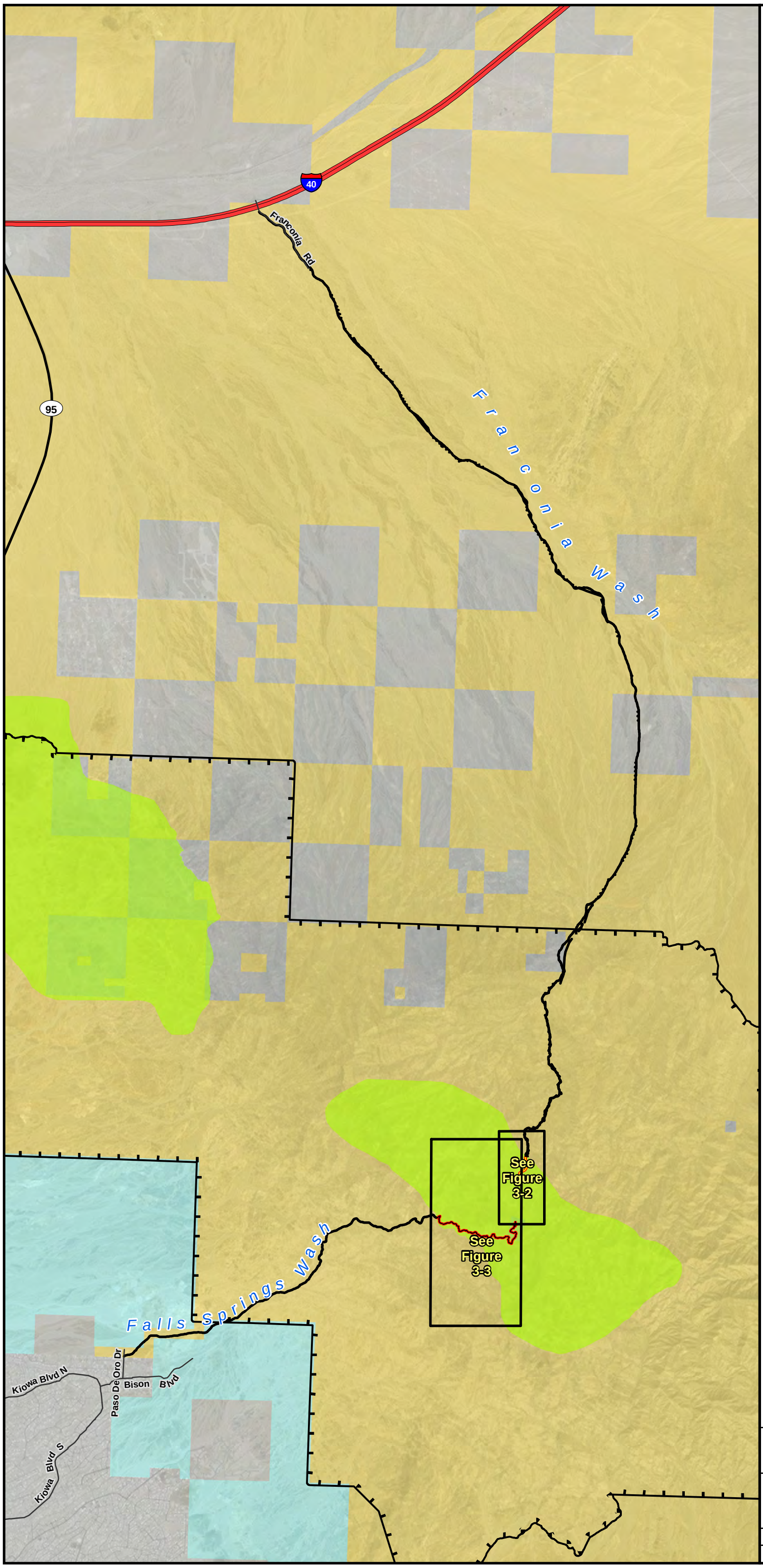
Biological Evaluation - Biological Resources

Designed: Aspen EG Approved:

GIS	March 2017	Figure 2-13	



Area of Critical Environmental Concern

Bighorn sheep sensitive habitat

Land Ownership

Bureau of Land Management

State Trust

Private

BLM Environmental Restrictions on Roads

No restrictions in place

Existing Road

Full restrictions in place February 1 - March 31 (no work, only access)

Any work from January 1 - January 31 and April 1 - April 30 would require coordination with AGFD.

Existing Road

New Road

Scale 1:75,000

0 0.5 1 2

Miles

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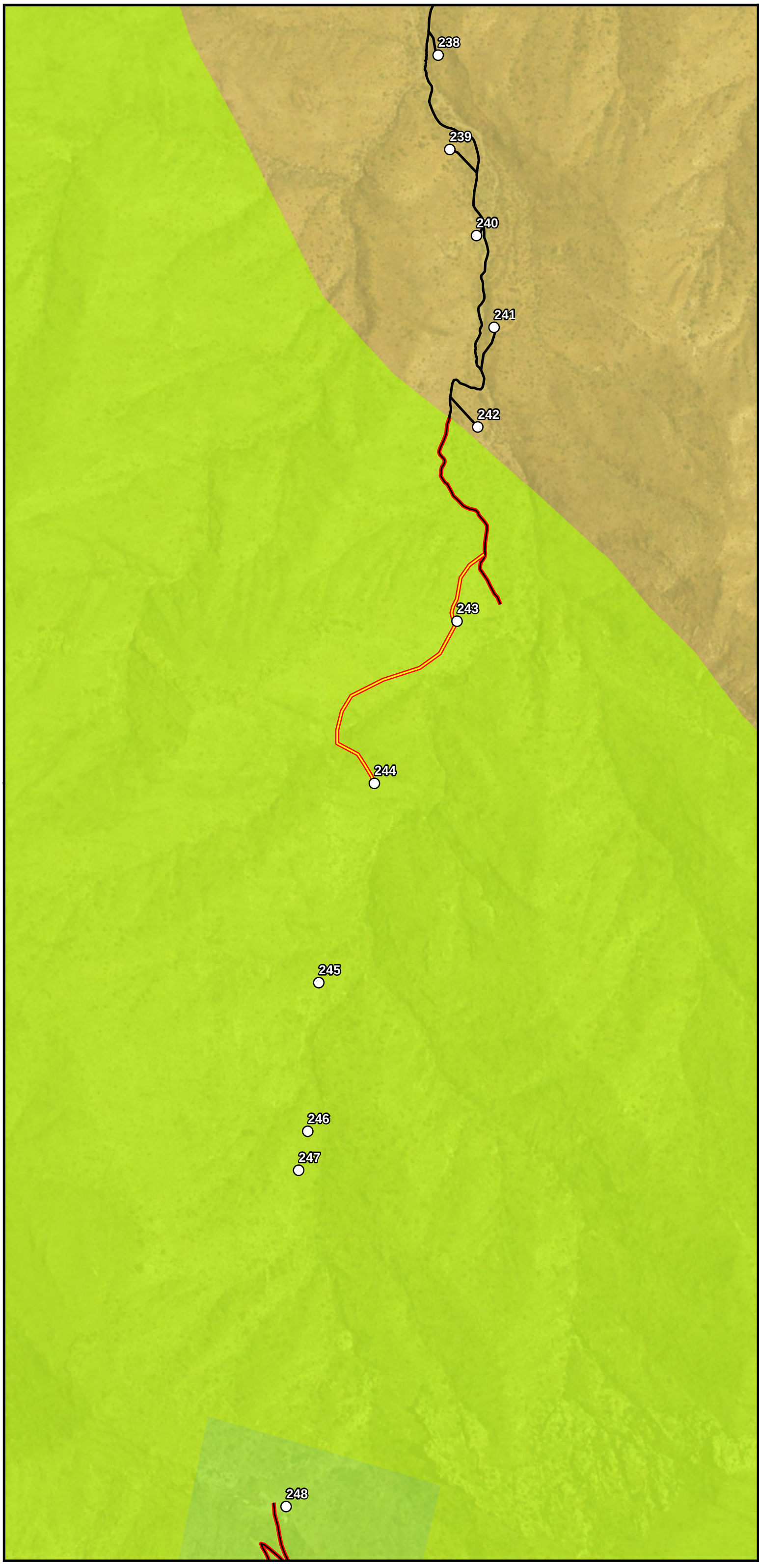
ARIZONA

Biological Evaluation - BLM Environmental Restrictions

Designed: Aspen EG Approved:

GIS	March 2016	Figure 3-1	



Proposed Distribution Line Poles

Bighorn sheep sensitive habitat

Land Ownership

Bureau of Land Management

Private

BLM Environmental Restrictions on Roads

No restrictions in place

Existing Road

Full restrictions in place February 1 - March 31 (no work, only access)

Any work from January 1 - January 31 and April 1 - April 30 would require coordination with AGFD.

Existing Road

New Road

Scale 1:4,500

0 300 600

Feet

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WESTERN AREA POWER ADMINISTRATION
HEADQUARTERS - PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Biological Evaluation - Environmental Restrictions

Designed: Aspen EG Approved:

GIS	3/15/2017	Figure 3-3	

244
245
246
247
248
C
S

Proposed Distribution Line Poles

Bighorn sheep sensitive habitat

Land Ownership

Bureau of Land Management

Private

BLM Environmental Restrictions on Roads

No restrictions in place

Existing Road

Full restrictions in place February 1 - March 31 (no work, only access)

Any work from January 1 - January 31 and April 1 - April 30 would require coordination with AGFD.

Existing Road

New Road

Scale 1:9,000

0 500 1,000

Feet

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ARIZONA

Biological Evaluation - Environmental Restrictions

Designed: Aspen EG Approved:

GIS	March 2017	Figure 3-3	

Attachment 4 – Arizona On-line Review Tool Results

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
Crossman Peak

Project Description:
Western Area Power Administration propose to build a new communication site, distribution line, and access road.

Project Type:
Energy Storage/Production/Transfer, Energy Transfer, Power line/electric line (new)

Contact Person:
Justin Wood

Organization:
Aspen Environmental Group

On Behalf Of:
OTHER_FED

Project ID:
HGIS-04419

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

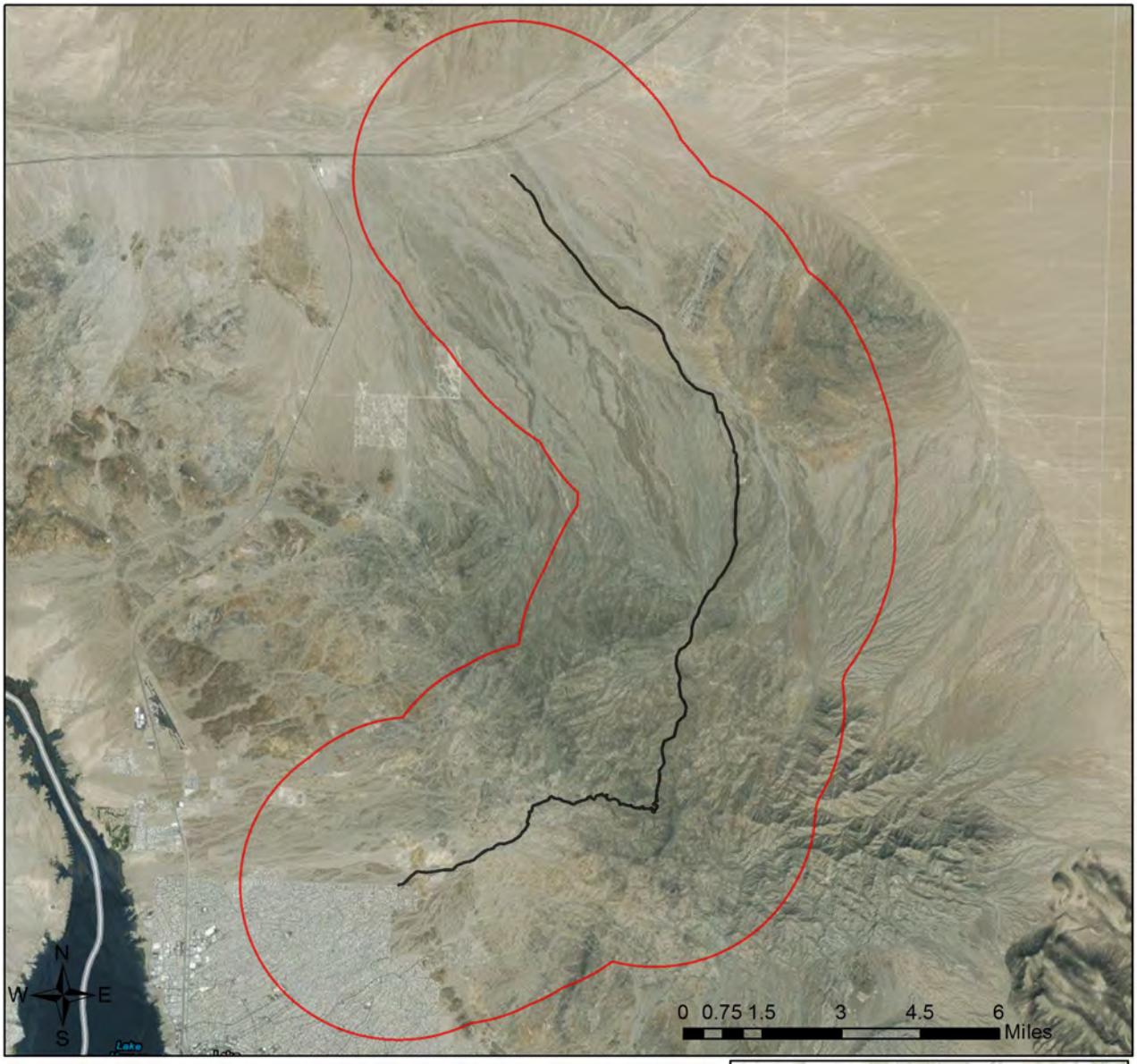
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

Crossman Peak

Aerial Image Basemap With Locator Map



Project Boundary

Buffered Project Boundary

Project Size (acres): 171.48

Lat/Long (DD): 34.5484 / -114.1976

County(s): Mohave

AGFD Region(s): Kingman

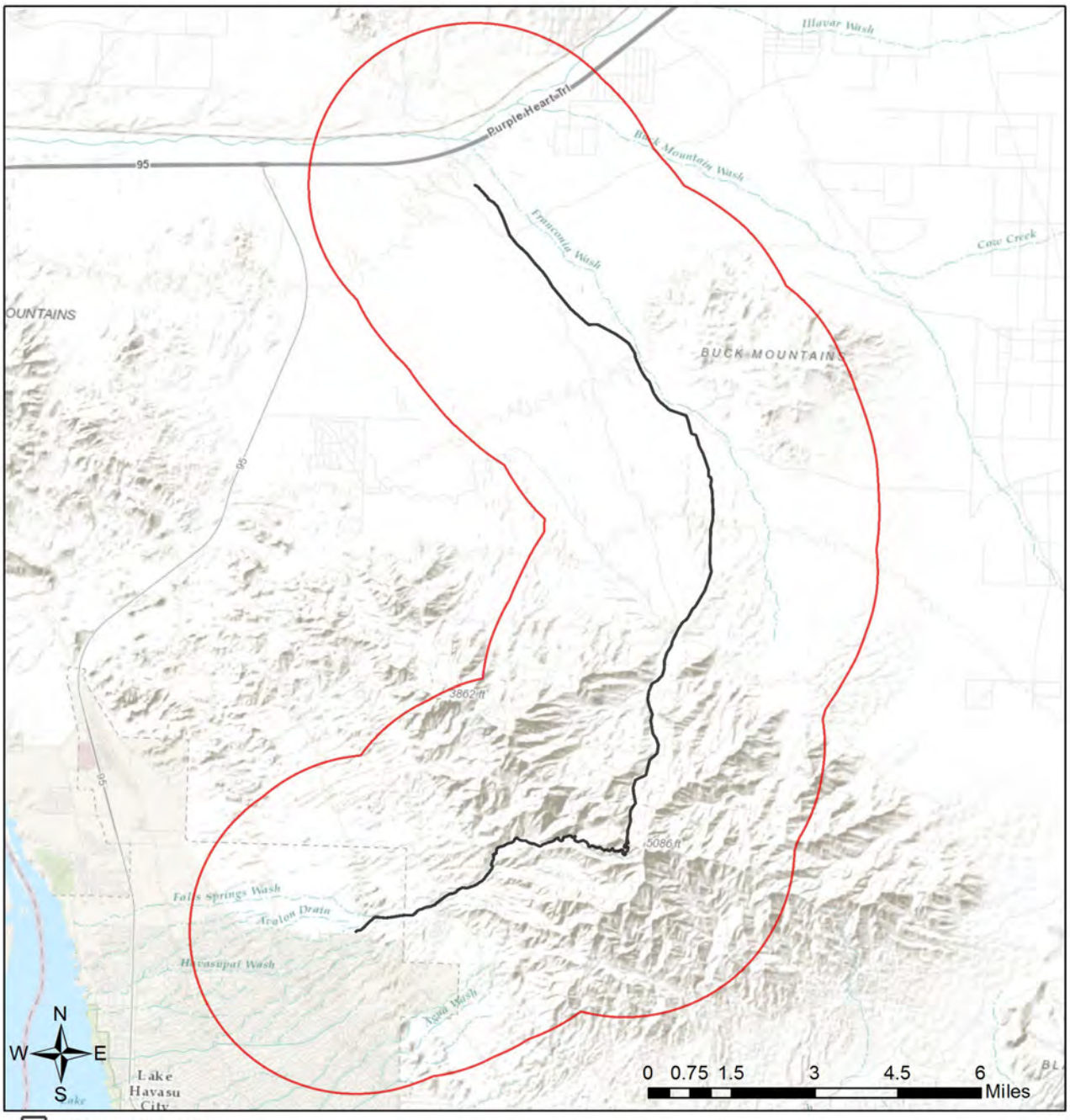
Township/Range(s): T16N, R19W; T15N, R19W; T15N, R18W +

USGS Quad(s): BUCK MOUNTAINS; LAKE HAVASU CITY NORTH +

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong),

Crossman Peak

Web Map As Submitted By User



Project Boundary

Buffered Project Boundary

Project Size (acres): 171.48

Lat/Long (DD): 34.5484 / -114.1976

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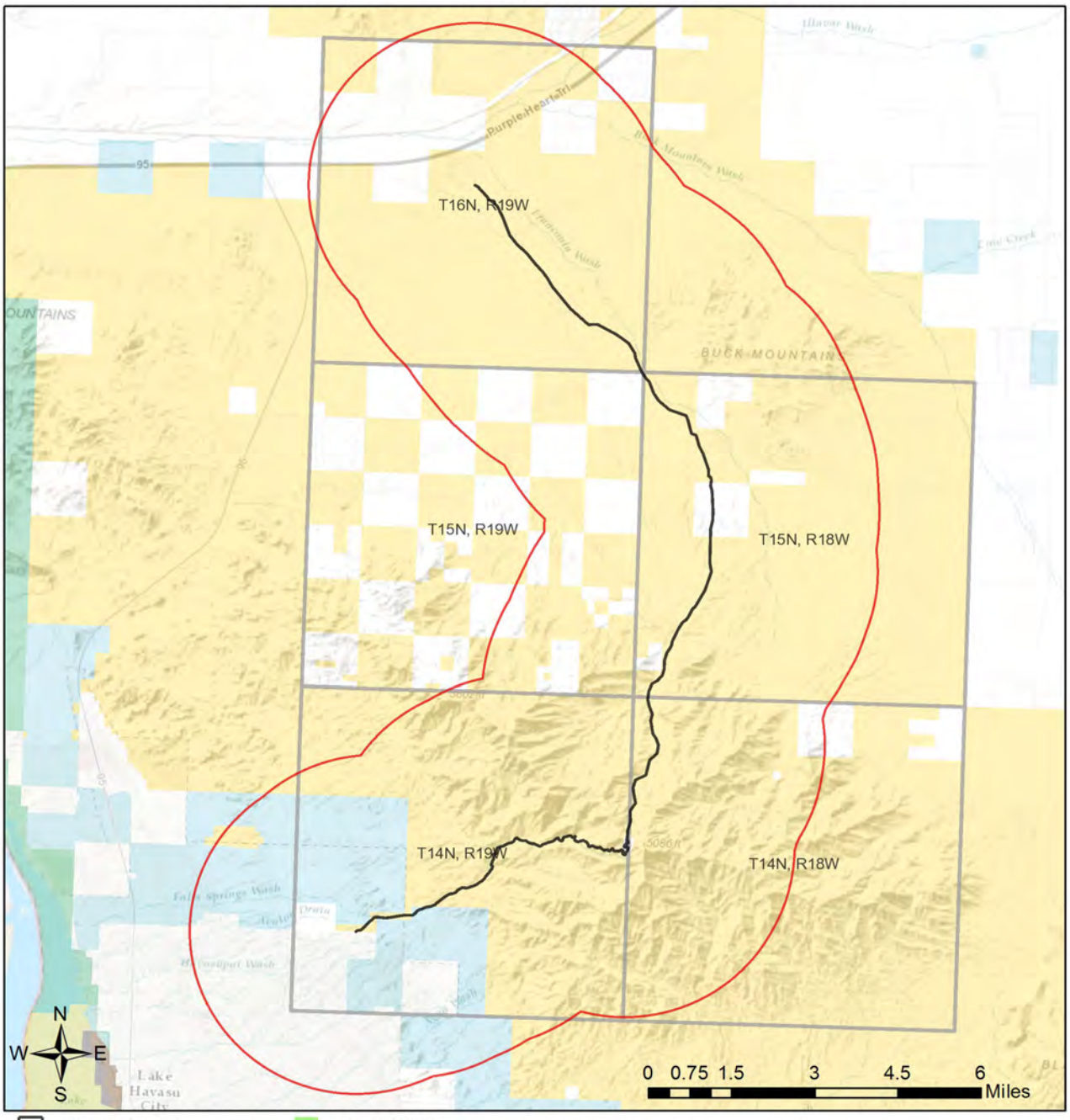
Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Crossman Peak

Topo Basemap With Township/Ranges and Land Ownership



- Project Boundary
- Buffered Project Boundary
- Township/Ranges
- AZ Game and Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State and Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge

Project Size (acres): 171.48

Lat/Long (DD): 34.5484 / -114.1976

County(s): Mohave

AGFD Region(s): Kingman

Township/Range(s): T16N, R19W; T15N, R19W; T15N, R18W +

USGS Quad(s): BUCK MOUNTAINS; LAKE HAVASU CITY NORTH +

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Special Status Species and Special Areas Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Allium parishii	Parish Onion			S	SR	
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Bat Colony						
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S			1A
Heloderma suspectum cinctum	Banded Gila Monster	SC				1A

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Aix sponsa	Wood Duck					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anthus spragueii	Sprague's Pipit	C*				1A
Antilocapra americana americana	America Pronghorn					1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Aspidoscelis flagellicauda	Gila Spotted Whiptail					1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Castor canadensis	American Beaver					1B
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
Colaptes chrysoides	Gilded Flicker			S		1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus cerberus	Arizona Black Rattlesnake					1B
Empidonax traillii extimus	Southwestern Willow Flycatcher	LE				1A
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S			1A
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Idionycteris phyllotis	Allen's Lappet-browed Bat	SC	S	S		1B
Incilius alvarius	Sonoran Desert Toad					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Laterallus jamaicensis coturniculus	California Black Rail	SC		S		1B
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Microtus mexicanus	Mexican Vole					1B
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Passerculus sandwichensis	Savannah Sparrow					1B
Perognathus amplus	Arizona Pocket Mouse					1B
Perognathus longimembris	Little Pocket Mouse					1B
Rallus obsoletus yumanensis	Yuma Ridgeway's Rail	LE				1A
Setophaga petechia	Yellow Warbler					1B
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Toxostoma lecontei	Le Conte's Thrasher					1B
Troglodytes pacificus	Pacific Wren					1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox					1B

Species of Economic and Recreation Importance Predicted within Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Odocoileus hemionus	Mule Deer					
Ovis canadensis nelsoni	Nelson Desert Bighorn Sheep					
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Energy Storage/Production/Transfer, Energy Transfer, Power line/electric line (new)

Project Type Recommendations:

Minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g., microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g., livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants, https://agriculture.az.gov/. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control, http://www.usda.gov/wps/portal/usdahome. The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information https://www.azgfd.com/hunting/regulations.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

For any powerlines built, proper design and construction of the transmission line is necessary to prevent or minimize risk of electrocution of raptors, owls, vultures, and golden or bald eagles, which are protected under state and federal laws. Limit project activities during the breeding season for birds, generally May through late August, depending on species in the local area (raptors breed in early February through May). Conduct avian surveys to determine bird species that may be utilizing the area and develop a plan to avoid disturbance during the nesting season. For underground powerlines, trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herptefauna (snakes, lizards, tortoise) from entering ditches. In addition, indirect affects to wildlife due to construction (timing of activity, clearing of rights-of-way, associated bridges and culverts, affects to wetlands, fences) should also be considered and mitigated.

Based on the project type entered, coordination with State Historic Preservation Office may be required (http://azstateparks.com/SHPO/index.html).

Based on the project type entered, coordination with U.S. Fish and Wildlife Service (Migratory Bird Treaty Act) may be required (http://www.fws.gov/southwest/es/arizona/).

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

Project Location and/or Species Recommendations:

HDMS records indicate that one or more native plants listed on the Arizona Native Plant Law and Antiquities Act have been documented within the vicinity of your project area. Please contact:
Arizona Department of Agriculture
1688 W Adams St.
Phoenix, AZ 85007
Phone: 602.542.4373
https://agriculture.az.gov/environmental-services/np1

HDMS records indicate that Western Burrowing Owls have been documented within the vicinity of your project area. Please review the western burrowing owl resource page at:
https://www.azgfd.com/wildlife/speciesofgreatestconservneed/burrowingowlmanagement/.

HDMS records indicate that Sonoran Desert Tortoise have been documented within the vicinity of your project area. Please review the Tortoise Handling Guidelines found at: https://www.azgfd.com/wildlife/nongamemanagement/tortoise/

Appendix C

Preliminary Jurisdictional Delineation Report

Final Preliminary Jurisdictional Waters/Wetlands Delineation Report

Crossman Peak Communications Facility Project

Prepared for:

Western Area Power Administration

Western Area Power Administration, Desert Southwest Region
615 S. 43rd Avenue

Phoenix, Arizona 85009

Prepared by:

Aspen Environmental Group
5020 Chesebro Road, Suite 200
Agoura Hills, CA 91301

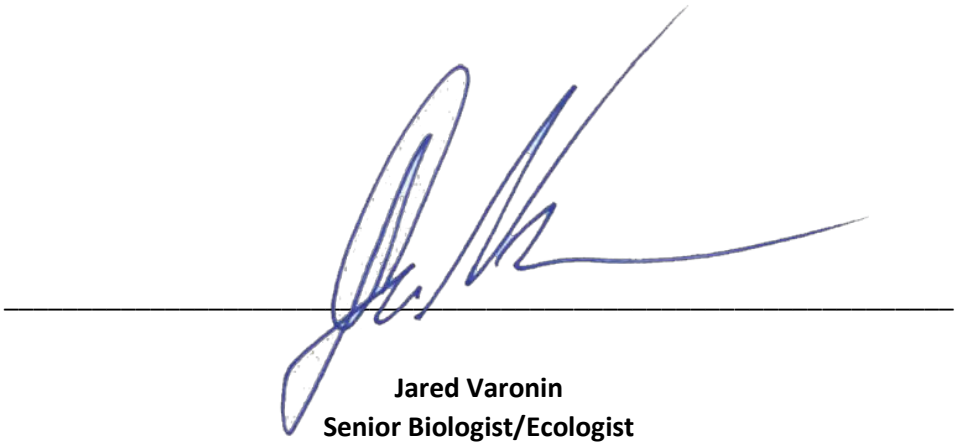
Blanket Purchase Agreement No.: DE-AB65-11WG90286
Task Order No.: 1118-024AS Task 4

March 2017

Final Preliminary Jurisdictional Waters/Wetlands Delineation Report

Crossman Peak Communications Facility Project

The undersigned certifies that this report is a complete and accurate account of the findings and conclusions of a jurisdictional determination and delineation for the above-referenced project.



Jared Varonin
Senior Biologist/Ecologist
Regulatory Permitting Lead
Certified Fisheries Professional
Aspen Environmental Group

March 2017

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1.0 Introduction

This report presents the findings of an investigation of jurisdictional features conducted by Aspen Environmental Group (Aspen) within the right of way (ROW) for the proposed Crossman Peak Communications Facility Project (Project). The Project is located northeast of Lake Havasu City in Mohave County, Arizona (Figure 1). The proposed Project would include approximately 14.6 miles of new 20.8 kilovolt (kV) distribution line and construction of a new access road and temporary spur routes. Field surveys were conducted from November 1 – 3, 2016 within the new proposed distribution line right-of-way (50 feet), communications tower site, and existing and new access roads/spur routes (maximum 20 feet wide) (Survey Area); surveys were conducted by Aspen Senior Biologist/Ecologist Jared Varonin and Senior Biologist Justin Wood. The assessment was conducted to determine the extent of resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE) and the Arizona Department of Environmental Quality (ADEQ). These are the primary regulating agencies in Arizona for all activities taking place within wetlands and waters subject to their jurisdiction.

1.1 Project Description

WAPA proposes to construct a new self-supporting communications tower at the existing Crossman Peak facility and improve the access road as part of the Project. In support of WAPAs Project, UniSource Energy Services (UES) proposes to construct approximately 14.6 miles of 20.8 kV distribution line from the Franconia Substation, located just south of Interstate 40, to the proposed communications facility (Figure 1). The distribution line would include approximately 250 new poles. A new access road would be needed along the distribution line route. Approximately 4.6 miles of existing access road would be improved (if needed), 0.24 mile of new road would be built, as needed, where trucks could not travel overland.

The Project area is located in Mohave County, Arizona. It is on public lands managed by the Bureau of Land Management (BLM) and Arizona State Land Department (ASLD) and on private lands. In advance of construction activities, WAPA would acquire right-of-way from the ASLD and BLM for use of the existing communications facility access road. WAPA would purchase and own 3,500 square-feet of privately-owned land where the communications facility would be built. UES would acquire right-of-way from BLM for the proposed distribution line and access road construction and improvements on BLM lands. UES would also request land owner permission for construction and operation of the distribution line on private lands.

Communications Facility Construction

WAPA proposes to construct the communications facility within a 50-foot by 70-foot area. WAPA would access work areas by construction vehicles via the existing unpaved access road. Equipment staging and storage would be confined to an adjacent 50-foot by 70-foot area and within a wide road shoulder located just south of the southern-most switchback. WAPA would prepare the site for construction, including removal of vegetation (mainly shrubs) from the communications site and access road switchbacks. WAPA would also grade the immediate work zone within the 50-foot by 70-foot area around the communications site for safety.

To construct the communications facility, WAPA would install concrete slab foundations for the communications tower, equipment shelter, generator, and propane tank. WAPA would create an underground connection between the propane tank and the generator. A grounding grid would be installed around the perimeter of the communications tower. To excavate the foundations for the tower, WAPA would auger holes four feet in diameter and up to 20 feet deep. A crane or helicopter would set

the tower foundations in the excavated holes and the holes would be backfilled with concrete. Excess excavated material would be used to backfill holes or spread onsite. WAPA estimates the maximum ground disturbance area for the communications site would be the 50-foot by 70-foot (3,500 square-foot) area.

WAPA would improve the four degraded switchback curves located on private land nearest the facility. To complete this, WAPA would clear brush, perform minor grading, and compact the area. Water trucks would be used on the access road to control dust and to retain fine surface rock. The remainder of the existing access road would not be improved or maintained.

Distribution Line Construction

UES proposes to install approximately 250 distribution line poles. Most poles would be 45-feet tall and made of wood or steel; several 55- to 80-foot steel poles would be installed in the steep 2.0-mile section leading up to the communications facility, shown as poles 243 through 248 on Figure 2-9. The poles and other components would be delivered to the Project staging area, either at the disturbed Franconia Substation or along the distribution line right-of-way, at each proposed pole site. The structures and other components would be delivered to the installation locations using ground transport equipment suitable for the rugged terrain.

Installing the distribution line poles, conductor, and overhead ground wires would disturb the ground. The temporary disturbance area at each distribution line pole would be no more than 2,500 square feet and the permanent disturbance would be no more than two square feet. UES would conduct ground-disturbing activities within the proposed distribution line right-of-way. UES would also require up to 24 temporary, 50-foot by 100-foot, pulling/stringing areas at the turning structures along the distribution line that may be located adjacent to, but outside of the proposed right-of-way. Lastly, UES would build three temporary, 75-foot by 75-foot, work pads at the three, southern-most pole locations and construct those poles using a helicopter due to steep terrain.

To install poles, UES would use tracked or rubber-tire vehicles (i.e. front loader or backhoe) to level the ground and use an auger to excavate the foundations to a depth of up to 20 feet. Poles would be placed in the hole and temporarily supported by a crane while concrete is poured around the base. Excess excavated material would be used as backfill or removed from the site.

Conductor Stringing

UES proposes to string the conductor between structures by first running a “sock line” through a series of pullies and then running a lighter-weight rope back through the pullies by pulling on the sock line. The conductor would then be pulled into place and tensioned by pulling on the rope using pulling equipment at one end of the section and tensioning equipment at the other end. Once the correct tension has been reached, the conductor will be secured at each of the pulling segments using mechanical or compression dead-end devices. During the conductor stringing process, the conductor will only be allowed to contact the ground at pulling and tensioning locations. The work will be completed using lift equipment, by climbing the structure, or by helicopter.

Access Road Construction and Improvements

To improve and construct the access road for the distribution line, UES would clear brush and grade the existing road where necessary. UES would construct approximately 4.6 miles of new temporary access routes off the existing access road (where trucks would not be able to travel overland), and the existing road would be extended at the south end of the distribution line for approximately 0.24 mile. The

temporary access routes would be cleared of vegetation and graded, where needed, to allow for temporary construction access. Upon completion of construction, all locations where a temporary road crosses a jurisdictional drainage would be returned to pre-construction elevations and contours. During construction, UES would use water trucks on the access road to control dust and to retain fine surface rock. UES would implement a Stormwater Pollution Prevention Plan (SWPPP) during construction, per Arizona Department of Environmental Quality (ADEQ) guidelines. The SWPPP includes construction of dirt berms and corrugated metal pipes to maintain stormwater flow, and installation of wildlife-friendly (i.e., non-plastic and biodegradable) and weed free straw wattles, etc. to prevent sediment flow into the washes. Any erosion control installation would be removed after construction.

Operation and Maintenance

WAPA proposes to operate the communications facility remotely from WAPA's Phoenix office and would only require occasional visits to the facility. WAPA personnel would conduct routine maintenance of the access road and communications equipment to assure the safe and reliable access to and operation of the proposed communications site. WAPA expects to inspect its facilities once or twice per year. WAPA proposes to perform the following:

- Maintain and inspect communication towers, antennae, and appurtenant equipment;
- Maintain foundations and footings;
- Refill propane tanks, and maintain associated gauges and switches;
- Install underground and/or overhead power, communication, ground electrical, or control lines (between propane tank, generator, and building) less than 100-feet long;
- Maintain the facility, e.g., maintain the generator and air conditioner, add or remove panels, and install or replace antennae;
- Apply herbicides (including pesticides) within the facility's fence;
- Maintain and repair the access road;
- Install and maintain a fence around the communication site; and
- Remediate small spills (up to 10 gallons) of oil and hazardous materials.

UES will not perform routine maintenance on the temporary access routes as they will only be used during construction. UES will inspect the distribution line annually and perform routine maintenance to the line and access road as needed. Normally no maintenance is needed for several years, even decades.

Project Schedule

WAPA would begin construction no later than February 15, 2018. WAPA's construction activity would occur over three to four months. All construction would occur during daylight hours, and night lighting would not be required. WAPA would begin operation of the proposed communications facility no later than December 2018.

UES would begin construction no sooner than October 1, 2017. UES's construction activities would occur for up to six months. All construction would occur during daylight hours, and night lighting would not be required. UES would energize the distribution line in time to meet WAPA's operational target date of December 2018.

1.2 Contact Information

Table 1-1. Applicant and Consultant Contact Information

Applicant Contact	Wetland and Biological Consultant
Western Area Power Administration Desert Southwest Region 615S. 43rd Avenue Phoenix, AZ 85009 *Contact:* Linda Marianito 602.605.2524 marianito@wapa.gov UniSource Energy Services PO Box 711, HQE613 Tucson AZ 85702 *Contact:* Leslie Carpenter 520.918.8311 LCarpenter@tep.com	Aspen Environmental Group 5020 Chesebro Road, Suite 200 Agoura Hills, CA 91301 *Contacts:* Jared Varonin 818.338.6715 jvaronin@aspeneg.com Heather Blair 916.235.9891 hblair@aspeneg.com

1.3 Site Access

Table 1-2 identifies driving directions to the Project area.

Table 1-2. Driving Directions to the Project Area

From Phoenix, AZ
Take the I-10 W towards Los Angeles
Take exit 45 for Vicksburg Rd towards AZ-72 W
Turn right onto AZ-72 W
Continue straight onto AZ-95 N at the AZ95/AZ-72 junction
Continue on AZ-95 N and turn right onto McCulloch Blvd S once you enter the outskirts of Lake Havasu City
Travel approximately 4.3 Miles and turn right onto Jamaica Blvd N
Travel approximately 0.7 miles and turn right onto Kiowa Blvd S
Travel approximately 1.6 miles and turn right onto Bison Blvd
Travel approximately 0.3 miles and turn left onto Paso De Oro Drive
Travel approximately 0.30 miles to the starting point of the access road on the south side of Crossman Peak
From Los Angeles, CA

Table 1-2. Driving Directions to the Project Area
Take the I-10 E towards Blythe, CA
Take exit 192 for Desert Center/Rice Road/CA-177
Continue on CA-177
Turn right onto CA-62 E and the CA-177/CA-62 Junction
Turn left onto AZ-95 N/West Riverside Drive shortly after crossing the Colorado River in Parker, AZ
Continue on AZ-95 N and turn right onto McCulloch Blvd S once you enter the outskirts of Lake Havasu City
Travel approximately 4.3 Miles and turn right onto Jamaica Blvd N
Travel approximately 0.7 miles and turn right onto Kiowa Blvd S
Travel approximately 1.6 miles and turn right onto Bison Blvd
Travel approximately 0.3 miles and turn left onto Paso De Oro Drive
Travel approximately 0.30 miles to the starting point of the access road on the south side of Crossman Peak

2.0 Regulatory Background

Any impacts to jurisdictional waters or wetlands associated with the Project would require authorization from the USACE and the ADEQ. The USACE regulates activities pursuant to Section 404 of the Federal Clean Water Act (CWA) and the ADEQ regulates activities under Section 401 of the CWA.

2.1 Section 404 of the Clean Water Act

Section 404 of the CWA regulates the discharge of dredged material, placement of fill material, or certain types of excavation within "waters of the U.S." (resulting in more than incidental fallback of material) and authorizes the Secretary of the Army, through the Chief of Engineers, to issue permits for such actions. Permits can be issued for individual projects (individual permits) or for general categories of projects (general permits). "Waters of the U.S." are defined by the CWA as "rivers, creeks, streams, and lakes extending to their headwaters and any associated wetlands." This includes ephemeral drainages, such as those that occur within the proposed Project area, that generally only flow after significant rain events. Wetlands are defined by the CWA as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil conditions."

The USACE may: authorize use of a Nationwide Permit (NWP), which is a type of general permit issued by the USACE Headquarters for nationwide application; authorize use of a Regional General Permit (RGP), issued by particular USACE Districts or Divisions; or issue an Individual/Standard Permit (IP/SP) if a project meets the general terms and conditions of an NWP or RGP, but will result in greater than minimal impacts to aquatic resources on an individual or cumulative basis. A pre-construction notification (PCN) of project activities may be required depending on specific conditions in the NWP, RGP or IP.

2.2 Section 401 of the CWA

Section 401 of the CWA requires that:

> *…any applicant for a Federal permit for activities that involve a discharge to "waters of the State," shall provide the Federal permitting agency a certification from the State in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the Federal Clean Water Act.*

Therefore, before the USACE will issue a Section 404 permit, applicants must apply for and receive a Section 401 Water Quality Certification from the ADEQ. The ADEQ may add conditions to their certification to remove or mitigate potential impacts to water quality standards. Such conditions must ultimately be included in the Federal Section 404 permit.

3.0 Existing Conditions

3.1 Project Location, Topography, and Land Ownership

Crossman Peak is located northeast of Lake Havasu City in Mohave County, Arizona (Figure 1). The proposed communications facility would be located at approximately 4,700 feet in elevation, approximately nine miles east of Highway 95, and 13 miles south of Interstate 40. The proposed communications facility would be located adjacent to an existing American Tower communications facility. The previously disturbed, private land is on APN 113-02-003 in the Southeast ¼ of Section 13, Township 14 North, Range 19 West, Gila and Salt River Baseline and Meridian. BLM-administered lands surround this private inholding and contain the majority of the Proposed Action's linear facilities (distribution line corridor and access roads). The six-mile dirt access road to the proposed communications Facility begins at the northeast corner of Lake Havasu City and continues northeast to the Project site. The distribution line access road travels south from Interstate 40 in Franconia terminating at a point below, but not connecting to, the proposed communications facility.

3.2 Climate

Regional climate is semi-arid, characterized by hot summers and mild winters, with average daytime high temperatures ranging between 53 to 96.6 degrees (based on data from 1971 – 2000) Fahrenheit (ADWR, 2010). Rainfall in the area averages approximately three to five inches (based on data from 1971 – 2000) per year (ADWR, 2010).

3.3 Hydrology, Geology, and Geomorphology

The Survey Area is located along the southwestern edge of the Upper Colorado River Planning Area (UCRPA) within a portion of the UCRPA referred to as the Lake Havasu Basin. The Lake Havasu Basin is approximately 252 square miles in surface area. It contains one large reservoir/dam, Lake Havasu (Parker Dam), which has a maximum storage of 651,000 acre-feet (ADWR, 2010).

The Survey Area is located in the Basin and Range physiographic province of Arizona, which is characterized by broad, gently sloping alluvial basins separated by north to northwest trending fault-block mountains (ADWR, 2009).

3.4 Vegetation and Land Uses

All land uses and vegetation types present within the Survey Area were mapped and are described below, using the nomenclature of Brown (1994); refer to Attachment A, Figure 2. A complete list of all plant species observed within the Survey Area and their wetland indicator status are presented in Attachment C.

- **Sonoran-Mojave Creosotebush-White Bursage Desert Scrub.** This vegetation community is characterized by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Other species noted, although much less frequently, include white ratany (*Krameria grayi*), big galleta

(*Pleuraphis rigida*), and pencil cholla (*Cylindropuntia ramosissima*). Larger shrubs are generally sparse but annuals are seasonally abundant and dependent on rainfall. Annuals such as sandmat (*Chamaesyce* spp.), low woollygrass (*Dasyochloa pulchella*), three-awn grass (*Aristida* spp.), cryptanthas (*Cryptantha* spp.), and phacelias (*Phacelia* spp.) were observed. Within the Survey Area, this vegetation is found primarily on the bajada surfaces along the northern-most portion of alignment. This vegetation best matches the Creosotebush–White Bursage Series in the Upper Colorado River Valley Subdivision of Sonoran Desertscrub (Brown 1994).

- **Sonoran Paloverde-Mixed Cacti Desert Scrub.** This vegetation community is characterized by yellow paloverde (*Parkinsonia microphylla*) with other species such as ocotillo (*Fouquieria splendens*), creosote bush, white bursage, chollas (*Cylindropuntia* spp.), and brittlebush (*Encelia farinosa*) occurring less frequently. South of Crossman Peak the vegetation has realtively sparse cover of yellow paloverde and has a much higher cover of species such as buckhorn cholla (*Cylindropuntia acanthacarpa*), teddy-bear cholla (*Cylindropuntia bigelovii*), hedgehog cactus (*Echinocereus* spp.), California barrel cactus (*Ferocactus cylindraceus*), dollarjoint pricklypear (*Opuntia chlorotica*), Parry's beargrass, and desert agave. Along the southern access road, saguaro (*Carnegiea gigantean*) are also present. Within the washes and canyon bottoms additional species such as common burrobrush (*Ambrosia salsola*), Coues' cassia (*Senna covesii*), sweetbush (*Bebbia juncea*), and catclaw acacia (*Senegalia greggii*) are present. The vegetation community matches descriptions of Paloverde–Cacti–Mixed Scrub Series in the Arizona Upland Subdivision of Sonoran Desertscrub (Brown 1994).
- **Mojave Mid-Elevation Mixed Desert Scrub.** This diverse shrubland community is characterized by numeorus shrubs and trees such as crucifixion thorn (*Canotia holocantha*), Parry's beargrass (*Nolina parryi*), Joshu tree (*Yucca bervifolia*), turpentinebroom (*Thamnosma montana*), Agave (*Agave deserti*), and bladder-sage (*Salazaria mexicana*). Within the canyon bottoms and washes this vegetation also has species such as common burrobrush, desert baccharis (*Baccharis sergiloides*), Mojave rabbitbrush (*Ericameria paniculata*), and Coues' cassia. This community is most common on the northern slope of Crossman Peak from an elevation of approximately 2,700 feet elevation to the peak.
- **Great Basin Pinyon-Juniper Woodland.** This vegetation community is characterized by singleleaf pinyon (*Pinus monophylla*), which grows as a small tree reaching up to 30 feet tall. It grows on the north-facing slopes of Crossman Peak starting at an elevation of approximately 3,900 feet. Additional species such as Sonoran scrub oak (*Quercus turbinella*), dollarjoint pricklypear, an unknown scrub oak (*Quercus* sp.) that may be *Q. john-tuckeri*, and Heermann's buckwheat (*Eriogonum heermanii*) are present. This vegetation is extremely limited in the Survey Area and within the Mohave Mountains.
- **Developed and Disturbed.** Developed and disturbed lands are those portions of the Survey Area with human-dominated land uses, including the existing communications facility, a small development, and the unpaved access roads. Vegetation (if present) is dominated by native and non-native ruderal (weedy) species.

3.5 Soils

Aspen used soil data from the Natural Resources Conservation Service (NRCS) historic mapping projects to determine if and where hydric soils could be present in the Survey Area (NRCS, 2016a, 2016b). Figure 3 (see Attachment A) illustrates the location of these mapped soil types in relation to the Survey Area. Table 3-1 describes the soils within the Survey Area. The majority of the mapped soil types are excessively drained, well-drained, or somewhat excessively drained and are not prone to flooding; the only exception is Map Unit Symbol 19 (Carrizo family very gravelly loamy sand, 1 to 3 percent slopes) which is described as being prone to frequent flooding. In general, the descriptions of soil types within the Survey Area

indicate that hydric soil conditions are not expected. It is possible that the mapped soils below may include small pockets of other soil types that were not captured within the NRCS mapping scale but that were assessed as part of the field work.

Table 3-1. Soil Types Within the Survey Area

Map Unit Symbol	Map Unit Name	Description	Acres in Survey Area
16	Cacique family extremely gravelly loam, 1 to 7 percent slopes	Generally found from 1,800 to 2,400 feet in elevation; parent material consists of alluvium derived from igneous rock and/or alluvium derived from metamorphic rock; depth to water table is generally more than 80 inches; not prone to flooding; well-drained soil; gravelly loam (0 – 1 inches), gravelly sandy clay loam (1 – 8 inches), gravelly clay loam (8 – 35 inches), indurated (35 – 60 inches).	27.21
19	Carrizo family very gravelly loamy sand, 1 to 3 percent slopes	Generally found from 500 to 1,800 feet in elevation; parent material consists of alluvium derived from mixed; depth to water table is generally more than 80 inches; excessively drained soil; prone to frequent flooding; very gravelly loamy sand (0 – 1 inches), loamy sand (1 – 9 inches), very gravelly coarse sand (9 – 60 inches).	5.66
25	Cellar-Rock outcrop complex, 20 to 60 percent slopes	Generally found from 1,800 to 3,700 feet in elevation; parent material consists of alluvium derived from igneous rock and/or alluvium derived from metamorphic rock and/or colluvium derived from metamorphic rock and/or colluvium derived from igneous rock; depth to water table is generally more than 80 inches; somewhat excessively drained soil; not prone to flooding; very gravelly sandy loam (0 – 10 inches), weathered bedrock (10 – 13 inches), unweathered bedrock (13 – 23 inches).	1.00
26	Cellar-Rock outcrop complex, dry, 20 to 60 percent slopes	Generally found from 1,800 to 3,700 feet in elevation; parent material consists of alluvium derived from igneous rock and/or alluvium derived from metamorphic rock and/or colluvium derived from metamorphic rock and/or colluvium derived from igneous rock; depth to water table is generally more than 80 inches; somewhat excessively drained soil; not prone to flooding; very gravelly sandy loam (0 – 10 inches), weathered bedrock (10 – 13 inches), unweathered bedrock (13 – 23 inches).	77.91
30	Chuckawalla-Riverbend families complex, 2 to 15 percent slopes	Generally found from 550 to 2,200 feet in elevation; parent material consists of alluvium derived from mixed; depth to water table is generally more than 80 inches; well-drained soil; not prone to flooding; very gravelly sandy loam (0 – 11 inches), very gravelly loamy sand (11 – 60 inches).	41.36
56	Gunsight very gravelly loam, 2 to 15 percent slopes	Somewhat excessively drained soil generally found from 460 to 2,600 feet in elevation; parent material consists of alluvium derived from mixed; depth to water table is generally more than 80 inches; not prone to flooding; very gravelly loam (0 – 3 inches), very gravelly sandy loam (3 – 6 inches), extremely gravelly sandy loam (6 – 28 inches), extremely gravelly coarse sandy loam (28 – 50 inches), extremely gravelly loamy sand (50 – 60 inches).	54.61

Table 3-1. Soil Types Within the Survey Area

Map Unit Symbol	Map Unit Name	Description	Acres in Survey Area
90	Quilotosa-Rock outcrop complex, 20 to 60 percent slopes	Somewhat excessively drained soil generally found from 500 to 3,000 feet in elevation; parent material consists of alluvium and colluvium derived from igneous and metamorphic rock; depth to water table is generally more than 80 inches; not prone to flooding; extremely gravelly sandy loam (0 – 3 inches), very gravelly sandy loam (3 – 9 inches), weathered bedrock (9 – 15 inches), unweathered bedrock (15 – 25)	4.62

4.0 Waters/Wetlands Delineation

4.1 Non-wetland "Waters of the U.S." Delineation Methods

Aspen reviewed recent aerial photographs, detailed topographic maps, NRCS Soil Surveys, and the local and state hydric soil list to evaluate the potential jurisdictional features prior to conducting the field assessment (NRCS 2016a and 2016b). During the field assessment, Aspen evaluated biological resources and potentially jurisdictional features concurrently. Boundaries of non-wetland "waters of the U.S." were identified. Potentially jurisdictional waters were mapped on aerial photographs or with a Trimble Juno SB GPS unit. Field maps were digitized using Global Information System (GIS) technology and the total area of jurisdictional features was calculated.

Based on guidance in the USACE Field Guide to the Identification of the Ordinary High Water Mark in the Arid West Region (2008b), Aspen delineated jurisdictional non-wetland "waters of the U.S." based on the limits of the ordinary high water marks (OHWM) as determined by aerial imagery, evidence of flow, changes in physical and biological features such as bank erosion, deposited vegetation or debris, and vegetation and soil characteristics. Criteria used to identify OHWMs and, if present, determine the limit of jurisdictional "waters of the U.S.," are presented in Attachment E (Federal Waters/Wetlands Delineation Methods). Refer to Attachment B for representative photos of mapped features within the Survey Area.

4.2 Federal Wetlands Delineation Methods

Aspen evaluated potentially jurisdictional features to determine their federal wetlands status using a routine determination according to the methods outlined in the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) based on three wetland parameters: dominant hydrophytic vegetation, wetland hydrology, and hydric soils. Data on vegetation, hydrology, and soils were collected using the methods described in Attachment E and, when necessary, recorded on Wetland Determination Data Forms.

4.3 Results

Aspen delineated the limits of USACE and ADEQ jurisdictions within the Survey Area (refer to Figure 4, Attachment A). According to the NRCS Hydric Soils List (NRCS 2016a and 2016b), no hydric soils occur within the Survey Area. One type of jurisdictional feature was documented within the Survey Area: non-wetland "waters of the U.S." (refer to Tables D-1 and D-2 in Attachment D, and Figure 4 in Attachment A).

Table 4-1 summarizes the total acreage of jurisdictional "waters of the U.S." within the Survey Area and proposed Project impact areas.

Table 4-1. Summary of Acreage of Jurisdictional Non-Wetland "Waters of the U.S."

	Non-wetland "waters of the U.S."			
	UES Distribution Line		WAPA Communications Site and Access Road	
Acres Within Survey Area*	29.263		11.810	
	Temporary Impacts*		Permanent Impacts*	
	UES Distribution Line	WAPA Communications Site and Access Road	UES Distribution Line	WAPA Communications Site and Access Road
Spur Routes	0.485	0	0.189	0
Pull Sites	0.183	0	0	0
Pole Sites	0.031	0	0.004	0
Existing Road Improvements	0.002	11.196	1.633	0
Totals	0.701	11.196	1.826	0

* Refer to Figure 4 (Attachment A) for the location of drainages in relation to impact areas and Tables D-1 and D-2 (Attachment D) for detailed information on each of the drainages.

4.3.1 Federal Wetlands

Vegetation

A dominance of wetland plant species or hydrophytes was not found within any portion of the Survey Area; therefore, the criterion defined by the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) for wetland vegetation was not met.

Soils

Indicators of hydric soils were not observed within the Survey Area. Therefore the criterion defined by the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) for hydric soils were not met for the Survey Area. Evidence of ponding or soil saturation was not observed within any portion of the Survey Area. The lack of evidence of ponding or soils saturation correlates with the dominance of "well-drained, excessively drained, and somewhat excessively drained" nature of the soils mapped in the Survey Area (NRCS 2016a).

Hydrology

Wetland hydrology indicators were not observed in the Survey Area and therefore did not meet the criterion defined by the USACE Wetland Delineation Manual (1987) and the Arid West Supplement (2008) for wetland hydrology.

Summary

Based on assessment of hydrology, vegetation, and soils during Aspen's field surveys and in Aspen's professional opinion, no portion of the Survey Area satisfies the criteria as wetlands pursuant to the USACE 1987 Manual and 2008 Regional Supplement to the USACE Wetland Delineation Manual: Arid West Region, with subsequent clarification memoranda and dependent on confirmation by the USACE. Refer to Tables D-1 and D-2 (Attachment D) and Figure 4 (Attachment A) for detailed information on the size and location of the potentially jurisdictional features.

4.3.2 Non-Wetland "Waters of the U.S."

Based on assessment of hydrology and the limits of the OHWM as determined by aerial imagery, evidence of flow, changes in physical and biological features such as bank erosion, deposited vegetation or debris, and characteristics of vegetation and soils documented during Aspen's field surveys and in Aspen's professional opinion, approximately 41.046 acres of the Survey Area meet the definition of "waters of the U.S." as defined in 33 CFR Part 328. Refer to Tables D-1 and D-2 (Attachment D) and Figure 4 (Attachment A) for detailed information on the size and location of the potentially jurisdictional features. Within the 41.073 acres, approximately 13.723 acres (1.826 acres of permanent impact and 11.897 acres of temporary impact) would be impacted by the Project.

Connectivity Analysis

Within the Survey Area all mapped drainages south and southwest of Crossman Peak are part of the Falls Springs Wash watershed; this watershed drains to Lake Havasu, a known "waters of the U.S." Drainages mapped north of Crossman Peak drain northward into the Sacramento Wash that ultimately confluences with the Colorado River, a known "waters of the U.S."

5.0 Summary and Conclusions

The Survey Area contains USACE jurisdictional non-wetlands waters. No portions of the Survey Area were found to support hydrophytic vegetation, show evidence of wetland hydrology, and contain hydric soils (therefore no jurisdictional wetlands are present within the Survey Area). Areas not meeting the hydrophytic vegetation, wetland hydrology, and/or hydric soils criteria for wetlands, but where evidence of hydrology and/or a discernible OHWM was visible, were mapped as jurisdictional non-wetland "waters of the U.S." (41.073 acres). The Project would impact 13.723 acres (1.826 acres of permanent impact and 11.897 acres of temporary impact) of the non-wetland "waters of the U.S." within the Project area.

Within the Project area, impacts to 31 of the 32 mapped drainages are less than 0.50 acres of permanent impact or result in only temporary impacts (which to not count towards the impact threshold) and therefore meet the conditions of a NWP No. 12. Impacts to these drainages would not require the submittal of a Pre-construction Notification (PCN) to the USACE because permanent impacts (if any) would be less than 0.10 acres at each drainage (refer to Tables D-1 and D-2 in Attachment D). Improvements and crossings constructed within drainage No. 59 would result in 0.555 acres of temporary impact and 1.826 acres of permanent impact. Permanent impacts to drainage No. 59 would exceed the threshold for use of NWP No. 12 (0.50 acres) and would therefore require an individual permit (IP) and a PCN (refer to Tables D-1 and D-2 in Attachment D for details on individual drainage impacts). Upon completion of construction, all locations where a temporary road crosses a jurisdictional drainage would be returned to pre-construction elevations and contours. The USACE defines impacts to temporarily impacted waters as follows:

> *Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States.*

Project activities would not occur within Outstanding Arizona Waters (OAW) nor would they be within one mile upstream of and/or one-half mile downstream of CWA 303(d) impaired waters (based on the 2010 and draft 2012/2014 impaired waters list). Therefore, those drainages that are compliant with the conditions of NWP No. 12 would be pre-certified under Section 401 by the ADEQ. Those drainages requiring an individual permit would require individual certification under Section 401 from the ADEQ. Prior to submitting permit applications for the Project, the current ADEQ list of OAWs and CWA 303(d) impaired waters should be reviewed for updates for changes that would affect the use of conditional certification for Project activities under Section 401.

Based on the information presented above, UES will be required to obtain an IP from the USACE and a Section 401 Water Quality Certification from the ADEQ for impacts to Drainage No. 59. Impacts to all other drainages within UES construction areas are temporary in nature (see definition above) and do not require authorization from the USACE. Impacts related to access road maintenance on the south side of Crossman Peak are temporary in nature and all drainages would be returned to pre-construction elevations and contours; therefore WAPA will not be required to obtain authorization from either the USACE or ADEQ.

The conclusions presented above represent Aspen's professional opinion based on its knowledge and experience with the USACE and ADEQ, including their regulatory guidance documents and manuals. However, the USACE and ADEQ have final authority in determining the status and presence of jurisdictional wetlands/waters and the extent of their boundaries.

6.0 References

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_____. Crossman Peak 7.5-minute Topographic Quadrangle.

_____. Buck Mountains 7.5-minute Topographic Quadrangle.

_____. Franconia 7.5-minute Topographic Quadrangle.

Attachment A – Figures

Survey Area

Scale 1:75,000

0 0.5 1 2

Miles

This cartographic product and GIS data were prepared in accordance with professional practice standards. The data represented on this map has been developed from the best available sources. Although efforts have been made to ensure that the data is accurate and reliable, errors may be reflected in the data. Users must be aware of these conditions and bear responsibility for the appropriate use of this map. The data on this map is for reference use only.

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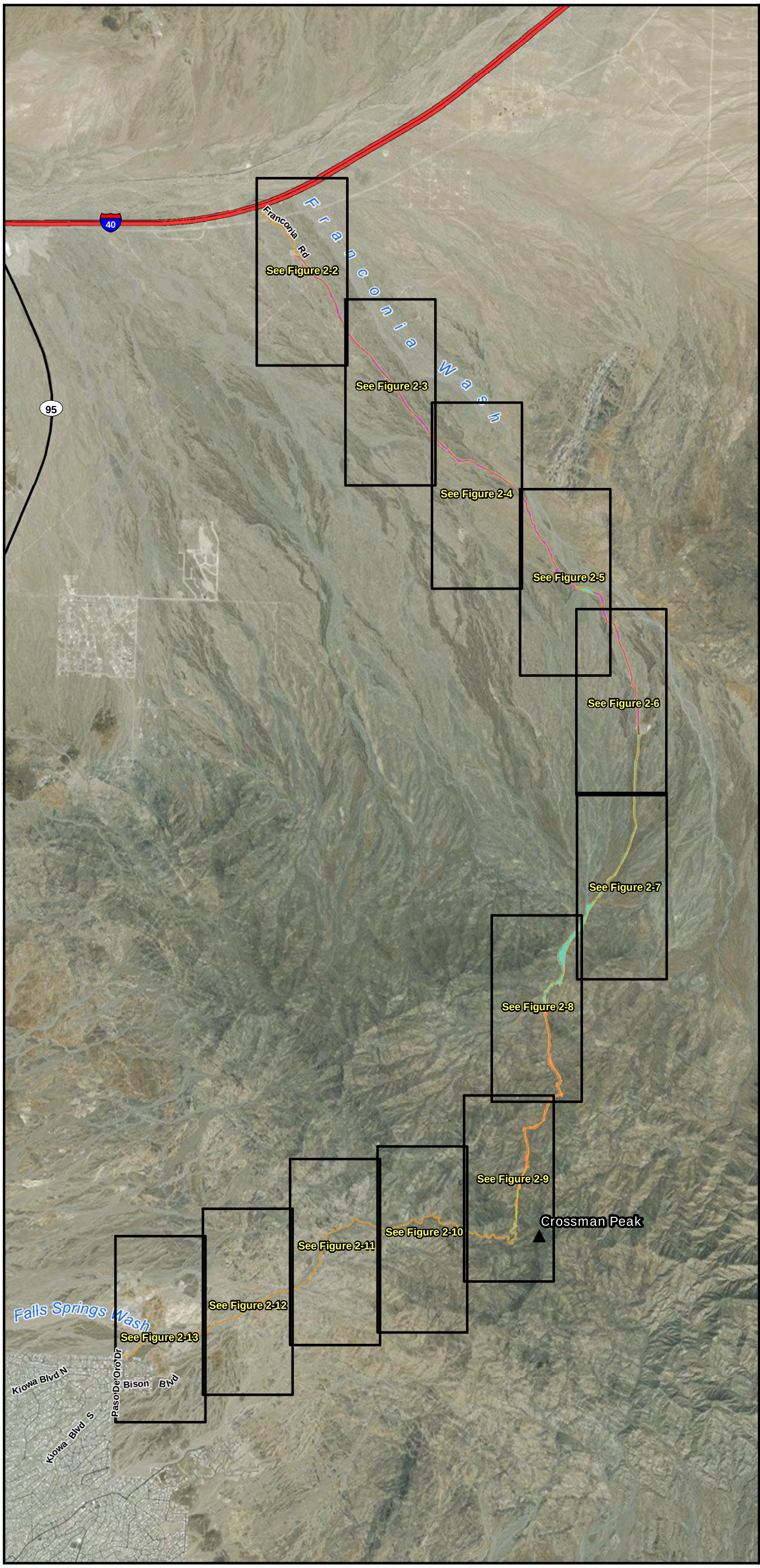
Jurisdictional Delineation - Project Vicinity

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 1	DRAFT



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Jurisdictional Delineation - Vegetation

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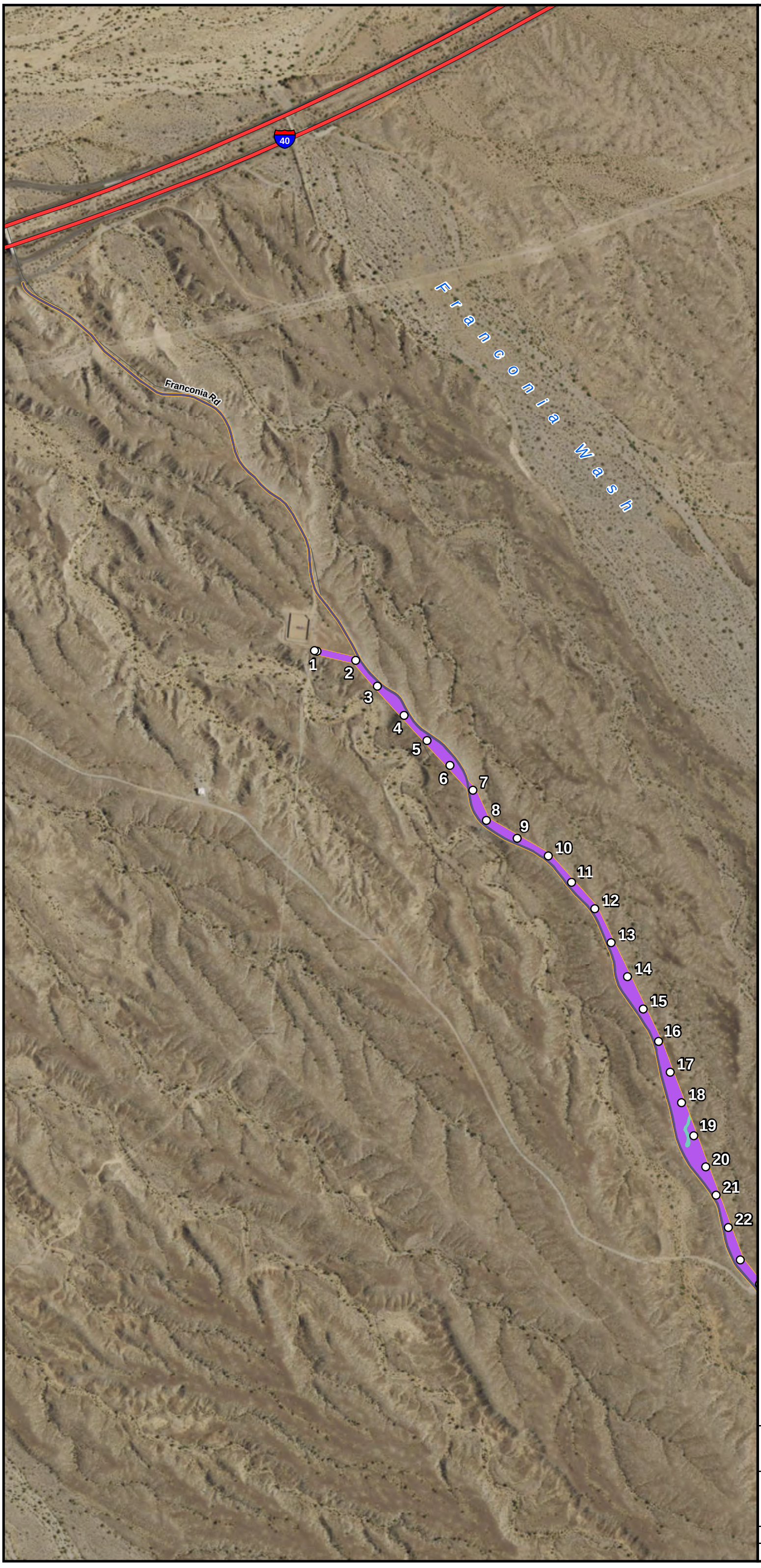
GIS	DECEMBER 2016	Figure 2-1	



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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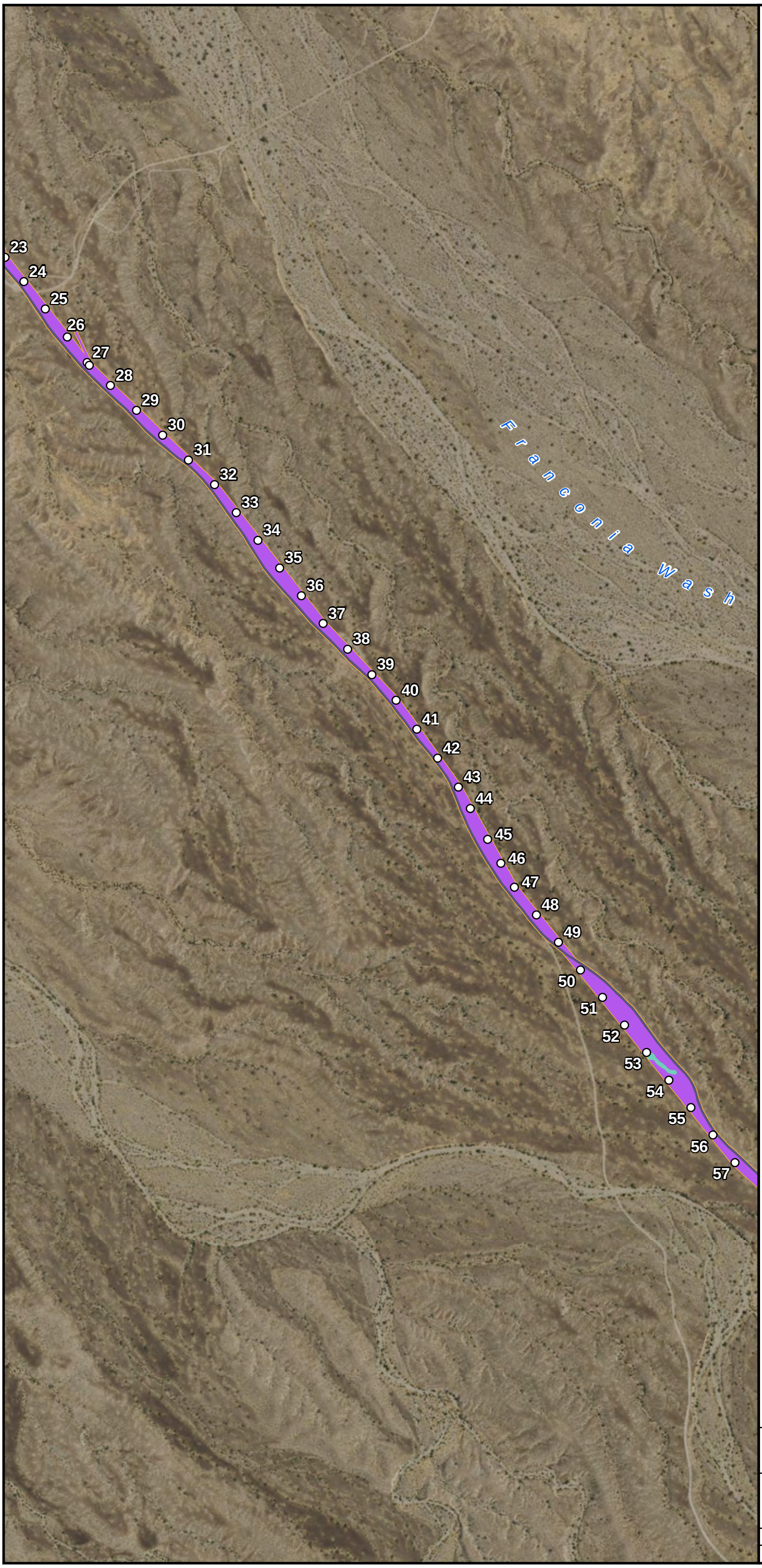
GIS	JANUARY 2017	Figure 2-2	



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

- Disturbed or developed
- Sonoran paloverde-mixed cacti desert scrub
- Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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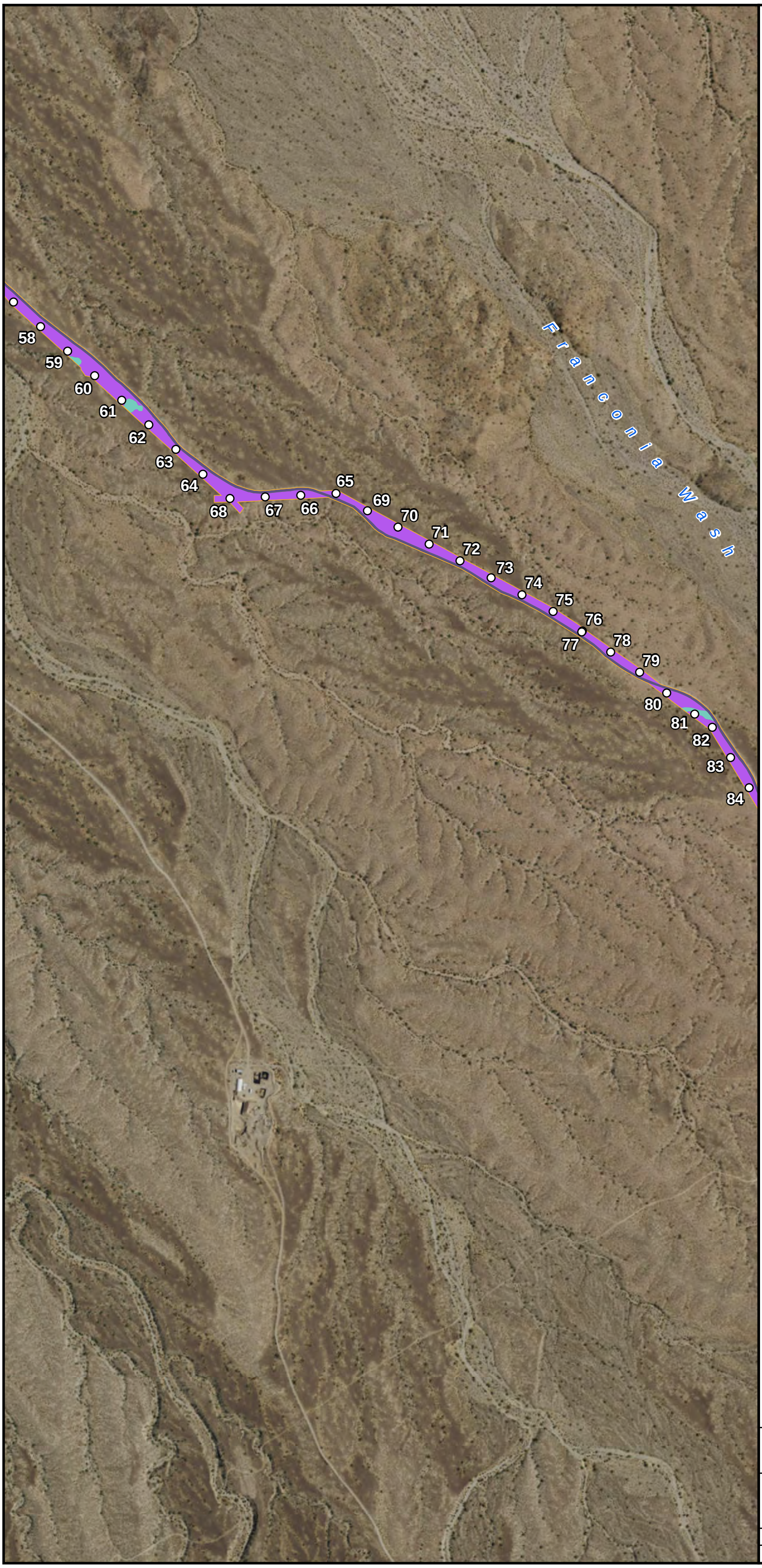
GIS | JANUARY 2017 | Figure 2-3



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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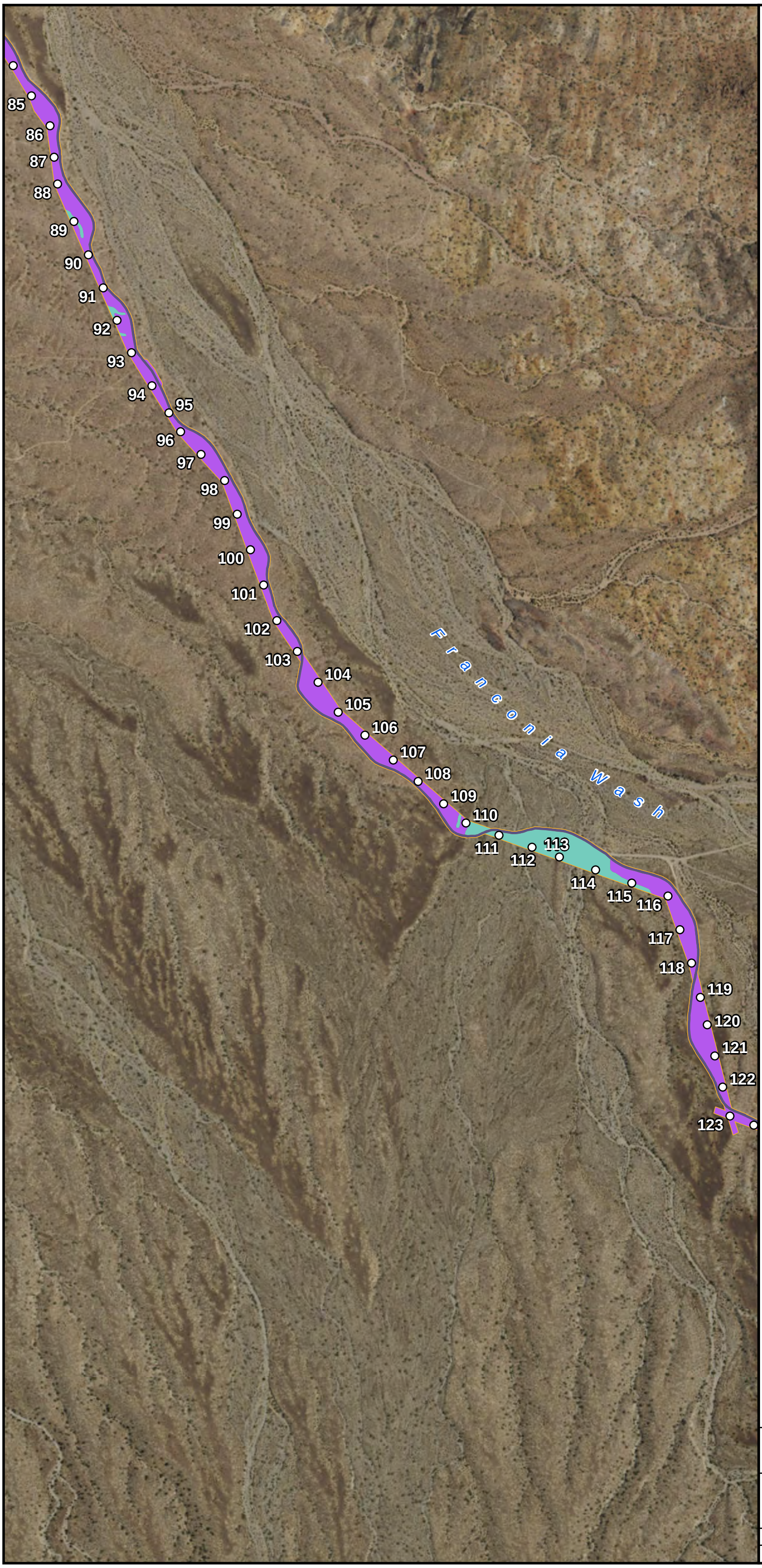
GIS	JANUARY 2017	Figure 2-4	



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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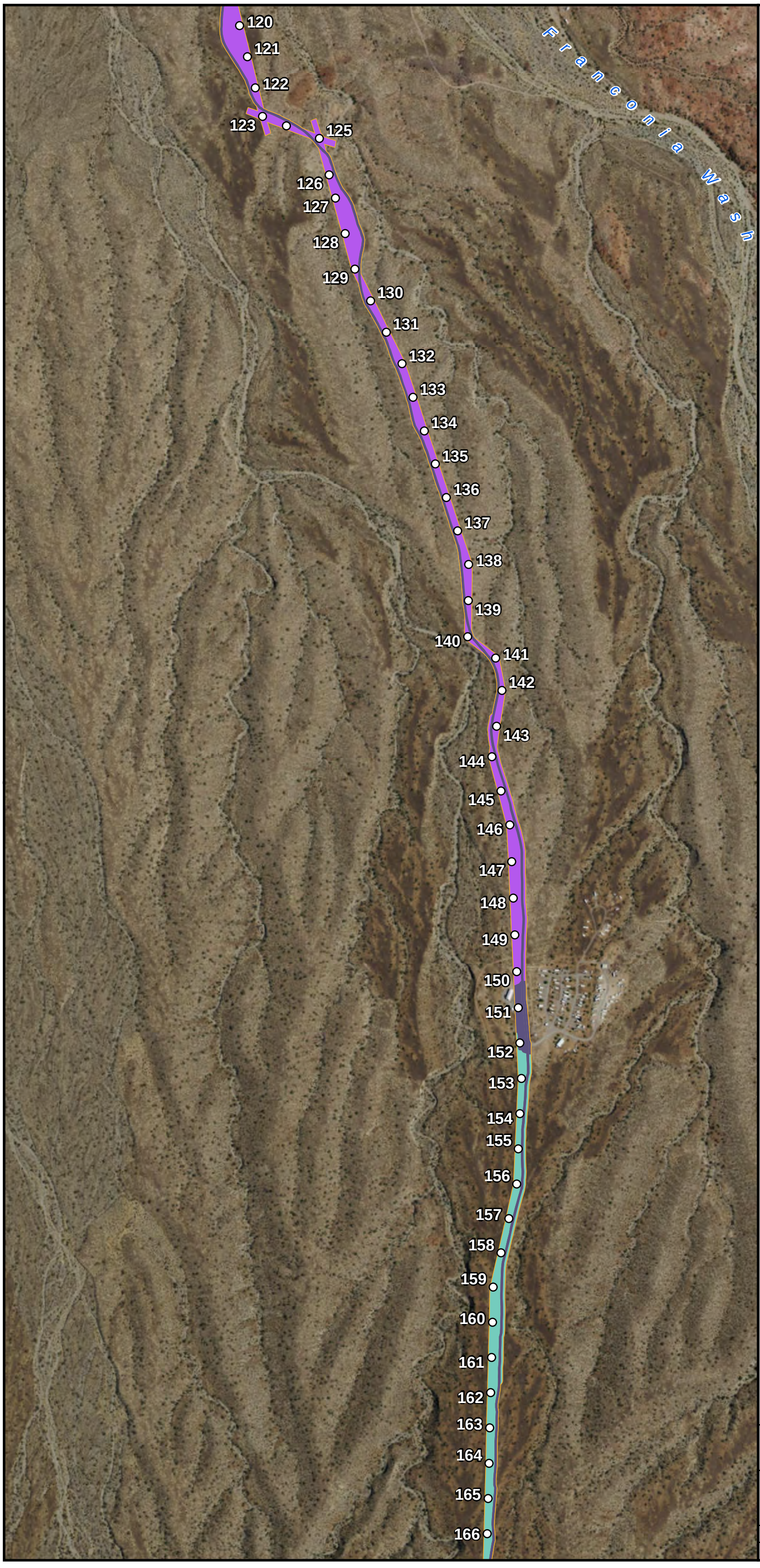
JANUARY 2017 | Figure 2-5



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

- Disturbed or developed
- Sonoran paloverde-mixed cacti desert scrub
- Sonoran-Mojave creosotebush-white bursage desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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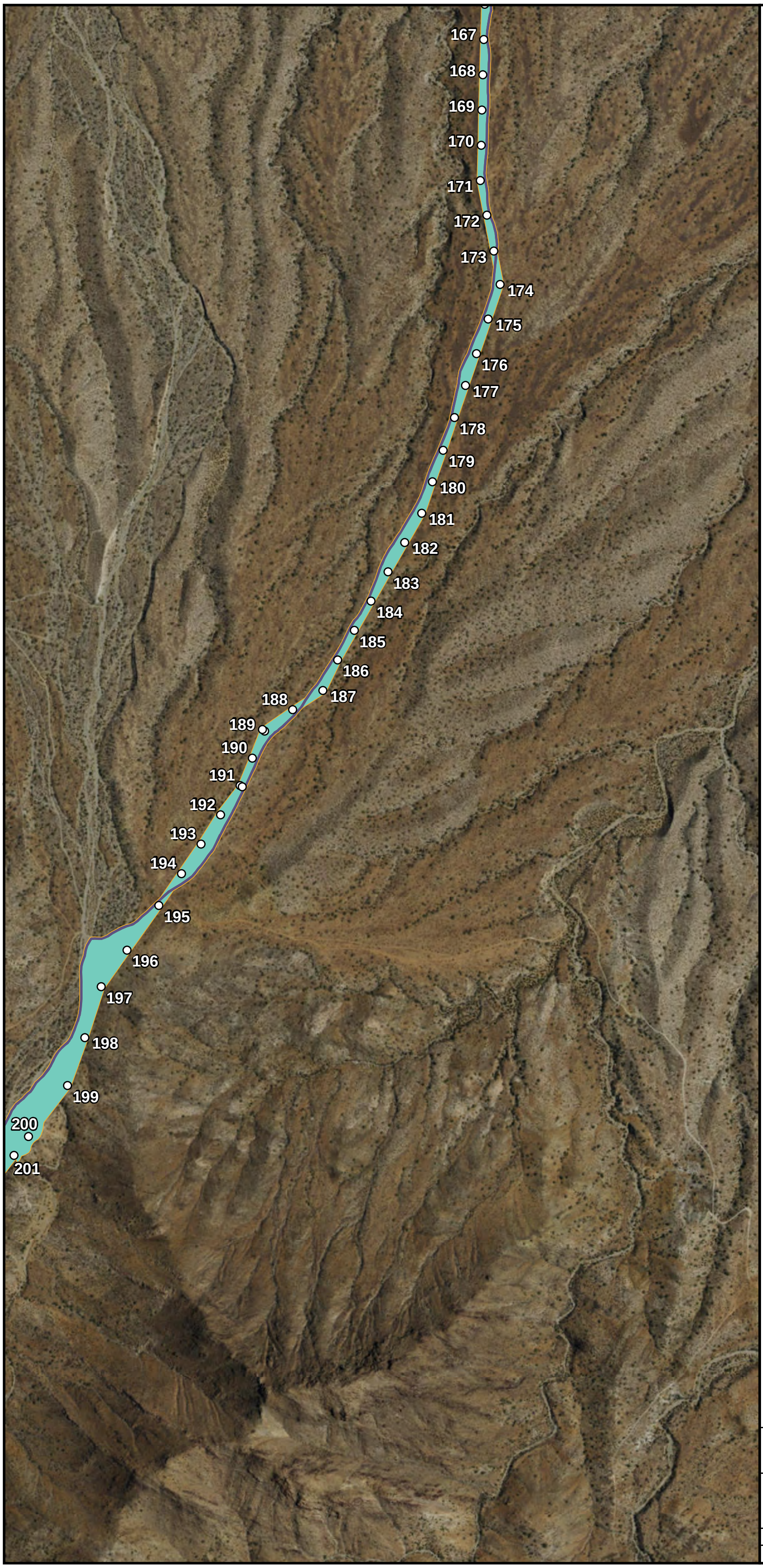
JANUARY 2017 | Figure 2-6



Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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GIS | JANUARY 2017 | Figure 2-7

Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

Disturbed or developed

Mojave mid-elevation mixed desert scrub

Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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JANUARY 2017 | Figure 2-8

Proposed Distribution Line Poles

Survey Area

Vegetation and Cover Type

- Disturbed or developed
- Great Basin pinyon-juniper woodland
- Mojave mid-elevation mixed desert scrub
- Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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GIS	JANUARY 2017	Figure 2-9	

Survey Area

Vegetation and Cover Type

Disturbed or developed

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

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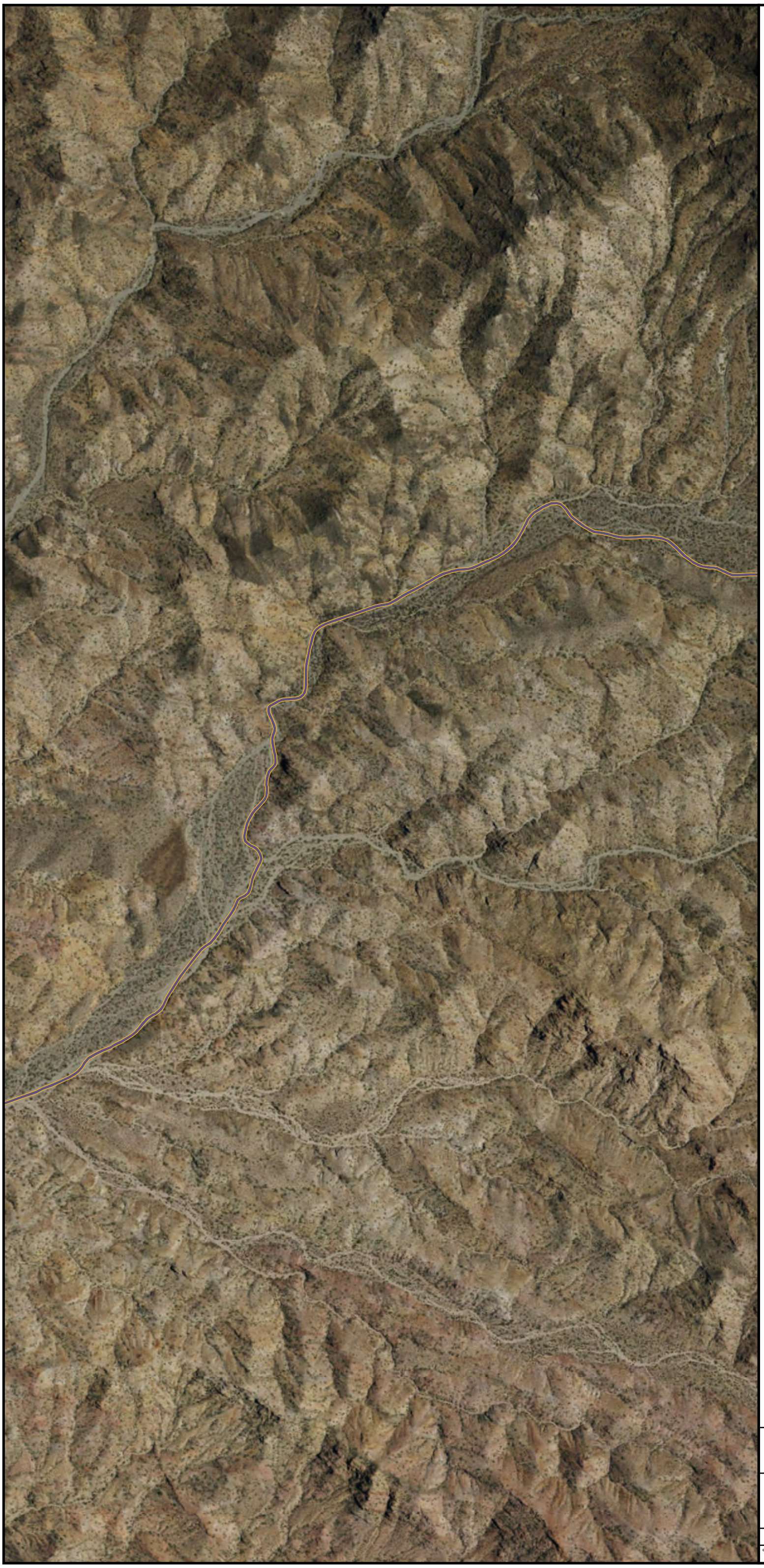
GIS | JANUARY 2017 | Figure 2-10



Survey Area

Vegetation and Cover Type

Disturbed or developed

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 2-11	

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-
mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Vegetation

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 2-12	

Survey Area

Vegetation and Cover Type

Disturbed or developed

Sonoran paloverde-mixed cacti desert scrub

Scale 1:9,000

0 250 500 1,000

Feet

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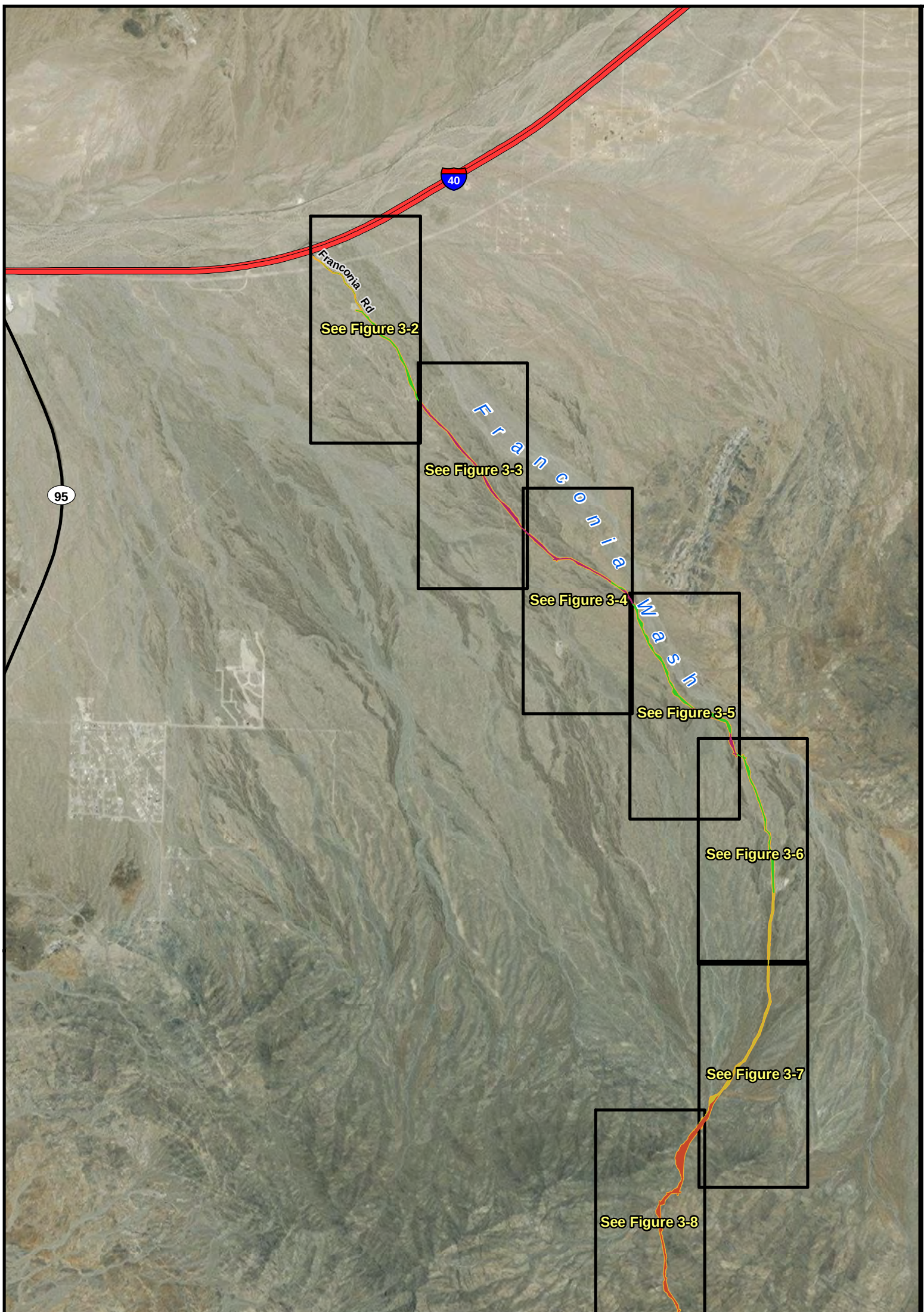
Jurisdictional Delineation - Vegetation

Designed: Aspen EG Approved:

GIS | JANUARY 2017 | Figure 2-13



Survey Area

Soil Type

Refer to Section 3.5 for complete soil description

- 16 - Cacique family extremely gravelly loam
- 19 - Carrizo family very gravely loamy sand
- 25 - Cellar-Rock outcrop complex
- 26 - Cellar-Rock outcrop complex
- 30 - Chuckawalla-Riverbend families complex
- 56 - Gunsight very gravelly loam
- 90 - Quilotosa-Rock outcrop complex

Scale 1:75,000

0 0.5 1 2

Miles

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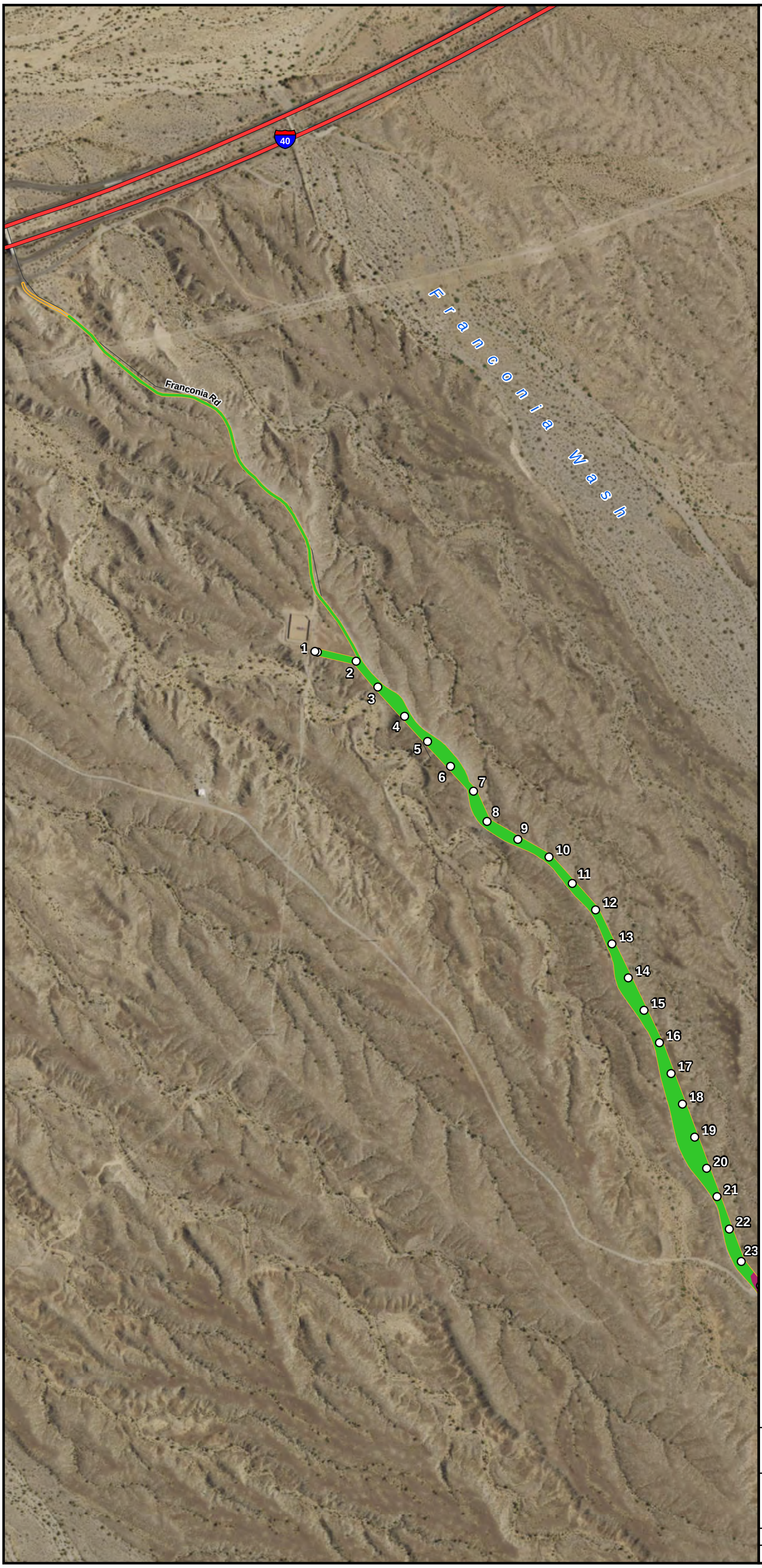
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	DECEMBER 2016	Figure 3-1	



Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

30 - Chuckawalla-Riverbend families complex

56 - Gunsight very gravelly loam

Scale 1:9,000

0 250 500 1,000

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 2

Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

30 - Chuckawalla-Riverbend families complex

56 - Gunsight very gravelly loam

Scale 1:9,000

0 250 500 1,000

Feet

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WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 3	

Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

30 - Chuckawalla-Riverbend families complex

56 - Gunsight very gravelly loam

Scale 1:9,000

0 250 500 1,000

Feet

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PHOENIX, ARIZONA

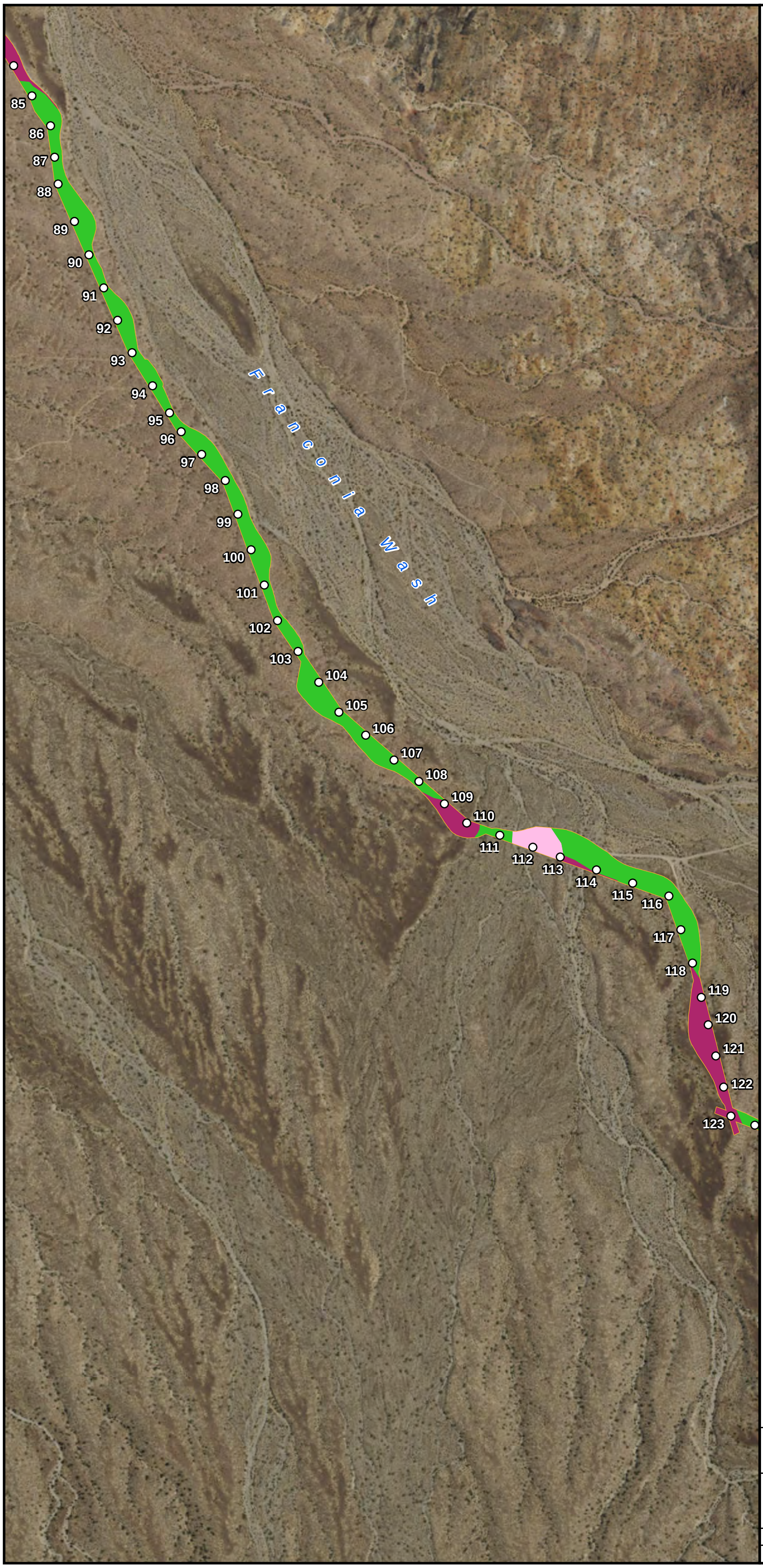
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS | JANUARY 2017 | Figure 3- 4



Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

- 19 - Carrizo family very gravely loamy sand
- 30 - Chuckawalla-Riverbend families complex
- 56 - Gunsight very gravelly loam

Scale 1:9,000

0 250 500 1,000

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

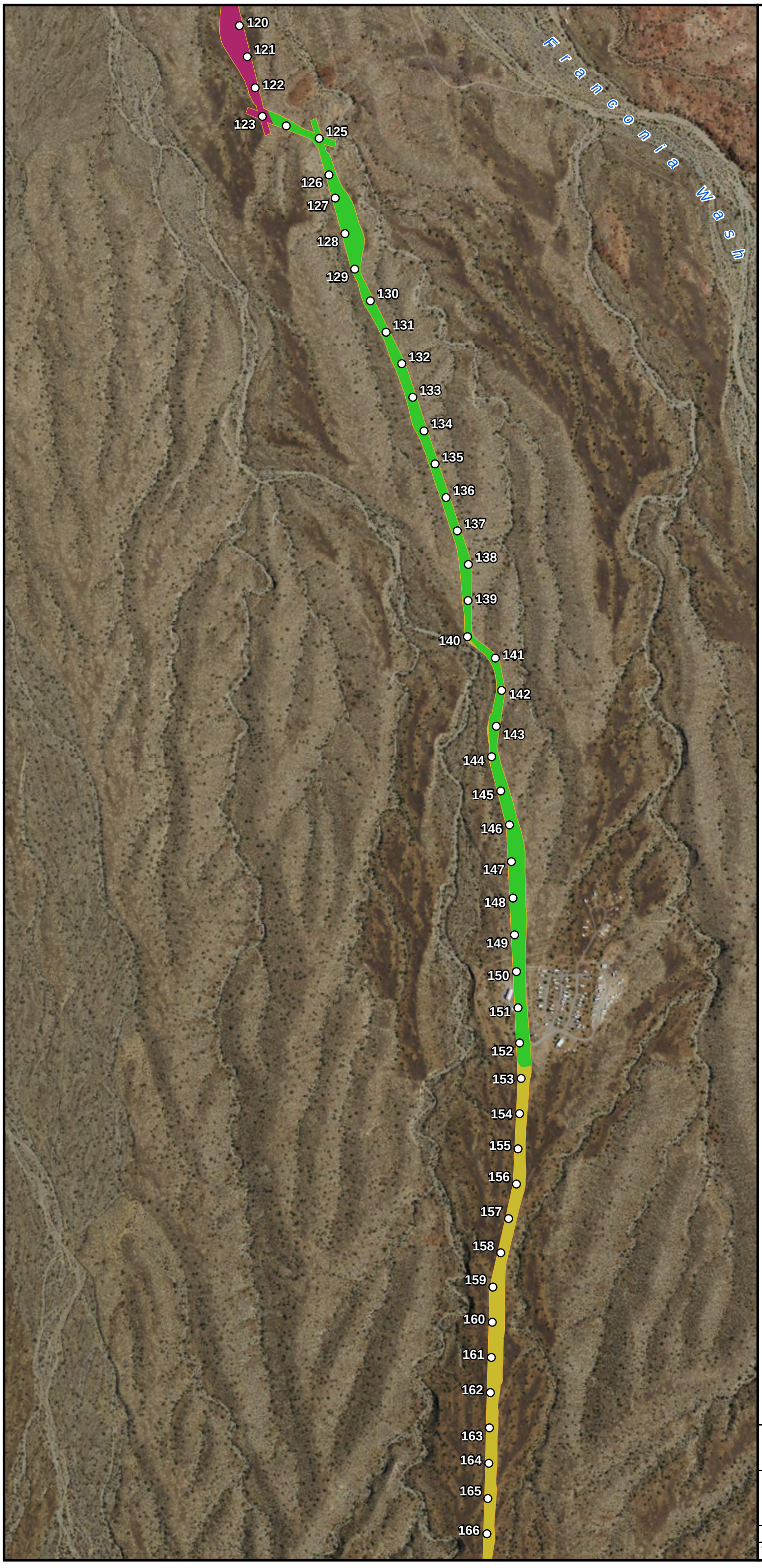
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 5	



Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

- 16 - Cacique family extremely gravelly loam
- 30 - Chuckawalla-Riverbend families complex
- 56 - Gunsight very gravelly loam

Scale 1:9,000

0 250 500 1,000

Feet

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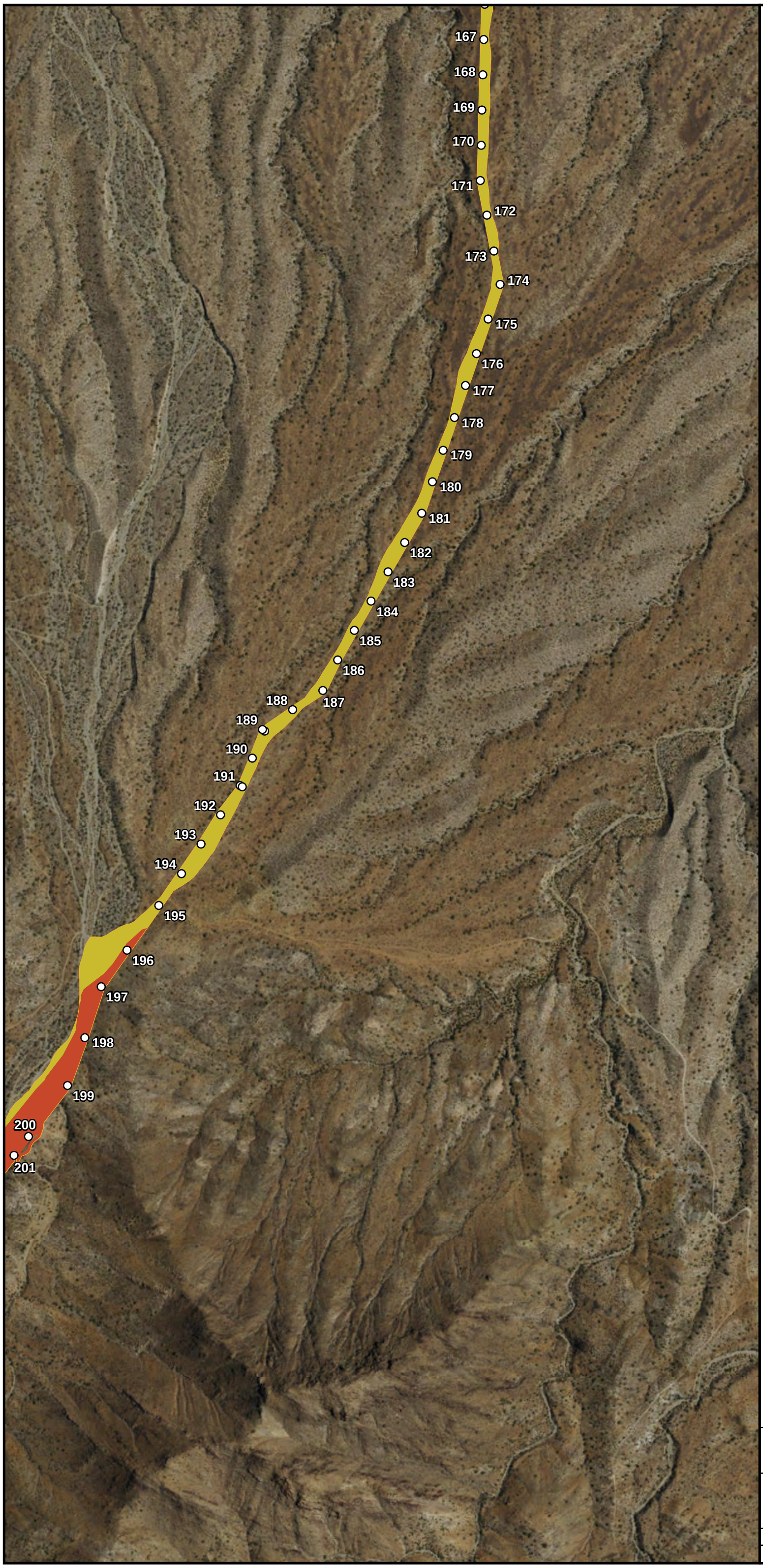
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 6	



Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

16 - Cacique family extremely gravelly loam

26 - Cellar-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS | JANUARY 2017 | Figure 3- 7

Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

16 - Cacique family extremely gravelly loam

26 - Cellar-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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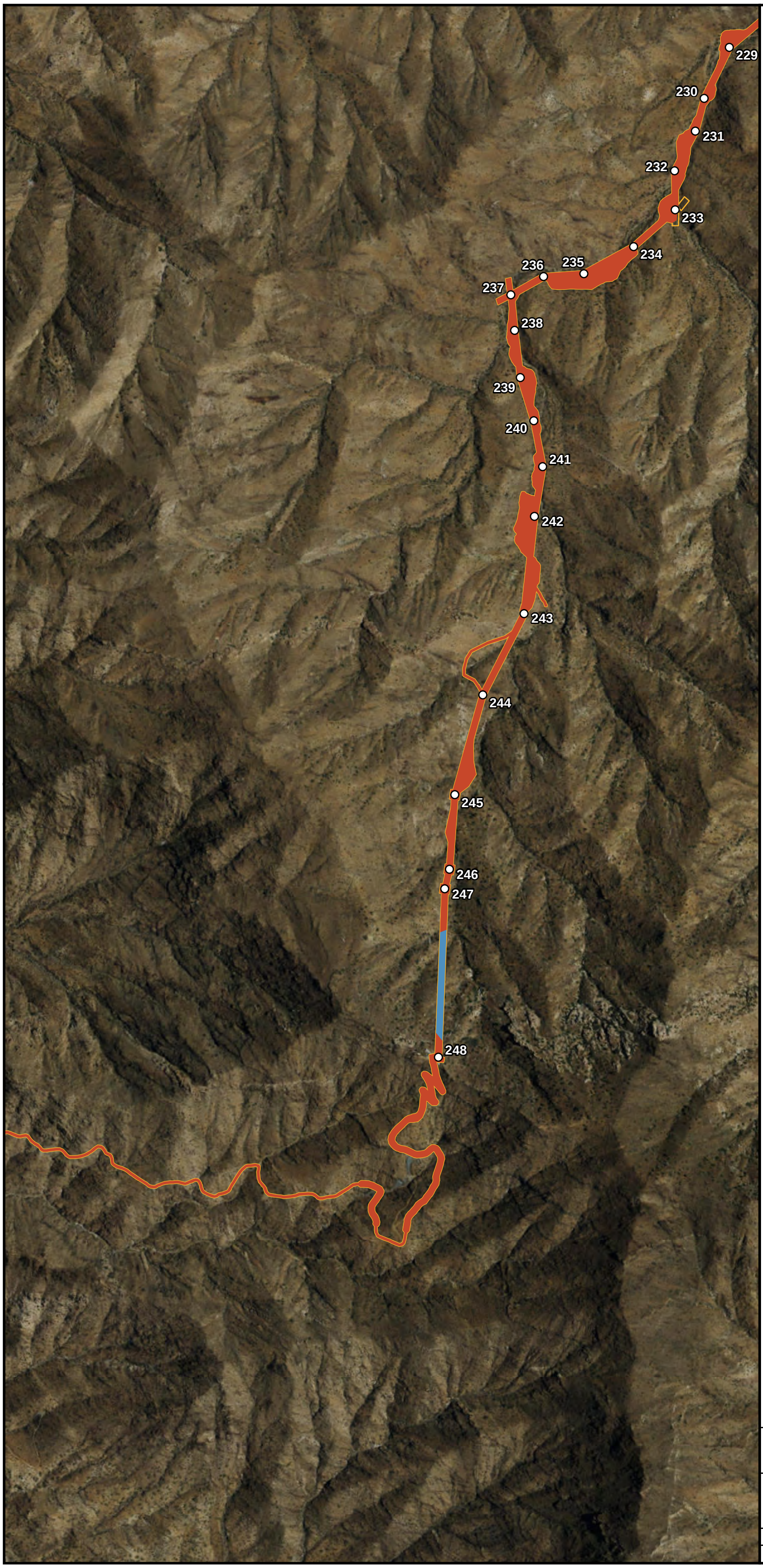
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 8	



Survey Area

Proposed Distribution Line Poles

Soil Type

Refer to Section 3.5 for complete soil description

25 - Cellar-Rock outcrop complex

26 - Cellar-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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CROSSMAN PEAK COMMUNICATIONS FACILITY

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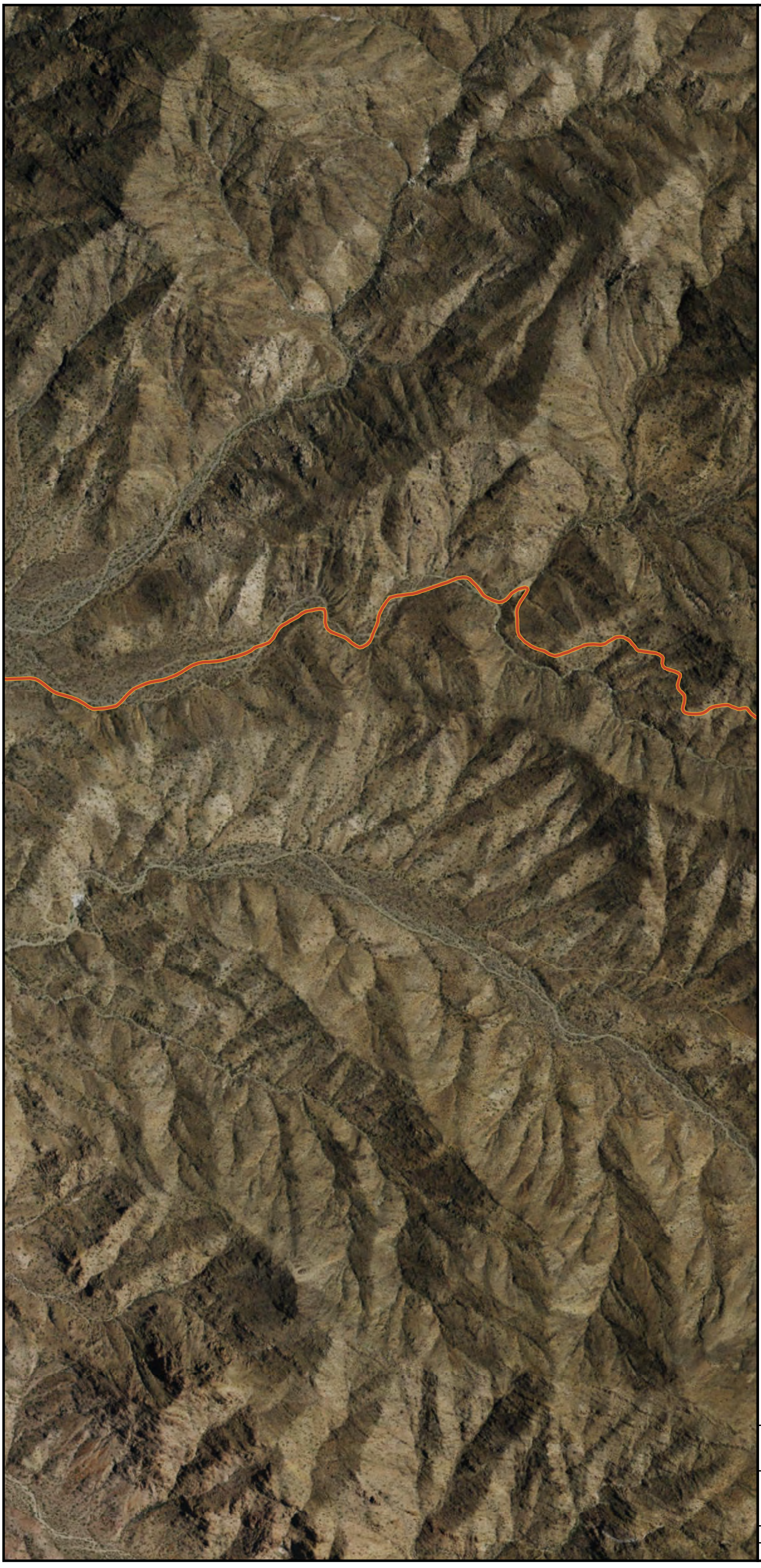
Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3- 9	



Survey Area

Soil Type

Refer to Section 3.5 for complete soil description

26 - Cellar-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3-10	

Survey Area

Soil Type

Refer to Section 3.5 for complete soil description

- 26 - Cellar-Rock outcrop complex
- 90 - Quilotosa-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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PHOENIX, ARIZONA

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ARIZONA

Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3-11	

Survey Area

Soil Type

Refer to Section 3.5 for complete soil description

- 19 - Carrizo family very gravely loamy sand
- 56 - Gunsight very gravelly loam
- 90 - Quilotosa-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3-12	

Survey Area

Soil Type

Refer to Section 3.5 for complete soil description

- 19 - Carrizo family very gravely loamy sand
- 30 - Chuckawalla-Riverbend families complex
- 90 - Quilotosa-Rock outcrop complex

Scale 1:9,000

0 250 500 1,000

Feet

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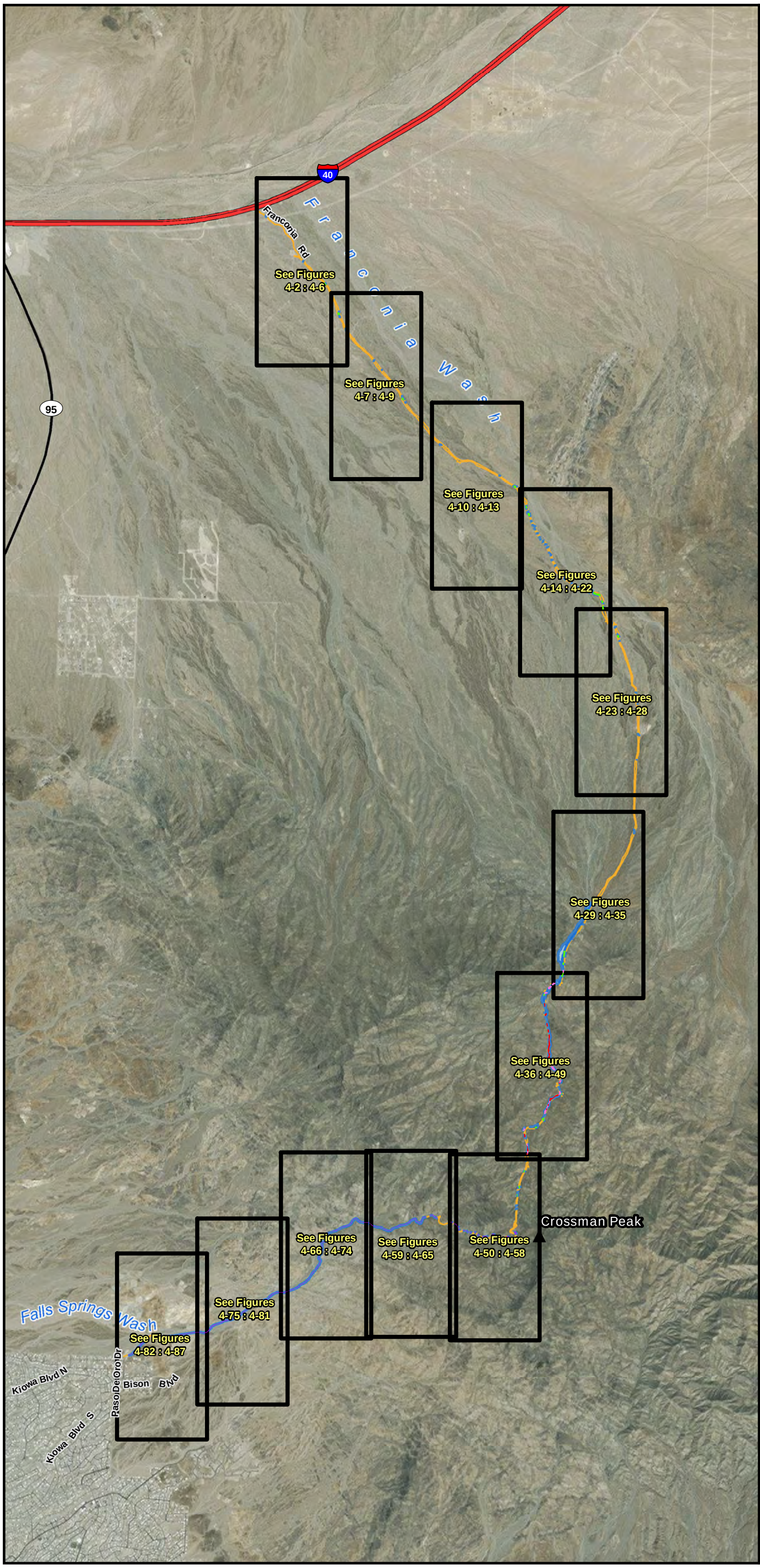
Jurisdictional Delineation - Soils

Designed: Aspen EG Approved:

GIS	JANUARY 2017	Figure 3-13	



Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

UES: Temporary Impact, NWP No. 12 - PCN required

UES: Temporary Impact, NWP No. 12 - no PCN required

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:75,000

0 0.5 1 2

Miles

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WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

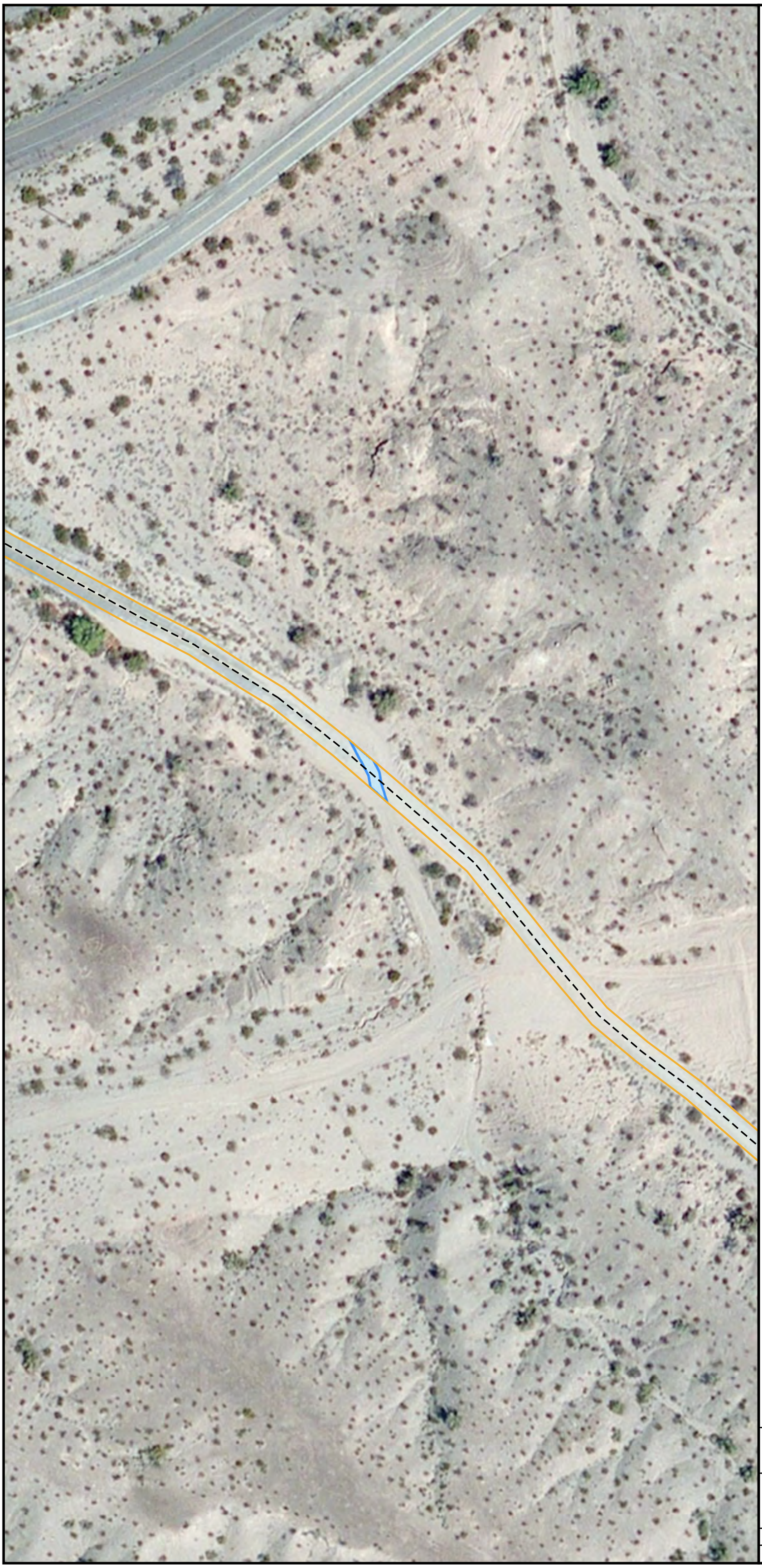
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-1



Existing Access

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4- 2

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access Road

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4- 3	

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4- 4

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

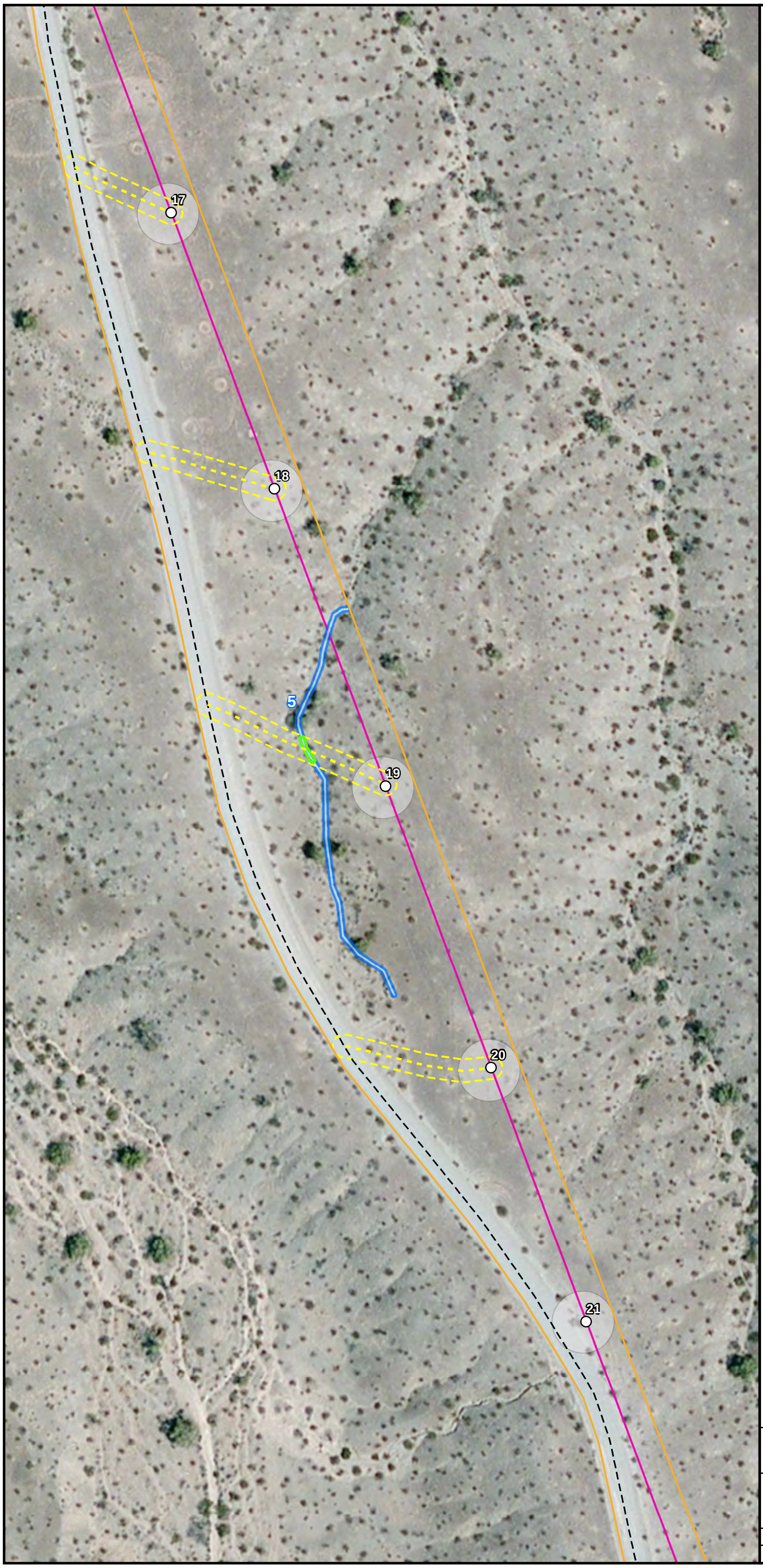
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4- 5



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

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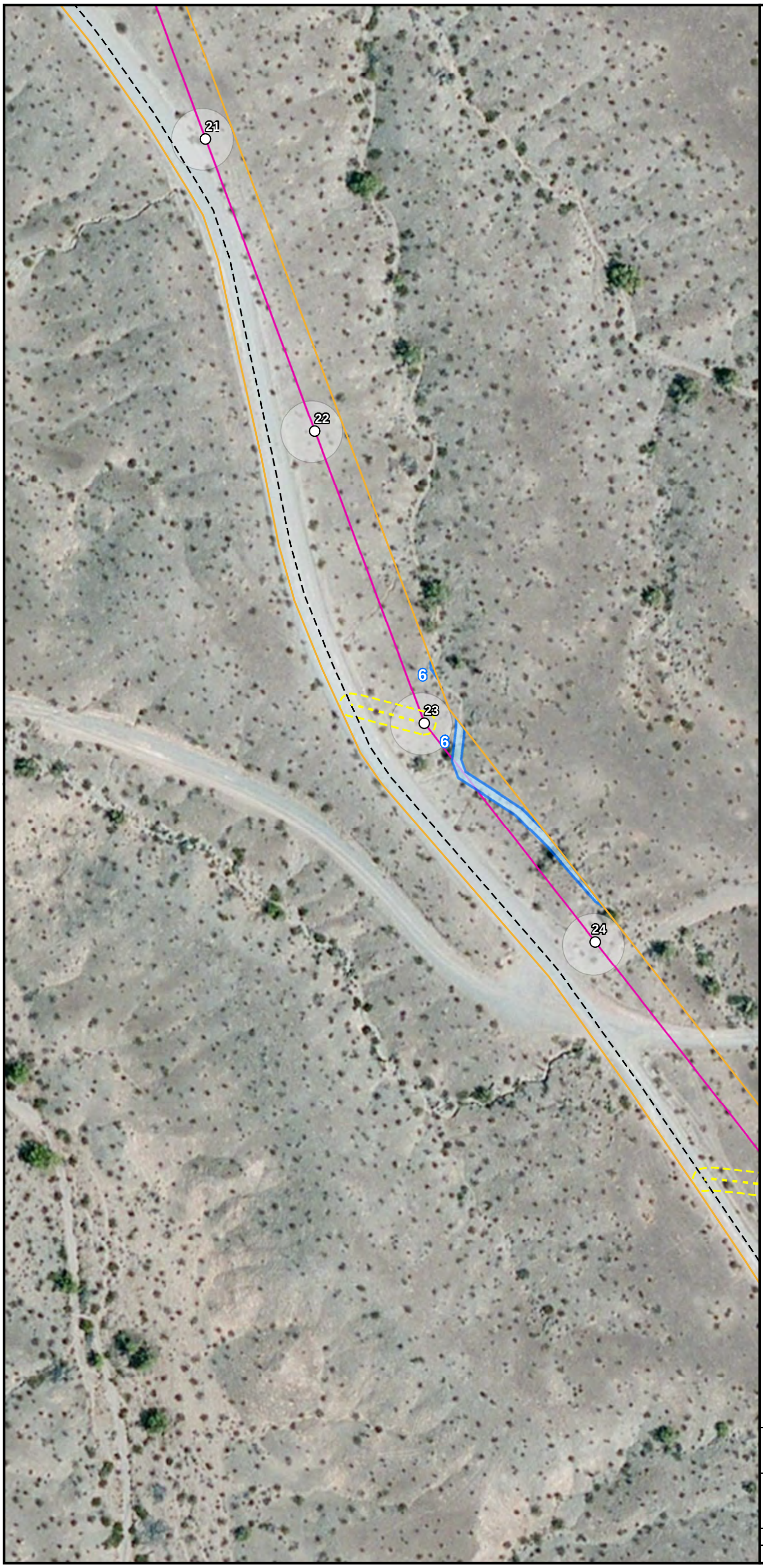
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4- 6	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4- 7

- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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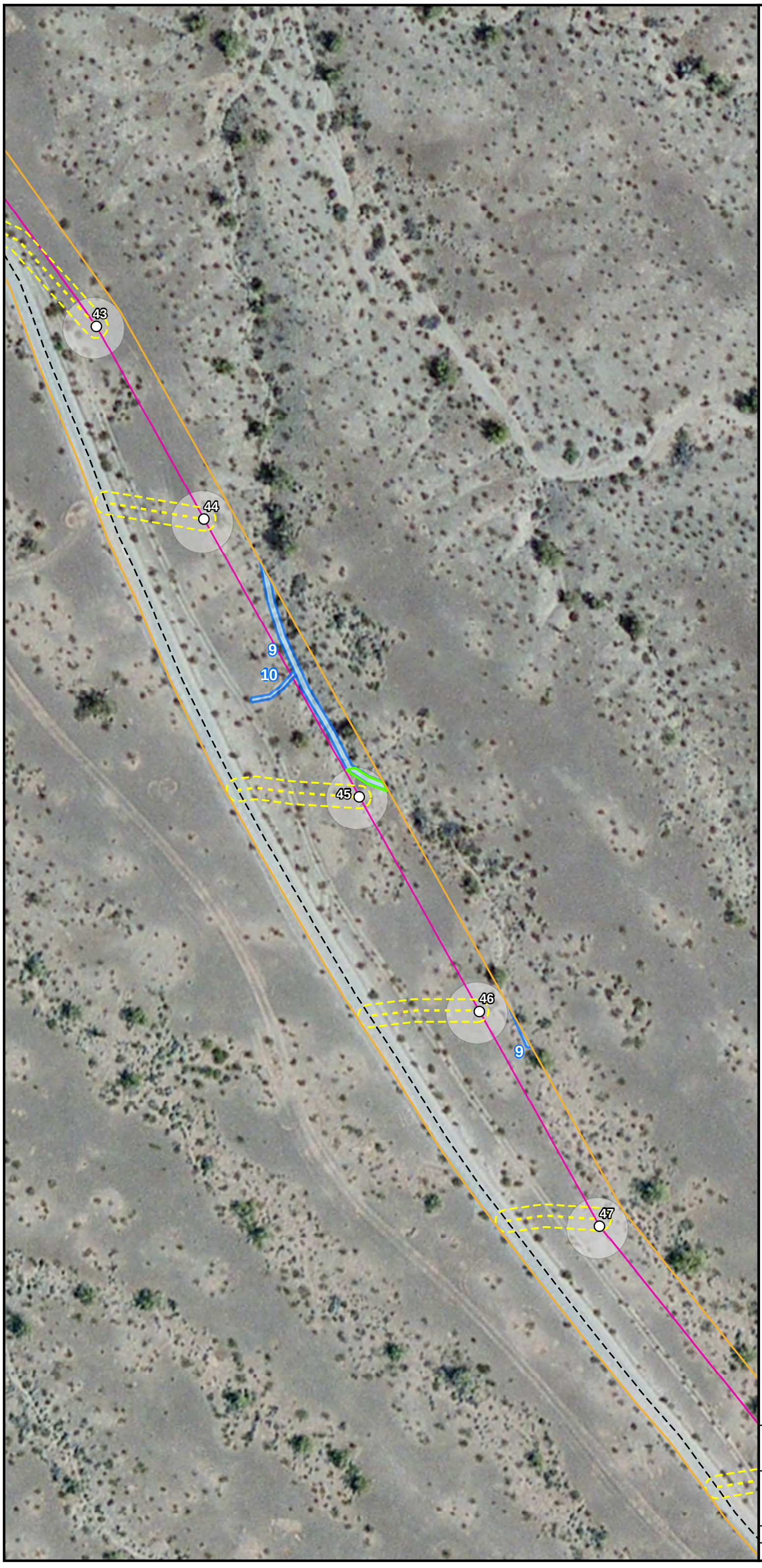
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4- 8	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
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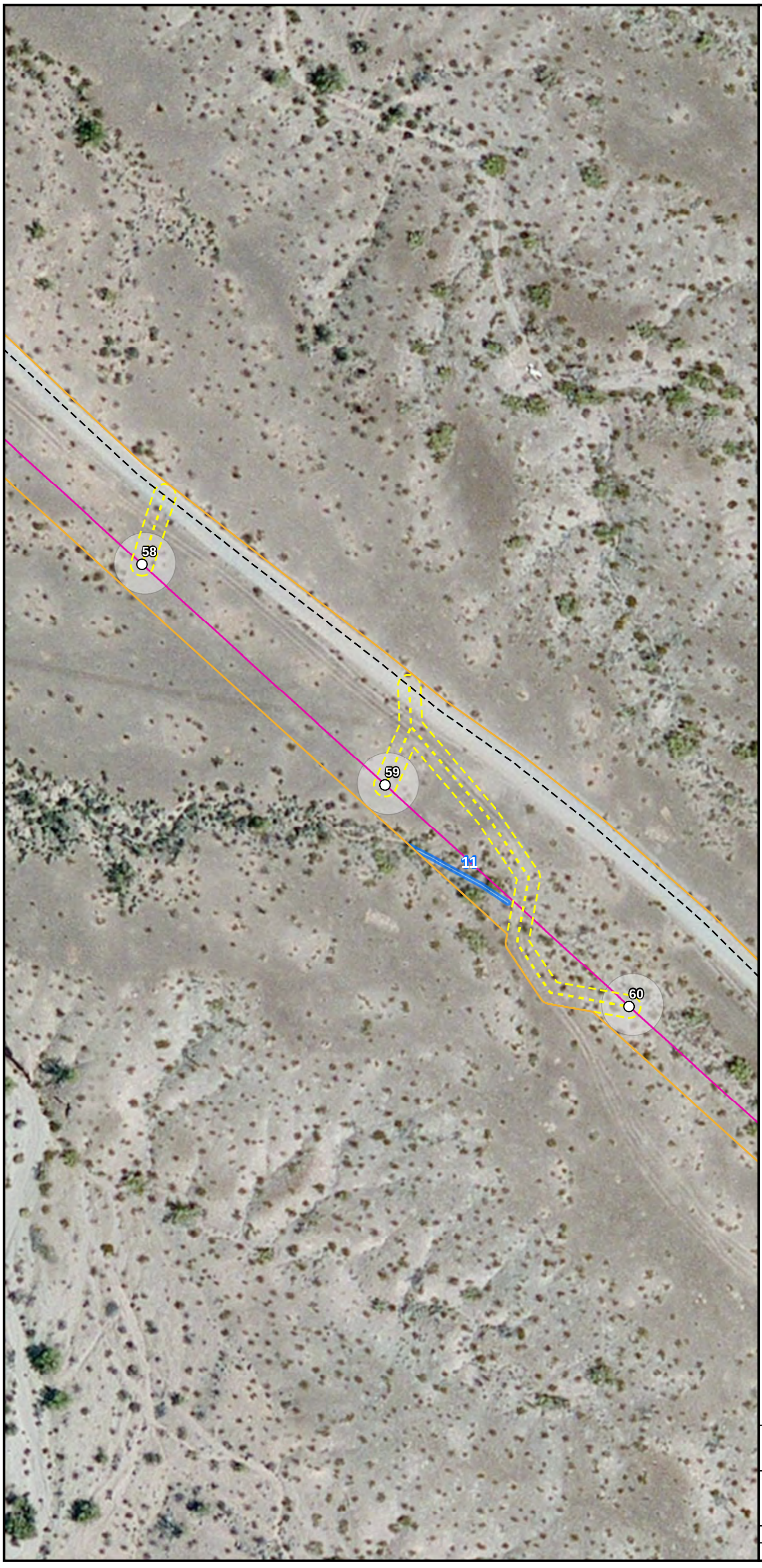
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4- 9



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-10	

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-11

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

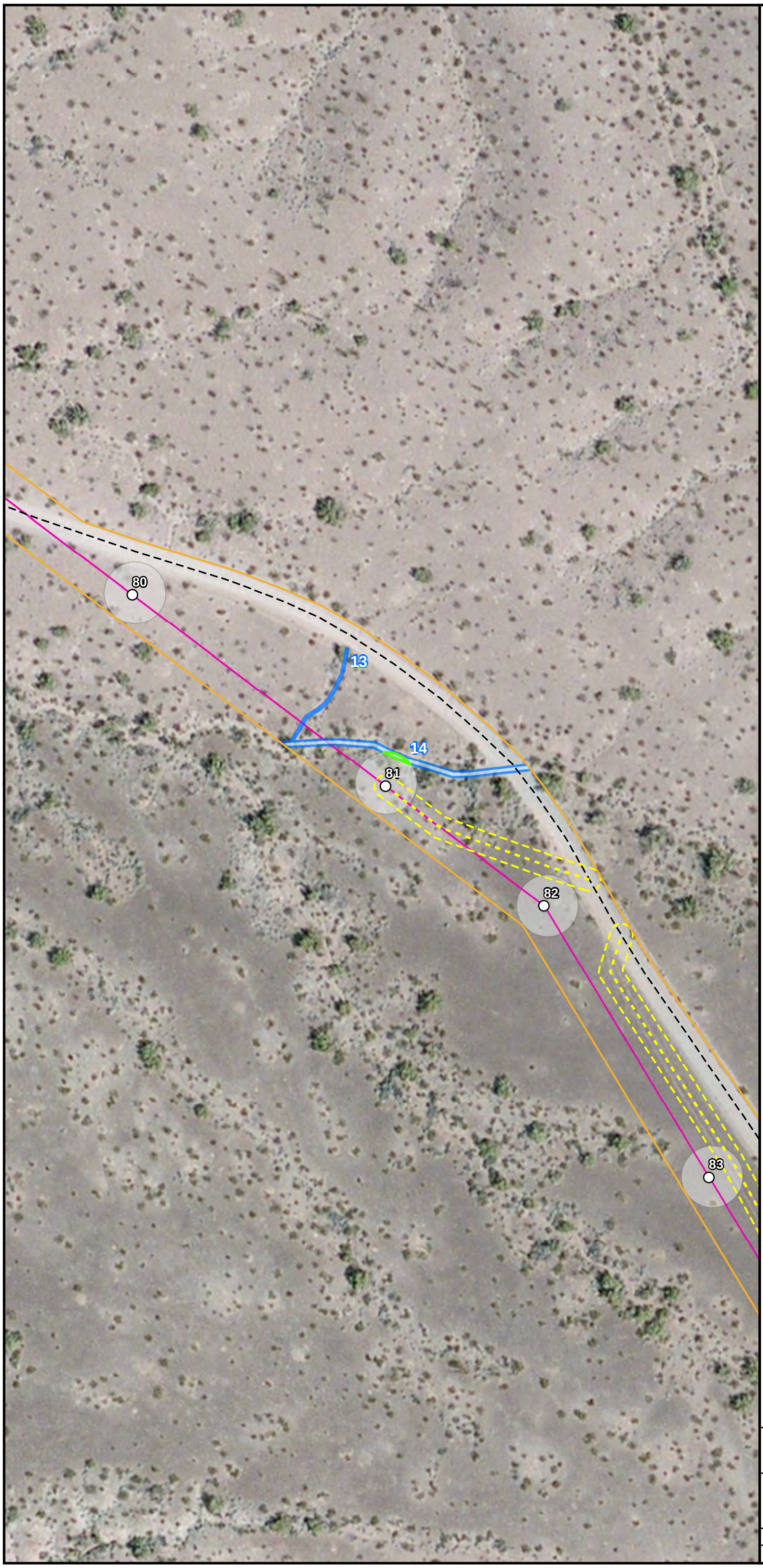
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-12



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

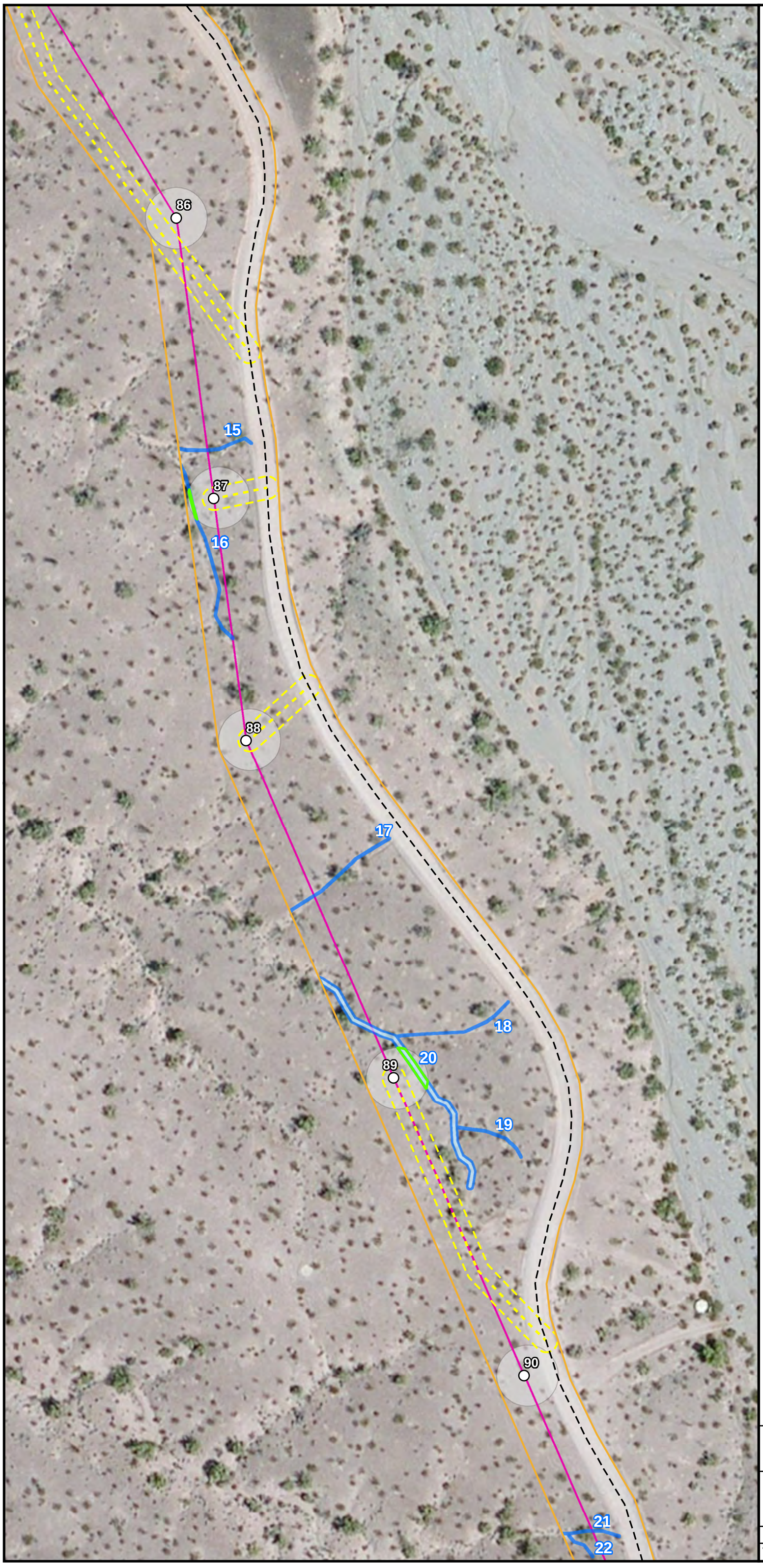
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-13



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access Road
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

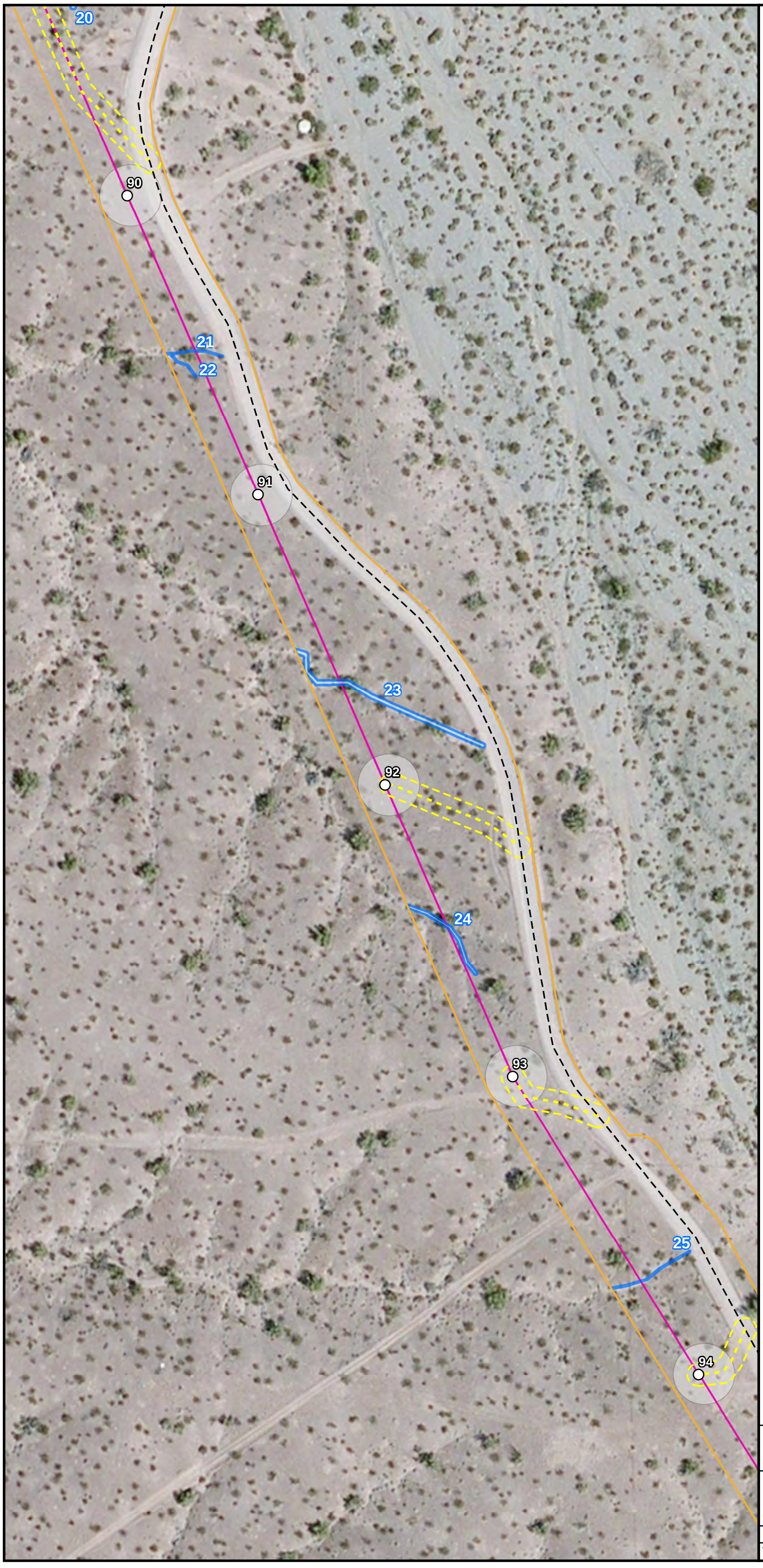
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-14



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access Road
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

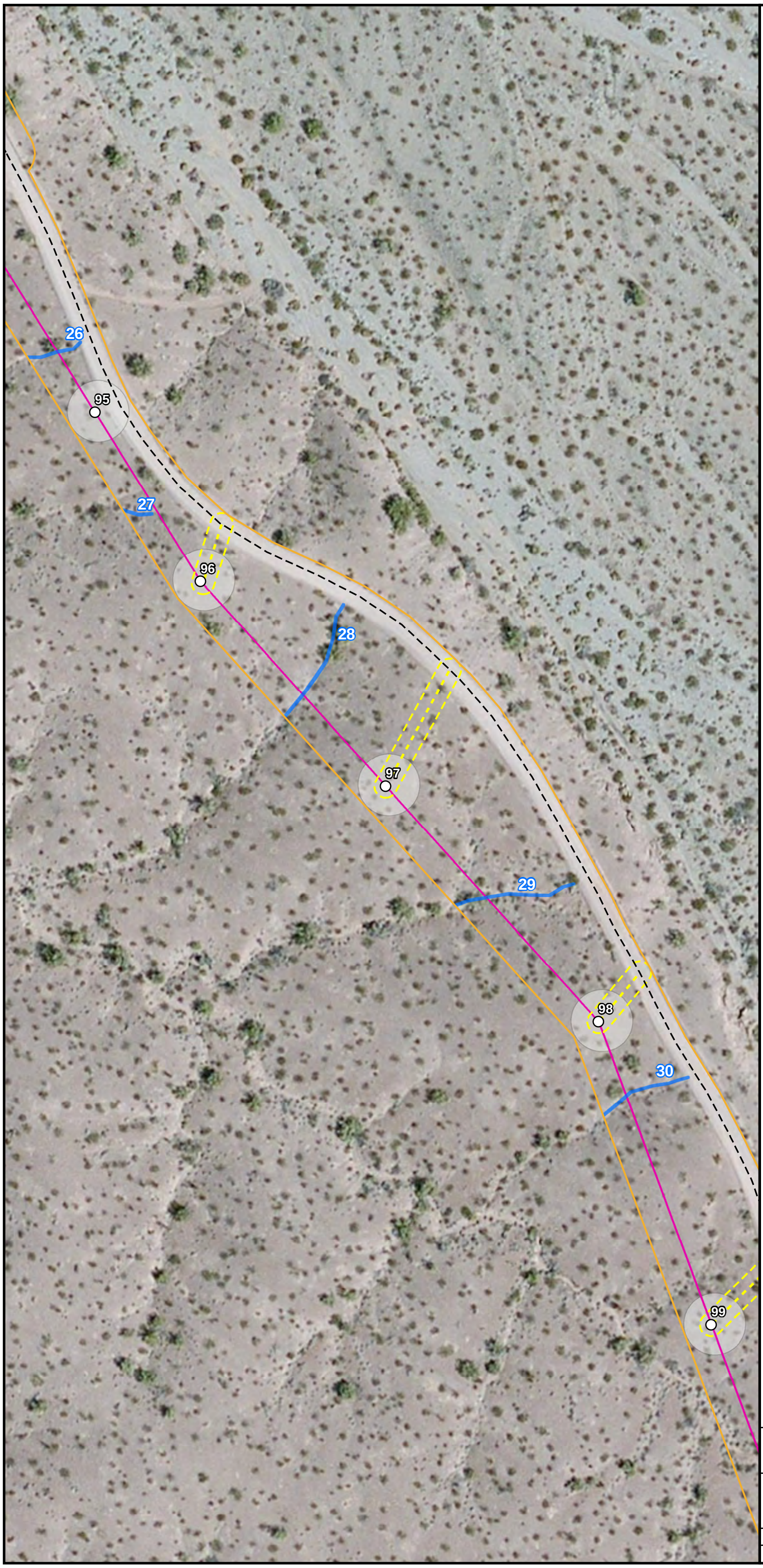
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-15	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

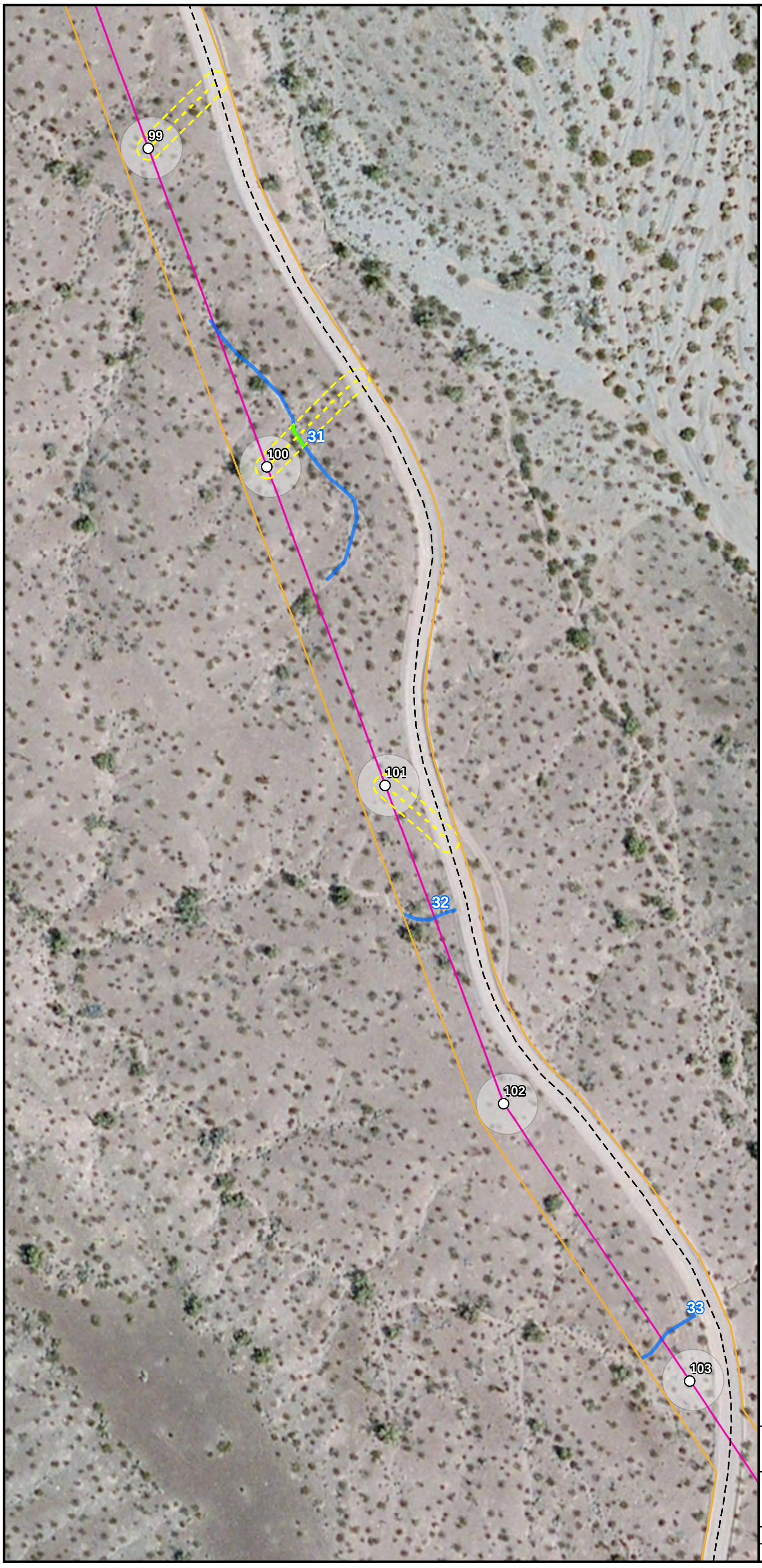
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-16



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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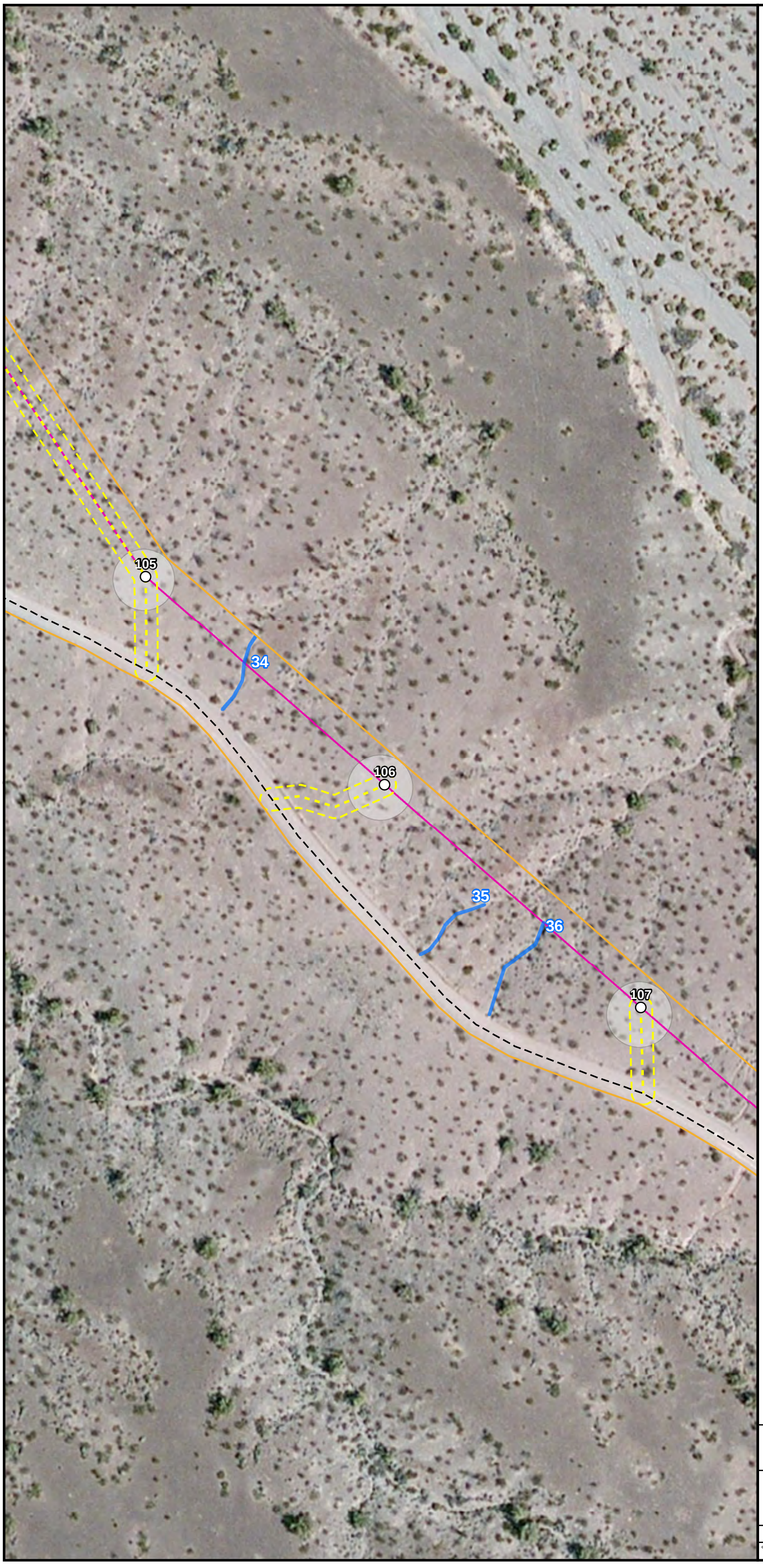
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-17	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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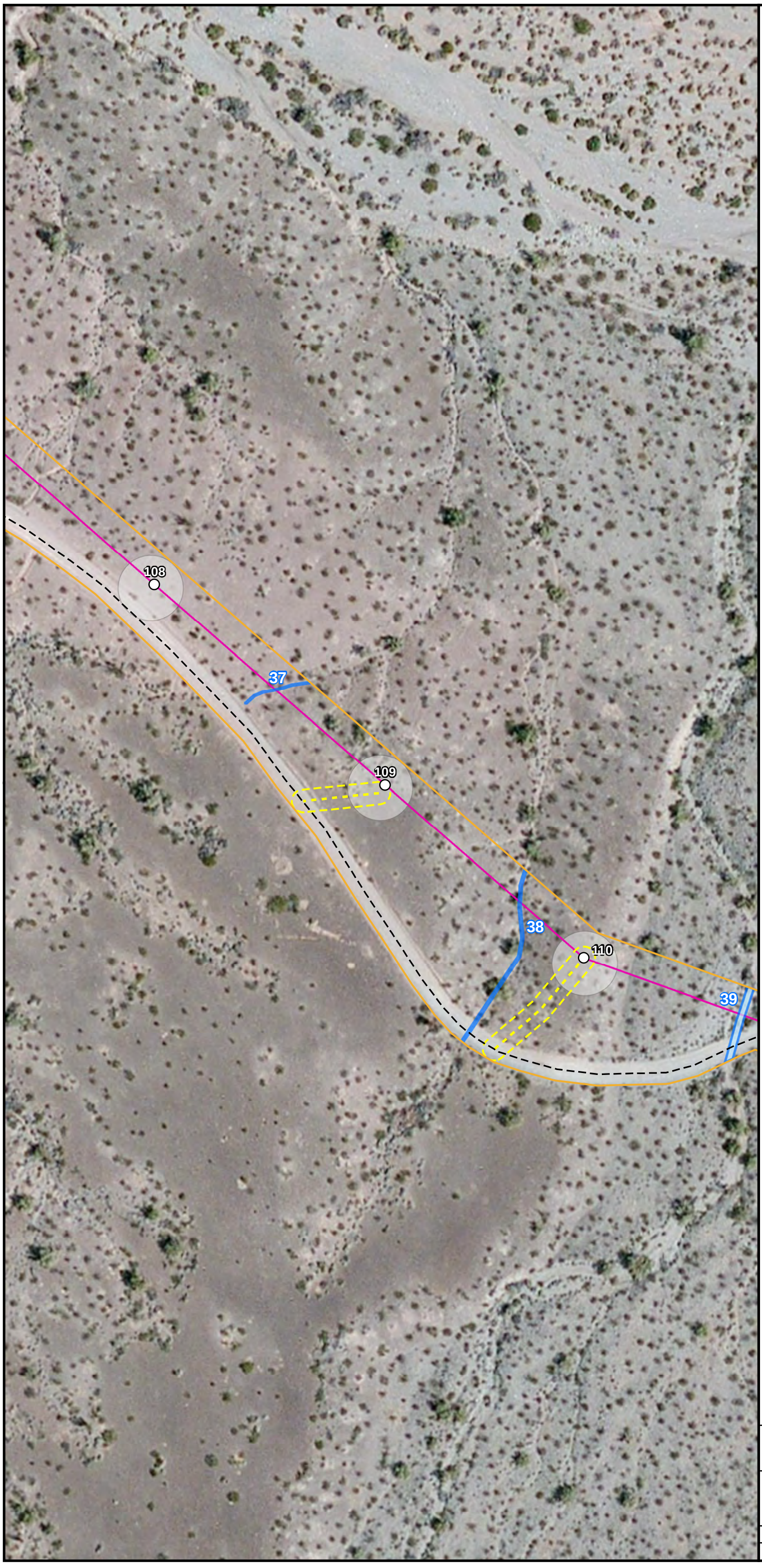
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-18



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-19

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

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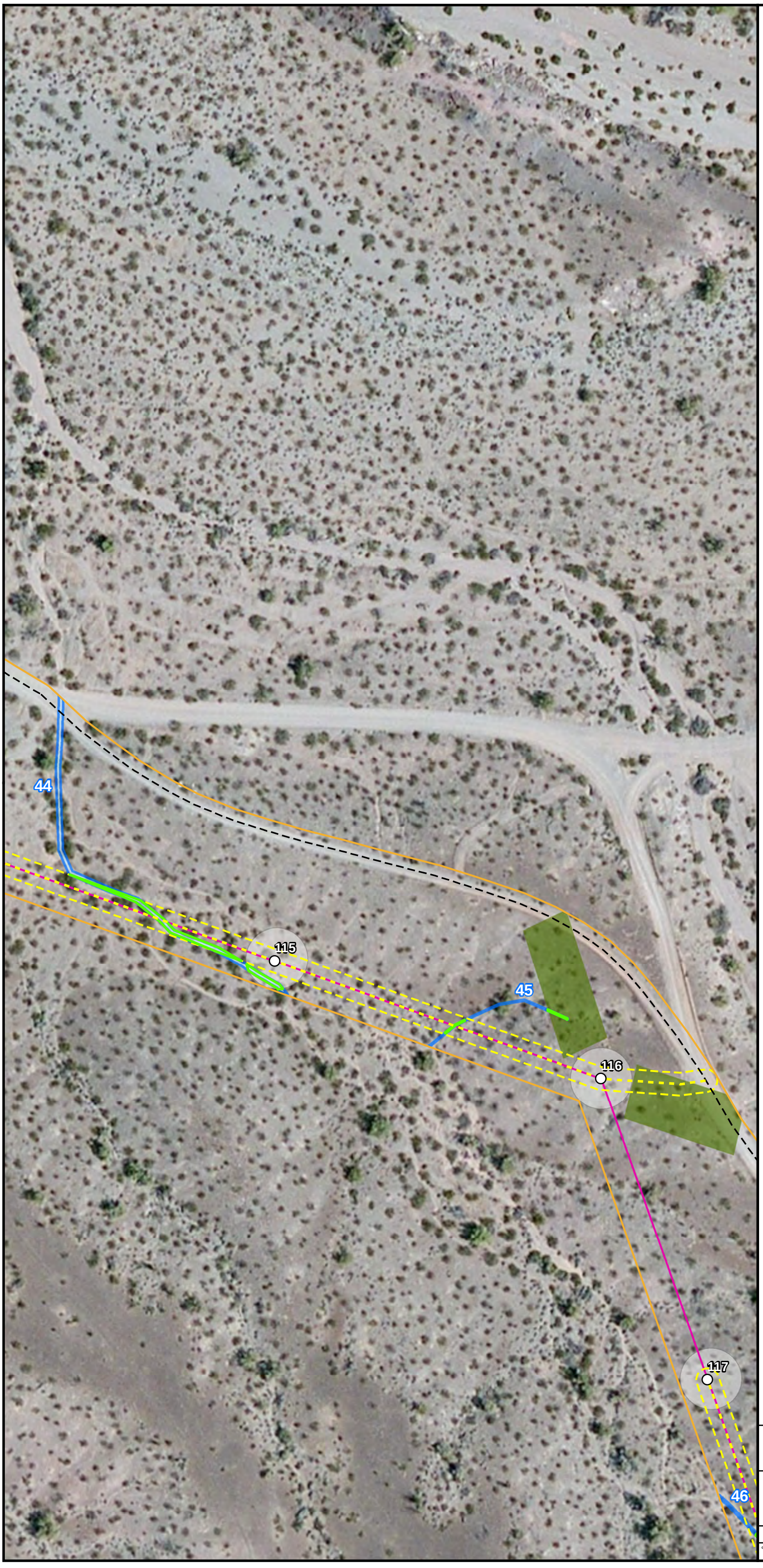
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-20	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Pull Site (Temporary Impact)

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-21	

- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Pull Site (Temporary Impact)
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-22

- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Pull Site (Temporary Impact)
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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WESTERN AREA POWER ADMINISTRATION
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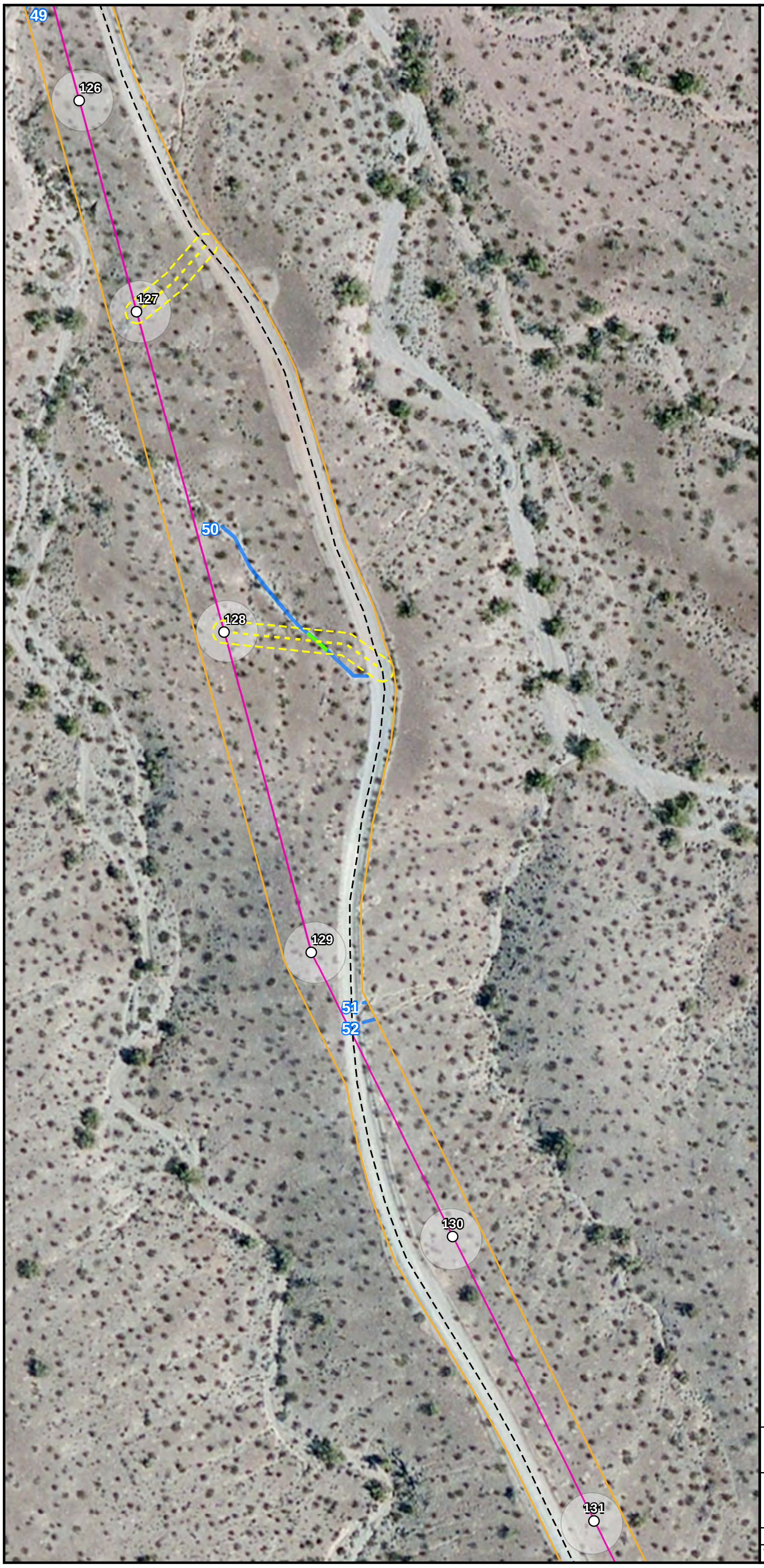
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-23	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access Road

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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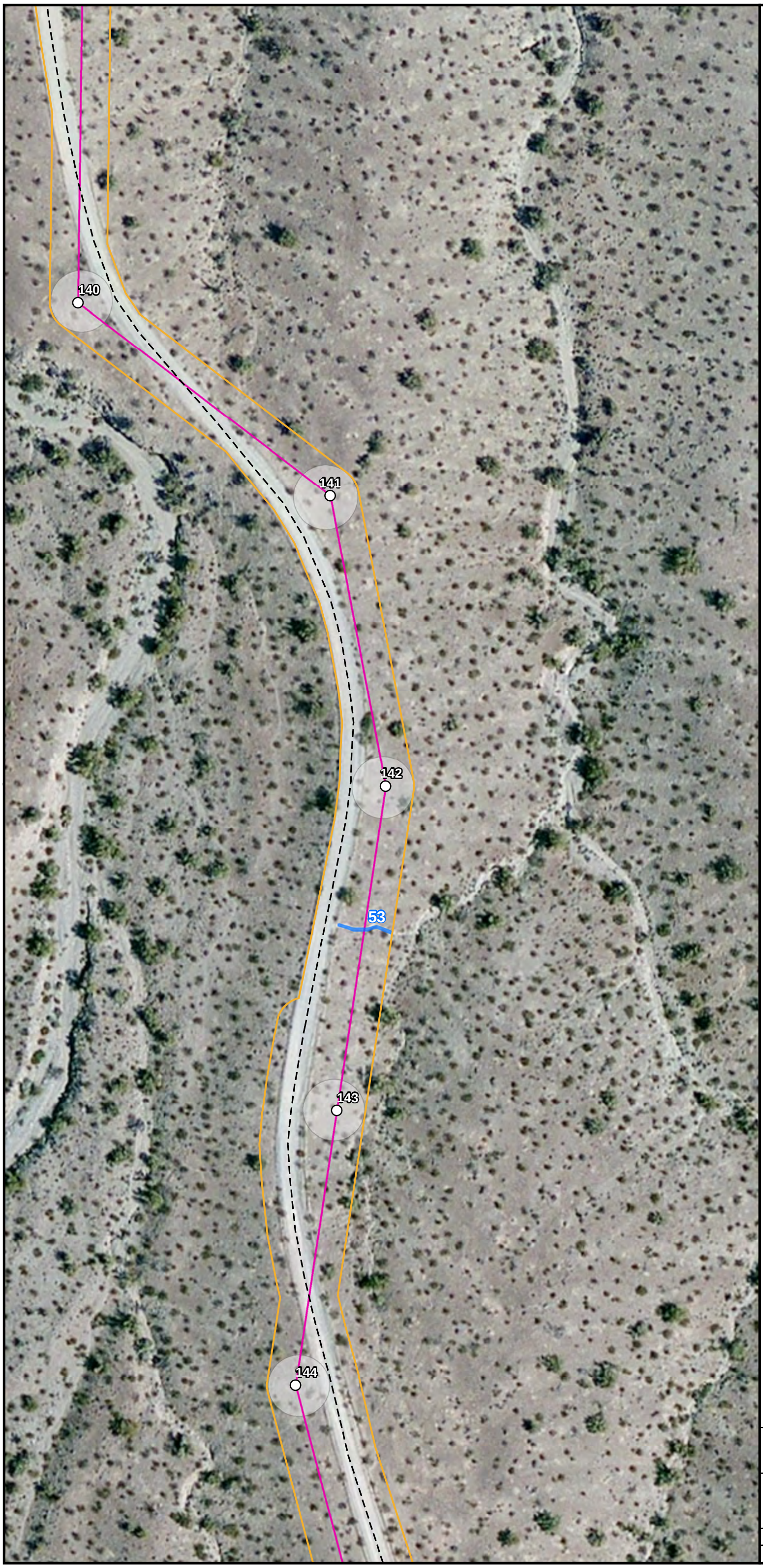
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-24	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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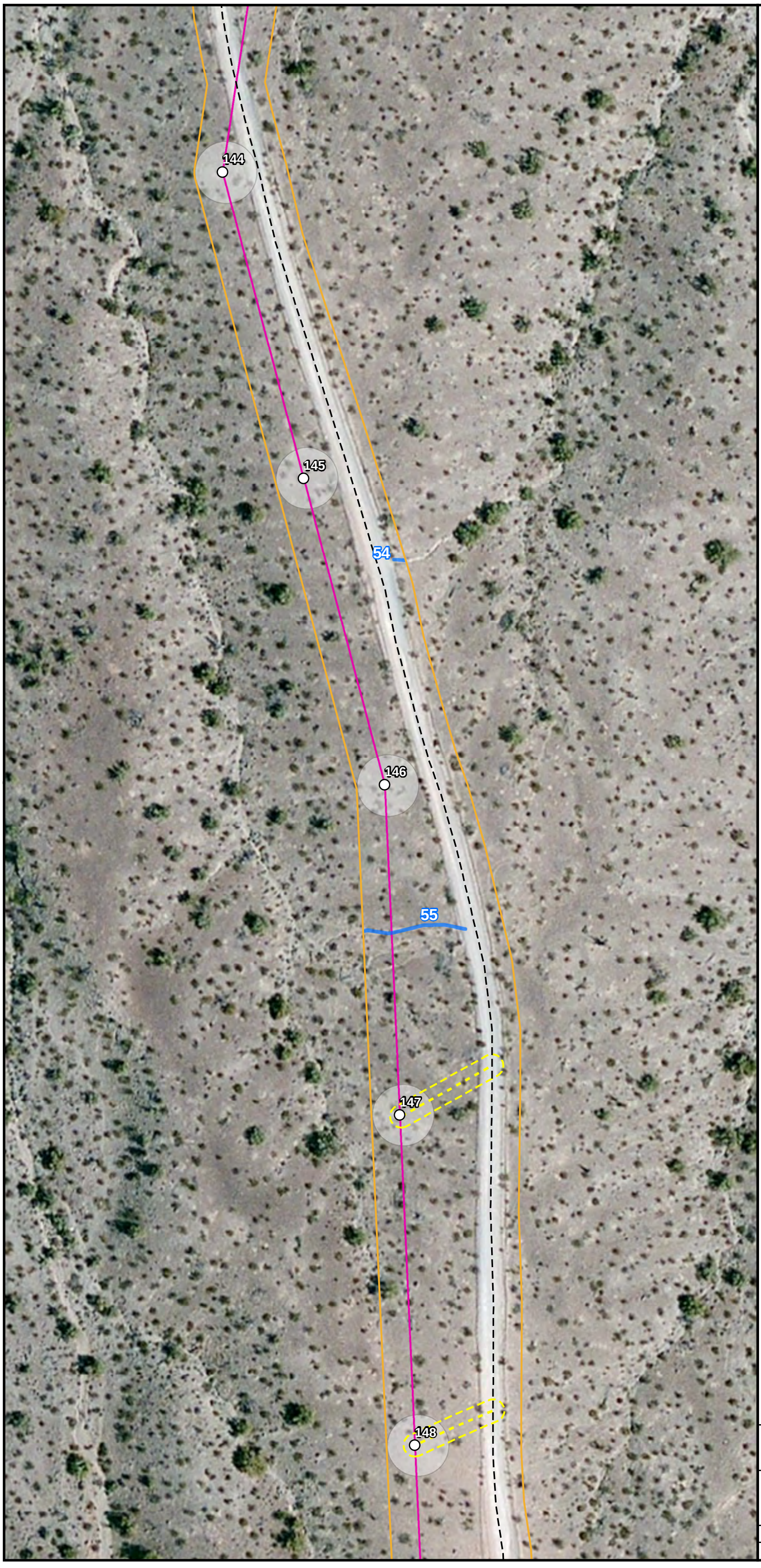
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-25	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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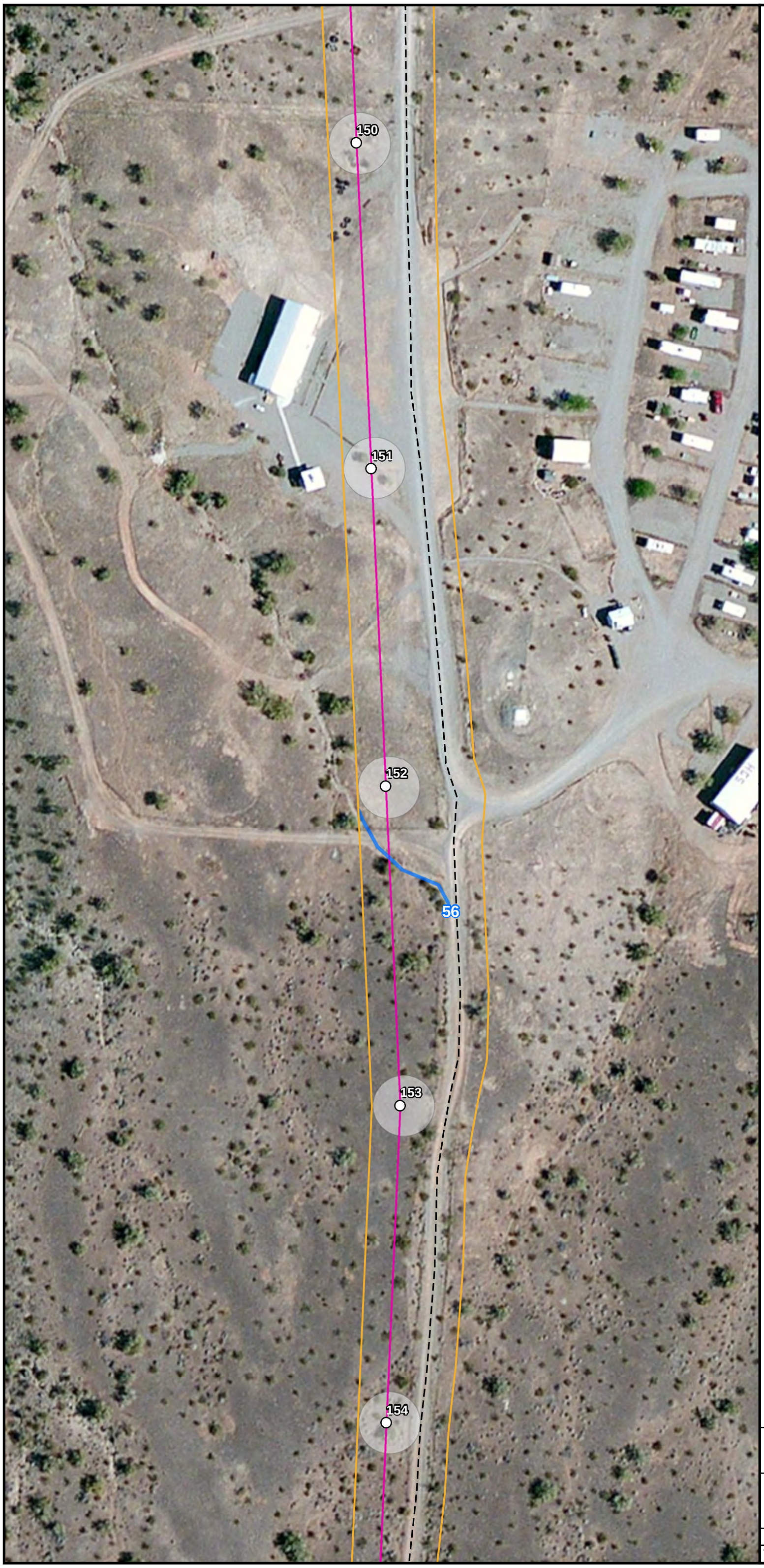
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-26



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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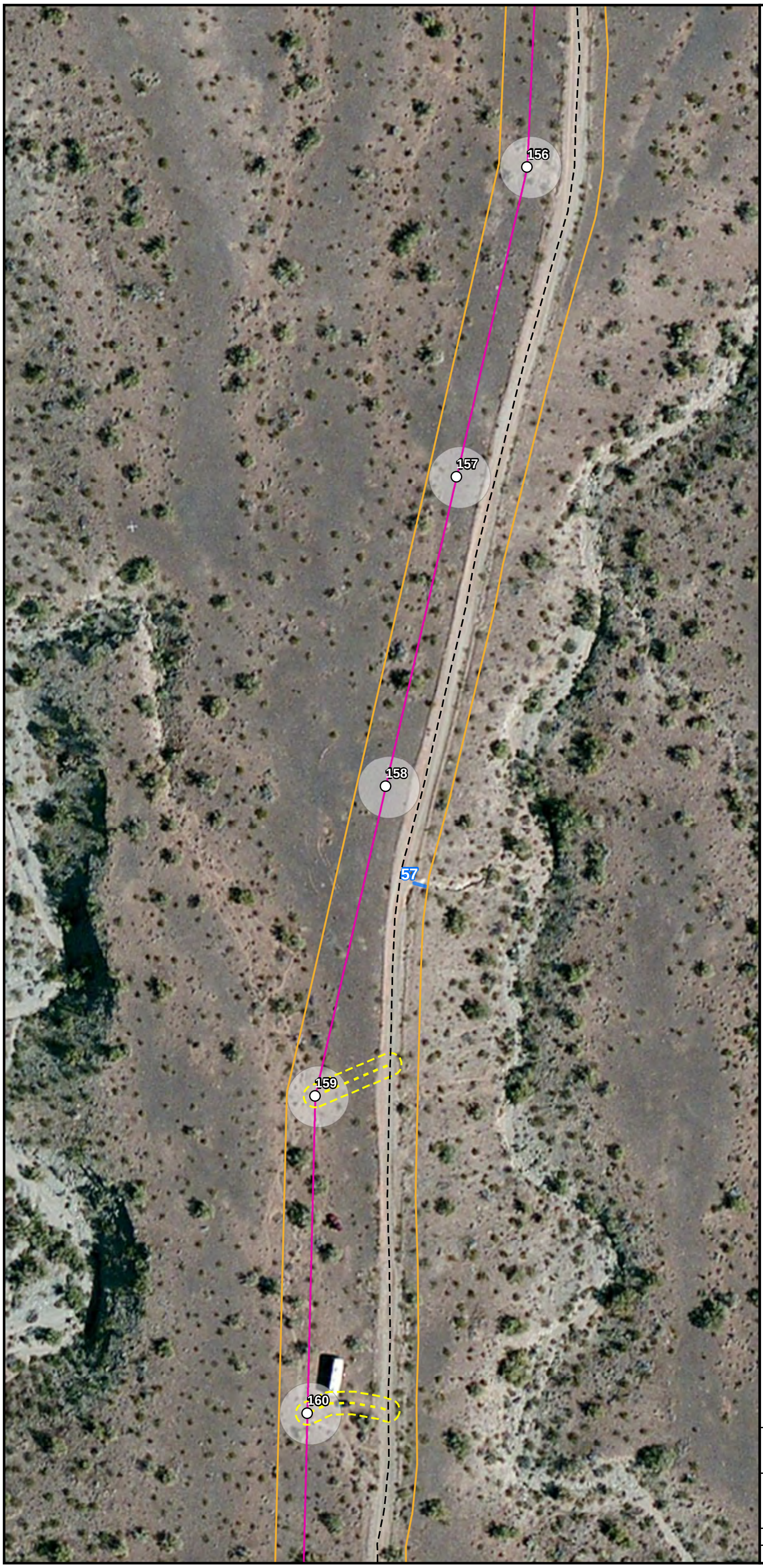
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-27



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

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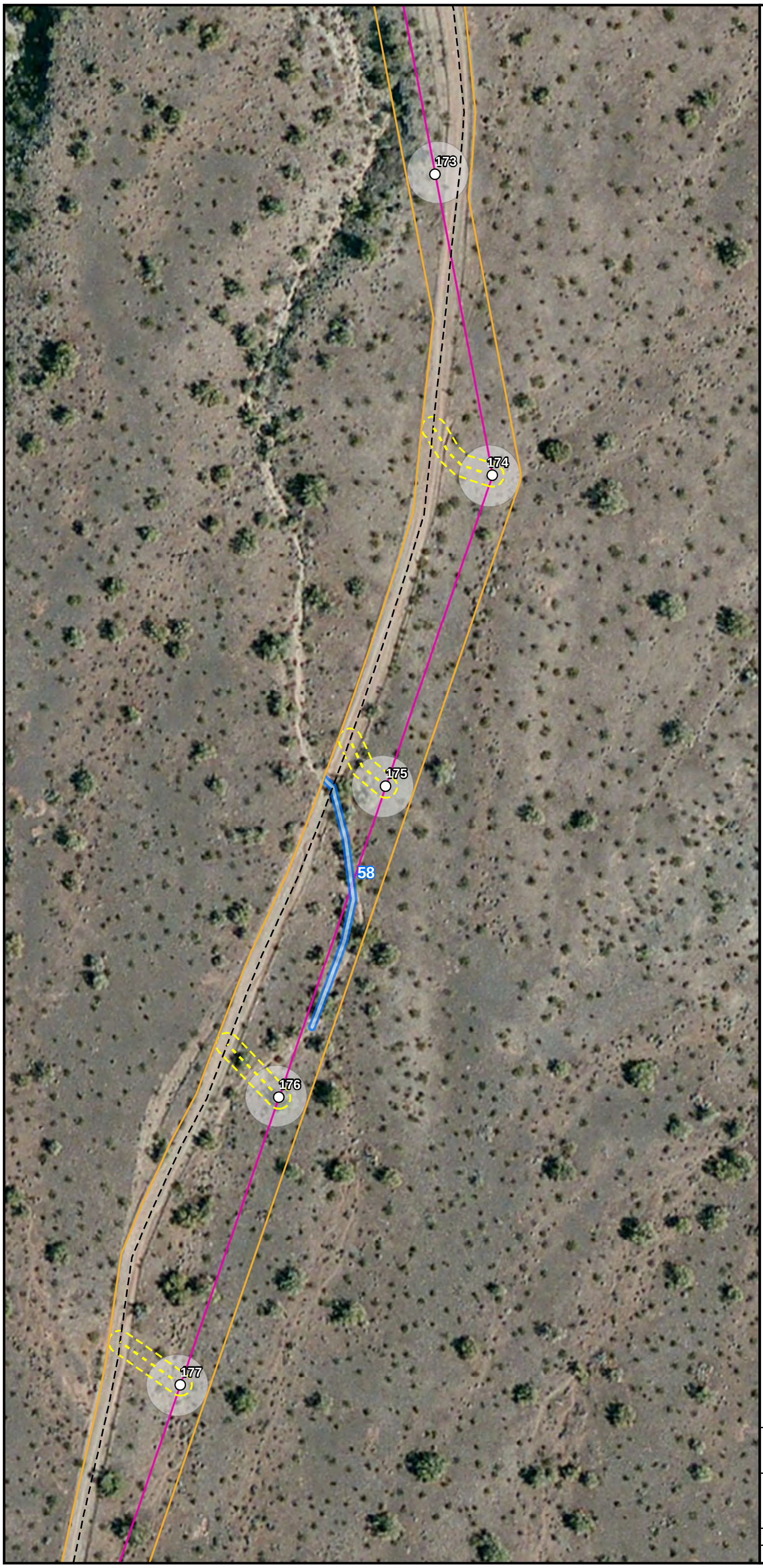
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-28	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-29	

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-30

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - PCN required

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-31

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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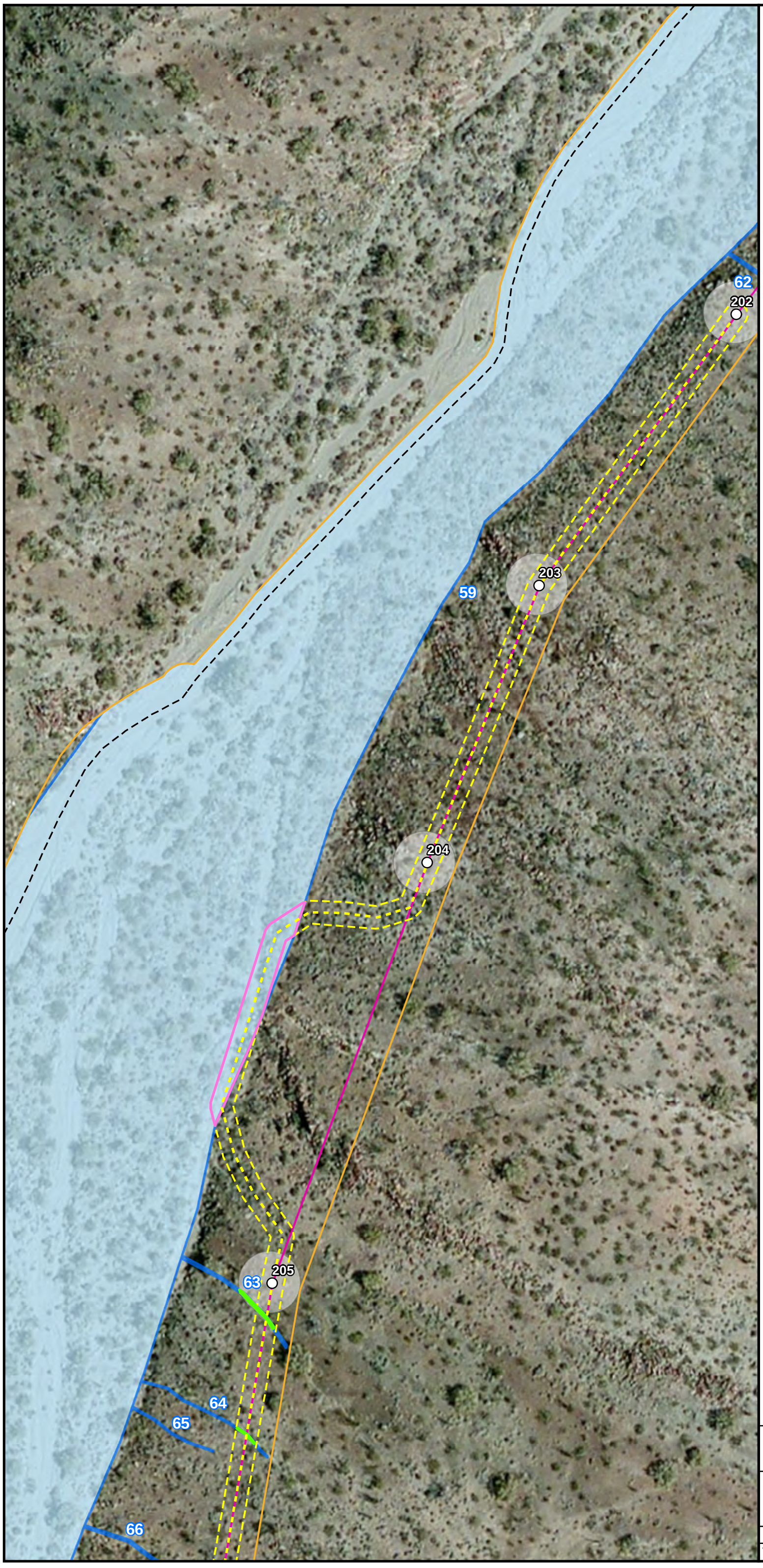
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-32



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - PCN required

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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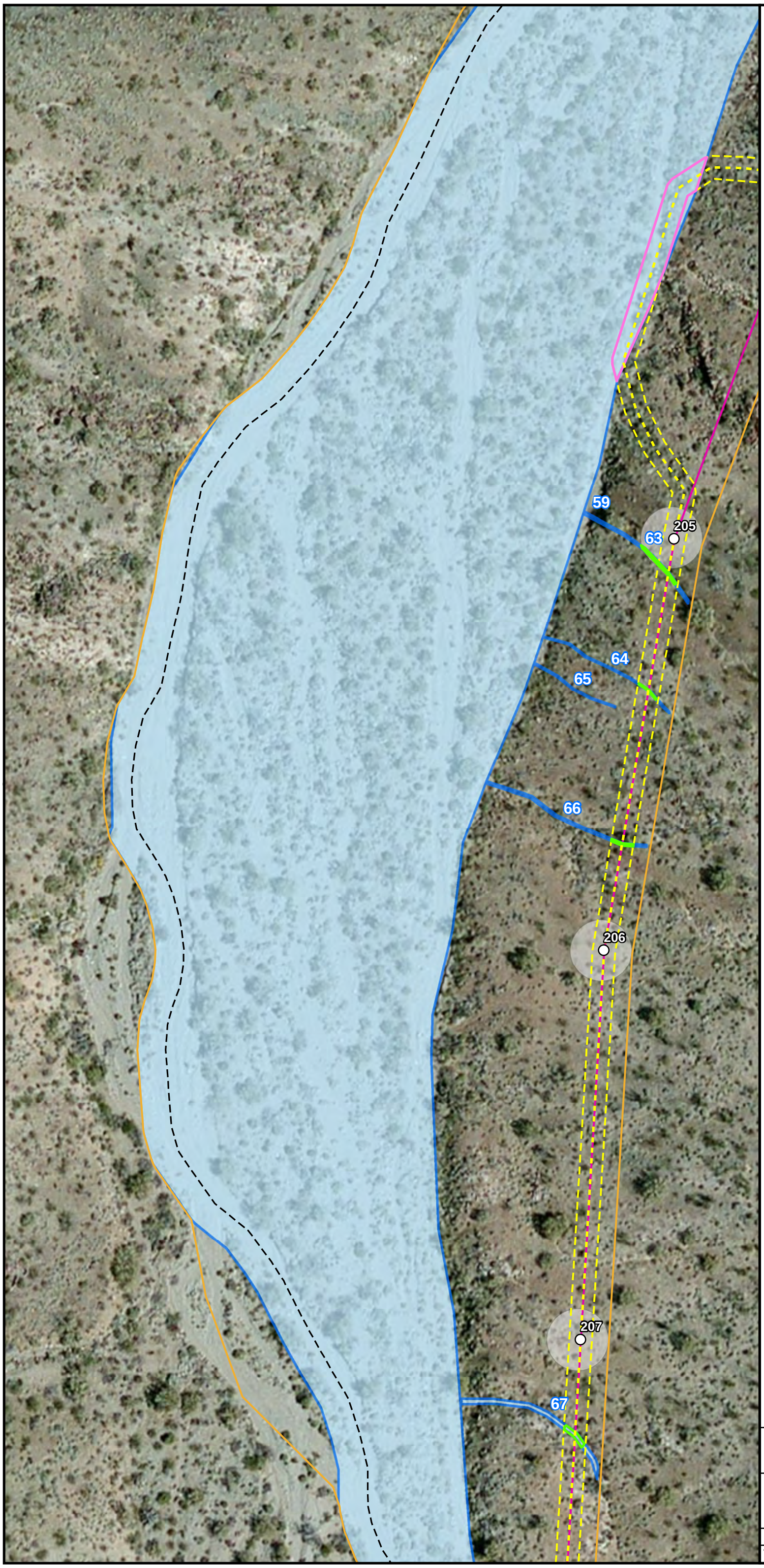
CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-33



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - PCN required
- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

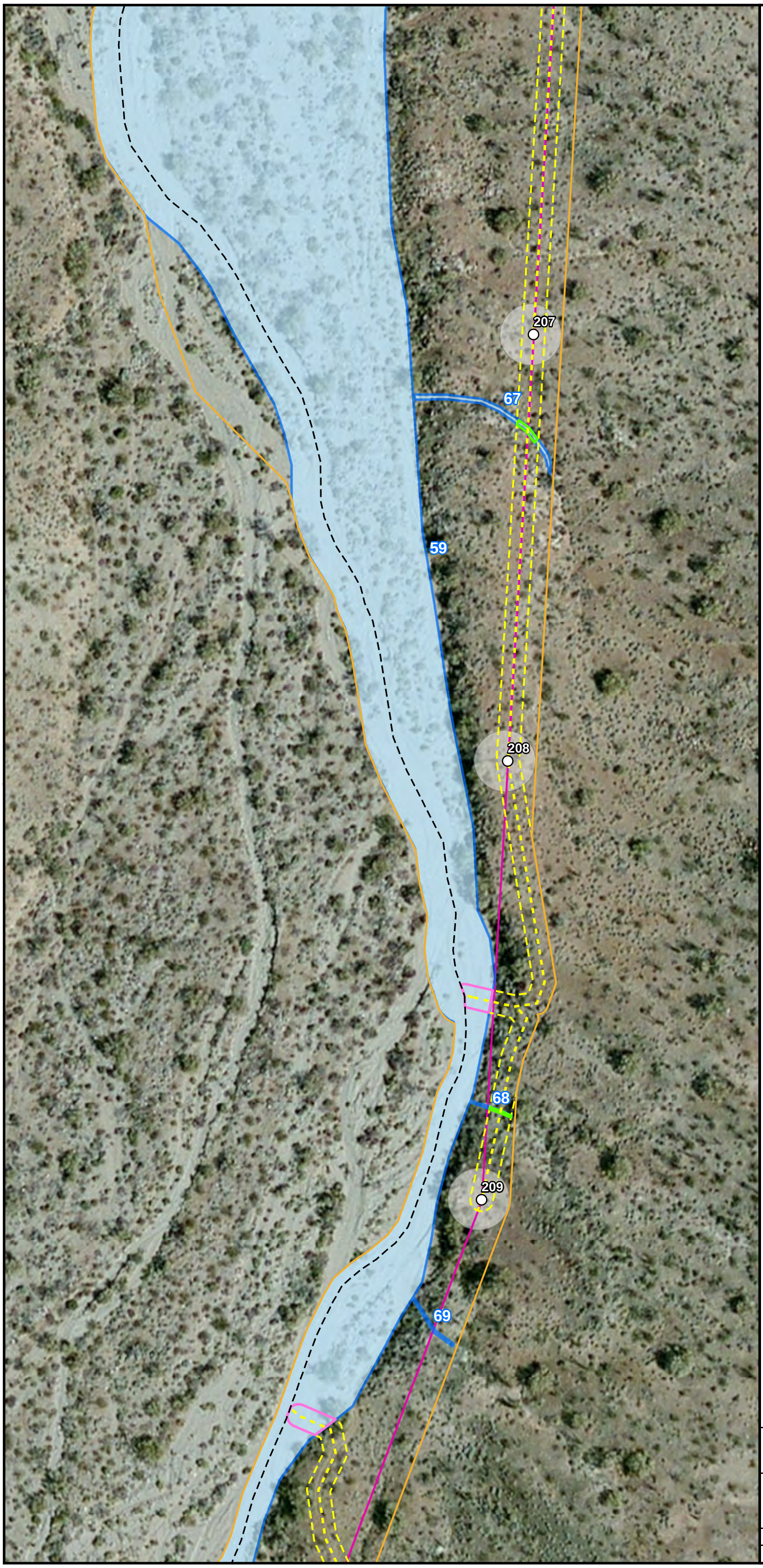
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-34



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES: Temporary Impact, NWP No. 12 - PCN required
- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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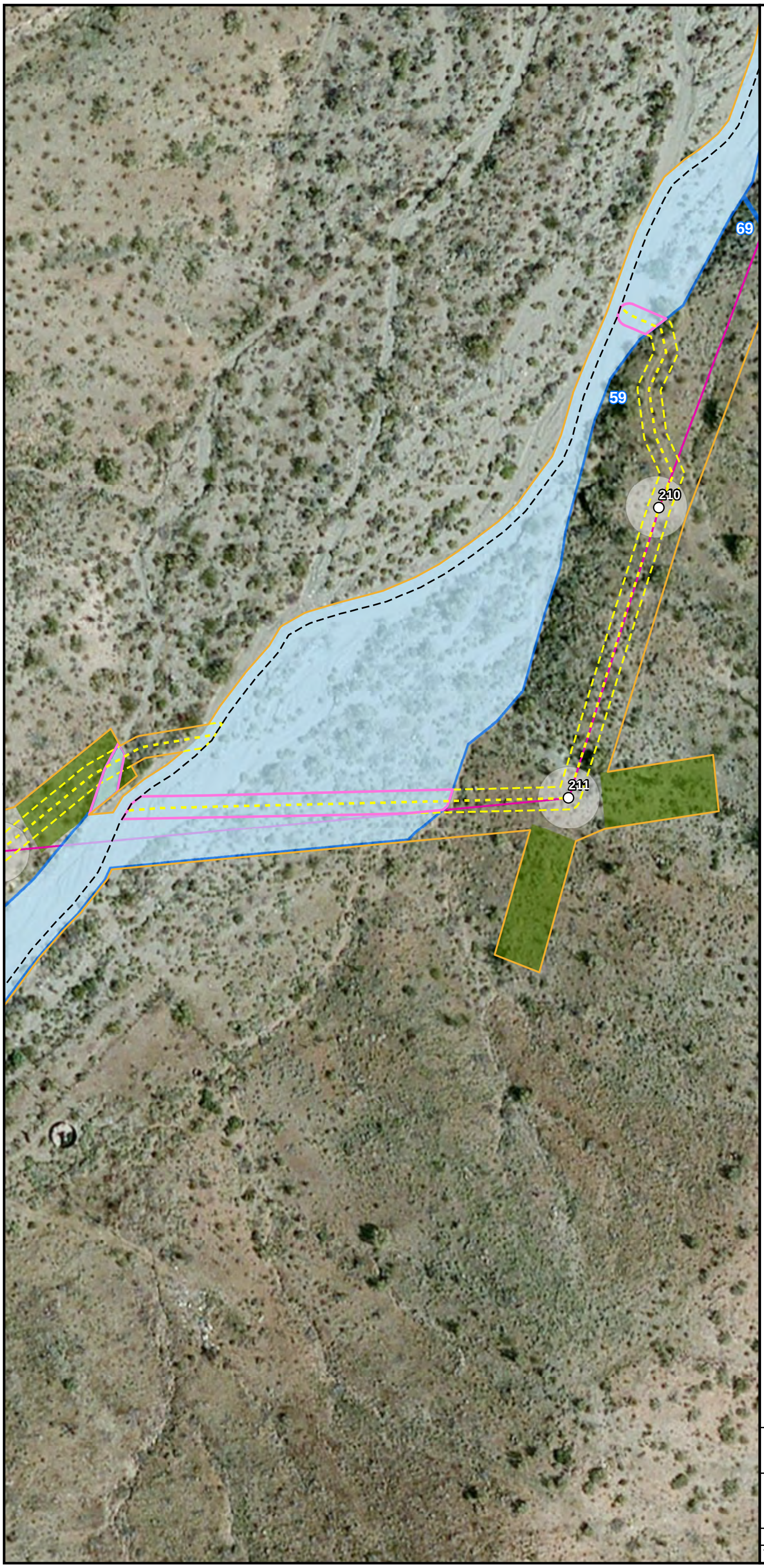
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-35



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Pull Site (Temporary Impact)

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - PCN required

Scale 1:1,000

0 25 50 100

Feet

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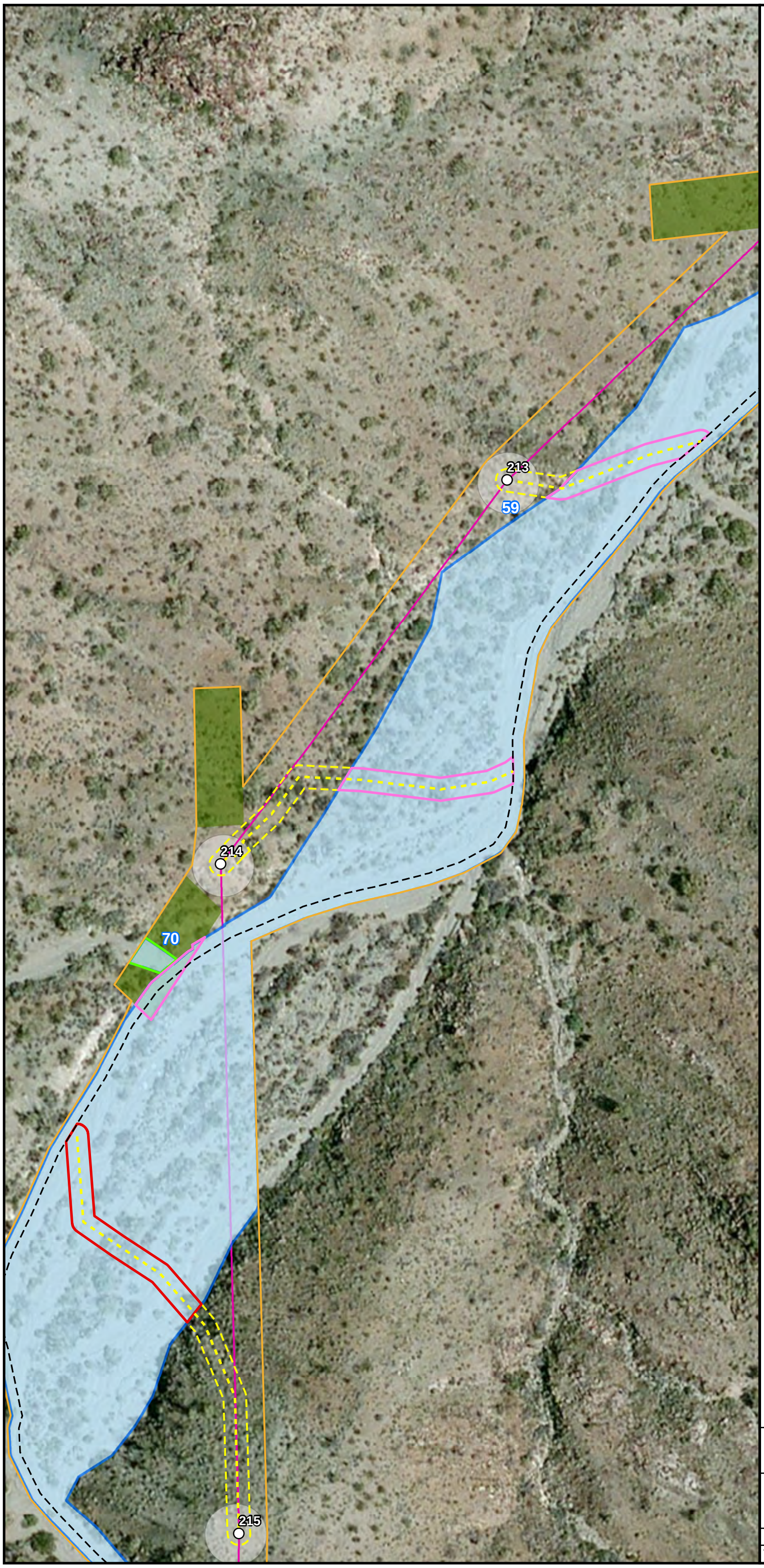
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-36



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Pull Site (Temporary Impact)

Existing Access Road

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

UES: Temporary Impact, NWP No. 12 - PCN required

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-37	

- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access Road
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

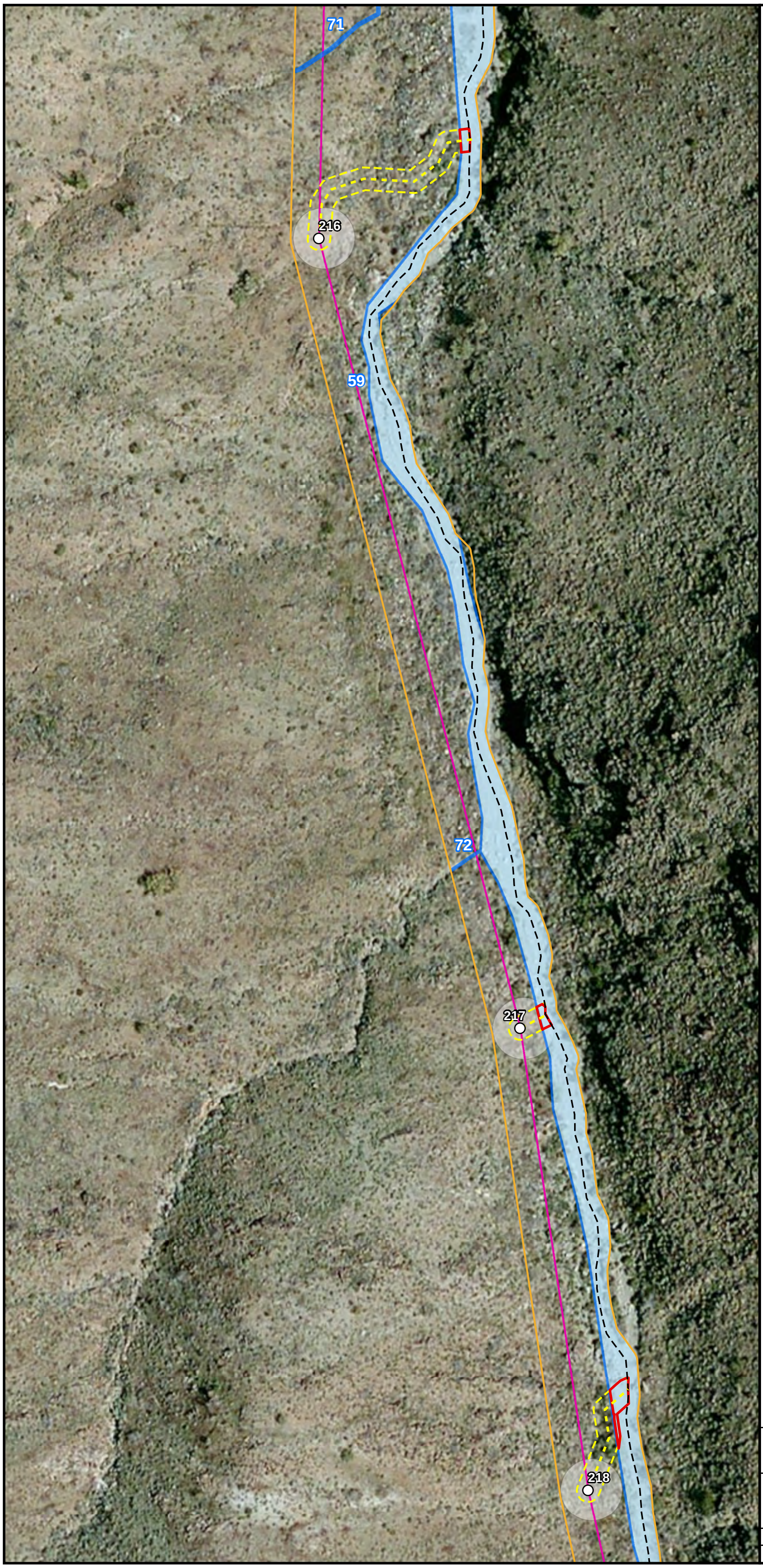
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-38	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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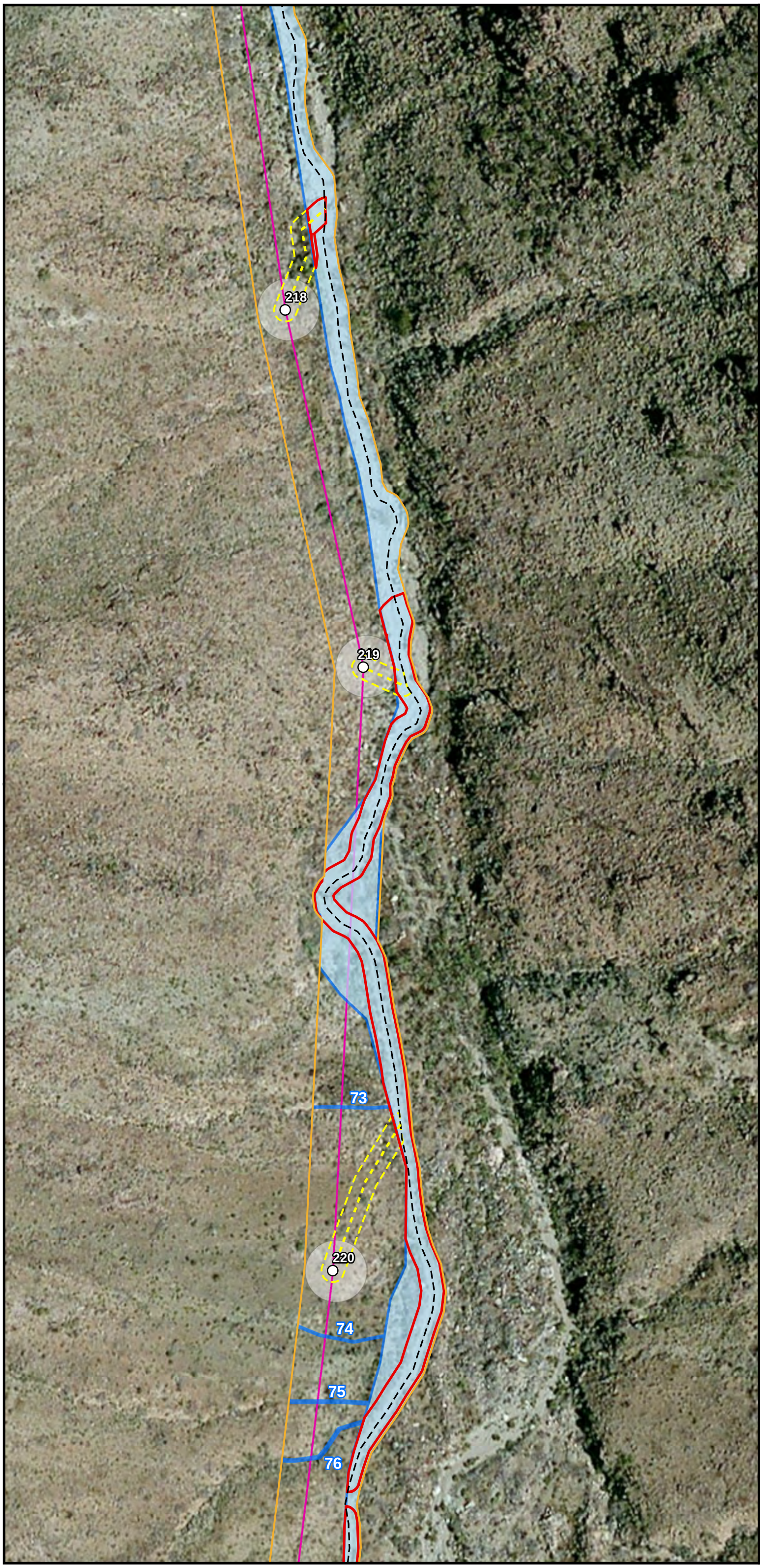
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-39



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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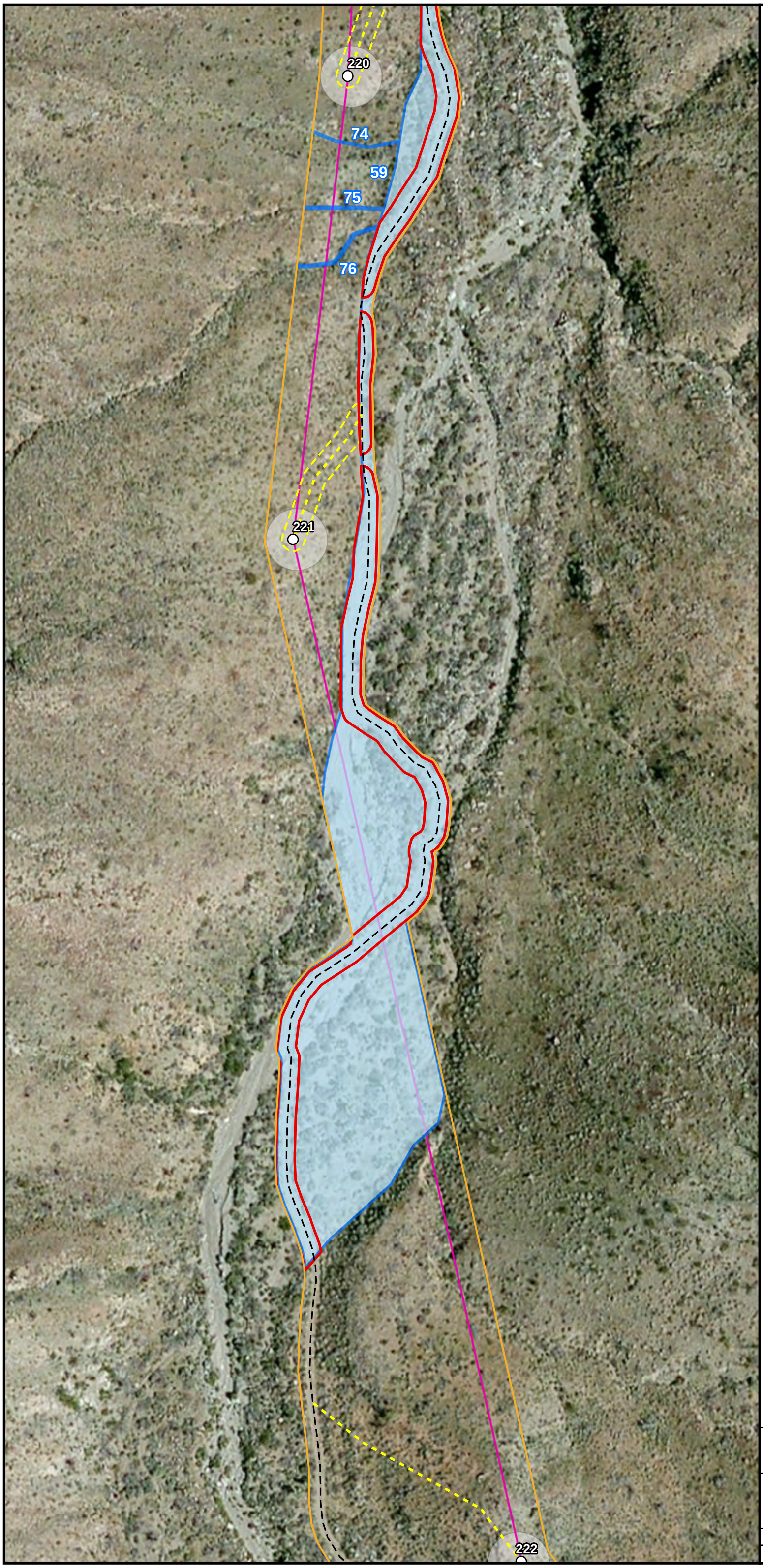
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-40	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

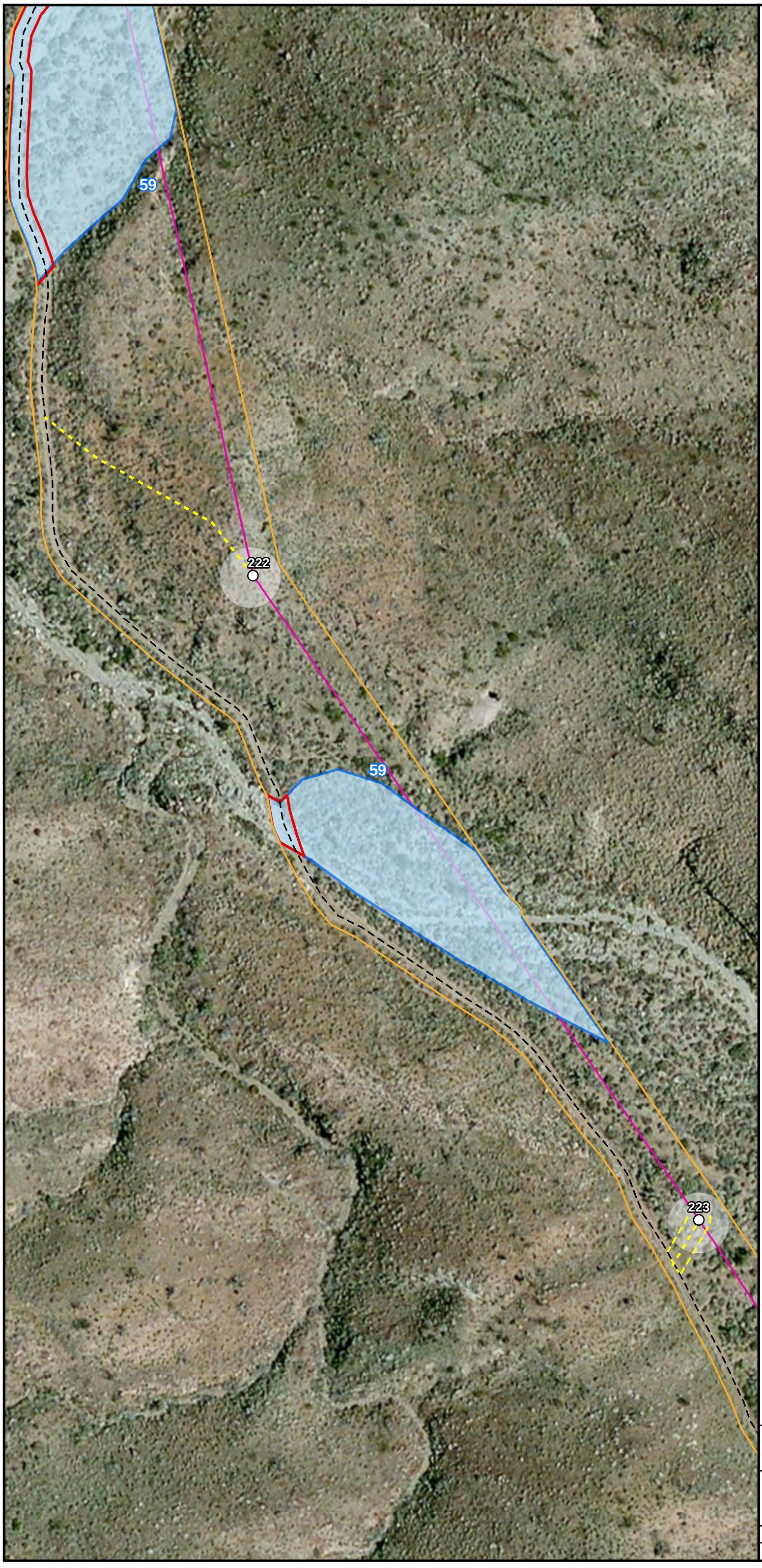
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-41	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

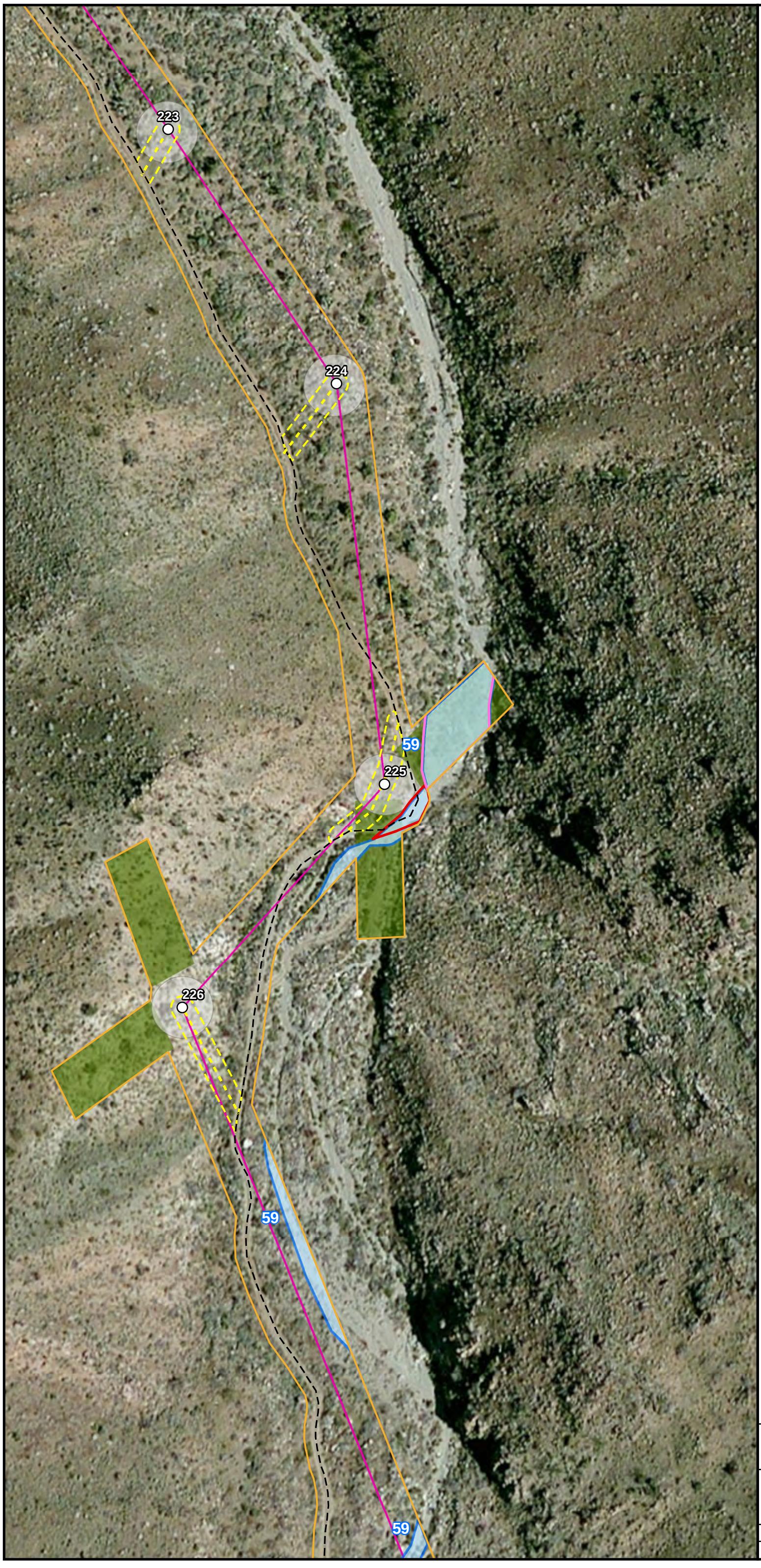
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-42



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Pull Site (Temporary Impact)

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

UES: Temporary Impact, NWP No. 12 - PCN required

Scale 1:1,000

0 25 50 100

Feet

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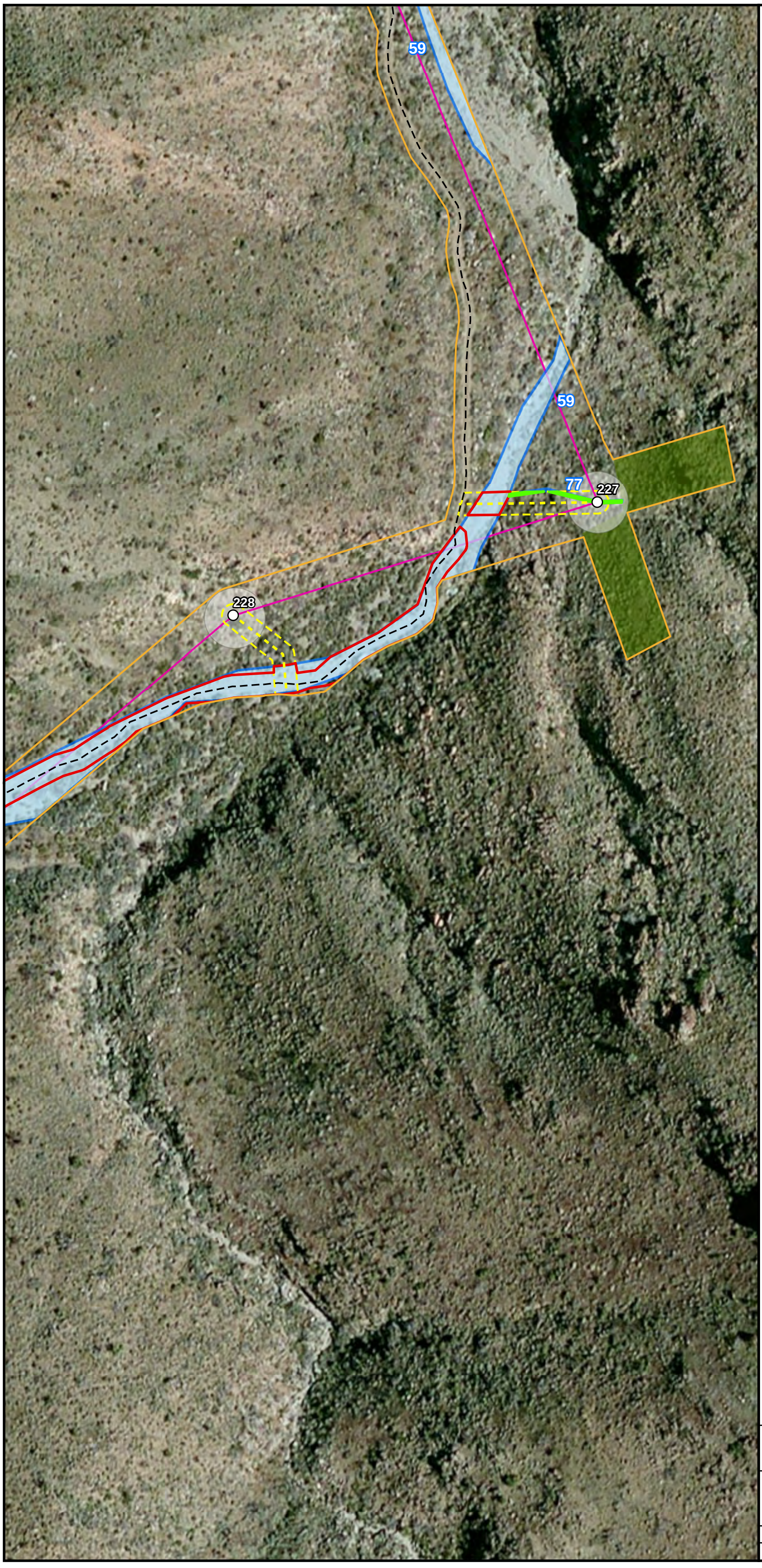
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-43	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Pull Site (Temporary Impact)
- Existing Access Road
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES, Permanent Impact, Individual Permit - PCN required
- UES: Temporary Impact, NWP No. 12 - PCN required
- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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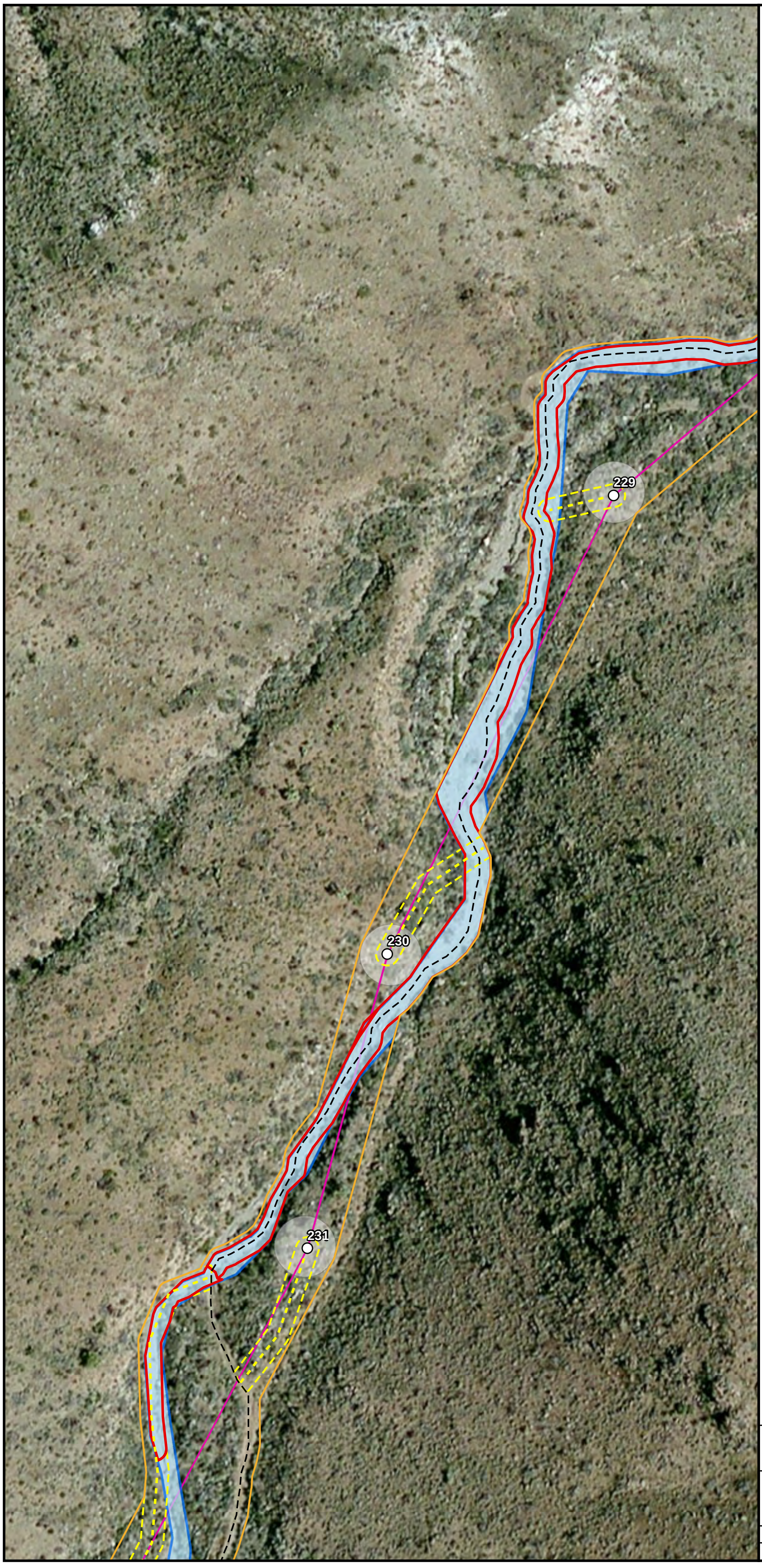
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-44	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access Road

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

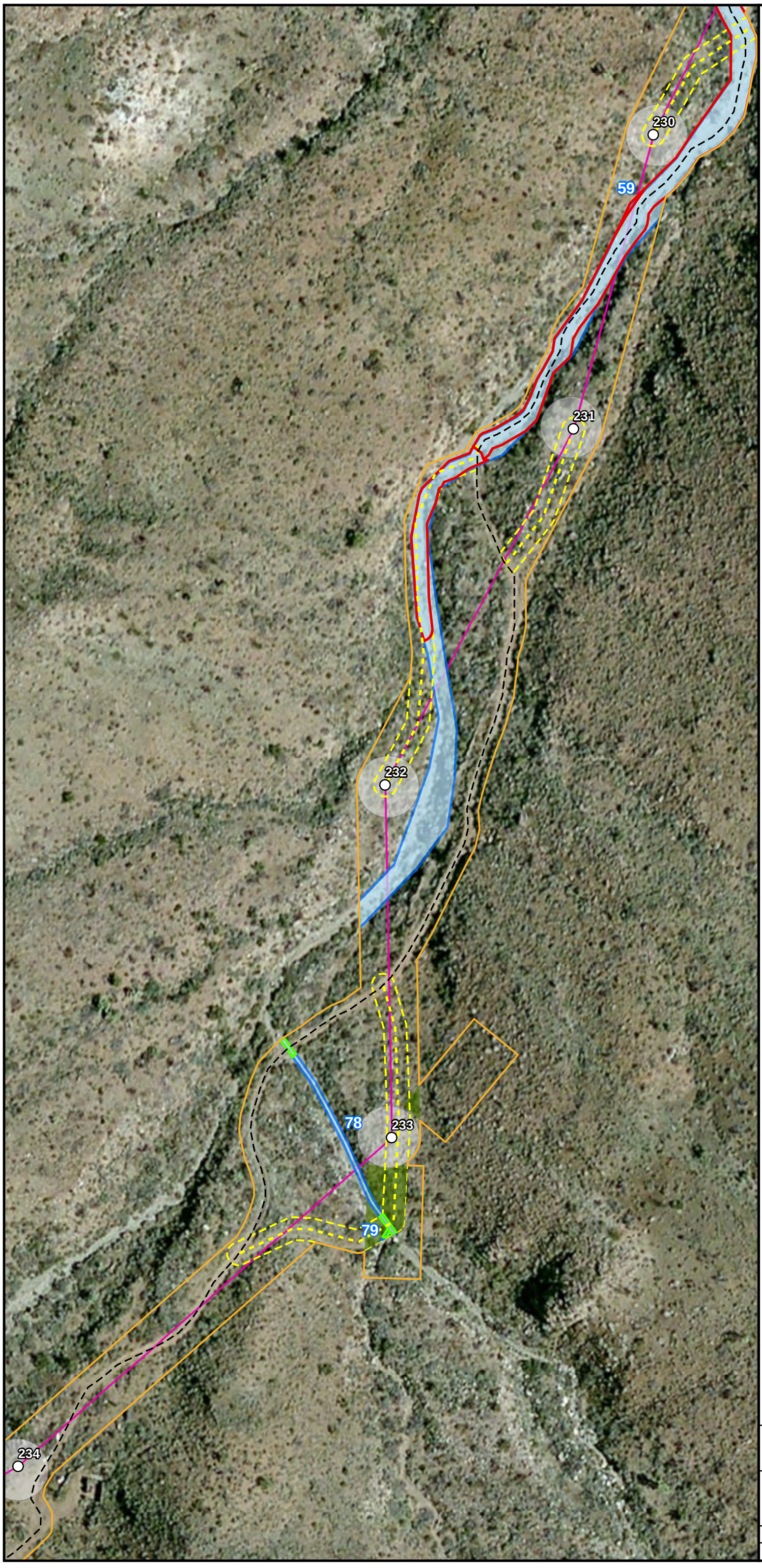
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-45	



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Pull Site (Temporary Impact)
- Existing Access
- Proposed Spur Road (Temporary Impacts)
- Survey Area
- Potentially Jurisdictional Waters

Impacted Drainage

- UES, Permanent Impact, Individual Permit - PCN required
- UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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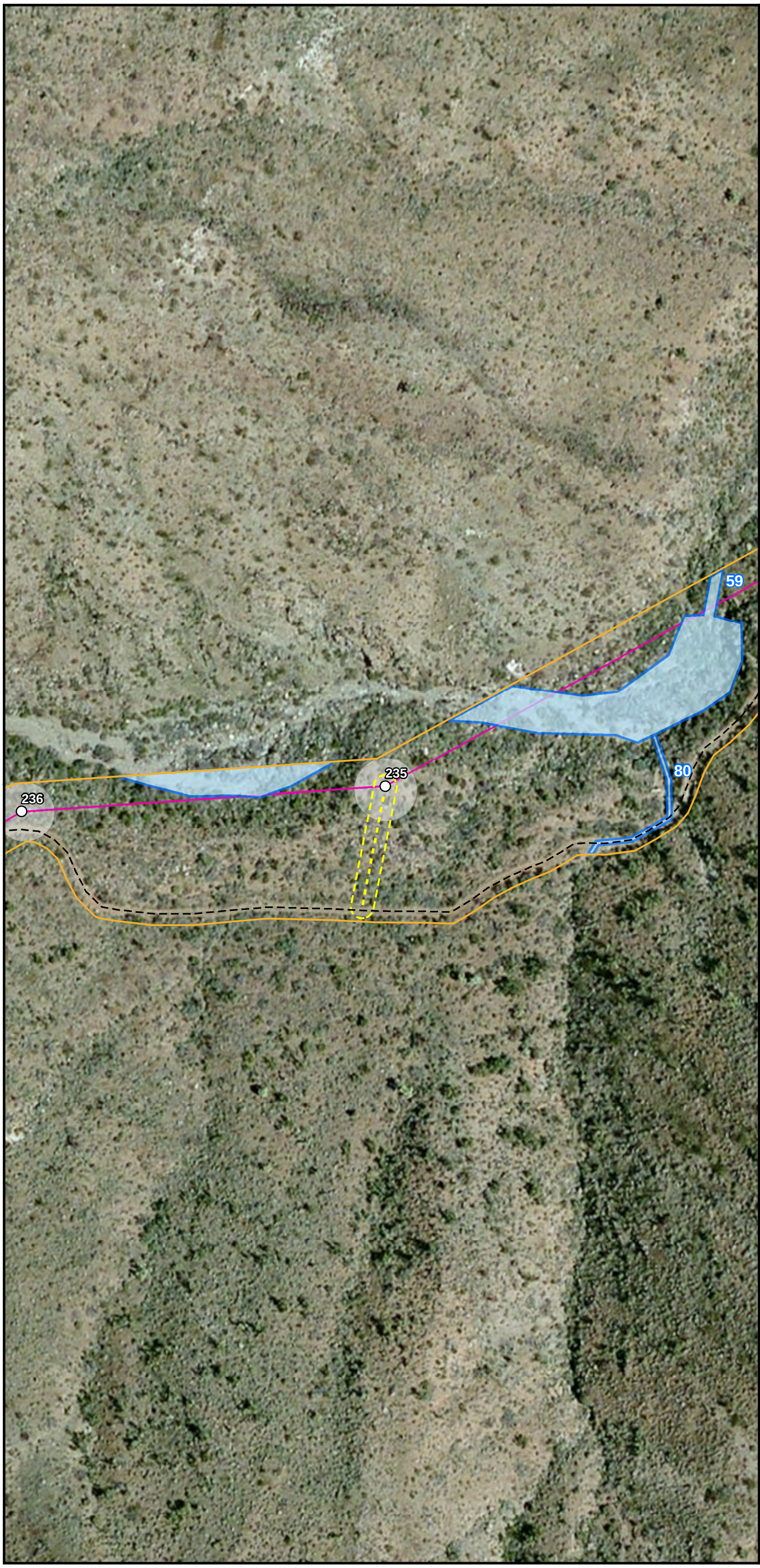
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-46	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

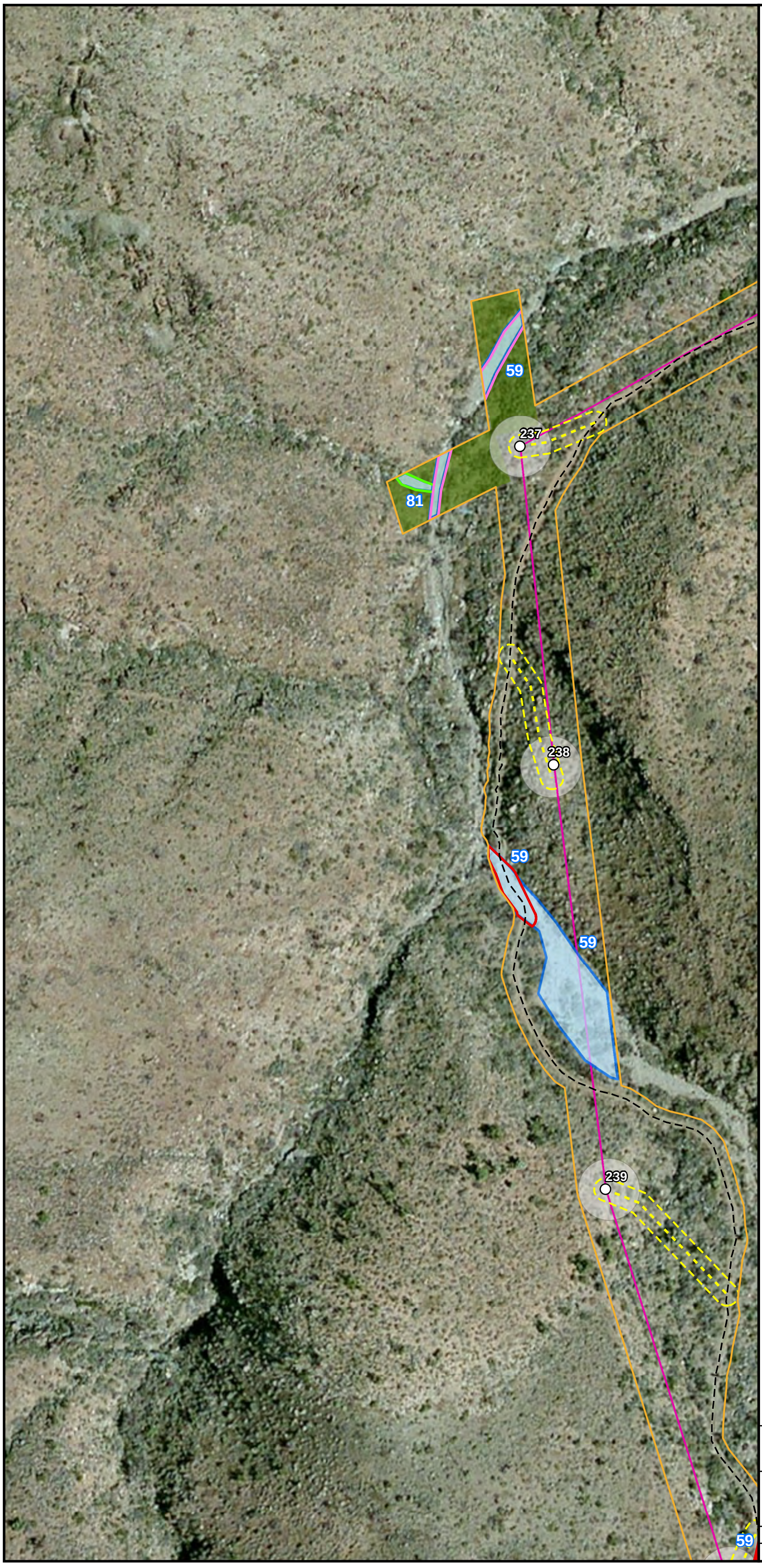
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-47	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Pull Site (Temporary Impact)

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

UES: Temporary Impact, NWP No. 12 - PCN required

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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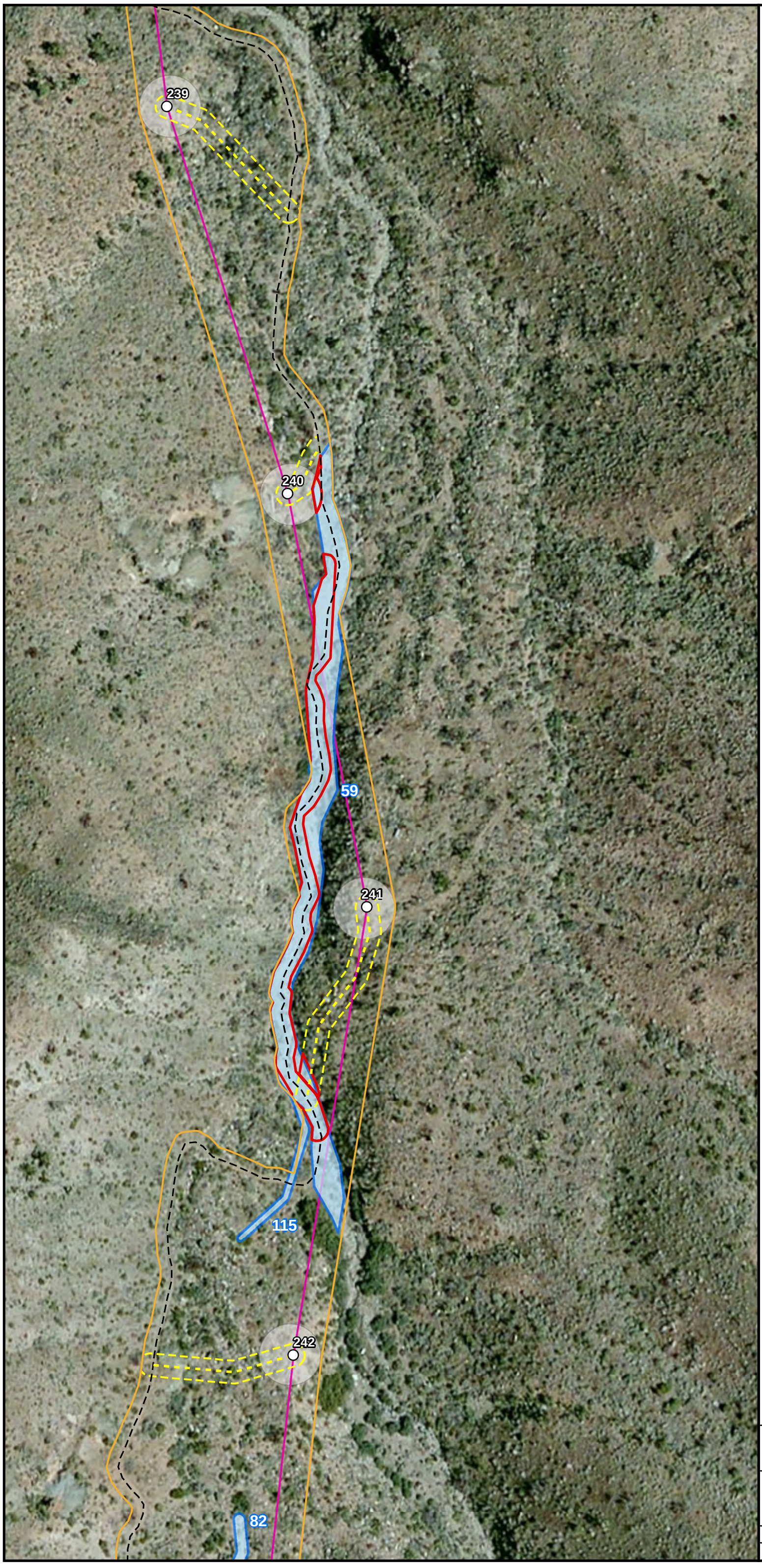
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-48	



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Proposed Spur Road (Temporary Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES, Permanent Impact, Individual Permit - PCN required

Scale 1:1,000

0 25 50 100

Feet

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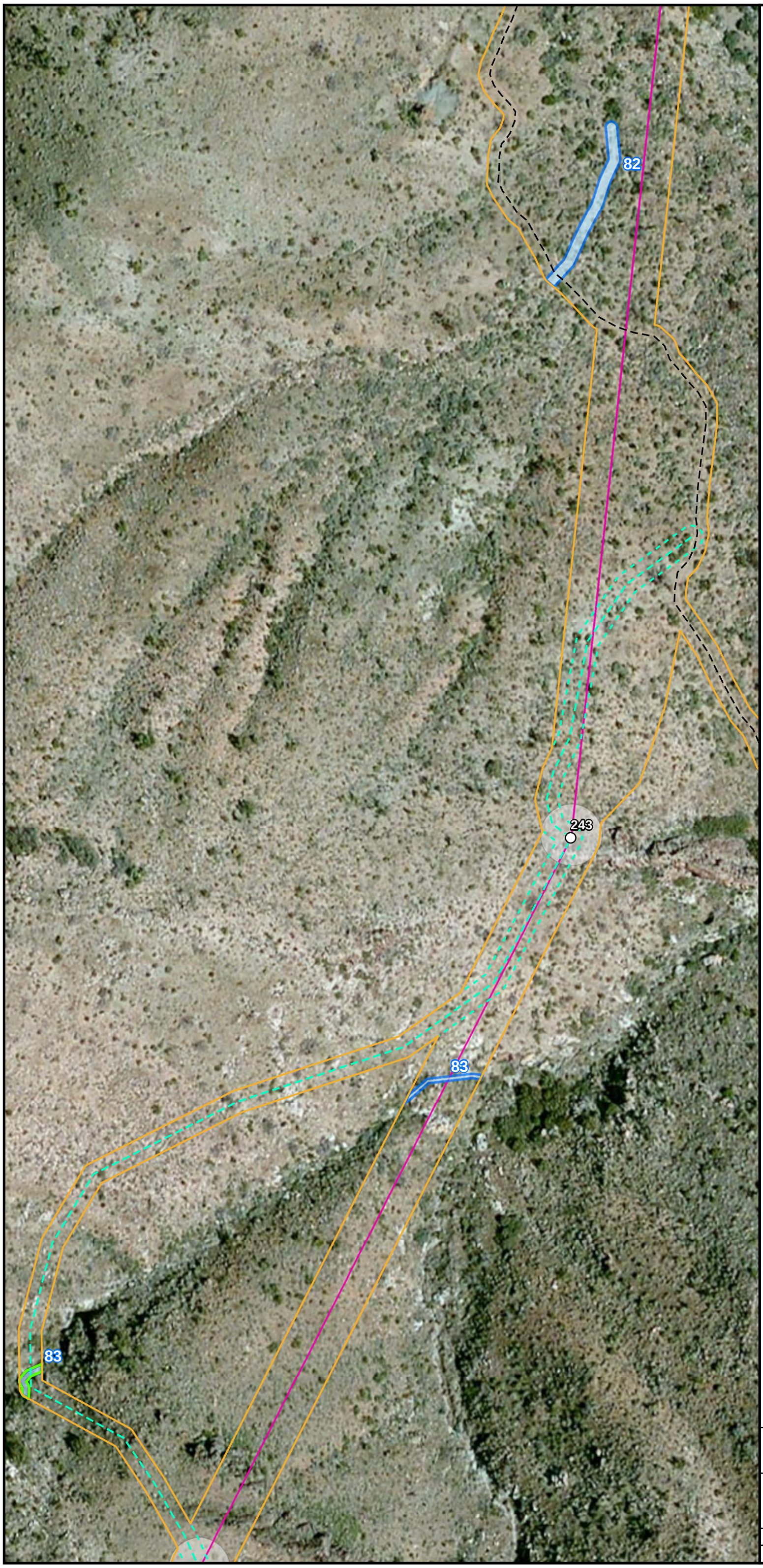
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-49



Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Existing Access

Road Extension

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

UES: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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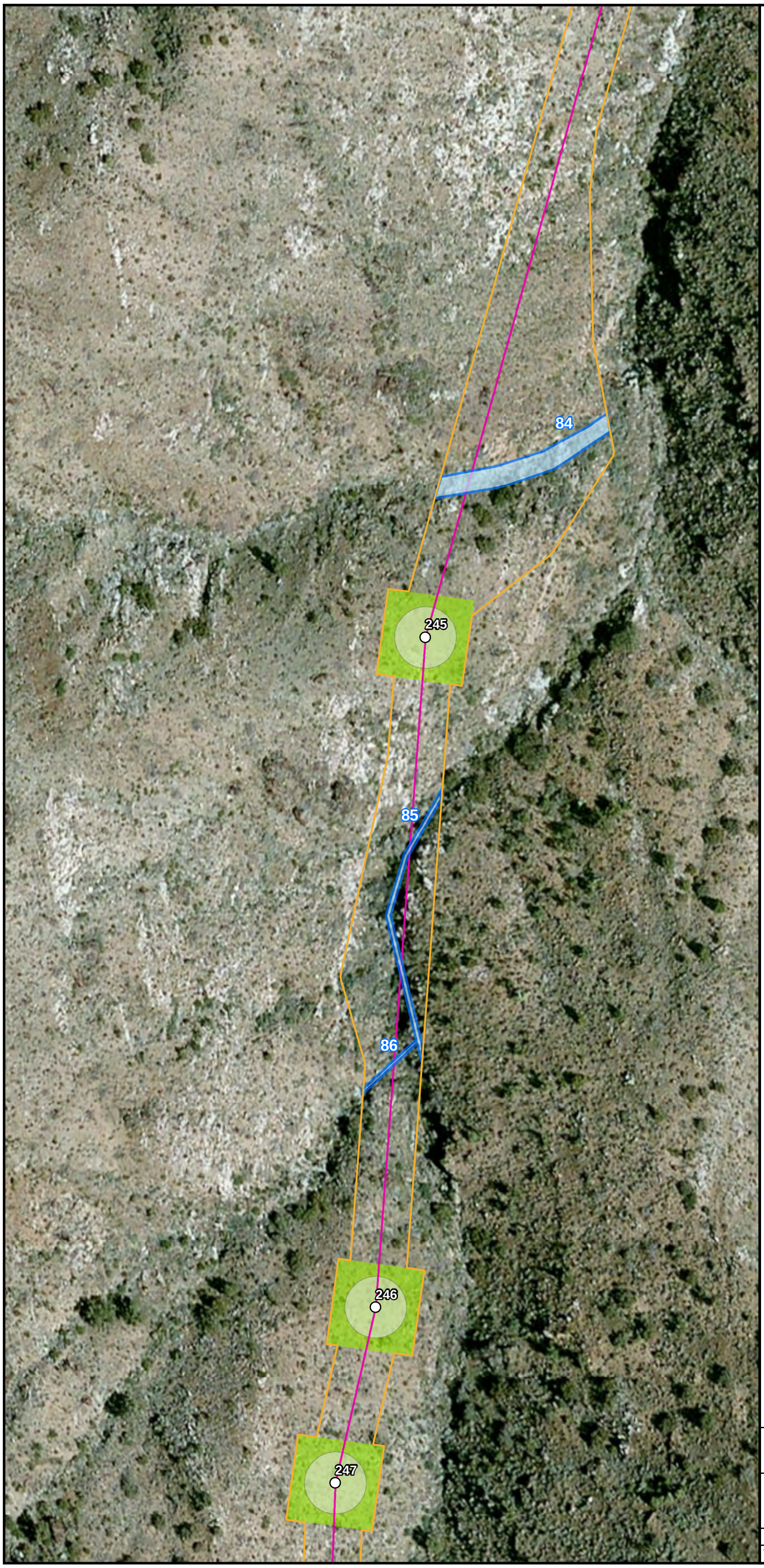
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-50



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Work Pad (Temporary Impact)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

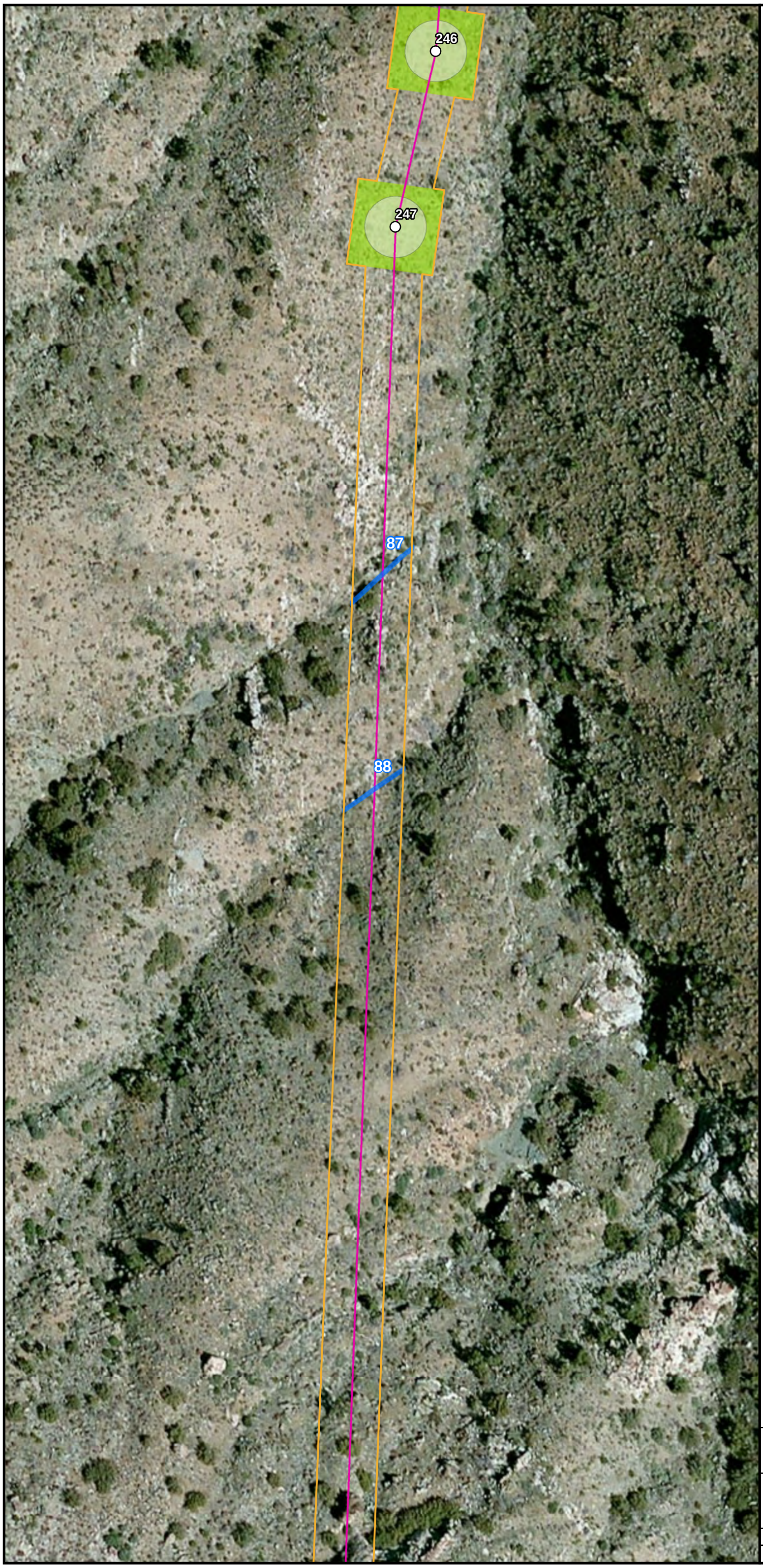
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-51



- Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)
- Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)
- Proposed Distribution Line Wires
- Work Pad (Temporary Impact)
- Survey Area
- Potentially Jurisdictional Waters

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-52	

Proposed Distribution Line Pole (Permanent Impacts 25 sq. ft)

Proposed Distribution Line Pole Construction Area (Temporary Impacts 2,500 sq.ft.)

Proposed Distribution Line Wires

Proposed Communication Site

Maintain and/or Repair of Existing Access Road (Permanent Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-53	

Existing Access Road

Maintain and/or Repair of Existing Access Road (Permanent Impacts)

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

March 2017 | Figure 4-54

Existing Access

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

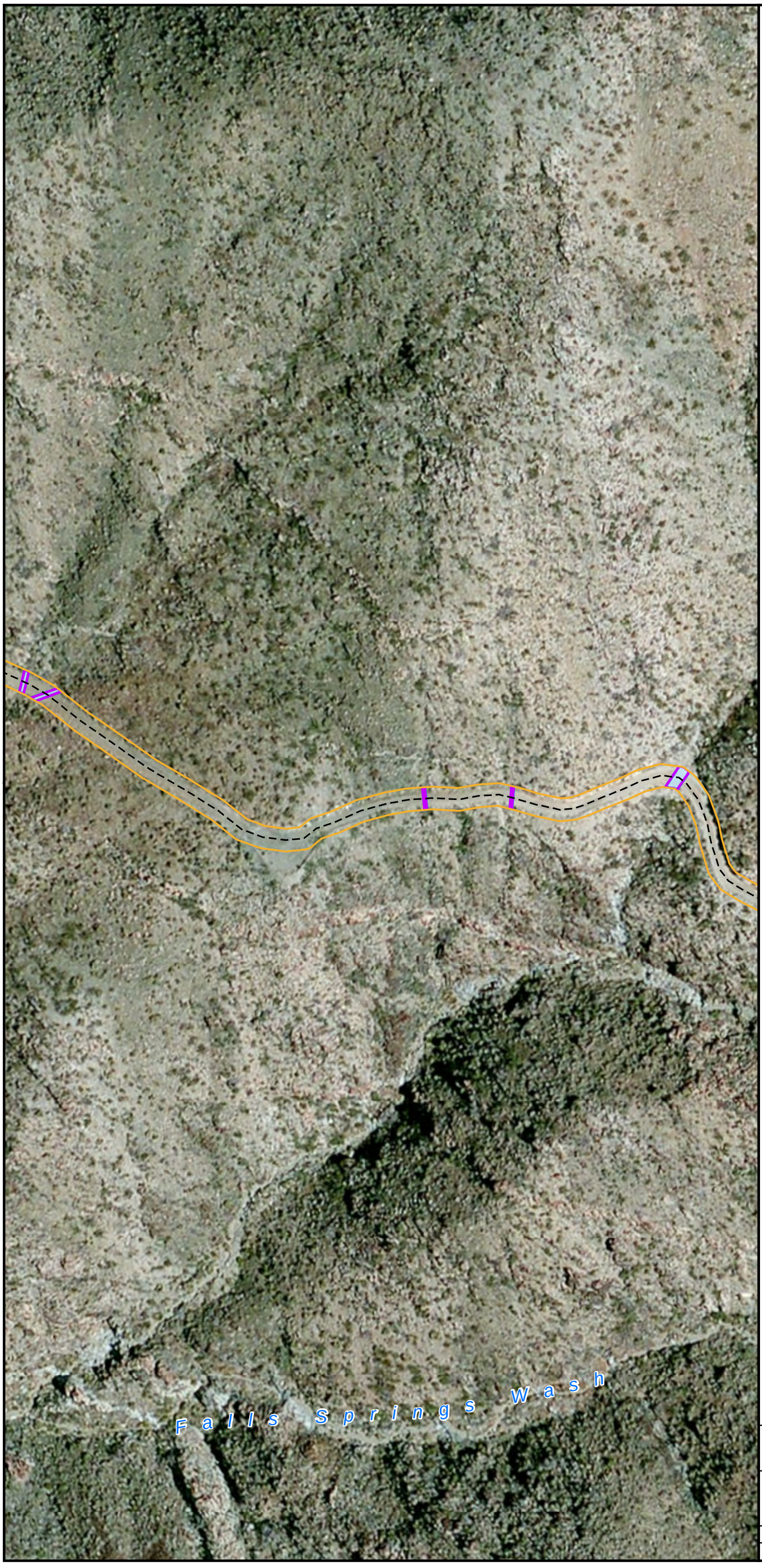
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-55



Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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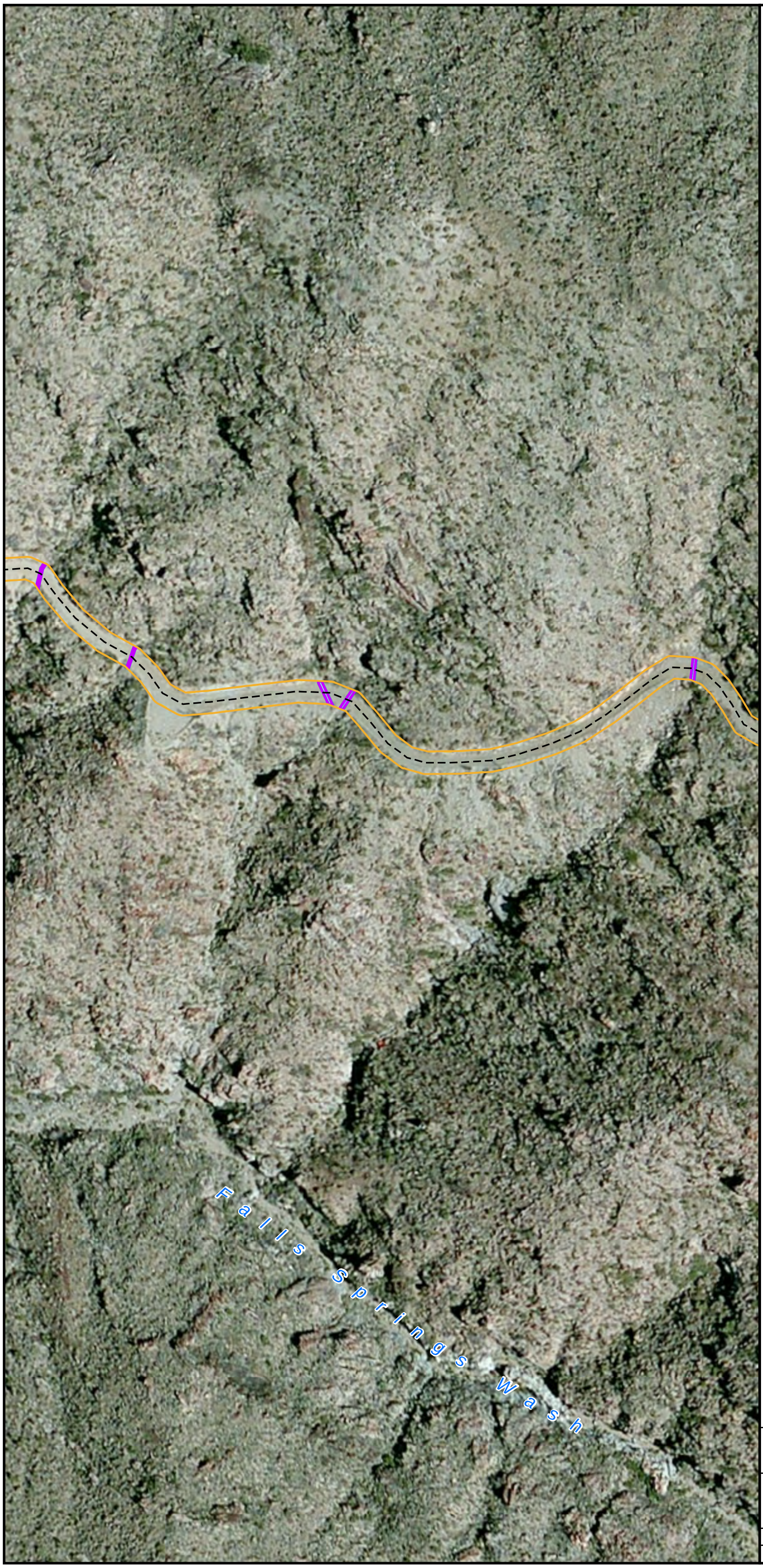
UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-56



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PHOENIX, ARIZONA

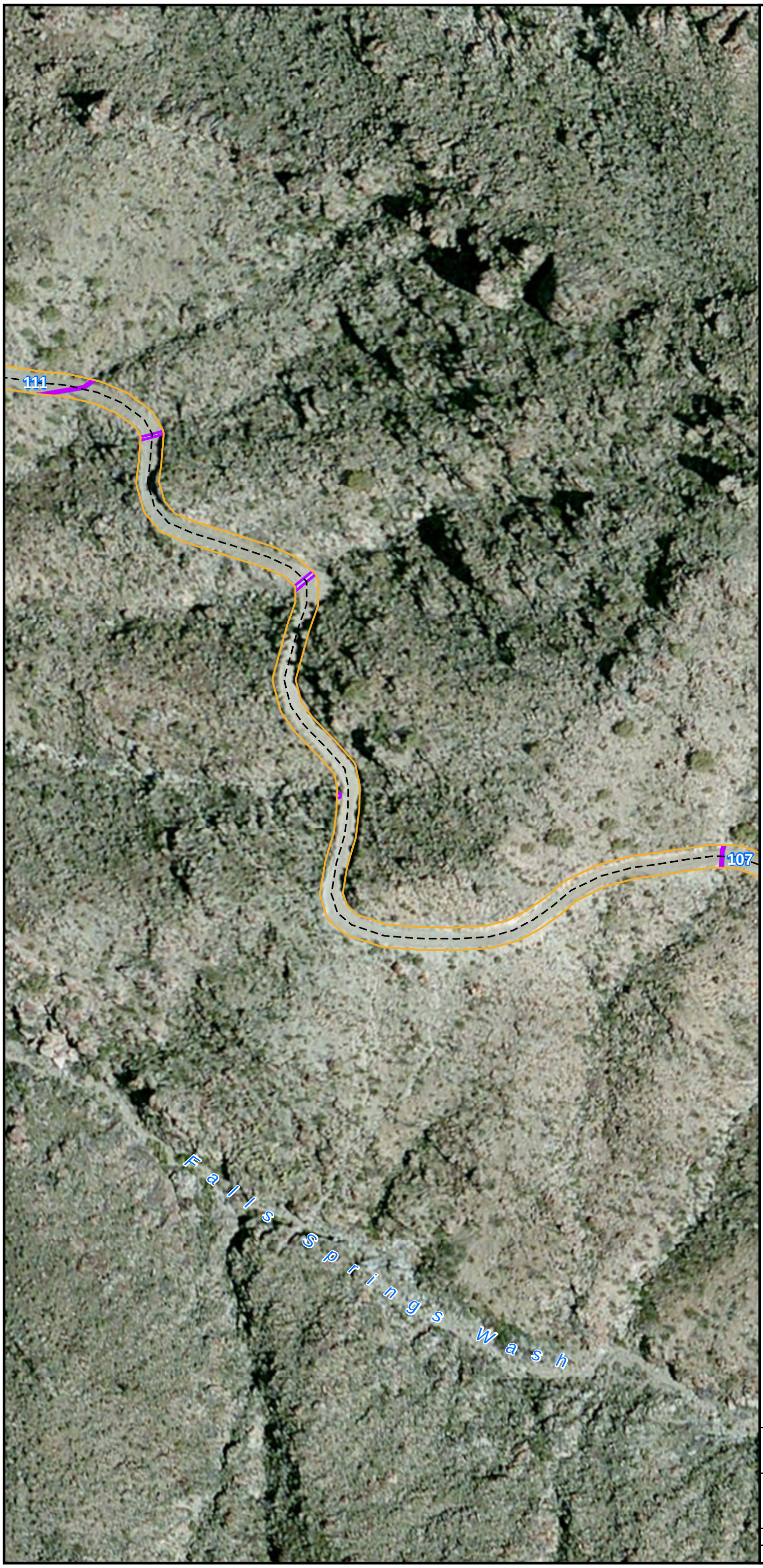
CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-57	



Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-58 |

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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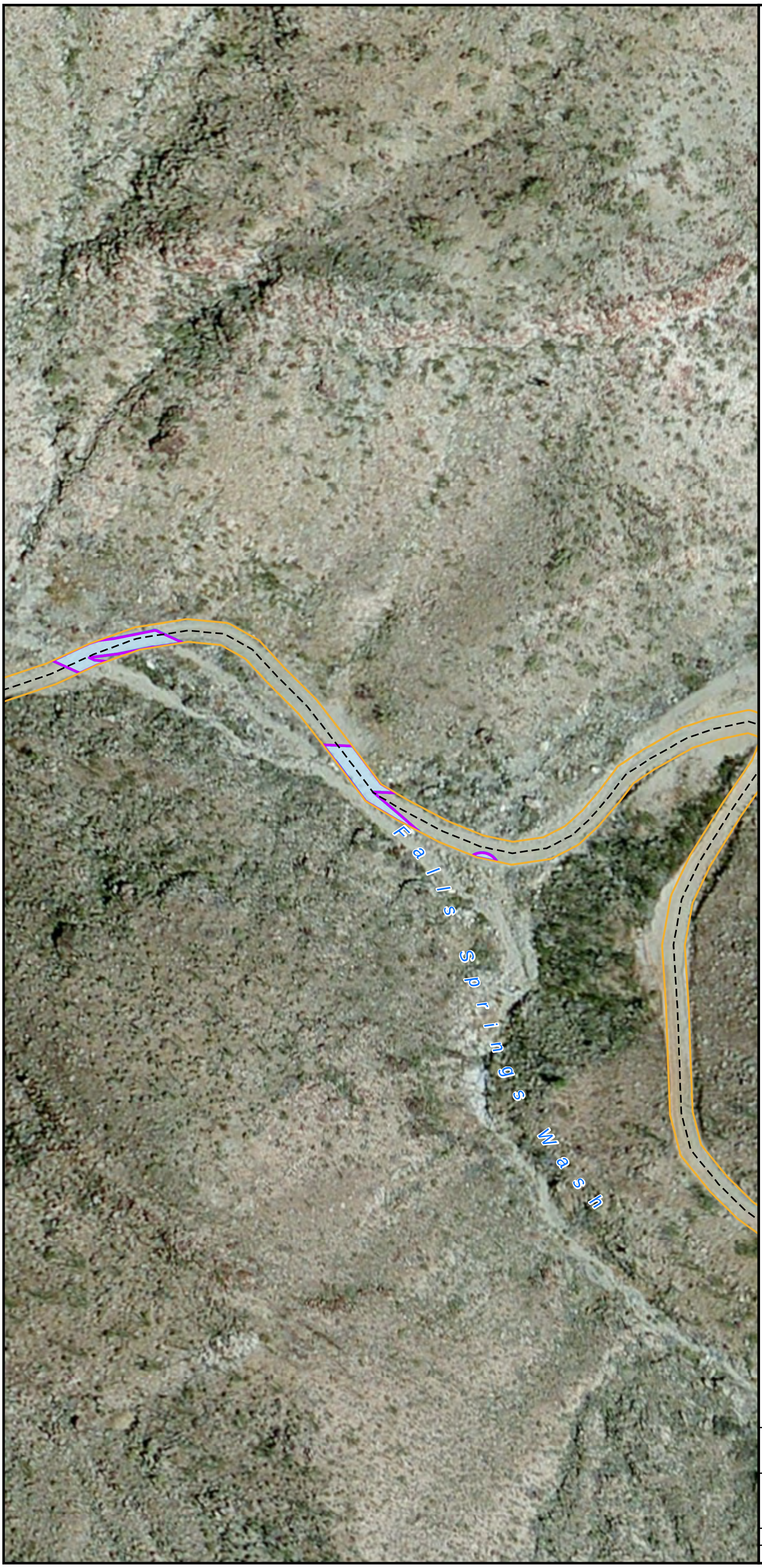
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-59	



Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-60	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-61

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-62

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-63	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-64	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-65 |

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-66	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-67	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-68

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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CROSSMAN PEAK
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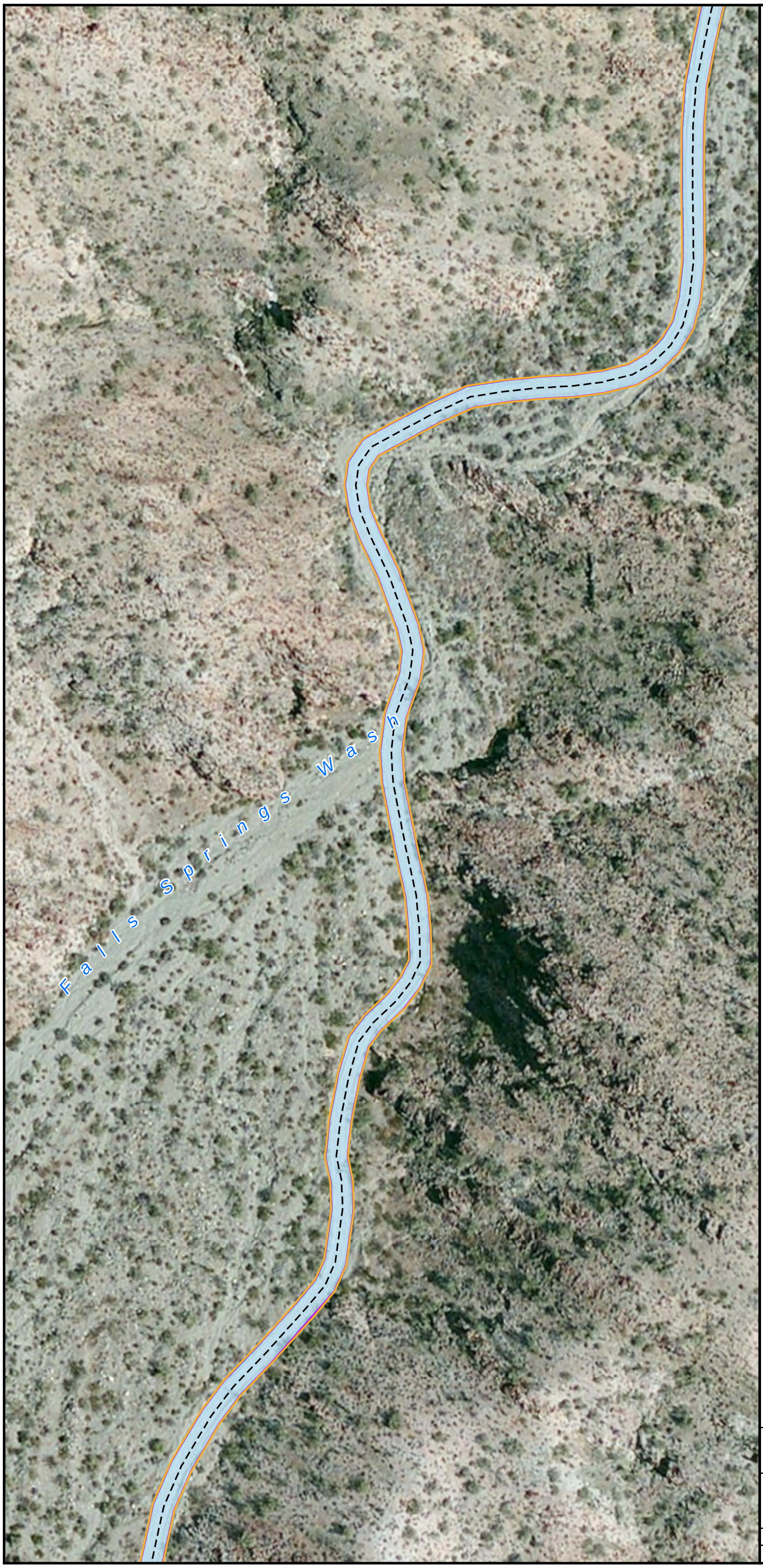
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-69



Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-70

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-71	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-72

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-73

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
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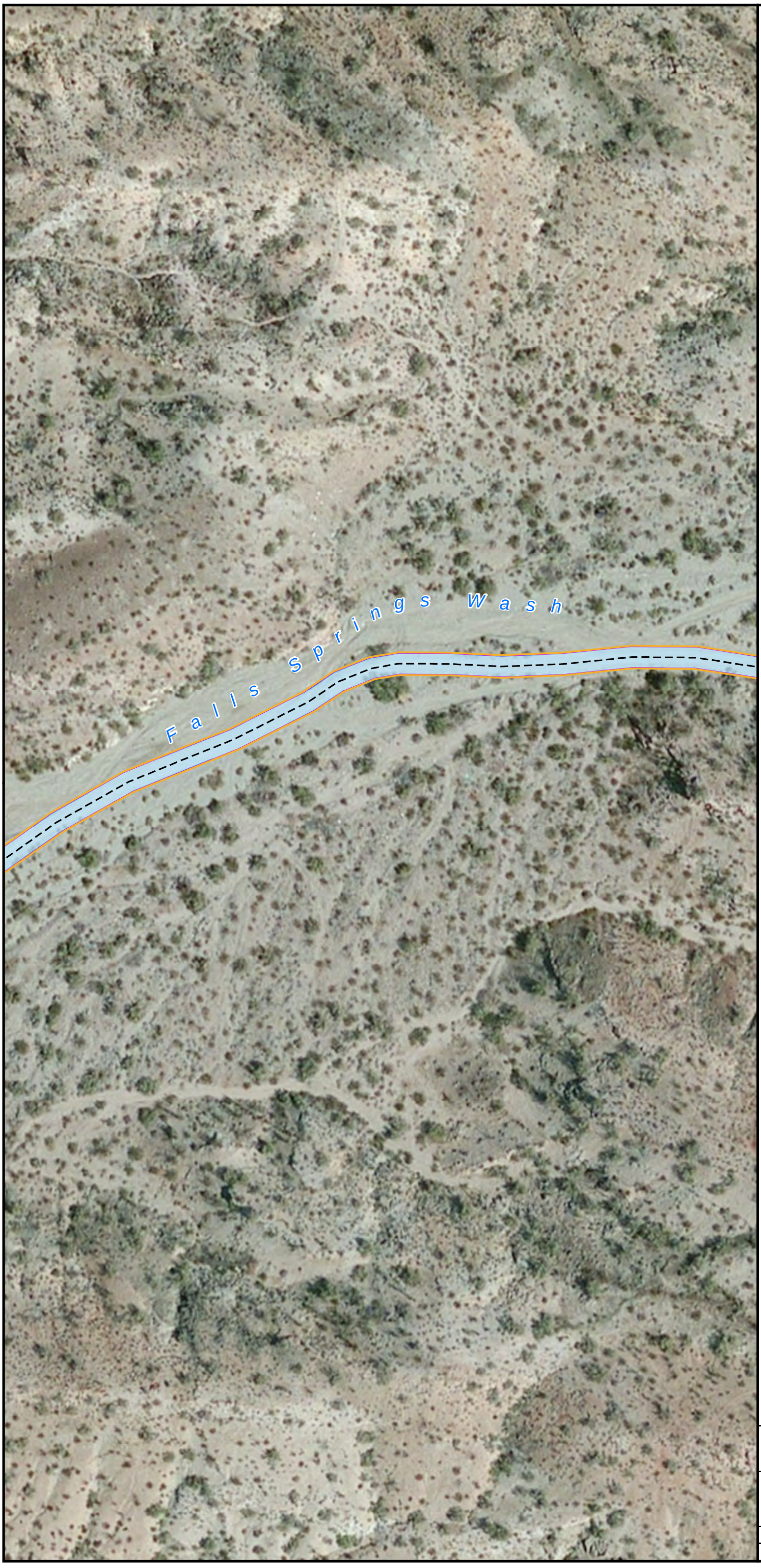
Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-74



Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-75

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

UNITED STATES DEPARTMENT OF ENERGY
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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-76

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-77

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
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PHOENIX, ARIZONA

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-78

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK
COMMUNICATIONS FACILITY
ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-79	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-80	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-81

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-82

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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PHOENIX, ARIZONA

CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-83

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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CROSSMAN PEAK
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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-84	

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-85

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

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Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS | March 2017 | Figure 4-86

Existing Access Road

Survey Area

Potentially Jurisdictional Waters

Impacted Drainage

WAPA: Temporary Impact, NWP No. 12 - no PCN required

Scale 1:1,000

0 25 50 100

Feet

This cartographic product and GIS data were prepared in accordance with professional practice standards. The data represented on this map has been developed from the best available sources. Although efforts have been made to ensure that the data is accurate and reliable, errors may be reflected in the data. Users must be aware of these conditions and bear responsibility for the appropriate use of this map. The data on this map is for reference use only.

UNITED STATES DEPARTMENT OF ENERGY
WESTERN AREA POWER ADMINISTRATION
PHOENIX, ARIZONA

CROSSMAN PEAK COMMUNICATIONS FACILITY

ARIZONA

Jurisdictional Delineation - Drainages

Designed: Aspen EG Approved:

GIS	March 2017	Figure 4-87	

Attachment B – Representative Site Photos

NOTE: Due to the large number of drainages present within the Survey Area, individual photos of each drainage are not included in this report. The images in this attachment are representative photos of some of mapped washes within the Survey Area. Images of all drainages mapped on the ground via GPS are available in digital format.

Photo 1 – View looking west at drainage No. 14.

Photo 2 – View looking south at drainage No. 43.

Photo 3 – View looking downstream at drainage No. 59.

Photo 4 – View looking downstream at drainage No. 59.

Photo 5 – View looking southwest at drainage No. 95.

Photo 6 – View looking west at drainage No. 108.

Photo 7 – View looking northeast at drainage No. 113.

Photo 8 – View looking south at drainage No. 91.

Attachment C – Wetland Indicator Status of Plant Species Observed in the Survey Area

Table C-1. Plant Species Observed in the Survey Area

Latin Name	Common Name	Wetland Indicator Status** Region 7/Arid West
FLOWERING PLANTS		
FILICALES	FERN FAMILIES	
Cheilanthes parryi	Parry's lipfern	--
Pellaea truncata	Spiny cliffbrake	--
EPHEDRACEAE	EPHEDRA FAMILY	
Ephedra aspera (?)	Rough jointfir	--
Ephedra nevedensis	Nevada jointfir	--
PINACEAE	PINE FAMILY	
Pinus monophylla	Singleleaf pinyon	--
AMARANTHACEAE	AMARANTH FAMILY	
Amaranthus fimbriatus	Fringed amaranth	--
Tidestromia oblongifolia	Arizona honeysweet	--
ANACARDIACEAE	SUMAC FAMILY	
Rhus aromatica	Fragrant sumac	FACU
APOCYNACEAE	DOGBANE FAMILY	
Asclepias subulata	Rush milkweed	--
Funastrum hirtellum	Hairy milkweed	--
ASTERACEAE	ASTER FAMILY	
Acourtia wrightii	Brownfoot	--
Ambrosia dumosa	White bur-sage	--
Ambrosia salsola	Common burrobrush	--
Baccharis sergiloides	Desert baccharis	FACU
Baileya multiradiata	Desert marigold	--
Bebbia juncea	Sweetbush	--
Brickellia atractyloides	Spearleaf brickellbush	--
Cirsium neomexicanum (?)	New Mexico thistle	--
Encelia actonii	Acton's brittlebush	--
Encelia farinosa	Brittlebush	--
Ericameria laricifolia	Turpentine bush	--
Ericameria paniculata	Mojave rabbitbrush	--
Machaeranthera pinnatifida	Lacy tansyaster	UPL
Stephanomeria pauciflora	Wire-lettuce	--
Viguiera parishii	Parish's goldeneye	--
Xylorhiza tortifolia	Mojave woodyaster	--
BIGNONIACEAE	TRUMPET CREEPER FAMILY	
Chilopsis linearis	Desert willow	FACU
BORAGINACEAE	BORAGE or WATERLEAF FAMILY	
Amsinckia sp.	Unid. fiddleneck	--
Cryptantha sp.	Unid. annual cryptantha	--
Phacelia sp.	Unid. phacelia	--
BRASSICACEAE	MUSTARD FAMILY	
Arabis sp.	Unid. rockcress	--

Table C-1. Plant Species Observed in the Survey Area

Latin Name	Common Name	Wetland Indicator Status** Region 7/Arid West
* *Brassica tournefortii*	Asian mustard	--
Lepidium lasiocarpum	Shaggyfruit pepperweed	--
CACTACEAE	CACTUS FAMILY	
Carnegiea gigantea	Saguaro	--
Cylindropuntia acanthacarpa	Buckhorn cholla	--
Cylindropuntia bigelovii	Teddy-bear cholla	--
Cylindropuntia echinocarpa (?)	Silver cholla	--
Cylindropuntia ramosissima	Pencil cholla	--
Echinocereus engelmannii	Engelmann's hedgehog cactus	--
Echinocereus triglochidiatus (?)	Kingcup cactus	--
Ferocactus cylindraceus	California barrel cactus	--
Mammillaria tetrancistra	Common fishhook cactus	--
Opuntia basilaris var. *basilaris*	Beavertail cactus	--
Opuntia chlorotica	Dollarjoint pricklypear	--
CELASTRACEAE	STAFF-TREE FAMILY	
Canotia holacantha	Crucifixion thorn	--
CROSSOSOMATACEAE	CROSSOSOMA FAMILY	
Crossosoma bigelovii	Ragged rockflower	--
EUPHORBIACEAE	SPURGE FAMILY	
Chamaesyce polycarpa	Smallseed sandmat	--
Chamaesyce setiloba	Yuma sandmat	--
Tetracoccus hallii (?)	Hall's shrubby-spurge	--
FABACEAE	PEA FAMILY	
Marina parryi	Parry's false prairie-clover	--
Parkinsonia microphylla	Yellow palo verde	--
Senegalia greggii	Catclaw acacia	FACU
Senna covesii	Coues' cassia	--
FAGACEAE	OAK FAMILY	
Quercus sp.	Unid. scrub oak	--
Quercus turbinella	*Sonoran scrub oak*	--
FOUQUIRIACEAE	OCOTILLO FAMILY	
Fouquieria splendens	Ocotillo	--
KRAMERIACEAE	RHATANY FAMILY	
Krameria erecta	Littleleaf ratany	--
LAMIACEAE	MINT FAMILY	
Hyptis emoryi	Desert lavender	--
Monardella arizonica (?)	Arizona monardella	--
Salazaria mexicana	Bladder-sage	--
Salvia columbariae	Chia	--
LOASACEAE	STICK LEAF FAMILY	
Mentzelia involucrate (?)	Whitebract blazingstar	--
MALVACEAE	MALLOW FAMILY	

Table C-1. Plant Species Observed in the Survey Area

Latin Name	Common Name	Wetland Indicator Status** Region 7/Arid West
Sphaeralcea ambigua	Desert globemallow	--
NYCTAGINACEAE	FOUR O'CLOCK FAMILY	
Allionia incarnata	Trailing windmills	--
Boerhavia triquetra	*Slender spiderling*	--
Boerhavia wrightii	Largebract spiderling	--
Mirabilis laevis (?)	Desert wishbone-bush	--
ONAGRACEAE	EVENING PRIMROSE FAMILY	
Camissonia californica (?)	California suncup	--
POLYGONACEAE	BUCKWHEAT FAMILY	
Eriogonum deflexum	Skeleton weed	--
Eriogonum fasciculatum	Eastern Mojave buckwheat	--
Eriogonum heermannii	Heermann's buckwheat	--
Eriogonum inflatum	Desert trumpet	--
Eriogonum sp.	Unid. annual buckwheat	--
Eriogonum wrightii	Bastardsage	--
RUBIACEAE	BEDSTRAW FAMILY	
Galium stellatum	Starry bedstraw	--
RUTACEAE	RUE FAMILY	
Thamnosma montana	Turpentinebroom	--
SOLANACEAE	NIGHTSHADE FAMILY	
Lycium andersoni	Water jacket	--
Nicotiana obtusifolia	Desert tobacco	FACU
Physalis crassifolia	Yellow groundcherry	--
TAMARICACEAE	TAMARISK FAMILY	
* *Tamarix ramosissima*	Tamarisk	--
VERBENACEAE	VERBENA FAMILY	
Glandularia gooddingii	Southwestern mock vervain	--
VISCACEAE	MISTLETOE FAMILY	
Phoradendron californicum	Desert mistletoe (on *Senegalia greggii* and *Parkinsonia microphylla*)	--
Phoradendron juniperinum	Juniper mistletoe (on *Pinus monophylla*)	--
ZYGOPHYLLACEAE	CALTROP FAMILY	
Larrea tridentata	Creosote bush	--
AGAVACEAE	AGAVE FAMILY	
Agave deserti	Desert agave	--
Yucca brevifolia	Joshua tree	--
LILIACEAE	LILY FAMILY	
Nolina parryi	Parry's beargrass	--
POACEAE	GRASS FAMILY	
Achnatherum hymenoides	Indian ricegrass	UPL

Table C-1. Plant Species Observed in the Survey Area

	Latin Name	Common Name	Wetland Indicator Status** Region 7/Arid West
	Achnatherum speciosum (?)	Desert needlegrass	--
	Aristida adscensionis	Sixweeks three-awn grass	--
	Aristida sp.	Unid. perennial three awn	--
	Bouteloua aristidoides	Needle grama	--
	Bouteloua barbata	Sixweeks grama	--
	Bouteloua curipendula	Sideoats grama	--
*	*Bromus madritensis*	Compact brome	--
*	*Cynodon dactylon*	Bermudagrass	FACU
	Dasyochloa pulchella	Low woollygrass	--
	Hilaria rigida	Big galleta	--
	Muhlenbergia microsperma	Littleseed muhly	--
	Tridens muticus	Slim tridens	FAC

* = Alien species

** = Wetland Indicator Status (USACE, 2007; USACE, 2012)

-- A wetland indicator status has not been assigned to these species.

This list includes only species observed within the biological Survey Area. Others may have been overlooked or unidentifiable due to season (many plants are identifiable only in spring). Plants were identified using keys, descriptions, and illustrations in Kearney and Peebles (1951), Baldwin et al (2002), and Flora of North America (FNA: 1993+). Plant taxonomy and nomenclature generally follow USDA (2016).

Attachment D – Mapped Drainage Impact Information

Table D-1. Mapped Drainages Meeting the Definition of "Waters of the U.S." within UES Distribution Line Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
1	10	0.010	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
2	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
3	2	0.004	0.002	0.000	Ephemeral Desert Wash	Yes	No
4	2	0.005	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
5	4	0.035	0.002	0.000	Ephemeral Desert Wash	Yes	No
6	8	0.035	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
7	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
8	2	0.000	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
9	6	0.033	0.005	0.000	Ephemeral Desert Wash	Yes	No
10	4	0.004	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
11	3	0.007	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
12	2	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
13	2	0.004	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
14	5	0.026	0.002	0.000	Ephemeral Desert Wash	Yes	No
15	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
16	1	0.004	0.001	0.000	Ephemeral Desert Wash	Yes	No
17	1	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
18	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
19	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
20	5	0.028	0.005	0.000	Ephemeral Desert Wash	Yes	No
21	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
22	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
23	4	0.018	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
24	3	0.006	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
25	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
26	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
27	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A

Table D-1. Mapped Drainages Meeting the Definition of "Waters of the U.S." within UES Distribution Line Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
28	1	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
29	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
30	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
31	1	0.007	0.001	0.000	Ephemeral Desert Wash	Yes	No
32	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
33	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
34	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
35	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
36	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
37	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
38	2	0.008	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
39	6	0.009	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
40	14	0.031	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
41	8	0.035	0.055	0.000	Ephemeral Desert Wash	Yes	No
42	6	0.028	0.006	0.000	Ephemeral Desert Wash	Yes	No
43	86	0.312	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
44	4	0.034	0.014	0.000	Ephemeral Desert Wash	Yes	No
45	1	0.003	0.001	0.000	Ephemeral Desert Wash	Yes	No
46	2	0.009	0.001	0.000	Ephemeral Desert Wash	Yes	No
47	1	0.003	0.002	0.000	Ephemeral Desert Wash	Yes	No
48	2	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
49	10	0.018	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
50	1	0.004	0.001	0.000	Ephemeral Desert Wash	Yes	No
51	1	0.000	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
52	1	0.000	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
53	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
54	1	0.000	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
55	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A

Table D-1. Mapped Drainages Meeting the Definition of "Waters of the U.S." within UES Distribution Line Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
56	1	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
57	1	0.000	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
58	5	0.027	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
59	10	28.079	0.555	1.826∞	Ephemeral Desert Wash	No	Yes
60	1	0.002	0.001	0.000	Ephemeral Desert Wash	Yes	No
61	25	0.098	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
62	2	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
63	2	0.006	0.002	0.000	Ephemeral Desert Wash	Yes	No
64	1	0.003	0.001	0.000	Ephemeral Desert Wash	Yes	No
65	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
66	2	0.007	0.001	0.000	Ephemeral Desert Wash	Yes	No
67	4	0.014	0.002	0.000	Ephemeral Desert Wash	Yes	No
68	2	0.002	0.001	0.000	Ephemeral Desert Wash	Yes	No
69	2	0.002	0.000	0.000	Ephemeral Desert Wash	Yes	No
70	20	0.016	0.016	0.000	Ephemeral Desert Wash	Yes	No
71	2	0.011	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
72	1	0.001	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
73	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
74	1	0.002	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
75	2	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
76	2	0.004	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
77	2	0.005	0.004	0.000	Ephemeral Desert Wash	Yes	No
78	4	0.018	0.004	0.000	Ephemeral Desert Wash	Yes	No
79	3	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
80	4	0.014	0.000	0.000	Ephemeral Desert Wash	Yes	No
81	10	0.007	0.007	0.000	Ephemeral Desert Wash	Yes	No
82	10	0.036	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
83	4	0.012	0.005	0.000	Ephemeral Desert Wash	Yes	No

Table D-1. Mapped Drainages Meeting the Definition of "Waters of the U.S." within UES Distribution Line Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
84	20	0.067	0.000	0.000	Ephemeral Desert Wash	Yes	No
85	4	0.022	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
86	3	0.005	0.000	0.000	Ephemeral Desert Wash	Yes	No
87	2	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
88	2	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
115	6	0.020	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
Total Acreage		29.263	0.701	1.826			

* Average width of drainage occurring within the Impact Area.

** Unless otherwise indicated all mapped drainages are ephemeral in nature.

∞ Proposed activities do not qualify for use of NWP No. 12 and an individual permit would be required. A PCN is a required condition of individual permits.

Table D-2. Mapped Drainages Meeting the Definition of "Waters of the U.S." within WAPA Communications Site and Access Road Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
89	8	0.003	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
90	6	0.002	0.000	0.000	Ephemeral Desert Wash	Yes	No
91	10	0.004	0.000	0.000	Ephemeral Desert Wash	N/A	N/A
92	6	0.008	0.003	0.000	Ephemeral Desert Wash	Yes	No
93	6	0.013	0.006	0.000	Ephemeral Desert Wash	Yes	No
94	4	0.002	0.000	0.000	Ephemeral Desert Wash	Yes	No
95	12	0.006	0.006	0.000	Ephemeral Desert Wash	Yes	No
96	4	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No
97	10	0.005	0.005	0.000	Ephemeral Desert Wash	Yes	No
98	2	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
99	2	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
100	4	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No

Table D-2. Mapped Drainages Meeting the Definition of "Waters of the U.S." within WAPA Communications Site and Access Road Portion of the Survey Area

Drainage No.	Width* (feet)	Acreage of Drainage within Survey Area	Acreage of Drainage in Project Impact Area		Drainage Type**/Name	NWP No. 12	
			Temporary Impact	Permanent Impact		Meets Usage Requirements	PCN Required
101	4	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No
102	3	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
103	3	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
104	3	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No
105	2	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
106	2	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
107	2	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
108	4	0.000	0.000	0.000	Ephemeral Desert Wash	Yes	No
109	4	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No
110	3	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
111	2	0.002	0.002	0.000	Ephemeral Desert Wash	Yes	No
112	3	0.001	0.001	0.000	Ephemeral Desert Wash	Yes	No
113	30	10.900	10.427	0.000	Ephemeral Desert Wash / Falls Springs Wash	Yes	No
114	20	0.845	0.726	0.000	Ephemeral Desert Wash	Yes	No
Total Acreage		11.810	11.196	0.00			

* Average width of drainage occurring within the Impact Area.

** Unless otherwise indicated all mapped drainages are ephemeral in nature.

Attachment E – Federal Waters/Wetlands Delineation Methods

E.1 Federal Non-Wetland Waters Delineation Methods

Jurisdictional non-wetland "waters of the U.S." were delineated based on the limits of the ordinary high water marks (OHWM) as determined by changes in physical and biological features, such as bank erosion, deposited vegetation or debris, and vegetation characteristics. Geomorphic and vegetative indicators used are presented in Tables E-1 and E-2.

Table E-1. Potential Geomorphic Indicators of Ordinary High Water Marks for the Arid West

(A) Below OHW	(B) At OHW	(C) Above OHW
1. In-stream dunes 2. Crested ripples 3. Flaser bedding 4. Harrow marks 5. Gravel sheets to rippled sands 6. Meander bars 7. Sand tongues 8. Muddy point bars 9. Long gravel bars 10. Cobble bars behind obstructions 11. Scour holes downstream of obstructions 12. Obstacle marks 13. Stepped-bed morphology in gravel 14. Narrow berms and levees 15. Streaming lineations 16. Desiccation/mud cracks 17. Armored mud balls 18. Knick Points	1. Valley flat 2. Active floodplain 3. Benches: low, mid, most prominent 4. Highest surface of channel bars 5. Top of point bars 6. Break in bank slope 7. Upper limit of sand-sized particles 8. Change in particle size distribution 9. Staining of rocks 10. Exposed root hairs below intact soil layer 11. Silt deposits 12. Litter (organic debris, small twigs and leaves) 13. Drift (organic debris, larger than twigs)	1. Desert pavement 2. Rock varnish 3. Clast weathering 4. Salt splitting 5. Carbonate etching 6. Depositional topography 7. Caliche rubble 8. Soil development 9. Surface color/tone 10. Drainage development 11. Surface relief 12. Surface rounding

Table E-2. Potential Vegetation Indicators of Ordinary High Water Marks for the Arid West

	(D) Below OHW	(E) At OHW	(F) Above OHW
Hydroriparian indicators	1. Herbaceous marsh species 2. Pioneer tree seedlings 3. Sparse, low vegetation 4. Annual herbs, hydromesic ruderals 5. Perennial herbs, hydromesic clonals	1. Annual herbs, hydromesic ruderals 2. Perennial herbs, hydromesic clonals 3. Pioneer tree seedlings 4. Pioneer tree saplings	1. Annual herbs, xeric ruderals 2. Perennial herbs, non-clonal 3. Perennial herbs, clonal and non-clonal co-dominant 4. Mature pioneer trees, no young trees 5. Mature pioneer trees w/upland species 6. Late-successional species
Mesoriparian Indicators	6. Pioneer tree seedlings 7. Sparse, low vegetation 8. Pioneer tree saplings 9. Xeroriparian species	5. Sparse, low vegetation annual herbs, hydromesic 6. ruderals 7. Perennial herbs, hydromesic clonals 8. Pioneer tree seedlings 9. Pioneer tree saplings 10. Xeroriparian species 11. Annual herbs, xeric ruderals	7. Xeroriparian species 8. Annual herbs, xeric ruderals 9. Perennial herbs, non-clonal 10. Perennial herbs, clonal and non-clonal codominent 11. Mature pioneer trees, no young trees 12. Mature pioneer trees, xeric understory 13. Mature pioneer trees w/upland species 14. Late-successional species 15. Upland species

Table E-2. Potential Vegetation Indicators of Ordinary High Water Marks for the Arid West

	(D) Below OHW	(E) At OHW	(F) Above OHW
Xeroriparian indicators	10. Sparse, low vegetation 11. Xeroriparian species 12. Annual herbs, xeric ruderals	12. Sparse, low vegetation 13. Xeroriparian species 14. Annual herbs, xeric ruderals	16. Annual herbs, xeric ruderals 17. Mature pioneer trees w/upland species 18. Upland species

E.2 Federal Wetland Delineation Methods

Vegetation

Plant species in each stratum (tree, sapling/shrub, herb, and woody vine) were ranked according to their canopy dominance (USACE, 2008). Beginning with the species with the highest coverage, species that contributed to a cumulative coverage total of at least 50 percent, and any species that comprised at least 20 percent of the total coverage for each stratum were recorded on the Field Data Sheets (50/20 Rule). The wetland indicator status was assigned to each dominant species using the National Wetland Plant List (USACE, 2014) for Region 7 (Southwest Region) and Wetland Plants of Specialized Habitats in the Arid West (USACE, 2007). As shown in Table E-3, if greater than 50 percent of the dominant species from all strata were Obligate, Facultative-wetland, or Facultative species, the criteria for wetland vegetation was considered to be met.

Table E-3. Summary of Wetland Indicator Status

Category		Probability
Obligate Wetland	OBL	Almost always occur in wetlands (estimated probability >99%)
Facultative Wetland	FACW	Usually occur in wetlands (estimated probability of 67–99%)
Facultative	FAC	Equally likely to occur in wetlands/non-wetlands (estimated probability of 34–66%)
Facultative Upland	FACU	Usually occur in non-wetlands (estimated probability 67–99%)
Obligate Upland	UPL	Almost always occur in non-wetlands (estimated probability >99%)
Non-Indicator	NI	No indicator status has been assigned

Source: Reed, 1988

Hydrology

The presence of wetland hydrology was evaluated by recording the extent of observed primary and secondary indicators (USACE, 2008). Such indicators as, but not limited to surface water or saturated soils (both Group A indicators) would be recorded if observed within the Project area. The Arid West Supplement includes two additional indicator groups that can be utilized during dry conditions or in areas where surface water/saturated soils are not present including Group B (evidence of recent inundation) and Group C (evidence of recent soil saturation) (USACE, 2008). The indicators are divided into two categories (primary and secondary indicators) and the presence of one primary indicator from any of the groups is considered evidence of wetland hydrology. These indicators are intended to be one-time observations of site conditions representing evidence of wetland hydrology when hydrophytic vegetation and hydric soils are present (USACE, 2008).

Table E-4. Wetland Hydrology Indicators*

Primary Indicators	Secondary Indicators
Watermarks	Oxidized Rhizospheres Associated with Living Roots
Water-Borne Sediment Deposits	FAC-Neutral Test
Drift Lines	Water-Stained Leaves
Drainage Patterns Within Wetlands	Local Soil Survey Data

*Table adapted from 1987 USACE Manual and Related Guidance Documents.

Table E-5. Wetland Hydrology Indicators for the Arid West*

	Primary Indicator (any one indicator is sufficient to make a determination that wetland hydrology is present)	Secondary Indicator (two or more indicators are required to make a determination that wetland hydrology is present)
Group A – Observation of Surface Water or Saturated Soils		
A1 – Surface Water	X	
A2 – High Water Table	X	
A3 – Saturation	X	
Group B – Evidence of Recent Inundation		
B1 – Water Marks	X (Non-riverine)	X (Riverine)
B2 – Sediment Deposits	X (Non-riverine)	X (Riverine)
B3 – Drift Deposits	X (Non-riverine)	X (Riverine)
B6 – Surface Soil Cracks	X	
B7 – Inundation Visible on Aerial Imagery	X	
B9 –Water-Stained Leaves	X	
B10 – Drainage	X	X
B11 – Salt Crust	X	
B12 – Biotic Crust	X	
B13 – Aquatic Invertebrates	X	
Group C – Evidence of Current or Recent Soil Saturation		
C1 – Hydrogen Sulfide Odor	X	
C2 – Dry-Season Water Table		X
C3 – Oxidized Rhizospheres along Living Roots	X	
C4 – Presence of Reduced Iron	X	
C6 – Recent Iron Reduction in Tilled Soils	X	
C7 – Thin Muck Surface	X	
C8 – Crayfish Burrows		X
C9 – Saturation Visible on Aerial Imagery		X
Group D – Evidence from other Site Conditions or Data		
D3 – Shallow Aquitard		X
D5 – FAC-Neutral Test		X

*Table adapted from Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0.

Soils

Historic soil data from the National Resource Conservation Society (NRCS) was used to determine if and where hydric soils could be present (2014a and 2014b). Refer to Section 3.4 of the delineation report for a detailed description of soils that have historically occurred in the Project area. Soil pits, if necessary, were excavated in areas containing both wetland vegetation and hydrology in an effort to document the soil structure regardless of whether or not hydric soils were mapped. Soil pits were dug to a depth of 20 inches where possible (USACE, 2008). At each soil pit, the soil texture and color were recorded by comparison with standard plates within a Munsell soil color chart (2000). Any other indicators of hydric soils, such as redoximorphic features, buried organic matter, organic streaking, reduced soil conditions, gleyed or low-chroma soils were also recorded.

Table E-6. Field Indicators of Hydric Soil Conditions*

1. Indicators of Historical Hydric Soil Conditions	2. Indicators of Current Hydric Soil Conditions
a. Histosols b. Histic epipedons; c. Soil colors (e.g., gleyed or low-chroma colors, soils with bright mottles (Redoximorphic features) and/or depleted soil matrix d. High organic content in surface of sandy soils e. Organic streaking in sandy soils f. Iron and manganese concretions g. Soil listed on county hydric soils list	a. Aquic or peraquic moisture regime (inundation and/or soil saturation for *7 continuous days) b. Reducing soil conditions (inundation and/or soil saturation for *7 continuous days) c. Sulfidic material (rotten egg smell)

*Table adapted from 1987 USACE Manual and Related Guidance Documents.

Table E-7. Hydric Soil Indicators for the Arid West*

Hydric Soil Indicators			Hydric Soil Indicators for Problem Soils**
All Soils	**Sandy Soils**	**Loamy and Clay Soils**	
A1 – Histosol	S1 – Sandy Mucky Mineral	F1 – Loamy Mucky Mineral	A9 – 1 cm Muck
A2 – Histic Epipedon	S4 – Sandy Gleyed Matrix	F2 – Loamy Gleyed Matrix	A10 – 2 cm Muck
A3 – Black Histic	S5 – Sandy Redox	F3 – Depleted Matrix	F18 – Reduced Verti
A4 – Hydrogen Sulfide	S6 – Stripped Matrix	F6 – Redox Dark Surface	TF2 – Red Parent Material
A5 – Stratified Layers	—	F7 – Depleted Dark Surface	Other (See Section 5 of Regional Supplement, Version 2.0)
A9 – 1 cm Muck	—	F8 – Redox Depressions	—
A11 – Depleted Below Dark Surface	—	F9 – Vernal Pools	—
A12 – Thick Dark Surface	—	—	—

* Table adapted from Regional Supplement to the USACE of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0.
** Indicators of hydrophytic vegetation and wetland hydrology must be present

Attachment F – Nationwide Permit No. 12 Background Information

Nationwide Permit 12 – Utility Line Activities

Nationwide Permit (NWP) 12 is applicable to activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in "waters of the U.S.," provided the activity does not result in the loss of greater than ½ acre of "waters of the U.S."

NWP 12 authorizes the construction of access roads for the construction and maintenance of utility lines in "waters of the U.S.," provided the total discharge from a single and complete project (i.e., each wash crossing) does not cause the loss of greater than 0.5 acres of "waters of the U.S." Access roads must be the minimum width necessary, must be constructed so that the length of the road minimizes any adverse effects to "waters of the U.S.," and must be as near as possible to pre-construction contours and elevations. Access roads constructed above pre-construction contours and elevations in potential jurisdictional "waters of the U.S." must be properly bridged or culverted to maintain surface flows.

If impacts to "waters of the U.S." are minor, and do not exceed criteria listed under the current NWP 12 (Special Public Notice Arizona Nationwide Permits, May 18, 2012), notification to the USACE is not required. Western must submit a PCN in accordance with NWP 12 general condition 31 to the district engineer prior to commencing the activity if road maintenance activities cause any discharges that result in the loss of greater than 0.1 acres of "waters of the U.S."

In addition to permit specific conditions, the permittee must comply with the 29 NWP general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Two important general conditions are discussed below and the full list of general conditions is found in NWP 12 (USACE 2012).

Endangered Species (General Condition 18): No activity is authorized under any NWP, which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or modify critical habitat of such species. Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and the activity is authorized.

Historic Properties (General Condition 20): In cases where the district engineer determines that the activity may affect properties listed or eligible for listing in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied. Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties.

Attachment G – Excerpts from Local Soil Survey Lists

Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Loamy Slopes 10-13" p.z. (R040XA113AZ)

16—Cacique family extremely gravelly loam, 1 to 7 percent slopes

Map Unit Setting

National map unit symbol: 1mm28
Elevation: 1,800 to 2,400 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Cacique family and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cacique Family

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from igneous rock and/or alluvium derived from metamorphic rock

Typical profile

A - 0 to 1 inches: extremely gravelly loam
Bt - 1 to 8 inches: gravelly sandy clay loam
Btk - 8 to 35 inches: gravelly clay loam
2Bkm - 35 to 60 inches: indurated

Properties and qualities

Slope: 1 to 7 percent
Depth to restrictive feature: 20 to 40 inches to petrocalcic

Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Limy Upland 7-10" p.z. (R040XB210AZ)

17—Castaneda extremely gravelly loam, 1 to 7 percent slopes

Map Unit Setting

National map unit symbol: 1mm29
Elevation: 1,600 to 4,000 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 59 to 70 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Castaneda and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Castaneda

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from igneous rock and/or alluvium derived from metamorphic rock

Typical profile

A - 0 to 1 inches: extremely gravelly loam
Bt - 1 to 9 inches: gravelly clay loam
Btk - 9 to 17 inches: gravelly clay loam
Bk - 17 to 32 inches: very gravelly loam
2Bkm - 32 to 41 inches: indurated
3C - 41 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 1 to 7 percent

Depth to restrictive feature: 20 to 40 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Available water storage in profile: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Limy Upland 6-9" p.z. (R030XB214AZ)

19—Carrizo family very gravelly loamy sand, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1mm2c
Elevation: 500 to 1,800 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Carrizo family and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carrizo Family

Setting

Landform: Flood plains, alluvial fans
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed

Typical profile

A - 0 to 1 inches: very gravelly loamy sand
C1 - 1 to 9 inches: loamy sand
C2 - 9 to 60 inches: very gravelly coarse sand

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A
Ecological site: Sandy Wash 3-7" p.z. (R040XD416AZ)

20—Carrizo family-Riverwash complex, 1 to 3 percent slopes

Map Unit Setting
National map unit symbol: 1mm2d
Elevation: 500 to 1,800 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition
Carrizo family and similar soils: 65 percent
Riverwash: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carrizo Family

Setting
Landform: Alluvial fans, flood plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed

Typical profile
A - 0 to 1 inches: very gravelly loamy sand
C1 - 1 to 9 inches: loamy sand
C2 - 9 to 60 inches: very gravelly coarse sand

Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Across-slope shape: Convex
Parent material: Alluvium derived from mixed

Typical profile

A - 0 to 1 inches: gravelly sandy loam
Bw - 1 to 7 inches: gravelly coarse sandy loam
2Bkm - 7 to 28 inches: indurated
2C - 28 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 10 to 35 percent
Depth to restrictive feature: 4 to 20 inches to petrocalcic
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: D
Ecological site: Limy Upland 7-10" p.z. (R040XB210AZ)

25—Cellar-Rock outcrop complex, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: 1mm2k
Elevation: 1,800 to 3,700 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Cellar and similar soils: 50 percent
Rock outcrop: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cellar

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Alluvium derived from igneous rock and/or alluvium derived from metamorphic rock and/or colluvium derived from metamorphic rock and/or colluvium derived from igneous rock

Typical profile

A - 0 to 2 inches: very gravelly sandy loam
Bw - 2 to 10 inches: very gravelly sandy loam
2Cr - 10 to 13 inches: weathered bedrock
2R - 13 to 23 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock; 4 to 20 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: D
Ecological site: Granitic Hills 10-12" p.z. (R040XC335AZ)

26—Cellar-Rock outcrop complex, dry, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: 1mm2l
Elevation: 1,800 to 3,700 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Cellar and similar soils: 50 percent
Rock outcrop: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cellar

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Alluvium derived from igneous rock and/or alluvium derived from metamorphic rock and/or colluvium derived from metamorphic rock and/or colluvium derived from igneous rock

Typical profile

A - 0 to 2 inches: very gravelly sandy loam
Bw - 2 to 10 inches: very gravelly sandy loam
2Cr - 10 to 13 inches: weathered bedrock
2R - 13 to 23 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock; 4 to 20 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: D
Ecological site: Limy Fan 3-7" p.z. (R040XC306AZ)

27—Cellar-Topock-Rock outcrop complex, 5 to 35 percent slopes

Map Unit Setting

National map unit symbol: 1mm2m
Elevation: 2,400 to 4,800 feet
Mean annual precipitation: 10 to 12 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 200 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Cellar and similar soils: 45 percent
Topock and similar soils: 30 percent
Rock outcrop: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cellar

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope

30—Chuckawalla-Riverbend families complex, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1mm2q
Elevation: 550 to 2,200 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Chuckawalla family and similar soils: 65 percent
Riverbend family and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chuckawalla Family

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from mixed

Typical profile

A - 0 to 1 inches: extremely gravelly silt loam
Btz - 1 to 10 inches: very gravelly loam
Btk - 10 to 23 inches: very gravelly sandy clay loam
2Bk - 23 to 60 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Saline Upland 3-7" p.z. (R040XD414AZ)

Description of Riverbend Family

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from mixed

Typical profile

A - 0 to 2 inches: very gravelly sandy loam
B - 2 to 11 inches: very gravelly sandy loam
Bk - 11 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Available water storage in profile: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A
Ecological site: Limy Upland 3-7" p.z. Deep (R040XD410AZ)

31—Cipriano very stony loam, 2 to 10 percent slopes

Map Unit Setting

National map unit symbol: 1mm2r
Elevation: 500 to 1,500 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Cipriano and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Map Unit Composition

Graham and similar soils: 60 percent
Rock outcrop: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Graham

Setting

Landform: Hills, mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from igneous rock

Typical profile

A - 0 to 2 inches: very cobbly loam
Bt1 - 2 to 7 inches: clay loam
Bt2 - 7 to 14 inches: clay
2R - 14 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 10 to 40 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: D
Ecological site: Volcanic Hills 12-16" p.z. Clayey (R038XA117AZ)

56—Gunsight very gravelly loam, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1mm3k
Elevation: 460 to 2,600 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Gunsight and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gunsight

Setting

Landform: Fan terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium derived from mixed

Typical profile

A - 0 to 3 inches: very gravelly loam
Bw - 3 to 6 inches: very gravelly sandy loam
Bk1 - 6 to 28 inches: extremely gravelly sandy loam
Bk2 - 28 to 50 inches: extremely gravelly coarse sandy loam
C - 50 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: A
Ecological site: Limy Upland 3-7" p.z. Deep (R040XD410AZ)

57—Gunsight very gravelly sandy loam, 10 to 40 percent slopes

Map Unit Setting

National map unit symbol: 1mm3l
Elevation: 460 to 2,400 feet
Mean annual precipitation: 3 to 7 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Hydrologic Soil Group: B
Ecological site: Limy Fan 6-9" p.z. (R030XB211AZ)

90—Quilotosa-Rock outcrop complex, 20 to 60 percent slopes

Map Unit Setting

National map unit symbol: 1mm4n
Elevation: 500 to 3,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 70 to 74 degrees F
Frost-free period: 250 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Quilotosa and similar soils: 60 percent
Rock outcrop: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Quilotosa

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium and colluvium derived from igneous and metamorphic rock

Typical profile

A - 0 to 3 inches: extremely gravelly sandy loam
Bw - 3 to 9 inches: very gravelly sandy loam
2Cr - 9 to 15 inches: weathered bedrock
2R - 15 to 25 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 60 percent
Depth to restrictive feature: 9 to 12 inches to paralithic bedrock; 10 to 20 inches to lithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Available water storage in profile: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: D