

APPENDIX 5.7 BIG-2

MINERAL RESOURCES TECHNICAL REPORT

Barstow International Gateway Mineral Resources Technical Report

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Prepared by:
Shannon & Wilson
Geotechnical and Environmental Consultants

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ACRONYMS AND ABBREVIATIONS

ARA	Aggregate Resource Areas
BIG	Barstow International Gateway
BNSF	BNSF Railway
City	City of Barstow
County	Unincorporated territory in the County of San Bernardino
CDMG	California Division of Mines and Geology
CWP	Countywide Plan
DWR	Department of Water Resources
MRZ	mineral resource zone
SCE	Southern California Edison
SMARA	Surface Mining and Reclamation Act of 1975
SMGB	State Mining and Geology Board
USGS	U.S. Geological Survey

1.0 PROJECT SUMMARY

This Report has been prepared to analyze the proposed Barstow International Gateway (“BIG”) and associated off-site improvements. BIG is located in the City of Barstow (“City”) and in unincorporated territory in the County of San Bernardino (“County”), California (see **Figure 1: Regional Vicinity Map** and **Figure 2: Local Vicinity Map**). BIG consists of a rail yard with an intermodal facility¹ and “block swap” facility², a transload warehouse center³, and a solar farm.

Additionally, to serve the proposed rail yard and transload warehouse center, BNSF Railway Company (BNSF) proposes off-site rail improvements (including lead track extensions), and off-site non-rail improvements (including drainage, utilities, and roadways).

BIG’s proposed components are depicted on **Figure 3: Barstow International Gateway Conceptual Site Plan**, **Figure 4: BIG Off-Site Improvements, West**, and off-site improvements are depicted on **Figure 5: BIG Off-Site Improvements, East**.

1.1 Project Location and Setting

BIG totals approximately 5,000 acres⁴, and includes approximately 680 acres which would remain ungraded/undisturbed (“Mojave River buffer area”). BIG’s Specific Plan area totals approximately 4,300 acres and is generally bounded by the Mojave River to the north, Main Street (also referred to as National Trails Highway or Route 66) to the south, Lenwood Road to the east, and Hinkley Road to the west.

Most of the BIG footprint is within unincorporated County lands, while the remainder is within Barstow City limits. The BIG footprint is generally flat and gradually slopes north to the Mojave River. Off-site improvements are generally within existing BNSF rail and City/County street rights-of-way. The BIG footprint is primarily vacant undeveloped land, which is traversed by an existing BNSF railroad, and which contains scattered residential, commercial, and industrial land uses. This area is mostly devoid of tall vegetation and trees, with structures and other elements of the built environment scattered throughout. Existing land uses within BIG’s footprint are listed in **Table 1: Existing Land Uses**. There are approximately 108 dwelling units and approximately 94,000 square feet of non-residential land uses (i.e., commercial and industrial) within the BIG footprint. Additionally, a private airstrip (“Depue Airport”) is within BIG’s proposed solar farm footprint. Under BIG, this private airstrip would be demolished and replaced with the proposed solar farm.

¹ “Intermodal facility” refers to a rail yard where containerized goods are transferred between trains and trucks. Trucks arrive to either pick up containers from arriving trains or deliver containers for departing trains. However, unlike traditional intermodal facilities, at BIG the majority of containers would arrive by train and be transferred to and from electric hostlers.

² “Block Swap” refers to transferring a block of intermodal train cars between trains. In effect, the entire block of cars remains coupled together and is moved en masse to another train.

³ “Transload” refers to the transfer of goods from one container to another. In this document, it specifically refers to the transfer of goods from 40-foot international containers to 53-foot domestic containers. The transload warehouse center at the BIG is designed to serve goods transported to and from the intermodal facility by rail.

⁴ Although the BIG Specific Plan acreage is 4,335 acres, throughout this technical report, the BIG Specific Plan acreage is referred to as 4,300 acres. Note: all acreages in this report are preliminary and based on GIS data. Acreages will be refined with site survey.

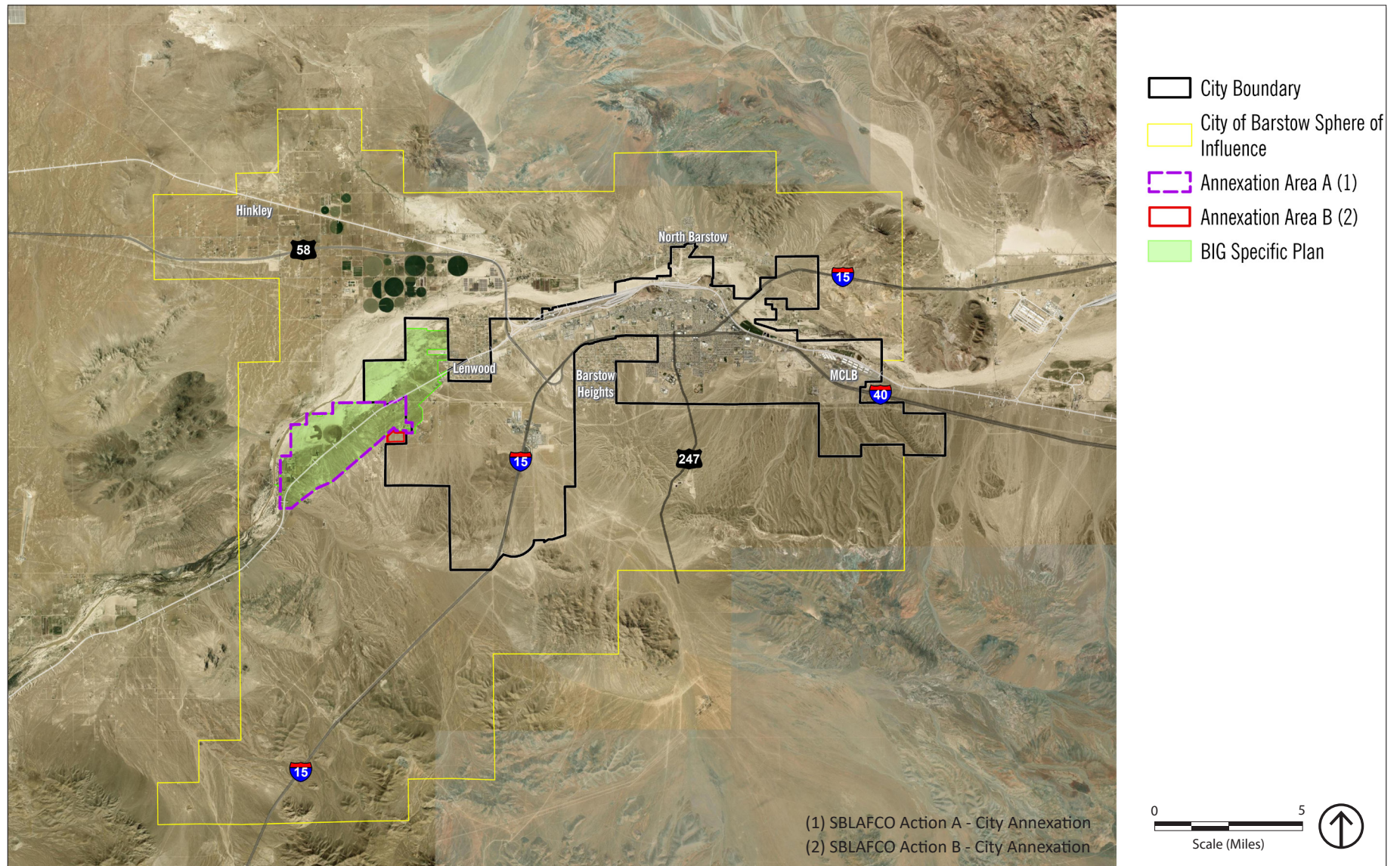
Table 1: Existing Land Uses					
Description	Residential (DU)	Commercial (SF)	Industrial (SF)	TOTAL (DU)	TOTAL (SF)
Existing Land Use	108	85,887	7,837	108	93,724

Regional vehicular access to BIG is provided by Main Street from the south, I-15 from the southeast, and SR-58 from the east. Local access to BIG is primarily provided by Lenwood Road and Hinkley Road from the east and west, respectively, in addition to various unpaved roads along Main Street. Regional rail access is provided from the north by BNSF's Mojave subdivision, from the west by BNSF's Cajon subdivision, and from the east by BNSF's Needles subdivision.



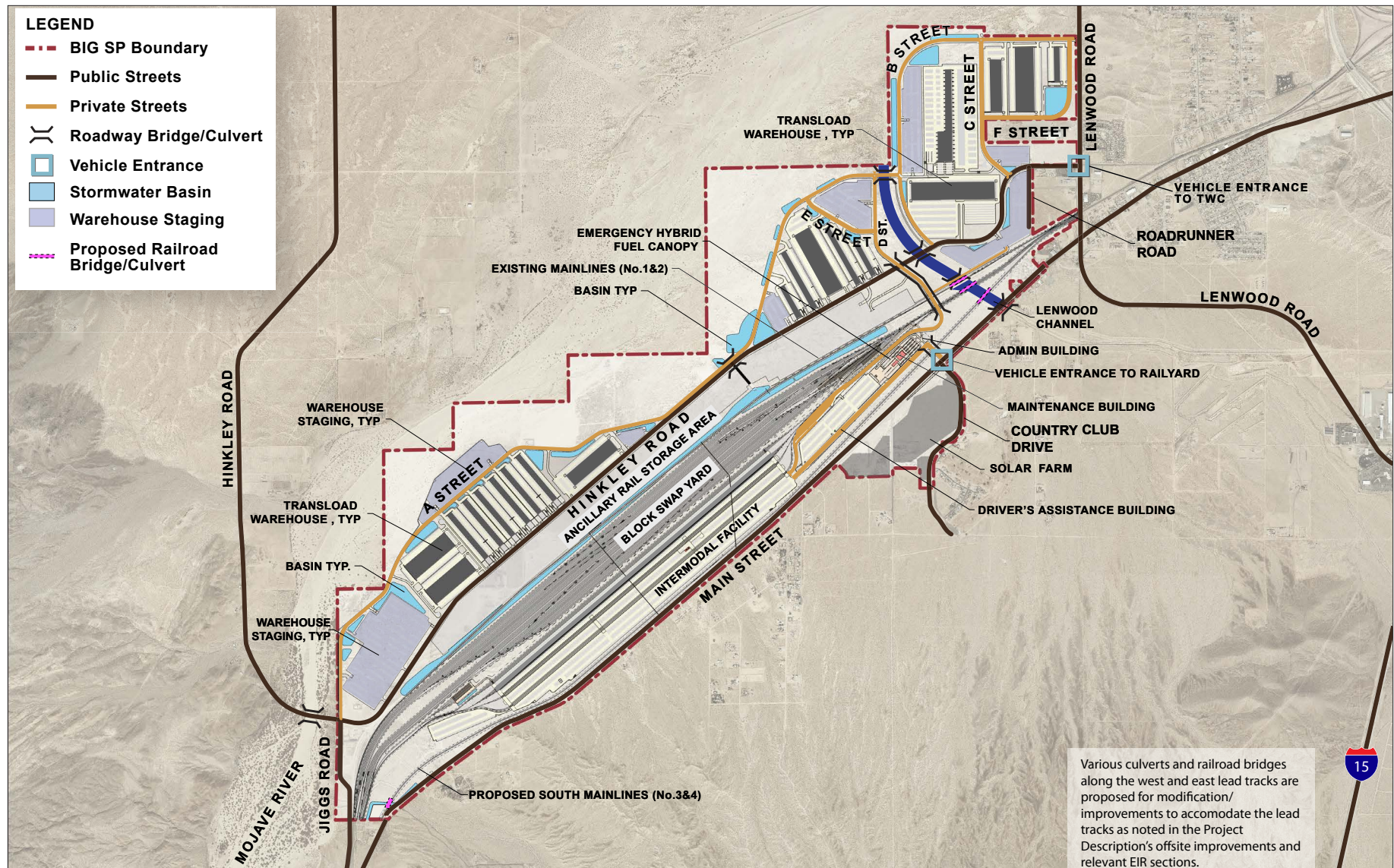
Sources:
City of Barstow, City Boundaries, 2024.

Figure 1
Regional Vicinity Map



Sources:
County of San Bernardino, 2023; City of Barstow, 2024.

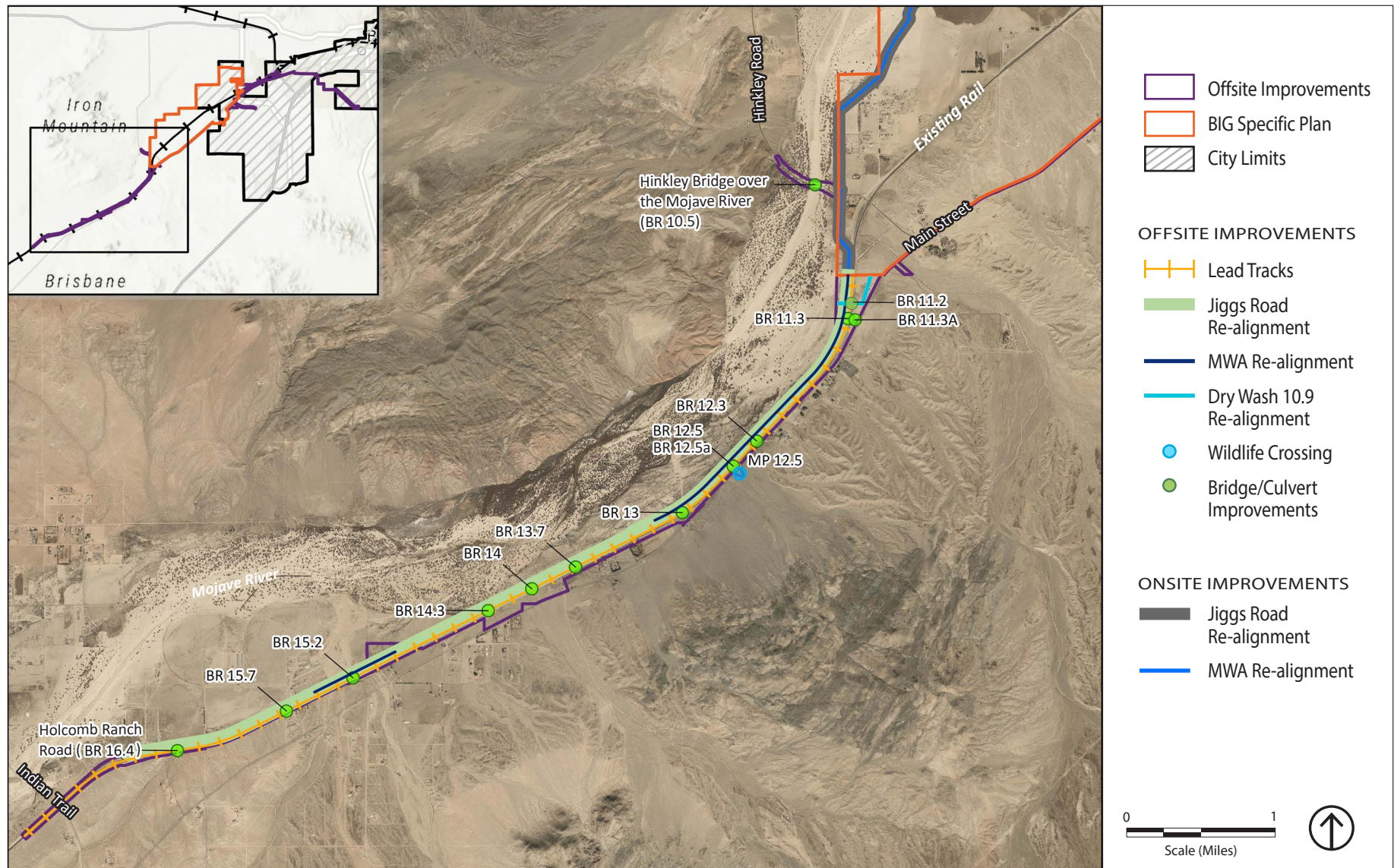
Figure 2
Local Vicinity Map



Sources:
Transsystems, 2025.

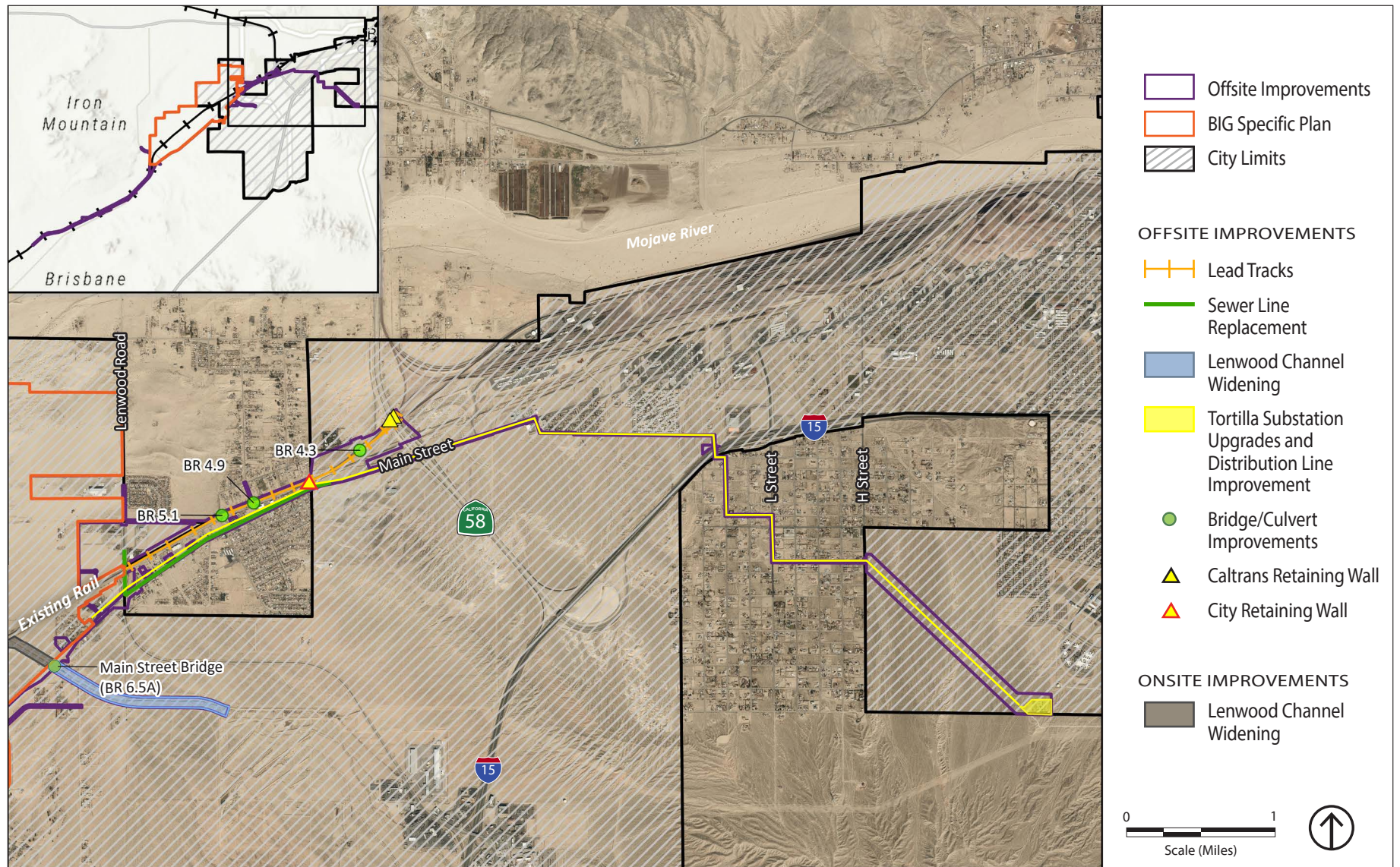
Note: Specific details set forth in the Specific Plan pertaining to the rail yard are considered definitive. The conceptual site plan for the transload warehouse center is for illustrative purposes only. The final site plan presented for entitlement approval may differ based on final design with building square footages not to exceed 9 MSF.

Figure 3
Barstow International Gateway Conceptual Site Plan



Sources:
TransSystems, 2025.

Figure 4
BIG Offsite Improvements, West



Sources:
TransSystems, 2025.

Figure 5
BIG Offsite Improvements, East

1.2 Project Components

Rail Yard

Overview

The rail yard would be generally bound by the existing mainline to the north, Main Street to the south, Lenwood Road to the east, and Hinkley Road to the west. The rail yard would consist of an intermodal facility (i.e., where cross-dock intermodal operations and other intermodal facility operations would occur and where support intermodal facility uses would be located), a block swap yard, and ancillary rail areas (i.e., container yard, chassis storage, and ancillary rail storage area), as described below.

BIG's proposed rail yard would operate 24 hours per day, 365 days per year. The rail yard would have approximately 860 employees during Opening Year (2028), 1,010 employees in Interim Year (2033), and 1,125 employees during Horizon Year (2048)⁵, which would accommodate both the block swap yard and intermodal facility operations. Employees would be split evenly between three shifts.

While the block swap yard would change the number of trains that would arrive or depart BIG by optimizing for end destinations, it would not increase the number of containers. BIG's intermodal facility would, through the cross-dock intermodal operation, add a new volume to the BNSF network, totaling approximately 3.2 trains per day on average in 2028, approximately 4.3 trains per day on average in 2033, and approximately 4.9 trains per day on average in 2048. These train counts include eastbound and westbound trains, and as described elsewhere, trains between the Ports and the BIG intermodal facility would be comprised of dedicated Tier 4 locomotives.

Intermodal Facility

BIG's intermodal facility is proposed at the southern extent of the BIG Specific Plan area and its operations would consist of two types: cross-dock intermodal and "other" operations. BIG's intermodal facility would operate differently than typical intermodal facilities in that most of the containers processed at BIG intermodal facility would not arrive or leave externally by heavy-duty trucks. Instead, almost all of the containers would arrive or leave by train and be processed via BIG's unique "cross-dock intermodal" operation. The intermodal facility's primary purpose would be to transfer containers between railcars and electric hostlers⁶ for cross-dock movements at the on-site proposed transload warehouse center, and vice versa, though a small portion would arrive by heavy-duty truck. The electric hostlers would be used to transport containers within the rail yard, and between the rail yard and transload warehouse center. The electric hostlers would be zero-emission and would not leave BIG. This differs from the operations at a traditional intermodal facility where the primary purpose is to transfer containers from heavy-duty trucks⁷ to railcars, and vice versa (defined as "other" operations). BIG also includes a dedicated fleet of Tier 4 linehaul locomotives⁸ to move containers between the Ports and the BIG intermodal facility.

⁵ A "Horizon Year" is the last year of analysis. BIG's Horizon Year is 20 years after opening.

⁶ Electric hostlers are trucks used for moving trailers and containers short distances within freight terminals, rail yards, and warehouses. Electric hostlers would not use public roadways outside of BIG footprint.

⁷ "Heavy-duty" trucks are conventional highway trucks that travel on public roads and carry containers intra- and inter-state.

⁸ "Tier" refers to emissions standards set by regulatory agencies for engine emissions, with Tier 0 referring to the oldest and having the highest emissions, while Tier 4 is the latest, more stringent standard with the fewest emissions.

BIG's intermodal facility would be composed of various components including railroad tracks, cargo handling equipment, an automated gate system, circulation roadways, yard equipment parking, container parking, stormwater detention ponds, electric vehicle charging stations, and buildings and ancillary rail facilities. Containers would be stored in parking spaces and low stacks at the intermodal facility, along with the ancillary rail area, and transload warehouse center (each described further below). Although electric lift equipment would be utilized to the extent commercially feasible within BIG's intermodal facility, a small 5,000-square-foot fuel canopy would be constructed in the electric hostler maintenance area to accommodate fueling of hybrid equipment. Hybrid and diesel equipment would include rubber-tired gantry cranes, seven air compressors, welders, railcar wheel change machines, and heavy-duty truck transport refrigeration units. The fuel canopy would be served by a 10,000-gallon unleaded fuel aboveground storage tank and a 20,000-gallon diesel fuel aboveground storage tank, with both controlled by an electronic fuel control system. In addition, starting in BIG opening year 2028, BNSF would increase the renewable diesel composition within their existing southern California fueling sites, including the existing fueling sites at the Ports and Barstow classification yard from 1 percent to 10 percent, a 900 percentage point increase in renewable diesel. This would improve the emissions of all BNSF trains fueling at the Ports, including those BNSF trains that would not stop at BIG.

BIG's intermodal facility proposes approximately 134,000 square feet of support buildings and structures, as detailed in **Table 2: BIG Intermodal Facility Structures**. As described below, final building sizes may vary slightly, this Environmental Impact Report conservatively analyzes up to 150,000 SF of support buildings and structures.

Table 2: BIG Intermodal Facility Structures	
Building/Canopy	Square Footage
Administration Building	23,000
Electric Hostler Employee and Maintenance Building	39,000
Drivers Assist Building	5,000
Crane Maintenance Employee and Storage Building	5,000
Crane Maintenance Canopies	22,500
Container Safe Haven Canopies	2,500
Quick Repair Canopy	10,000
AGS Kiosk Canopies	20,000
AGS Portals	2,000
Emergency Fuel Station Canopy for Hybrid Vehicles	5,000
Total	134,000
Assumed Building Total for Final Design	150,000
Note: The square footage described is an estimate and may vary up to 10% depending on the final engineering, therefore, the total square footage for planning purposes is estimated at approximately 150,000 sf.	

Block Swap Yard

The block swap yard is proposed within the middle portion of the BIG Specific Plan area, on approximately 410 acres of the rail yard's total approximately 1,950 acres. The proposed block swap yard would allow for the transfer of multiple railcars, or "blocks" of intermodal rail cars between trains via Tier 4 switcher locomotives. A block is defined as rail cars of a similar type moving to a similar destination that are already connected and can be combined with other blocks intended for similar destinations to produce more efficient train movements. The entire block of rail cars would remain coupled together and be moved en

masse, permitting the synchronizing of blocks to their destinations, so that each train would be compiled of rail car blocks travelling to similar destinations. Blocks could be assembled from inbound trains or trains processed at the intermodal facility carrying containers processed at the transload warehouse center. Certain train blocks may stage at the block swap yard until another train arrives with similar destination. The block swap yard would facilitate switching and transfer of lengthy rail car blocks between tracks for assembling departing trains. Thus, by synchronizing trains to their destinations, the block swap yard would improve train efficiency eastbound and westbound. The rail car blocks within the block swap yard would include containers from BIG's intermodal facility and containers processed at the transload warehouse center, combining as needed based on their destination.

The block swap yard's function is unique compared to a typical classification yard, such as the existing Barstow classification yard. Classification yards are where trains being processed are made up of non-intermodal railcars (i.e., individual boxcars, gondolas, open and closed hopper cars, automobile railcars, and tank cars), rather than intermodal railcars. BNSF designates these types of trains with a different train identification than those that would be processed at BIG. Further, BNSF uses different equipment to process these trains than would be used at BIG. While there is a small intermodal facility component adjacent to the existing Barstow classification yard, that intermodal facility is only used to process overflow from other BNSF intermodal facilities. By contrast, BIG's block swap yard would disassemble and assemble lengthy blocks of railcars with intermodal containers to similar destinations utilizing Tier 4 switcher locomotives. The existing Barstow classification yard also utilizes switcher locomotives as part of its operations, although they are currently Tier 0/0+/1+ switchers. Starting in BIG opening year 2028, BNSF will voluntarily retire all existing Tier 0/0+/1+ switcher locomotives at the unrelated existing Barstow classification yard, and in their place add six Tier 4 switcher locomotives.

Ancillary Rail Area

The ancillary rail storage area is an approximately 400-acre area north of the existing mainline and would be graded and covered with aggregate to be used for numerous purposes, including a container yard, truck chassis storage, and storage of maintenance equipment. A container yard would support the storage of empty containers awaiting loading while chassis storage would be used to provide parking for empty chassis awaiting use for loading, unloading, or draying of containers. The ancillary rail storage area would also be used for storage of spare parts and equipment for track maintenance, including rail, ties, turnouts, and other track material.

Mainline Improvements

BIG would retain the existing two rail mainlines ("north mainlines") within their current alignments, except at bridge crossings, which would be upgraded. BIG also proposes to construct two new mainlines ("south mainlines"), which would traverse the proposed rail yard in an east-west orientation, extending from Lenwood Road on the east to Hinkley Road on the west. During the construction phase, the south mainlines would be used to divert train traffic from the existing mainlines while they are upgraded. During BIG operations, half of the trains which would bypass BIG would use the north mainlines and half would use the south mainlines to balance train counts between the mainlines. BIG would also upgrade various bridge crossings including replacement of the crossing at Lenwood Channel to accommodate the

proposed Lenwood Channel widening; removal of existing culverts⁹ to accommodate proposed culverts for the overall rail yard; and replacement of two structures to meet BNSF standards regarding 50- and 100-year flood conditions.

Transload Warehouse Center

The transload warehouse center is proposed at the northern extent of the BIG Specific Plan area, on approximately 1,330 acres of BIG SP's total approximately 4,300 acres. The transload warehouses would be designed to process the contents of containers from cross-dock intermodal operations, with a small percentage dedicated to processing the contents of containers that have a portion destined for the Inland Empire (the remainder of the container's contents would be placed on trains destined eastward). A small percentage of containers processed at the transload warehouse center would arrive/leave by heavy-duty trucks, primarily from/to the Inland Empire. The transload warehouse center would process most of the containers within an on-site "closed loop" operation between BIG's intermodal facility and the transload warehouse center. The transload warehouse center would include approximately 9.0 million square feet of transload warehouses. The transload warehouse center would be fully built during construction, but operations would gradually increase as customers relocate to BIG. Transload warehouse center operations would include approximately 2,767 employees in Opening Year, approximately 3,660 employees in Interim Year, and 4,248 employees in Horizon Year.

The transload warehouse center would be composed of multiple buildings of various configurations and sizes, depending on tenant needs. As such, **Figure 4: Barstow International Gateway Conceptual Site Plan** provides a conceptual site plan for illustrative purposes showing potential transload warehouse buildings, locations, and sizes. Final transload warehouse buildings, locations, and sizes may differ from those proposed and would be processed with the City, as development occurs. Each transload warehouse would include container parking/storage areas, employee parking, stormwater/hydrology improvements, and landscaping. Finally, emergency generators are proposed throughout the transload warehouse center to provide electric power in the event of a power outage.

There would also be several areas distributed around the transload warehouse center, adding up to approximately 275 acres, for staging/overflow parking of containers accessing the transload warehouse center. These warehouse staging areas would be for truck containers only; truck "hoteling"¹⁰ would not occur, as electric hostlers would transfer containers to/from these areas, thus, heavy-duty truck trailers would not enter or exit these areas.

Hydrology/Stormwater Drainage Improvements

BIG would construct various infiltration basins and drainage outlets to the Mojave River that would be designed for 100-year flood events. Preliminarily, BIG proposes detention ponds of various sizes throughout BIG footprint totaling approximately 165 acre-feet of storage volume, which would accommodate the 100-year flood conditions.

⁹ Culverts are drainage features, typically a pipe or arch, used to convey water under a road or rail tracks.

¹⁰ Truck "hoteling" refers to when a heavy-duty truck parks for the driver to rest within the cab.

In addition to various ephemeral washes throughout BIG footprint, three other primary hydrologic features traverse BIG footprint, as detailed below.

Unnamed Stream (Milepost 10.9): This feature is a dry wash from Main Street to the Mojave River that includes a sharp western bend. This feature would be realigned to accommodate track mains, sidings, and support tracks and improved with a combination of bridges and box culverts spanning the channel (Bridge 10.9a and Bridge 11.2, respectively).

Hinkley Road Bridge at Mojave River (Milepost 10.5): The existing Hinkley Road Bridge, which the County owns and maintains, is at a narrowed section of the Mojave River and crosses via a concrete pier structure. Based on discussions with the County, the existing Hinkley Road Bridge over the Mojave River is experiencing structural issues and is at risk of being over-topped from seasonal flooding. Hydrology and hydraulic analyses have indicated the existing bridge is undersized. To maintain a roadway connection to Hinkley Road from the transload warehouse center, BIG proposes to replace the existing bridge with a longer structure to better match the channel width of the Mojave River at that location. The channel beneath, and immediately adjacent to, the existing bridge would be excavated and widened to match the natural channel width more closely. Portions of Hinkley Road immediately east and west of the bridge would be raised to reduce exposure to Mojave River flood events. These proposed improvements at Hinkley Road Bridge would reduce flooding compared to existing conditions. As part of the improvements, the existing at-grade crossing would be abandoned, and vehicles would instead utilize the proposed Hinkley Road extension through the transload warehouse center.

Lenwood Channel (Milepost 6.5): A portion of the BIG footprint along Lenwood Channel is currently within the FEMA 100-year flood zone due to existing flooding concerns. Lenwood Channel is a north-south earthen channel used to convey water from the southeast to the Mojave River and maintained by San Bernardino County Flood District. Lenwood Channel would be widened by approximately 60 to 100 feet throughout the Specific Plan area for a length of 1.1 miles, continuing offsite south of Main Street, for an additional 1 mile. The widened channel would improve flooding compared to existing conditions. Preliminary BIG design requires the Lenwood Channel to be spanned at three locations for additional track east leads, mains, and sidings, as well as three roadway crossings: Main Street, Hinkley Road, and the private road between the intermodal facility and transload warehouse center.

Utility Improvements

To accommodate the proposed rail yard and transload warehouse center, BIG would require both relocations of existing facilities and construction of new/expanded facilities (i.e., water, wastewater, electric power, natural gas, and telecommunications). The utility improvements proposed within BIG's footprint are discussed below.

Water

BIG's construction phase water demand includes non-potable water for construction activities and potable water for on-site construction workers. To provide non-potable water during the construction phase, up to eight new private on-site temporary groundwater wells would be constructed within BIG's transload warehouse center portion.

Temporary aboveground connections from Golden State Water Company existing mains within Main Street to BIG would be constructed to supply potable water to the construction sites. Additionally, Mojave

Water Agency owns and operates a 48-inch recharge water line that crosses the BIG Specific Plan area. BIG proposes to relocate this existing line to the north to avoid conflict with rail yard and transload warehouse center improvements.

Operational potable water and fire flow water would be provided by directly connecting to facilities owned and operated by the Golden State Water Company. Fire flow would be supplemented by on-site water tanks and fire pumps if necessary to meet the fire flow requirements. Power to water tanks and fire pumps would be supported by the transload warehouse diesel backup generators in the case of an emergency. Water tanks would be placed entirely within the BIG footprint. The transload warehouse center would connect to an existing water main in Jasper Road on the east end of the BIG Specific Plan area. The rail yard would connect to an existing water main on the east end of the BIG Specific Plan area near Lenwood Road on the south side of Main Street. A new public 12- to 16-inch looped water main would be constructed from the existing connection in Main Street, extending west to the edge of rail yard, north to Hinkley Rd, and then continue east in Hinkley Road to the existing connection point near Lenwood Road. A second connection from the looped water main would be provided at the northeast corner of the Specific Plan at Lenwood Road. The new on-site public water mains total approximately 10 miles in length.

Wastewater

BIG's construction-related wastewater generation would be from construction workers. Temporary portable facilities (i.e., portable restrooms and portable handwash stations) would be utilized during the construction phase.

BIG's operational wastewater generation would be from transload warehouse center and rail yard employees, and the rail yard wash bays and track pans. Wastewater generated by BIG would discharge to the City's existing wastewater system at three connection points. The transload warehouse center would discharge to the proposed new sewer main in Hinkley Road. A new 8-inch wastewater line is proposed within the Hinkley Road extension from the west end of the transload warehouse center to the northeast end of the transload warehouse center and would connect to the existing sewer main in Lenwood Road. Within the transload warehouse center, west of the Lenwood Channel, 8-inch lines would extend north in C Street to serve the transload warehouses connecting to Lenwood Road via B Street. The rail yard would include new wastewater lines and force mains at the southern portion of the rail yard, conveying wastewater to the east and connecting to the existing sanitary sewer main in Main Street near Country Club Drive. BIG's wastewater would be conveyed by gravity flow to and treated at the Barstow Regional Wastewater Treatment Facility, which is owned and operated by the City. Wastewater conveyance and treatment would be coordinated with the City.

Electrical Power

BIG construction activities would generate temporary electric power demand from construction equipment, tools, lighting, and other necessary facilities (e.g., temporary offices). The electric power for construction activities would be supplied through connections to existing Southern California Edison (SCE) facilities.

BIG operations would generate permanent electric power demand from the transload warehouse center (lighting, electric vehicle charging for material handling, and forklifts) and rail yard (lighting, buildings,

cranes, and electric hostlers (used to move containers between the rail yard and the transload warehouse center). BIG operational electric power demand would be met through connecting to the SCE Tortilla Substation and supplemented with on-site electrical generation (i.e., an approximately 140-acre, approximately 21 megawatts solar power generation facility (i.e., solar farm), which is described further below. BIG proposes to construct the following on-site electric power facilities to serve BIG:

Three substations: two substations at the eastern and western extents of the rail yard; and one substation within the solar farm.

- Additional 33kV distribution lines connecting via underground duct banks in a loop around the west end of the intermodal facility and north end of the transload warehouse center. These proposed 33KV distribution lines would total 23 miles of ductbank within the BIG Specific Plan area.
- An approximately 140-acre solar farm is proposed south of BIG rail yard, at the southwest corner of the Main Street at Country Club Drive intersection. The solar farm is estimated to generate approximately 21 megawatts to serve BIG. The solar farm would include a battery electric storage system and a new substation at the northwest corner to route power from the solar farm to BIG rail yard. The solar farm would be fenced to prevent trespass and would include internal roadways for maintenance vehicles. The solar farm would require minimal grading to level the site as existing topography is utilized wherever possible and excavation limited primarily to stormwater detention to capture runoff. Additionally, BIG would comply with CalGreen regulations requiring that rooftop solar generation be installed on the industrial warehouse rooftops (Title 24, Section 140.10). Based on 9.0 MSF of transload warehouse, BIG would include approximately 6.4 megawatts of rooftop solar generation for Title 24 compliance.
- Emergency diesel generators are proposed at various locations across the rail yard and transload warehouse center to provide backup power in the event of Tortilla Substation service interruptions. Rail yard generators would only be used if a power outage were to occur at nighttime, as the proposed solar farm would provide sufficient power during daytime in the event of a power outage. The rail yard would include up to 10 generators at the far western extent, while the transload warehouse center would include up to 29 generators dispersed throughout. Generators would require up to 50 hours of testing and maintenance operations per year.

Solar farm maintenance would consist of cleaning, inspecting, and replacing solar panels, equipment, and other system components. Maintenance trips associated with these activities would be limited to trucks transporting materials, equipment, and supplies to and from the farm. To maintain uninterrupted power generation for BIG, maintenance activities would occur incrementally. The solar farm would also require vegetative maintenance (e.g., mowing and weeding, and other grass control measures). No grading would occur during solar farm maintenance.

Natural Gas

BIG construction activities would not require construction of new natural gas facilities, although protection in place or relocation of existing natural gas facilities would be required to accommodate BIG.

Stormwater

To collect stormwater runoff, BIG proposes stormwater basins that would detain any stormwater in excess of predevelopment flows then discharge to existing drainageways through stormwater best management practices. BIG would include various outlets to the Mojave River. Exact sizing and locations of transload warehouse center basins would be dependent on final transload warehouse location, layout, and sizing. In addition, Lenwood Channel would be modified as discussed above.

Solid Waste

BIG would result in solid waste generation from construction (demolition debris, broken or excess materials, packaging, and other construction waste), as well as during operations from the rail yard and transload warehouse center. BIG's solid waste would be collected within on-site trash bins and be disposed of at the Barstow Sanitary Landfill, with 65 percent being recycled (for instance, demolished concrete foundations can be crushed and re-used onsite as aggregate).

Telecommunications

Telecommunication lines cross BIG footprint along Lenwood Road and along the southern edge of the existing tracks. Underground utilities may also be present. All underground communication facilities are assumed to have shallow depths except those crossing under existing features such as underpasses and creeks. Lines within BIG footprint may be relocated adjacent to/within existing and proposed rights of way or abandoned. In addition, BNSF Telecommunications would install approximately 12 communication towers with heights generally between 100 - 120 feet, though two communication towers would be 160 feet tall. Additionally, various existing telecommunications lines owned by Frontier Communications and Lumen would be removed from within BIG footprint, and, in their place, new communications line would be run beginning at the Jasper Road at Lenwood Road intersection, running to the western extent of the BIG Specific Plan area, and then running eastward back to Lenwood Road in a "loop."

On-Site Circulation Improvements

BIG would include various on-site circulation improvements as discussed below.

Hinkley Road Realignment: BIG would vacate Hinkley Road between the south side of the Mojave River bridge crossing and Main Street, closing the existing at-grade rail crossing. Hinkley Road would be realigned beginning at the north side of the Mojave River bridge crossing to connect through the transload warehouse center to the Jasper Road/Lenwood Road intersection. Transload warehouse center employees and heavy-duty trucks destined for the transload warehouse center would enter from the Lenwood Road/Hinkley Road/Jasper Road intersection.

Internal private roadways: In addition to the realigned public Hinkley Road (discussed above), BIG would include four dedicated internal private roadways for electric hostlers (private streets A, B, D, and E), and two internal private roadways for employee, visitor, and truck access (private streets C and F).

Country Club Drive: Country Club Drive would be widened along the solar farm frontage for approximately 400 feet to the proposed realignment of Sweeten Lane. A new stop-controlled intersection is proposed at the Country Club Drive at Sweeten Lane intersection.

Main Street: Rail yard employees and heavy-duty trucks destined for the intermodal facility would enter BIG's rail yard from a new driveway on Main Street across from Country Club Road. Main Street would be

widened from two lanes to four lanes for approximately 0.5 mile east of Country Club, resulting in a consistent four-lane roadway width through Barstow. Additionally, the existing two-lane Main Street over Lenwood Channel low water crossing would be replaced with a new four-lane bridge that accommodates the 100-year flood condition, substantially reducing the existing flood conditions. Main Street would be raised over Lenwood channel, modifying the vertical alignment of Main Street for approximately 0.8 mile. The intent of this design is to keep flood waters contained in Lenwood Channel and convey the flow to the Mojave River under the bridge at MP 6.5, avoiding the overflow of the bank that can occur under existing conditions.

To accommodate BIG, various on-site public rights-of-way within the City and unincorporated San Bernardino County would also need to be vacated.

Off-Site Improvements

In addition to the on-site improvements described above, BIG also proposes off-site rail and non-rail improvements, as discussed below:

Off-Site Rail Improvements

BIG proposes lead track extensions to the east of approximately two miles and lead track extensions to the west of approximately seven miles (“east lead track” and “west lead track”). These off-site rail improvements would be primarily within existing BNSF right-of-way. These improvements would enable trains to safely enter and exit the mainline at mainline speeds, rather than slower “yard” speeds and risk fouling the track.¹¹ BIG east and west lead tracks would require modifications to existing culverts within the footprint; see also *Stormwater Drainage* discussion below.

Off-Site Non-Rail Improvements

BIG proposes ancillary and related stormwater drainage, utility (i.e., water, sewer, electric power, natural gas, and telecommunications), and circulation/roadway improvements and modifications, described below.

Water. North of transload warehouse center, an existing Mojave Water Agency 48-inch recharge line would be relocated. The relocated line would stretch along the north side of the transload warehouse center to the west end of the BIG Specific Plan area, then continue along the north side of the mainline and lead tracks for a total of 8.3 miles.

Wastewater. An existing approximately 27-inch sanitary sewer line is within existing BNSF ROW for approximately 1.6 miles between Lenwood Road and Pettit Road. This line includes multiple north/south lateral connections to serve the land uses between Main Street and the existing BNSF tracks. BIG would relocate this line at Phillips Street south to within Main Street. Additionally, the transload warehouse center will connect to City sewer via a new 27-inch sewer line within Jasper Road extending to north of Paris Avenue.

¹¹ “Fouling the track” means the placement of an individual or an item of equipment in such proximity to a track that the individual or equipment could be struck by a moving train or on-track equipment, or in any case is within four feet of the field side of the near running rail (49 CFR Part 214). When a rail network becomes congested, trains can foul the track by moving slower than a train behind them.

Electric Power. Electrical demand would be handled through connecting to the Southern California Edison Tortilla Substation, located approximately 0.4 mile south of the Veterans Parkway at Diamond Avenue intersection. Three underground duct banks with electrical conductors would connect BIG to the Tortilla Substation utilizing existing franchise agreements with the City and County on a route following Main Street, Sunrise Road, N Street, and Bonanza Road before utilizing existing easements between Bonanza Road and the substation. This proposed 33KV distribution route would extend approximately 7.1 miles underground from the Tortilla Substation to the intermodal facility's eastern extent at Country Club drive, then continue overhead approximately 3.5 miles from Country Club Drive to approximately Hinkley Road. For the 33kv line segment from Tortilla Substation to BIG, the 33kv circuits would be in underground utility lines resulting in an approximately 30-foot-wide disturbance to account for construction access and temporary spoils. From Tortilla substation to H Street (approximately 1.2 miles), the 33kv conduit could occur within a 450-foot-wide corridor, inclusive of the existing 150-foot wide SCE easement along Bonanza Road. However, the exact alignment is presently unknown and is being coordinated with SCE. Therefore, this EIR analyzes an approximately 30-foot wide disturbance within the 450-foot wide corridor ("33kv distribution corridor"). This EIR analyzes the "worst-case" environmental impacts within the 33kv distribution corridor. SCE would make modifications, which include constructing new feeders and new power distribution lines. Within the Tortilla Substation's existing fence line, SCE would also make modifications to supply the new feeders from their existing 115kV-33kV transformers. Various off-site existing electric power lines could be relocated, modified, or extended to accommodate BIG improvements.

Natural Gas. Various off-site existing natural gas lines could be relocated to accommodate BIG improvements.

Telecommunications. No off-site telecommunications improvements are proposed. Various minor existing telecommunications lines would be relocated toward the eastern end of the lead track improvements. Existing telecommunications lines passing through the intermodal facility and block swap yard would be relocated to the north side of the Main Street ROW.

Stormwater Drainage. As described above, the Lenwood Channel widening would continue offsite, south of Main Street. It would be widened by approximately 60 to 100 feet for a total of approximately 2.1 miles (of which 1 mile would be offsite) to improve flooding compared to existing conditions. At the Main Street crossing at Lenwood Channel, BIG would replace 0.8-mile of the existing Main Street low water crossing of Lenwood Channel with a bridge and raise and widen the road through this stretch west to the new intermodal facility entrance. These improvements accommodate the City/County master plan and improve flooding compared to existing conditions.

Other. To accommodate wildlife crossings from south of Main Street to the Mojave River without potential conflict with vehicular or train traffic, BIG proposes an underground wildlife crossing under Main Street west of the existing Hinkley Road.

Circulation/Roadway. Jiggs Road would be realigned generally from just east of Indian Trail to Hinkley Road to maintain emergency access from Indian Trails to Hinkley Road. In addition, a maintenance road would be constructed alongside the mainline to provide maintenance access to the tracks, generally from just east of Indian Trail to Hinkley Road. Various circulation and roadway improvements and modifications are proposed outside the BIG Specific Plan area. All circulation improvements would be permanent,

except a temporary Main Street bypass. The temporary bypass would be constructed to maintain access along Main Street during Lenwood Channel Bridge reconstruction. To maintain access for adjacent residents, the temporary Main Street bypass would include private driveways for adjacent residential uses and would be open for the approximately 18-month bridge reconstruction period. Once the Lenwood Channel Bridge reconstruction is complete, the bypass would be removed and the site restored to its original condition. Additionally, construction of additional lead tracks over Pettit Road (approximately 1,100 feet west of SR-58) would require the road to be lowered by approximately 2.0 feet. BIG would also vacate various ROW within the City and County. Finally, Sweeten Lane would be vacated and realigned to eliminate the existing unimproved intersection with Main Street. A new paved access would extend from Country Club east approximately 1,000 feet and connect to the unimproved Sweeten Lane.

Maintenance Activities

While “light maintenance activities”¹² could occur at BIG, major maintenance activities¹³ would still occur at the existing Barstow classification yard, thus, requiring short-distance trips via BNSF’s existing mainline to and from the existing Barstow classification yard for heavy maintenance. Locomotive trips associated with maintenance activities would be based on the number of linehaul locomotives needed to move trains between the Ports and BIG intermodal facility, and the number of switcher locomotives needed to haul rail cars within BIG intermodal facility and block swap yard. All switcher locomotives at BIG would be Tier 4 locomotives, and BNSF would also retire all existing Tier 0/0+/1+ locomotives at the unrelated existing Barstow yard and, in their stead, add six Tier 4 switcher locomotives.

1.3 Project Construction Activities and Phasing

For analysis purposes, construction is anticipated to occur over approximately 34 months beginning in the third quarter of 2025 and ending in the third quarter of 2028. The entirety of BIG’s construction activities, including off-site improvements, are analyzed in this report and described below. The anticipated construction phase timing is shown in **Table 3: BIG Construction Schedule**. However, the current construction schedule anticipates that BIG construction would begin approximately August 2026, and end approximately July 2029, for an approximate 13-month shift from the schedule shown in **Table 3: BIG Construction Schedule** and analyzed in this technical report. However, construction duration (34 months) would remain unchanged. Further, given fleet turnover and compliance with increased regulatory requirements, construction and operational air quality emissions would improve over time as is reflected in CalEEMod, the California Air Resource Board’s air quality emissions modeling platform.

During peak construction periods, work would be under way at several locations within BIG footprint simultaneously, with overlapping construction of various elements. Construction working hours and the number of workers present at any time would vary depending on the activities being performed. BIG construction would require approximately 8,177 construction workers per year.¹⁴

¹² “Light maintenance activities” means routine locomotive servicing (e.g., window washing, fueling, inspecting fluid levels and topping off fluids, stocking cabins with crew equipment such as water and trash bags, toilet servicing) and minor railcar servicing (e.g., wheel changes, brake and friction shoes, and loose or missing bolts)

¹³ “Major maintenance activities” means repair of railing and platform, railcar suspension, hitches, engine, etc.

¹⁴ Based on 23,200 construction worker “job years”

Table 3: BIG Construction Schedule		
Phase	Start Date	End Date
South Mainlines	8/7/2025	10/2/2026
Intermodal Facility	8/7/2025	1/4/2027
Block Swap Yard	1/22/2026	6/8/2028
North Mainlines	5/27/2027	6/8/2028
Transload Warehouse	2/5/2026	12/6/2027
33 kV Distribution Undergrounding	9/13/2025	5/7/2027
Solar Site	3/20/2026	2/27/2027

Nighttime construction could occur throughout the BIG footprint except where within 300 feet of sensitive receptors (along the 33kv distribution line). To avoid potential noise and vibration impacts from pile driving, BIG proposes to establish a buffer of 1,800 feet for nighttime pile driving and 500 feet for daytime pile driving from sensitive receptors. Additionally, nighttime construction would be necessary for track work adjacent to the existing mainline where lead tracks would tie into the mainline. All construction activities would occur within BIG footprint.

BIG components would involve the following construction activities:

Demolition and Grading

The BIG footprint is primarily vacant, undeveloped land traversed by an existing BNSF railroad and containing scattered residential, commercial, and industrial land uses. Existing land uses within BIG's footprint are listed in **Table 1**. All existing land uses not demolished during acquisition to avoid trespassing and safety concerns would be demolished prior to, or during, mass grading. In addition, existing utilities (underground and aboveground) within BIG footprint would be removed or temporarily relocated as needed.

Six culverts/bridges would need to be demolished within the existing BIG footprint. Demolition would involve excavators to break apart bridge abutments and foundations.

Mass grading would occur in one phase across the BIG footprint and require approximately 26 million cubic yards of cut and fill. Mass grading would be typified by large construction equipment establishing the area's general grading contours. For locations supporting future buildings, roadways, or track, mass grading would include watering and compaction of soil to provide a stable subgrade. Earthwork onsite would be balanced, with excess cut from the rail yard being used as fill within the transload warehouse center.

Fine grading would include site-specific grading for the transload warehouse center, as well as finish grading around buildings, parking areas, curb and gutter, etc.

Construction of Rail Yard (Intermodal Facility and Block Swap Yard)

The likely sequence for BIG rail yard construction (intermodal facility and block swap yard) would include mass grading; compacting the rail bed and internal roadways/parking areas; installing underground improvements/utilities; fine grading; installing crushed rock subballast; laying track and ballast; and installing train signals and communications systems. To reduce construction trucking, BIG would bring rail ties, welded rail, and rail ballast in via train.

Rail yard construction elements would include surface and elevated track work where the track would cross a water feature, a grade-separated roadway crossing for electric hostlers to access (and return from) the transload warehouse center, and installation of an intermodal facility. Major construction activities would include grading and excavation support, underground utility installation, systems construction, bridge construction, and railway systems construction (including trackwork, signaling, and communications). High-mast lights (up to 120 feet in height) would be constructed throughout the rail yard, including foundation work, conduits, and security camera positions. Rail yard construction would also include foundations and tracks for gantry cranes.

Furthermore, the proposed rail yard area would be excavated to result in a nearly-level grade between the east and west ends. With the proposed grading, most of the rail yard would be approximately 30-45 feet below Main Street. Various key BIG elements are also shown below.

Rail materials such as rail ties, welded rails, and ballast would be delivered by train. As noted above, the two existing north mainlines would be protected in place except at the bridge crossings, and two new south mainlines constructed. The south mainlines would be constructed first, and, during the first year of construction, existing rail traffic would use the new south mainlines so that the existing mainlines can be rebuilt and their bridge crossings upgraded. Mainline, rail yard, and lead track construction would utilize a Track-Laying Machine for approximately 20 months to lay track.

Intermodal facility construction would include various administrative and support buildings and substantial paving for the container parking and storage.

Solar Farm Construction

Solar farm construction, which would occur in a single phase, would require minimal grading to level the site as existing topography is utilized wherever possible and excavation limited primarily to stormwater detention to capture runoff. Fencing would be installed around the solar farm's perimeter of the solar farm, internal drive-aisles would be graded and paved, and the proposed substation would be constructed per SCE standards.

Construction of Transload Warehouse Center

Construction elements for the transload warehouse center would include grading, over-excavation,¹⁵ footing and foundation excavation and pouring, tilt-up panel concrete construction, parking lot grading and paving, utility installation and undergrounding, and hydrology/drainage improvements.

Construction of On-Site Bridges and Roadway Improvements

Railroad bridge and roadway construction may use various methods including segmented pre-cast, cast-in-place, box girder or pre-cast, and span-by-span techniques.

Pre-construction activities would occur during final design and would include geotechnical investigations, identification of staging areas, initiation of site preparation and demolition, relocation of utilities, and implementation of temporary, long-term, and permanent road closures. Two bridges would be

¹⁵ "Over-excavation" refers to removal and re-compaction of soil.

constructed over Lenwood Channel (BR 6.5D, 6.5E, and BR 6.5F) to enable traffic to flow from either side of Lenwood Channel.

Construction of Off-Site Rail Improvements

Off-site rail improvements would include clearing and grubbing, bridge crossing construction, ballast placement, track laying, and connection to the mainline. Off-site rail improvements would parallel the existing mainline and primarily be within existing BNSF right-of-way. BIG's rail deliveries of rail ties and ballast would include materials for construction of off-site rail improvement.

Construction of Off-Site Non-Rail Improvements

Off-site non-rail improvements would include construction of drainage, utility, and roadway improvements.

Drainage. Lenwood Channel improvements would consist of scouring and widening the channel. Construction equipment would be within Lenwood Channel in order to accomplish the widening.

Utilities. Additionally, off-site construction would include utility improvements including the 33kv distribution/Tortilla Substation improvements. Construction processes are anticipated to include clearing and grubbing, saw cuts and demolition of existing pavement, excavation to approximately 10 feet below ground surface, installation of temporary shoring, placement of circuits and distribution lines, fill placement and removal of temporary shoring, and roadway repair.

Roadways/Intersections. A bridge over Lenwood Channel for Main Street would be constructed to replace the existing low water crossing and accommodate widening of Main Street in that immediate area. Additionally, BIG proposes roadway/intersection improvements/modifications, including the installation of traffic signals at various intersections.

Typical construction processes for these off-site non-rail improvements would include clearing and grubbing, over-excavation, bridge construction, traffic signals with associated underground conduits and cabling, and restriping and asphalt or concrete pavement placement, where needed.

2.0 REGULATORY SETTING

2.1 Federal

There are no federal regulations concerning mineral resources that are applicable to BIG.

2.2 State

Surface Mining and Reclamation Act

California Public Resources Code §§ 2710-2796, also known as the Surface Mining and Reclamation Act (SMARA), is the primary regulatory framework governing mining in the state. The act requires the state geologist to use the California Geological Survey to identify important mineral deposits in the state threatened by land uses that would be incompatible with future extraction and classify them into Mineral Resource Zones (MRZs). SMARA delegates specific regulatory authority to local jurisdictions which are required to enact specific procedures to guide mineral conservation and extraction at identified sites and to incorporate mineral resource management policies into their general plans.

SMARA requires the California State Mining and Geology Board (SMGB) to classify California mineral resources with the MRZ system. These MRZs have been established within areas of regional significance by Miller (1993) within the Barstow-Victorville area based on the presence or absence of sand and gravel deposits and crushed rock and stone sources (e.g., products used in the production of cement). The SMGB defines “Area of regional significance” as “an area designated by the board pursuant to Section 2790 which is known to contain a deposit of minerals, the extraction of which is judged to be of prime importance in meeting future needs for minerals in a particular region of the state within which the minerals are located and which, if prematurely developed for alternate incompatible land uses, could result in the permanent loss of minerals that are more than local significance.” The State Geologist uses the following MRZ categories to classify the state’s lands (California Department of Conservation, Division of Mine Reclamation, ND, pg. 4-6):

- **MRZ-1:** Areas where adequate geologic information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence. This zone is applied where well developed lines of reasoning, based on economic-geologic principles and adequate data, indicate that the likelihood for occurrence of significant mineral deposits is nil or slight.
- **MRZ-2a:** Areas underlain by mineral deposits where geologic data show that significant measured or indicated resources are present. MRZ-2 is divided on the basis of both degree of knowledge and economic factors. Areas classified MRZ-2a contain discovered mineral deposits that are either measured or indicated reserves as determined by such evidence as drilling records, sample analysis, surface exposure, and mine information. Land included in MRZ-2a is of prime importance because it contains known economic mineral deposits. A typical MRZ-2a area would include an operating mine, or an area where extensive sampling indicates the presence of a significant mineral deposit.
- **MRZ-2b:** Areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present. Areas classified MRZ-2b contain discovered deposits that are either inferred reserves or deposits that are presently sub-economic as determined by limited sample analysis, exposure, and past mining history. Further exploration work and/or

changes in technology or economics could result in upgrading areas classified MRZ-2b to MRZ-2a. A typical MRZ-2b area would include sites where there are good geologic reasons to believe that an extension of an operating mine exists or where there is an exposure of mineralization of economic importance.

- **MRZ-3a:** Areas containing known mineral deposits that may qualify as mineral resources. Further exploration work within these areas could result in the reclassification of specific localities into MRZ-2a or MRZ-2b. MRZ-3 is divided on the basis of knowledge of economic characteristics of the resources. MRZ-3a areas are considered to have a moderate potential for the discovery of economic mineral deposits. An example of an MRZ-3a area would be where there is direct evidence of a surface exposure of a geologic unit, such as a limestone body, known to be or to contain a mineral resource elsewhere but has not been sampled or tested at the current location.
- **MRZ-3b:** Areas containing inferred mineral deposits that may qualify as mineral resources. Land classified MRZ-3b represents areas in geologic settings which appear to be favorable environments for the occurrence of specific mineral deposits. Further exploration work could result in the reclassification of all or part of these areas into MRZ-3a or specific localities into MRZ-2a or MRZ-2b. MRZ-3b is applied to land where geologic evidence leads to the conclusion that it is plausible that economic mineral deposits are present. An example of an MRZ-3b area would be where there is indirect evidence such as a geophysical or geochemical anomaly along a permissible structure which indicates the possible presence of a mineral deposit or that an ore-forming process was operative.
- **MRZ-4:** Areas where geologic information does not rule out either the presence or absence of mineral resources. The distinction between the MRZ-1 and MRZ-4 categories is important for land-use considerations. It must be emphasized that MRZ-4 classification does not imply that there is little likelihood for the presence of mineral resources, but rather there is a lack of knowledge regarding mineral occurrence. Further exploration work could well result in the reclassification of land in MRZ-4 areas to MRZ-3 or MRZ-2 categories.

Figure 6: State Mineral Lands Classification Map depicts the regional MRZs (defined above) and indicates there are approximately 905 acres of MRZ-2b and approximately 4,090 acres of MRZ-3a classified lands within the BIG footprint.

As part of the SMARA, the SMGB is also responsible for distributing information about Aggregate Resource Areas (ARAs) to lead agencies but does not infringe on the authority of local governments to make land use decisions. ARAs are areas classified MRZ-2a or MRZ-2b for construction aggregate areas that have current land uses similar to areas which have been mined in the past. The purpose of determining ARAs is to “provide a semi-quantified estimate of construction aggregate resources which are likely to be available to satisfy society’s needs during the 50-year period following the classification of an area” (California Department of Conservation, ND). The estimation of future mineral resource availability in ARAs is not a precise analysis, but rather the best general estimate which can be made with the data available. Once ARAs have been identified, they are divided into one of three relative categories of significance as follows:

- Immediately Significant – All permitted lands within ARAs.

- Highly Significant – Aras that contain 10 or more times the threshold value of material, or that are adjacent to property currently permitted for mining.
- Significant – All remaining ARAs.

State Mining & Geology Board (SMGB)

The SMGB provides professional expertise and serves as a regulatory, policy, and hearing body representing the state's interest in the development, utilization, and conservation of mineral resources, the reclamation of mined lands, and the development and dissemination of geologic and seismic hazard information.

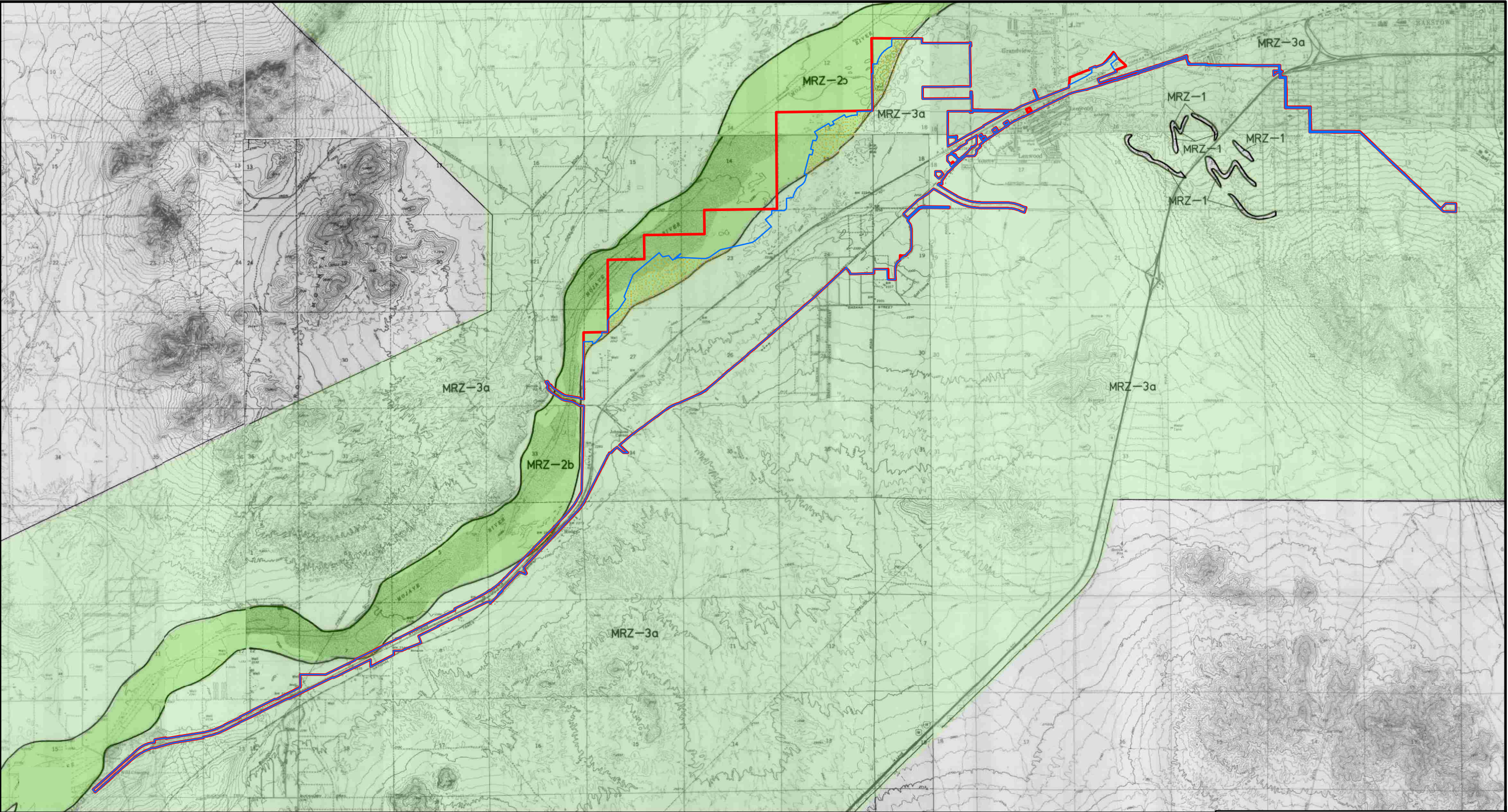
California Geological Survey

California Public Resources Code, Division 2, Chapter 2, establishes the California Geological Survey, which provides geologic information about California's diverse nonfuel mineral resources and their related hazards through maps, reports, and other data. The California Geological Survey assists governmental agencies, mining companies, consultants, and the public in recognizing, developing, and protecting important mineral resources. The California Geological Survey produces Mineral Land Classification studies that identify areas with potentially important mineral resources that should be considered in local and regional planning.

The BIG footprint is addressed in the Department of Conservation's 2006 Geological Survey, "Aggregate Availability in California," under the "Barstow Victorville P-C Region," which contains 133 million tons of permitted aggregate resources as of January 1, 2006 (California Department of Conservation, Division of Mine Reclamation, 2006, pg. 4).

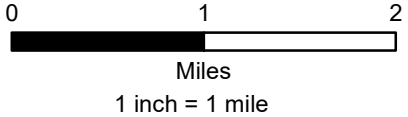
Division of Mine Reclamation

The California Department of Conservation's Division of Mine Reclamation provides a measure of oversight for local governments as they administer SMARA within their respective jurisdictions. The Division of Mine Reclamation may provide comments to lead agencies on a mining operation's reclamation plan and financial assurance and, jointly with SMGB, is charged with administering actions that encourage SMARA compliance. The primary focus is on existing mining operations and reclaiming mined lands to a usable and safe condition that is readily adaptable for alternative land uses. The Division of Mine Reclamation maintains an online database (Mines Online), which identifies active mines in the County of San Bernardino (County). Mines Online lists mines subject to SMARA requirements that disturb more than one acre or remove more than 1,000 cubic yards of material. As reported on Mines Online, there are no active mines identified within the BIG footprint (California Department of Conservation, Division of Mine Reclamation, 2016). The active mine nearest the BIG footprint is Best Rock Quarry, approximately 5.1 miles to the north.



LEGEND

- Grading Limits
- BIG Project Boundary
- MRZ-2b within Grading
- MRZ-2b
- MRZ-3a



Barstow International Gateway
San Bernardino County, California

**STATE MINERAL LANDS
CLASSIFICATION MAP**

February 2025 110111-002

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FIG. 6

Oil and Gas Conservation

California Public Resources Code § 3000-3473 establishes the California Geologic Energy Management Division within the California Department of Conservation, which oversees the drilling, operation, maintenance, plugging or abandonment of oil, natural gas, and geothermal wells. The California Geologic Energy Management Division's regulatory program emphasizes the wise development of oil, natural gas, and geothermal resources in the state through sound engineering practices that protect the environment, prevent pollution, and ensure public safety.

2.3 Local

County of San Bernardino Countywide Plan

The County adopted the Countywide Plan (CWP) in October 2020. The CWP Policy Plan addresses the physical, social, and economic issues facing the County's unincorporated portions. **Table 4: Countywide Plan Policy Plan Relevant Goals and Policies – Mineral Resources** includes the mineral-related goals and policies relevant to BIG:

Table 4: Countywide Plan Policy Plan Relevant Goals and Policies – Mineral Resources	
Number	Goal or Policy
NATURAL RESOURCES ELEMENT	
Goal NR 6	Mineral resource zones that allow extraction industries to continue supporting the regional and national economy while minimizing negative impacts on the public and natural environment.
Policy NR-6.1	Mineral resource areas. We prioritize the conservation of land area with mineral resources by prohibiting or discouraging development of land that would substantially preclude the future development of mining facilities in areas classified as MRZ 2a, 2b, or 3a.
Source: County of San Bernardino. (2020). <i>Countywide Plan, Natural Resources Element</i> . Retrieved from: https://countywideplan.com/policy-plan/natural-resources/ .	

The CWP Policy Plan includes the following Policy Maps that address mineral resources:

- Policy Map LU-4 Mineral Resource Zones: Depicts County areas with either MRZ Class 2 (Known or Highly Likely Location) or MRZ Class 3 (Moderate Potential or Possible Location) for the mineral deposits listed below. The County's MRZ Open-File Report Area Plate¹⁶ boundaries and numbers are also depicted.
 - Magmatic Concentration (Rare Earth Element)
 - Contact Metasomatic (Skarns),
 - Industrial Minerals,
 - Hydrothermal Deposits, and
 - Aggregate Resource Zones.

Figure 7: County Mineral Resource Zones Map depicts the County's mineral resources and MRZ mineral deposits and indicates a 4,995-acre portion of the BIG footprint is within a County delineated MRZ (i.e., per Policy Map LU-4).

¹⁶ The plates pertain to a digital geologic map database.

It is noted that any County zoning for mining, and County policies related to mining and mineral resources, would not apply to BIG's proposed annexation areas which would be annexed to the City and subject to Barstow General Plan, Municipal Code and/or proposed BIG Specific Plan regulations. Therefore, for the purposes of this BIG-specific analysis, the portions of the BIG footprint that are within the County but would be annexed to the City are analyzed under City General Plan, Municipal Code and/or proposed BIG Specific Plan regulations.

Codified Ordinances of the County of San Bernardino Municipal Code

The Codified Ordinances of the County of San Bernardino (County Code) regulations addressing mineral resources are provided below.

County Code Chapter 82.17: Mineral Resources Overlay. The intent of the Mineral Resources Overlay is as follows:

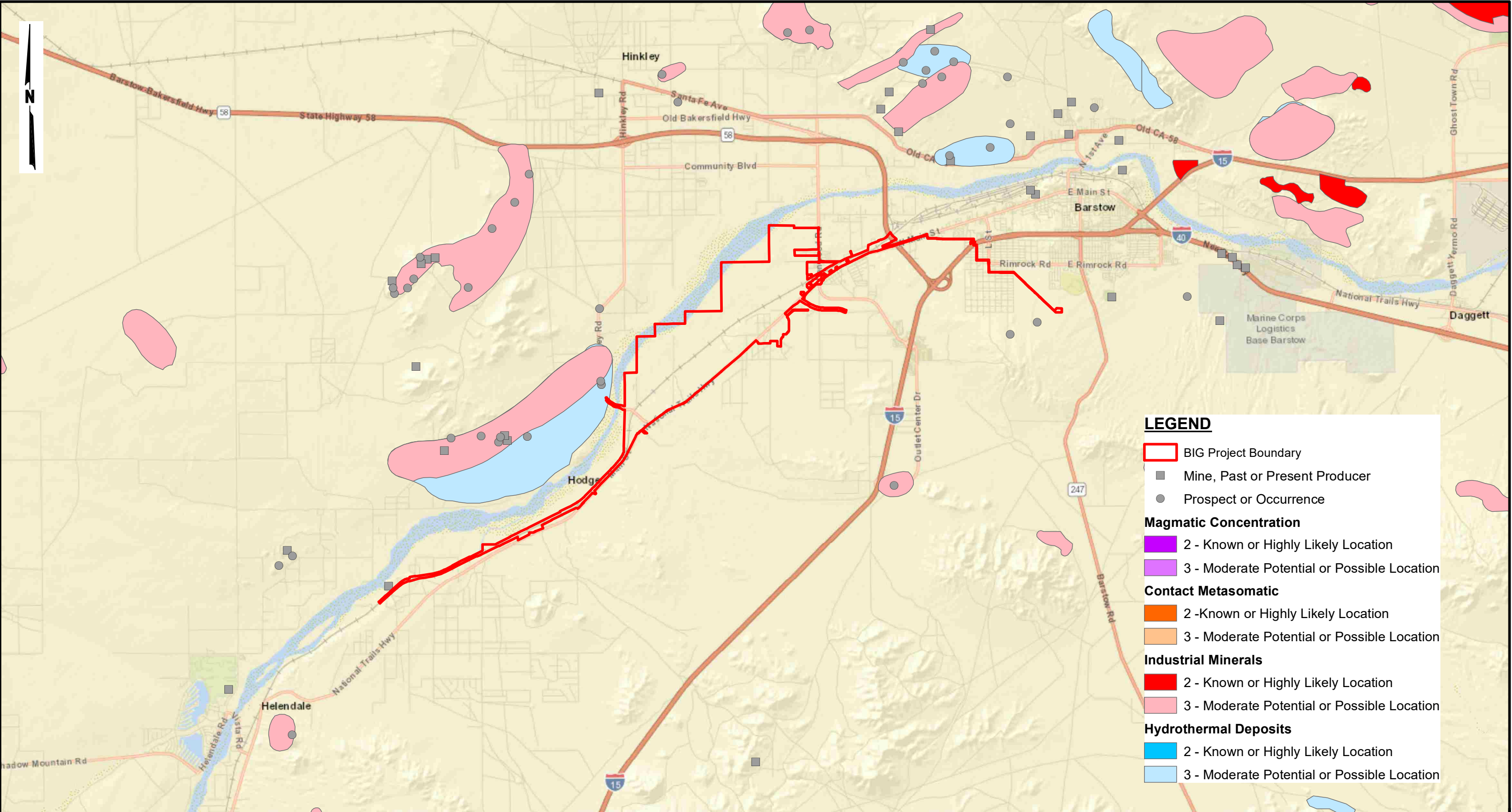
- Prevent or minimize all adverse environmental effects.
- Reclaim mined lands to a usable condition that is readily adaptable for alternative land uses.
- Encourage the production and conservation of minerals while preserving areas relating to environmental and recreational amenities if such amenities are located within the mining locale.
- Eliminate residual hazards to the public health and safety.

County Code Chapter 83.04: Conditional Grading Compliance. The purpose of this Chapter is to ensure compliance with conditions of approval on projects involving earthwork grading. The provisions in this Chapter regulate onsite continuous inspections that are required by the Building Official of grading projects or developments for which adopted conditions of approval:

- Require any specific or general features to be incorporated into the earthwork; or
- Restrict or limit the earthwork in any way that is more restrictive than the grading provisions prescribed in the California Building Code.

City of Barstow General Plan

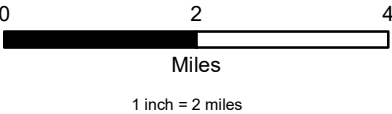
The City adopted the City of Barstow 2015-2020 General Plan (2020 General Plan) in February 2015. The 2020 General Plan is the overarching guide for implementation of the Development Code, which defines development regulations and establishes zoning districts throughout the City. The Barstow General Plan does not delineate the City's mineral resource recovery sites on a map, but does report the City's MRZs "where significant mineral resources have been determined or inferred to be present are located primarily along the Mojave River and south of U.S. I-40. Most of the City, as well as the annexation areas, have been mapped within MRZs containing known mineral deposits of undetermined significance" (City of Barstow, 2015, p. RC-18). The General Plan also reports that the only mineral resource the State identifies as actively being utilized within the Barstow Planning Area is aggregate for the manufacture of concrete (Ibid).



LEGEND

- BIG Project Boundary
- Mine, Past or Present Producer
- Prospect or Occurrence
- Magmatic Concentration**
- 2 - Known or Highly Likely Location
- 3 - Moderate Potential or Possible Location
- Contact Metasomatic**
- 2 -Known or Highly Likely Location
- 3 - Moderate Potential or Possible Location
- Industrial Minerals**
- 2 - Known or Highly Likely Location
- 3 - Moderate Potential or Possible Location
- Hydrothermal Deposits**
- 2 - Known or Highly Likely Location
- 3 - Moderate Potential or Possible Location

Sources: Mineral Resources Online Spatial Data, 2024, USGS.



Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCAn, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Barstow International Gateway
San Bernardino County, California

**COUNTY MINERAL
RESOURCE ZONES MAP**

February 2025 110111-002

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FIG. 7

The Code of the City of Barstow

The Code of the City of Barstow (Barstow Code) regulations addressing mineral resources are provided below.

Barstow Code Chapter 15.28: Surface Mining. This chapter regulates the City's surface mining operations in accordance with the SMARA requirements, the regulations adopted thereunder, and the California Geological Survey. This chapter is also intended to secure the continued availability of important mineral resources while also ensuring that adverse environmental effects are prevented or mitigated, and mined lands are reclaimed to a usable condition readily adaptable for alternative land uses.

3.0 METHODS FOR EVALUATING IMPACT EFFECTS

SMARA directs the state Geologist to classify the state's non-fuel (metals, industrial minerals, and construction aggregate) MRZs and the policies and procedures for this process are described in *California Surface Mining and Reclamation Policies and Procedures* (CDMG, 2000). BIG is located within the Barstow-Victorville Production -Consumption region discussed in detail in Miller (1993).

3.1 Definition of Study Area

The study area for direct impacts to mineral resources is the BIG grading footprint. The BIG grading footprint includes all areas within the BIG footprint that require grading activities and would extend throughout approximately 4,275 acres of the total approximately 5,000-acre footprint.

3.2 Terminology and Concepts

Mineral resources in California include a wide range of mineral and aggregate resources. The principal constraint of mineral and aggregate resources is the need for planning to ensure that construction of new facilities would not conflict with the removal of economically important resources (CDMG, 2000, p.8).

Information on the mineral resources were obtained from publications of the California Division of Mines and Geology (CDMG, 2000; Bezore and Shumway, 1994; Miller, 1993), California Geological Survey, 2018; Clinkenbeard and Gius), and the US Geological Survey (USGS, 2024). These publications were evaluated to determine the presence of mineral resources within the BIG footprint and to perform the impact analyses.

Non-Aggregate Mineral Resources

To assess non-aggregate mineral resources, readily available information and the Mineral Resources Data System by the USGS (USGS, 2024) were reviewed.

Aggregate Resources

To assess aggregate production and consumption in the region, California Geological Survey (2018) was reviewed. This report and map provide estimates of aggregate demand versus permitted resources for various regions throughout California.

Geology within MRZ-2b Area

To assess geology within the MRZ-2b, regional maps, geologic mapping, and data available from Shannon & Wilson (2019) were reviewed.

Geology within MRZ-3a Area

To assess geology within the MRZ-3a, regional maps and data available from Dibblee and Minch (2008a,b); Miller and others (2020), and Stamos and others (2001). However, geology classified as MRZ-3a do not have available data to determine if the aggregate resources are significant.

Soil Survey

The Web Soil Survey was reviewed to determine the surficial (upper 6.0 feet) conditions of the BIG footprint for the suitability of the soils for construction materials, specifically gravel and sand (NRCS, 2023).

4.0 ENVIRONMENTAL SETTING

4.1 Mineral Resource Zone Categories

Miller (1993) evaluated and classified land located within the BIG footprint as MRZ- 2b and MRZ-3a, shown in **Figure 8: Mineral Resource Zone Map**. MRZ-2b areas classified by Miller (1993) are defined as:

- Areas underlain by mineral deposits where geologic information indicates that significant inferred resources are present. For this report, areas classified as MRZ-2b contain discovered mineral deposits that are significant inferred resources as determined by their lateral extension from proven deposits or their similarity to proven deposits. Further exploration work could result in upgrading areas classified as MRZ-2b to MRZ-2a.

Lands within the BIG footprint that are outside the MRZ-2b areas are mapped as MRZ-3a and defined as:

- Areas containing known mineral occurrence of undetermined mineral resource significance. Further exploration work within these areas could result in the reclassification of specific localities into the MRZ-2a or MRZ-2b categories.

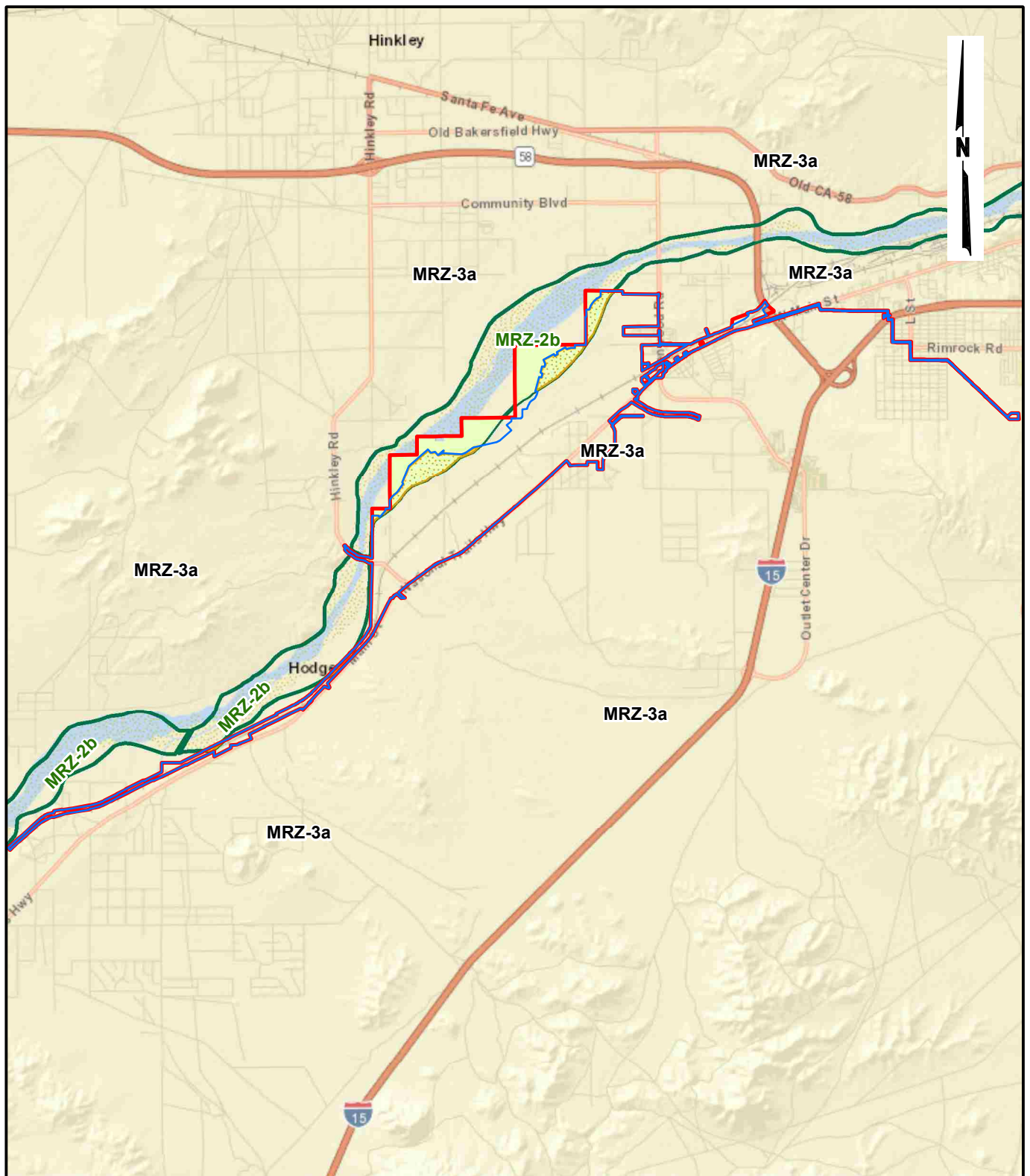
Non-Aggregate Mineral Resources

Figure 7 shows the non-aggregate, non-fuel mineral resource potential of the Barstow-Victorville area and indicates the BIG footprint is within MRZ-4 (Bezore and Shumway, 1994, p. 19). An MRZ-4 zone is an area of no known mineral occurrences where geologic information does not rule out either the presence or absence of significant mineral resources. This information and the USGS Mineral Resources Data System show no active or abandoned mining of metallic and nonmetallic mineral resources within the BIG footprint (USGS, 2024).

Aggregate Resources

According to the California Department of Conservation, Division of Mine Reclamation, the estimated 50-year demand for aggregate in the Barstow-Victorville P-C region is 163 million tons, and permitted aggregate reserves are 117 million tons (Clinkenbeard and Gius 2018, p. 5). It is estimated that the projected years remaining of these reserves are 31 to 40 years (Ibid).

Miller (1993) provides information regarding former, current, and potential mining locations in BIG's vicinity and reports that within the Barstow-Victorville P- C region, the Mojave River resource area (i.e., adjacent and north of BIG footprint) land has a high likelihood of significant deposits of concrete-grade aggregate.



LEGEND

- Grading Limits
- BIG Project Boundary
- MRZ 2b within Grading
- MRZ 2b within BIG Boundary
- MRZ 2b

0 1 2
1 inch = 2 miles

Barstow International Gateway
San Bernardino County, California

MINERAL RESOURCE ZONE MAP

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FIG. 8

4.2 BIG and Resource Area Conditions

Geologic Setting

Geologic maps (Dibblee and Minch 2008a; Dibblee and Minch, 2008b; Miller and others, 2020; Stamos and others, 2001) and soil samples reviewed during previous subsurface explorations (Shannon & Wilson 2019, 2021) show the BIG footprint to be underlain by alluvial, alluvial-fan, eolian and playa deposits overlying older alluvium and sedimentary bedrock and gravels shown in **Figure 9: Regional Geologic Map**, Miller (1993) designates the Mojave River stream channel deposits to be within MRZ-2b. Miller (1993) states that within the Barstow-Victorville area the Mojave River channel is land that has a high likelihood of significant deposits of concrete-grade aggregate. The geology within each BIG MRZ is discussed in more detail below.

Geology within MRZ-2b Area

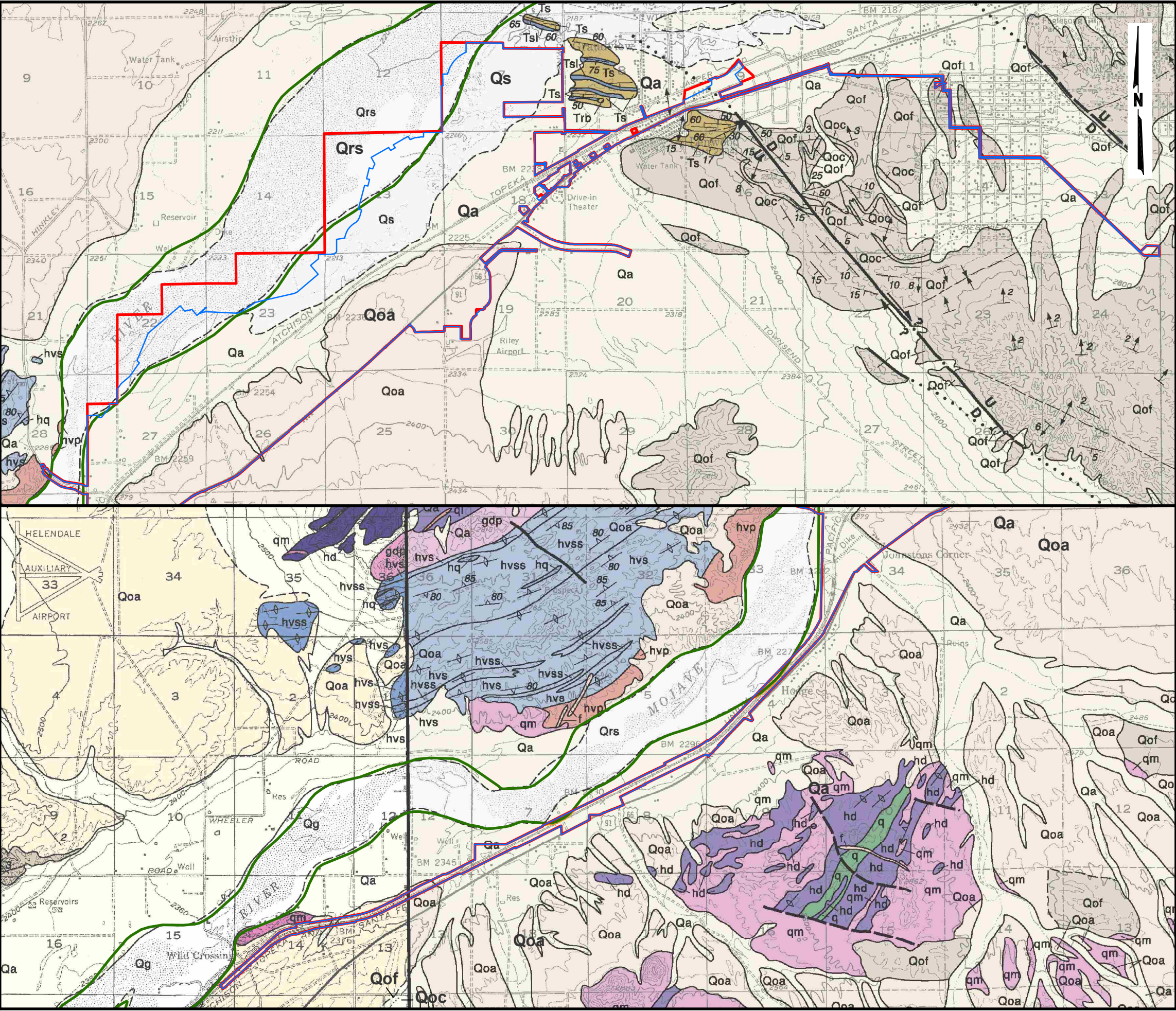
Areas classified as MRZ-2b within the BIG footprint are underlain by Mojave River stream deposits. The Mojave River stream deposits are comprised of very loose to medium dense, poorly graded sands and silty sands with some rounded pebble and cobble gravel (Shannon & Wilson, 2019). Stamos and others (2001) refers to these deposits as Younger Mojave River alluvium that are within 1.0 mile of the current drainage and are up to 200 feet thick (DWR, 2003, p. 194).

The following is excerpted from Miller (1993) regarding the Mojave River channel resource area. The alluvium in the active river channel and parts of the adjacent floodplain generally consists of an upper layer of mostly sand and a lower section that is more gravelly. There are often clay layers either between the upper sand and the lower gravelly layers or within the gravelly layer. The deposits as described by Miller (1993) above are similar to those encountered in exploratory borings reported by Shannon & Wilson (2019).

Geology within MRZ-3a Area

Areas classified as MRZ-3a within the BIG footprint do not have available data to determine if the aggregate resources are significant. Review of available information shows that the geology in these areas is older Mojave river deposits, young and older alluvial fan deposits, and playa deposits.

Miller (1993) reports that older deposits in the area may have deleterious properties when used for concrete grade aggregate. The pre-Holocene alluvial fan deposits and playa deposits have well-developed calcium carbonate zones deposited in soil layers that can be several feet thick (Miller, 1993; Miller and other, 2000). Miller (1993) reports that these layers break down in processing to a fine silt-like material. The presence of volcanic rocks in alluvial fan materials often contain amorphous quartz and zeolite coatings and fillings which can react with alkali in Portland cement and may require concrete admixtures.



LEGEND

- Grading Limits
- BIG Project Boundary
- MRZ-2b - Known or Highly Likely Location
- Qa Alluvium
- Qs Windblown Sand
- Qrs Mojave River Channel Sand
- Qoa Older Alluvium
- Qoc Older Clay and Marl
- Qof Older Fanglomerate and Gravel
- Ts Shale and Sandstone, interbedded
- Tsl Limestone
- qm Quartz Monzonite
- gdp Granodiorite
- hd Hornblende
- hvp Quartz Latite-Dacite
- hvs Schistose Meta-Quartz Latite
- hvss Sericite and Muscovite Schist
- hq Quartzite

0 1 2 Miles

1 inch = 1 miles

Map adapted from Geologic map of the Barstow & Daggett 15 minute quadrangles, San Bernardino County, California, by Dibblee, T.W., and Minch, J.A., 2008 and Geologic map of the Kramer & Hawes 15 minute quadrangles, San Bernardino and Los Angeles County, California, by Dibblee, T.W., and Minch, J.A., 2008. Mineral Resources Zones 2023, by County of San Bernardino, PlaceWorks 2020.

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San Bernardino County, California

REGIONAL GEOLOGIC MAP

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FIG. 9

Soil Survey

The soil types within areas classified as MRZ-2b within the BIG footprint generally include the Villa Loamy Sand and Victorville Sandy Loam. These soil types are described as loamy sand, stratified sand, sandy loam, and clay loam.

The Web Soil Survey defines gravel and sand sources as suitable for commercial use with a minimum of processing and evaluates several soil properties, including gradation of grain size, the thickness of suitable material, and the content of rock fragments. Fair to good ratings indicate that gravel or sand are likely to be in or below the soil.

The Web Soil Survey reports that the surficial soils within the BIG footprint's MRZ-2b and MRZ-3a areas are a poor commercial source for gravel as shown in **Figure 10: Web Soil Survey Commercial Source for Gravel (A)** and **Figure 11: Web Soil Survey Commercial Source for Gravel (B)**. Within the MRZ-2b zone, the soils are considered to be a fair source for sand as shown in **Figure 12: Web Soil Survey Commercial Source for Sand (A)** and **Figure 13: Web Soil Survey Commercial Source for Sand (B)**. Within the MRZ-3a area, the soils are considered to be a good source for sand. The soils that are considered a good source consist of sands and gravelly sands and are likely associated with more recent alluvial fan deposits.

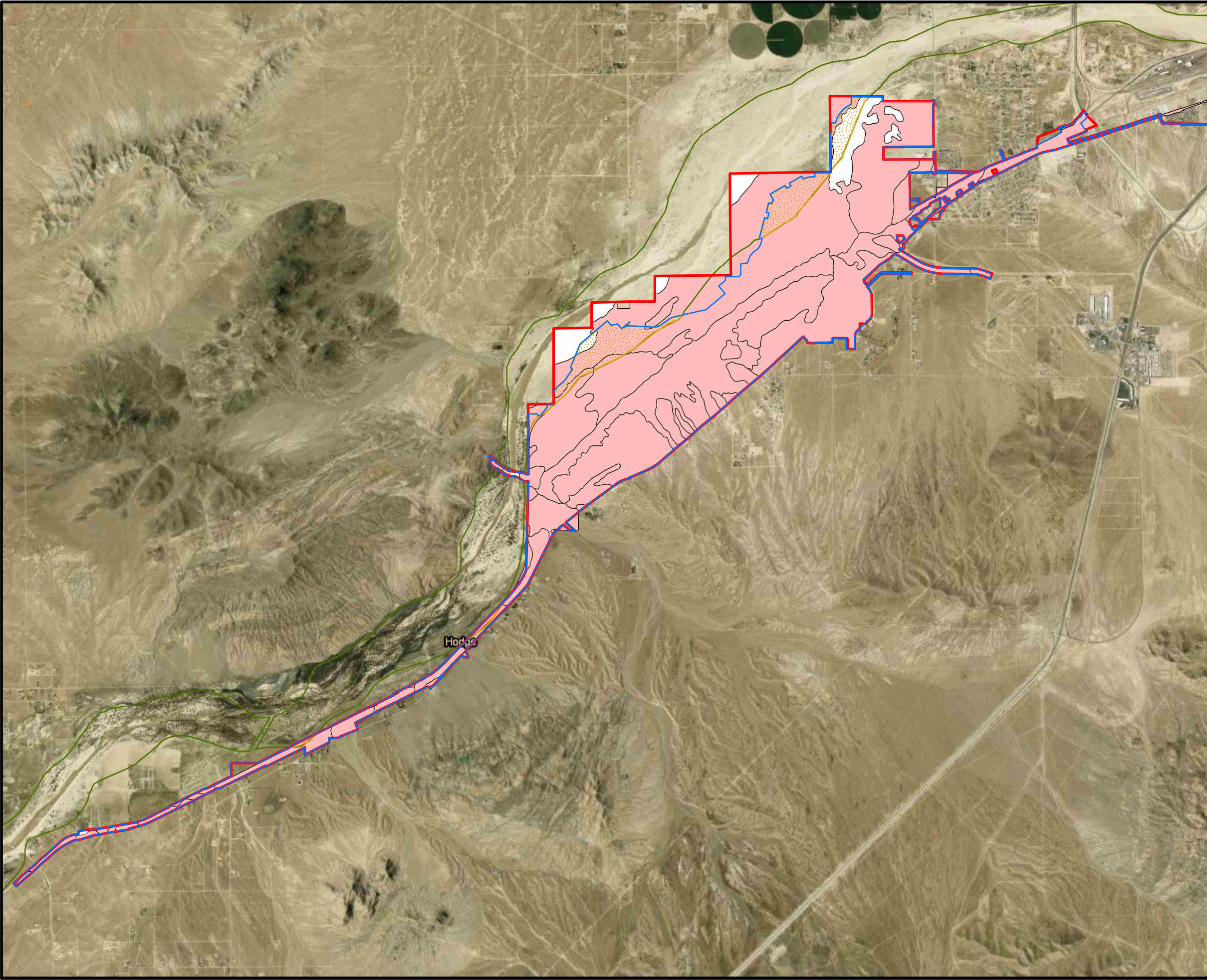
Mojave River Resource Area Mining

Miller (1993) reports on several sand and gravel mines along the Mojave River resource area. A pit in Barstow's northern portion began in about 1931 and the deposit contains approximately 90% sand and 10% gravel. Approximately two miles east of Barstow, Elmer Leak began mine operations from 1963 to 1972 for sand until the railroad expanded the rail yard over the mine site. Additional sand mining from the river channel was done approximately three miles west of Barstow. Additional mines south of Victorville and near Hesperia at the head of the Mojave River have been mined for mostly sand and some gravel.

In summary, Miller (1993) reports that the Mojave River resource area contains a very large amount of sand and gravel and is a very important resource to the Barstow-Victorville area. A description of the MRZ-2b resource areas within the BIG footprint area are discussed below.

Aggregate Resource Areas in the BIG Footprint

ARAs are for construction aggregate areas that have land use similar to areas which have been mined in the past (CDMG, 2000, p.6). The ARAs "provide a semi-quantified estimate of construction aggregate resources which are likely to be available to satisfy society's needs during the 50-year period following the classification of an area." The ARAs for the Barstow-Victorville area was last classified by Miller (1993) and those within and near the BIG footprint are shown in **Figure 14: Aggregate Resource Areas – BIG**.



LEGEND

Grading Limits

BIG Project Boundary

MRZ-2b within Grading

MRZ-2b

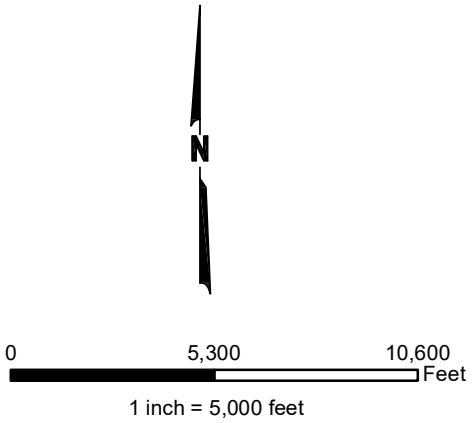
Commercial Source of Gravel

Good

Fair

Poor

Not Rated



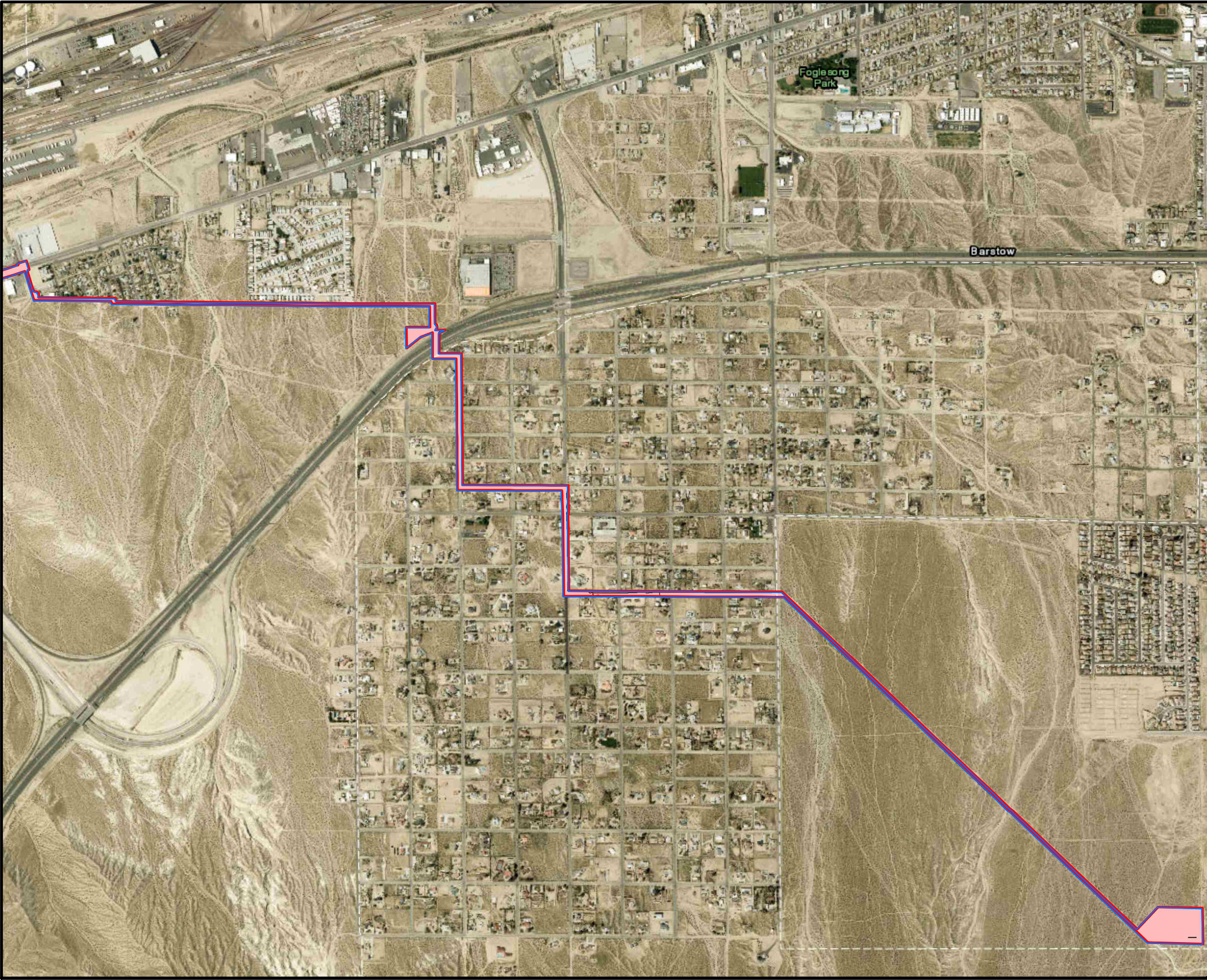
Reference: Map adapted from Web Soil Survey,
by USGS, accessed 11-3-2022

<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Barstow International Gateway
San Bernardino County, California

**WEB SOIL SURVEY
COMMERCIAL SOURCE
FOR GRAVEL**

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LEGEND

Grading Limits

BIG Project Boundary

MRZ-2b within Grading

MRZ-2b

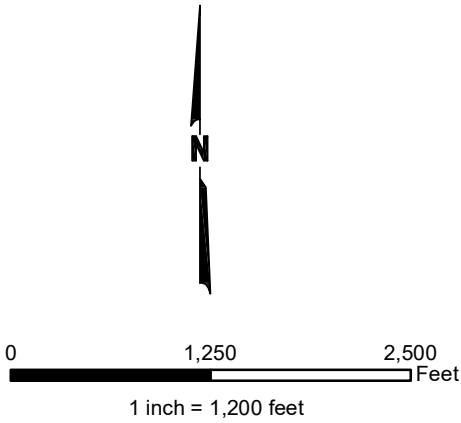
Commercial Source of Gravel

Good

Fair

Poor

Not Rated

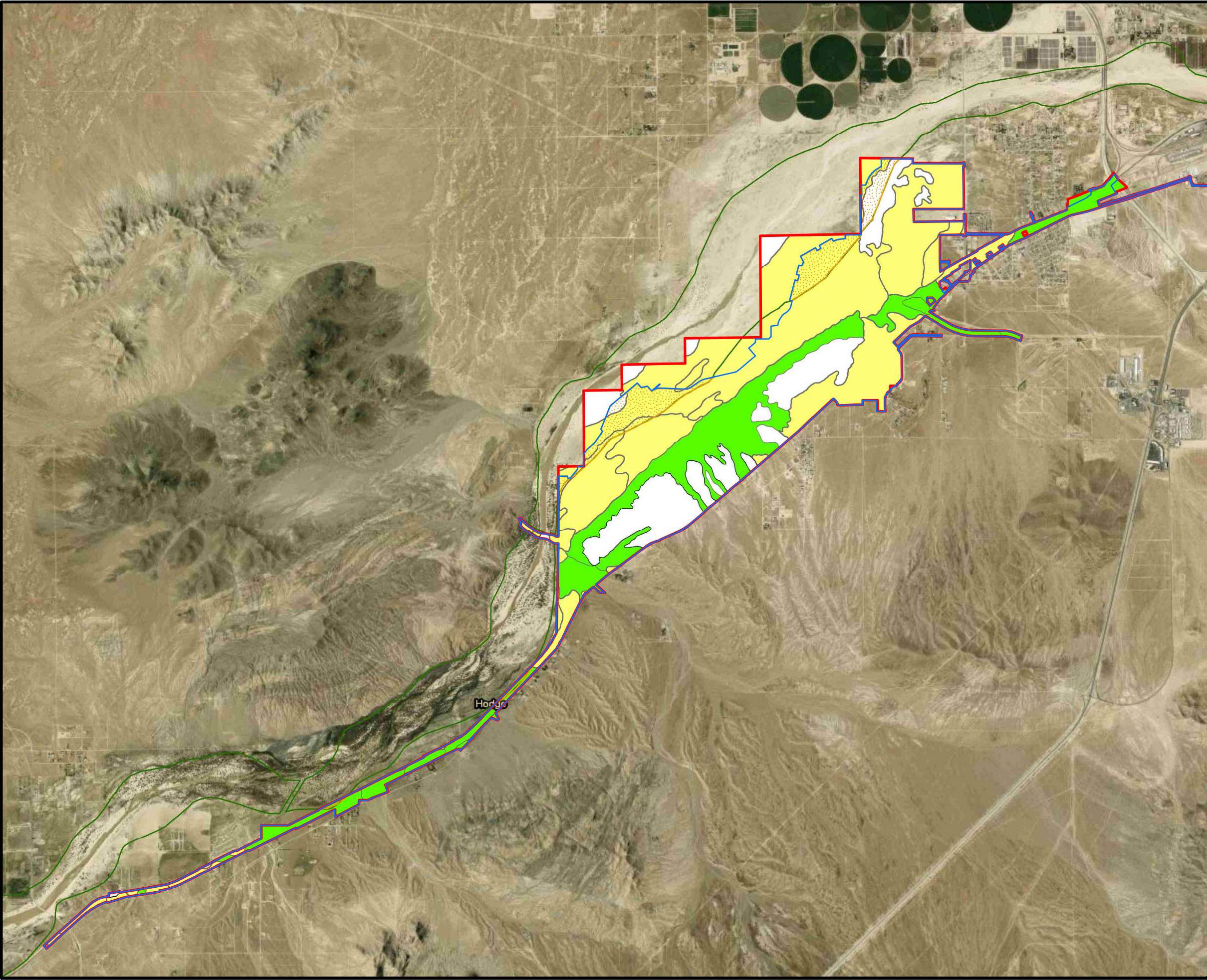


Reference: Map adapted from Web Soil Survey,
by USGS, accessed 11-3-2022
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

Barstow International Gateway
San Bernardino County, California

**WEB SOIL SURVEY
COMMERCIAL SOURCE
FOR GRAVEL**

October 2024110111-002



LEGEND

- Grading Limits
- BIG Project Boundary
- MRZ-2b within Grading
- MRZ-2b

Commercial Source of Sand

- Good
- Fair
- Poor
- Not Rated



0 5,000 10,000 Feet

1 inch = 5,000 feet

Reference: Map adapted from Web Soil Survey, by USGS, accessed 11-3-2022

<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

Barstow International Gateway
San Bernardino County, California

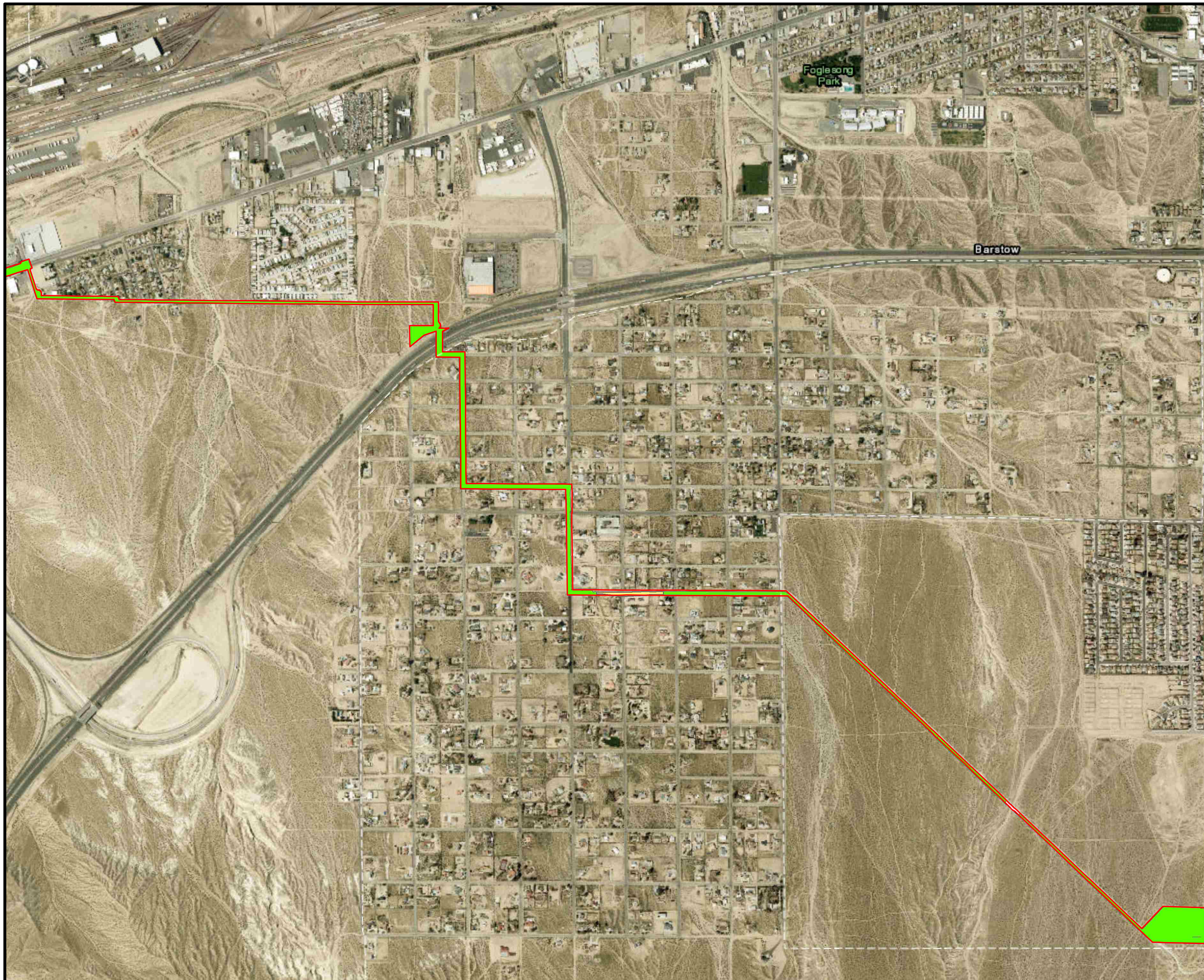
**WEB SOIL SURVEY
COMMERCIAL SOURCE FOR SAND**

February 2025

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FIG. 12



LEGEND

- BIG Project Boundary
- MRZ-2b within Grading
- MRZ-2b

Commercial Source of Sand

- Good
- Fair
- Poor
- Not Rated



0 1,200 2,400
Feet

1 inch = 1,200 feet

Reference: Map adapted from Web Soil Survey,
by USGS, accessed 11-3-2022

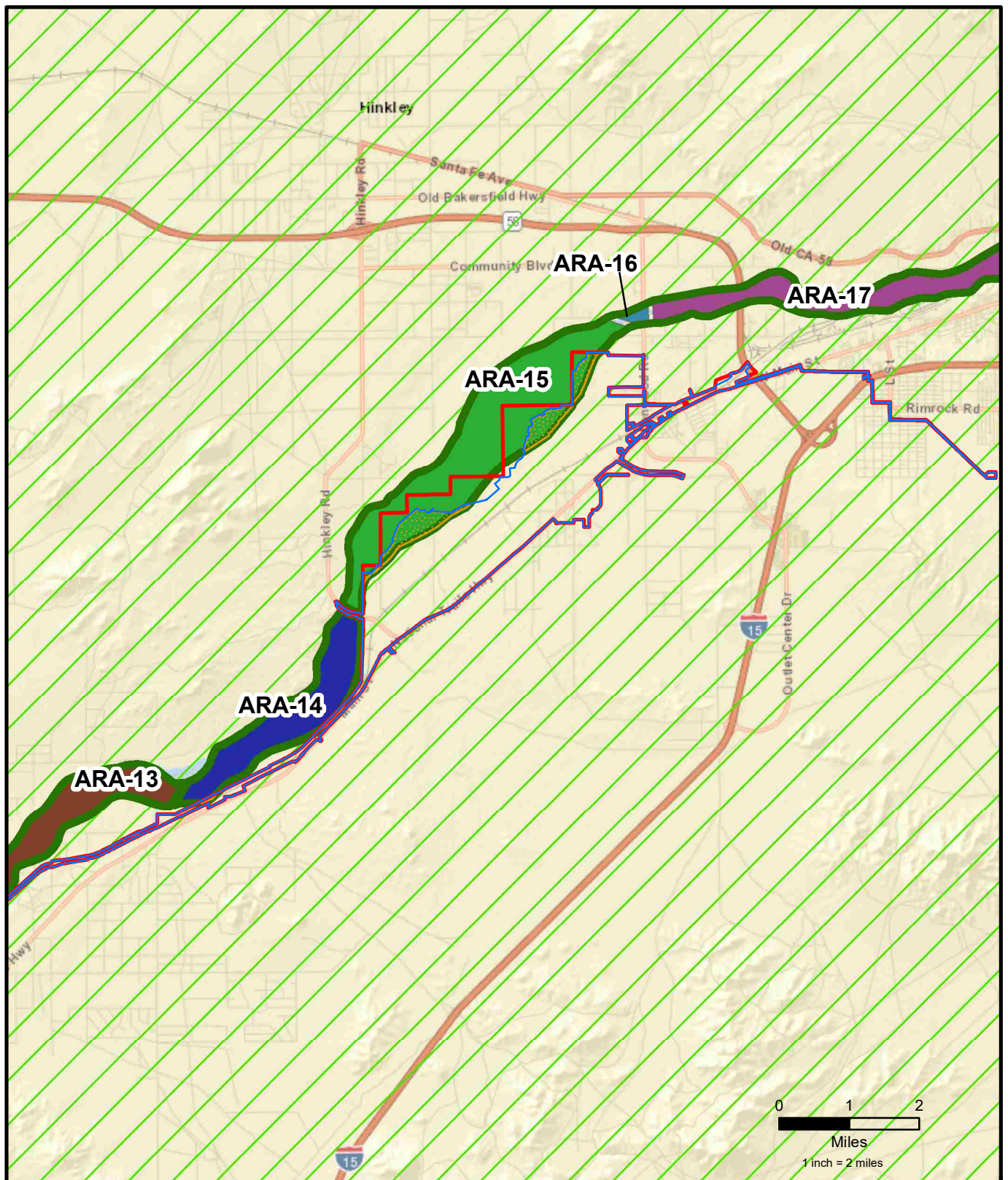
<https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

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LEGEND

	Grading Limits		ARA-13
	BIG Project Boundary		ARA-14
	MRZ-2b within Grading		ARA-15
	MRZ-2b		ARA-16
	MRZ-3a		ARA-17

Barstow International Gateway
San Bernardino County, California

AGGREGATE RESOURCE AREAS

February 2025

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FIG. 14

The SMGB is responsible for distributing information about ARAs to lead agencies but does not infringe on the authority of local governments to make land use decisions about the ARAs. The CDMG (2000) provides a list of specific land uses that are considered to be generally incompatible with mining and are excluded from ARAs (e.g., residential and industrial uses). At the time Miller (1993) was prepared, the only land excluded were locations of major pipelines and roads trending through the ARAs as shown in **Figure 14**.

The ARAs designated ARA-14 and ARA-15 shown in **Figure 14** are within an approximately 863-acre portion of the BIG footprint. Each of these ARAs is deemed Highly Significant, which Miller (1993) defines as containing a minimum of 21.5 million tons of construction aggregate (Miller 1993, p. 42). The following descriptions for each ARA are from Miller (1993) and the acreage and tonnage were determined with available data for the BIG footprint and the acreage and thickness information provided in (Miller 1993).

ARA-14

As shown in **Figure 14**, this part of the Mojave River MRZ-2b is between the Hinkley Road crossing and a pipeline crossing approximately 1.7 miles to the west. ARA-14 is approximately 1,166 acres. The aggregate resources in ARA-14 are approximately 45 feet thick, based on area well logs (Miller 1993, p. 35). ARA-14 is rated as Highly Significant. The highest probable use of material from the ARA-14 deposit is concrete aggregate. An approximately 13-acre portion of the BIG grading footprint is within ARA-14 and is estimated to contain approximately 1.6 million tons of aggregate.

ARA-15

As shown in **Figure 14**, this part of the Mojave River MRZ-2b is between the Hinkley Road crossing and a pipeline crossing approximately six miles downstream. ARA-15 is approximately 2,604 acres. The aggregate resources in ARA-15 are approximately 54 feet thick, based on area well logs (Miller 1993, p. 35). ARA-15 is rated as Highly Significant. The highest probable use of material from the ARA-15 deposit is concrete aggregate. An approximately 358-acre portion of the BIG grading footprint is within ARA-15 and is estimated to contain approximately 50.5 million tons of aggregate.

Table 5: Maximum Aggregate Resource in ARA and in BIG Grading Footprint presents the maximum aggregate resources available within the BIG grading footprint within the two ARAs from Miller (1993). The maximum aggregate resources within the BIG footprint are based on the percentages of the BIG grading footprint within the MRZ-2b zone. As indicated in **Table 5**, the maximum aggregate resources available within the BIG grading footprint (both ARAs) is approximately 52.1 million tons of aggregate.

Table 5: Maximum Aggregate Resource in ARA and in BIG Grading Footprint				
ARA No.	Assumed Density (tons per cubic foot) ¹	Assumed Waste (percent)	Total Aggregate Resources in ARA (in million tons)	Maximum Aggregate Resources in BIG Grading Footprint (in million tons)
ARA-14	0.06	0	137	1.6
ARA-15	0.06	0	368	50.5
Total				52.1

Sources: Miller, 1993, p. 43

5.0 IMPACT ANALYSIS

5.1 Impacts

<i>Impact 1</i>	<i>Would the Project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?</i>
-----------------	--

As shown in **Figure 8** and **Figure 14**, and **Table 5**, portions of the BIG footprint would be graded. Those areas outside the grading footprint would not result in the loss of availability of aggregate resources.

As discussed above, the MRZ-2b classified land within the BIG footprint (approximately 905 acres) is considered part of ARA-14 and ARA-15 and may have a potential for producing concrete aggregate-grade sand and some concrete aggregate-grade gravel. As indicated in **Table 5**, the maximum aggregate resources available within the BIG grading footprint (both ARAs) is approximately 52.1 million tons of aggregate. Therefore, BIG would result in the loss of availability of a known mineral resource, however, there are no established current economic operations for concrete aggregate extraction within or near the BIG footprint. Other sources are present and favorably located locally within the City's sphere-of-influence and regionally within the County within the Mojave River channel.

The MRZ-3a classified lands within the BIG footprint do not have established current economic operations for concrete aggregate sand or gravel within or near the Parcels. Also, other sources are present and more favorably located within ARAs within the Mojave River channel.

Mining of land designated within MRZ-2b would result in additional costs due to other environmental impacts within the Mojave River channel. Any disturbance of state and federal aquatic features (i.e., the Mojave River or any dry streambed connecting to the Mojave River) would need to be mitigated at a minimum 3:1 ratio, with each credit costing approximately \$70,000. Every acre of impact to aquatic features costs would thus cost approximately \$210,000 in aquatic mitigation. These fees do not take into consideration the additional biological mitigation fees, permit preparation, and compliance. The MRZ-2b and MRZ-3a areas are almost entirely within the Mojave River. Given there are approximately 750 acres of MRZ-2b land within aquatic jurisdictional areas, mining in this area would cost approximately \$158 million in mitigation fees alone, in addition to land costs, equipment, permitting, labor, and more. Furthermore, it is unlikely that a mine would be built within the Mojave River given it is within the floodplain. Therefore, because the MRZ-2b and MRZ-3a zones are almost entirely within the Mojave River, the aggregate resources are not considered valuable to the region.

The following would preclude the ARA-designated land within the BIG grading footprint from future use as an aggregate resource area:

- Recent subsurface explorations (Shannon & Wilson, 2024a; unpublished data) and evaluation of historical aerial photos (Shannon & Wilson, 2019, 2024a) show that the areas to be developed within ARA-15 were disturbed in the upper 5 feet by agricultural land use. Recent subsurface explorations in these disturbed areas (Shannon & Wilson, 2024a) encountered fine aggregates found to be of varying quality (Shannon & Wilson, 2024b). Preliminary soil testing in the upper 5 feet of ARA-15 indicates that some soils are not suitable for concrete-grade aggregate due to

inorganic impurities and lean clays interbedded with sands. Additional processing would be required to create useable concrete-grade aggregates.

- Review of recent geologic mapping (Miller and others, 2020) shows that the most recent and undisturbed Mojave River sand deposits are within the ARA areas located north of the BIG footprint.
- Previously unmapped young Mojave River sand deposits (Miller and others, 2020) are located outside and north of the ARA zones mapped in Miller (1993). These younger deposits would be a potential source of concrete-grade aggregate.
- The BIG project in ARA-14 is located where current (2024) groundwater encountered in subsurface exploration is within 9 and 17 feet below the ground surface (Shannon & Wilson, unpublished data). Historical groundwater levels near these 2024 subsurface exploration locations show groundwater elevations at 4 and 11 feet below the exploration ground surface elevation, respectively (DWR, 2024). These high groundwater elevations would make these areas unsuitable for surface or subsurface mining.
- The BIG project in ARA-15 is located where current (2024) groundwater encountered in subsurface exploration is within 17 and more than 50 feet below the ground surface (Shannon & Wilson, unpublished data). Historical groundwater levels near these 2024 subsurface exploration locations show groundwater elevations at 24 and 16 feet below the exploration ground surface elevations, respectively (DWR, 2024). These high groundwater elevations would limit these areas for surface and subsurface mining.

Mining in ARAs located within the BIG grading footprint would encroach into the Mojave River floodplain and surface or subsurface mining would likely affect flows of surface waters of the Mojave River and may adversely affect adjacent or downstream properties. Mineral deposits within the BIG footprint are not available for mining, given the location within and adjacent to the Mojave River, and groundwater being generally between 4 and 17 feet below ground surface. Therefore, despite the BIG footprint containing ARAs, development of these lands would not result in a loss of availability of a known mineral resource.

Therefore, a less than significant impact would occur, and no mitigation is required.

Impact 2

Would the Project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

As discussed above, **Figure 7** depicts the County's mineral resources and MRZ mineral deposits and indicates 4,995 acres of the BIG footprint (all within the BIG Specific Plan area) is within a County delineated MRZ (i.e., per Policy Map LU-4). However, because the City proposes to annex the BIG Specific Plan area, including where the MRZs are present, the County's CWP policies would not apply to this area. Therefore, BIG would not result in the loss of availability of a locally-important mineral resource recovery site delineated on a County Policy Map. No impact would occur in this regard.

As also discussed above, the Barstow General Plan does not delineate the City's mineral resource recovery sites on a map, but does report the City's MRZs where significant mineral resources have been determined

or inferred to be present are located primarily along the Mojave River and south of U.S. I-40. Most of the City has been mapped within MRZs containing known mineral deposits of undetermined significance. Based on these General Plan descriptions and the state's MRZ classification definitions, it can be inferred that the City contains MRZ-2b and MRZ-3a areas. For impacts to the state's MRZ classified areas, see **Impact 1** above.

The BIG grading footprint within ARA-15 is approximately 358 acres and is within the City's Sphere-of-Influence. This acreage is included in the City of Barstow land use areas with currently adopted land use designations of estate residential and general industrial (City of Barstow, 2015, p. LU-4). Under these existing land use designations, the ARA-15 area would be considered generally incompatible with mining and excluded from an ARA. Therefore, less than significant impact would occur.

5.2 Cumulative Impacts

The construction of present and foreseeable future projects are not anticipated to alter the risk of geologic hazards to BIG and would not result in significant unavoidable impacts to BIG related mineral impacts. The overall contribution of BIG to the significant cumulative regional mineral effects associated with future foreseeable projects and improvements would be less than cumulatively considerable.

5.3 Mitigation Measures

No mitigation is required.

5.4 References

- Bezore, S. P. and Shumway, D.O. (1994). *Mineral Land Classification of a Part of Southwestern San Bernardino County: the Barstow-Victorville Area, California*. Open File Report 94-04. California Department of Conservation, Division of Mines and Geology.
- California Department of Conservation, California Geological Survey. (2006). *Aggregate Availability in California*. Retrieved from:
<https://static1.squarespace.com/static/555e48cfe4b0b5279fec3af3/t/56fd64b127d4bd9cf4587ec8/1459446962745/Aggregate-Availability-in-California.pdf>.
- California Division of Mines and Geology (CDMG). (2000). *California Surface Mining and Reclamation Policies and Procedures. Special Publication 51*.
- California Department of Conservation, Division of Mines and Geology. (ND). *Guidelines for Classification and Designation of Mineral Lands*. Retrieved from:
<https://www.conservation.ca.gov/smgbg/guidelines/documents/classdesig.pdf>.
- California Department of Conservation, Division of Mine Reclamation. (2016). Mines Online. Retrieved from: <https://maps.conservation.ca.gov/mol/index.html>.
- California Department of Water Resources (DWR). (2024). Water data library, <https://wdl.water.ca.gov/waterdatalibrary/>, accessed June 2024.
- Clinkenbeard, J.P. and Gius, F.W. (2018). *Aggregate Sustainability in California*. California Geological Survey. Map Sheet 52.

- City of Barstow. (2015). *2015 – 2020 Land Use Element*. Retrieved from:
<https://www.barstowca.org/home/showpublisheddocument/5361/636607004813770000>.
- Dibblee, T. W., Jr. and Minch, J. A. (2008a). *Geologic Map of the Barstow and Daggett Quadrangles, San Bernardino County, California*. Map No. DF-393. Scale 1:62,500. Dibblee Geological Foundation.
- Dibblee, T.W., Jr. and Minch, J.A. (2008b). *Geologic Map of the Kramer & Hawes 15-minute Quadrangles, Kern, San Bernardino & Los Angeles Counties, California*, Map No. DF-385. Scale 1:62,500. Dibblee Geological Foundation.
- California Department of Water Resources (DWR). (2003). *California's Groundwater. Bulletin 118, update 2003*.
- Miller, R.V. (1993). *Mineral Land Classification of Concrete Aggregate Resources in the Barstow-Victorville Area, California*. California Division of Mines and Geology OFR 92-09.
- Miller, D.M., Langenheim, V.E., Haddon, E.K. (2020). *Geologic Map and Borehole Stratigraphy of Hinkley Valley and Vicinity, San Bernardino County, California*. Scientific Investigations Map 3458. Scale 1:24,000 U.S. Geological Survey.
- Natural Resource Conservation Service (NRCS). (2023). Web Soil Survey.
<https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx> (accessed April 2023).
- Shannon & Wilson. (2019). *Preliminary Geotechnical Design Report, Barstow Logistics, BNSF Railway, Cajon Subdivision, Line Segment 7600, Barstow, California*. November 18, 2019.
- Shannon & Wilson. (2021). *Geotechnical Design Report, BNSF Lenwood Staging Track Component, California High-Speed Rail System, San Bernardino County, California*. June 14, 2021.
- Shannon & Wilson (2024a) Geotechnical Design Report, Conceptual Warehouse Design, Barstow International Gateway, BNSF Railway, San Bernardino County, California. Project No. 110111-008 for TranSystems, Kansas, Missouri, November, 442 p.
- Shannon & Wilson (2024b) Geotechnical Data Report for Aggregate Evaluation, Barstow International Gateway, BNSF Railway, San Bernardino County, California. Project No. 110111-009 for TranSystems, Kansas, Missouri, April, 42 p.
- Stamos, C. L.; Martin, P.; Nishikawa, T.; and Cox, B. F. (2001). *Simulation of Ground-Water flow in the Mojave River Basin, California. Water-Resources Investigations Report 01-4002 Version 3*. U.S. Geological Survey.
- U.S. Geological Survey (USGS). (2024). Mineral Resources Data System: Data for San Bernardino County.
<https://mrdata.usgs.gov/mrds/map-us.html#home>.