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February 15, 2021

Project No. 423828

Nichole Osuch  
Project Manager  
The Arizona Department of Environmental Quality  
1100 West Washington Boulevard  
Phoenix, Arizona 85007

No Further Action Report  
BNSF Winslow Central Railyard  
Winslow, Arizona  
Site Code 513069-00

Dear Ms. Osuch:

This No Further Action (NFA) Report has been provided pursuant to your email correspondence dated December 23, 2020 indicating that BNSF could proceed with submittal of an NFA Report for the BNSF Winslow Central Railyard located at 1417 West 2nd Street in Winslow, Arizona, in Navajo County.

In accordance with Arizona Revised Statutes (A.R.S.) §49-181, BNSF submitted the following reports which demonstrate the remediation levels and controls pursuant to A.R.S. §49-175 were achieved at the site.

- *Confirmation Soil Sampling Results and Additional Water Well Information*, dated October 22, 2020 (TRC, 2020)
- *Technical Memorandum in Support of No Further Action Determination*, dated January 23, 2019 (ERM, 2019)
- *Site Closure/Remediation Completion Report*, dated February 2018 (ERM, 2018)

As a result, the Arizona Department of Environmental Quality (ADEQ) issued an email dated December 23, 2020 documenting the approval of the data presented in the abovementioned reports, and that BNSF could proceed with a request for No Further Action (NFA) determination.

On behalf of BNSF, this NFA Report for the above-referenced site is submitted in accordance with A.R.S. §49-181 as follows:

**1. DRAFT PUBLIC NOTICE**

See Attachment 1.

**2. SCALED MAP OF NFA BOUNDARY**

See Attachment 2.

**3. DESCRIPTION OF SPECIFIC SOIL AND GROUNDWATER CONTAMINANTS FOR WHICH AN NFA DETERMINATION IS BEING SOUGHT**

Analyte	
VOCs	Acetone
	Benzene
	n-Butylbenzene
	sec-Butylbenzene
	tert-Butylbenzene
	Ethylbenzene
	Isopropylbenzene
	p-Isopropyltoluene
	Naphthalene
	n-Propylbenzene
	1,1,2,2-Tetrachloroethane
	Toluene
	1,2,4-Trimethylbenzene
	1,2,3-Trimethylbenzene
	1,3,5-Trimethylbenzene
	Xylenes, total
PAHs	Anthracene
	Acenaphthene
	Benzo(a)anthracene
	Benzo(a)pyrene
	Benzo(b)fluoranthene
	Chrysene
	Fluoranthene
	Fluorene
	Naphthalene
	Phenanthrene
	Pyrene

**4. DESCRIPTION OF ACTIONS TAKEN TO ACHIEVE REMEDIATION LEVELS OR CONTROLS**

Between 1991 and 2020, BNSF implemented soil and groundwater investigations and remediation including removal of light non-aqueous phase liquid (LNAPL) petroleum from the groundwater, and excavation and removal of petroleum-impacted soil after demolition and removal of the former fueling platform.

The soil and groundwater remediation were completed within three general areas around the former fueling platform generally referred to as Areas 1, 2, and 3 (Attachment 2).

## **5. DESCRIPTION OF ANY SOIL, WATER, OR SOIL AND WATER TREATMENT SYSTEMS USED AS PART OF THE REMEDIATION**

Between 1991 and 1994, nineteen groundwater monitoring wells and two free product observation wells (i.e., DM-1 and DM- 2) were installed to evaluate site groundwater conditions as well as the lateral and vertical extent of groundwater impacted by the abovementioned contaminants of concern (ERM, 2019).

In 1998, during construction of the new fueling platform (in Area 3), BNSF installed an HDPE curtain wall and trench intercept system within the Central Railyard for subsurface LNAPL containment and collection. The intercept system included an HDPE curtain wall, several intercept sumps, LNAPL collection trenches and an oil/water separator (OWS) system. The curtain wall, sumps, and collection trenches captured mobile LNAPL present within the subsurface. Once captured, the fuel/water mixture was pumped to the OWS (northeast of Area 1), and LNAPL was removed using a series of settling chambers and skimmers (ERM, 2018). The LNAPL was then conveyed to an aboveground storage tank. The tank contents were periodically emptied and transported for proper disposal/recycling. Water from the OWS discharges to the City publicly owned treatment works (POTW).

### **5.1 REMOVAL OF HYDROCARBON IMPACTED SOIL**

Between 1998 and 2013, several phases of soil remediation were completed, primarily by excavation and offsite disposal of petroleum impacted soil. During this time, more than 5,000 tons of petroleum impacted soil was excavated and disposed offsite, and several thousand tons of petroleum impacted soil was remediated onsite via bioremediation (land farm) methodology. The onsite landfarm was closed and a NFA letter issued in 2009, and the remediated soil was utilized as clean backfill for the Former AST Area remediation excavation. Detailed reports of the soil remediation activities have been provided to, and approved by, the ADEQ. A summary of the soil remediation activities is below.

#### **5.1.1 Former AST Area**

In 2003, a 200,000-gallon diesel fuel AST was removed and seven potholes and two trenches were excavated to evaluate the vertical and lateral extent of diesel fuel impacts. Additional soil impacted with heavy-end hydrocarbons, including crude oil and asphalt-type material, was excavated and stockpiled. The soils impacted by crude oil and bunker oil were transported to Butterfield Landfill, a lined disposal facility in Maricopa, Arizona. That same year, a bermed soil bioremediation land farm was constructed in the former AST area to remediate the diesel fuel-impacted soil and the remaining in-situ soil impacted by the historical AST operations (ERM, 2018). Closure of the land farm entailed transporting the bio-remediated soil and previously buried concrete debris beneath the southwestern portion of the land farm into the bottom of the land farm's surface depression. The concrete debris was placed into the depression first, followed by the stockpiled soil. The stockpiled soil was placed and rough-graded such that the new surface elevations maintained a decreasing grade toward the southeast. Once the stockpiled soil was depleted, the existing northern berm of the former land farm was removed and transported into the land farm depression. The ADEQ issued an NFA for the land farm to BNSF in 2009 (ERM, 2018).

#### **5.1.2 Fueling Platform Area**

In 1998, soils were removed from the footprint of what is now the current fueling platform to expedite the cleanup process at the site and to establish a clean zone beneath the newly constructed

platform facility. Excavation activities were conducted using a track-hoe to a depth of approximately 13.5 feet bgs at which point Moenkopi Formation bedrock was encountered. Throughout the footprint of the excavation, numerous horizontal railyard utility pipe trenches or chases were identified. The pipes in these chases were typically bedded with fine sand and gravel and therefore, were incidental collection points for any migrating water or diesel (ERM, 2019).

A project-specific soil cleanup goal of 1,000 mg/kg TPH was established and soil within the fueling platform's footprint containing TPH greater than 1,000 milligrams/kilogram (mg/kg) was removed. Samples with TPH results below 1,000 mg/kg were marked for additional analyses to serve as confirmation results at the excavation boundary (ERM, 2019). A total of 73 soil samples were collected from the platform's excavation and soil remediation activities. Of the 73 collected soil samples, 22 samples were collected for confirmation of the excavation limits, and 13 samples were collected for profiling composited stockpiles. Confirmation soil samples were analyzed for the presence of TPH, extractable fuel hydrocarbons (EFH), BTEX and PAHs.

The conclusions of the 1998 Remedial Actions indicated the following:

- Surficial geologic deposits within the Central Railyard were confirmed to have an approximate thickness of 13.5 feet and were underlain by Moenkopi Formation bedrock.
- Soil with TPH concentrations less than 1,000 mg/kg remained in-situ based on the project-specific remediation level. However, the majority of the diesel-impacted soil was removed from within the footprint of the new fueling platform (ERM, 2019).
- Soil at depths of 13 feet and deeper with concentrations greater than 1,000 mg/kg were not able to be safely excavated due to adjacent active railroad tracks. Some water and oil were observed at depths of 13 feet. The new fueling platform will prevent horizontal migration of subsurface liquids at depths ranging from 0 to 9 feet bgs, which is where the majority of the diesel-impacted soils were observed.
- Stockpiled soil sample results indicated TPH concentrations ranging from 1,000 to 21,000 mg/kg. Additionally, two composite samples were selected for additional analysis of EFH, BTEX, and PAHs, none of which exceeded their respective ADEQ Soil Remediation Levels (ERM, 2019).
- Approximately 3,600 cubic yards (yd<sup>3</sup>) of soil was removed as part of the excavation/remedial activities of which 2,820 yd<sup>3</sup> of soil was taken to a disposal facility located in Joseph City, Arizona (approximately 800 yd<sup>3</sup> of soil was utilized as backfill for the new platform).

Soils beyond the footprint of the new fueling platform were not removed as part of the 1998 Remedial Actions and were instead addressed during subsequent remedial efforts (i.e., Central Railyard Collection and Remediation Oil/Water Separator Installation/Operation, Bunker Oil Conveyance Piping Remediation, and Exploratory Potholing) as described in the Site Closure/Remediation Completion Report (ERM, 2018).

### 5.1.3 Former Fueling Platform Conveyance Piping

In 2010, during the excavation and conveyance piping removal project, approximately 380 yd<sup>3</sup> of bunker oil-impacted soil were excavated from Area 2 and transported to the Painted Desert Landfill in Joseph City, Arizona, for proper disposal. In addition, approximately 500 gallons of bunker oil mixed with ZEP® Big Orange, a biodegradable citrus-based detergent, were removed and transported to Filter Recycling Services, Inc., a licensed disposal/recycling facility, in Bloomington, California, for proper disposal (ERM, 2018). In 2013 additional conveyance piping was investigated in Area 3 through potholing activities. During this investigation, approximately 104 tons of petroleum impacted soil was excavated and transported offsite to Painted Desert Landfill in Joseph City, Arizona, for proper disposal.

## 5.2 GROUNDWATER REMEDIATION

LNAPL recovery systems were installed between 1998 and 2013 and include a subsurface containment system consisting of intercept trenches and collection sumps, and three 36-inch-diameter diesel recovery wells (DRWs). These systems operated between 1998 and 2017 until LNAPL was no longer recoverable. Collectively, the system recovered a total of approximately 16,154 gallons of LNAPL. By 2017, recovery had diminished to less than 2 gallons per year and the system was shut down. Details are presented below.

### 5.2.1 Former AST Area

During initial investigations conducted by Dames & Moore in the vicinity of the former AST Area, a localized thin layer of LNAPL was encountered in a monitoring well. LNAPL was present in the perched water zone and was prevented from migrating vertically downward by a lean clay layer and sandstone/siltstone of the Moenkopi Formation. Based on soil conditions and the small amount of diesel fuel present in the groundwater, BNSF voluntarily chose to remove the LNAPL from the perched water zone using a series of skimmers in a collection trench east of the former AST Area. Skimmer operations began in May 1998.

The monthly volume of LNAPL removed fluctuated through July 1998, and then began to consistently diminish through August 1998 when LNAPL recovery was no longer feasible. From 1998 to 2000, the system was shut down due to low LNAPL recovery rates. In 2000, the system was monitored monthly with no measurable LNAPL observed. In 2001, the system was restarted with no additional LNAPL recovered through January 2002. The system was shut down again in March 2002. Up to that date, the skimmer system collected a total of 60.6 gallons of diesel fuel (ERM, 2018).

In August 2009, the LNAPL skimmer sumps (Man-Holes MH-16, -18, and -20) were over-excavated and removed. Following removal of the skimmer sumps and casings from MH-16, -18, and -20, the excavations and casing holes were backfilled using a bentonite-cement grout mixture. The grout was placed directly into the sump casing hole, filling it and the concrete sump excavation. The surface was then graded to match the surrounding surface (ERM, 2018).

### 5.2.2 Former Fueling Platform

In 2005, a diesel fuel recovery well (DRW-1) was installed to enhance the rate of LNAPL recovery in the proximity of the HDPE curtain wall and central intercept sump. DRW-1 was constructed using a 36-inch-diameter, corrugated metal pipe (CMP) with a pneumatically operated LNAPL recovery system (URS, 2005).

In 2009, a Cone Penetrometer Technology/Laser Induced Fluorescence (CPT)/LIF investigation was conducted to evaluate the presence and extent of LNAPL in the vicinity of DRW-1. Based on the results of the CPT/LIF investigation, two additional 36-inch-diameter diesel recovery wells (DRW-2 and DRW-3) were installed in 2010.

The recovered fluid was conveyed into the nearby Central Intercept Sump, which transfers the weathered diesel fuel to the OWS system; from the OWS system the LNAPL was conveyed to an aboveground waste oil tank. The contents of the tank were periodically emptied and properly disposed of/recycled. Water from the OWS discharges to the City POTW.

In December 2013, during exploratory potholing activities in Area 3, perched groundwater with visible LNAPL was encountered at relatively shallow depths in two potholes, SE-3, and SE-4. One vacuum extraction point was installed in each pothole, VP-1 and VP-2, respectively. In 2014, between March and December, six extraction events were conducted using wells MW-10R, DM-3, and vacuum points VP-1 and VP-2. At the conclusion of the six vacuum extraction events, approximately 11,200 gallons of fluids (water and LNAPL) were recovered, of which 202 gallons were LNAPL.

The Former Fueling Platform groundwater remediation systems were shut down in 2017. From 2009 to 2017, the groundwater remediation system removed approximately 16,154 gallons of LNAPL from the subsurface (ERM, 2018). Following approval of this no further action request, the groundwater remediation system will be properly decommissioned.

## **6 INSTITUTIONAL OR ENGINEERING CONTROLS**

There will be no institutional or engineering controls at the site.

## **7 POST-REMEDATION MONITORING**

There will be no post-remediation monitoring at the site. The groundwater monitoring wells, diesel recovery wells, and vacuum points will be properly abandoned.

## **8 DESCRIPTION OF COMMUNITY INVOLVEMENT**

Between January and May 2009, the public was notified of BNSF's request for an NFA for the soil remediation land farm (ERM, 2018). A Draft Public Notice regarding this NFA request is attached and will be published upon approval by ADEQ. Further community involvement regarding the coordination and collaboration between the ADEQ, BNSF, and the local community will be conducted if necessary.

## 9 LIST OF PERMITS OBTAINED

There are no open permits associated with soil and groundwater remediation for the Site.

### REFERENCES

In addition to the three primary references listed on Page 1 of this document (TRC, 2020; ERM, 2019, and ERM, 2018), additional key references are associated with the investigation, remediation, and closure of the project are listed below.

Dames & Moore. 1992. Soils and Groundwater Investigation, Atchison, Topeka, Santa Fe Railway Company, Winslow Railyard, Winslow, Arizona. 14 August.

Dames & Moore. 1998. Operation and Maintenance Manual: Oil-Water Separator System, Railyard Oil Recovery System, AST Area Oil Recovery System, BNSF Railroad, Winslow, Arizona. December.

ERM-West, Inc. (ERM). 2013. Exploratory Potholing Study Report. October.

ERM. 2016. BNSF Winslow Railyard - LNAPL Transmissivity Evaluation. January.

ERM. 2017. 2017 Annual Groundwater Monitoring Report. December. Interstate Technology & Regulatory Council. 2009. Evaluating Natural Source Zone Depletion at Sites with LNAPL. April.

ERM, 2018, Site Closure/Remediation Completion Report. February.

ERM, 2019, Technical Memorandum in Support of No Further Action Determination.

TRC, 2020, Confirmation Soil Sampling Results and Additional Water Well Information. October 22.

URS Corporation (URS). 2004. *Landfarming of Impacted Soils, Winslow Central Railyard, Winslow, Arizona*. 13 February.

URS. 2005. *Letter Report, Diesel Recovery Well, Winslow Central Railyard, Winslow, Arizona*. 25 May.

URS. 2008a. *Voluntary Remediation Program No Further Action Request, Soils Impacted by Petroleum Hydrocarbons, Winslow Central Railyard, Winslow, Arizona*. 1 April.

URS. 2008b. *Letter Report, Supplemental Site Investigation, Arsenic Concentrations in Background Soils, Winslow, Arizona*. 3 December.

URS. 2009a. *Hydrocarbon Recovery Enhancement Study Report, Winslow Central Railyard, Winslow, Arizona*. 1 July.

URS. 2009b. *Remediation Systems 2008 Annual Report, Winslow Central Railyard, Winslow, Arizona*. 15 April.

URS. 2009c. *Landfarm and Skimmer Sump Closure Letter Report, Winslow Central Railyard, Winslow, Arizona*. 22 October.



NFA Report  
BNSF Winslow Central Railyard  
Winslow, Arizona  
February 15, 2021

URS. 2010. *Diesel Recovery System Expansion & Bunker Oil Removal, Winslow Central Railyard, Winslow, Arizona.* 30 April.

Please contact Matt Eaton at [meaton@trccompanies.com](mailto:meaton@trccompanies.com) or Mike Makerov at [mike.makerov@bnsf.com](mailto:mike.makerov@bnsf.com) if you have any questions.

Sincerely,



Matthew R. Eaton, P.G.  
Principal Geologist



Patrick J. Toelkes, P.G.  
Project Manager

cc: Mike Makerov, BNSF

Attachments:

- 1: Draft Public Notice
- 2: Scaled Map of NFA Boundary



ATTACHMENT 1  
DRAFT PUBLIC NOTICE

**NOTICE OF 30-DAY PUBLIC COMMENT PERIOD  
BNSF WINSLOW CENTRAL RAILYARD  
VOLUNTARY REMEDIATION PROGRAM SITE  
REQUEST FOR NO FURTHER ACTION DETERMINATION**

BNSF Railway Company has submitted a request for a No Further Action (NFA) determination to the Arizona Department of Environmental Quality (ADEQ) Voluntary Remediation Program (VRP) for the BNSF Winslow Central Railyard VRP site. The NFA requests closure for soil and groundwater and was submitted in accordance with Arizona Revised Statutes § 49-181.

The BNSF Winslow Central Railyard VRP site consists of approximately 86 acres of land developed in the early 1900s as a fueling, repair, and service facility for steam and later diesel driven locomotives and as a maintenance and repair facility for railcars located in Winslow, Arizona. Contaminants of concern at the site are volatile organic compounds and polynuclear aromatic hydrocarbons.

The NFA Report is available online at: <http://azdeq.gov/notices>, and at the ADEQ Records Center, 1110 W. Washington St., Phoenix, (602) 771-4380, or (800) 234-5677, ext. 6027714380; please call for hours of operation and to schedule an appointment.

**PARTIES WISHING TO SUBMIT WRITTEN COMMENTS** regarding the NFA request for the BNSF Winslow Central Railyard VRP site may do so to ADEQ, Attention: Nichole Osuch, Voluntary Remediation Program, 1110 W. Washington St., Phoenix, AZ 85007 or [osuch.nichole@azdeq.gov](mailto:osuch.nichole@azdeq.gov); or Matt Eaton at [meaton@trccompanies.com](mailto:meaton@trccompanies.com) and reference this listing. **Comments must be postmarked or received by ADEQ or Matt Eaton by [24] [April], [2021].**

Dated this [12] day of [March], [2021].

ADEQ will take reasonable measures to provide access to department services to individuals with limited ability to speak, write or understand English and/or to those with disabilities. Requests for language translation, ASL interpretation, CART captioning services or disability accommodations must be made at least 48 hours in advance by contacting the Title VI Nondiscrimination Coordinator at 602-771-2215 or [Communications@azdeq.gov](mailto:Communications@azdeq.gov). For a TTY or other device, Telecommunications Relay Services are available by calling 711.

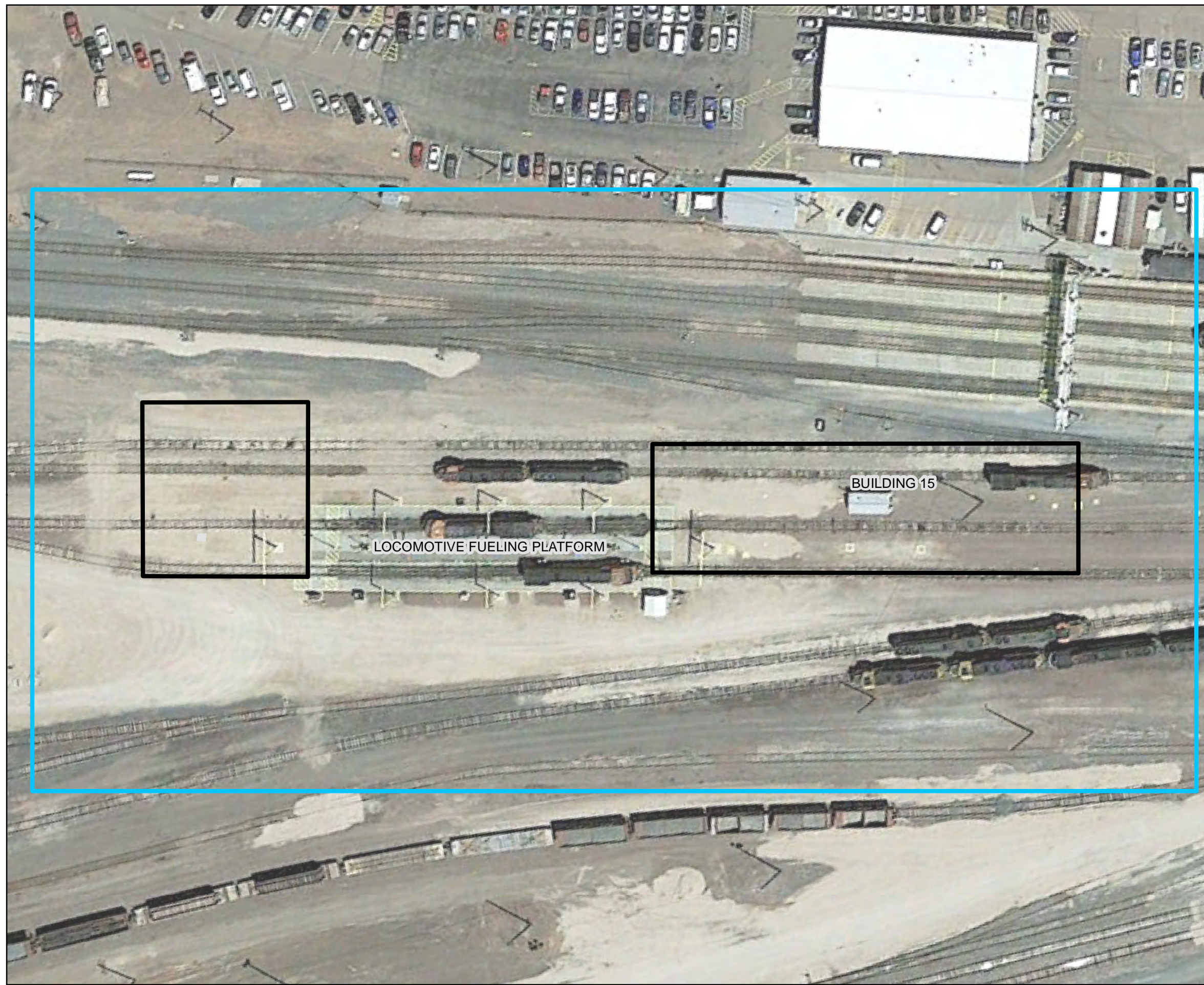
ADEQ tomará las medidas razonables para proveer acceso a los servicios del departamento a personas con capacidad limitada para hablar, escribir o entender inglés y/o para personas con discapacidades. Las solicitudes de servicios de traducción de idiomas, interpretación ASL (lengua de signos americano), subtítulo de CART, o adaptaciones por discapacidad deben realizarse con al menos 48 horas de anticipación comunicándose con el Coordinador de Anti-Discriminación del Título VI al 602-771-2215 o [Communications@azdeq.gov](mailto:Communications@azdeq.gov). Para un TTY u otro dispositivo, los servicios de retransmisión de telecomunicaciones están disponible llamando al 711.

ATTACHMENT 2



SCALED MAP OF NFA BOUNDARY

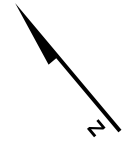
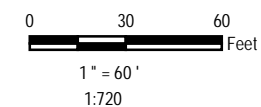


Plot Date: 3/11/2021 08:57:18 AM by: RCOLLINS -- LAYOUT: ANS1B(11"x17")  
 Path: L:\Graphics\Projects\BNSF - Winslow - Yard\354300.0000\GIS\MXD\Winslow\_NFA.mxd  
 Coordinate System: NAD 1983 StatePlane Arizona East FIPS 0201 Feet (Foot US)  
 TRC - GIS




**LEGEND**

-  Approximate No Further Action Boundary for Soil
-  Approximate No Further Action Boundary for Groundwater



GOOGLE EARTH IMAGE DATE: APRIL 4, 2015

PROJECT:		<b>BNSF WINSLOW CENTRAL RAILYARD WINSLOW, ARIZONA</b>	
TITLE:		<b>NO FURTHER ACTION DETERMINATION</b>	
DRAWN BY:	R. COLLINS	PROJ. NO.:	<b>FIGURE 1</b>
CHECKED BY:	C. FAUSEL		
APPROVED BY:	M. EATON		
DATE:	MARCH 2021		
		17911 Von Karman Avenue, Suite 400 Irvine, CA 92614 Phone: 949.727.9336 www.trcsolutions.com	
FILE NO.:		Winslow_NFA.mxd	