

Public Safety Communications Commission

WyoLink Recommendations



BFY 2021/2022

BFY 2023/2024

BFY 2025/2026

WyoLink Report Update

Summary of Contents



The following document includes additional information on the current status and updates of the WyoLink system.

Sections:

- Equipment
- Funding and budget
- Statewide map indicating the location of the existing and new 16 WyoLink tower sites including site coverage maps, scaled down to regional coverage.
- Definitions

WyoLink Main Equipment



Master Sites

There are currently two master sites, located in Cheyenne and Casper.



GTR Radio

A Motorola radio intended for use as a base repeater, and it is capable of conventional analog as well as transmission and reception. It is an updated version of the Quantar radio. Its output power is 125 watts.



Core Towers

Radio sites that provide for mobile radio coverage for the system's users. Communicates tower to tower and to handhelds where coverage exists.



Handheld Radio

Hand held, two-way radio transceiver that provides field personnel with transmit/receive capability for communication with the dispatch center and with other mobile radios. Its output power is 5 or 7 watts, depending on the radio.



Portable Enhancement Towers

A site added to enhance portable radio coverage in a local area. Communicates tower to tower and to mobile radios.



Mobile Radio

Vehicle mounted radio communication devices. Its output power is 50 or 100 watts, depending on the radio and options ordered.



Quantar Radio

A Motorola radio intended for use as a base repeater, and it is capable of conventional analog as well as transmission and reception. Its output power is 125 watts.



Control Stations

Stationary radio. Its output power is 50 or 100 watts, depending on the radio and options ordered.



Dispatch Center Console Seats *(in buildings)*

Its output power is effectively 125 watts because consoles use Quantar and GTR radios at Core and PCE sites to transmit.

WyoLink Re-Cap

QUANTAR™ – GTR



QUANTAR™ Radio: A Motorola radio intended for use as a base station, either as a radio or as a repeater. It is capable of conventional analog as well as transmission and reception. Its output power is 125 watts.



GTR Radio: Providing the same features of the QUANTAR™ but surpassing the bar previously set by QUANTAR™ offering software-based upgrades, no single point of failure, hot swap hardware, and front access serviceability. Its state of the art compact design enables everything from basic Analog Conventional to advanced P25 on the same hardware.

*Vendor support for the Quantar expires 12/31/2020; 346 units to be replaced at 70 WyoLink sites (5 to 7 units per site) at approx \$12.18 Million equaling approx \$35,200 per unit

DC Power Plants

- Base repeaters and microwave equipment operate on 48 volt direct current (DC) power plants
- DC power plant converts 120 volt commercial power into 48 volt direct current (DC)
- Replacement of existing power plants that have reached end-of-life/end of support



WyoLink Re-Cap

Cost: Over 6 Year Average



- Estimated \$5.5 Million per year (6 years)
 - Quantar replacement/GTR upgrade approx: \$2.03 million per year
 - System Maintenance Agreement (SMA) to include: Services, maintenance and software support, upgrades and DC power plants: approx \$3.35 million per year (estimated with additional 2.25%)

Cost: Over 6 Year Average Breakdown

	2021	2022	BFY 2021/2022	2023	2024	BFY 2023/2024	2025	2026	BFY 2025/2026
SMA & GTR Upgrade	\$ 4,166,660	\$ 4,166,660	\$ 8,333,320	\$ 4,166,660	\$ 4,166,660	\$ 8,333,320	\$ 4,166,660	\$ 4,166,660	\$ 8,333,320
Capital & Expansion	\$ 973,750	\$ 998,094	\$ 1,971,844	\$ 1,023,046	\$ 1,048,622	\$ 2,071,668	\$ 1,074,838	\$ 1,101,709	\$ 2,176,547
DC Power Plants	\$ 313,176	\$ 313,176	\$ 626,352	\$ 313,176	\$ 313,176	\$ 626,352	\$ 313,176	\$ 313,176	\$ 626,352
Totals	\$ 5,453,586	\$ 5,477,930	\$ 10,931,516	\$ 5,502,882	\$ 5,528,458	\$ 11,031,340	\$ 5,554,674	\$ 5,581,545	\$ 11,136,219



The SMA provides the following services **24/7/365**

Remote System Monitoring: notification, and dispatch services provided by the vendor's Network Operations Center (NOC)

Remote System Performance Management: allowing remote network technicians to diagnose and repair issues as they arise

Technical Assistance: provided to all WyoLink Technicians

On-Site Technician Services: for 2 WyoLink Master Sites (Cheyenne and Casper) as well WHP and TMC Dispatch Centers (Mission Critical locations)

On-Site Technician Services: for 3 back-up, non-Mission Critical Dispatch Centers (WOHS, Laramie TMC, WyoLink Operations Center)

Hardware Repairs with “**Advance Replacement**” for all WyoLink equipment & components



The SMA provides the following services **24/7/365**

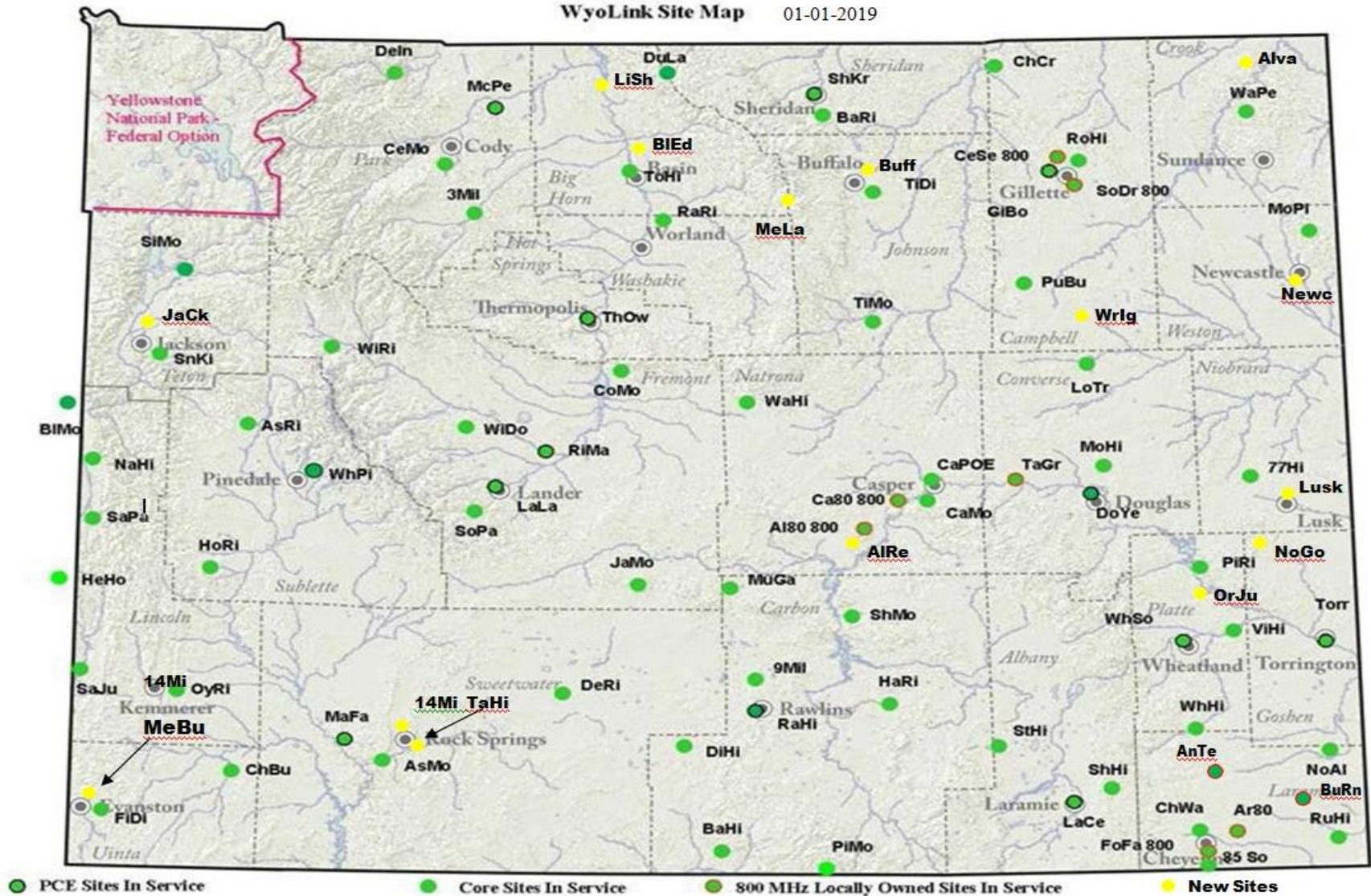
System Security Updates: providing up-to-date Cyber Security and testing for the entire system, including local Dispatch Centers (Windows Based Platforms require security patches, allowing WyoLink to administer to local Dispatch Centers)

System/Software Upgrade Agreement: is an annual system upgrade that is designed to maintain WyoLink at an “up to date” status. This includes software (ie: moving to Windows 10 prior to the January 2020 expiration) as well upgrading hardware and components no longer capable of supporting an “up to date” status. The agreement covers, to an extent, upgrading local Dispatch Centers equipment that would be incapable of supporting an “up to date” status.

WyoLink Site Map



WyoLink Site Map 01-01-2019



WyoLink Site Map



WyoLink Site Names	Abbreviation	WyoLink Site Names	Abbreviation	Portable Coverage Sites @19	Abbreviation
3 Mile	3Mil	Narrows Hill	HaHi	Buffalo	Buff
14 Mile (Rock Springs)	14Mi	Nine Mile	9Mil	Bluff Edge (Greybull)	BlEd
77 Hill	77Hi	North Albin	NoAl	Douglas Yellowstone	DoYe
85 South	85So	Northern Goshen	NoGo	Gillette Boxelder	GiBo
Alcova Reservoir (VHF)	AlRe	Orin Junction	OrJu	Jackson	Jack
Alva (Crook)	Alva	Oyster Ridge	OyRi	Laramie Cemetery	LaCe
Aspen Mountain	AsMo	Pine Ridge	PiRi	Lander Landfill	LaLa
Aspen Ridge	AsRi	Pinkham Mountain	PiMo	Lusk	Lusk
Baggs Hill	BaHi	Pumpkin Buttes	PuBu	Mans Face	MaFa
Banner Ridge	BaRi	Rattlesnake Ridge	RaRi	McCullough Peaks	McPe
Black Mountain	BlMo	Rendezvous Peak (MW Only)	RePe	Newcastle	Newc
Casper Mountain	CaMo	Rozet Hill	RoHi	Rawlins Hill	RaHi
Casper Port of Entry	CaPo	Sage Junction	SaJu	Riverton Main	RiMa
Cedar Mountain	CeMo	Salt Pass	SaPa	Sheridan Kroe	ShKr
Cheyenne Water Tank	ChWa	Sherman Hill	ShHi	Tank Hill (Rock Spring 800)	TaHi
Chicken Creek	ChCr	Shirley Mountain	ShMo	Thermopolis Owl	ThOw
Church Buttes	ChBu	Signal Mountain	SiMo	Torrington	Torr
Copper Mountain	CoMo	Snow King	SnKi	Wheatland South	WhSo
Dead Indian	DeIn	South Pass	SoPa	White Pine	WhPi
Delaney Rim	DeRi	Strous Hill	StHi		
Divide Hill	DiHi	Tisdale Divide	TiDi	Locally Owned Sites (800) @9	
Duncan Lake	DuLa	Tisdale Mountain	TiMo	Alcova Reservoir (800)	Al80
First Divide	FiDi	Torch Hill	ToHi	Antelope	Ante
Halleck Ridge	HaRi	Virgin Hill	ViHi	Archer	Ar80
Hell Hole	HeHo	Waltman Hill	WaHi	Burns	Burn
Hogsback Ridge	HoRi	Warren Peak	WaPe	Casper Mountain (800)	Ca80
Jade Mountain	JaMo	Whitcomb Hill	WhHi	Cemetery Separation	CeSe
Little Sheep (Big Horn)	LiSh	Windy Ridge	WiRi	Fox Farm	FoFa
Lone Tree	LoTr	Winkleman Dome	WiDo	Southern Drive	SoDr
Meadowlark (Washakie/Big Horn)	MeLa	Wright	Wrlg	Tall Grass	TaGr
Medicine Mountain	MeMo				
Morton Hill	MoHi				
Mount Pisgah	MoPi			Total WyoLink Sites	75
				New Sites Under Construction	15 *

*Note: See Site Location Update for additional details regarding Bondurant.

Portable Communication Enhancement Tower

BFY2019/2020 & BFY2021/2022



Site Evaluation Criteria

Frequency Available

- Priority was given to potential new sites with licensed frequencies

Population Description

- Taken from the A&I Economic Analysis Division 2010 Decennial Census Data.

Ranking

- The availability of licensed frequencies and population of the community were used to prioritize potential new sites. The first group of five sites has a minimum population base of 3,500 and the second group of sites has a minimum population base of 1,200. Coverage needs were determined by WyoLink users' experiences and testing.

Sites by Ranking

- | | |
|--|----------------------------------|
| 1) Rock Springs (2 sites) – Population: 23,036 | 5) Newcastle – Population: 3,532 |
| 2) Evanston – Population: 12,359 | 6) Greybull– Population: 1,847 |
| 3) Jackson – Population: 9,577 | 7) Lusk – Population: 1,567 |
| 4) Buffalo – Population: 4,585 | 8) Wright– Population: 1,807 |

Rock Springs



Rock Springs North 150'



Tiles © ArcGIS

41°44'5.61"N 109°20'31.64"W

Solution: Wyolink 16 Site Expansion

Job ID: 2755461419.1.Design 1

Workspace: Rock Springs North (150')

System version: 20180904, N/A, 2.3.2

Design: Design 1

Printed: 9/10/2018

Legend

 97% Area round_trip XTL 5000

Rock Springs



Rock Springs 800 MHz Option C Only Mobile



© OpenStreetMap contributors.

Roundtrip

Solution: Wyolink 16 Site Expansion

Job ID: 3253191645.1.Design 10 Rock Springs

Project: Rock Springs 800 MHz

System version: 20190515, N/A, 2.6.2

Design: Design 10 Rock Springs

Printed: 5/21/2019

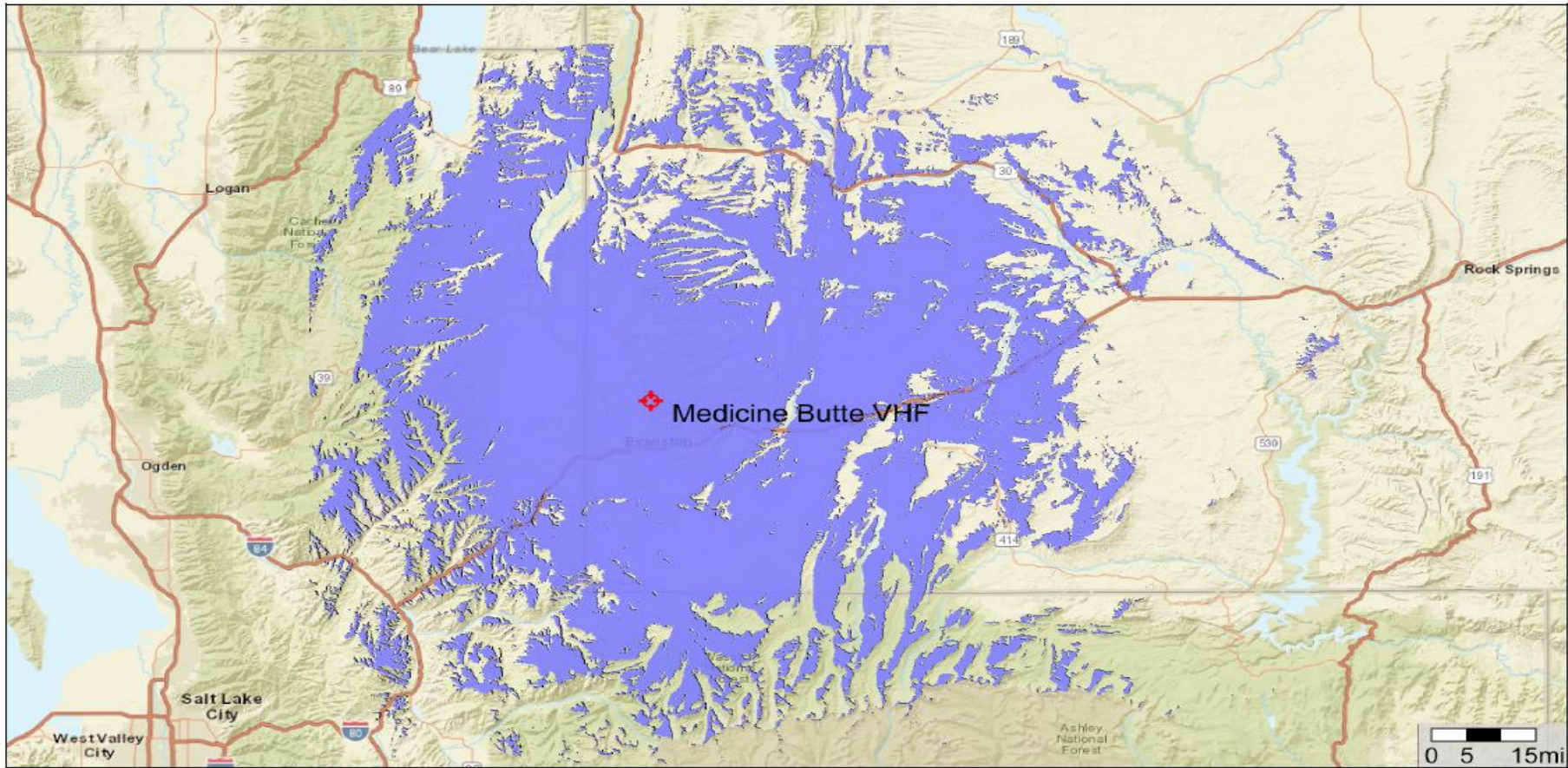
Legend

97% Area round_trip XTL 5000

Evanston



Evanston (Medicine Butte) VHF



Tiles © ArcGIS

Scale 1 : 1361199

Solution: Wyolink 16 Site Expansion

Workspace: Evanston (Medicine Butte) VHF

Design: Design 1

Job ID: 5449705724.1.Design 1

System version: 20180807, N/A, 2.3.1

Printed: 8/15/2018

Legend

 97% Area round_trip XTL 5000



Jackson Teton Pass VHF Mobile



© OpenStreetMap contributors.

Scale 1 : 820710

Solution: Wyolink 16 Site Expansion

Project: Jackson (Teton Pass) VHF

Design: Design 1

Job ID: 2626339726.1.Design 1

System version: 20190402, N/A, 2.6.1

Printed: 4/15/2019

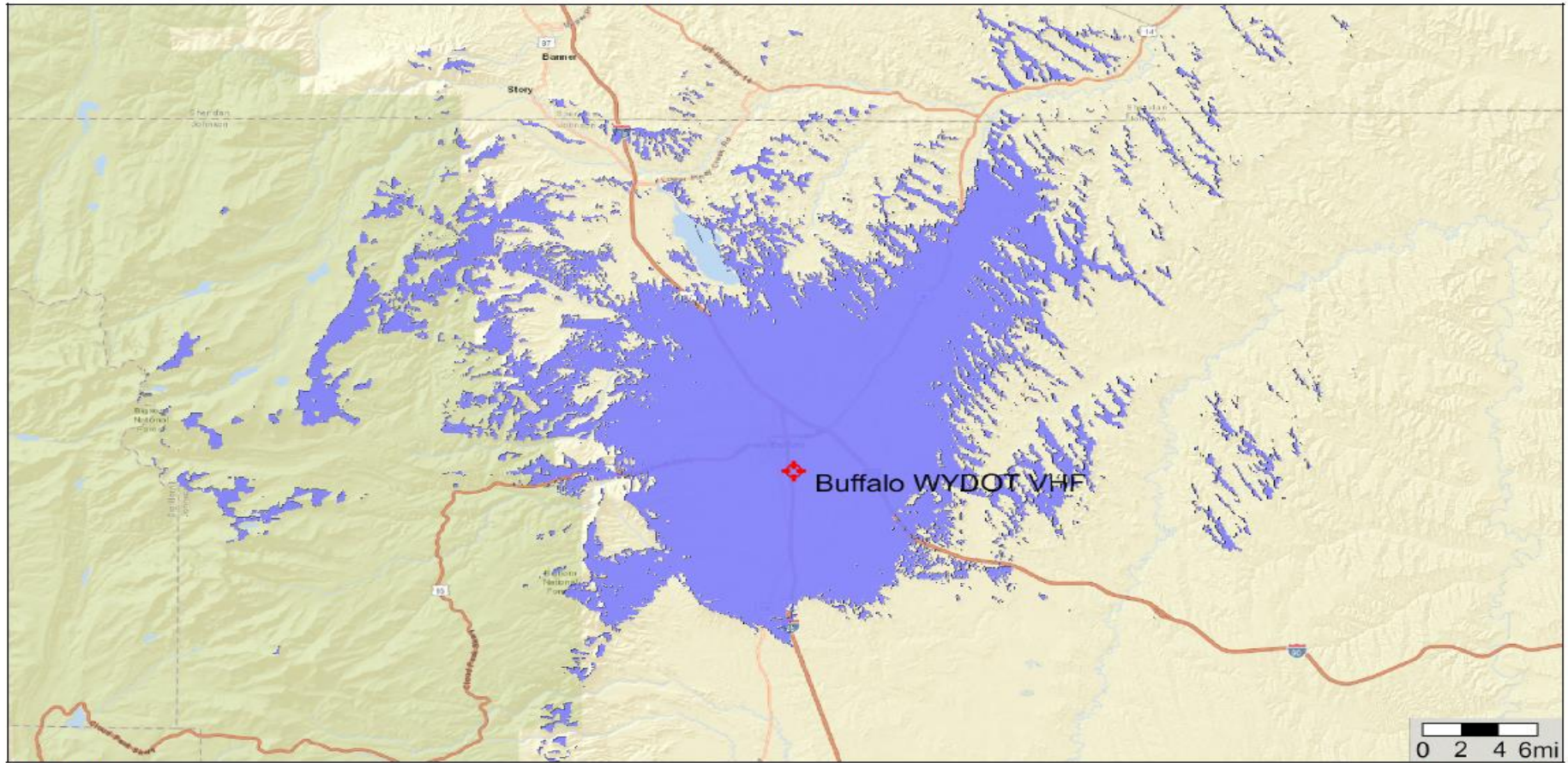
Legend

97% Area round_trip XTL 5000

Buffalo



Buffalo WYDOT VHF Mobile



Tiles © ArcGIS


Scale 1 : 492997

Solution: Wyolink 16 Site Expansion
Job ID: 2857723483.1.Design 2

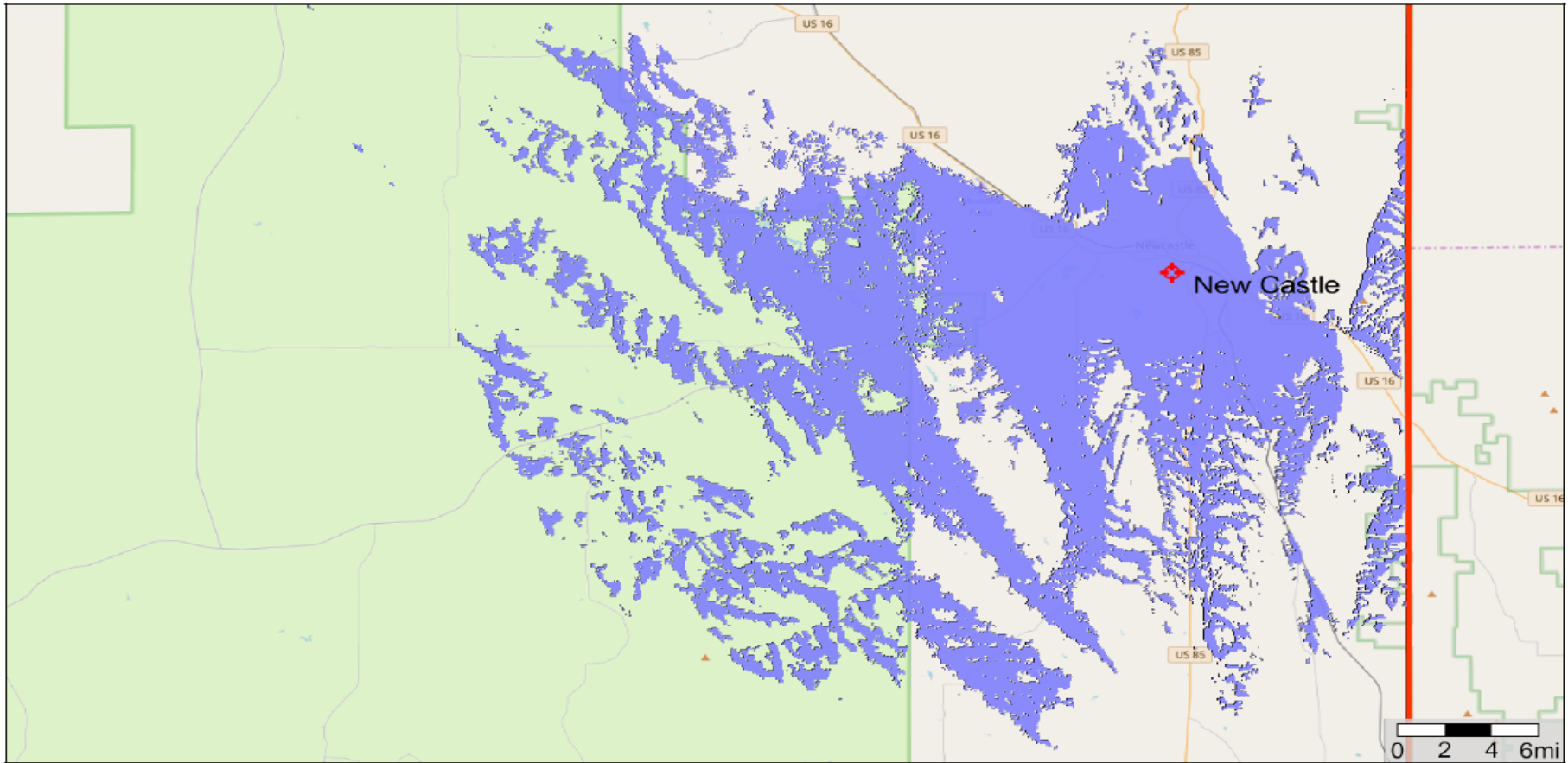
Workspace: Buffalo WYDOT VHF
System version: 20180718, N/A, 2.3.0.1

Design: Design 2
Printed: 7/31/2018

Legend

 97% Area round_trip Mobile

Newcastle



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Scale 1 : 401517

New Castle 43.840178, -104.200513 Rx @ 80, Tx @ 60

Solution: Wyolink 16 Site Expansion

Workspace: New Castle VHF

Design: Design 1

Job ID: 6299833376.1.Design 1

System version: 20180608, N/A, 2.2.2

Printed: 6/18/2018

Legend

 97% Area round_trip Subscriber

Greybull



GreyBull Edge Bluff VHF




Tiles © ArcGIS

Solution: Wyolink 16 Site Expansion
Job ID: 9334442492.1.Design 1

Workspace: GreyBull Edge Bluff VHF
System version: 20180807, N/A, 2.3.1

Design: Design 1
Printed: 8/11/2018

Legend

 97% Area round_trip XTL 5000

Lusk



© OpenStreetMap contributors.

Scale 1 : 300000

Lusk 42.764542, -104.45711 Rx @ 80, Tx @ 60

Solution: Wyolink 16 Site Expansion

Workspace: Lusk VHF


Design: Design 1

Job ID: 1587599291.1.Design 1

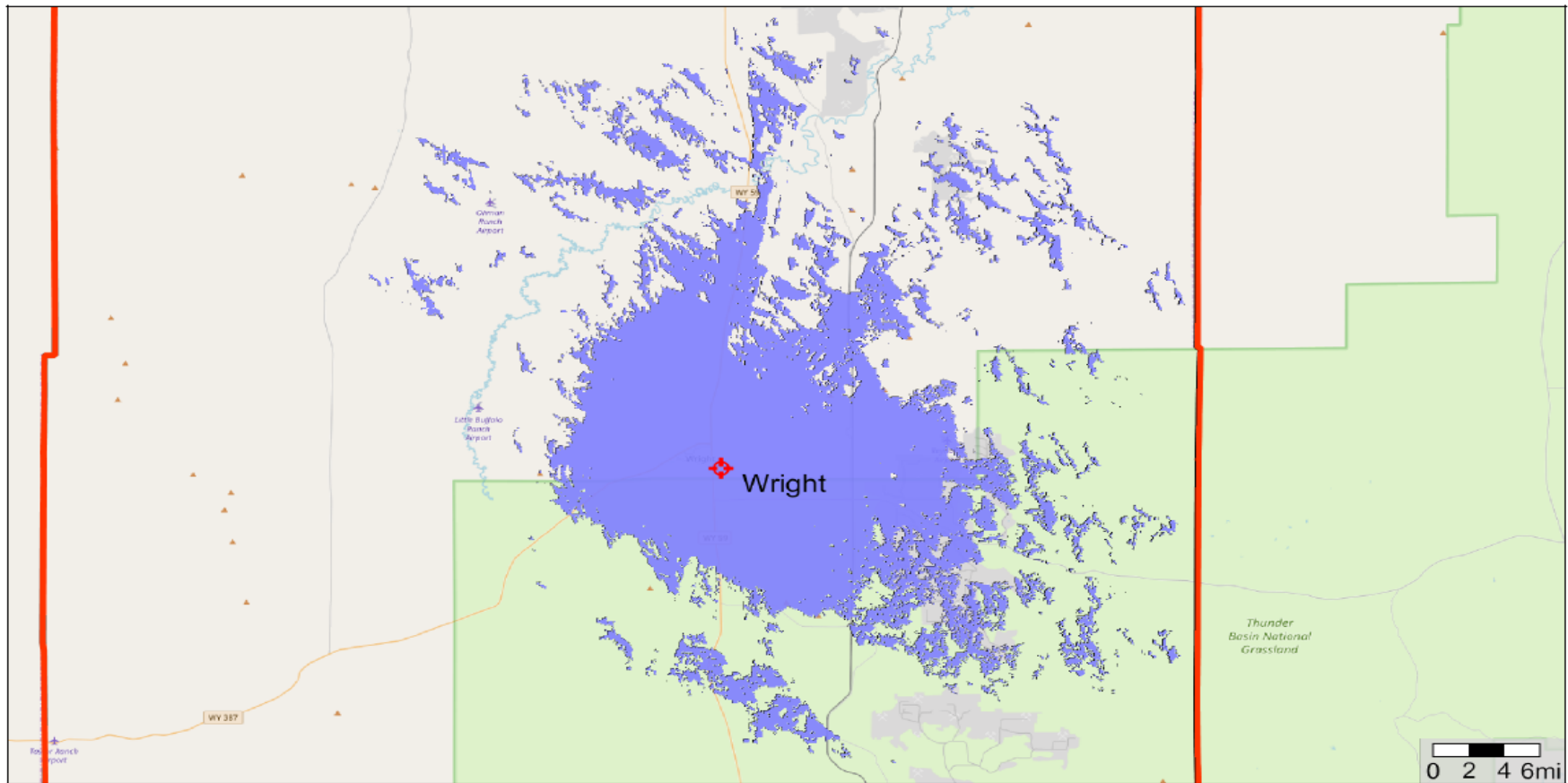
System version: 20180608, N/A, 2.2.2

Printed: 6/18/2018

Legend

 97% Area round_trip Subscriber

Wright



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Scale 1 : 530874

Wright 43.744667, -105.467841 Rx @ 80, Tx @ 60

Solution: Wyolink 16 Site Expansion

Workspace: Wright VHF


Design: Design 1

Job ID: 2144463370.1.Design 1

System version: 20180608, N/A, 2.2.2

Printed: 6/18/2018

Legend

 97% Area round_trip Subscriber

Proposed Core Tower Capitalization

BFY2019/2020 & BFY2021/2022



Core Site Evaluation Criteria *(locations subject to change based off future evaluation information)*

Frequency Available

- Priority was given to sites which have licensed frequencies or licensed frequencies in close proximity with a potential for being moved to the site.

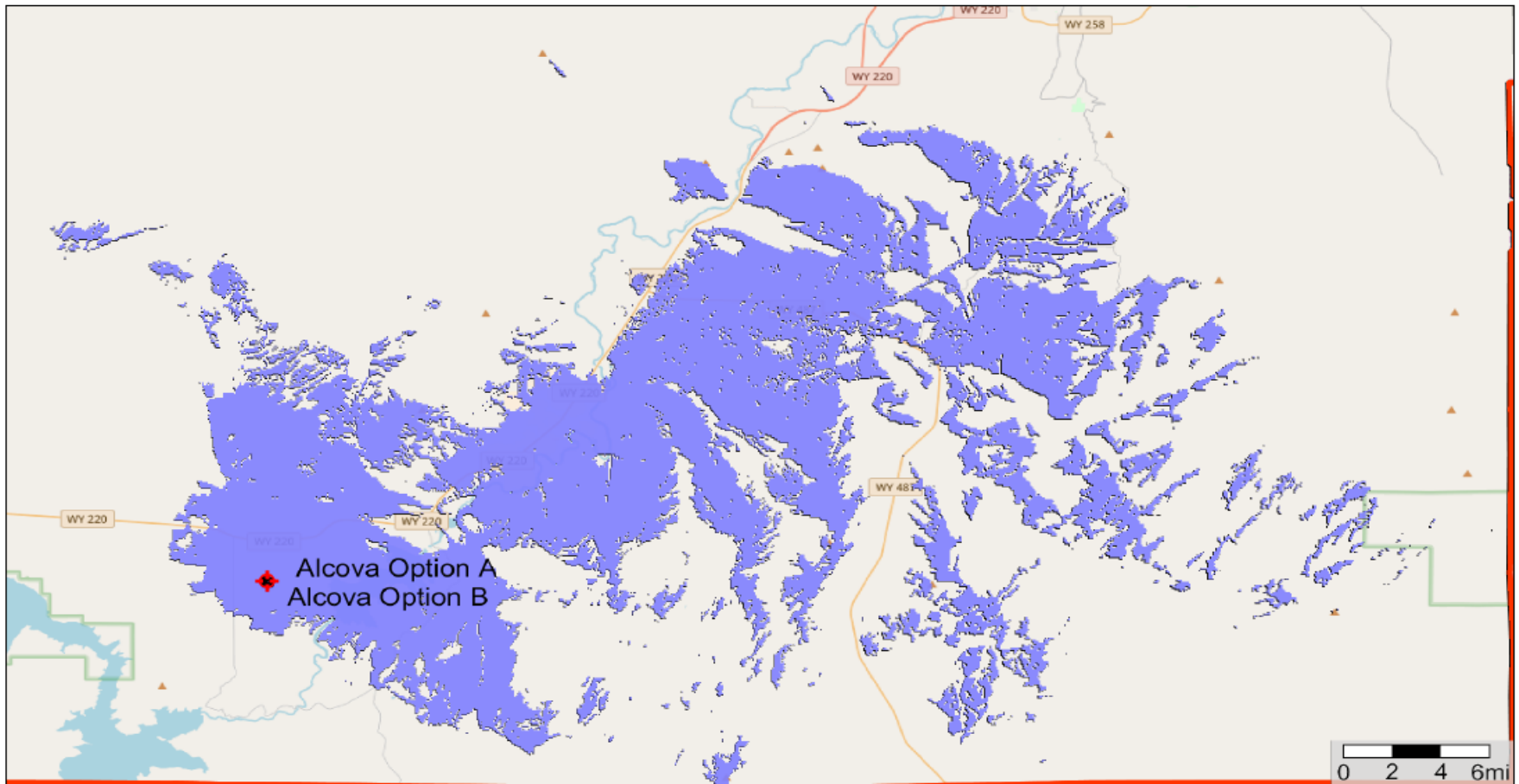
Coverage Needed

- WyoLink users experience, mobile coverage testing and benefit to WyoLink were used to determine the priorities for improved coverage

Proposed Sites

- | | |
|---|--|
| 1) Alcova | 5) Northern Big Horn County |
| 2) Bondurant Area* <i>(North Western Sublette County)*</i> | 6) Orin Junction |
| 3) Northern Goshen County | 7) Alva <i>(Northern Crook County)</i> |
| 4) Meadowlark <i>(Southern Portion of Bighorn National Forrest)</i> | |

**Note: See Site Location Update for additional details regarding this location.*



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Scale 1 : 375924

Alcova B 42.532491, -106.81458 Rx @ 80, Tx @ 60

Solution: Wyolink 16 Site Expansion

Workspace: Alcova VHF

Job ID: 8558336466.1.Design 5 Alcova Option B

System version: 20180608, N/A, 2.2.2

Legend

97% Area round_trip Subscriber

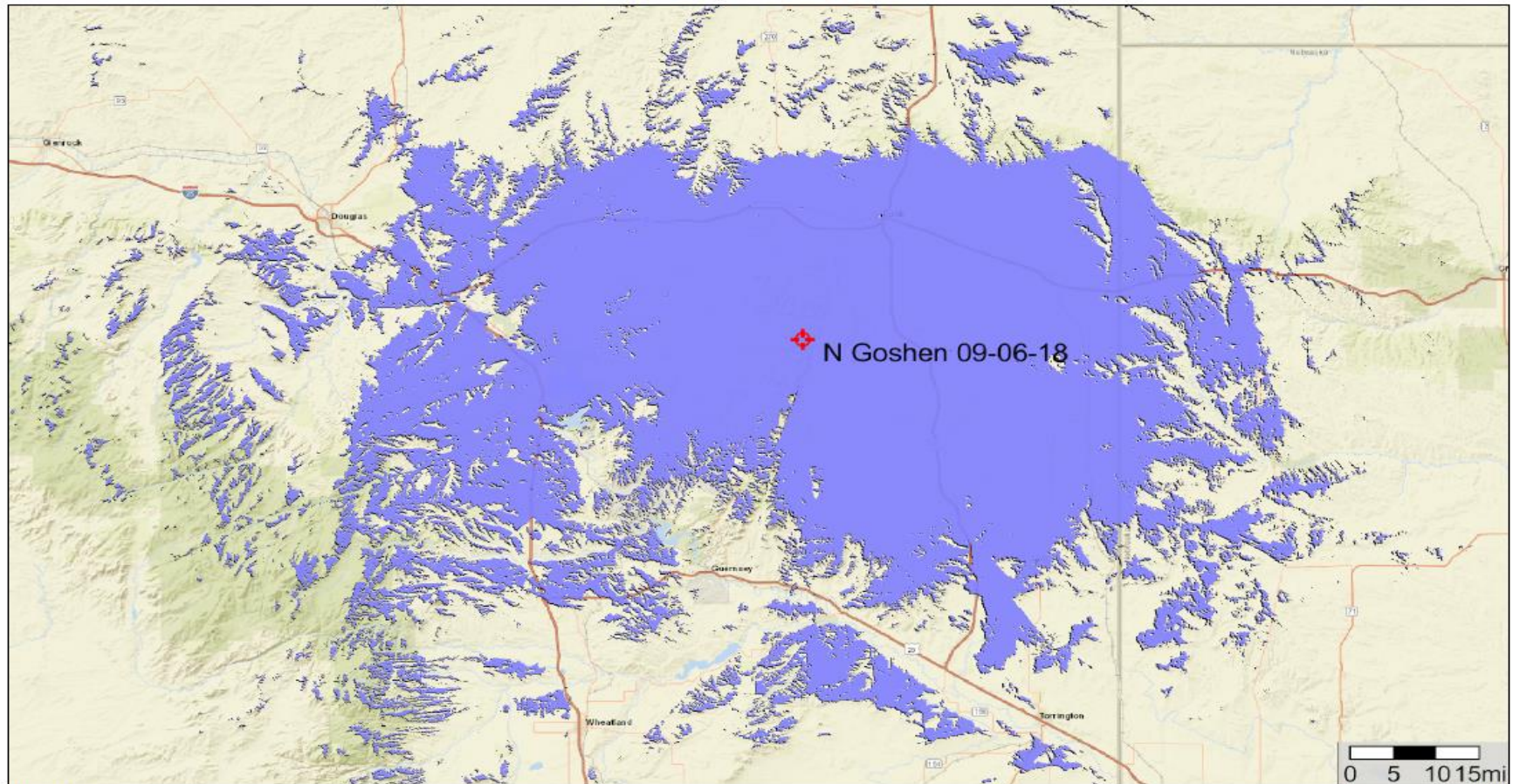
Design: Design 5 Alcova Option B

Printed: 6/18/2018

Northern Goshen County



North Goshen 09-06-2018



Tiles © ArcGIS

42.594272 -104.587381

Solution: Wyolink 16 Site Expansion

Job ID: 7389083973.1.Design 1

Workspace: N Goshen 09-06-2018

System version: 20180904, N/A, 2.3.2

Design: Design 1

Printed: 9/10/2018

Legend

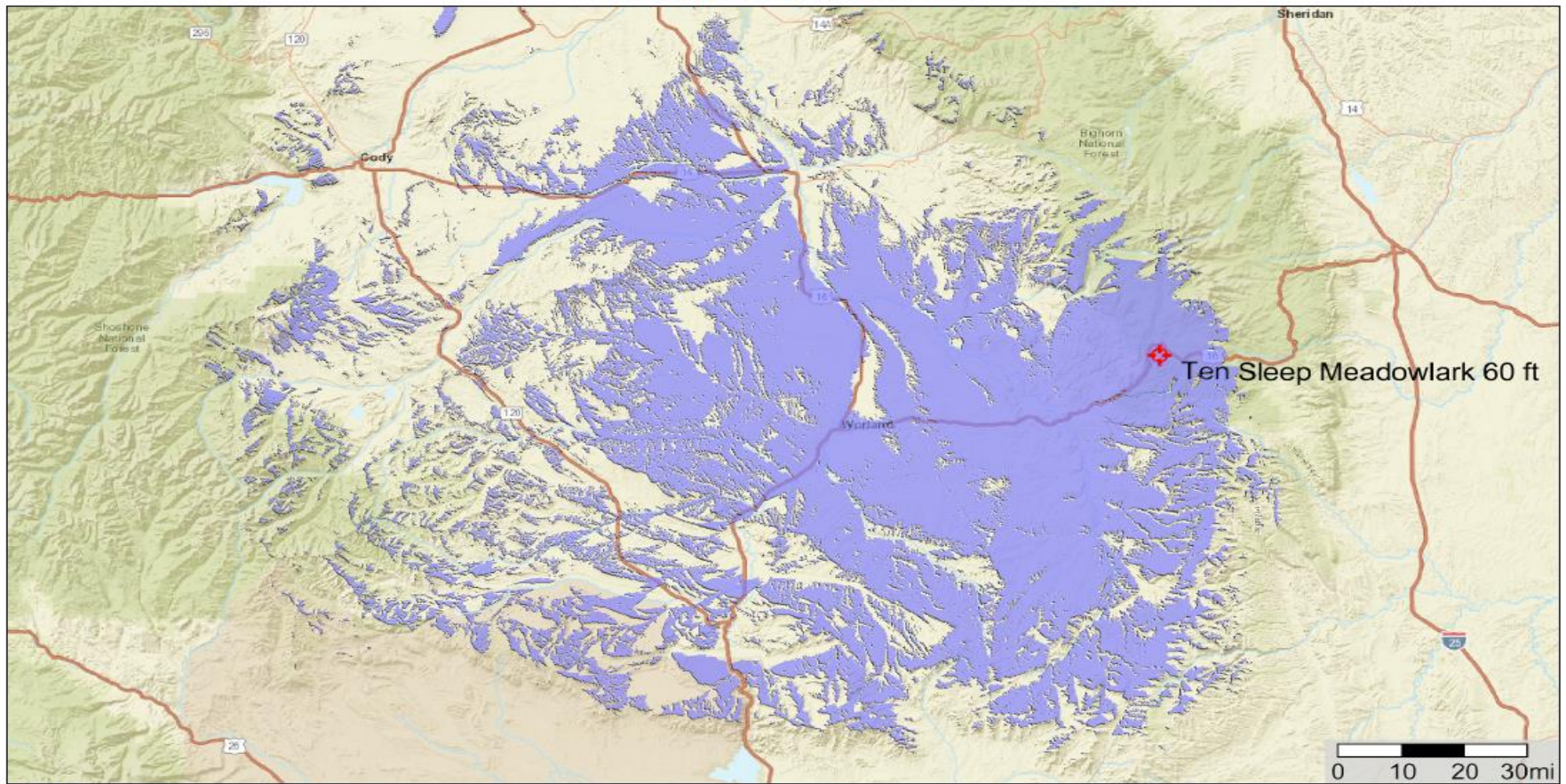
 97% Area round_trip XTL 5000

Scale 1 : 1063960

Meadowlark



Ten Sleep (Meadowlark) 60 ft



Tiles © ArcGIS

Scale 1 : 1494409

Solution: Wyolink 16 Site Expansion

Workspace: Ten Sleep (Meadowlark) 60 ft

Design: Design 1

Job ID: 5534474635.1.Design 1

System version: 20180904, N/A, 2.3.2

Printed: 9/11/2018

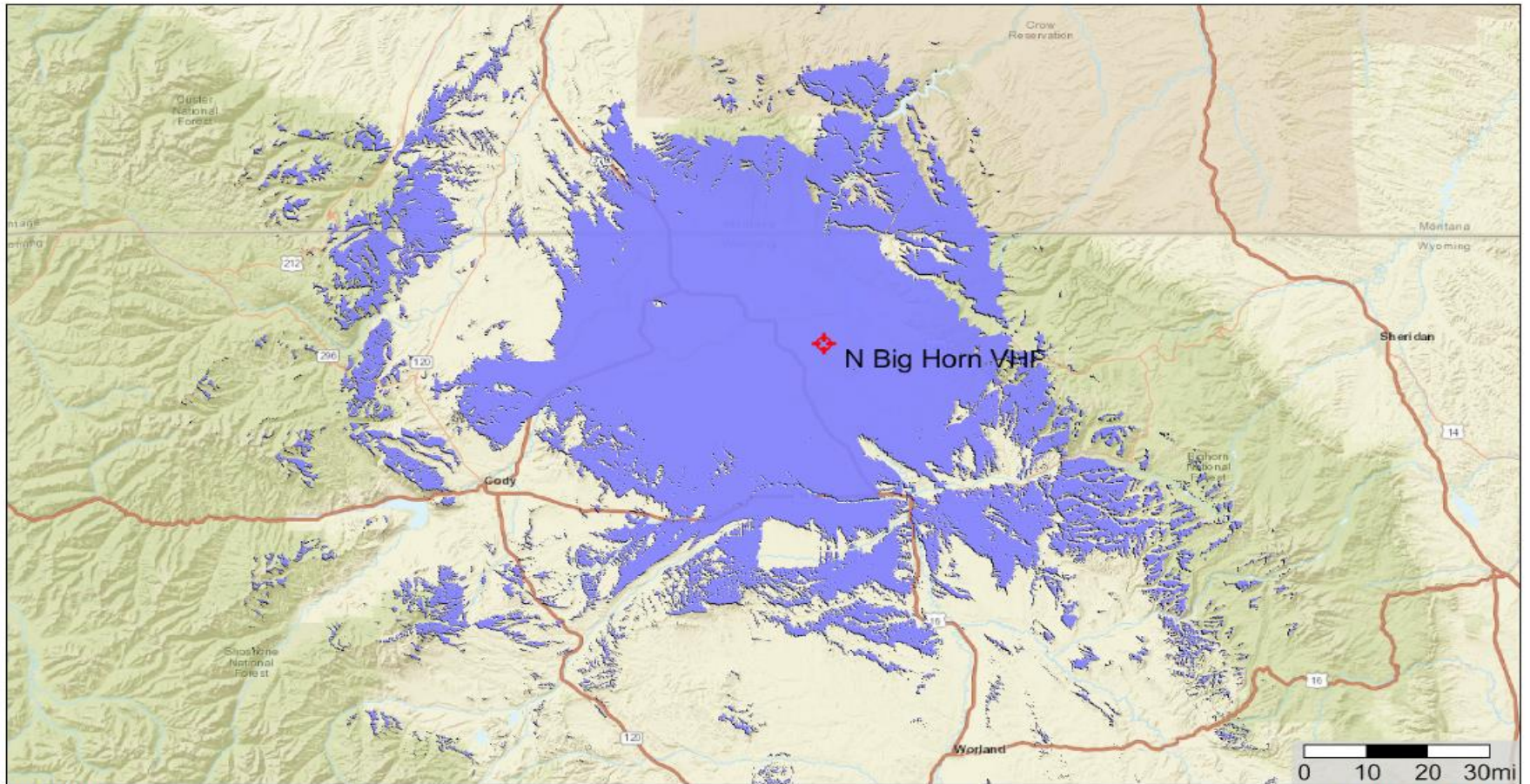
Legend

 97% Area round_trip XTL 5000

Northern Big Horn County



N Big Horn VHF Mobile



Tiles © ArcGIS

Scale 1 : 1491579

Solution: Wyolink 16 Site Expansion

Workspace: N Big Horn VHF


Design: Design 3

Job ID: 8114591186.1.Design 3

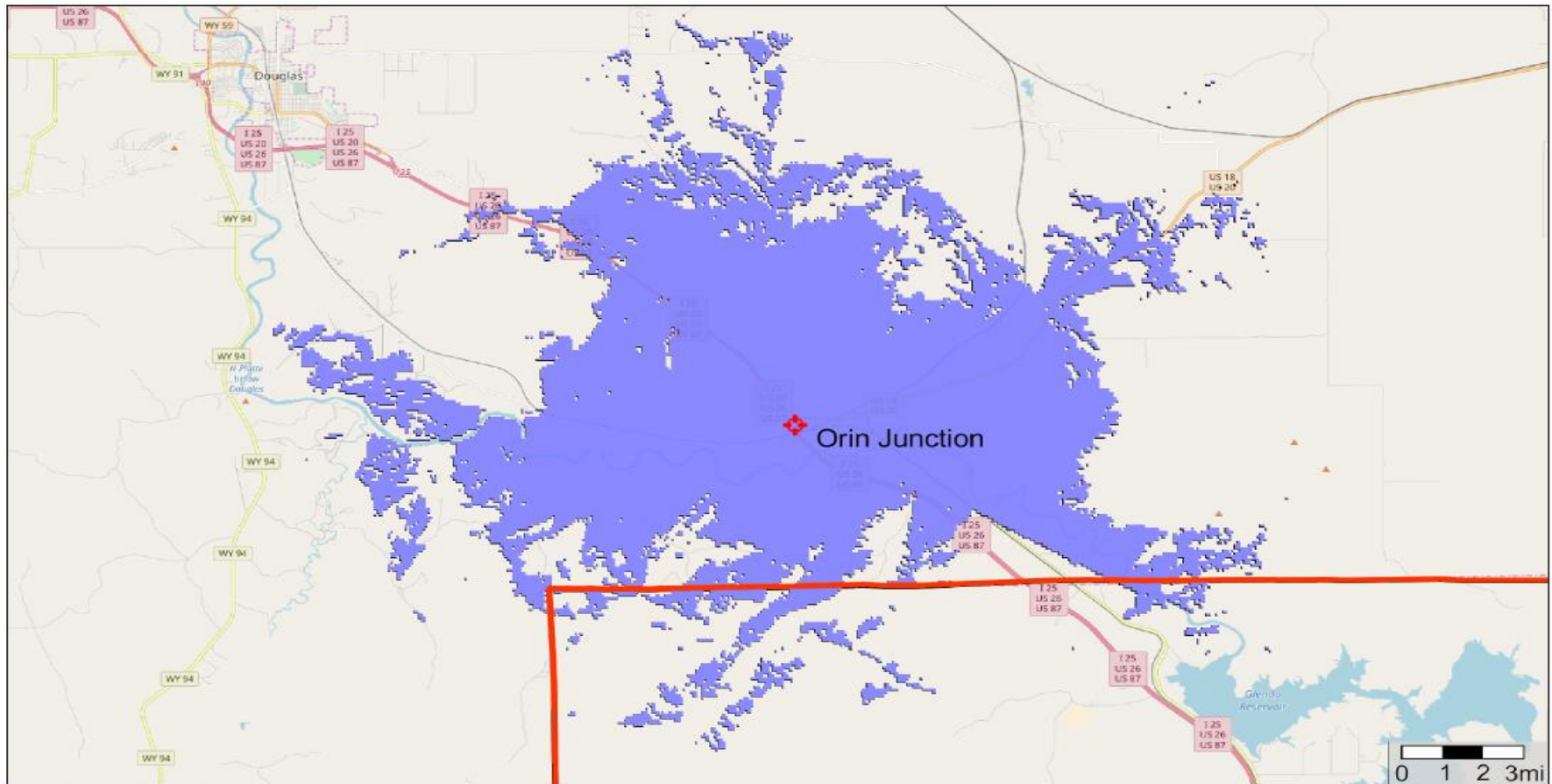
System version: 20180718, N/A, 2.3.0.1

Printed: 7/31/2018

Legend

 97% Area round_trip Mobile

Orin Junction



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Scale 1 : 229911

Orin Junction 42.654762, -105.198568 Rx @ 80, Tx @ 60

Solution: Wyolink 16 Site Expansion

Workspace: Orin Junction VHF


Design: Design 1

Job ID: 3104592102.1.Design 1

System version: 20180608, N/A, 2.2.2

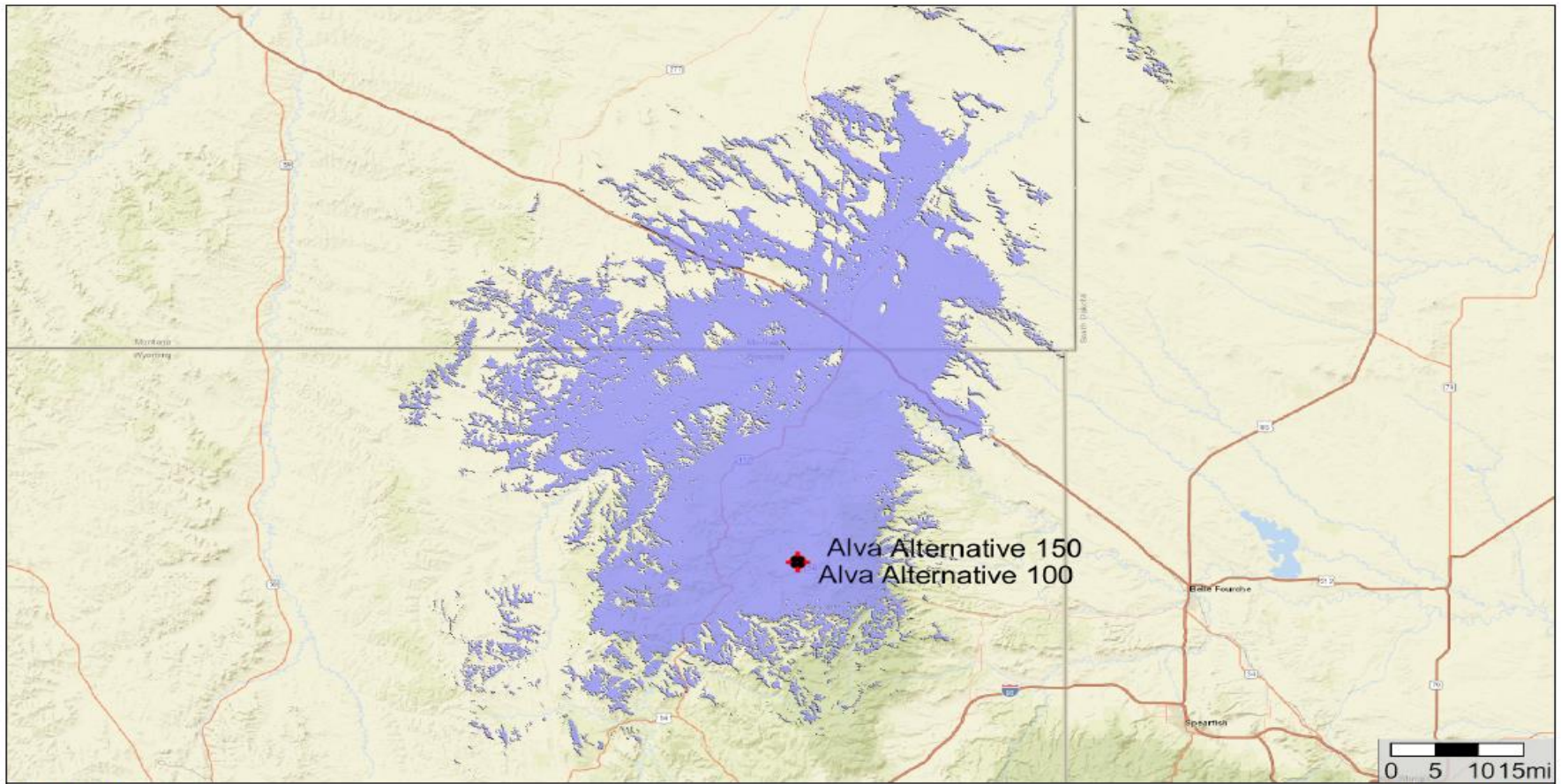
Printed: 6/18/2018

Legend

 97% Area round_trip Subscriber



Alva Alternative 150 Feet



Tiles © ArcGIS

Scale 1 : 1065859

Solution: Wyolink 16 Site Expansion

Workspace: Alva Alternative VHF (100 and 150 feet)

Design: Design 1

Job ID: 9119550175.1.Design 1

System version: 20181003, N/A, 2.4.0

Printed: 10/10/2018

Legend

97% Area round_trip XTL 5000

WyoLink Definitions



Dispatch Console: Computer based system, connected to a network used to facilitate communications with first responders.

Base Repeater: A radio which combines a receiver and a transmitter that receives a signal and retransmits it, so that two-way radio signals can cover longer distances; Base Repeaters are positioned at WyoLink radio sites.

Subscriber Unit: A Base, Mobile and/or Portable radio belonging to an agency or individual user.

Base Radio or Control Station: A stationary desk top radio used in public safety offices and as backup radio in dispatch centers. Its output power may be 35 to 100 watts, depending on the radio and options.

Mobile Radio: A vehicle mounted radio that provides communications with dispatch centers and other mobile and portable radios on the system. Its output power may be 35 to 100 watts, depending on the radio and options.

Portable Radio: A Portable, two-way radio that provides field personnel with the ability to communicate with a dispatch center and other mobile radios and portable radios. Its output power is 5 or 7 watts, depending on the radio.

Core Tower Site: Radio sites that provide for mobile/vehicle radio coverage for the system's users. Core Towers were strategically located to provide wide area coverage for the highway transportation system. 100% Maintained by WYDOT.

Portable Coverage Enhancement (PCE) Tower Site: Radio sites which enhance portable radio coverage in a local area. PCE's are located near cities and towns to provide first responders with radio coverage using their handheld portable radios.

Local Tower Site: Radio sites which are funded, built, and maintained by a local agency; yet are connected to the WyoLink system enabling access for all WyoLink users.

WyoLink Definitions



Affiliate: The radio will request a talkgroup from the trunked system based on the selected talkgroup. The system will then add that talkgroup to the site that the radio is currently attached to.

Subscriber Alias: A unique identifier that is displayed on dispatch's screen when a radio is transmitting on a talkgroup that is being monitored. The alias corresponds with a specified subscriber ID.

Subscriber ID: A number that the system uses to identify individual radios on a trunked system. No two radios will use the same subscriber ID number.

Channel: Denotes a communications path or mode; often used interchangeably with "frequency," "mode," or "talkgroup" in trunked radio systems "channel" typically refers to the individual transceivers at radio site.

Talkgroup: Denotes the channels in a trunked radio system and is distinct from "frequency," as the radio user never actually changes the frequency. Think of talkgroup as a group of individuals on the same talkgroup.

Mode: On a radio, the selection of a Talkgroup or channel in a radio zone.

Zone: Grouping of talkgroups/channels for ease of use or radio configuration.

Control Channel: Dedicated channel on each radio tower site that passes information between the radio and the zone controller.

Out of Range: Indication of no service available to radio. You will hear a long tone at regular intervals.

Scan: Allows radios to search programmed channels/talkgroups for activity.

Site Busy (Busies): Indication that no repeater resources are available at the tower the radio is affiliated at, accompanied by short repeated tones, much like telephone busy signal.

Site Trunking: Indication that site connectivity to network master controller has been lost. Radio will be operational only in the coverage area of the tower on which it is affiliated.

Wide Area Trunking: Normal operation of a WyoLink site and is connected to the network.