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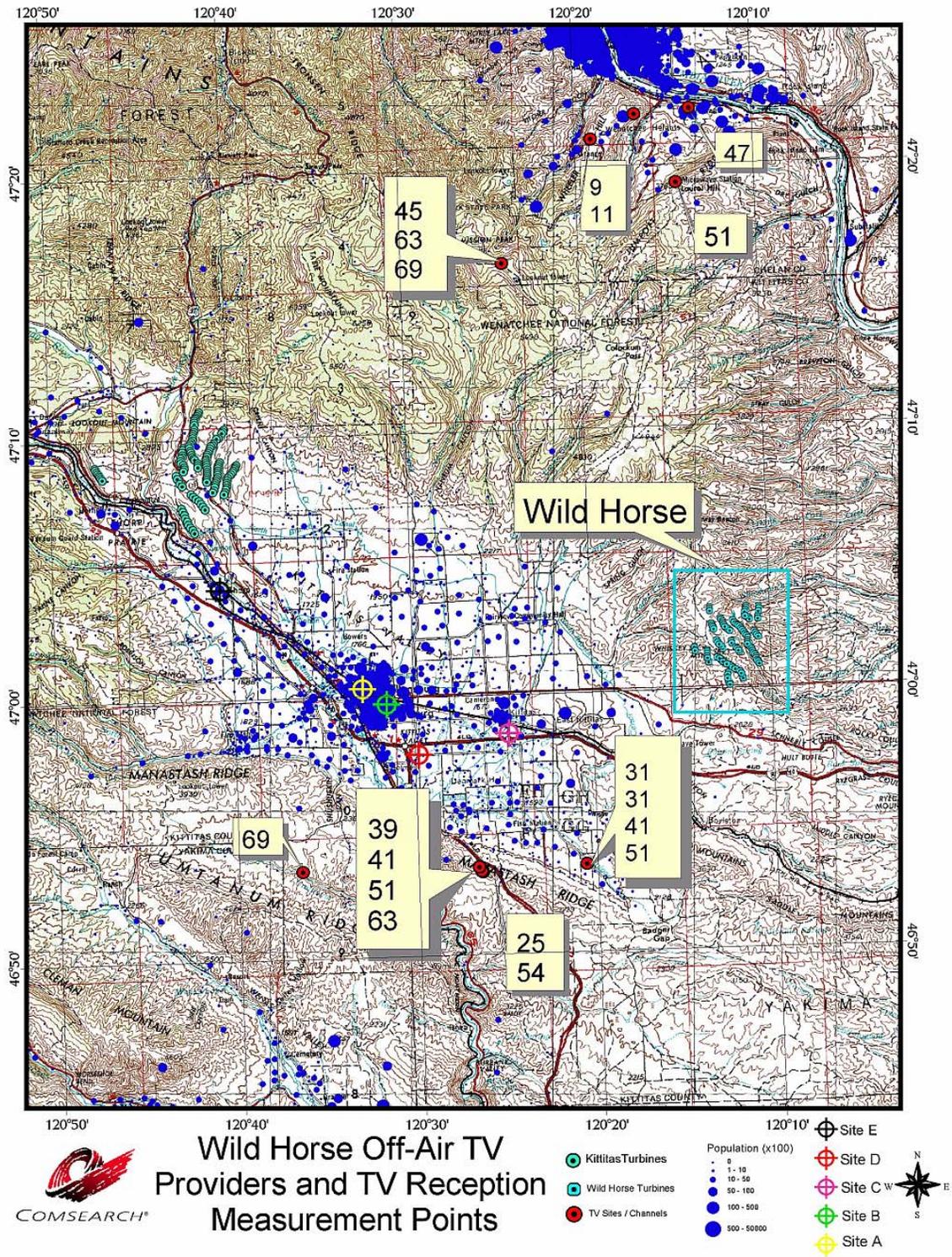
**Executive Summary**  
**Off-Air TV Reception Analysis with the Proposed Wild Horse Wind Power**  
**Project in Kittitas County, Washington**

Comsearch was contracted by Zilkha Renewable Energy (Applicant) to identify and analyze potential effects of wind turbines installed at the proposed Wild Horse Wind Power Project (Project) to the reception of off-air TV signals in Kittitas County, Washington. To do this, Comsearch used its database to determine the TV station operators in the area and performed field measurements to establish a baseline condition for TV reception in the area. Measurements were also performed at an operating wind power facility in Joice, Iowa to obtain measured off-air TV signal data to support the analytical work in Kittitas County. The purpose of the measurements in Kittitas County was to determine by measurement the quality of the off-air TV signals before the wind turbines are installed. The purpose of the measurements in Joice was to quantify the effects of the existing wind turbine facility on off-air TV reception in the surrounding communities and then apply the measurement results to the communities closest to the proposed Wild Horse Project.

Comsearch has been in the telecommunication consulting business for over 25 years. In that time, Comsearch has performed measurements and used its databases to evaluate potential interference problems around the world. The evaluations utilize the skills of its staff of telecommunication professionals made up of database specialists, software developers, field engineers and telecommunication analysts. Off-air TV reception in the presence of physical structures is an area that Comsearch has examined in urban, suburban and rural environments with respect to water and communication towers, buildings and other structures. This experience has been applied to the analysis of the proposed Project in Washington.

Comsearch personnel who worked on this evaluation included Roger Maier (Product Manager), John Manzer (Geographic Information Software (GIS) Analyst) David Cole (Field Engineer) and Les Polisky (Engineer).

The proposed Project is shown in Figure 1. Also shown in Figure 1 are the locations of the broadcast antennas for those TV stations providing TV service to the area and the five field measurement locations.



**Figure 1**

The results of the TV Station measurements made in the Kittitas County area are presented in the Table below.

**Video Quality Measured in Kittitas County**

<b>Channel</b>	<b>Site A</b>	<b>Site B</b>	<b>Site C</b>	<b>Site D</b>	<b>Site E</b>
2	N/R	N/R	3	4	N/R
9	5	4	5	3	5
11	5	4	5	4	4
25	3	2	2	2	2
31	1	1	1	1	1
39	1	1	1	1	1
41	2	2	2	2	1
45	N/R	N/R	4	4	N/R
47	N/R	N/R	3	3	5
51	1	1	1	1	1
54	1	1	1	1	1
63	1	1	1	1	1
69	2	1	1	1	1

Key:

1-Perfect cable quality

2-Good picture with some noise

3-Servicable picture but some rolling video and noisy picture

4-Trace of picture but unfit for watching

5-No video or audio discernable

N/R-No TV signal received

It should be noted from the measured results that Channels 2, 9, 11, 45 and 47 presently produce unacceptable TV reception in the area. The remaining eight channels measured produce generally good reception. Also, it is important to note that of the eight channels producing good TV reception, three of them have transmitting antennas located both to the North and Southwest direction of the Wild Horse Project. They are Channels 51, 63 and 69. Channels 25, 31, 39, 41 and 54 have their transmitting antennas located to the Southwest direction of the proposed Project.

Based on the TV signal measurements performed in Kittitas County, and Joice, IA and previous measurements of TV signal propagation, the following conditions are expected to occur after the installation of the Project:

1. Since all of the viewable TV stations in the area are located to the North and Southwest of the Project site, and the population centers in the area are to the West and Southwest of the Project site, for the vast majority of the residents in the area, there should be no degraded TV reception of the currently viewable TV stations.
2. In the areas to the East of the Project site there may be degradation of some of the TV signals. However, it is Comsearch’s understanding from a review of the area’s

demographic data, supported by information obtained from the Applicant, that the land to the East is uninhabited for more than ten miles East of the Project. Further to the East of the Columbia River, population densities continue to be extremely sparse, as most of the land is used for grazing or agriculture. Land to the immediate East of the Project site and down to the Columbia River is owned by Zilkha's partner landowners and is flanked by the Quilomene Wildlife Refuge to the North and the Whiskey Dick Wildlife Area to the South.

3. In the sector Northeast of the Project, the TV stations from the Southwest may be degraded. However, the three TV stations to the North will still provide coverage in the sector, which is almost entirely uninhabited. It is expected that the reduction in signal strength in the Northeast sector from TV broadcast antennas in the Southwest area and in the Southeast sector from TV transmit antennas in the North may be as great as 8 dB. However, the Applicant has reported that they know of no primary residences for more than 12 miles to the Northeast of the Project. The area to the Northeast is occupied almost entirely by the Quilomene and Colockum Wildlife Areas.
4. In the sector Southeast of the Project, the TV stations from the North will be degraded but there will still be eight TV stations providing coverage. The area to the Southeast of the Project is dominated by the Yakima Firing Range and the Whiskey Dick Wildlife Area.

Picture flicker caused by the motion of the wind turbine blades may occur in TV sets that are in locations close to the Project. This effect is normally seen in TV sets in close proximity to a wind power project. Since the nearest home is nearly 2 miles from the Project, this is unlikely to be an issue.

Electromagnetic noise generated from the wind turbines can affect the low VHF frequency channels only, and only in TV sets located less than 0.1 of a mile from the Project. In the Project area, it could affect Channel 2 reception, but the TV field measurements have shown that this channel already has an unacceptable TV signal coverage in the area and there are no houses within almost two miles of the Project. The off-air TV Channels that provide good TV service in the area are all UHF channels. Because TV transmitting antennas for Channels 51, 63 and 69 are located both North and Southwest of the proposed Project, TV reception of these channels to the Northeast and Southeast should be unaffected.

### **Conclusion:**

Based on the measurements and analysis performed for this study there should be no degradation to the population centers west of the Wild Horse Project site. Some degraded off-air TV reception may occur at locations in the Northeast sector from the proposed Project. However, good reception should still be available from the three TV

stations located North of the wind power facility, and the area to the Northeast of the Project site is almost totally uninhabited. No degradation of TV service will occur to the Southeast sector because the Northern TV station signals that would be degraded are also transmitted from Southwestern locations.

Comsearch has documented degradation of TV signals due to signal reflections and multipath interference at locations within a 2-mile radius of operating wind power projects. However, at the Wild Horse Project site, there are only three residences within 2 miles of the Project, and all are greater than 1.7 miles from the nearest proposed turbine.