

**Radio Frequency (RF) Alternatives Analysis
Prepared for Friends of Brockway (FoB)
SBA Proposed Site - Copper Harbor, Michigan
FCC ASR Application A0909673**

Background

PSC Alliance Inc. (PSC) was engaged by the Friends of Brockway to undertake a radio frequency alternatives analysis. The purpose of the analysis was to ascertain if any alternative site location could be identified that would address commercial wireless service needs in the vicinity of Copper Harbor Michigan. SBA Towers III, LLC sought to construct a 199' monopole tower to enhance commercial wireless (i.e. cellular) services in the area. Among the materials provided to us by FoB were zoning drawings, land use permit applications, various correspondence, and other incidental documents. Absent from any of the materials were any specific details concerning the wireless "search ring" or specific RF coverage objectives to be satisfied by the proposed tower except for vague narrative references to enhance cellular performance in the community of Copper Harbor, on Michigan Routes M26 and US41. Due to PSC's prior design work planning RF coverage improvements to enhance public safety communications for fire and first response personnel within Keweenaw County we had some prior knowledge of the area and the topography. No local site visits were undertaken by PSC relating to the FoB analysis. Representatives of the FoB group assisted by providing "on the ground" observations, estimates of structure height measurements, and GPS coordinates for candidate tower locations. A key understanding, communicated by FoB, was that SBA had represented as part of the zoning and other local approval processes that their selected Brockway Mountain site was the only feasible location that would satisfy project needs.

Tools Used in the Analysis

PSC utilized the following tools in undertaking the analysis:

- USGS topographic map data
- Google Earth map data
- Keweenaw County parcel maps
- Electronic terrain elevation data sets
- Microwave path profile software
- RF coverage prediction tools (Area Coverage) based on these models:
 - Okumura
 - Longley-Rice

Limitations of the Analysis

A web hosted teleconference was conducted for interested FoB participants. Attendees were briefed on the processes associated with wireless site planning, acquisition, approvals, technology, timelines, and processes. PSC subsequently made repeated calls to SBA in an effort to determine:

- RF search ring & specific coverage objectives
- Proposed technology planned for deployment at the Brockway Mountain site for example:
 - CDMA, GSM, LTE, etc.
 - Proposed band(s) of operation
 - Coverage & performance metrics

Voice mail messages were left; no calls were not returned by SBA personnel. Ultimately in April, 2014 a successful phone contact was made with Ed Roach of SBA's corporate offices who directed our future inquiries to SBA's outside counsel.

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Alternative Location Analysis

SBA's proposed Brockway Mountain tower is located on land owned by Keweenaw County. To perform the alternatives analysis PSC looked at nearby surrounding land owned by Keweenaw County with comparable ground elevations. An adjacent and contiguous 391 acre, County owned parcel is located south of SBA's proposed Brockway Mountain. Reviewing various land elevation databases, three (3) viable locations were identified on the Keweenaw County park land as shown below and subsequently considered for RF modeling.

Site Description	Latitude / Longitude	Ground Elevation
SBA Proposed Tower	47-27-59.4 N / 087-54-42.1 W	1,109' AMSL
Existing Tower	47-27-31.6 N / 087-54-31.8 W	1,101' AMSL
County Park Land Alternate 1	47-27-30.0 N / 087-54-26.9 W	1,104' AMSL
County Park Land Alternate 2	47-27-23.7 N / 087-54-00.3 W	1,086' AMSL
County Park Land Alternate 3	47-27-24.2 N / 087-54-19.0 W	1,140' AMSL

Alternate locations 2 and 3 are substantially screened from view of the historic Keweenaw Mountain Lodge by mature trees located on the County parcel. Such screening would mitigate impact upon the historic lodge building. Alternate location # 2 is more than 2,500 feet removed from the historic mountain lodge and alternate location # 3 is more than 1,400 feet removed from the mountain lodge.

Coverage Modeling

Because no substantive information was available from SBA concerning RF coverage criteria or technical demographics PSC made certain assumptions which are shown in the table below concerning RF performance from the various sites.

Criteria	Assumption
ERP	45 Watts
Antenna Height	199' AGL
Band of Operation	700 MHz (LTE assumed)
Antenna Pattern	Omni
Coverage Modeled	Downlink
Mobile Antenna Height	5' AGL
Losses	Various: Outdoor, vehicle, indoor

Analysis

The most distant site (alternate # 2) is approximately 1 mile removed from SBA's Brockway Mountain location. The closest site (alternate #1) is approximately 0.6 mile removed from SBA's Brockway Mountain location. As expected there are coverage tradeoffs between the alternate sites and SBA's proposed location based on proximity relative to various landmarks in the area. From this comparison PSC concluded that there are at least three viable RF alternative site locations capable of delivering commercial wireless service to the area of interest. Further, PSC concluded that any of the three alternate locations could be connected via 6 GHz microwave back haul to the nearby Lake Medora site (ASR 1281798) already owned by SBA.

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Unsuccessful Attempt to Negotiate with SBA

On May 18, 2014 successful telephone contact with SBA's outside counsel (William Sill) was accomplished. On June 5th, 2014 PSC wrote to Mr. Sill to provide information discussed during the May 18th telephone call and to attempt to constructively negotiate alternative site locations to the Brockway Mountain property.¹ SBA's counsel replied via letter dated July 15th, 2014 effectively dismissing the suggestions. SBA's ASR application was subsequently filed on July 17, 2014 with the FCC without effort by SBA to discuss the issues of concern.


Prepared by:

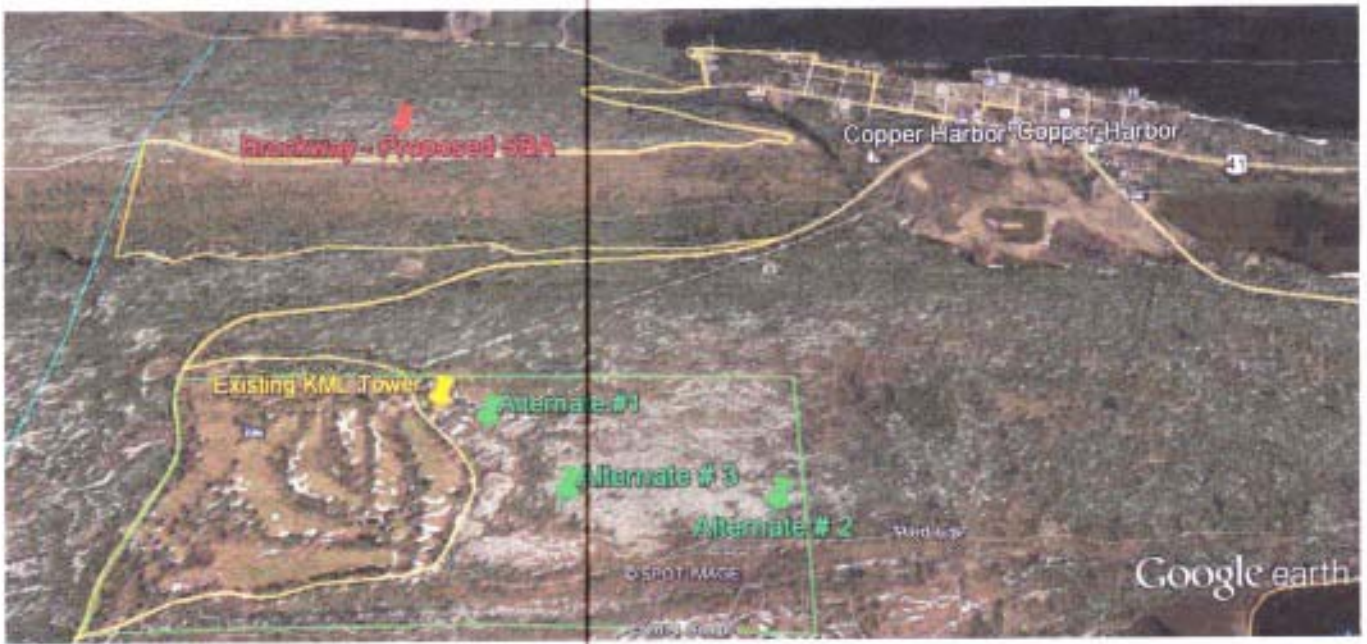
Jeff Nelson
PSC Alliance Inc.
7900 International Drive
Suite 300
Bloomington, MN 55425

Attachments - Coverage prediction maps showing:

- Google Earth Maps: Relative Locations
- Brockway Mountain SBA Proposed Location
- Keweenaw Park Alternate 3
- Keweenaw Park Alternate 2
- Keweenaw Park Alternate 1

¹ See EA Part 4 for copy of the PSC letter to Sill and his response.


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Google earth

feet
km



78 

NEC Grant T58 & 59N • R28W



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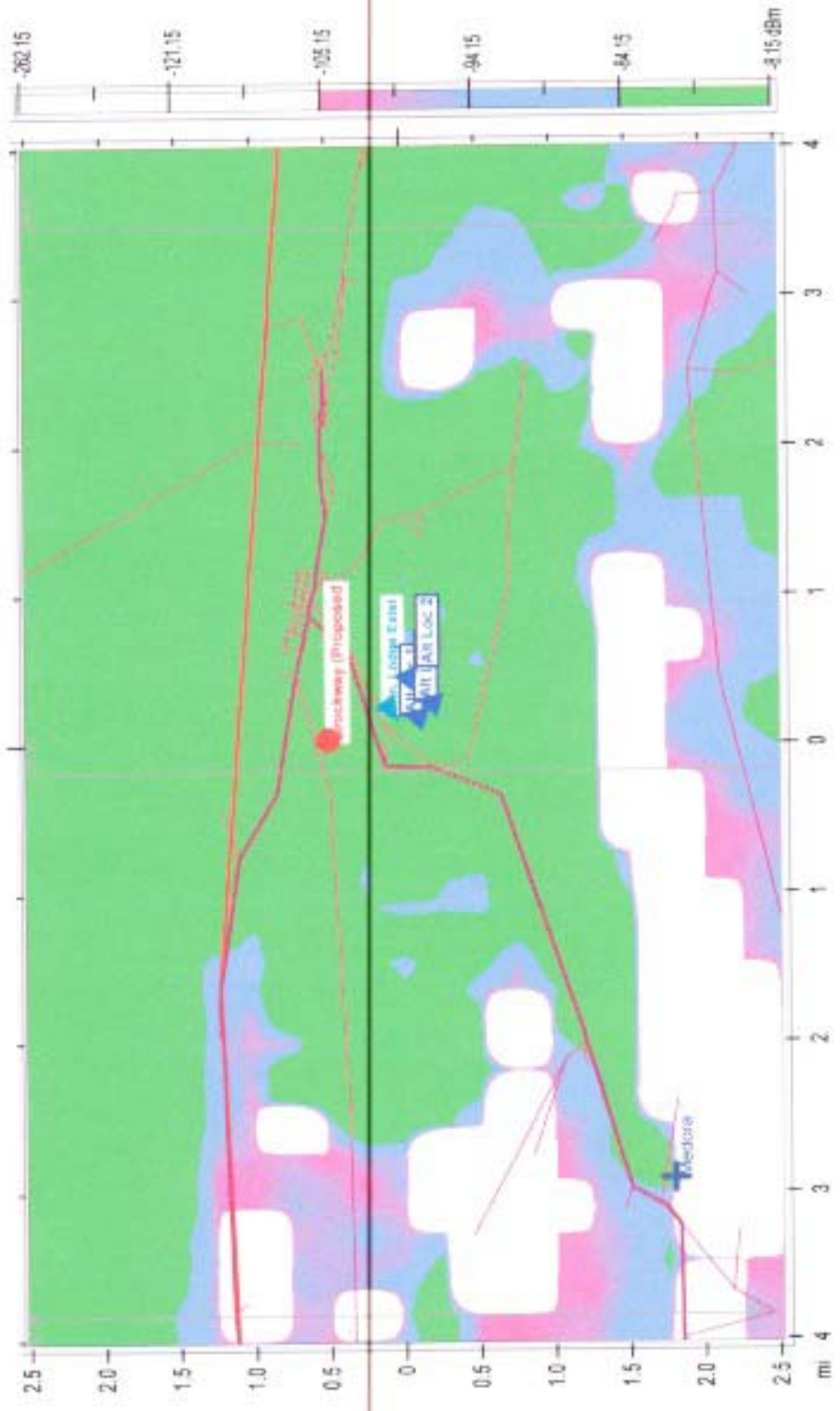
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Brockway Mountain 199'



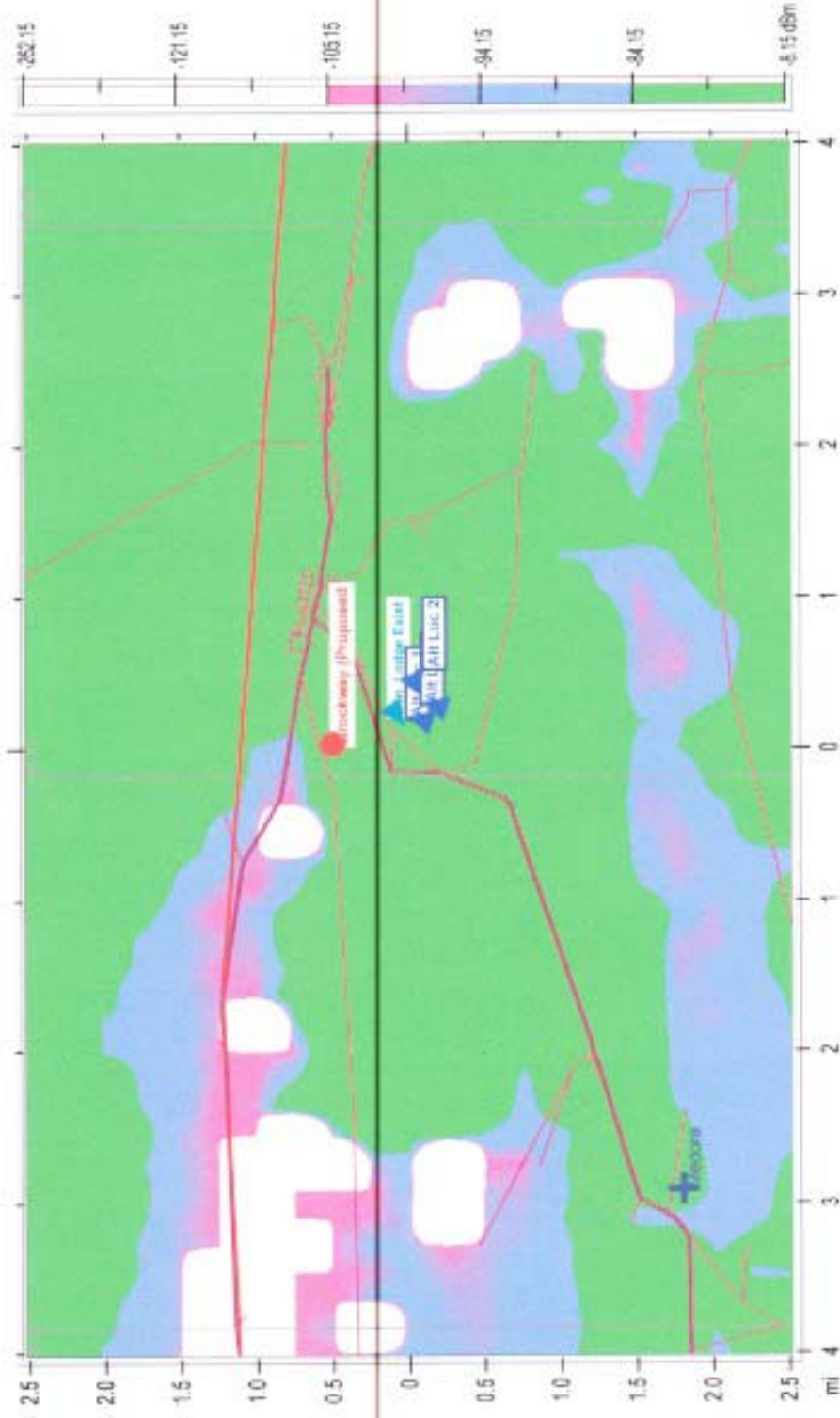
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- County Borders
- Highways
- Water Features
- Streets
- Lat/Lon Grid

Map Scale: 1:70832 1" = 1.12 mi V/H Size: 5.05 x 8.03 mi

Handwritten initials/signature and the number 830.

Alternate Location 1 199'



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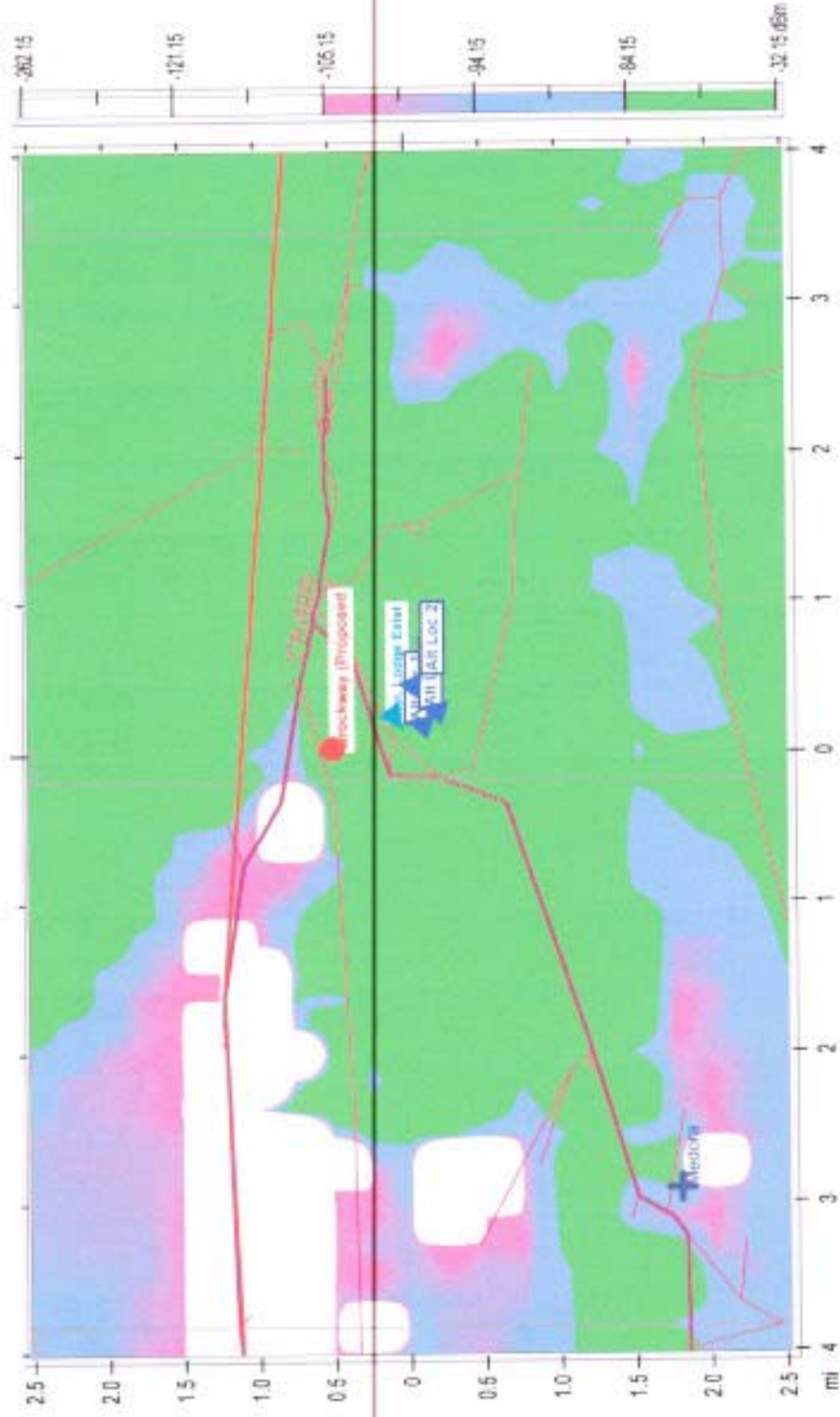
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- Highways
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Map Scale: 1" = 1.12 mi V | H Size: 5.05 x 8.03 mi

Handset 5' AGL - Outdoors

81 *[Handwritten Signature]*

Alternate Location 2 199'



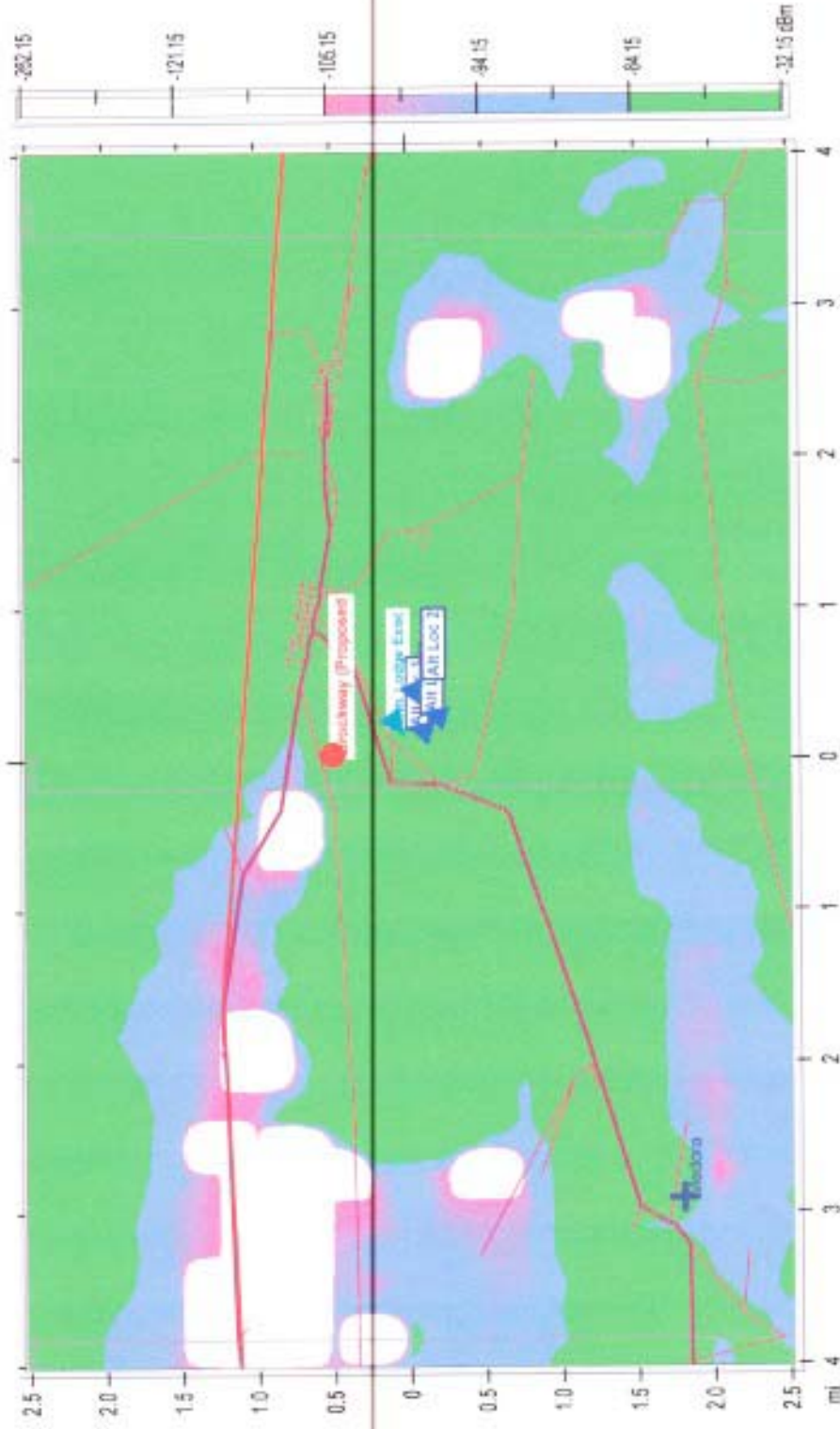
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- County Borders
- Highways
- Water Features
- Streets
- Lat/Lon Grid

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Alternate Location 3 199'



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- County Borders
- Highways
- Water Features
- Streets
- Lat/Lon Grid

Map Scale: 1:70832 1" = 1.12 mi V/H Size: 5.05 x 8.03 mi

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