UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

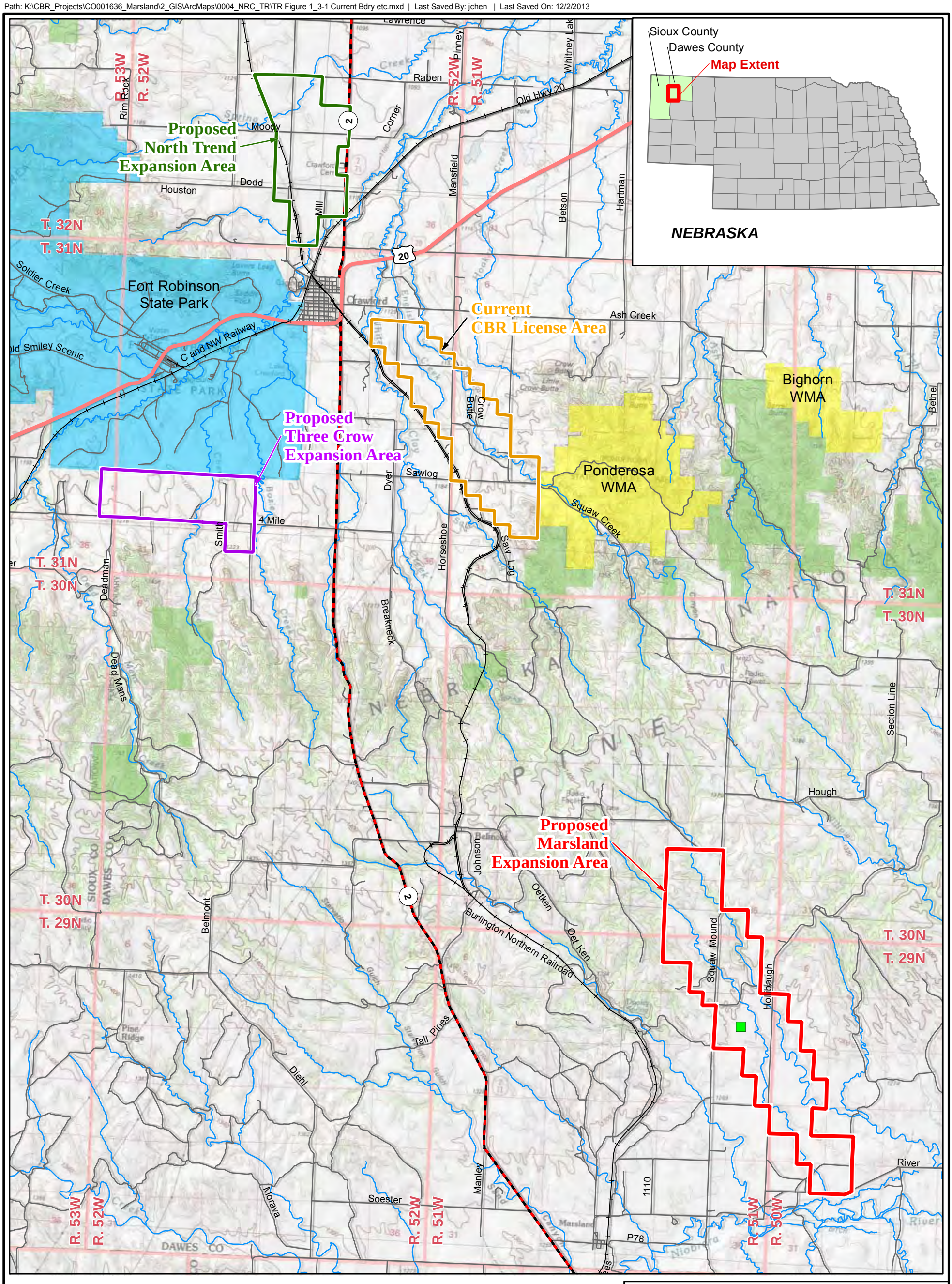
In the Matter of CROW BUTTE RESOURCES, INC. (Marsland Expansion Area)	Docket No. 40-8943-MLA-2 ASLBP No. 13-926-01-MLA-BD01

Hearing Exhibit

Exhibit Number: CBR008

Exhibit Title: Technical Report Figures

Path: K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 1_3-1 Current Bdry etc.mxd | Last Saved By: jchen | Last Saved On: 12/2/2013



LEGEND

- Proposed Marsland Satellite Facility Site
- Proposed Marsland Expansion Area
- Proposed Three Crow Expansion Area
- Proposed North Trend Expansion Area
- Current CBR License Area
- Township/Range
- WMA-Wildlife Management Area
- Fort Robinson State Park
- Nebraska National Forest
- Railroad
- U.S. Highway
- State Highway
- Roads, Other
- Stream

N

0 1 2

Miles

PROJECTION: NAD 1983, STATE PLANE NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

CROW BUTTE RESOURCES, INC.

FIGURE 1.3-1
CROW BUTTE RESOURCES INC.
CURRENT LICENSE AREA
AND PROPOSED EXPANSION AREAS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: J. CEARLEY

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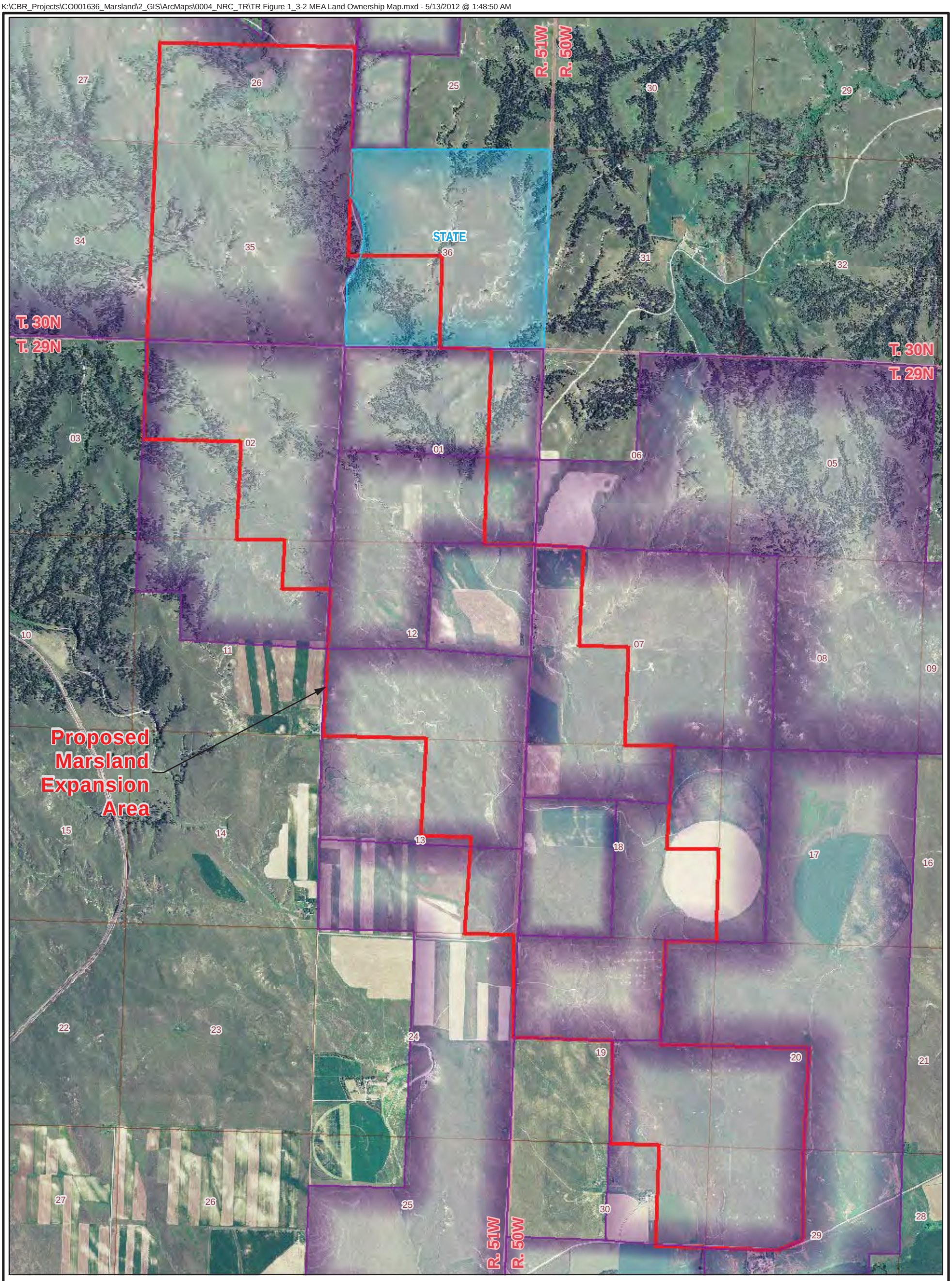
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 1_3-2 MEA Land Ownership Map.mxd - 5/13/2012 @ 1:48:50 AM



LEGEND

- Proposed Marsland Expansion Area
- Private Land
- State Land

N

0 1,250 2,500

Feet

PROJECTION: NAD1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: USDA NAIP IMAGERY 2010

CROW BUTTE RESOURCES, INC.

FIGURE 1.3-2
MARSLAND EXPANSION AREA
LAND OWNERSHIP

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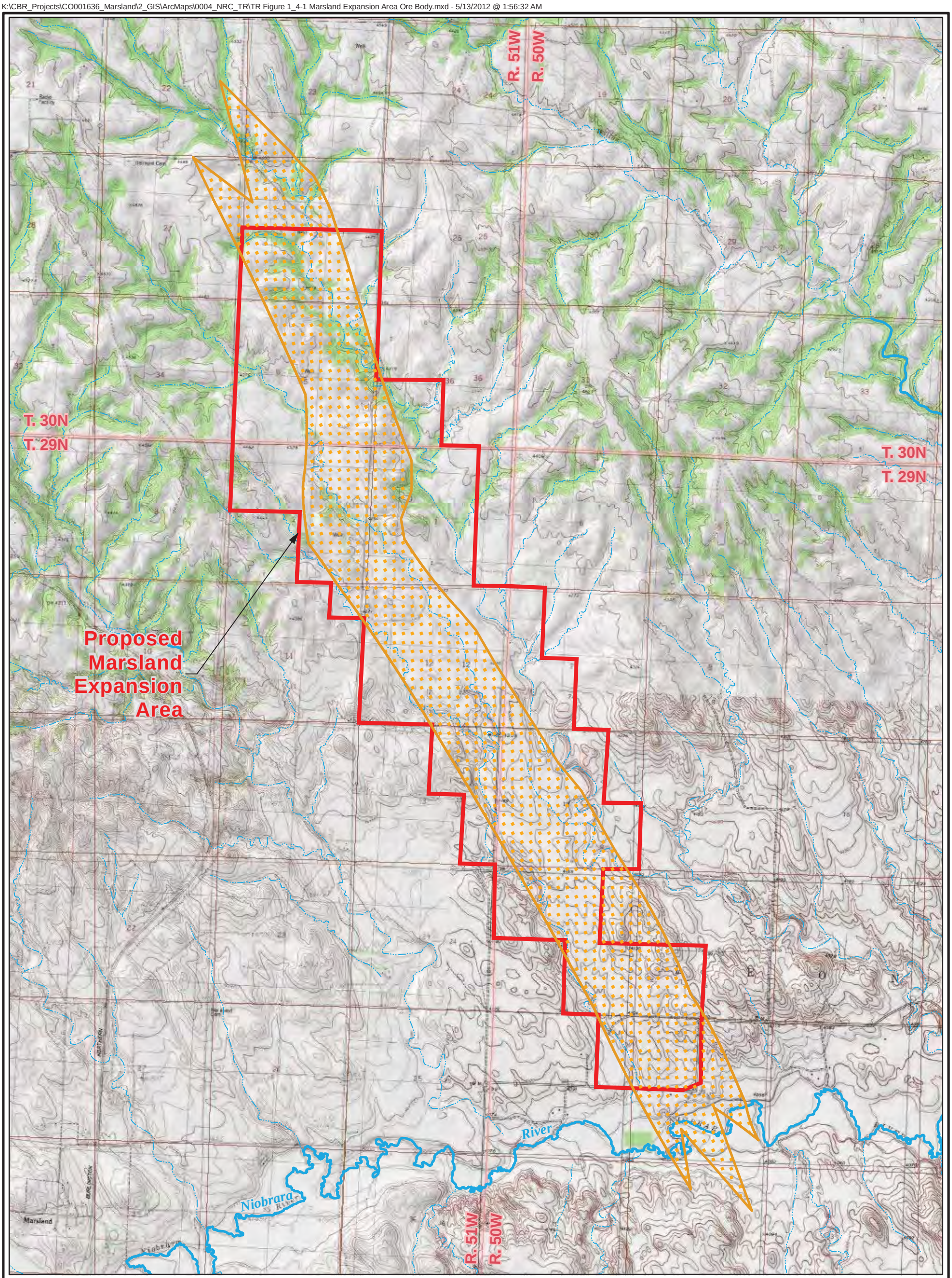
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 1_4-1 Marsland Expansion Area Ore Body.mxd - 5/13/2012 @ 1:56:32 AM



LEGEND

- Estimated Ore Body
- Proposed Marsland Expansion Area
- Perennial Stream/River
- Intermittent Stream/River

N

0 1,750 3,500

Feet

PROJECTION: NAD1927, STATE PLANE NEBRASKA NORTH, FIPS 2601 SOURCES: USA TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

CROW BUTTE RESOURCES, INC.

FIGURE 1.4-1
MARSLAND EXPANSION AREA
ESTIMATED ORE BODY

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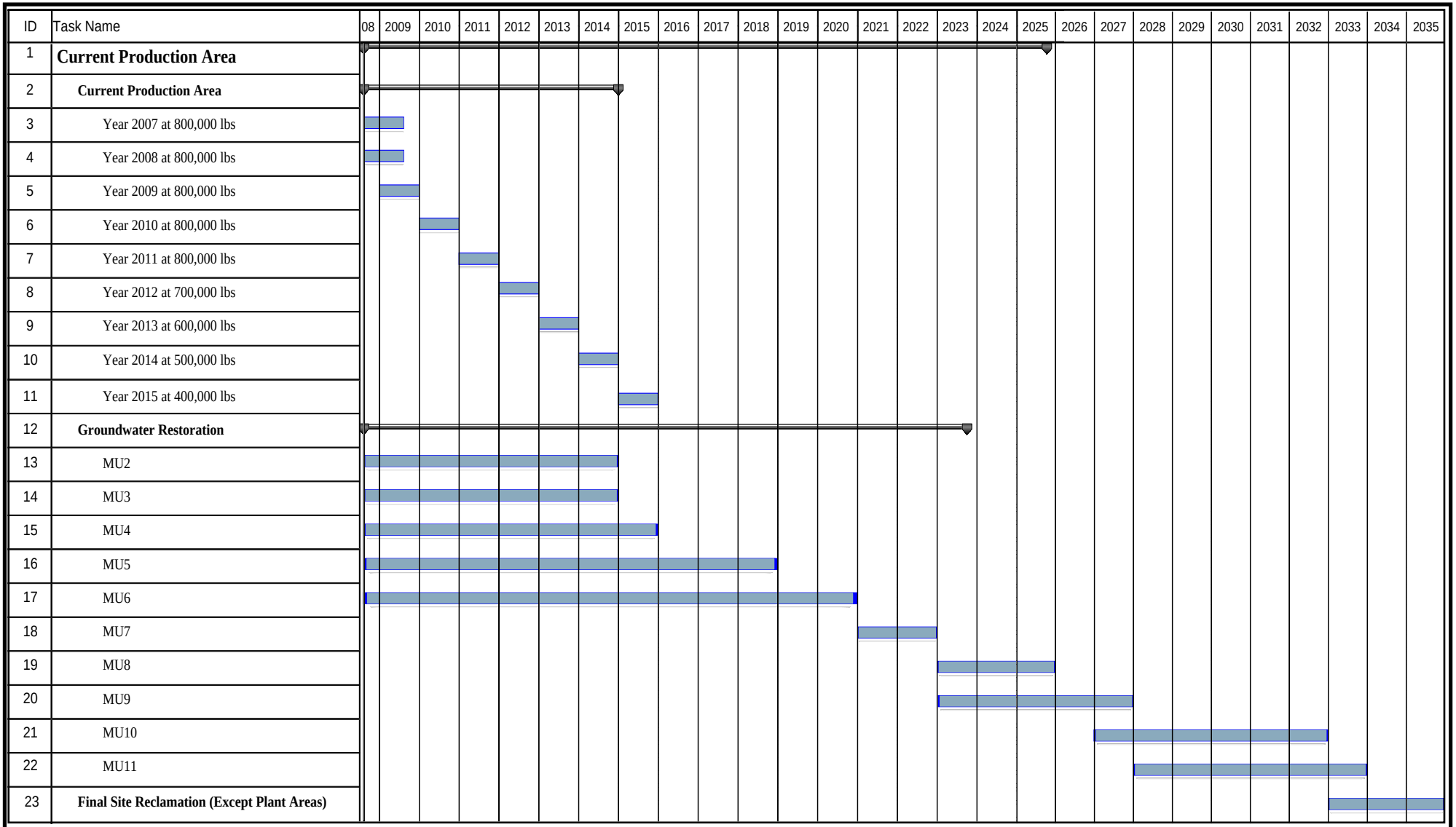

Task

Group By Summary

CROW BUTTE RESOURCES, INC.

FIGURE 1.7-1
CURRENT PRODUCTION AREA
MINE UNIT TIMELINE
EFFECTIVE AS OF JULY 1, 2013

PROJECT: CO001636.00001 MAPPED BY: JC CHECKED BY: JEC

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K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 1_7-1 Current Production Area Schedule_v10012013.ai @ 10/01/2013

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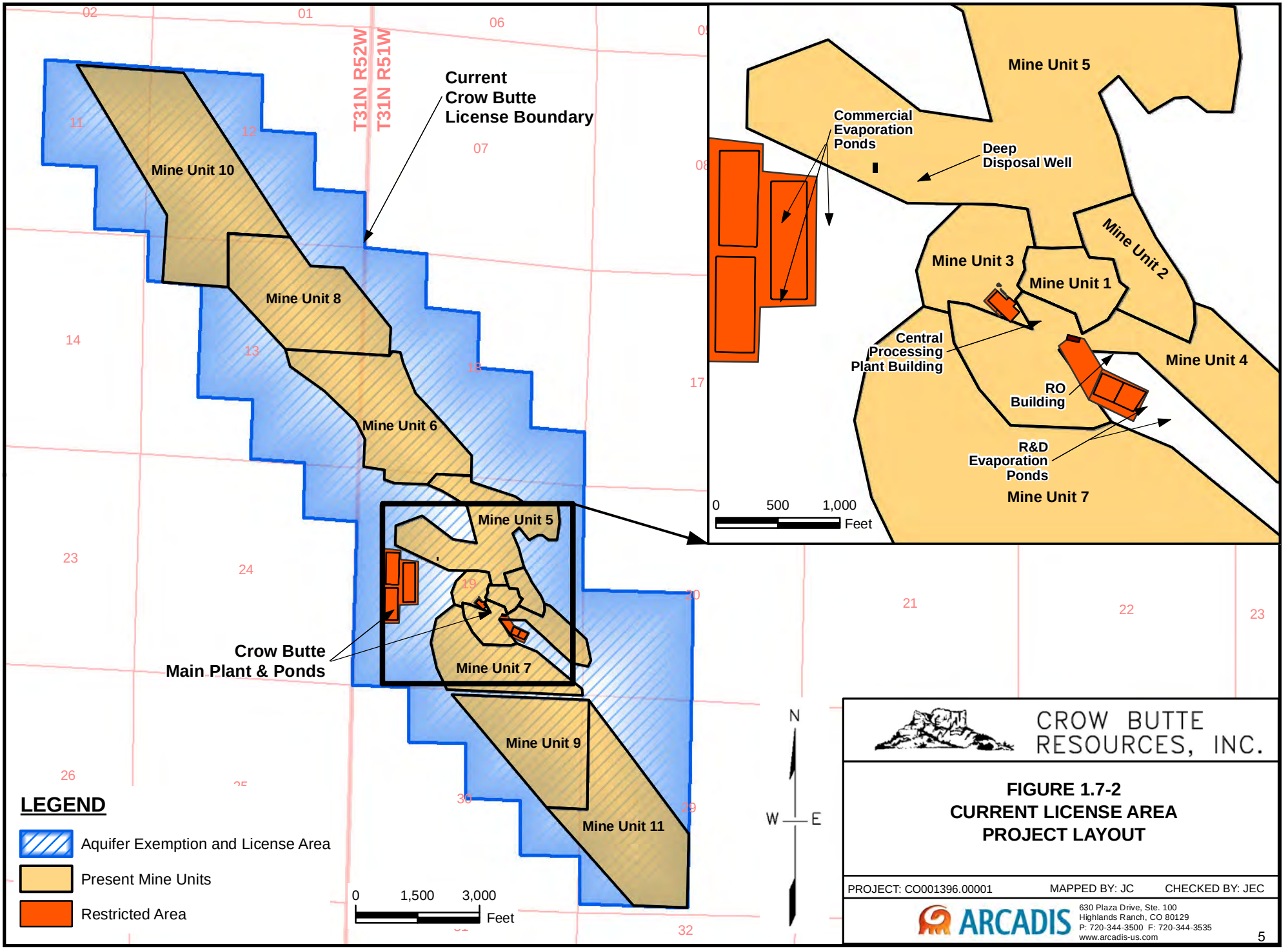

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FIGURE 1.7-2
CURRENT LICENSE AREA
PROJECT LAYOUT

PROJECT: CO001396.00001 MAPPED BY: JC CHECKED BY: JEC

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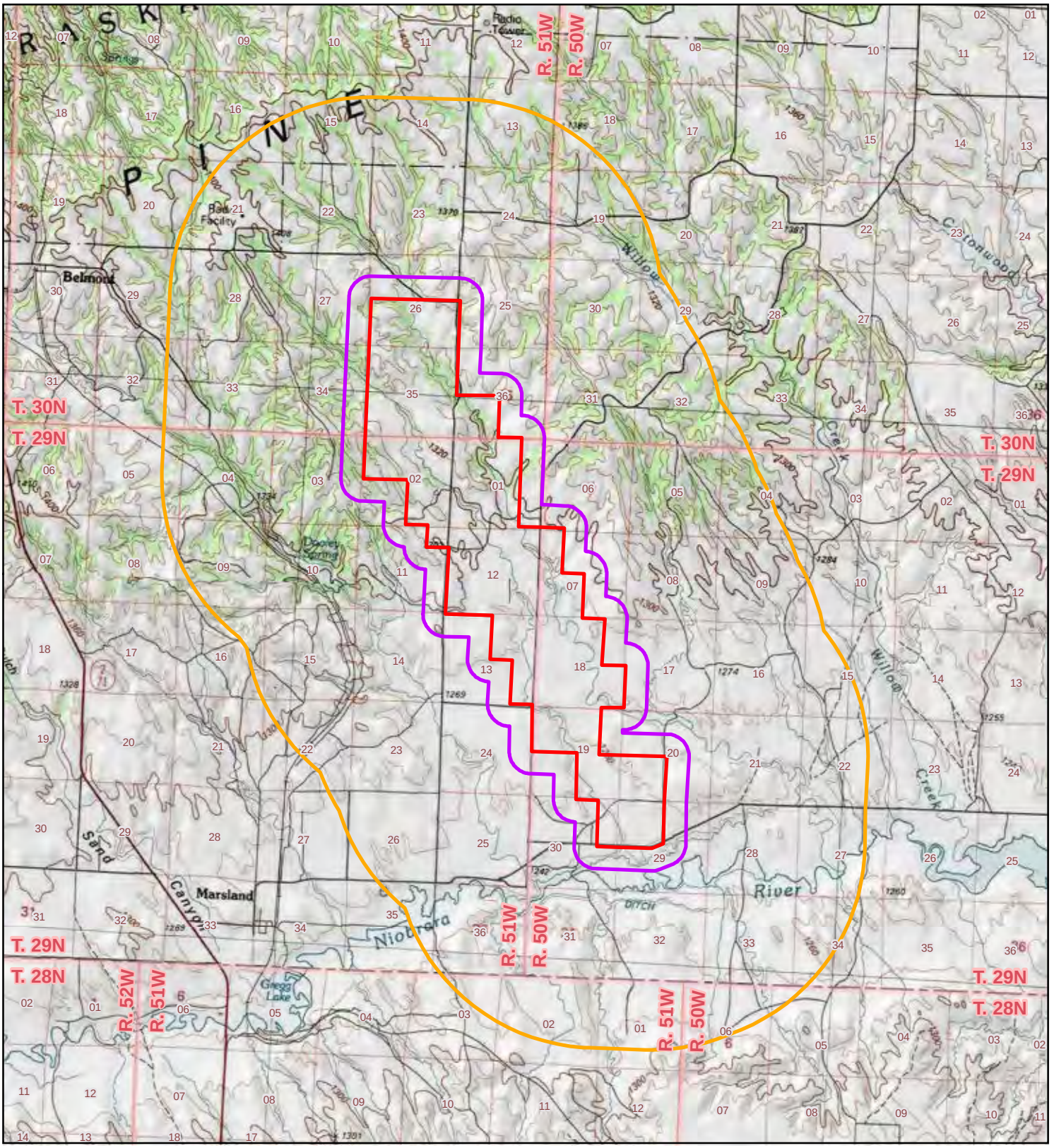

LEGEND

- Proposed Marsland Expansion Area
- ZOEI Boundary (1/4-mile fixed radius)
- AOR Boundary (2-mile fixed radius)

ZOEI = Zone of Endangering Influence

AOR = Area of Review

N

0 4,000 8,000

Feet

PROJECTION: NAD 1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: US TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

CROW BUTTE RESOURCES, INC.

FIGURE 1.7-3
PROJECT LOCATION MAP
ZOEI AND AOR

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: J. CEARLEY

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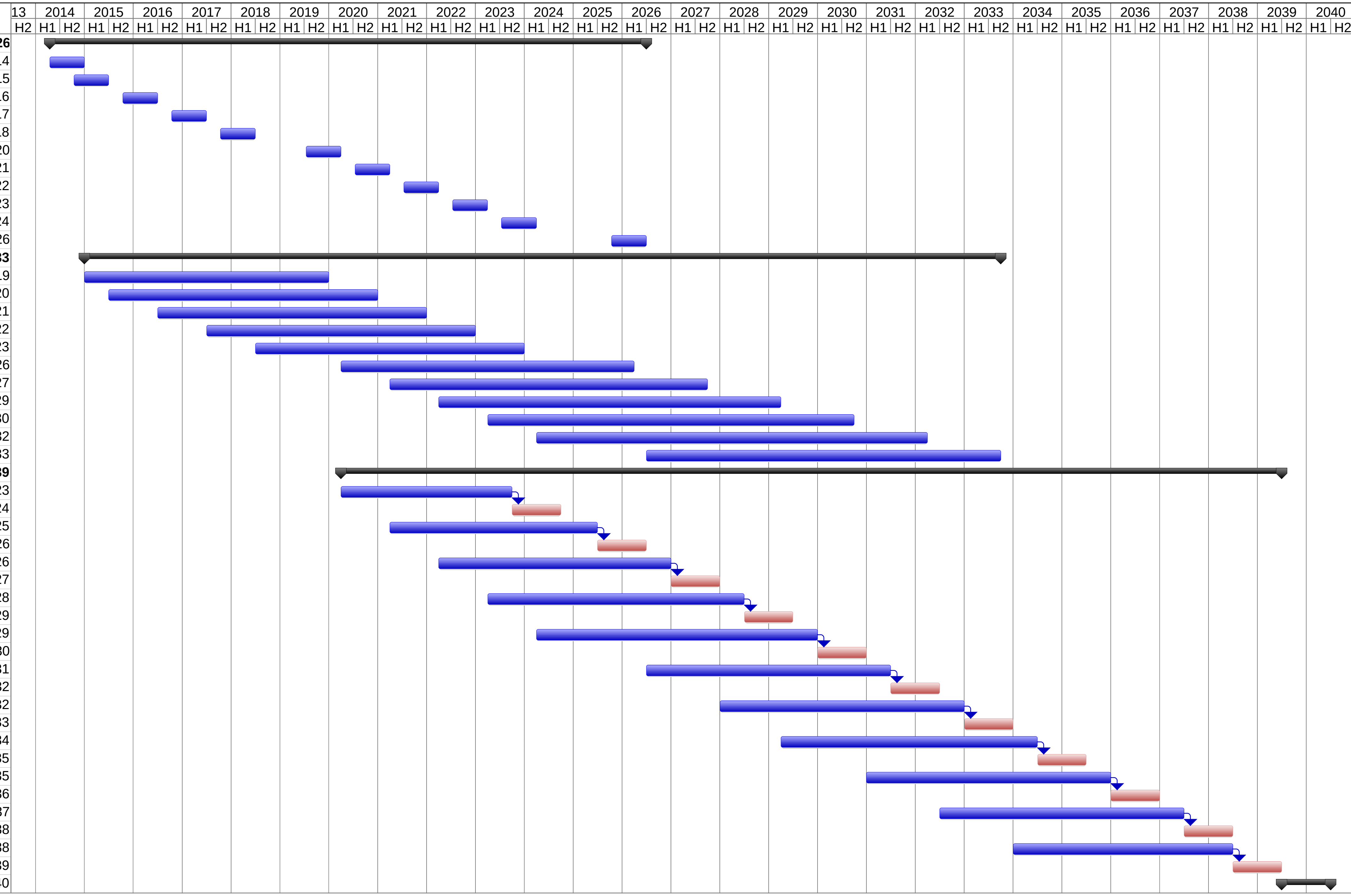
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TRTR Figure 1_7-3 Project Loc_ZOEI and AOR.mxd - 3/15/2012 @ 2:18:01 PM

Figure 1.7-4 Marsland Expansion Area Mining and Restoration Timeline

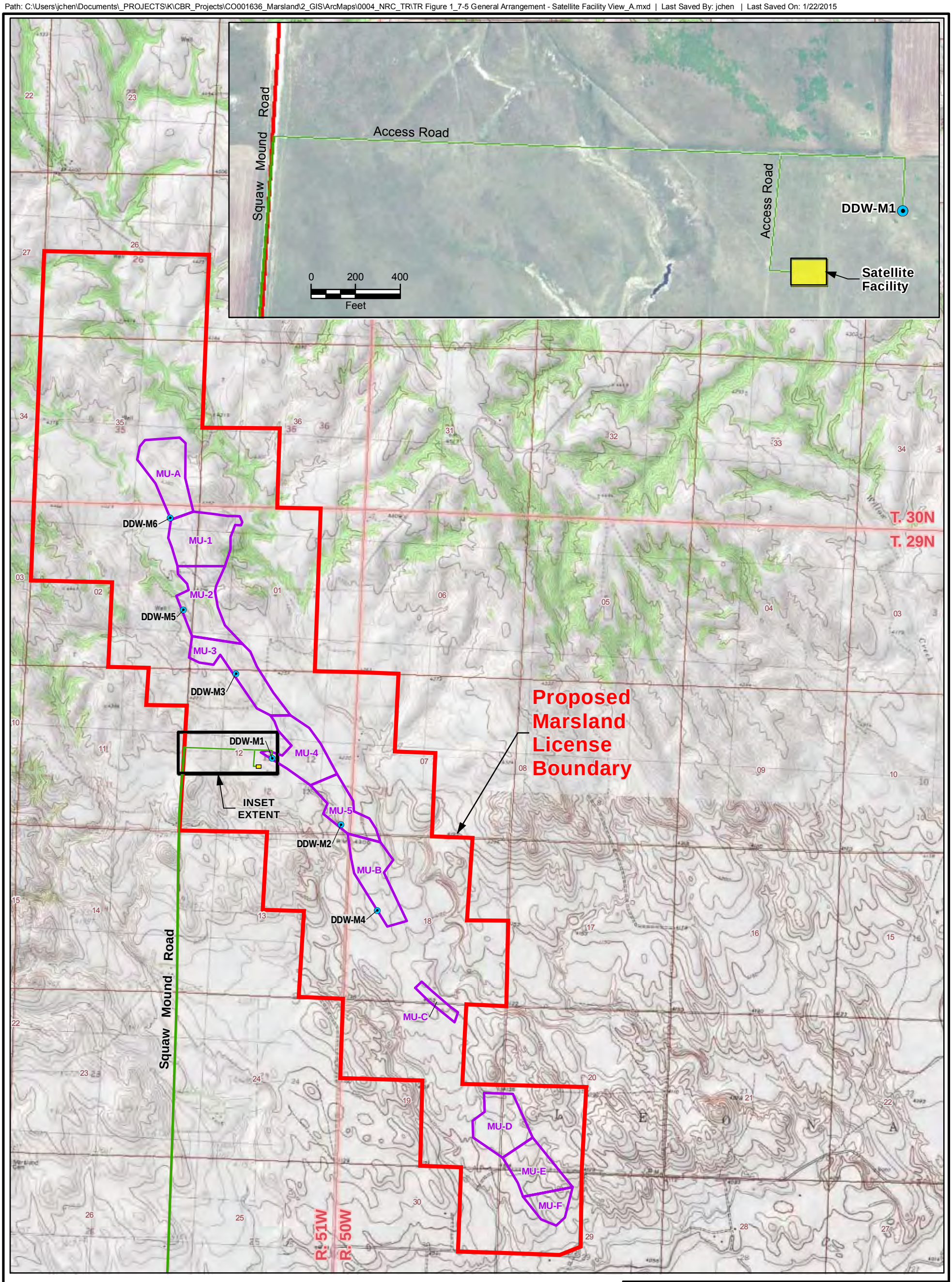
ID	Task Name	Duration	Start	Finish
1	**Facility Construction**	**3184 days**	**Thu 4/17/14**	**Tue 6/30/26**
2	MU-1	185 days	Thu 4/17/14	Wed 12/31/14
3	MU-2	185 days	Wed 10/15/14	Tue 6/30/15
4	MU-3	186 days	Thu 10/15/15	Thu 6/30/16
5	MU-4	186 days	Fri 10/14/16	Fri 6/30/17
6	MU-5	186 days	Fri 10/13/17	Sat 6/30/18
7	MU-A	186 days	Tue 7/16/19	Tue 3/31/20
8	MU-B	185 days	Thu 7/16/20	Wed 3/31/21
9	MU-C	186 days	Thu 7/15/21	Thu 3/31/22
10	MU-D	186 days	Fri 7/15/22	Fri 3/31/23
11	MU-E	186 days	Fri 7/14/23	Sun 3/31/24
12	MU-F	186 days	Tue 10/14/25	Tue 6/30/26
13	**Production**	**4892 days**	**Thu 1/1/15**	**Fri 9/30/33**
14	MU-1	1304 days	Thu 1/1/15	Tue 12/31/19
15	MU-2	1437 days	Wed 7/1/15	Thu 12/31/20
16	MU-3	1436 days	Fri 7/1/16	Fri 12/31/21
17	MU-4	1435 days	Mon 7/3/17	Sat 12/31/22
18	MU-5	1435 days	Mon 7/2/18	Sun 12/31/23
19	MU-A	1565 days	Wed 4/1/20	Tue 3/31/26
20	MU-B	1696 days	Thu 4/1/21	Thu 9/30/27
21	MU-C	1826 days	Fri 4/1/22	Sat 3/31/29
22	MU-D	1956 days	Mon 4/3/23	Mon 9/30/30
23	MU-E	2088 days	Mon 4/1/24	Wed 3/31/32
24	MU-F	1893 days	Wed 7/1/26	Fri 9/30/33
25	**Groundwater Restoration**	**5022 days**	**Wed 4/1/20**	**Thu 6/30/39**
26	MU-1	913 days	Wed 4/1/20	Sat 9/30/23
27	Stabilization Sampling	261 days	Mon 10/2/23	Mon 9/30/24
28	MU-2	1108 days	Thu 4/1/21	Mon 6/30/25
29	Stabilization Sampling	261 days	Tue 7/1/25	Tue 6/30/26
30	MU-3	1240 days	Fri 4/1/22	Thu 12/31/26
31	Stabilization Sampling	261 days	Fri 1/1/27	Fri 12/31/27
32	MU-4	1370 days	Mon 4/3/23	Fri 6/30/28
33	Stabilization Sampling	260 days	Mon 7/3/28	Fri 6/29/29
34	MU-5	1500 days	Mon 4/1/24	Sun 12/30/29
35	Stabilization Sampling	261 days	Tue 1/1/30	Tue 12/31/30
36	MU-A	1304 days	Wed 7/1/26	Mon 6/30/31
37	Stabilization Sampling	262 days	Tue 7/1/31	Wed 6/30/32
38	MU-B	1305 days	Mon 1/3/28	Fri 12/31/32
39	Stabilization Sampling	260 days	Mon 1/3/33	Sat 12/31/33
40	MU-C	1370 days	Mon 4/2/29	Fri 6/30/34
41	Stabilization Sampling	260 days	Mon 7/3/34	Sat 6/30/35
42	MU-D	1304 days	Wed 1/1/31	Mon 12/31/35
43	Stabilization Sampling	262 days	Tue 1/1/36	Wed 12/31/36
44	MU-E	1304 days	Thu 7/1/32	Tue 6/30/37
45	Stabilization Sampling	261 days	Wed 7/1/37	Wed 6/30/38
46	MU-F	1173 days	Mon 1/2/34	Wed 6/30/38
47	Stabilization Sampling	261 days	Thu 7/1/38	Thu 6/30/39
48	**Site Reclamation**	261 days	Fri 7/1/39	Sat 6/30/40



Project: Marsland Expansion Area
Date: Wed 5/22/13

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Progress
Split	External Tasks	Inactive Summary	Manual Summary	Deadline
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

Path: C:\Users\jchen\Documents_PROJECTS\K\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 1_7-5 General Arrangement - Satellite Facility View_A.mxd | Last Saved By: jchen | Last Saved On: 1/22/2015



LEGEND

- Proposed Deep Disposal Well
- Squaw Mound Road
- Access Road
- Satellite Facility (Restricted Area)
- Mine Unit
- Proposed Marsland License Boundary

N

0 1,500 3,000

Feet

PROJECTION: NAD 1983, STATE PLANE NEBRASKA NORTH, FIPS 2600
SOURCES: US TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

CROW BUTTE RESOURCES, INC.

FIGURE 1.7-5
GENERAL ARRANGEMENT
SATELLITE FACILITY VIEW

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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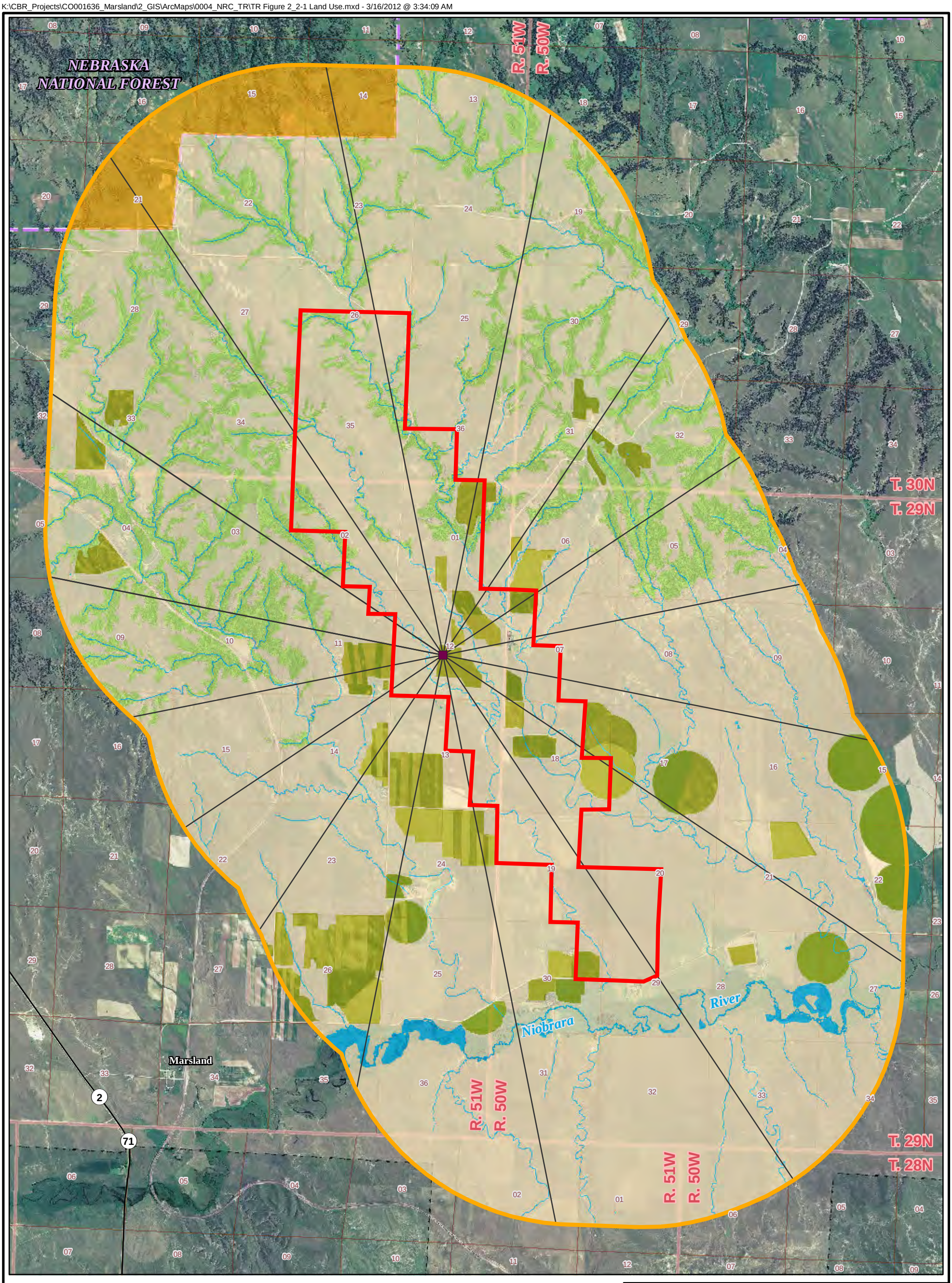
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 2_2-1 Land Use.mxd - 3/16/2012 @ 3:34:09 AM



LEGEND

- Proposed Marsland Satellite Plant Centroid
- Compass Sector Boundary
- Proposed Marsland Expansion Area
- Area of Review
- Nebraska National Forest Boundary

Land Use*

- Cropland
- Drainage/Potential Wetland
- Forest Land
- Rangeland
- Recreational Land

N

0 2,250 4,500

Feet

PROJECTION: NAD1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: USDA NAIP IMAGERY 2010

***** Land use data were interpreted from aerial image. The delineation of "Drainage/Potential Wetland" type also referenced NHD Flowlines and NWI Wetland Dataset.

CROW BUTTE RESOURCES, INC.

FIGURE 2.2-1
MARSLAND EXPANSION AREA
LAND USE

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: MS

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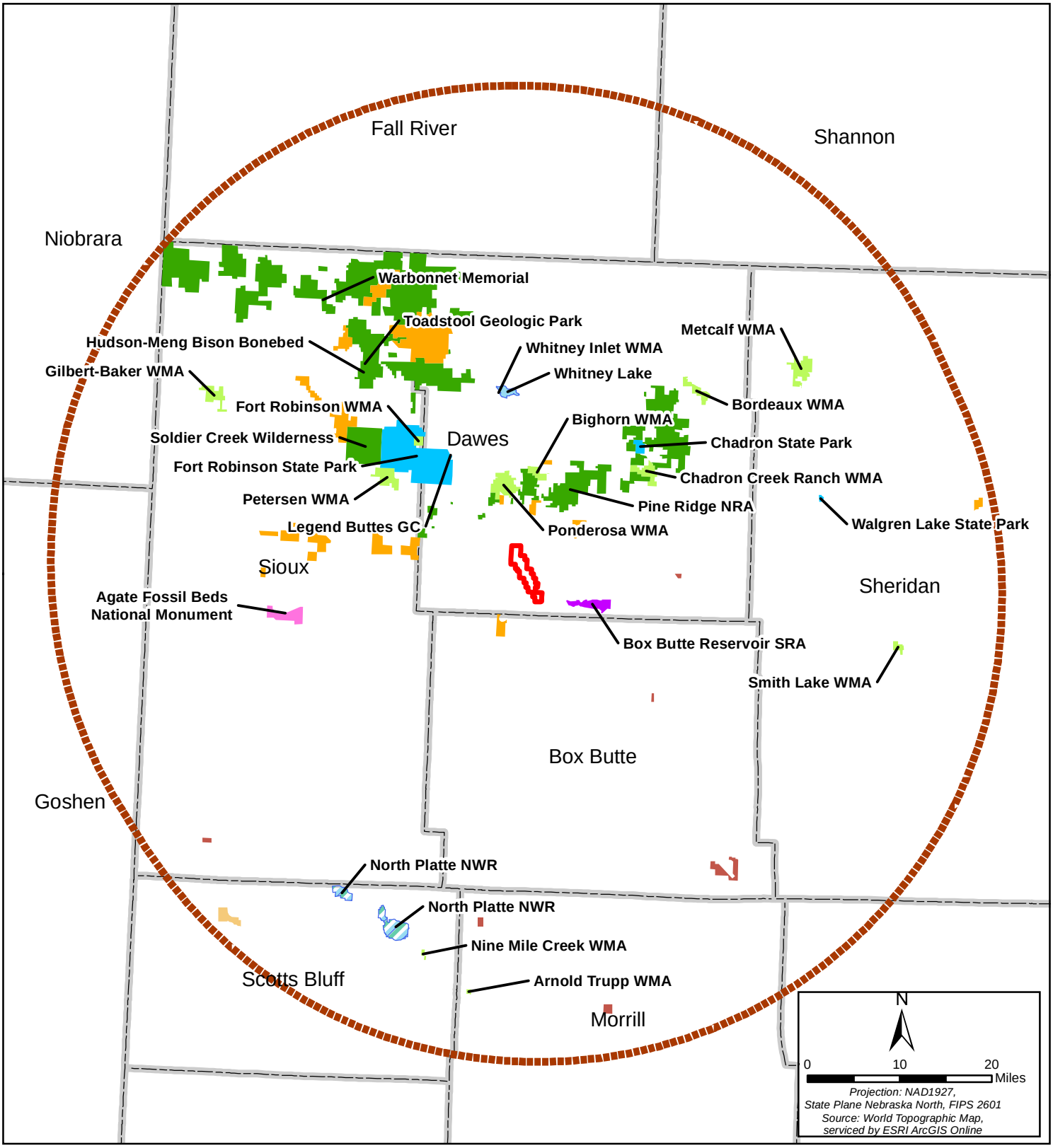

LEGEND

- Agate Fossil Beds National Monument
- Proposed Marsland Expansion Area
- 50 Mile Radius
- Wildlife Management Area
- State Recreation Area
- State Park; Walgren Lake State Park
- Conservation Partner Lands
- Natural Resource District Area
- Nebraska National Forest
- National Wildlife Refuge
- Open Fields and Waters
- Whitney Lake

CROW BUTTE RESOURCES, INC.

FIGURE 2.2-2
MARSLAND EXPANSION AREA
PROXIMITY TO RECREATION AREAS
AND WILDLIFE MANAGEMENT AREAS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: CM

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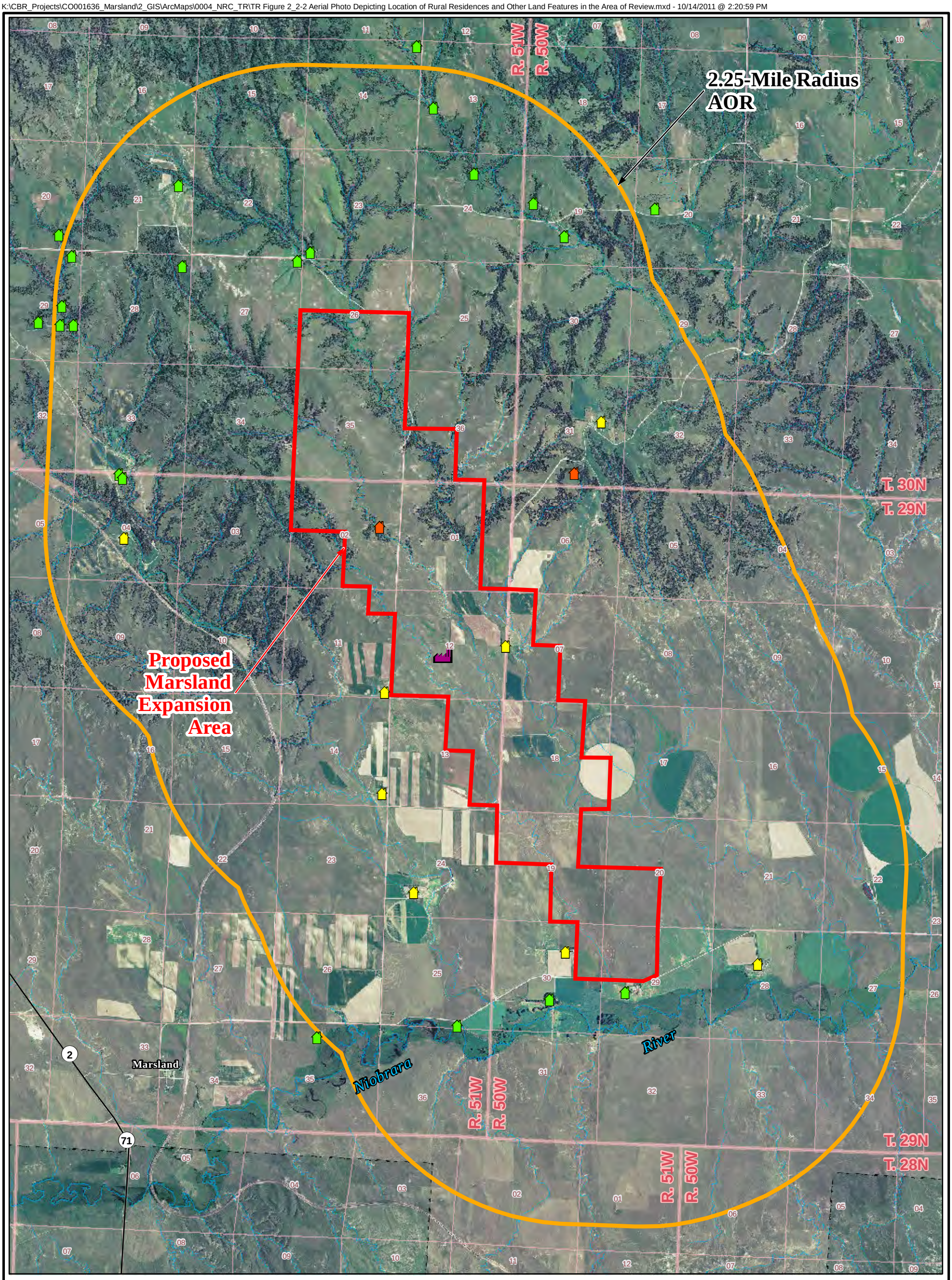
Document Path: I:\Marsland\GIS\ArcMap_MXD\TR Figure 2_x Recreation Facilities.mxd

K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 2_2-2 Aerial Photo Depicting Location of Rural Residences and Other Land Features in the Area of Review.mxd - 10/14/2011 @ 2:20:59 PM



LEGEND

- Structure
- Satellite Plant
- Occupied Residence
- Unoccupied Residence
- Proposed Marsland Expansion Area
- Area of Review (AOR)
- Intermittent Stream/River
- Perennial Stream/River

N

0 3,000 6,000

Feet

PROJECTION: NAD1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: USDA NAIP IMAGERY 2010

CROW BUTTE RESOURCES, INC.

FIGURE 2.2-3
AERIAL PHOTO DEPICTING LOCATION OF RURAL RESIDENCES AND OTHER LAND FEATURES IN THE AREA OF REVIEW

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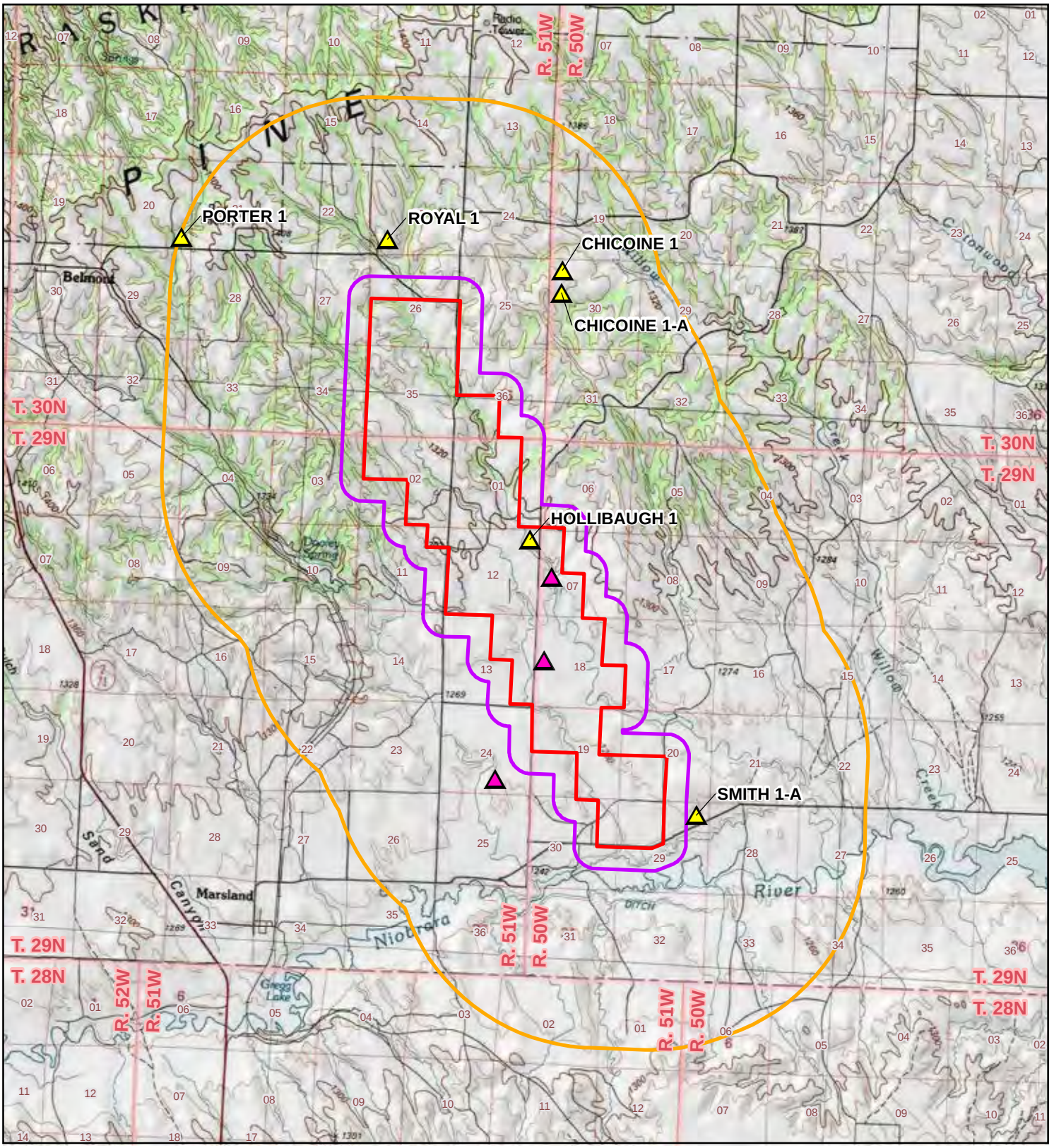

LEGEND

- Sand/Gravel Pit, Inactive
- Dry Hole, Dry and Abandoned
- Proposed Marsland Expansion Area
- ZOEI Boundary (1/4-mile fixed radius)
- AOR Boundary (2-mile fixed radius)

Sources for Sand/Gravel Pits

1. Dawes County, (http://dawes.assessor.gisworkshop.com/Assessor/index.jsp), Accessed on 08/03/2011, and
2. Burchett, R.R. 1971. Directory of Nebraska Quarries, Pits and Mines. Resource Report Number 5. University of Nebraska Conservation and Survey Division, Lincoln. March.

Sources for Oil/Gas Test Holes

Nebraska Oil and Gas Conservation Commission, (http://www.nogcc.ne.gov/NOGCCPublications.aspx), Accessed on 08/01/2011

N

0 4,000 8,000

Feet

PROJECTION: NAD 1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: US TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

CROW BUTTE RESOURCES, INC.

FIGURE 2.2-4
MARSLAND EXPANSION AREA
LOCATIONS OF GRAVEL PITS AND OIL/GAS TEST HOLES

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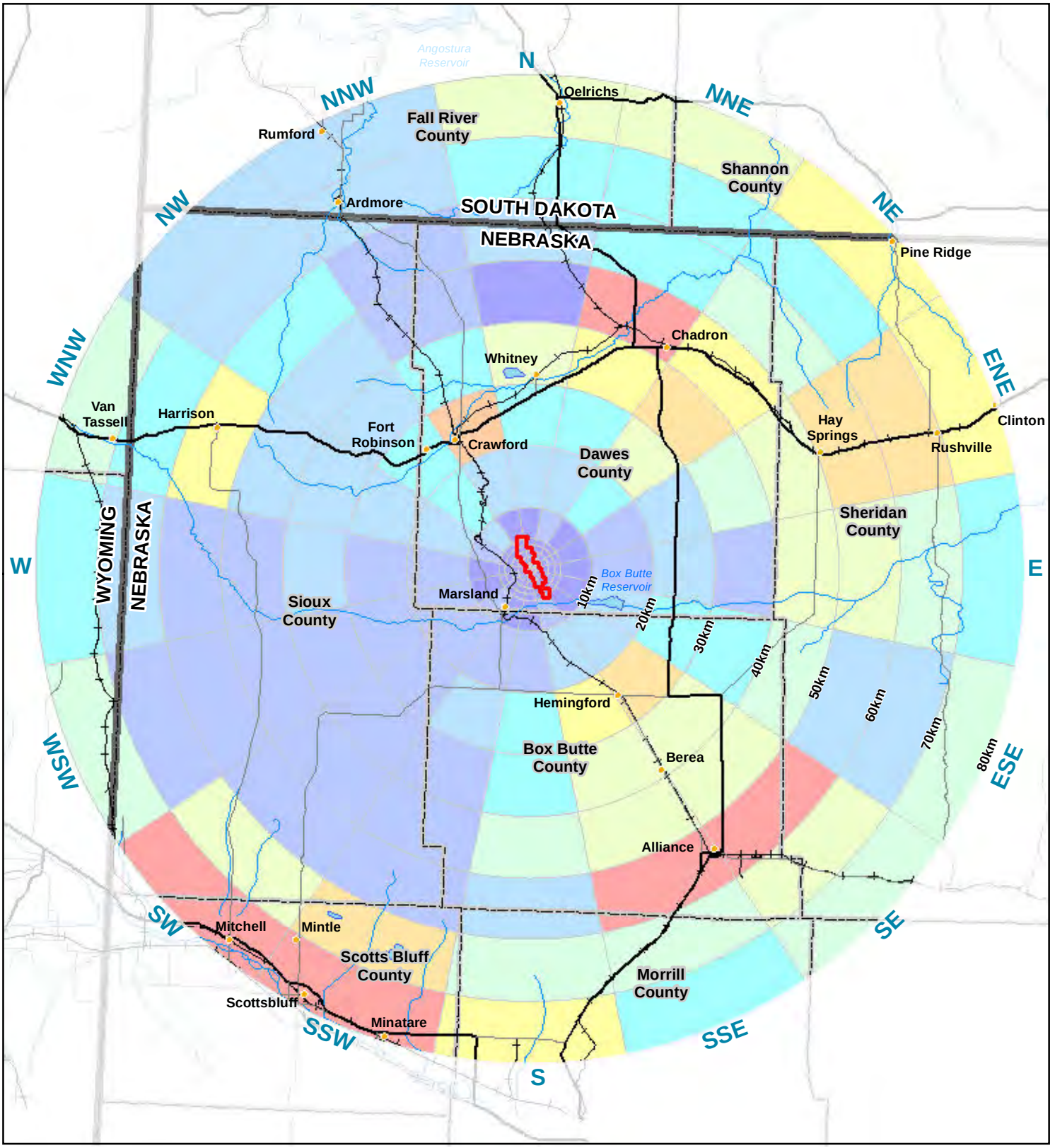
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TRTR Figure 2_2-3 Gravel Pits and OG Test Holes.mxd.mxd - 11/8/2011 @ 11:16:59 PM



LEGEND

Proposed Cameco/Marsland Expansion Area

Population (Census 2010)

0 - 6	86 - 208
7 - 18	209 - 523
19 - 31	524 - 1,101
32 - 51	1,102 - 2,997
52 - 85	2,998 - 19,150

N

0 5 10 15 Miles

0 10 20 30 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 2.3-1
SIGNIFICANT POPULATION CENTERS WITHIN AN 80-Km (50 mi) RADIUS OF THE MARSLAND SITE

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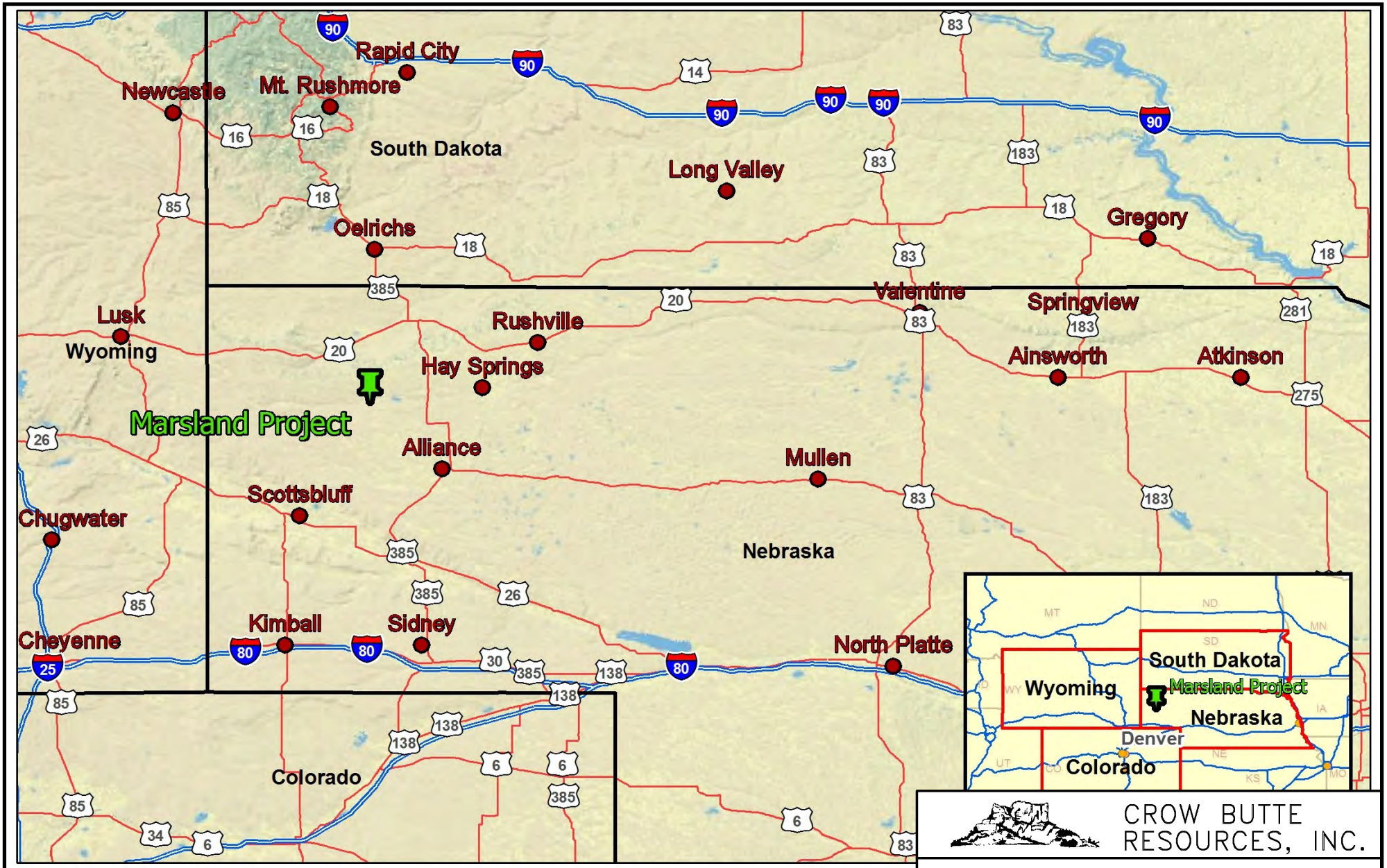

Climate Met Stations

- NWS ASOS/COOP
- Project Site

0 15 30 60 Miles

N W E S

Source: Inter-Mountain Lab (IML) Air Science, 2011

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-1
MARSLAND PROJECT
MET STATIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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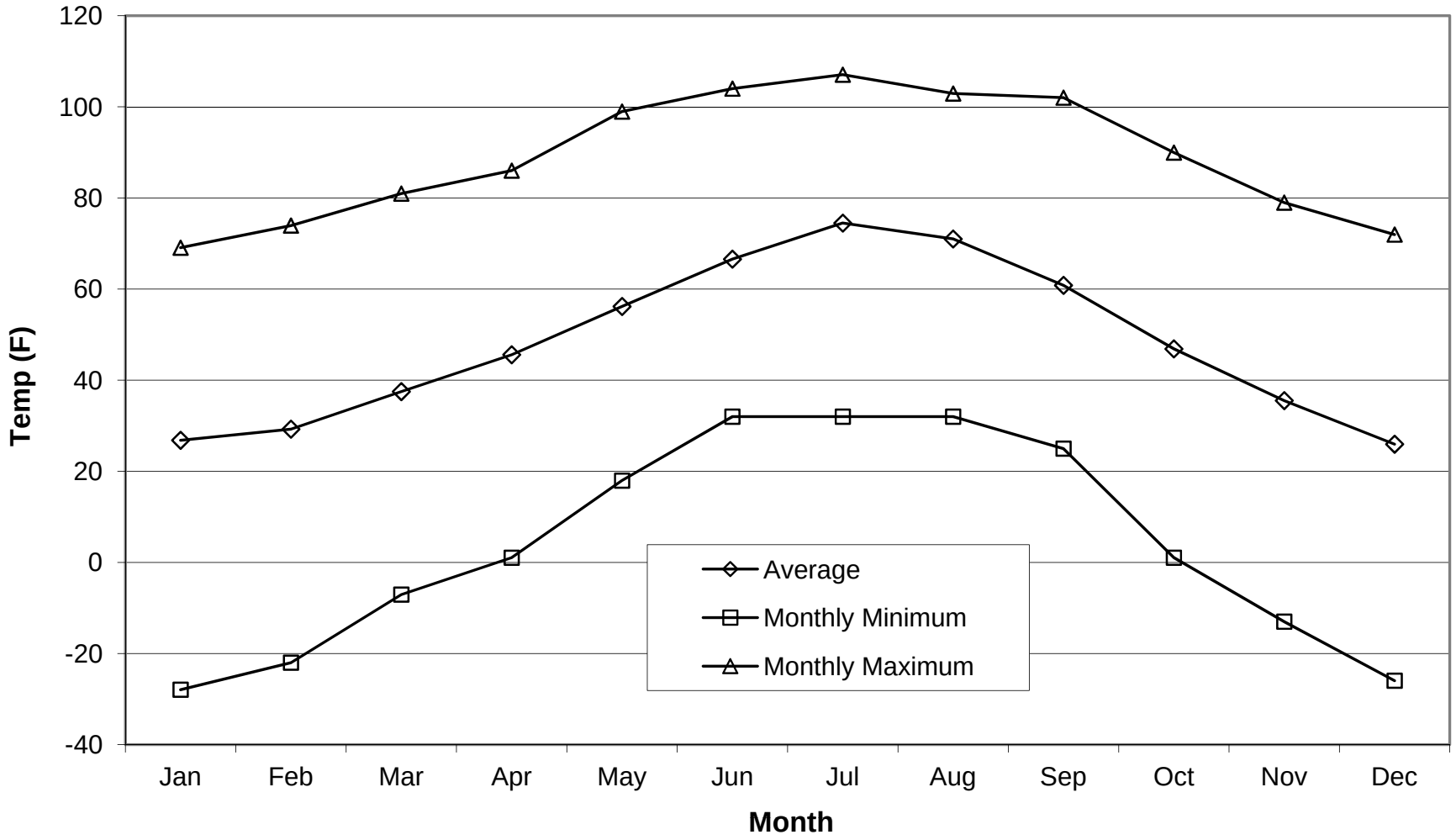

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-2
SCOTTSBLUFF AP
MONTHLY TEMPERATURES

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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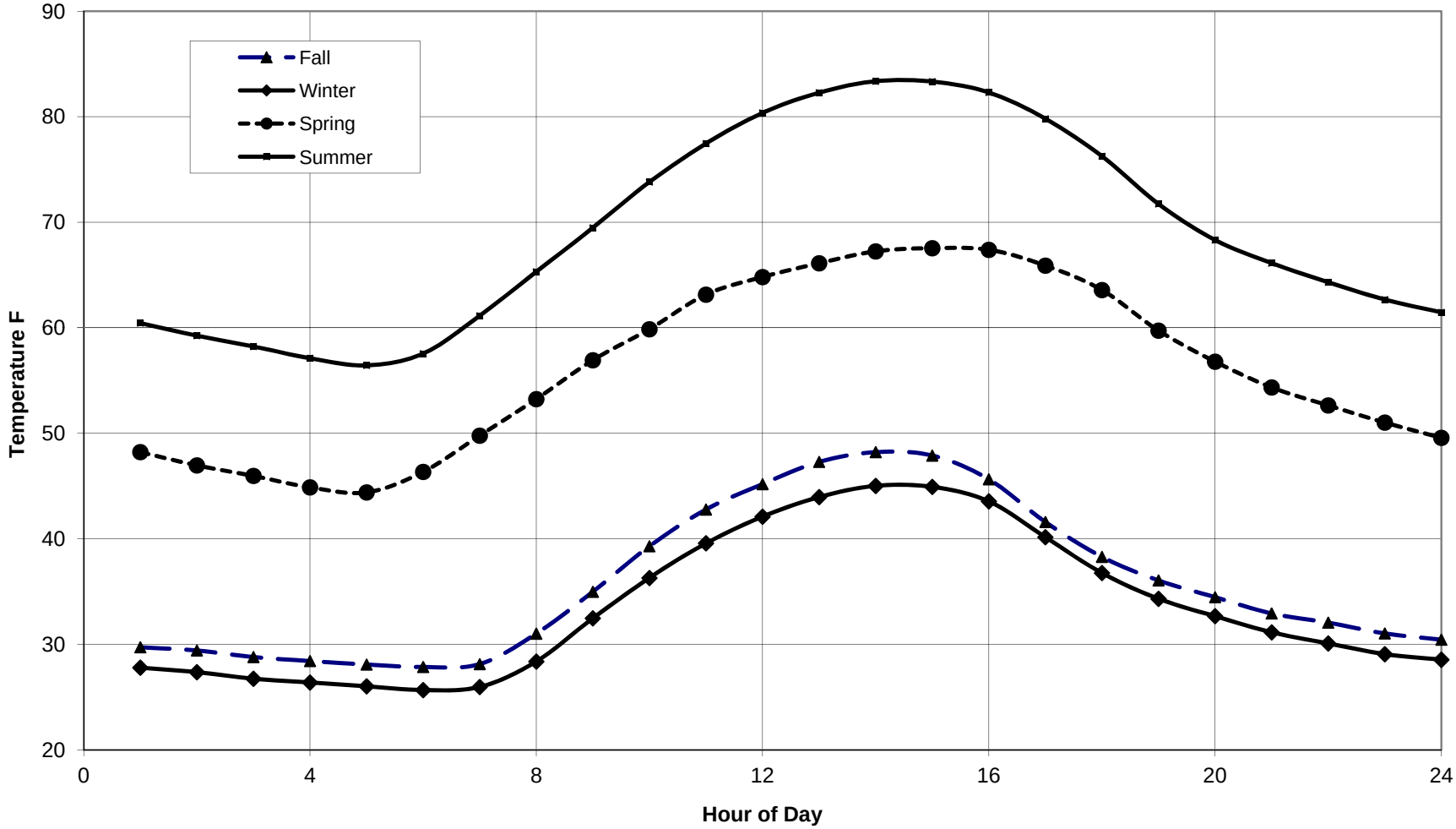
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-2 Scottsbluff AP Monthly Temp.ai @ 11/08/2011



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-3
SCOTTSBLUFF AP SEASONAL DIURNAL TEMPERATURE VARIATIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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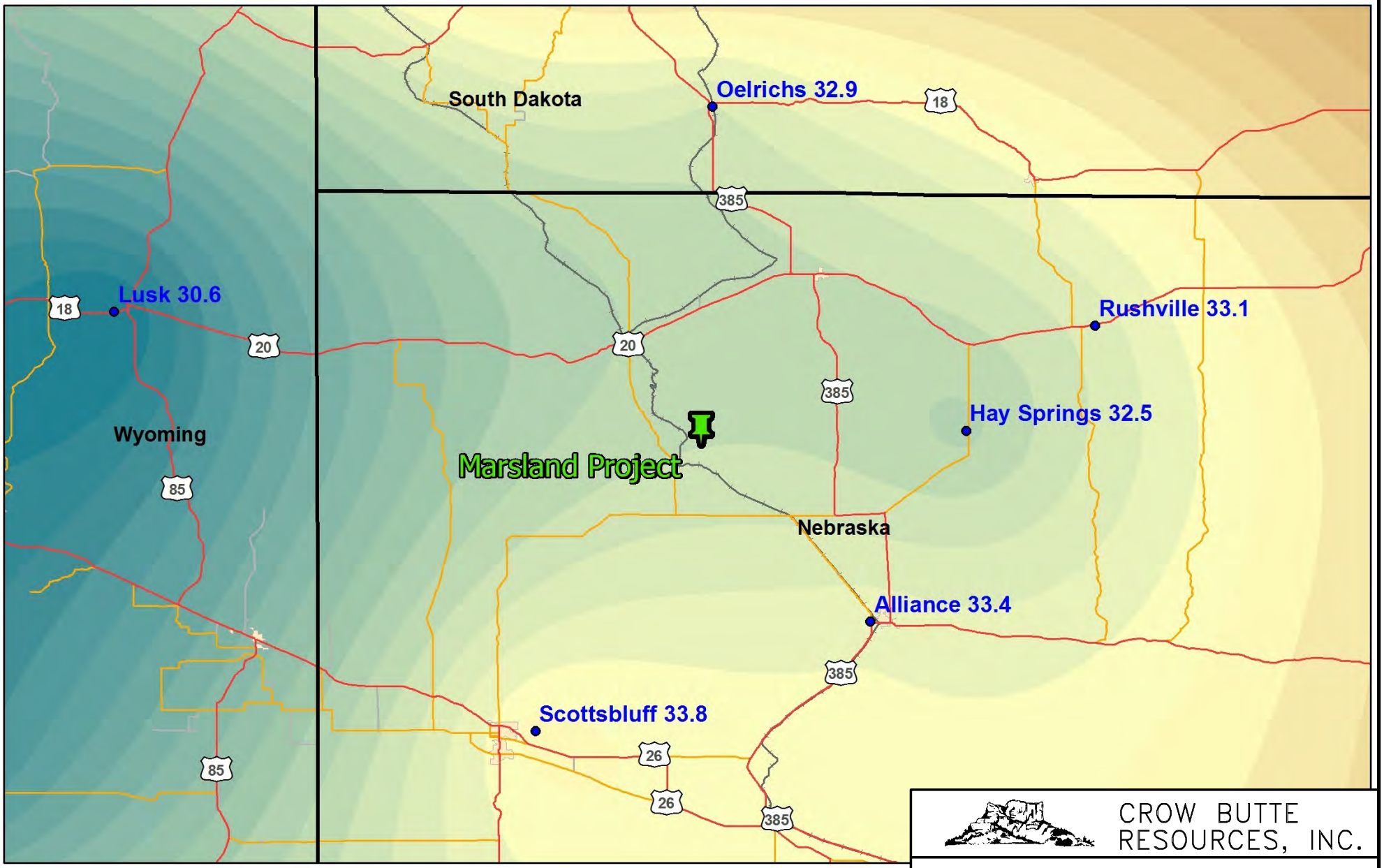
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-3 Scottsbluff AP Seasonal Diurnal Temp Variation.ai @ 11/08/2011



Source: Inter-Mountain Lab (IML) Air Science, 2011

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-4
REGIONAL ANNUAL AVERAGE MINIMUM TEMPERATURES

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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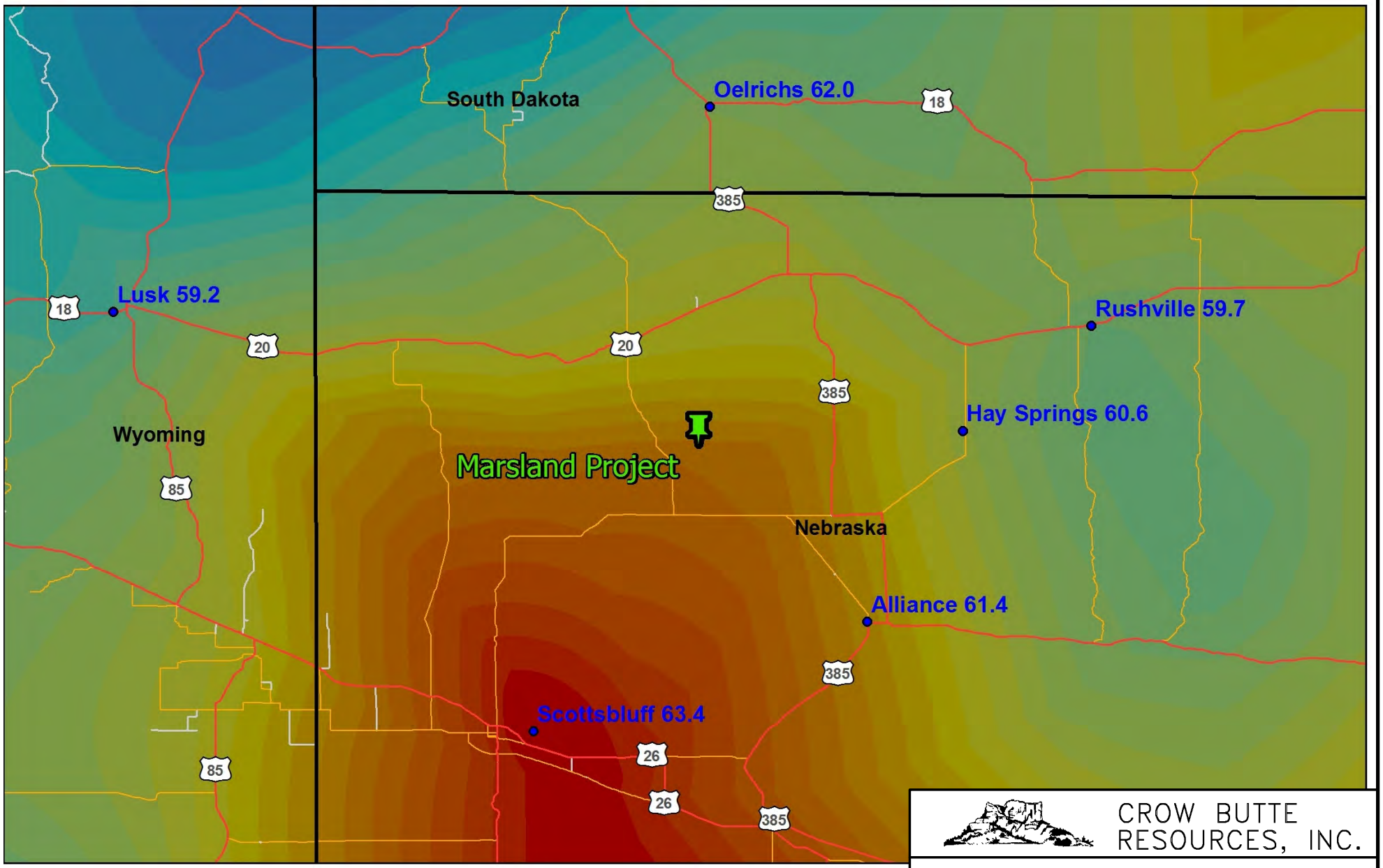
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-4 Regional Annual Average Minimum Temp.ai @ 10/17/2011



Source: Inter-Mountain Lab (IML) Air Science, 2011

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FIGURE 2.5-5
REGIONAL ANNUAL AVERAGE MAXIMUM TEMPERATURES

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorNTR Figure 2_5-5 Regional Annual Average Maximum Temp.ai @ 10/17/2011

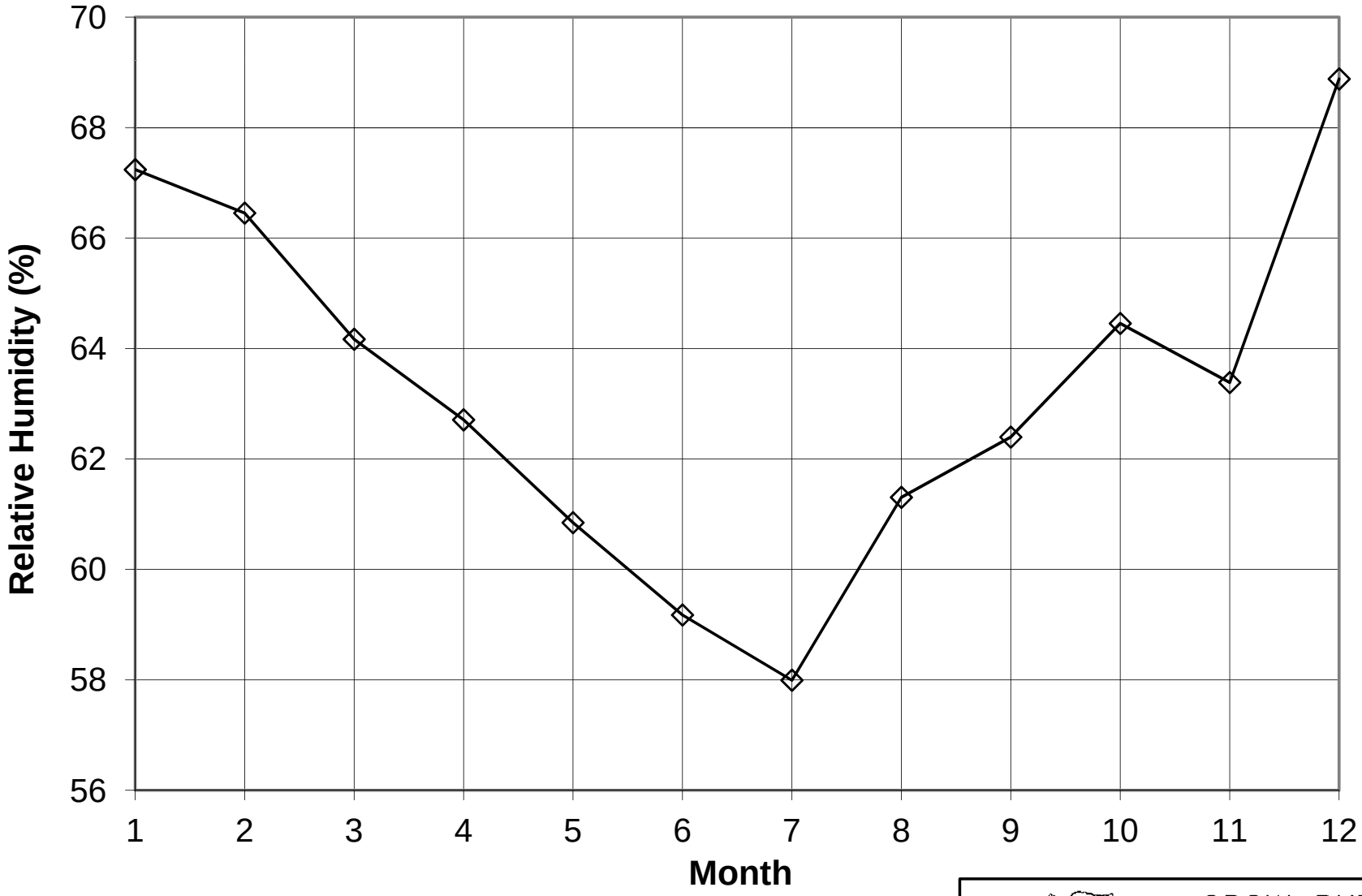

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FIGURE 2.5-6
MONTHLY RELATIVE HUMIDITY STATISTICS FOR SCOTTSBLUFF AP

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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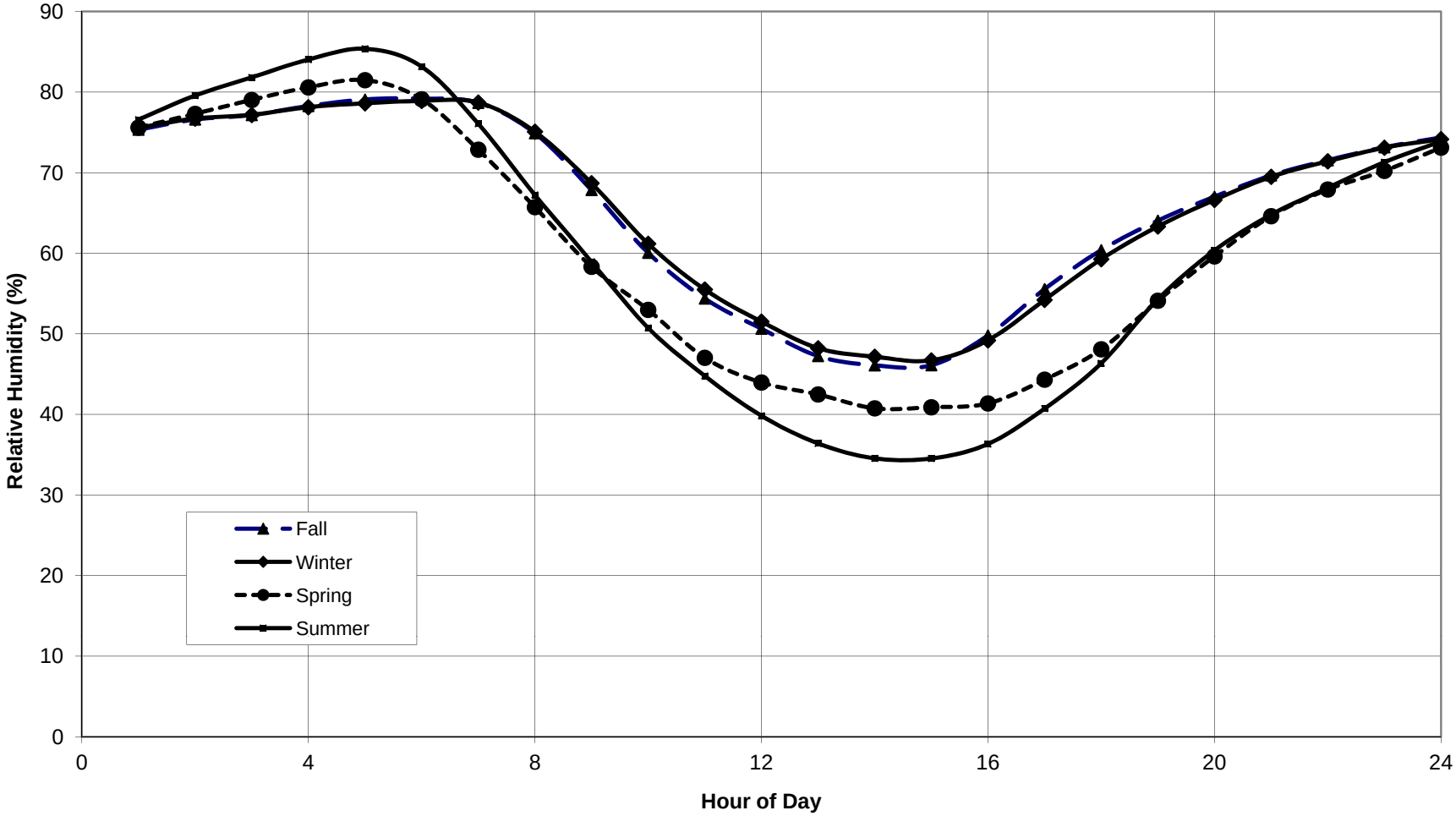
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-6 Monthly Relative Humidity Stat for Scottsbluff AP.ai @ 11/08/2011



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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FIGURE 2.5-7
DIURNAL VARIATION IN RELATIVE HUMIDITY FOR SCOTTSBLUFF BY SEASON

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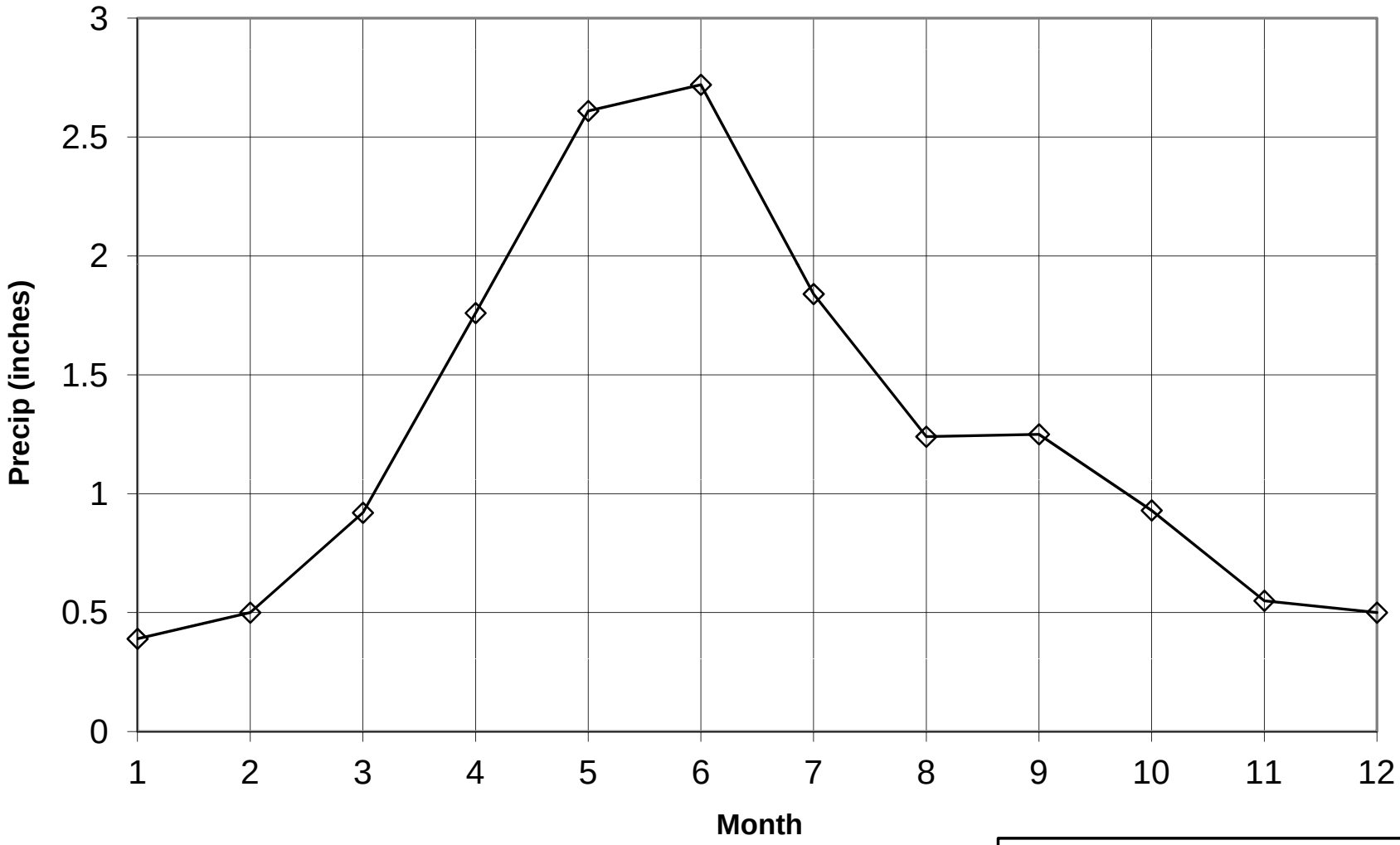
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-7 Diurnal Variation in Relative Humidity for Scottsbluff by Season.ai @ 11/08/2011



Source: High Plains Regional Climate Data Center, 2011, hourly data from 1893 through 2010.

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FIGURE 2.5-8
SCOTTSBLUFF AP
MONTHLY AVERAGE PRECIPITATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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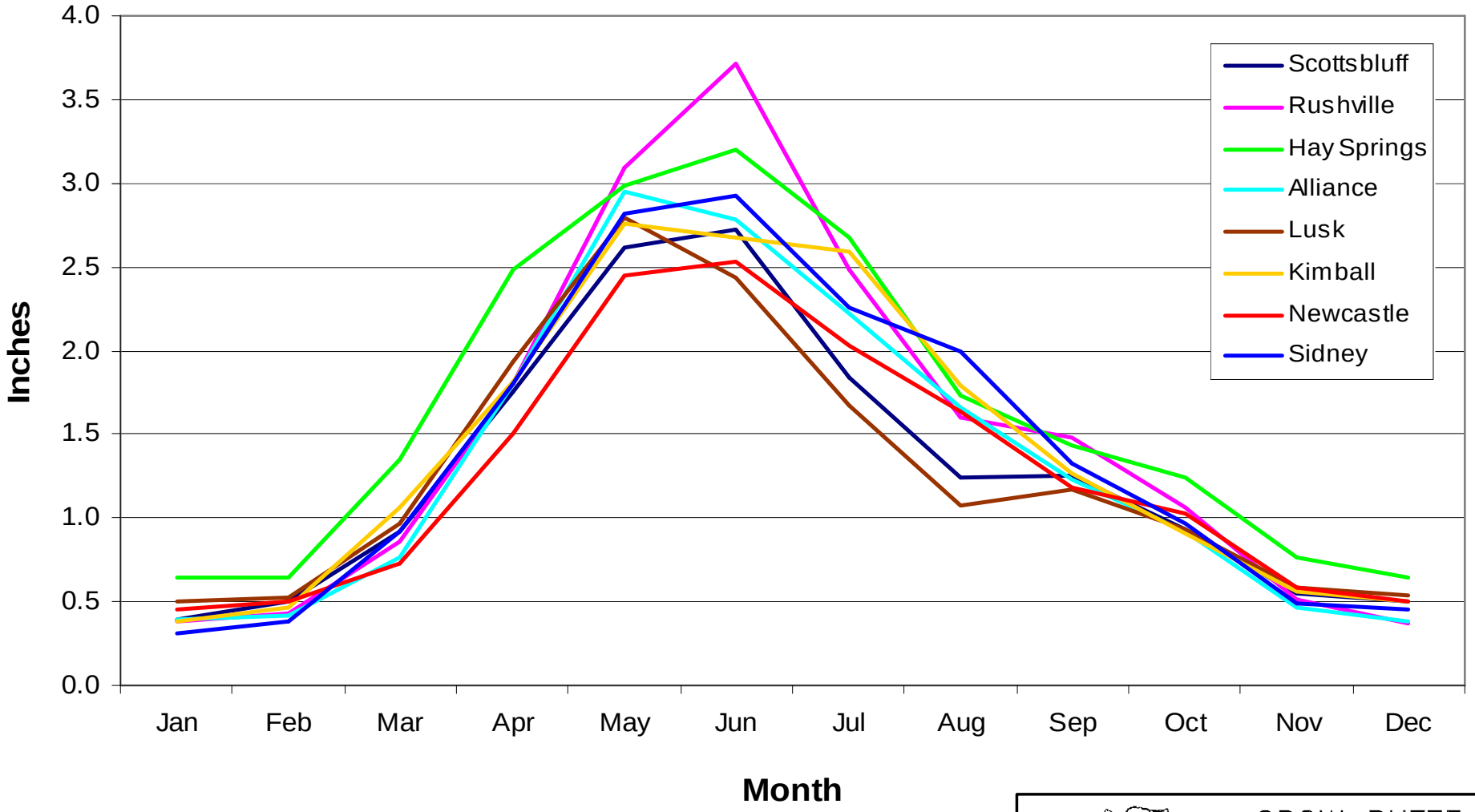
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-8 Scottsbluff AP Monthly Average Precipitation.ai @ 11/08/2011



Source: National Climate Data Center, 2011.

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FIGURE 2.5-9
REGIONAL
MONTHLY AVERAGE PRECIPITATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-9 Regional Monthly Average Precipitation.ai @ 11/08/2011

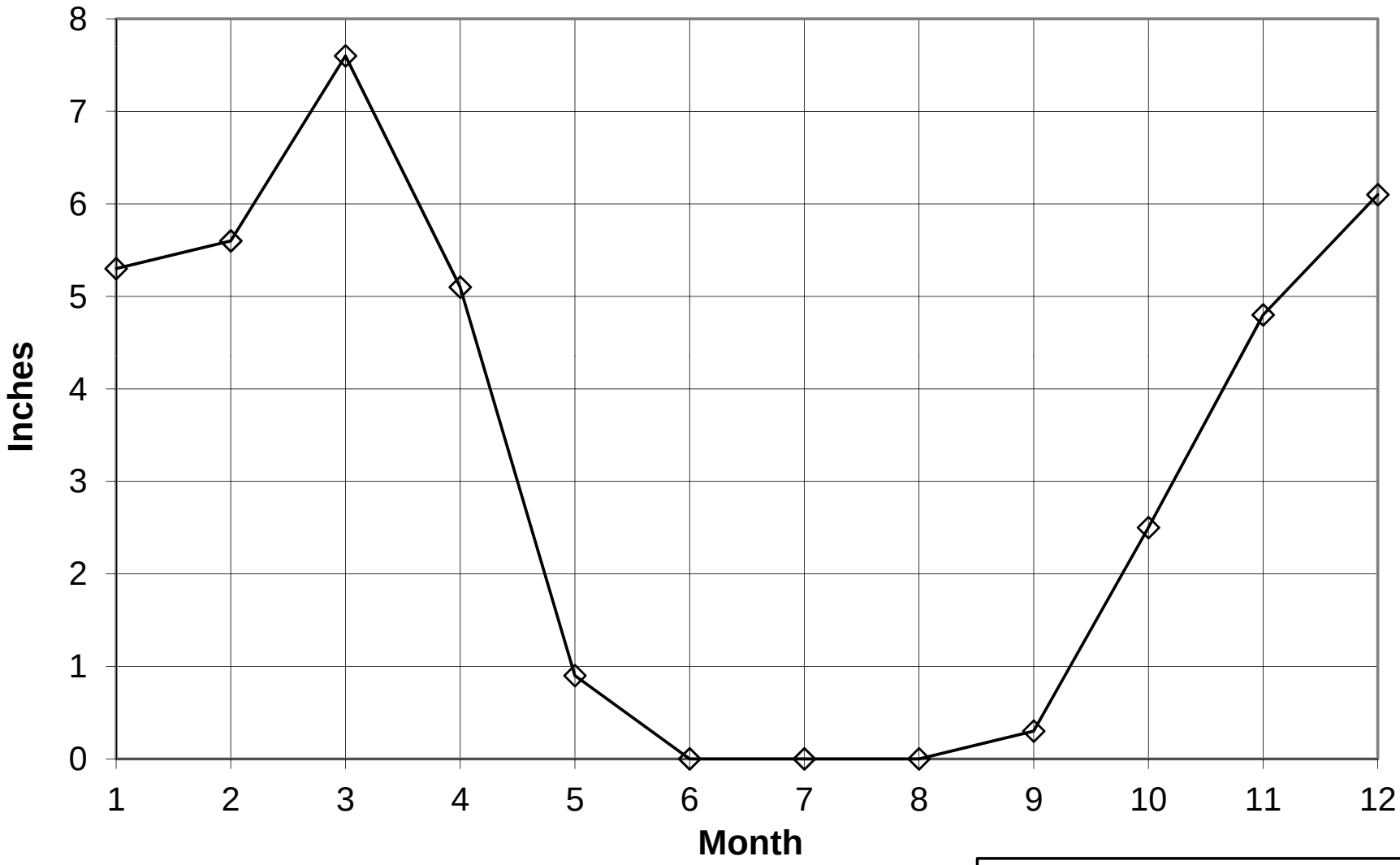

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FIGURE 2.5-10
SCOTTSBLUFF AP
MONTHLY SNOWFALL

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source: High Plains Regional Climate Data Center, 2011, hourly data from 1893 through 2010.

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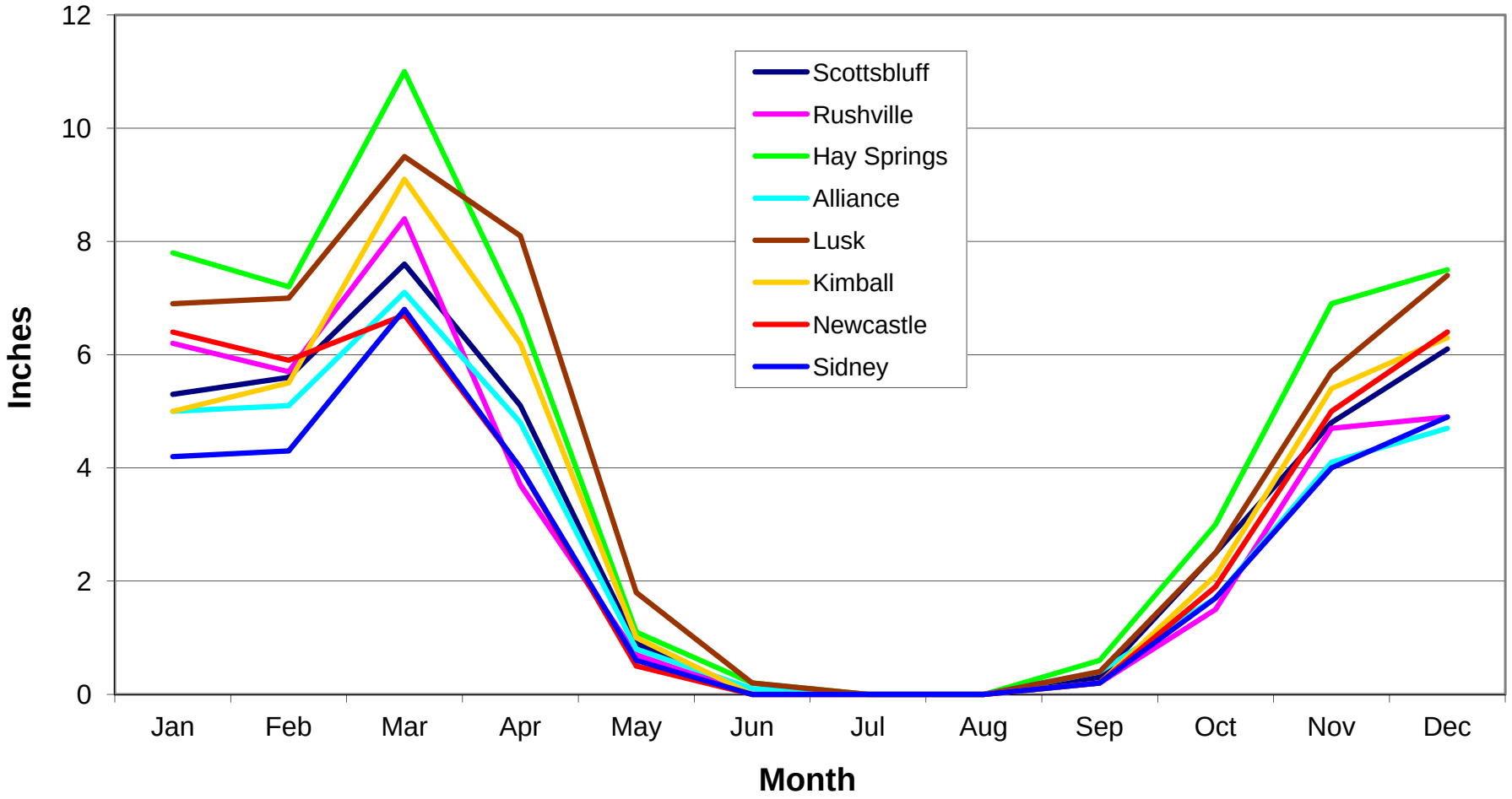
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorNTR Figure 2_5-10 Scottsbluff AP Monthly Snowfall.ai @ 11/08/2011



Source: National Climate Data Center, 2011.

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FIGURE 2.5-11
REGIONAL
MONTHLY AVERAGE SNOWFALL

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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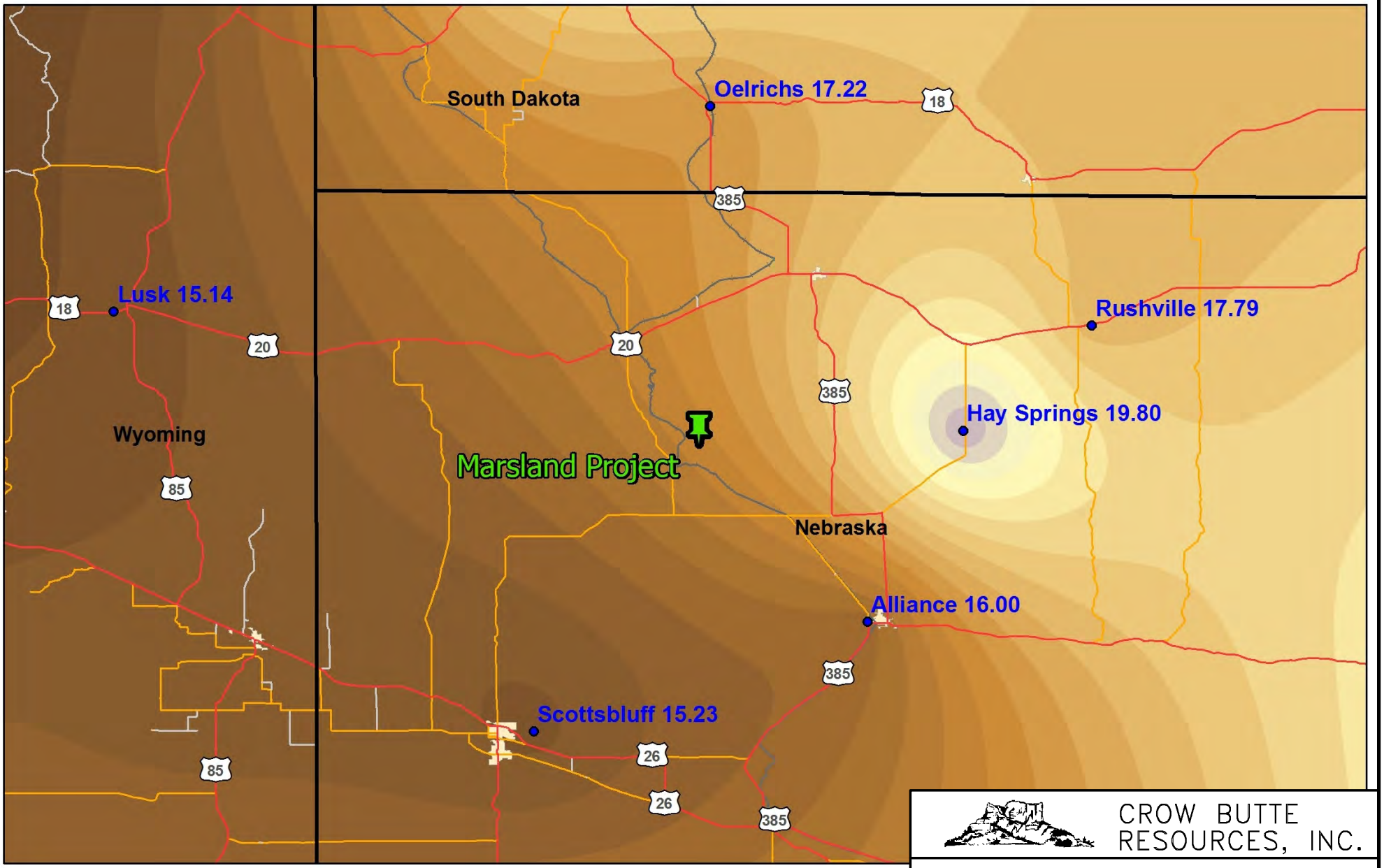
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorNTR Figure 2_5-11 Regional Monthly Average Snowfall.ai @ 11/08/2011



Source: Inter-Mountain Lab (IML) Air Science, 2011

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FIGURE 2.5-12
REGIONAL ANNUAL AVERAGE PRECIPITATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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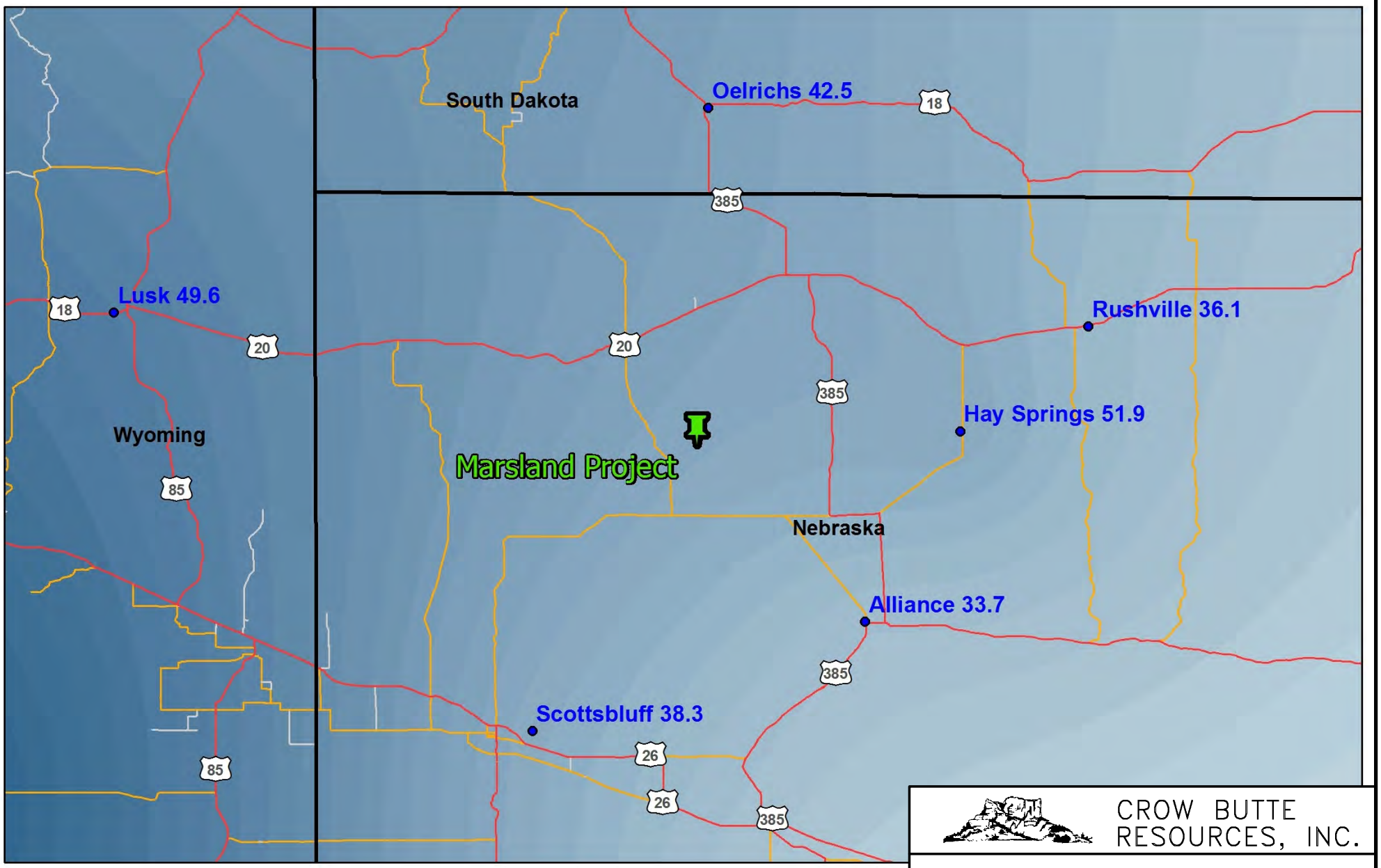
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-12 Regional Annual Average Precipitation.ai @ 10/17/2011



Source: Inter-Mountain Lab (IML) Air Science, 2011

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FIGURE 2.5-13
REGIONAL ANNUAL AVERAGE SNOWFALL

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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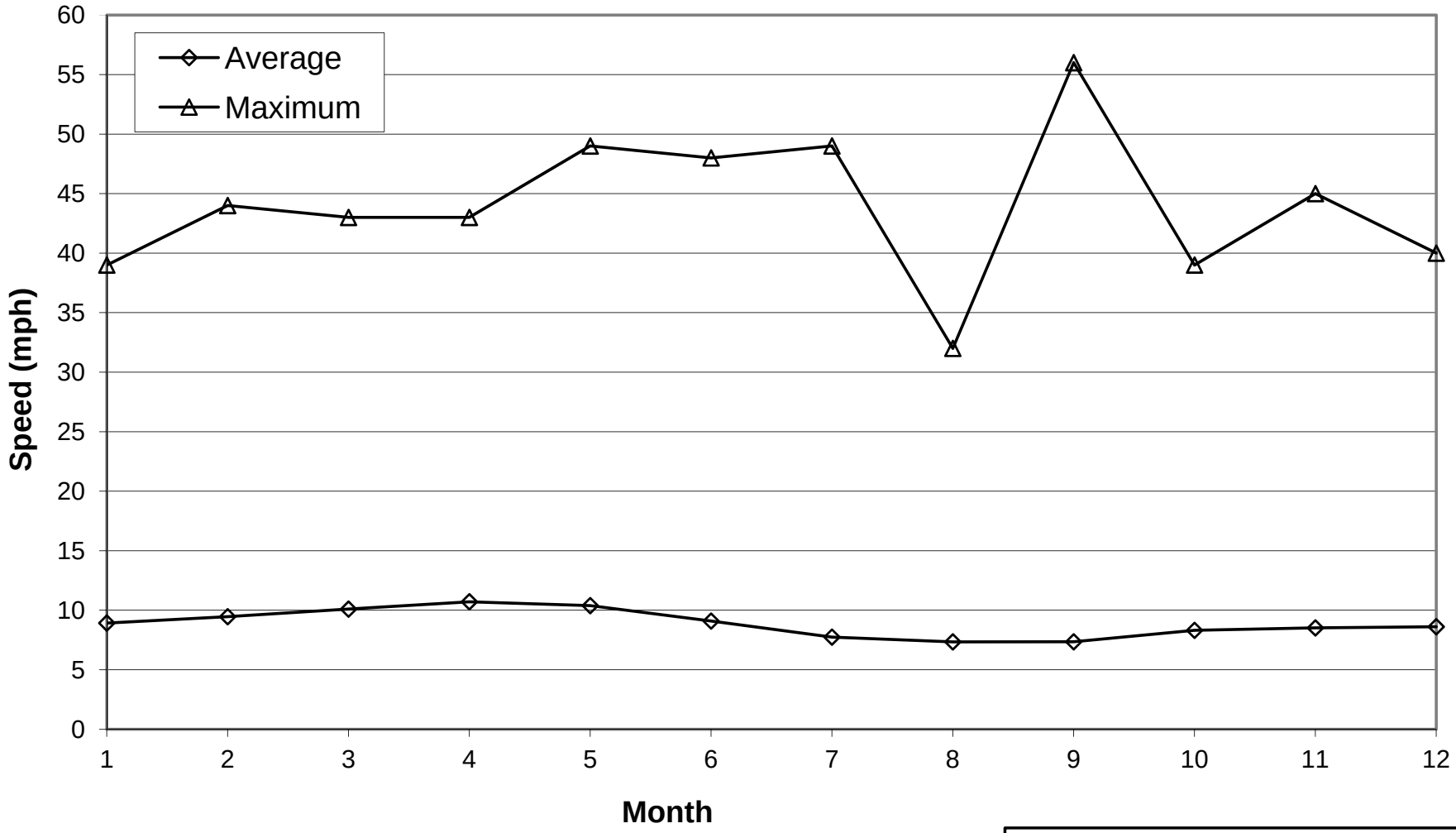
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-13 Regional Annual Average Snowfall.ai @ 10/17/2011



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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FIGURE 2.5-14
SCOTTSBLUFF AP
15-YEAR WIND SPEEDS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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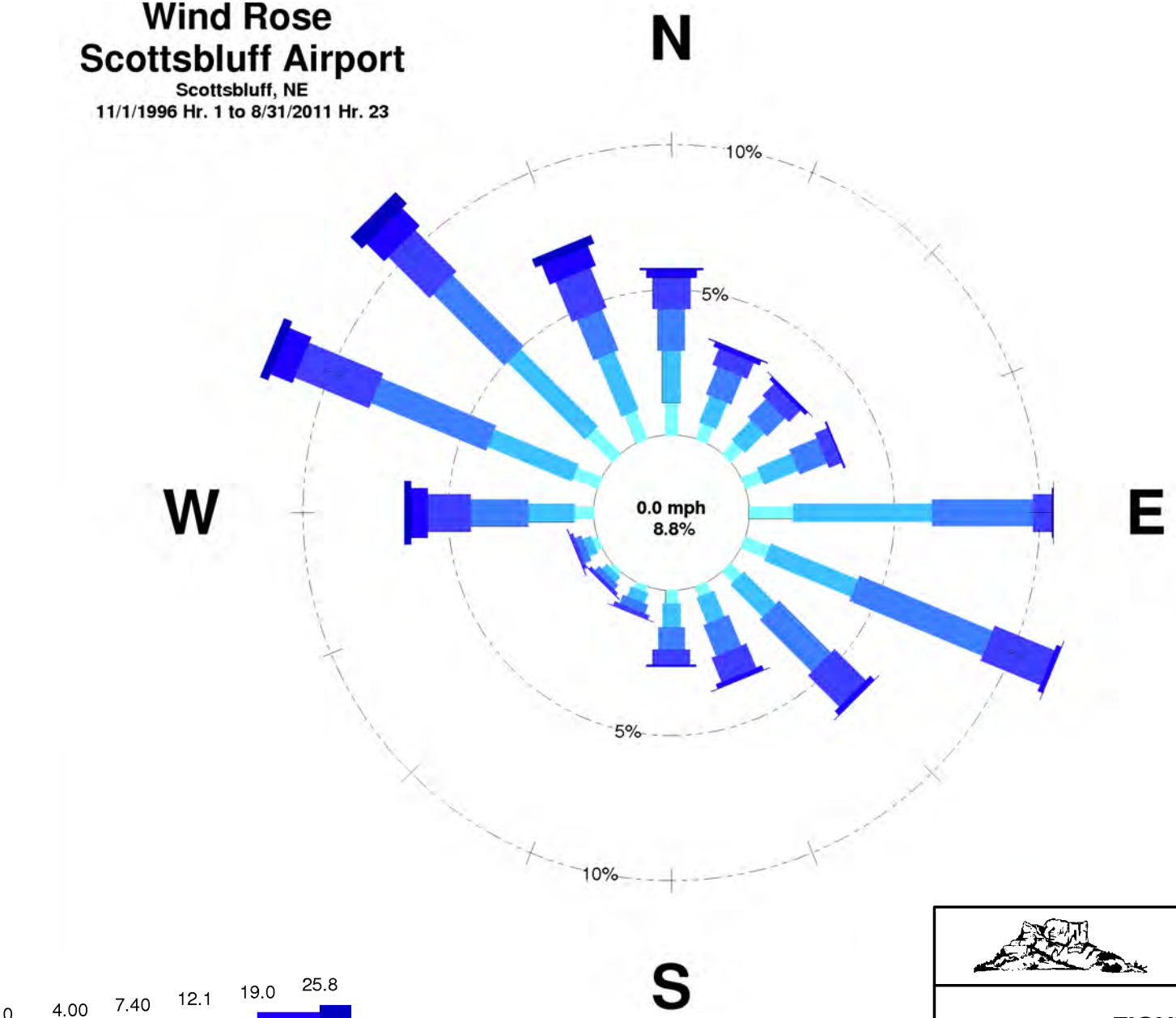
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-14 Scottsbluff 15-Year Wind Speeds.ai @ 11/08/2011

Wind Rose
Scottsbluff Airport

Scottsbluff, NE
11/1/1996 Hr. 1 to 8/31/2011 Hr. 23



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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FIGURE 2.5-15
SCOTTSBLUFF AP
15-YEAR WIND ROSE

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-15 Scottsbluff AP 15-Year Wind Rose.ai @ 10/17/2011

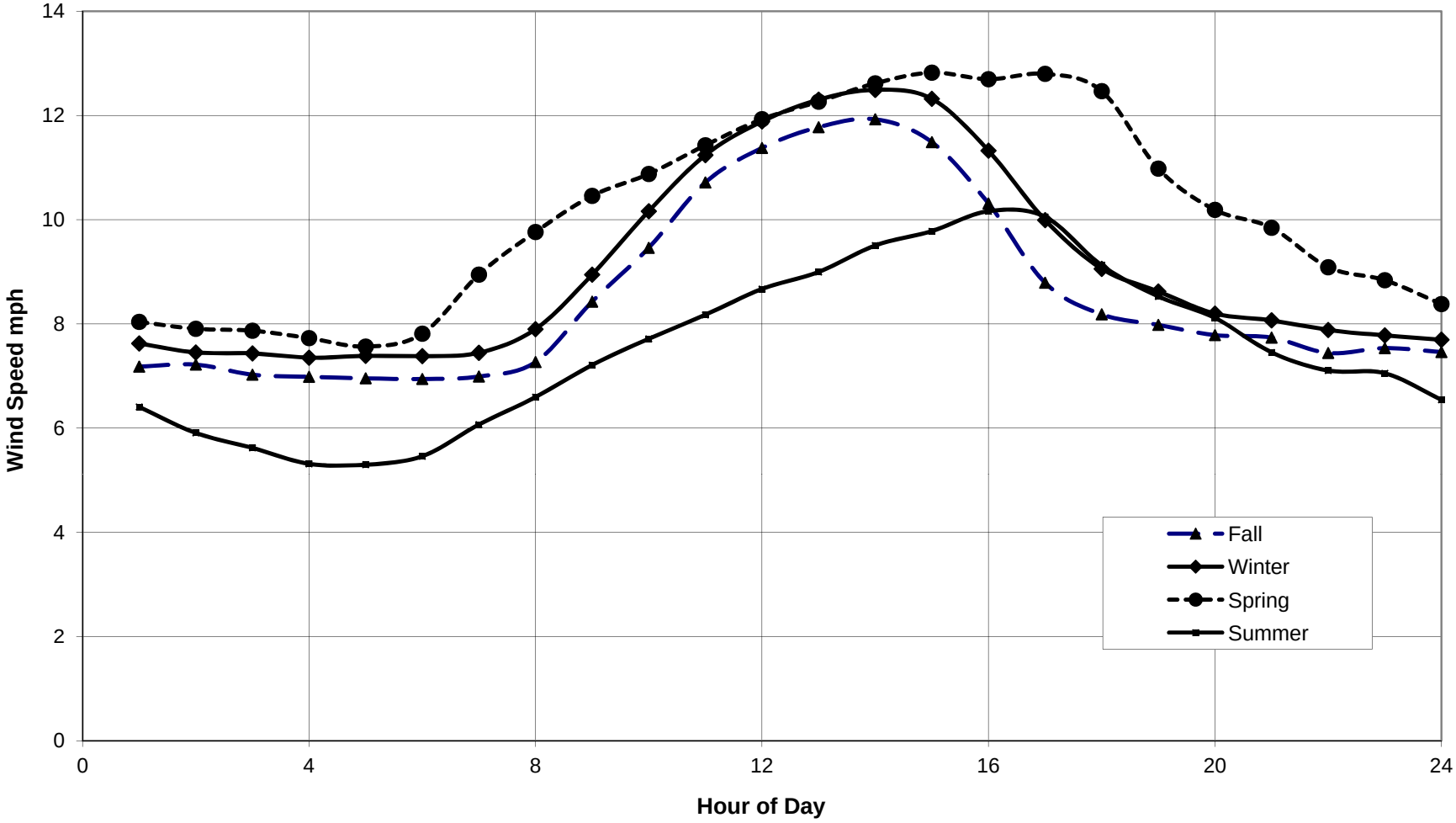

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FIGURE 2.5-16
SCOTTSBLUFF AP
DIURNAL WIND SPEEDS BY SEASON

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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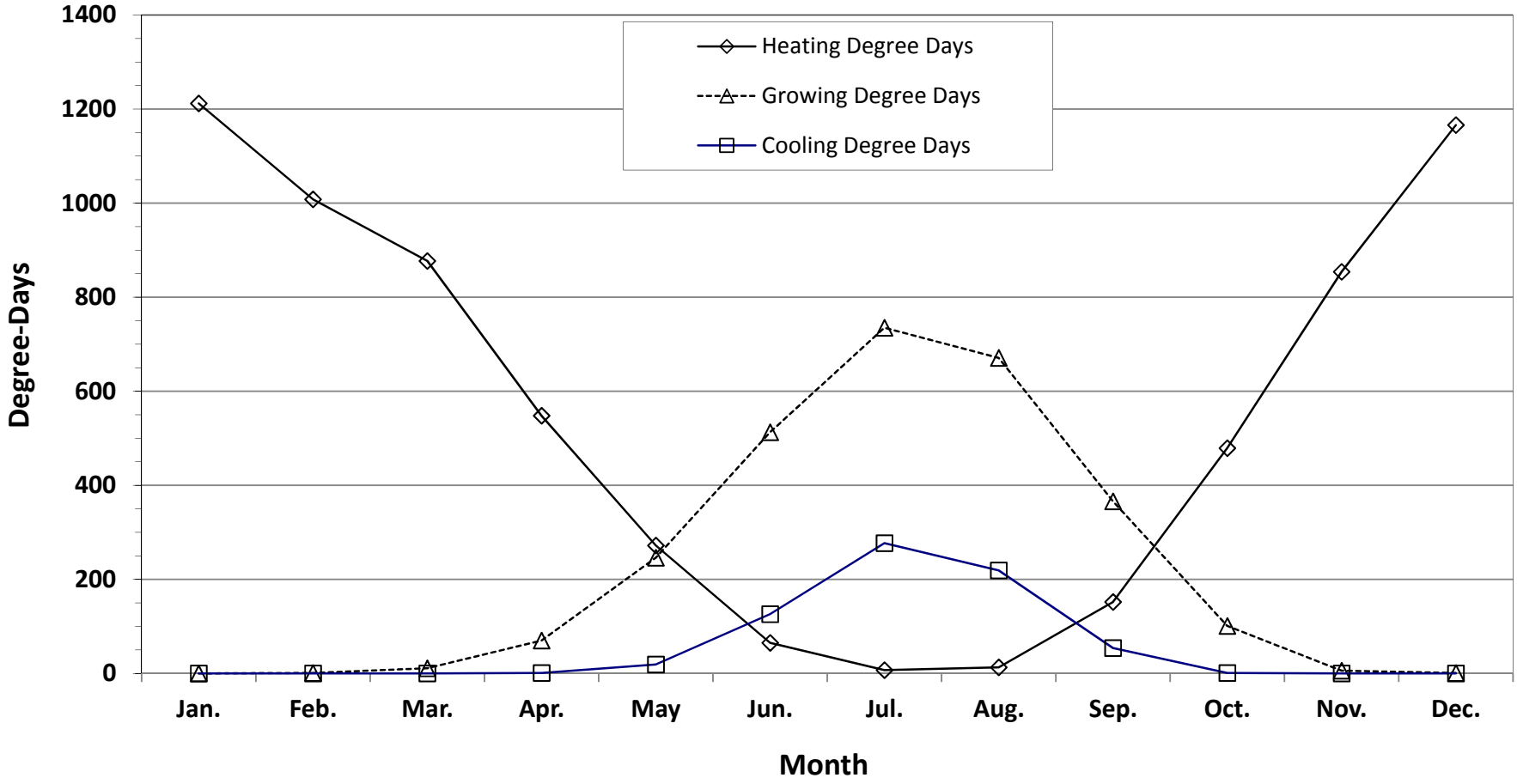
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-16 Scottsbluff AP Diurnal Wind Speeds by Season.ai @ 11/08/2011



Source: High Plains Regional Climate Data Center, 2011, data from 1893 through 2010.

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FIGURE 2.5-17
SCOTTSBLUFF AP
COOLING, HEATING, AND GROWING DEGREE DAYS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-17 Scottsbluff AP Cooling Heating and Growing Degree Days.ai @ 11/08/2011

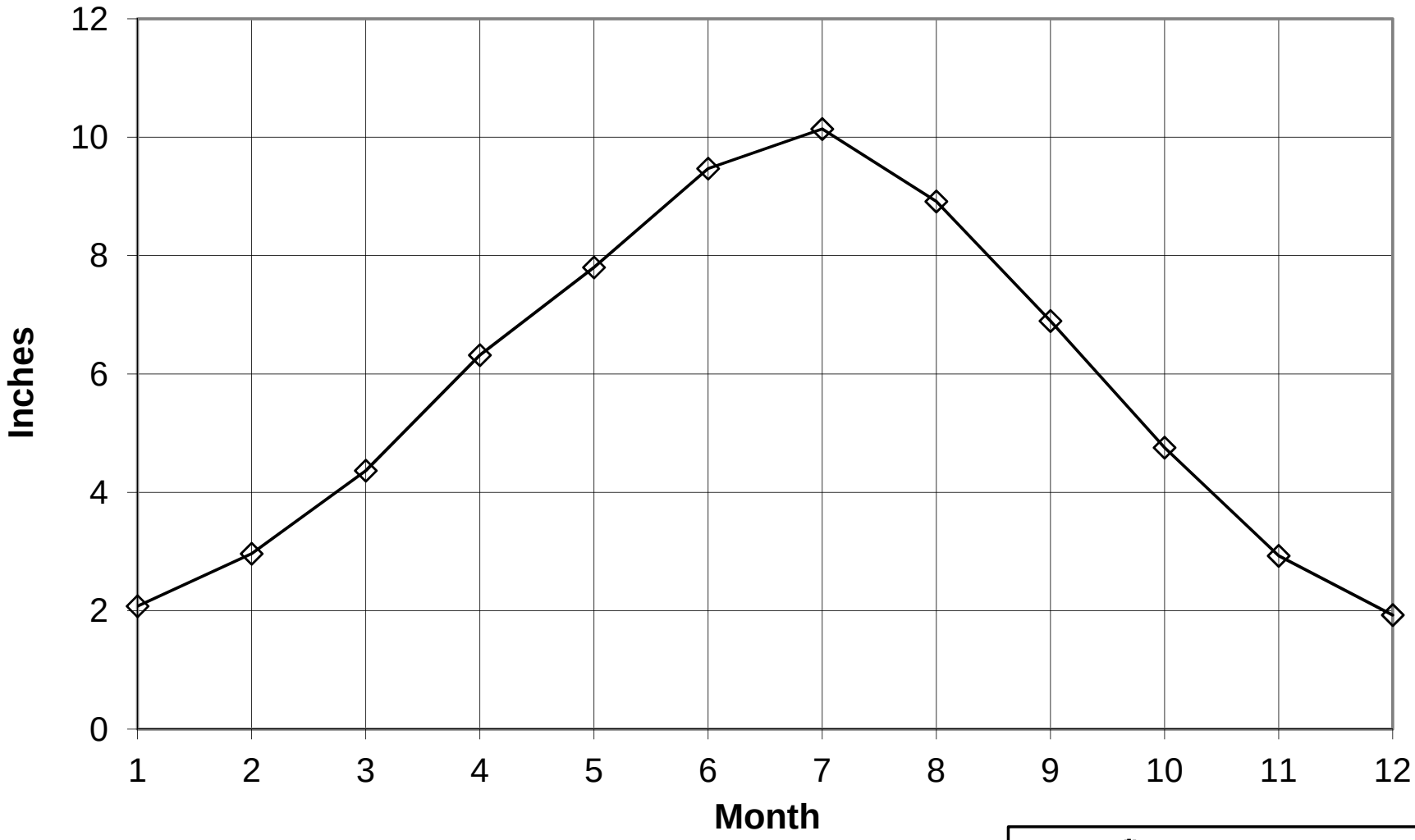

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FIGURE 2.5-18
SCOTTSBLUFF AP
POTENTIAL EVAPOTRANSPIRATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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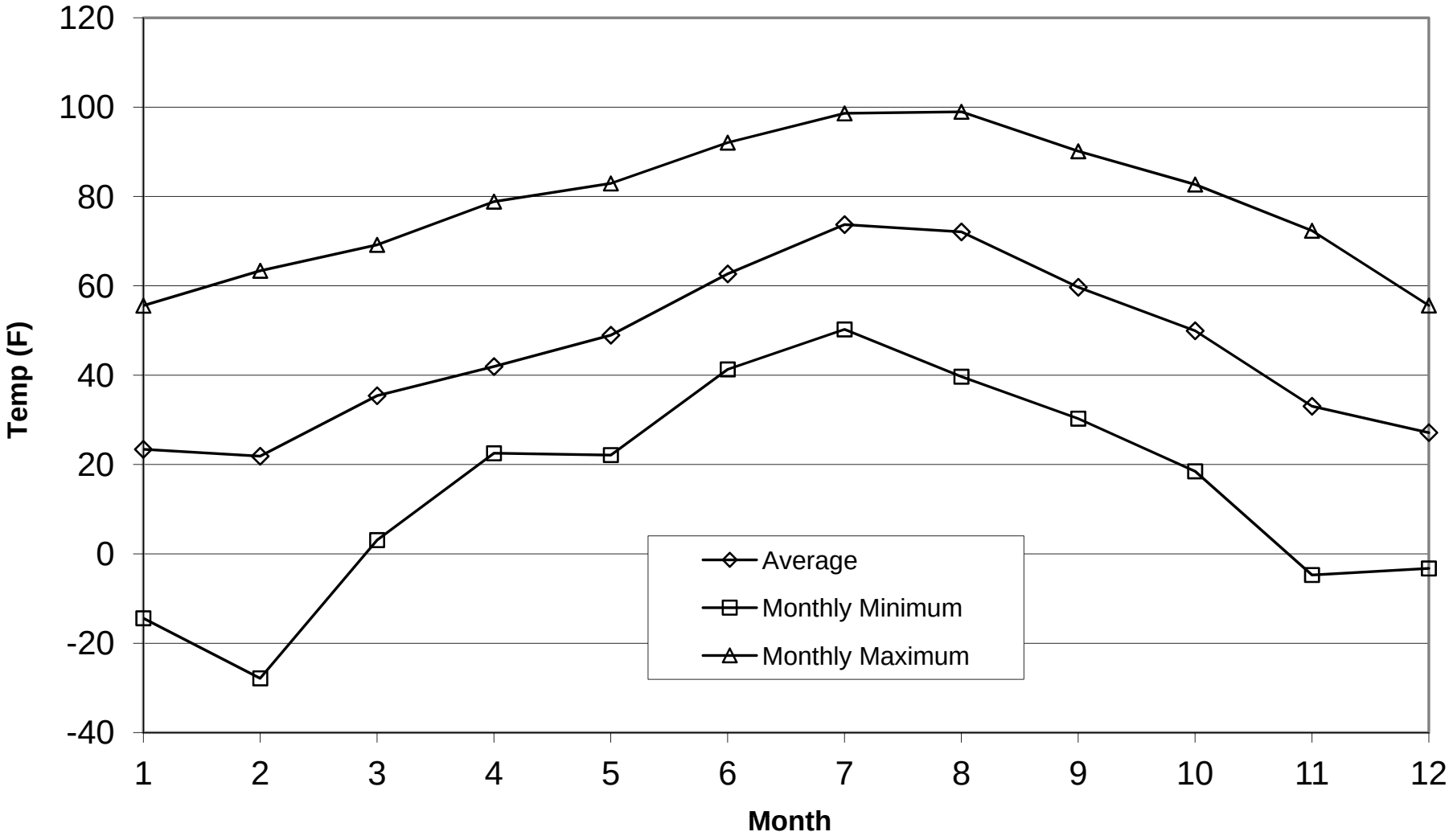
Source: Calculation based on Penman Equation.

K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-18 Scottsbluff AP Potential Evapotranspiration.ai @ 11/08/2011



Source: Cameco Resources, 2011, data from 8/24/2010 to 8/29/2011.

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-19
MARSLAND EXPANSION AREA
MONTHLY TEMPERATURES

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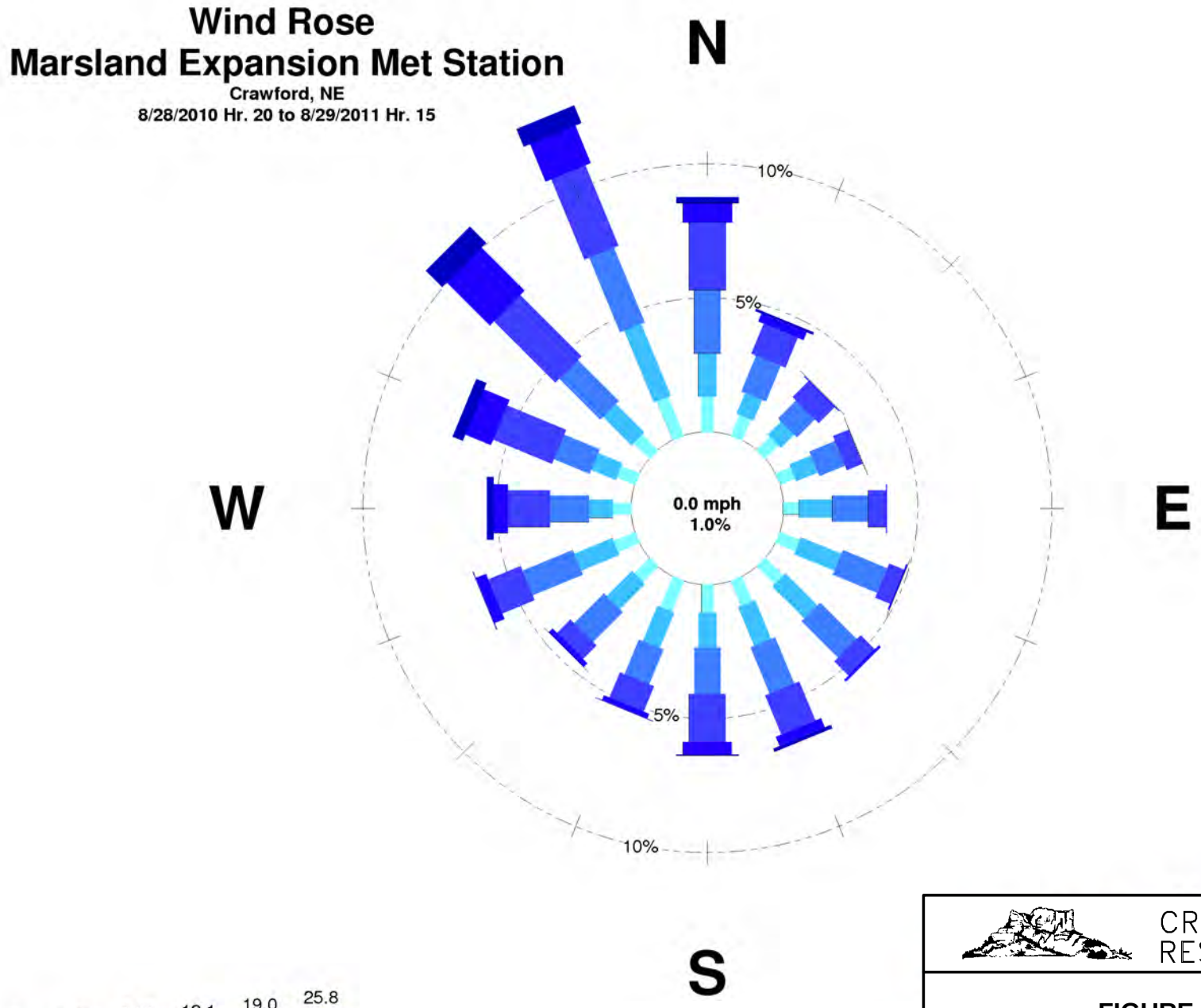
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-19 MEA Monthly Temp.ai @ 11/08/2011



Source: Inter-Mountain Lab (IML) Air Science, 2011.

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FIGURE 2.5-20
MARSLAND EXPANSION AREA
WIND ROSE

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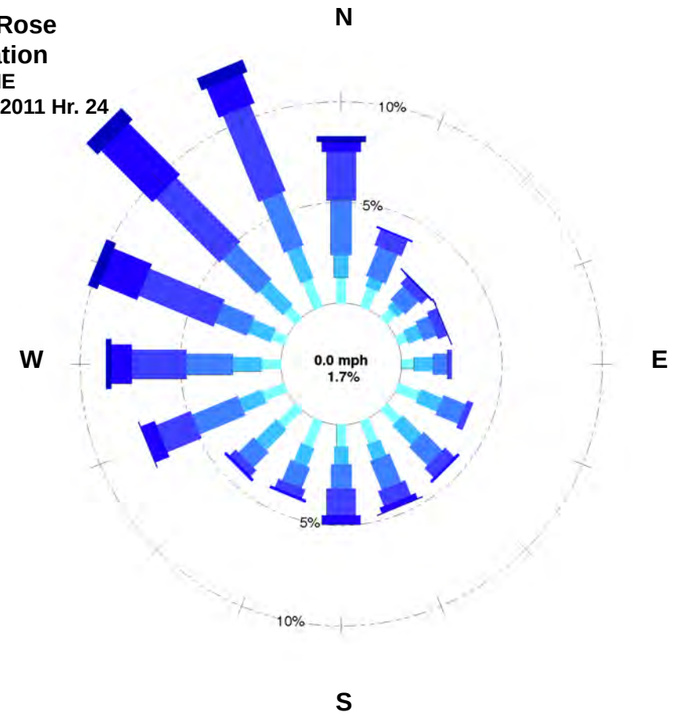
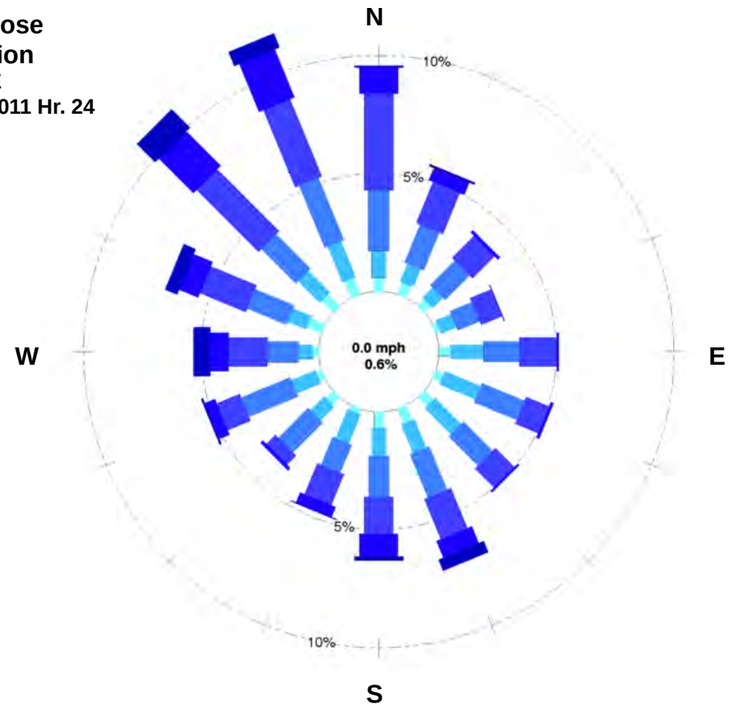
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-20 Marsland Expansion Area Wind Rose.ai @ 10/17/2011

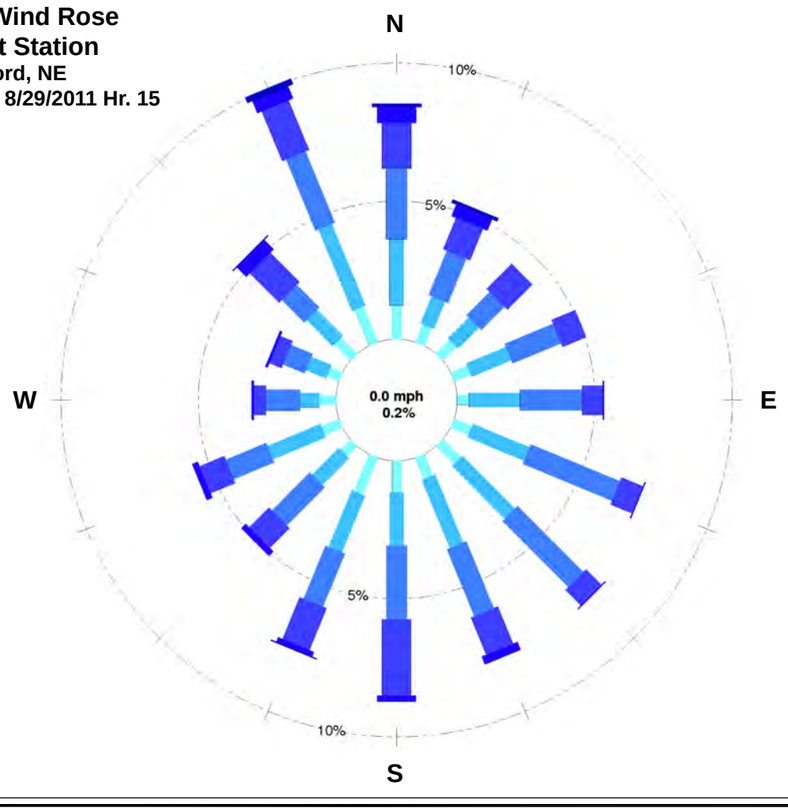
Winter Wind Rose
MEA Met Station
Crawford, NE
1/1/2011 Hr. 1 to 3/31/2011 Hr. 24



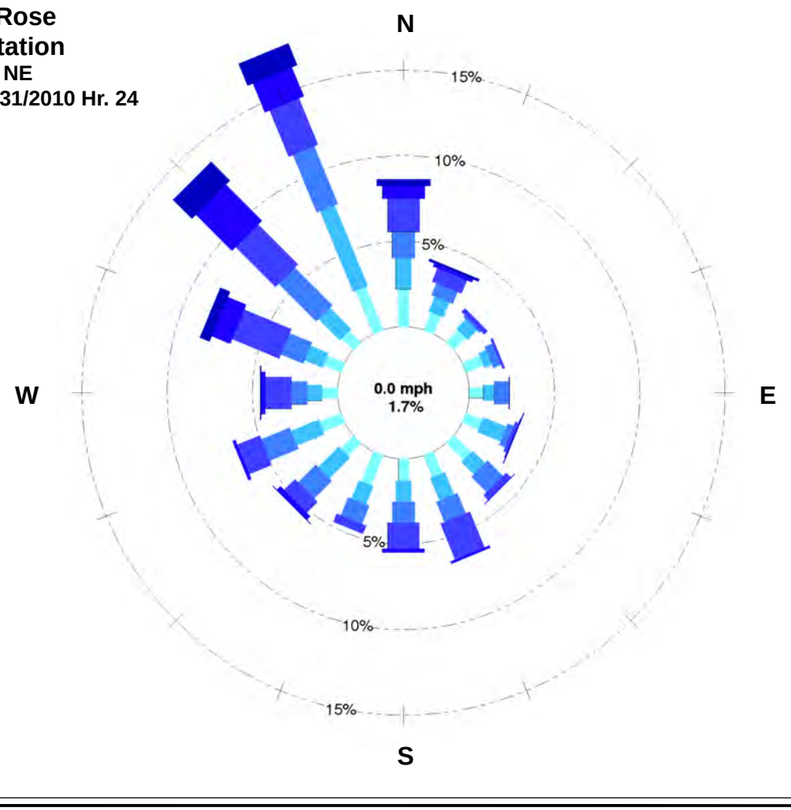
Spring Wind Rose
MEA Met Station
Crawford, NE
4/1/2011 Hr. 1 to 6/30/2011 Hr. 24



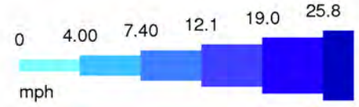
Summer Wind Rose
MEA Met Station
Crawford, NE
9/7/2010 Hr. 8 to 8/29/2011 Hr. 15



Fall Wind Rose
MEA Met Station
Crawford, NE
10/1/2010 Hr. 1 to 12/31/2010 Hr. 24



Note: The "summer" wind rose represents the 3rd calendar quarter, which includes July, August and September. Because the monitoring year spans parts of two calendar years, the summer wind rose software program utilized all of the available summer data from both years. This turned out to be September of 2010 (beginning with the 7th), July of 2011, and August of 2011 (up to the 29th). So the summer months are extracted from the stated date range.



Source:
Inter-Mountain Lab (IML) Air Science, 2011

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FIGURE 2.5-21
MARSLAND EXPANSION AREA
SEASONAL WIND ROSES

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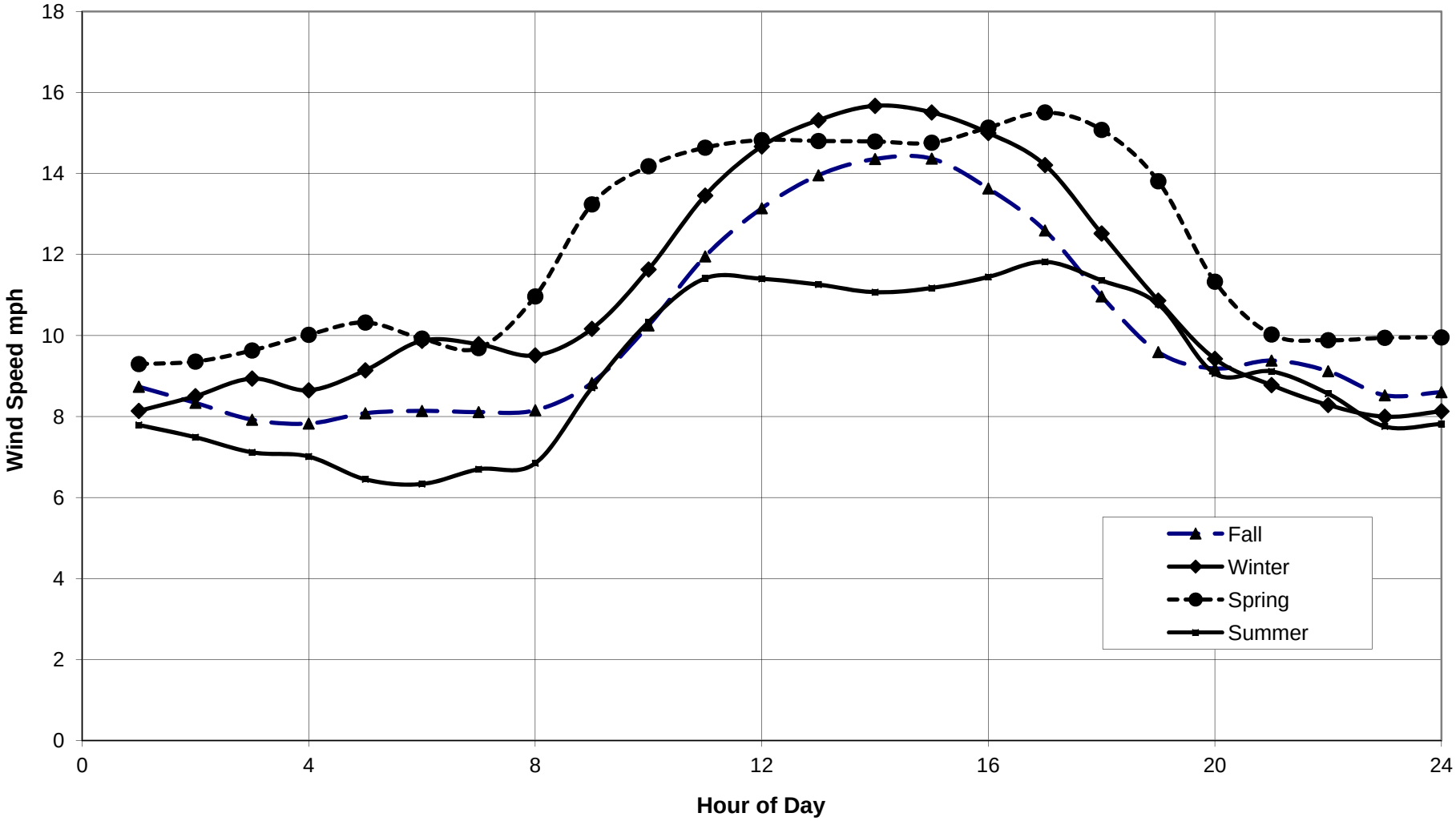
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-21 Marsland Expansion Area Seasonal Wind Roses_11x17.ai @ 10/17/2011



Source: Cameco Resources, 2011, data from 8/24/2010 to 8/29/2011.

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FIGURE 2.5-22
MARSLAND EXPANSION AREA
DIURNAL WIND SPEEDS

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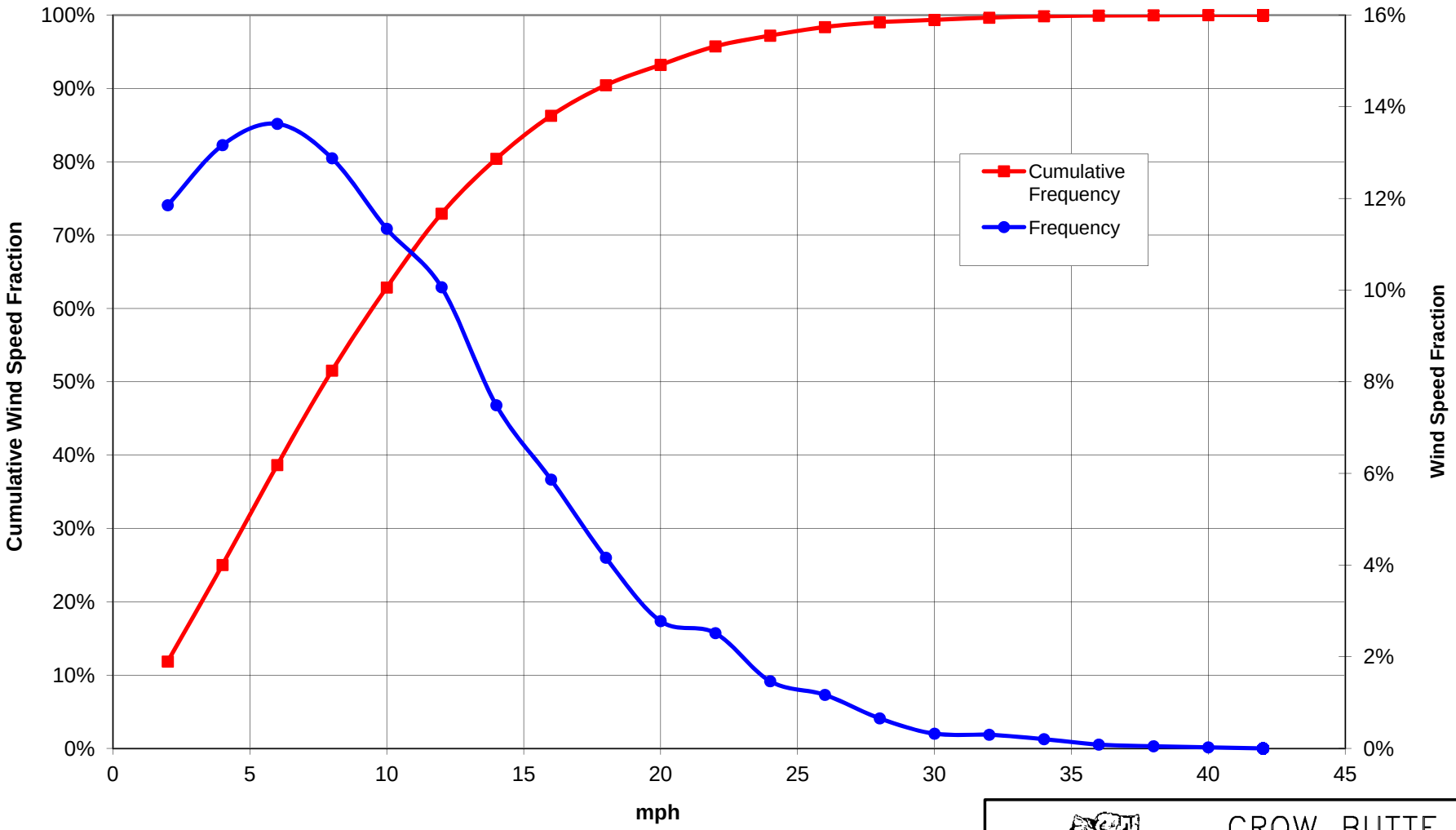

Source: Cameco Resources, 2011, data from 8/24/2010 to 8/29/2011.

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-23
MARSLAND EXPANSION AREA
WIND SPEED DISTRIBUTION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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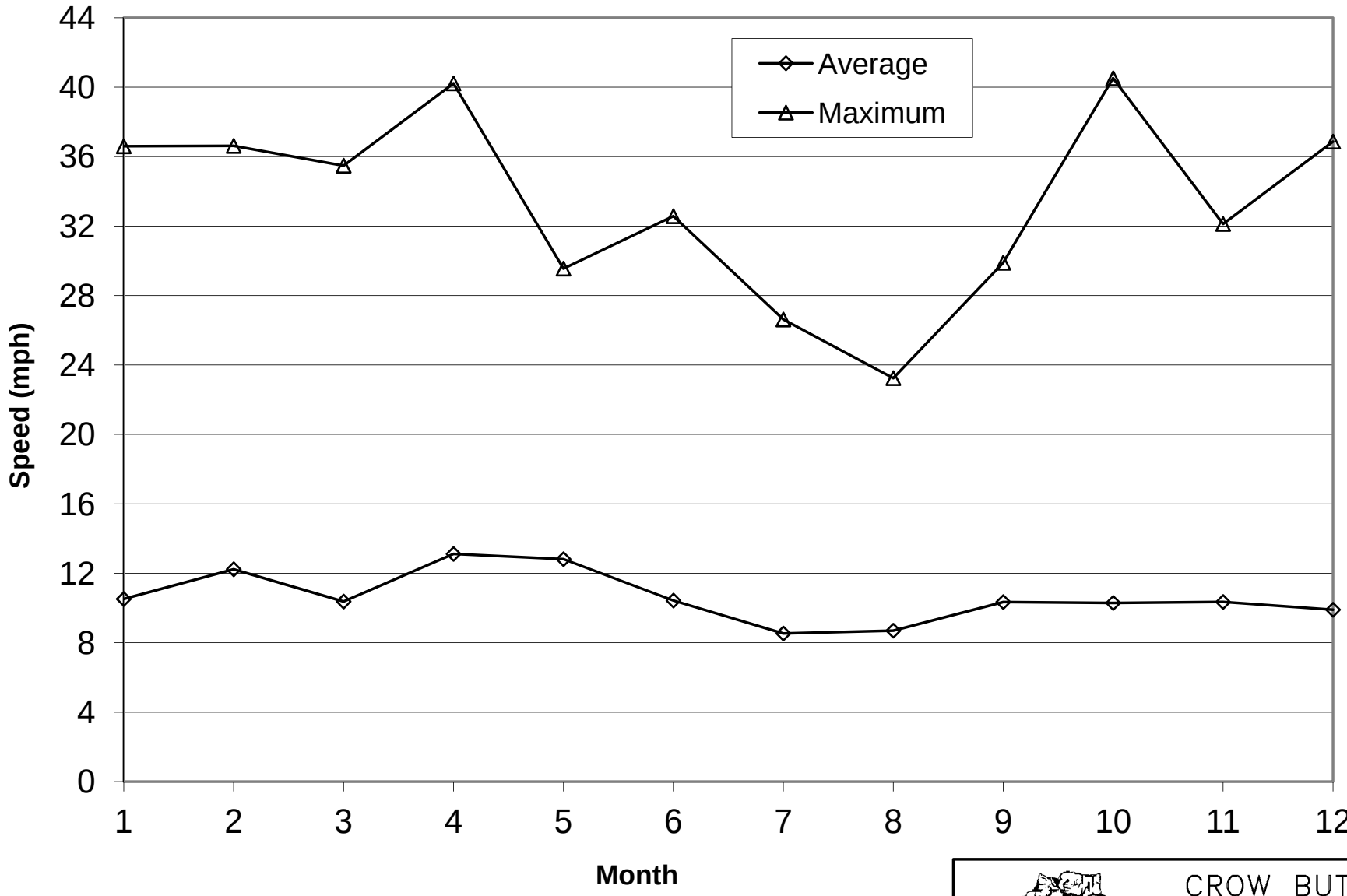
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-23 MEA Wind Speed Distribution.ai @ 11/08/2011



CROW BUTTE RESOURCES, INC.

FIGURE 2.5-24
PROJECT AREA
MONTHLY AVERAGE WIND SPEEDS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source: Cameco Resources, 2011, data from 8/24/2010 to 8/29/2011.

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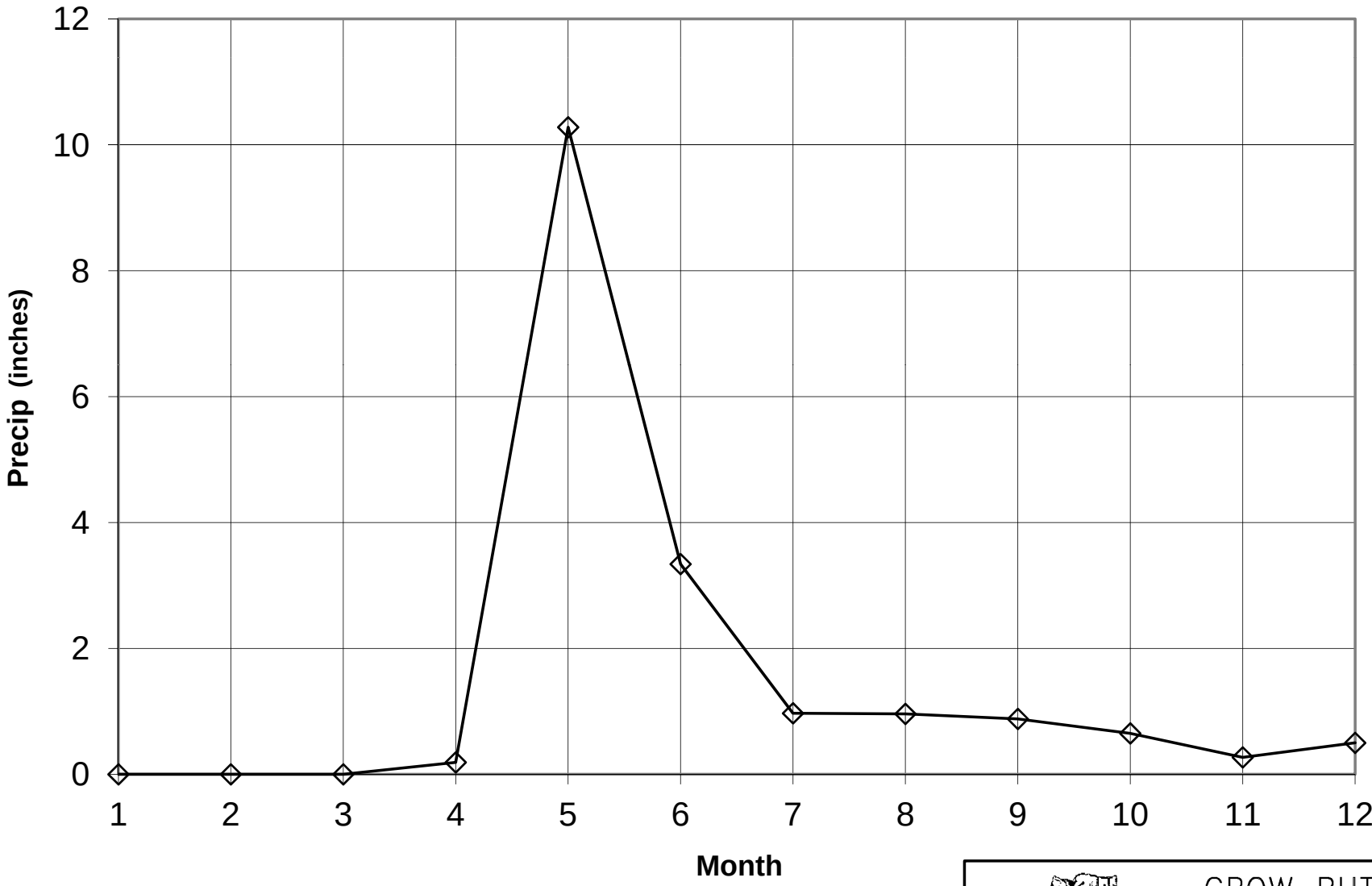

CROW BUTTE RESOURCES, INC.

FIGURE 2.5-25
MARSLAND EXPANSION AREA
TOTAL MONTHLY PRECIPITATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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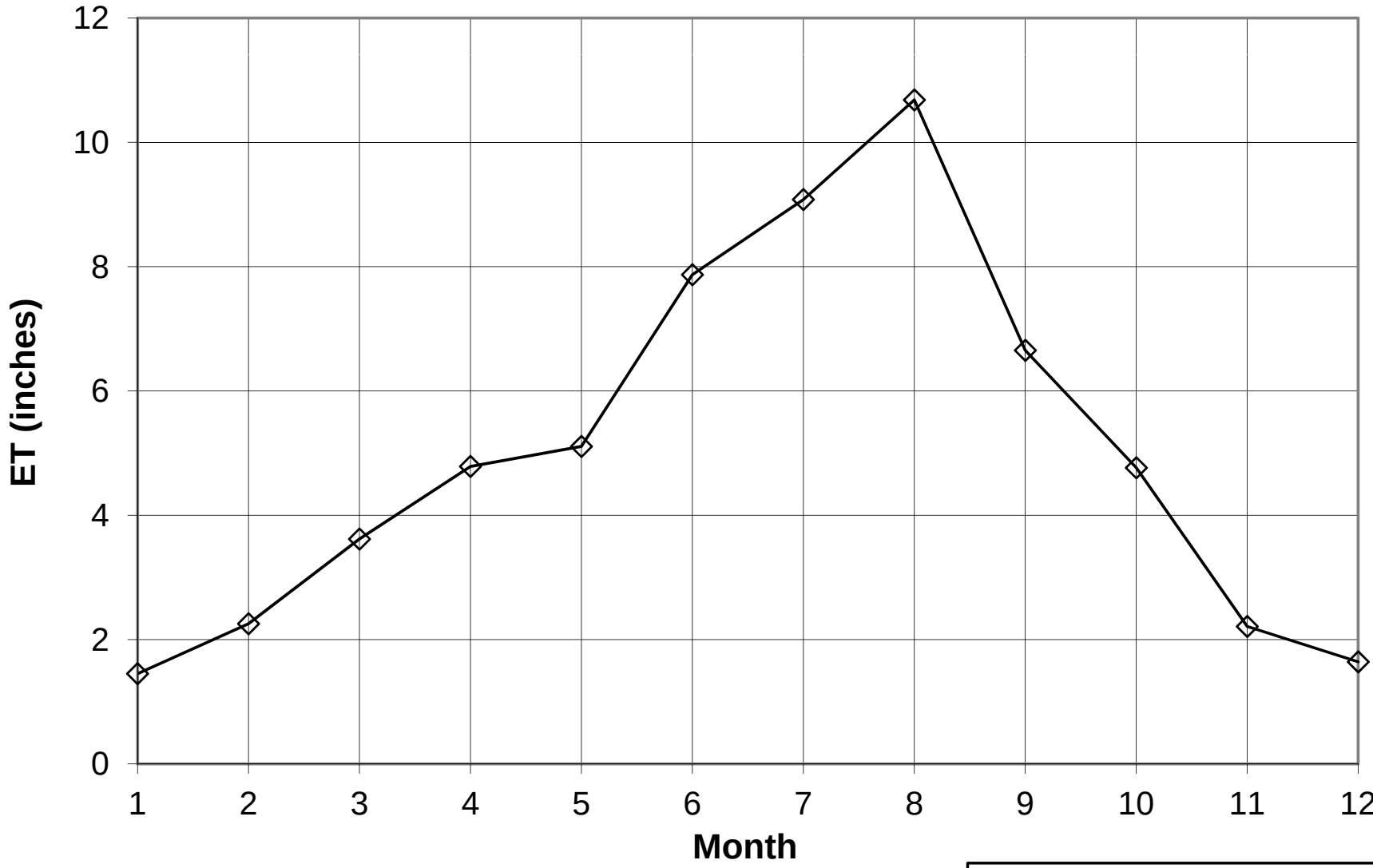
Source: Cameco Resources, 2011, data from 8/24/2010 to 8/29/2011.

K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorNTR Figure 2_5-25 MEA Monthly Precipitation.ai @ 07/18/2013



CROW BUTTE RESOURCES, INC.

FIGURE 2.5-26
MARSLAND EXPANSION AREA
POTENTIAL MONTHLY
EVAPOTRANSPIRATION

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

Source:
Calculation based on Penman Equation, from data supplied by Cameco Resources, from 8/24/2010 to 8/29/2011.

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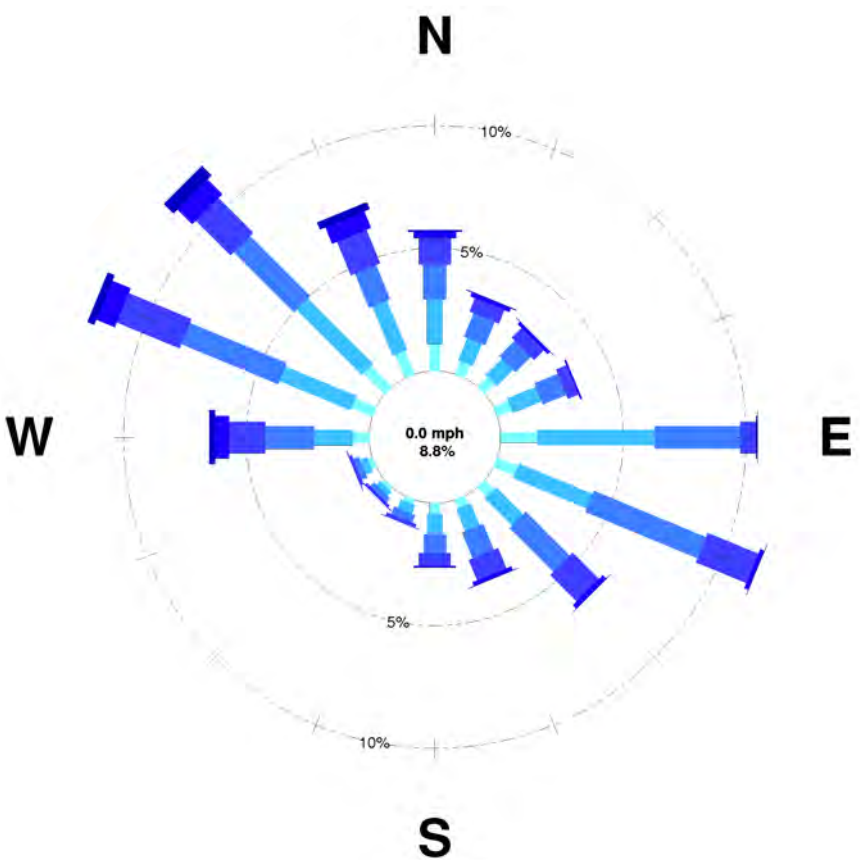
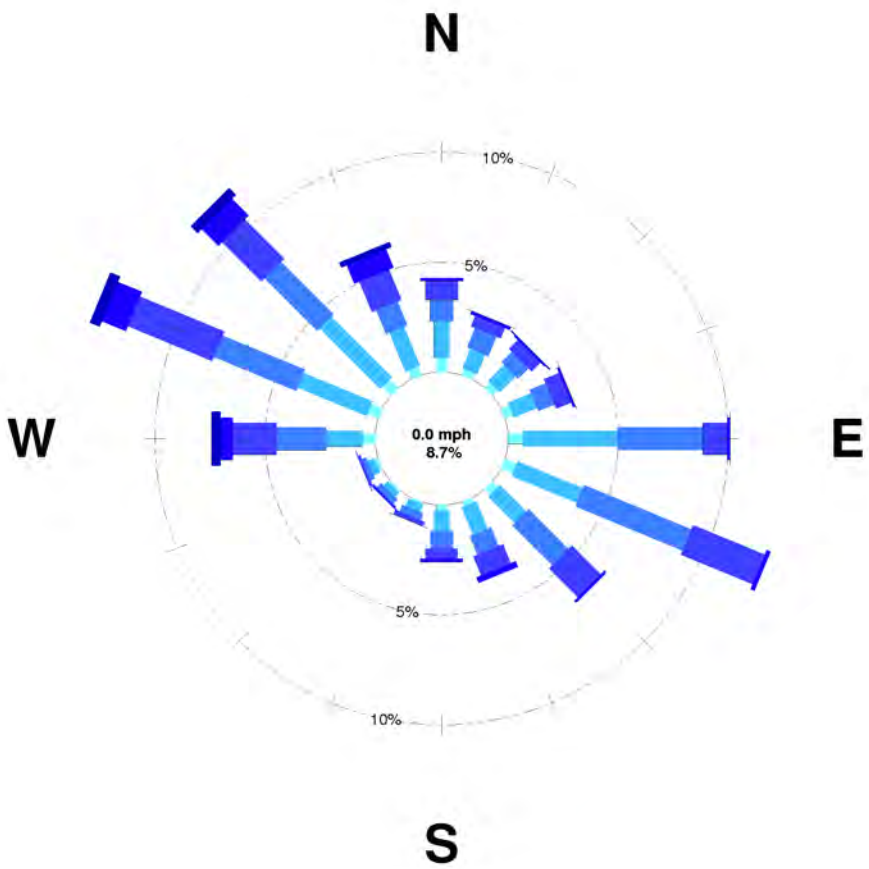
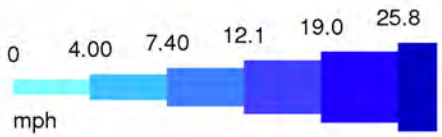
Wind Rose
Scottsbluff Airport
Scottsbluff, NE
11/1/1996 Hr. 1 to 8/31/2011 Hr. 23



Wind Rose
Scottsbluff Airport
Scottsbluff, NE
8/24/2010 Hr. 2 to 8/29/2011 Hr. 15





Source: Inter-Mountain Lab (IML) Air Science, 2011

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FIGURE 2.5-27
SCOTTSBLUFF 15-YEAR vs
BASELINE YEAR WIND ROSES

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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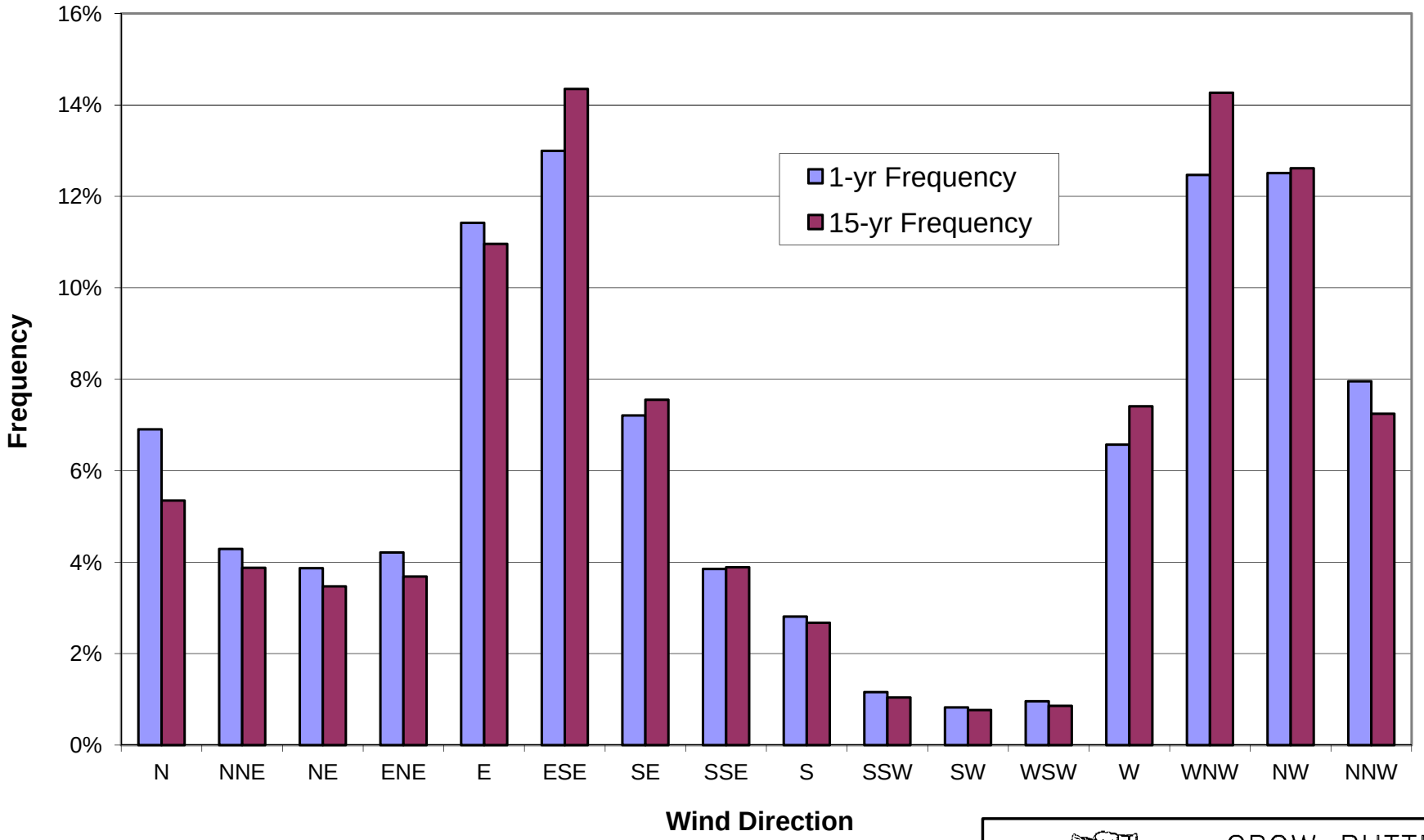
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-27 Scottsbluff 15-Year vs Baseline Year Wind Roses.ai @ 10/17/2011

Scottsbluff Airport Wind Direction Distribution



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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FIGURE 2.5-28
SCOTTSBLUFF 15-YEAR VS BASELINE YEAR WIND DIRECTIONS

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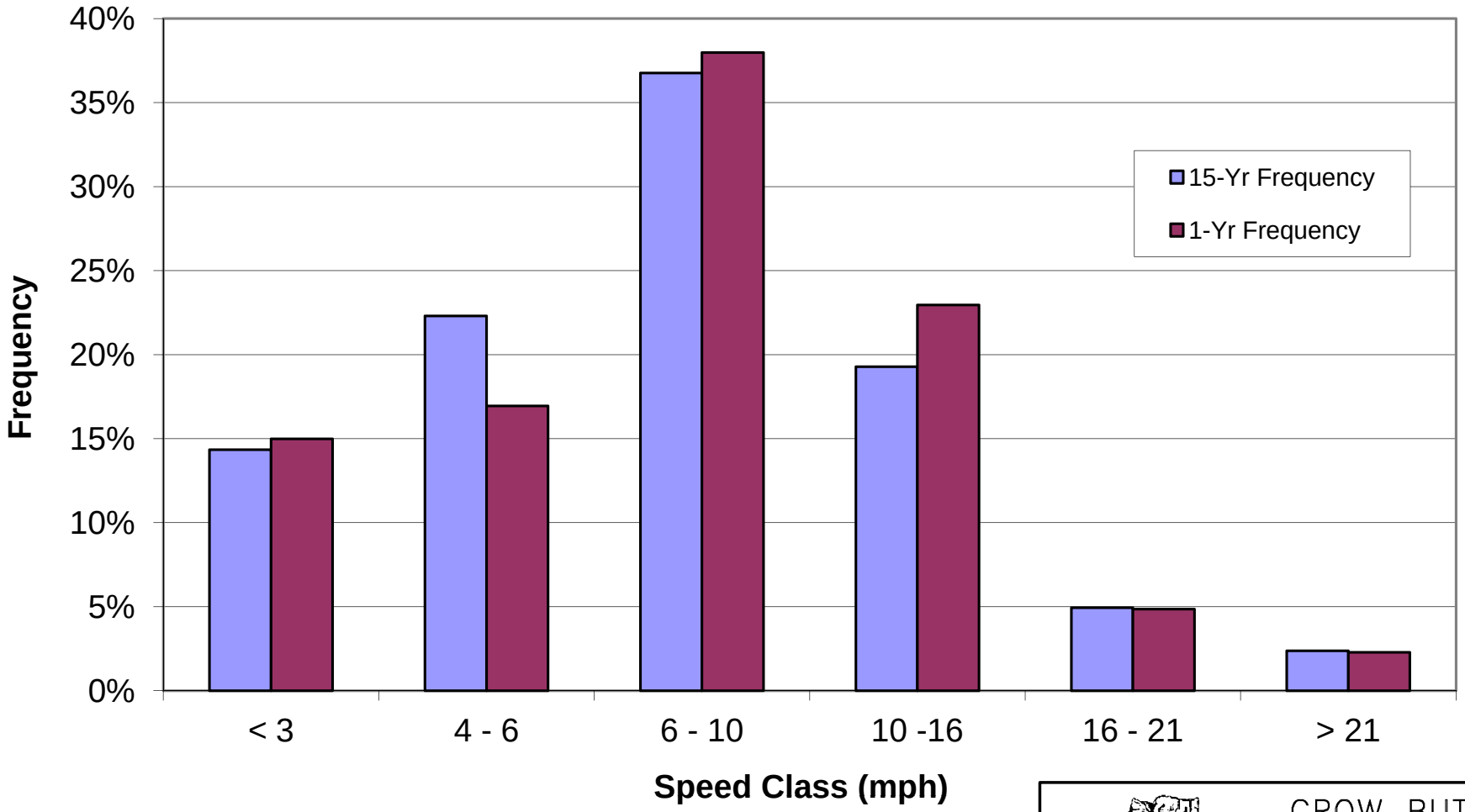
Scottsbluff Airport Wind Speed Distribution



Source: National Climate Data Center, 2011, hourly data from 1996 through 2011.

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FIGURE 2.5-29
SCOTTSBLUFF 15-YEAR VS BASELINE YEAR WIND SPEEDS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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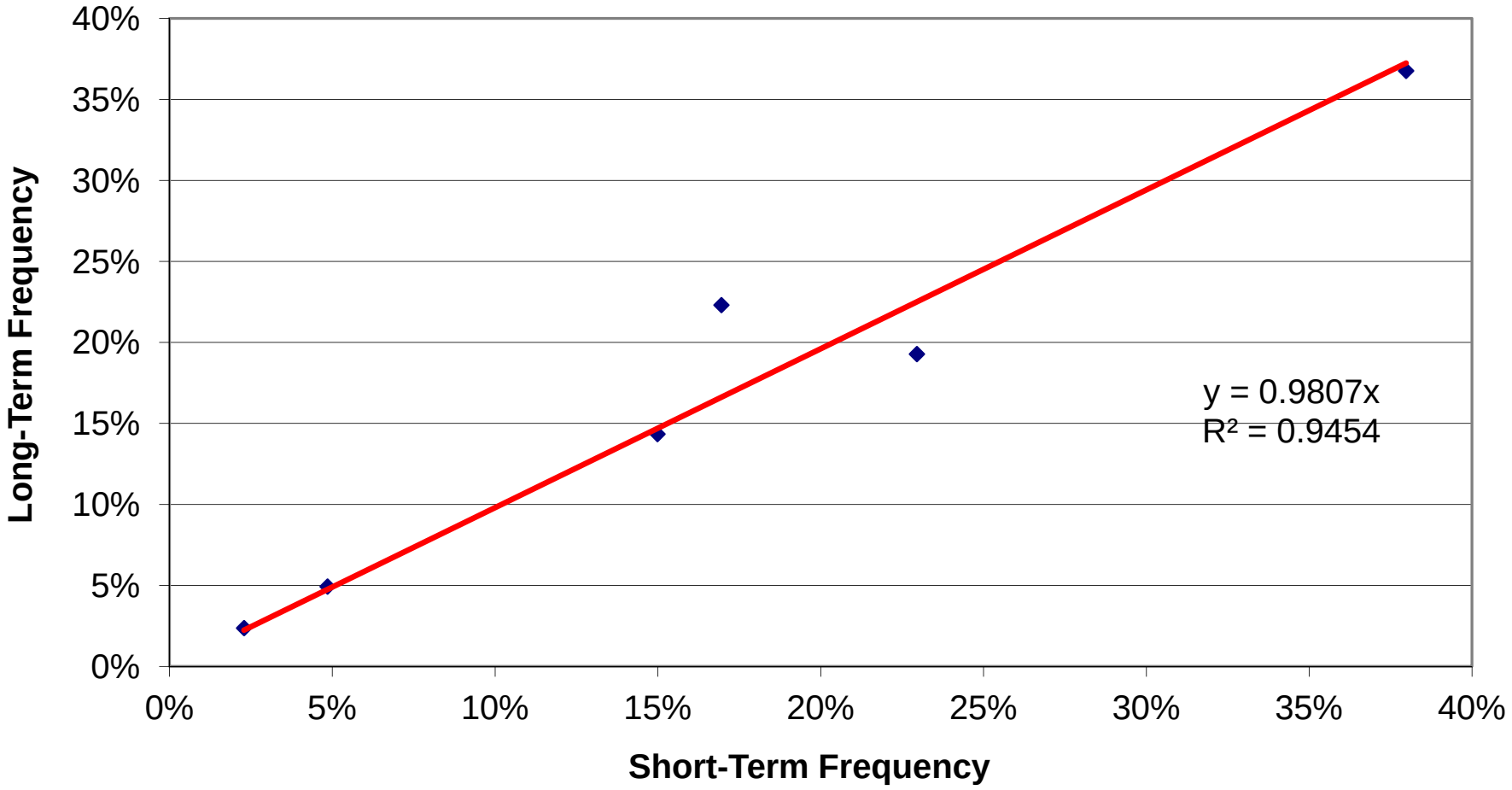
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-29 Scottsbluff 15-Year vs Baseline Year Wind Speeds.ai @ 11/08/2011

Scottsbluff Wind Speeds:
Correlation Between Short and Long Term



Source:
Analysis by IML Air Science using hourly data supplied by National Climate Data Center, from 1996 through 2011.

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FIGURE 2.5-30
SCOTTSBLUFF 15-YEAR
VS BASELINE YEAR
WIND SPEED DISTRIBUTIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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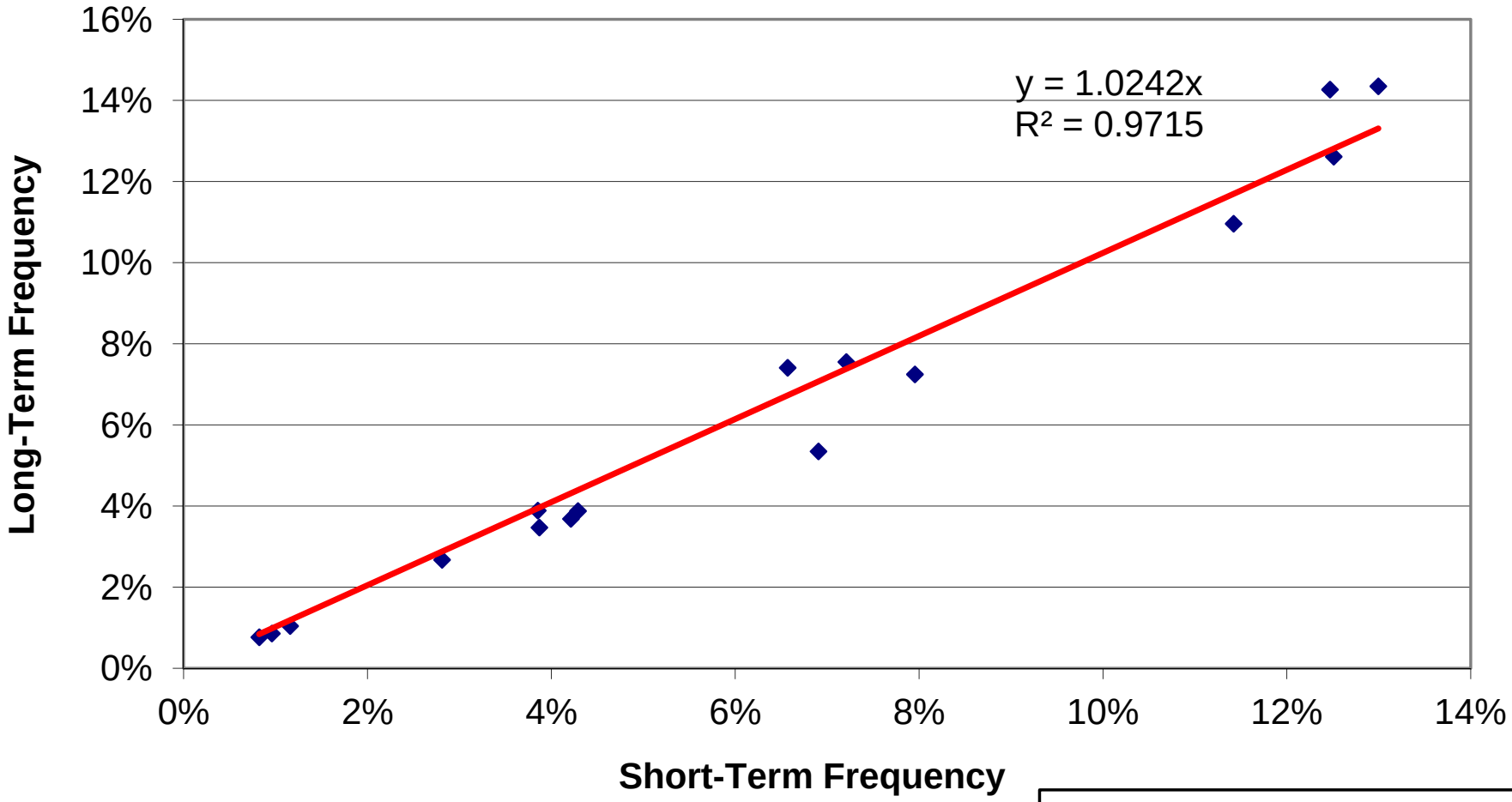
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-30 Scottsbluff 15-Year vs Baseline Year Wind Speed Distributions.ai @ 11/08/2011

Scottsbluff Wind Direction:
Correlation Between Short and Long Term



Source:
Analysis by IML Air Science using hourly data supplied by National Climate Data Center, from 1996 through 2011.

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FIGURE 2.5-31
SCOTTSBLUFF 15-YEAR
VS BASELINE YEAR
WIND DIRECTION DISTRIBUTIONS

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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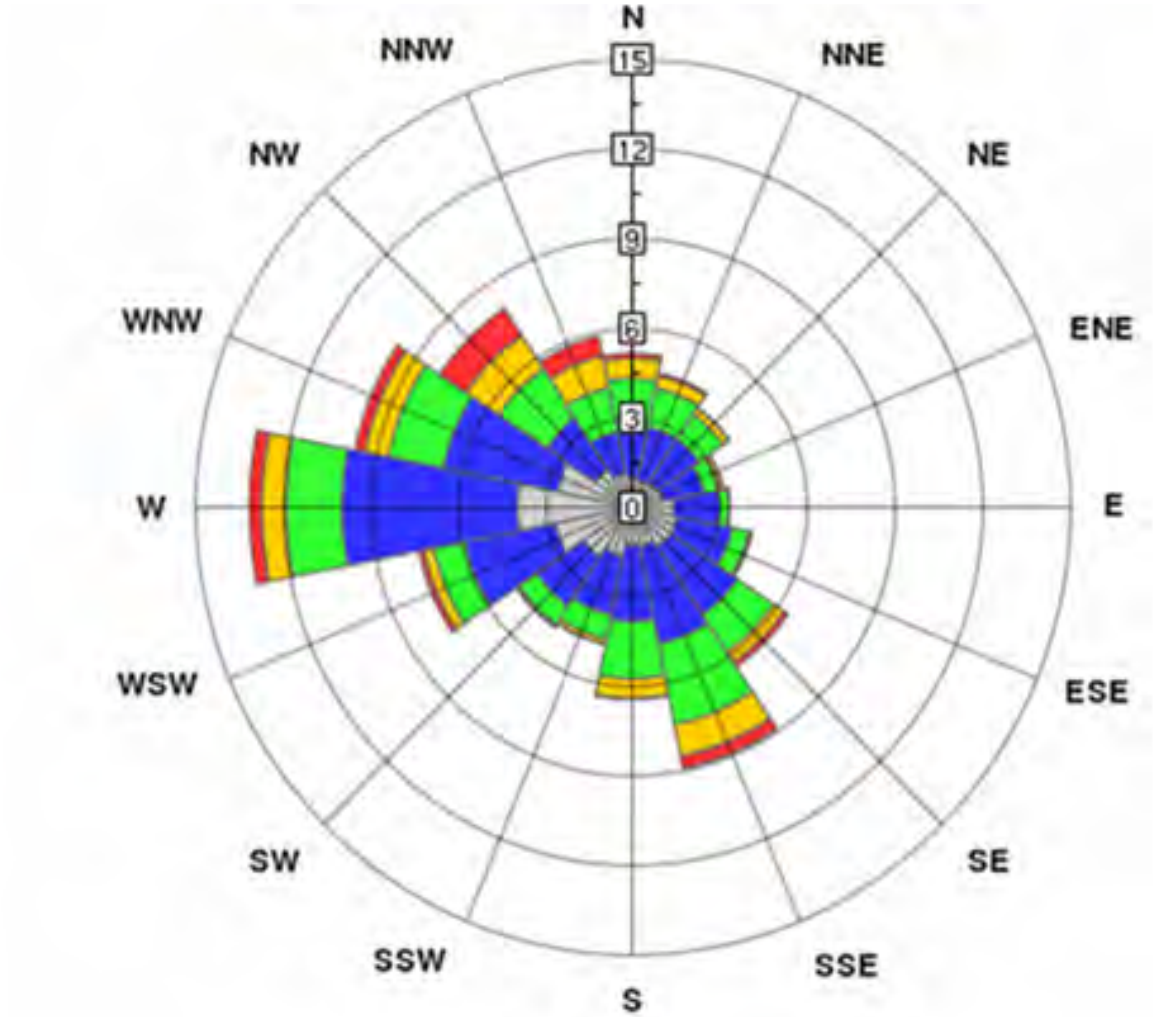
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\IllustratorTR Figure 2_5-31 Scottsbluff 15-Year vs Baseline Year Wind Direction Distributions.ai @ 11/08/2011



Alliance West
Station ID: a250138
Location: 42.02, -103.13
Elevation: 3978 Feet

Source: Smith 2013.

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FIGURE 2.5-32
ALLIANCE WEST 10-YEAR WIND ROSE
1996-2005

PROJECT: CO001636 MAPPED BY: JC CHECKED BY: JEC

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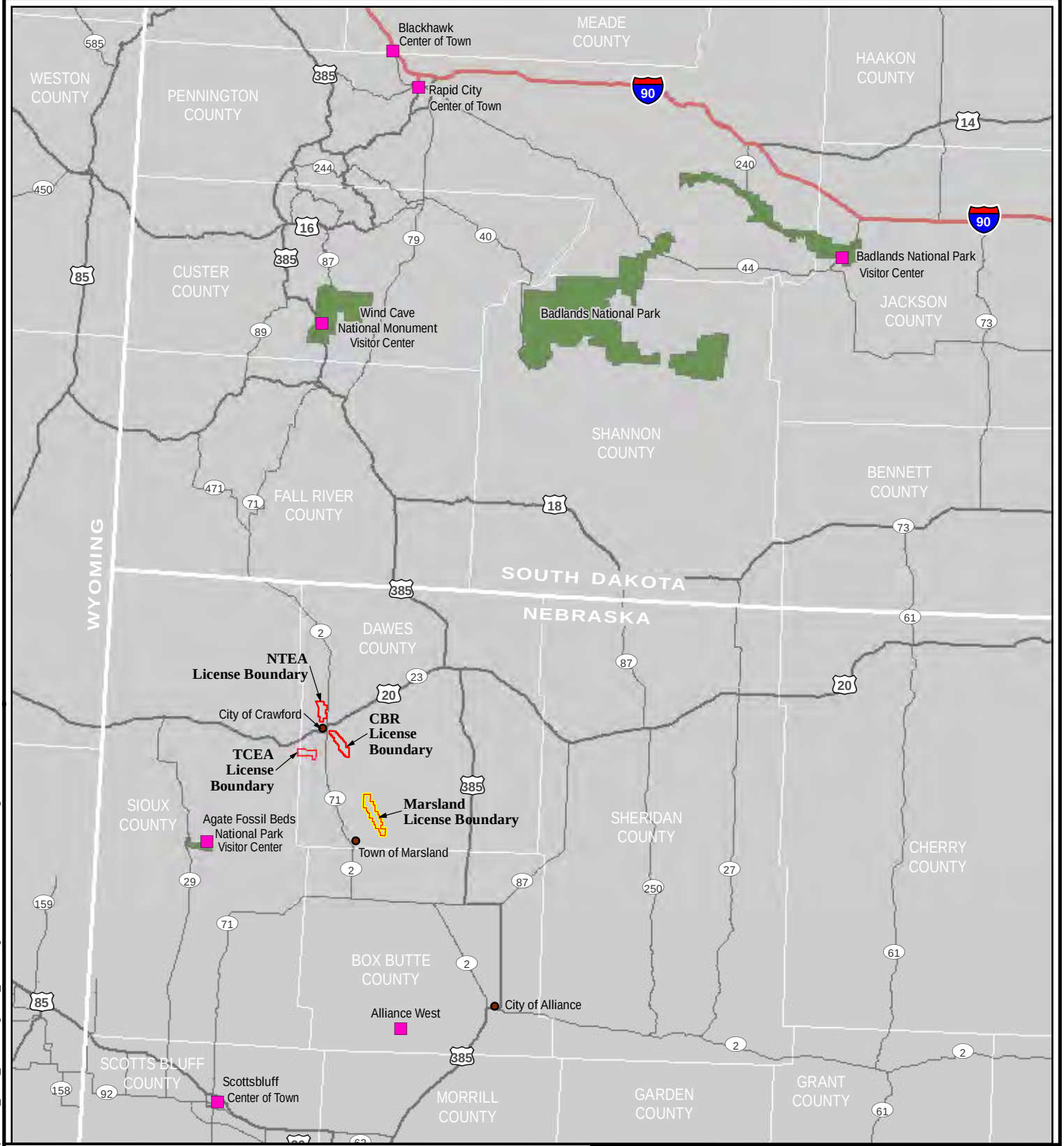
K:\CBR_Projects\CO001636_Marsland\3_IMAGES\Illustrator\TR Figure 2_5-32 SAlliance West 10-Year Wind Rose 1996 -2005.ai @ 12/02/2013



LEGEND

- City/Town of Interest
- Regional Ambient Air Monitoring Site
- Marsland License Boundary
- Other License Boundary
- National Park/Monument
- Interstate Highway
- U.S. Route
- State Highway

N

0 10 20

Miles

PROJECTION:
NAD 1983 UTM ZONE 13N

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FIGURE 2.5-33
LOCATION OF REGIONAL AMBIENT AIR MONITORING SITES

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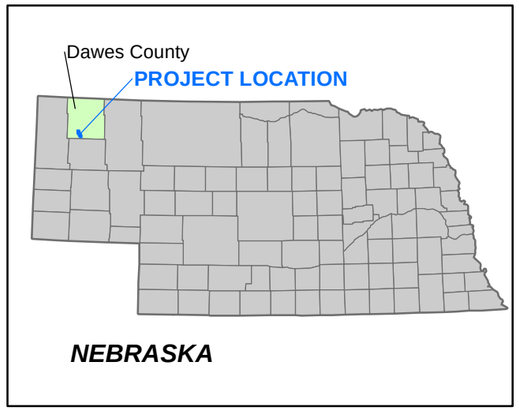
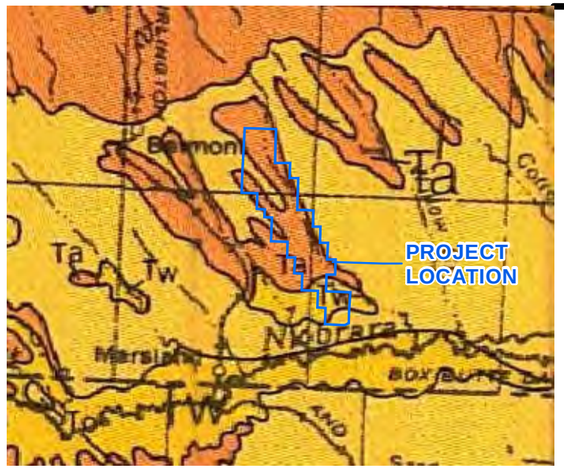
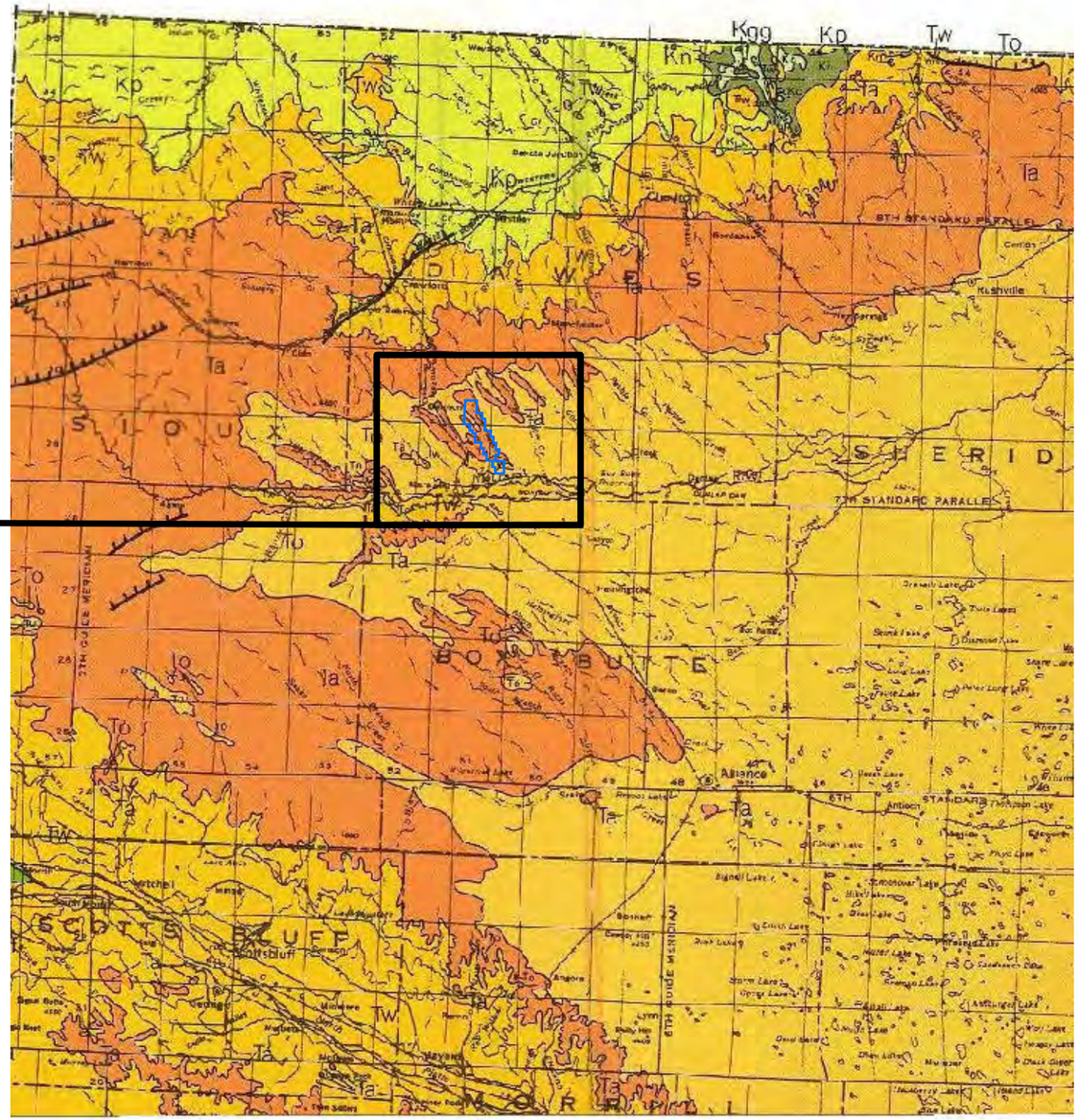
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 2_5-32 Regional Ambient Air Monitoring Sites.mxd - 11/9/2011 @ 9:14:51 AM







LEGEND

GEOLOGIC PERIOD	SERIES	GROUP OR FORMATION		
TERTIARY	MIOCENE		OGALLALA	To
			ARIKAREE	Ta
	OLIGOCENE		WHITE RIVER	Tw
		MONTANA	Fox Hills	Kf
			Pierre	Kp
CRETACEOUS	UPPER CRETACEOUS		Niobrara	Kn
		COLORADO	Carlile	Kc
			Greenhorn-Graneros	Kgg
	LOWER CRETACEOUS		DAKOTA	Kd
JURASSIC				
PERMIAN			CHASE	Pc
	BIG BLUE		COUNCIL GROVE	Pcg
			ADMIRE	Pa
			WABAUNSEE	IPw
	VIRGIL		SHAWNEE	IPs
			DOUGLAS	IPd
PENNSYLVANIAN	MISSOURI		LANSING	IPl
			KANSAS CITY	IPkc
	DES MOINES		MARMATON	IPm
MISSISSIPPIAN				
DEVONIAN				
SILURIAN				
ORDOVICIAN (Middle & Upper)				
CAMBRIAN & ORDOVICIAN (Lower)				
PRECAMBRIAN				

Source:
Burchett, R.R., 1986, Geologic bedrock map of Nebraska: University of Nebraska Conservation and Survey Division, Geologic Maps and Charts 1, scale 1:1000000.

N

PROJECTION: NAD 1927, STATE PLANE NEBRASKA NORTH FIPS 2601

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FIGURE 2.6-1
BEDROCK GEOLOGY OF THE MARSLAND EXPANSION AREA

PROJECT: CO001636 | MAPPED BY: JC | CHECKED BY: MS

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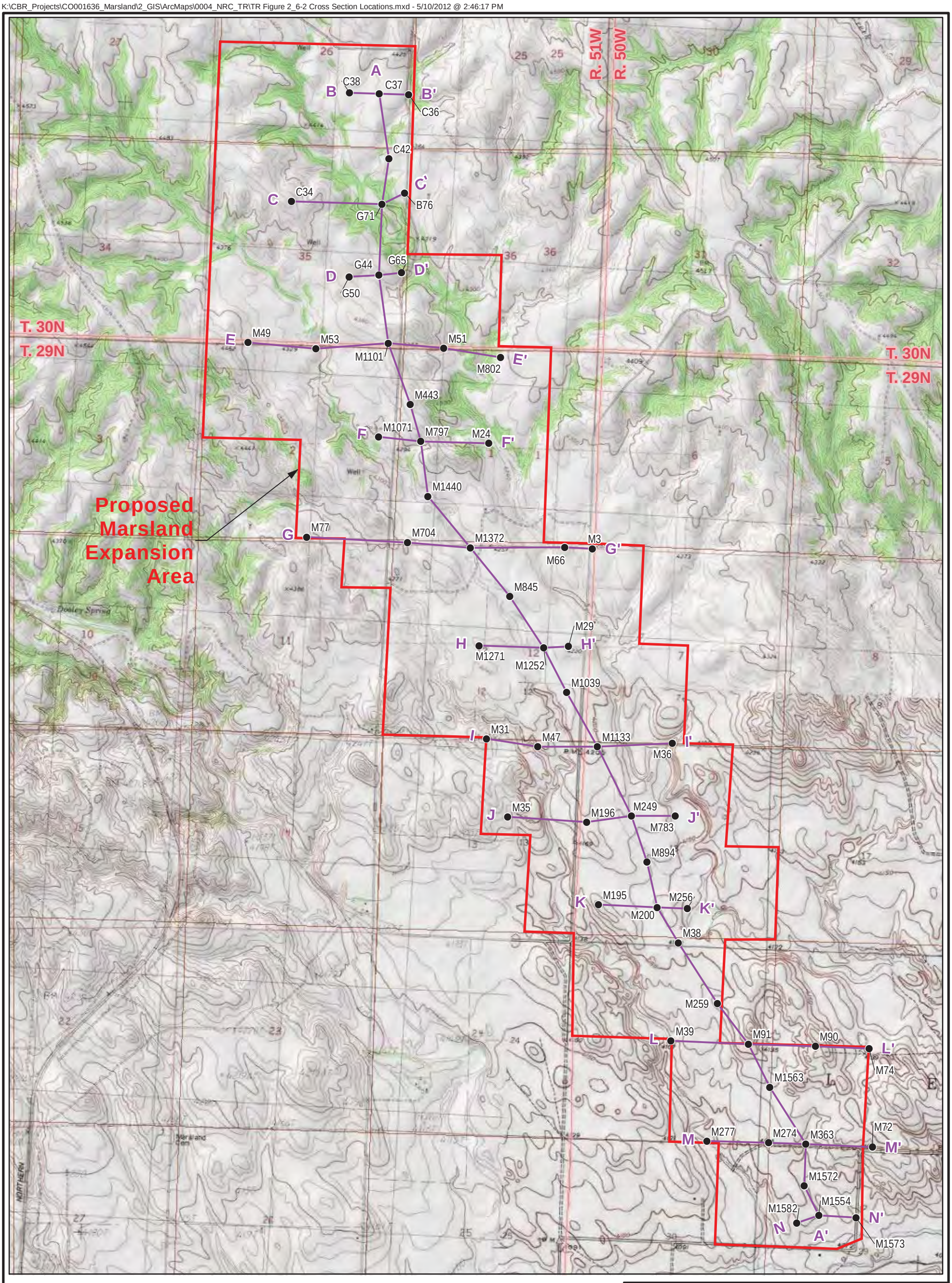
K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 2_6-1 Bedrock Geology of the Marsland Expansion Area.mxd - 11/10/2011 @ 3:22:32 PM

K:\CBR_Projects\CO001636_Marsland\2_GIS\ArcMaps\0004_NRC_TR\TR Figure 2_6-2 Cross Section Locations.mxd - 5/10/2012 @ 2:46:17 PM



LEGEND

- Borehole
- Cross Section Line
- Proposed Marsland Expansion Area

N

0 1,500 3,000

Feet

PROJECTION: NAD 1927, STATE PLANE NEBRASKA NORTH, FIPS 2601
SOURCES: US TOPO MAPS, SERVICED BY ESRI ARCGIS ONLINE

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FIGURE 2.6-2
MARSLAND CROSS-SECTION MAP SHOWING ARTIFICIAL PENETRATIONS

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