Oregon Solar Highways

Oregon Innovative Partnerships Program

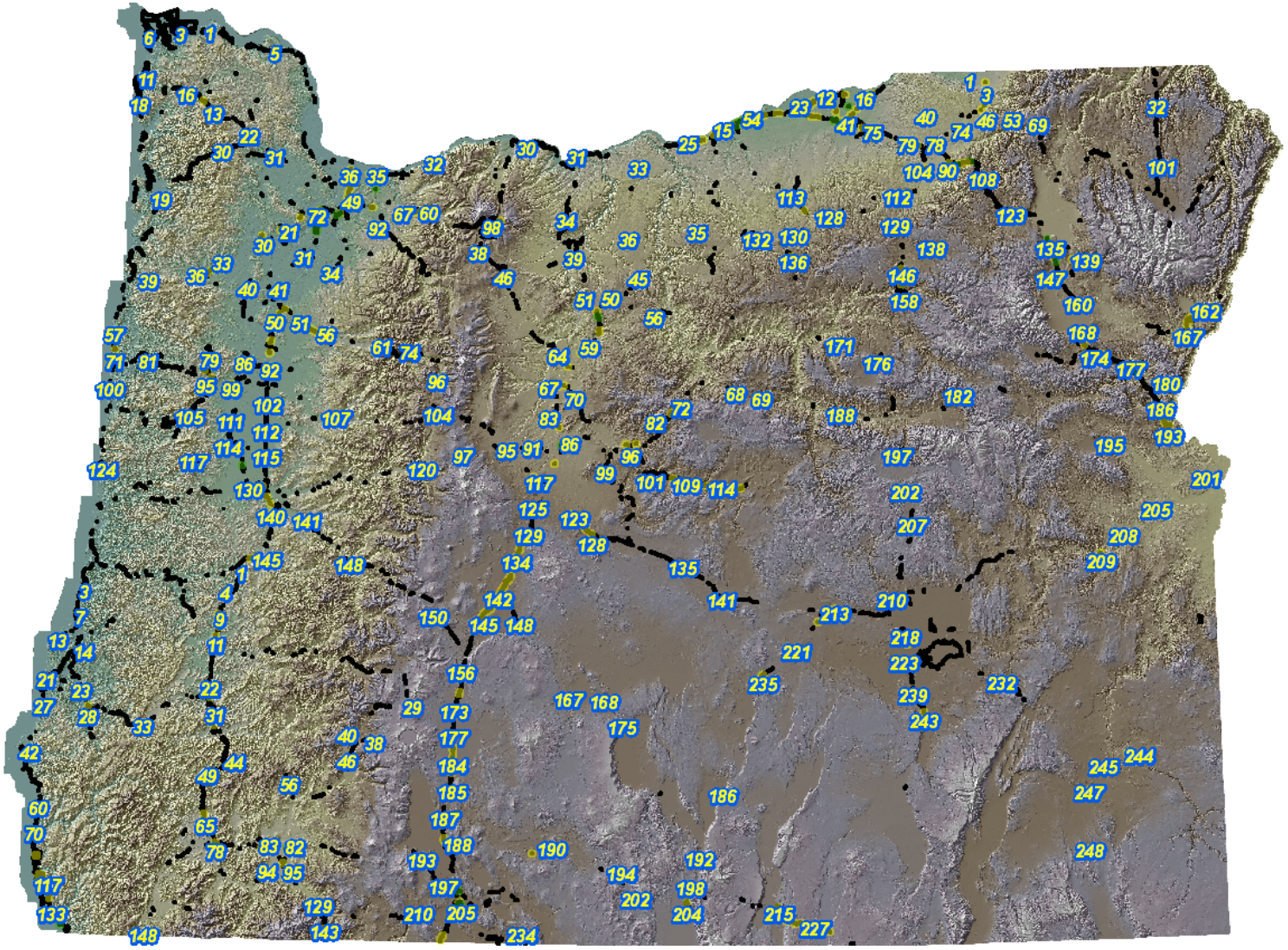
Oregon Department of Transportation

Alsea Geospatial, Inc.
www.alseageo.com

Solar Highway Program Origin

Solar Site Project

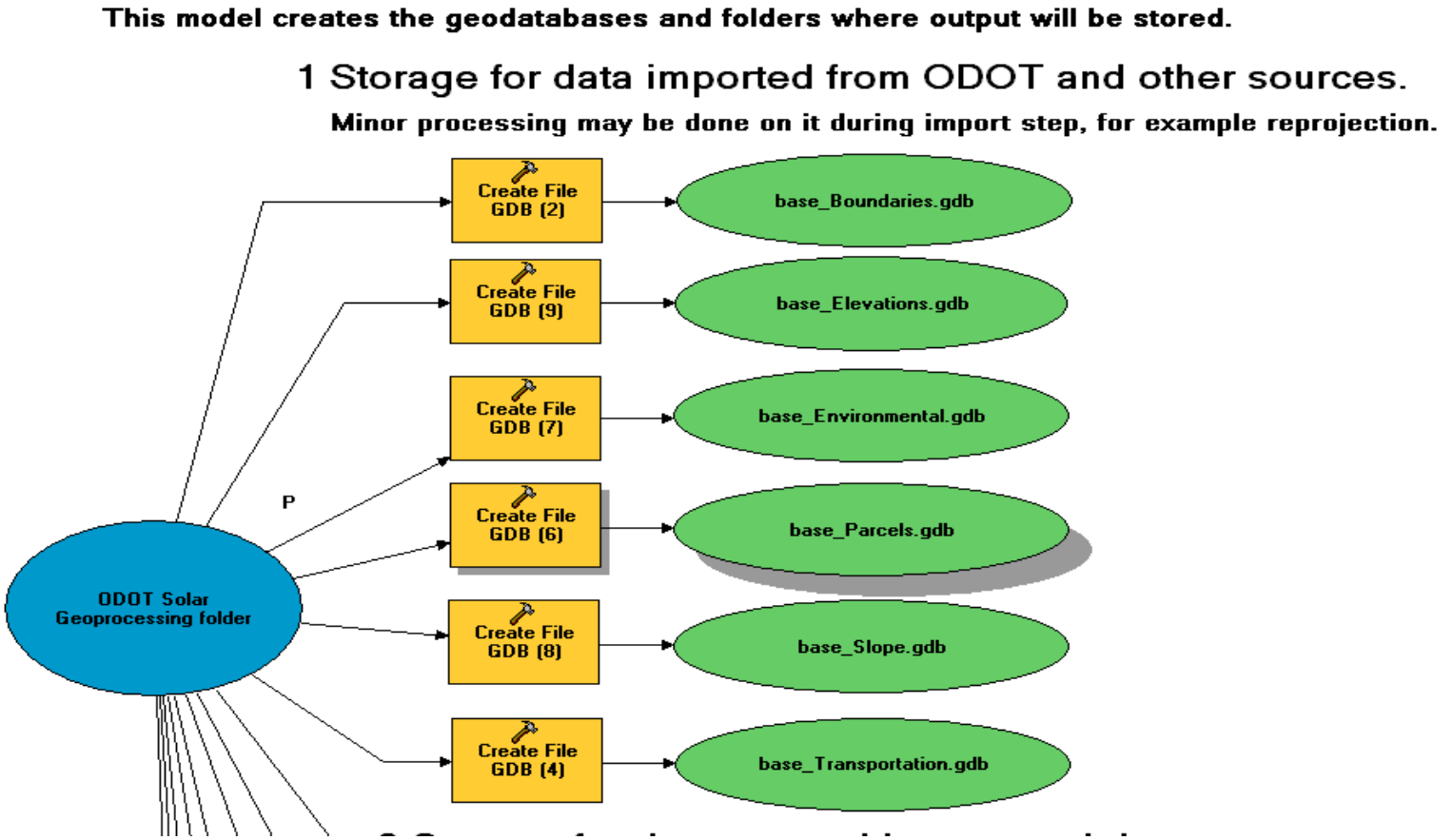
Find potential solar sites
Estimate energy potential



The process

ODOT defined solar site requirements

Alsea Geospatial built the tools to find sites

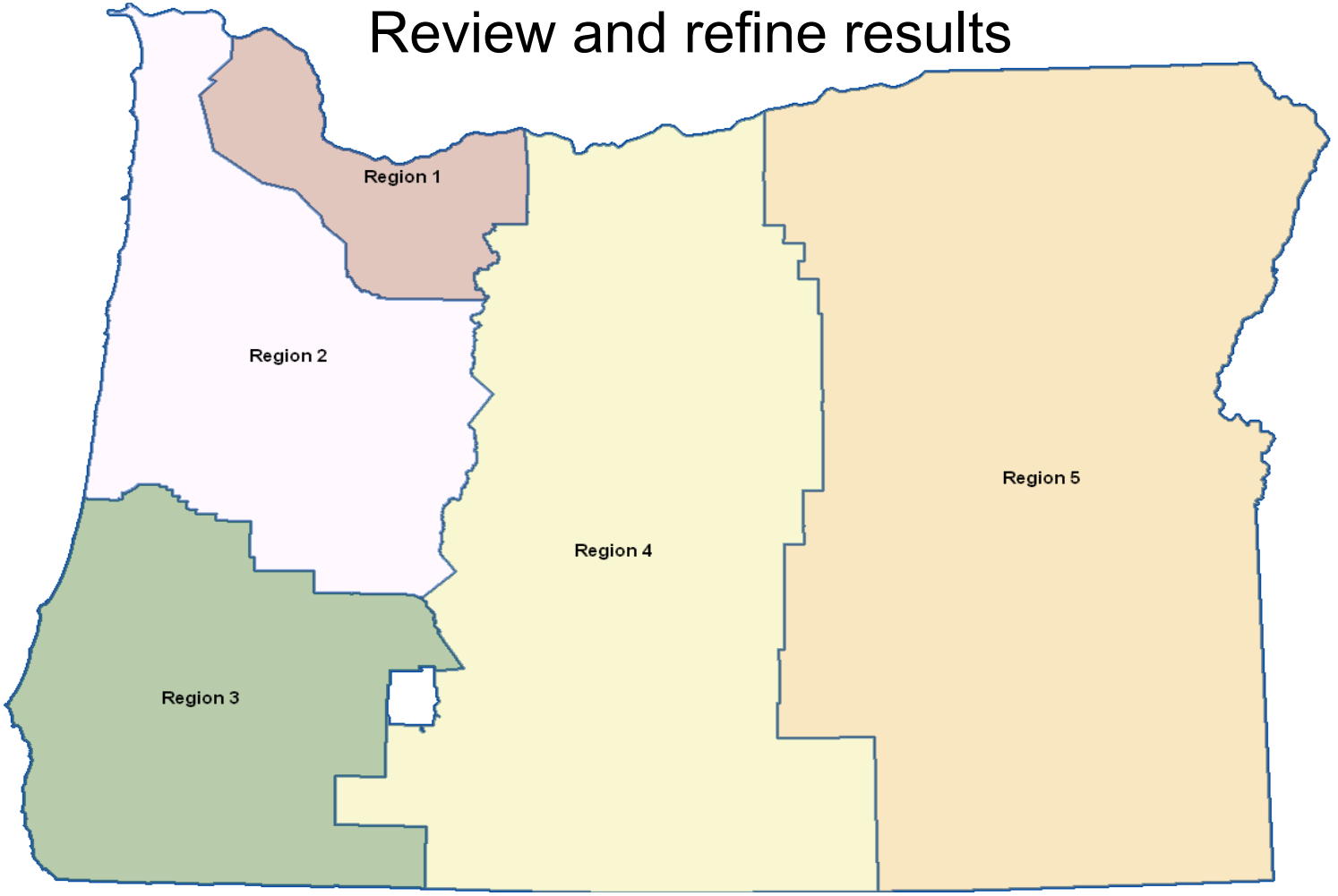


Project Steps

Collect data

Generate potential sites

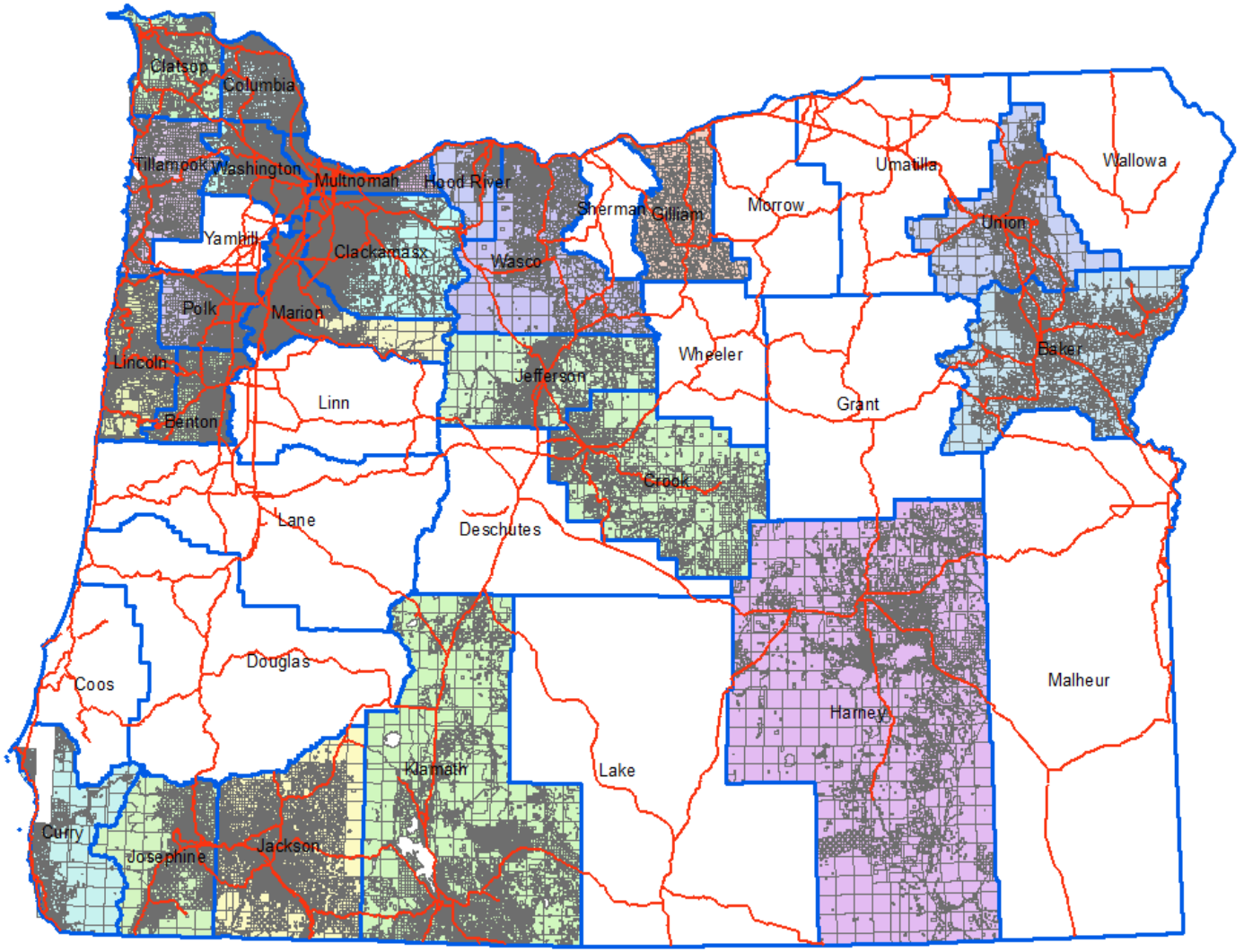
Review and refine results



Collecting the data

ODOT provided roughly half.

AGI collected the rest.



Identifying potential sites

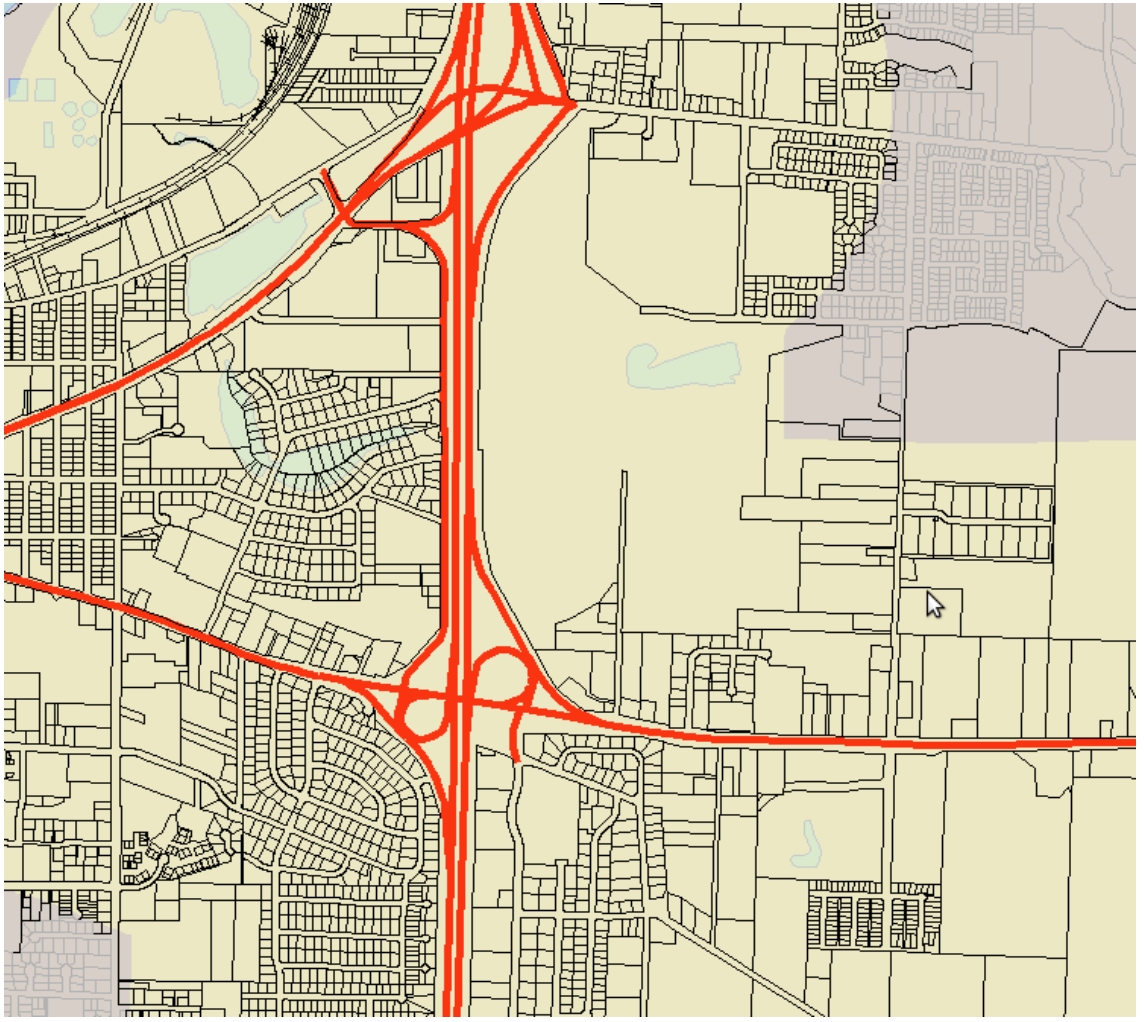
Determine ownership

Apply selection criteria

Add attribute values to sites

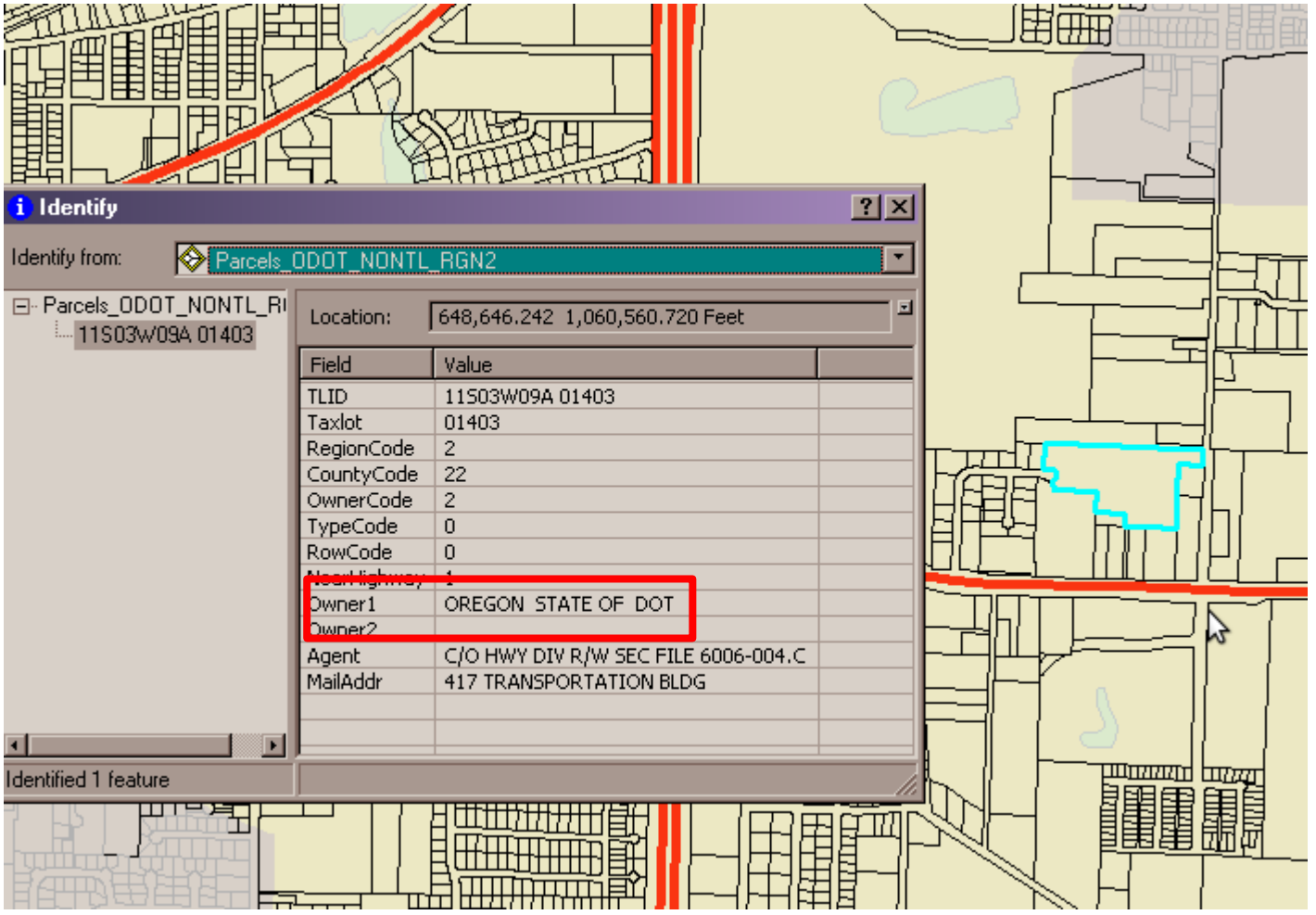
Ownership

Disregard areas more than 1/2 mile from highways

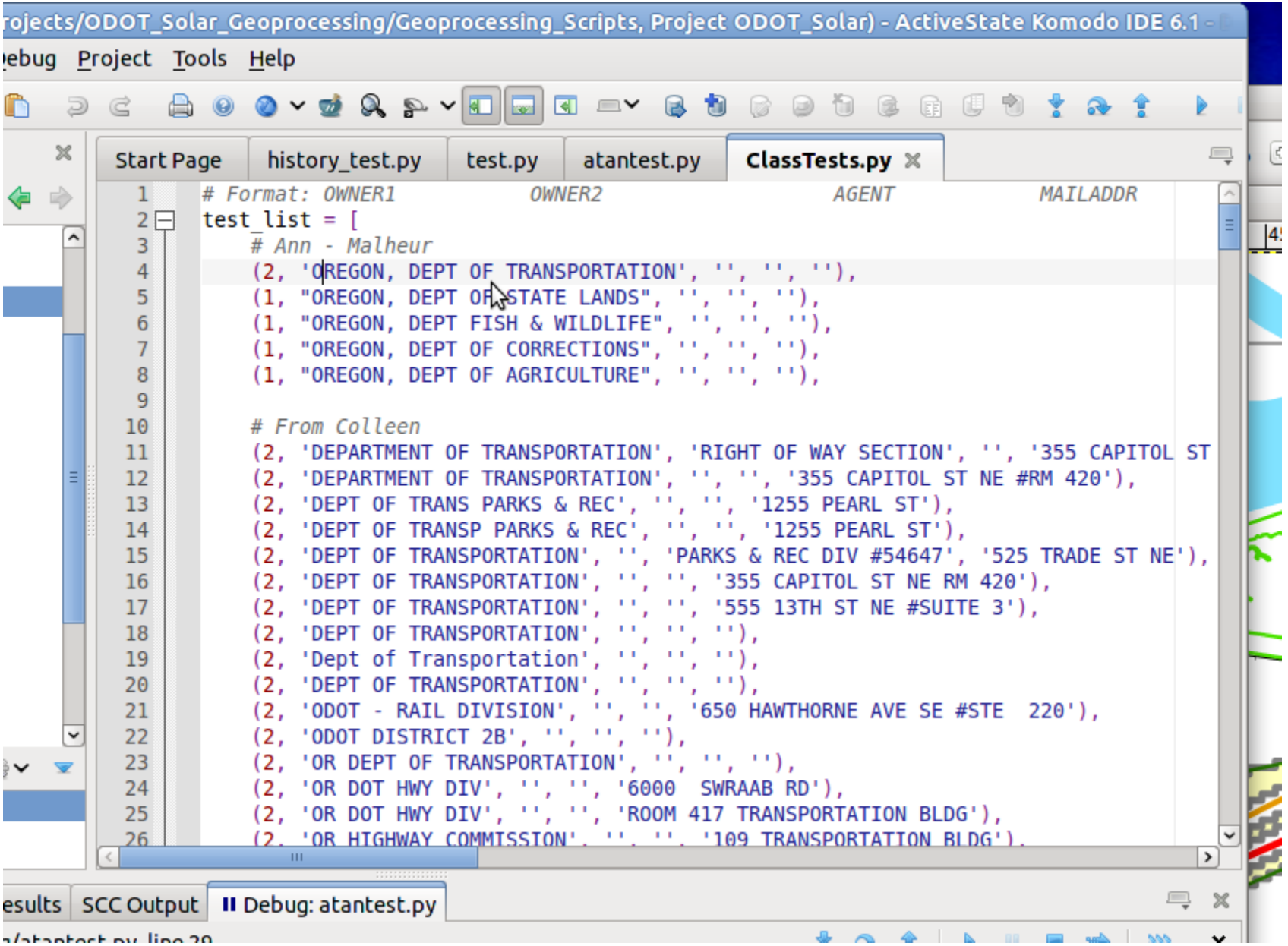


Ownership

Find ODOT owned parcels

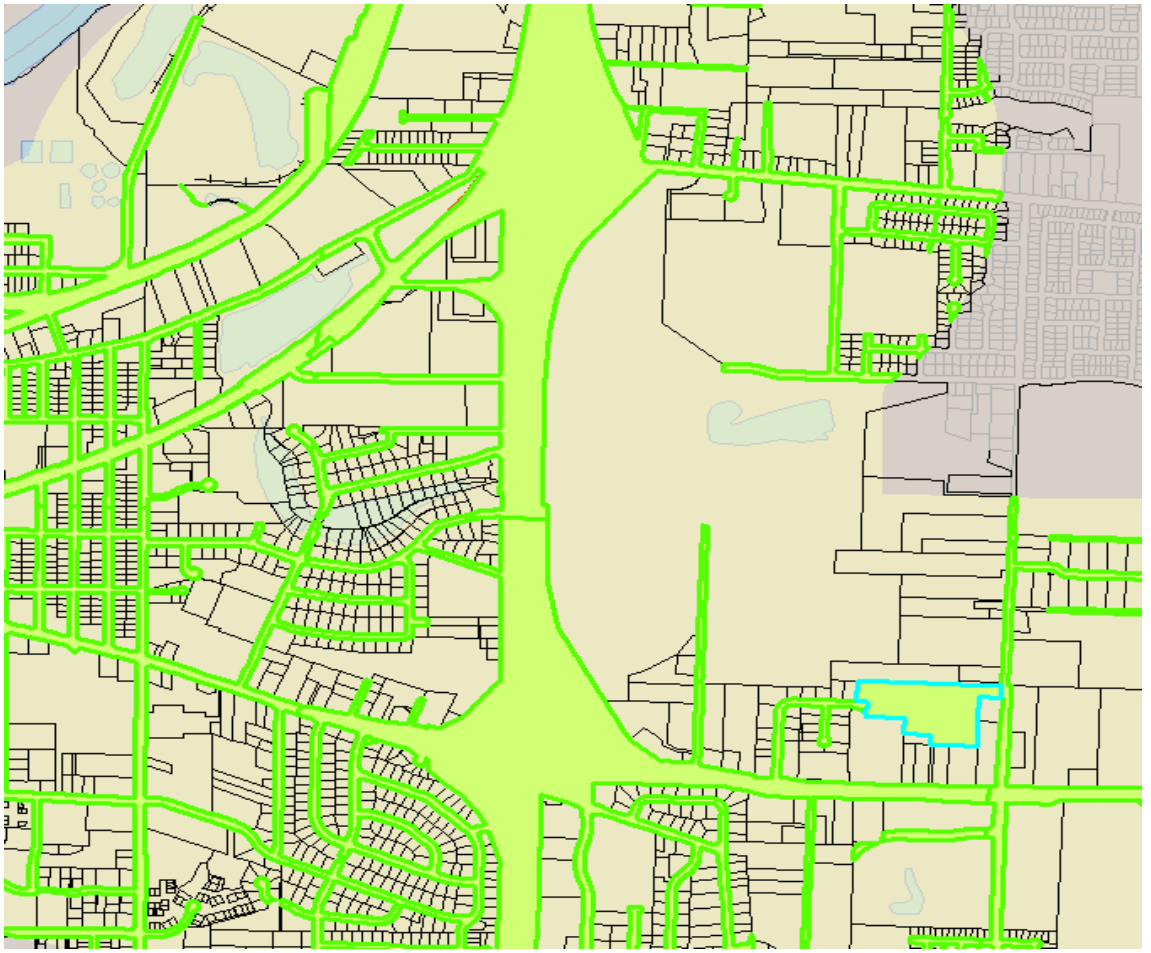


Finding ODOT Ownership



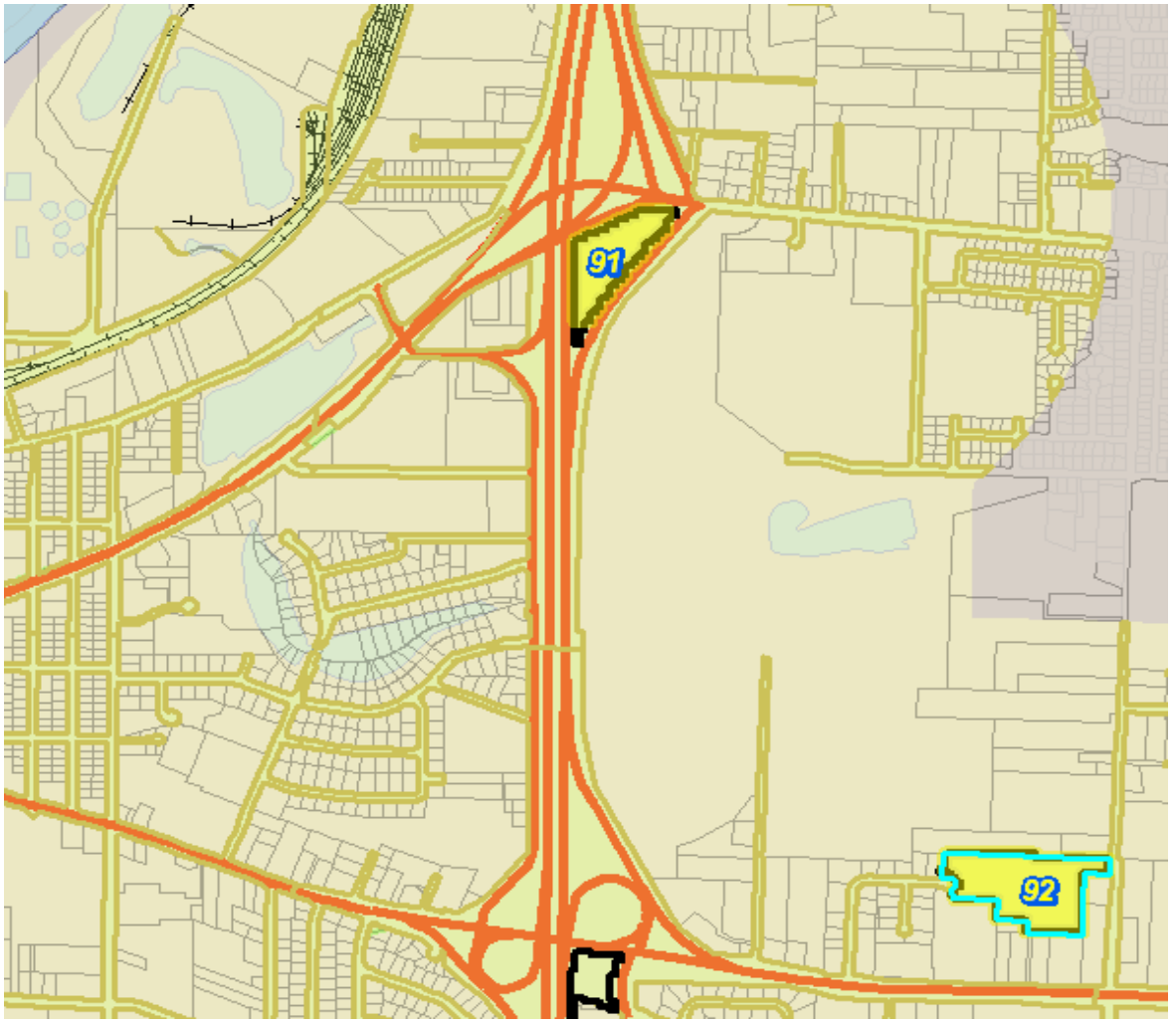
Ownership

Find ROW that *might be* owned by ODOT



Ownership

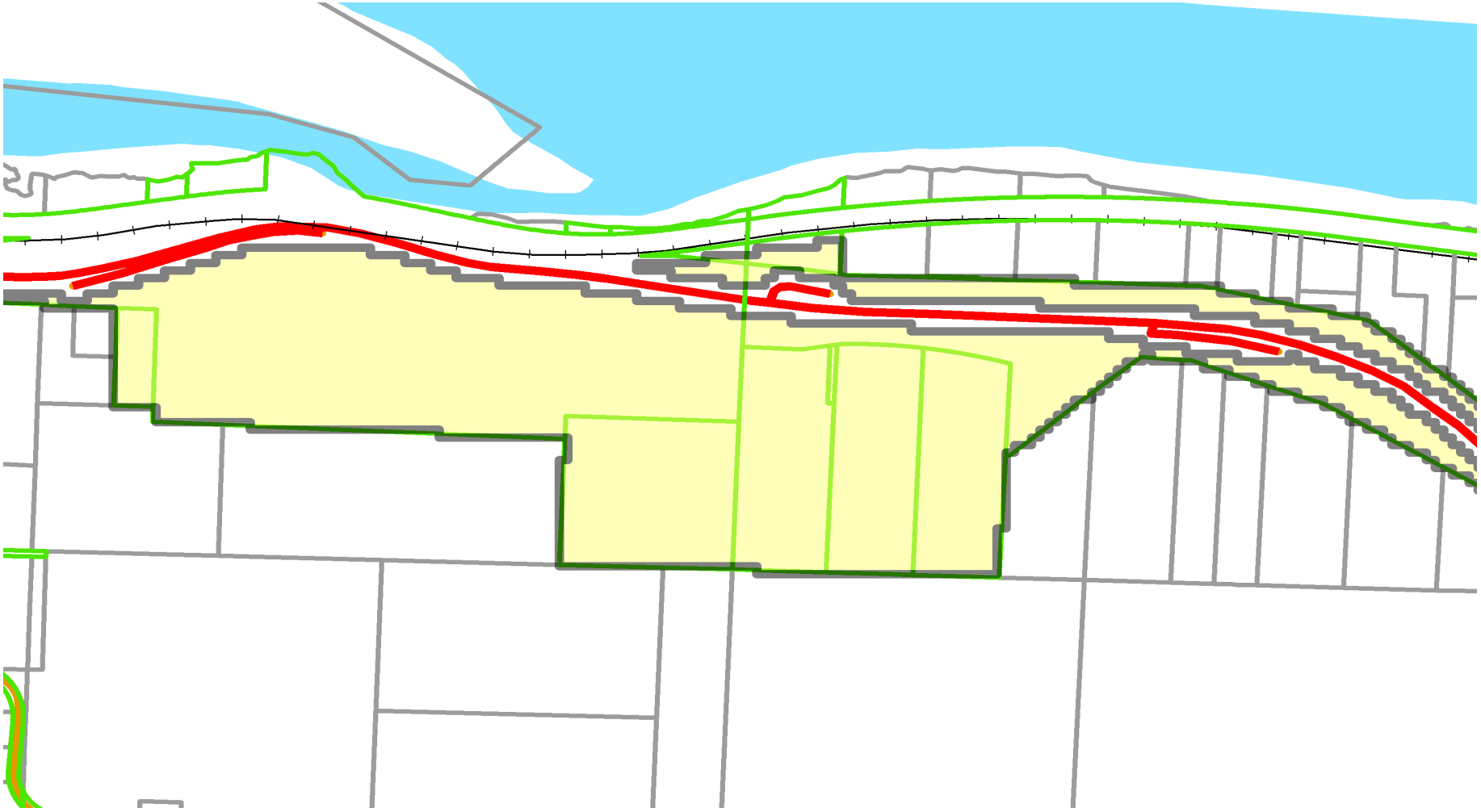
After removing roads...



Merge

Merge adjacent polygons

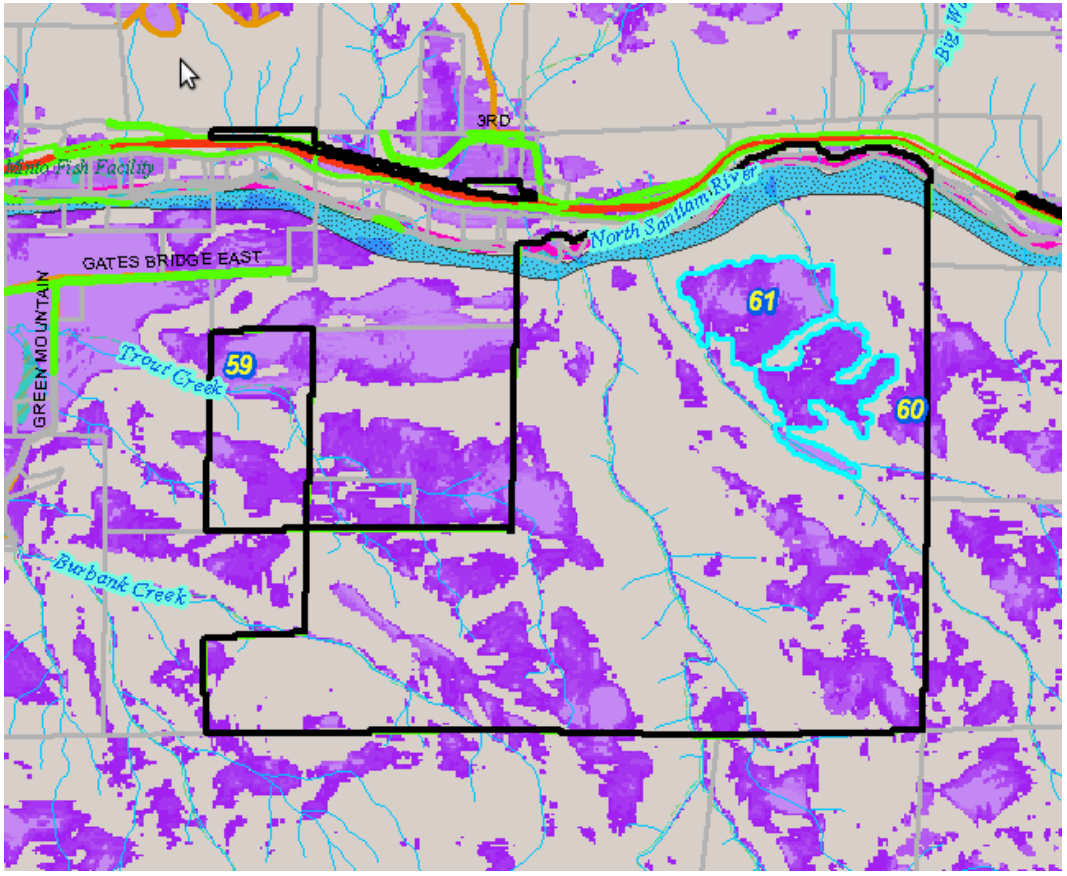
Disregard any site < 5 acres



Site Criteria

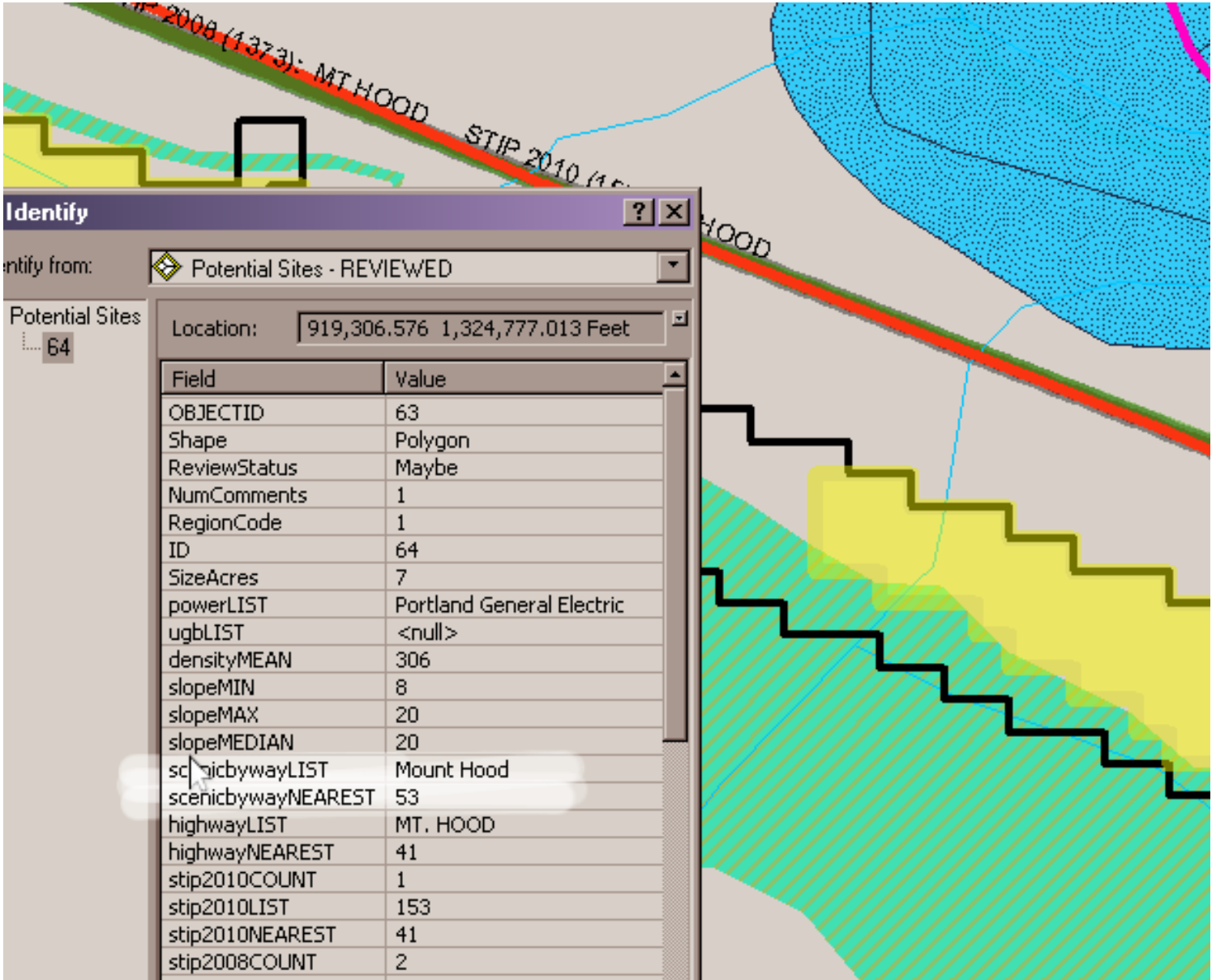
Evaluate physical attributes

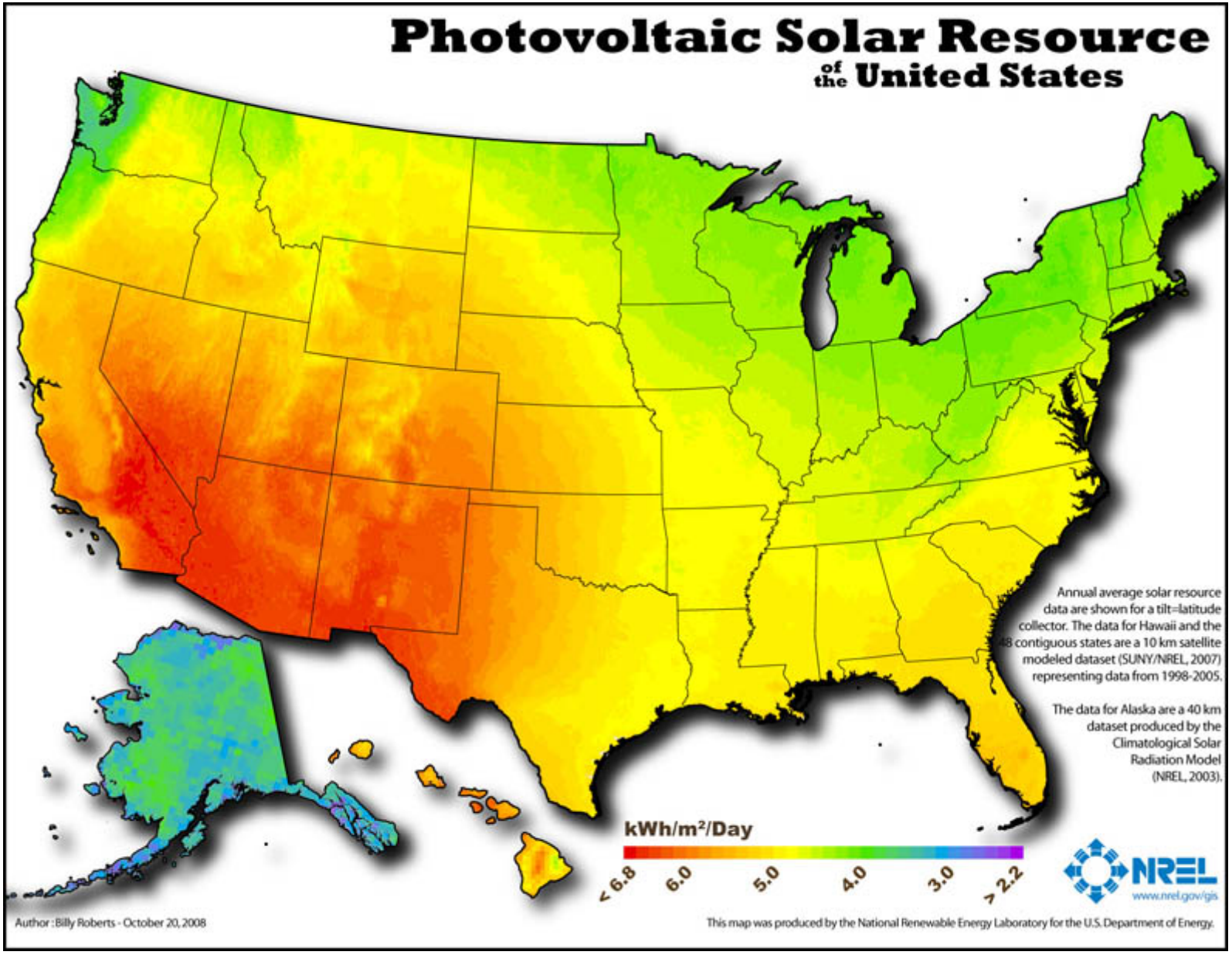
Remove sites < 5 acres



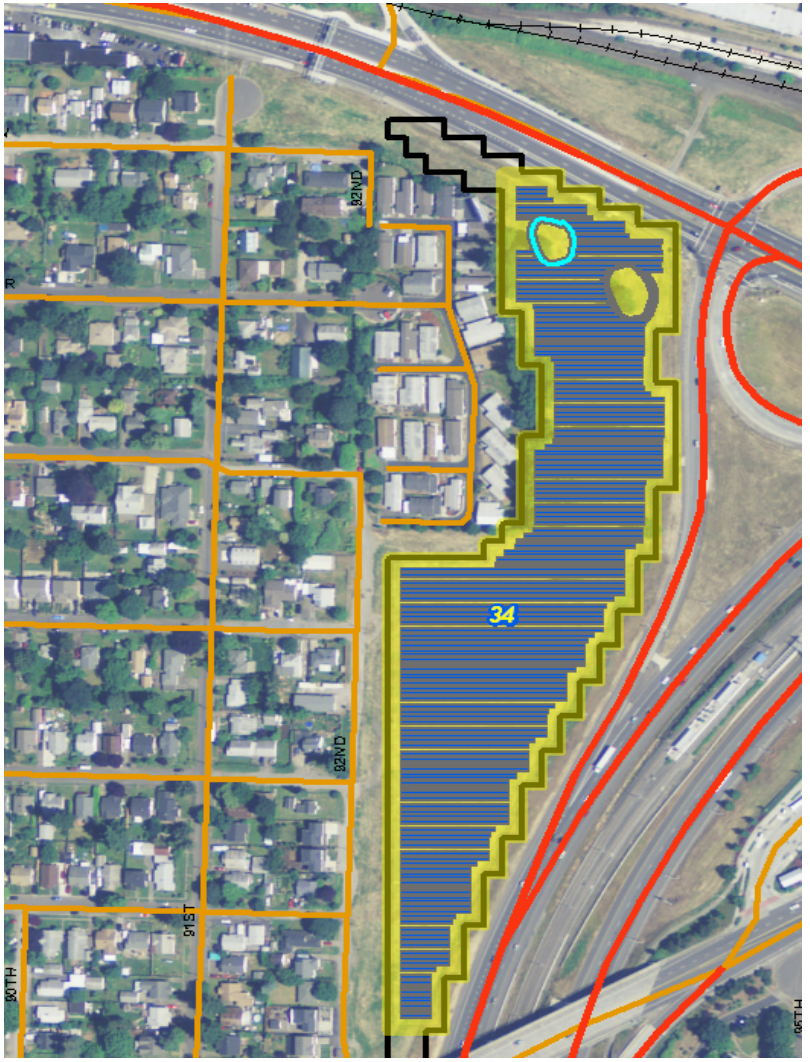
Add attributes

What is each site near? What are the stats?

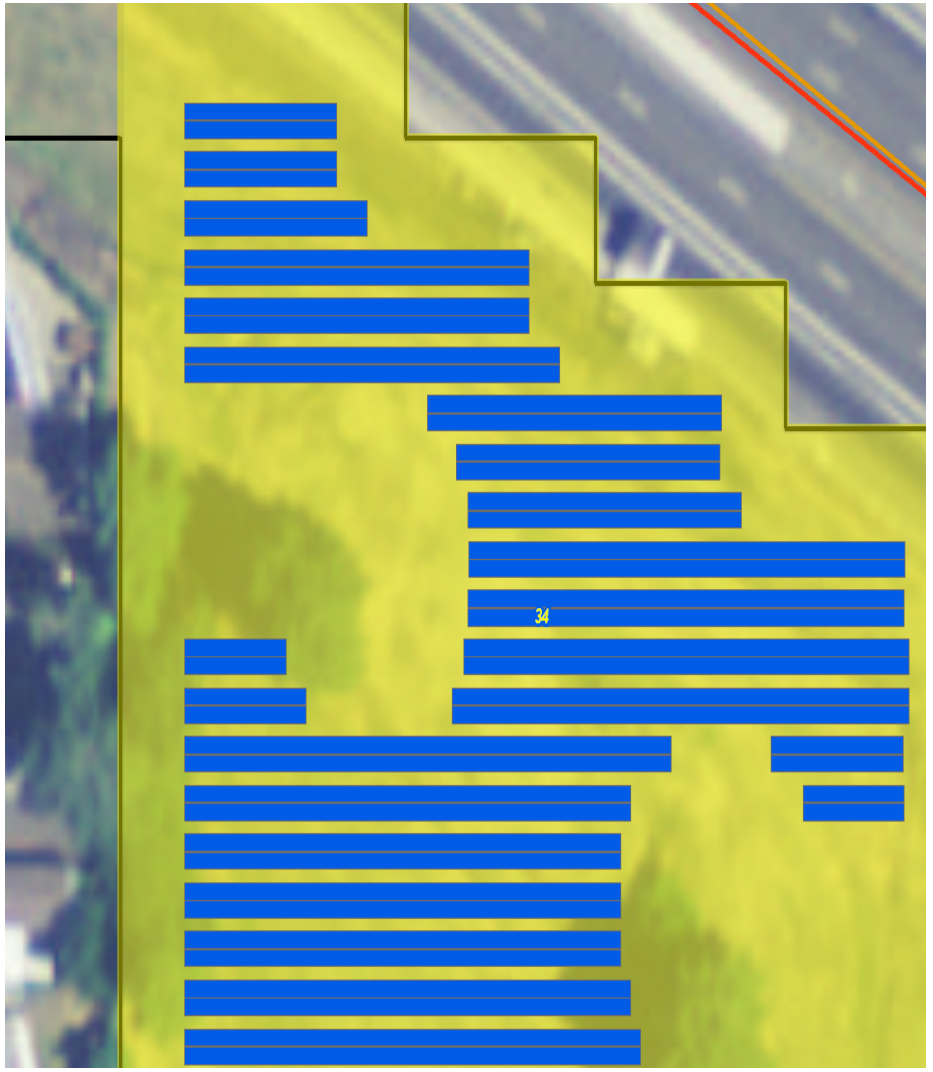



Photovoltaic Solar Resource
of the United States
Annual average solar resource data are shown for a tilt=latitude collector. The data for Hawaii and the 48 contiguous states are a 10 km satellite modeled dataset (SUNY/NREL, 2007) representing data from 1998-2005.
The data for Alaska are a 40 km dataset produced by the Climatological Solar Radiation Model (NREL, 2003).
kWh/m²/Day
< 6.8
6.0
5.0
4.0
3.0
> 2.2
NREL
www.nrel.gov/gis
Author : Billy Roberts - October 20, 2008
This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy.

Solar Power Estimate



Solar Power Estimate



Site Location:

Cell ID:	0185333
State*:	Oregon
Latitude*:	44.488
Longitude*:	-123.065

PV System Specifications:

DC Rating (kW): 1.0

DC to AC Derate Factor: 0.77 DERATE FACTOR HELP

Array Type: Fixed Tilt

Fixed Tilt or 1-Axis Tracking System:

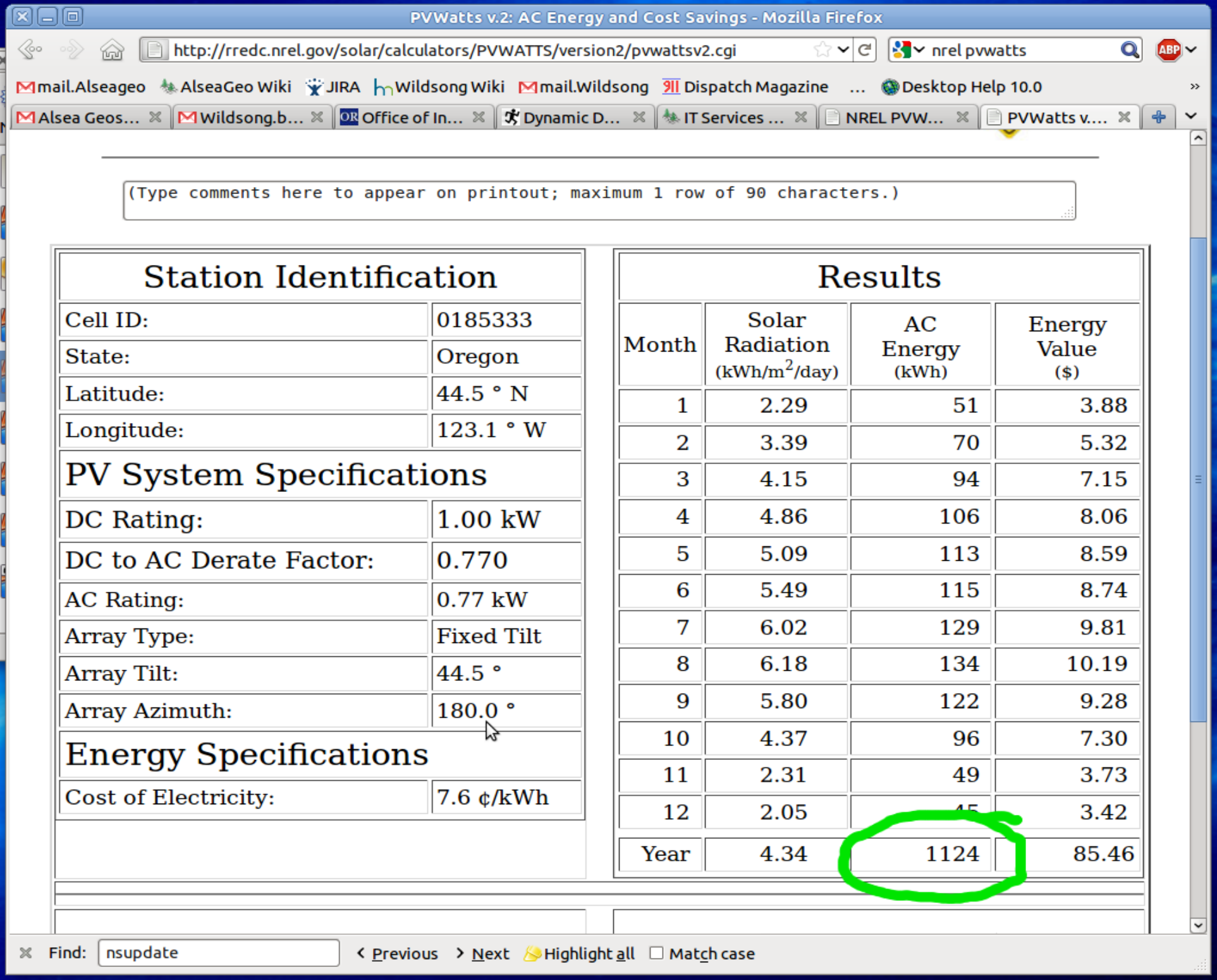
Array Tilt (degrees): 44.488 (Default = Latitude)

Array Azimuth (degrees): 180.0 (Default = True South) *What's this?*

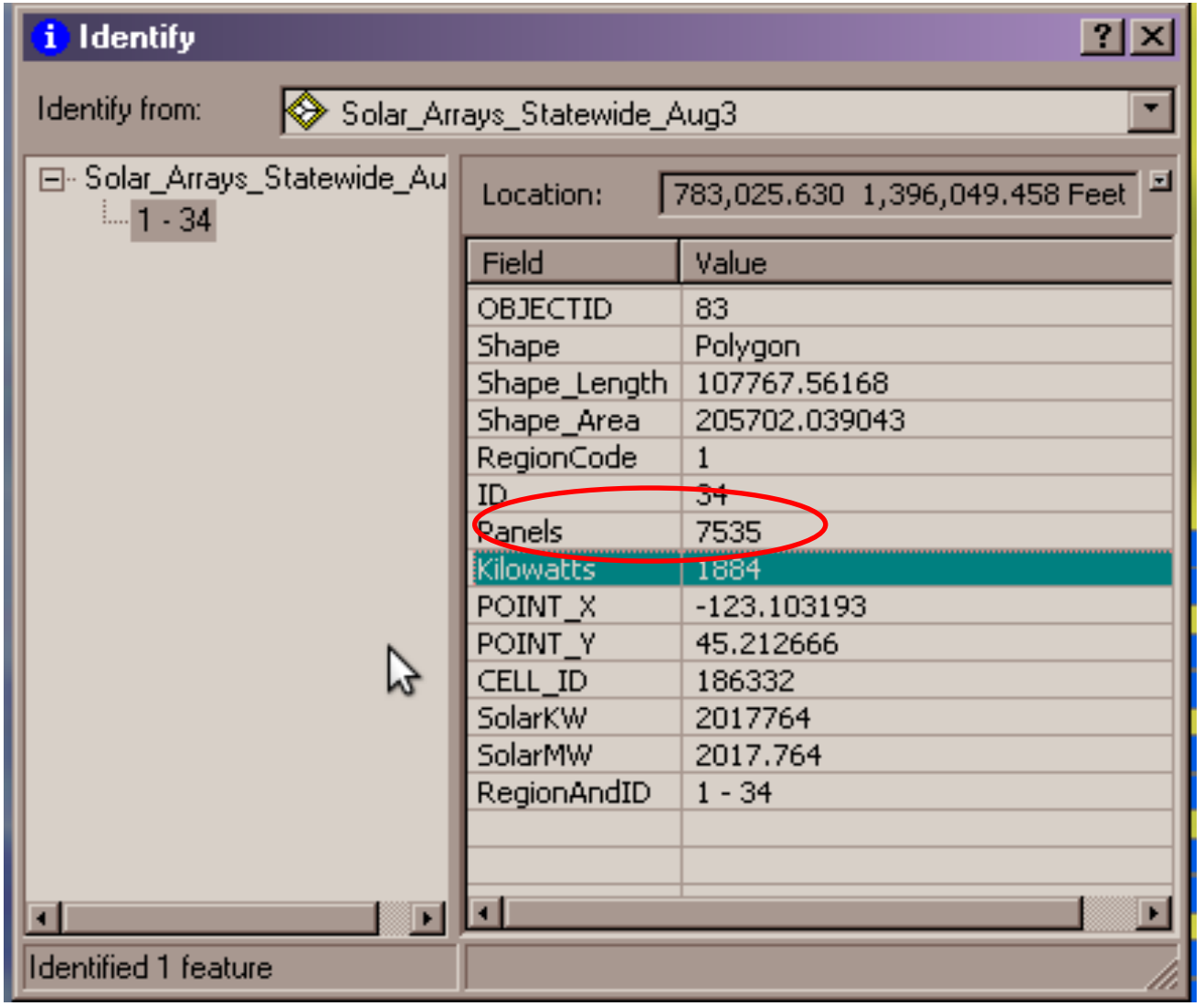
Energy Data:

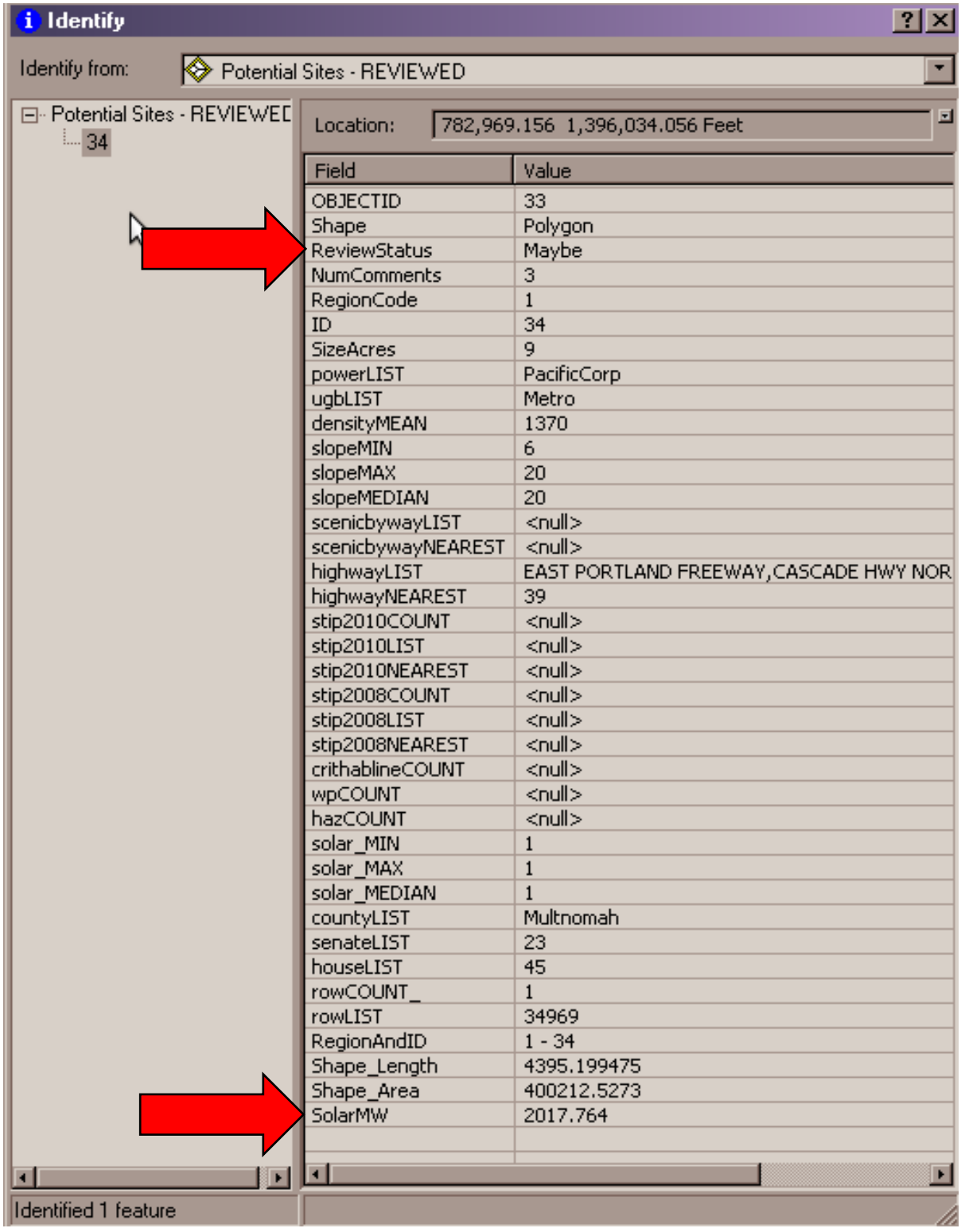
Cost of Electricity (cents/kWh): 7.603

Calculate HELP Reset Form


PVWatts v.2: AC Energy and Cost Savings - Mozilla Firefox
http://rredc.nrel.gov/solar/calculators/PVWATTS/version2/pvwattsv2.cgi
nrel pvwatts
mail.Alseageo
AlseaGeo Wiki
JIRA
Wildsong Wiki
mail.Wildsong
Dispatch Magazine
Desktop Help 10.0
Alsea Geos...
Wildsong.b...
Office of In...
Dynamic D...
IT Services ...
NREL PVW...
PVWatts v....
(Type comments here to appear on printout; maximum 1 row of 90 characters.)
Station Identification
Cell ID: 0185333
State: Oregon
Latitude: 44.5 ° N
Longitude: 123.1 ° W
PV System Specifications
DC Rating: 1.00 kW
DC to AC Derate Factor: 0.770
AC Rating: 0.77 kW
Array Type: Fixed Tilt
Array Tilt: 44.5 °
Array Azimuth: 180.0 °
Energy Specifications
Cost of Electricity: 7.6 ¢/kWh
Results
Month
Solar Radiation (kWh/m2/day)
AC Energy (kWh)
Energy Value ($)
1 2.29 51 3.88
2 3.39 70 5.32
3 4.15 94 7.15
4 4.86 106 8.06
5 5.09 113 8.59
6 5.49 115 8.74
7 6.02 129 9.81
8 6.18 134 10.19
9 5.80 122 9.28
10 4.37 96 7.30
11 2.31 49 3.73
12 2.05 45 3.42
Year 4.34 1124 85.46
Find: nsupdate
Previous
Next
Highlight all
Match case

Estimate Solar Kilowatts




Identify
Identify from:
Potential Sites - REVIEWED
Potential Sites - REVIEWED
34
Location:
782,969.156 1,396,034.056 Feet
Field
Value
OBJECTID
33
Shape
Polygon
ReviewStatus
Maybe
NumComments
3
RegionCode
1
ID
34
SizeAcres
9
powerLIST
PacificCorp
ugbLIST
Metro
densityMEAN
1370
slopeMIN
6
slopeMAX
20
slopeMEDIAN
20
scenicbywayLIST
<null>
scenicbywayNEAREST
<null>
highwayLIST
EAST PORTLAND FREEWAY,CASCADE HWY NOR
highwayNEAREST
39
stip2010COUNT
<null>
stip2010LIST
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stip2010NEAREST
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stip2008COUNT
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stip2008LIST
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stip2008NEAREST
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crithablineCOUNT
<null>
wpCOUNT
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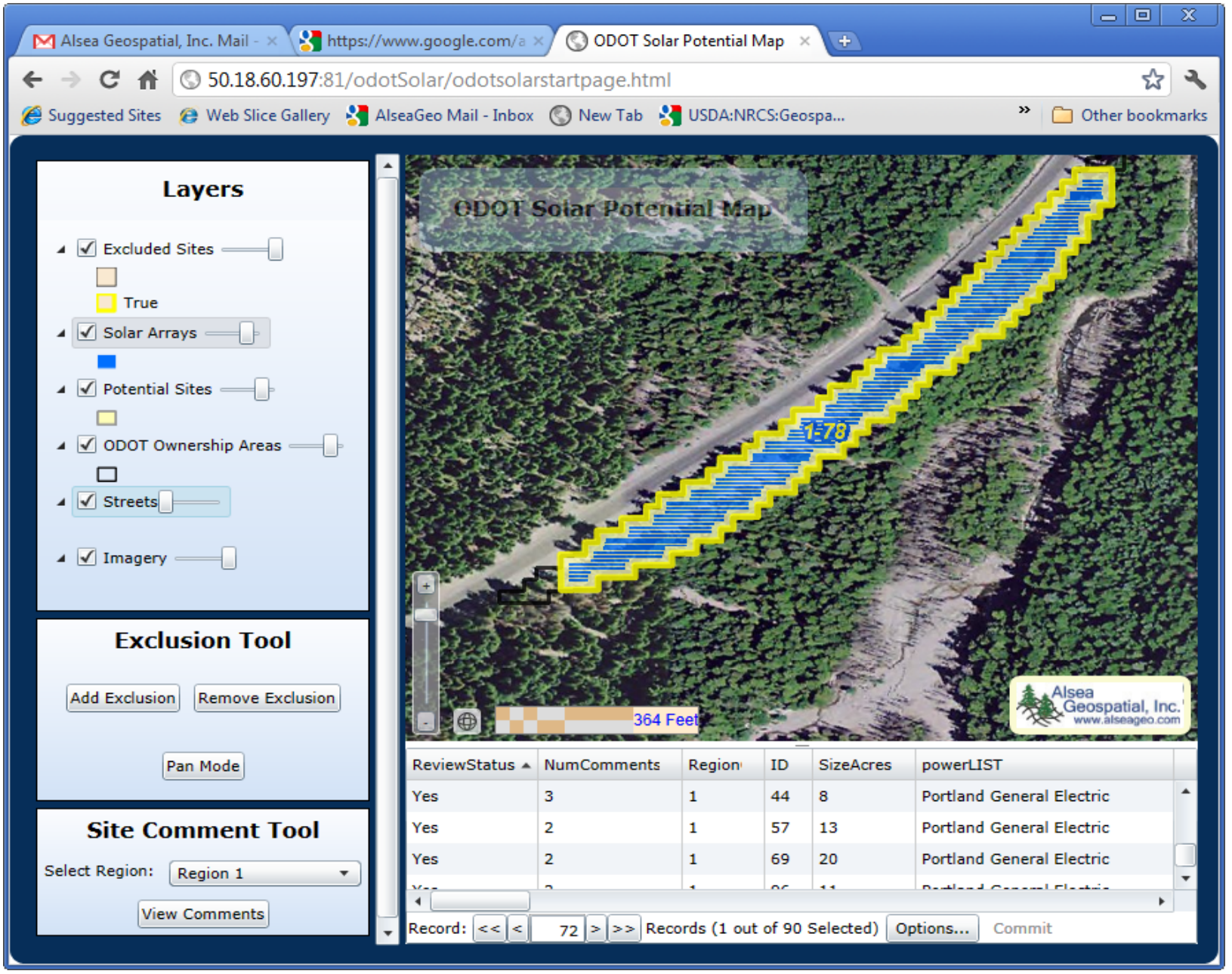
hazCOUNT
<null>
solar_MIN
1
solar_MAX
1
solar_MEDIAN
1
countyLIST
Multnomah
senateLIST
23
houseLIST
45
rowCOUNT_
1
rowLIST
34969
RegionAndID
1 - 34
Shape_Length
4395.199475
Shape_Area
400212.5273
SolarMW
2017.764
Identified 1 feature

Website for review

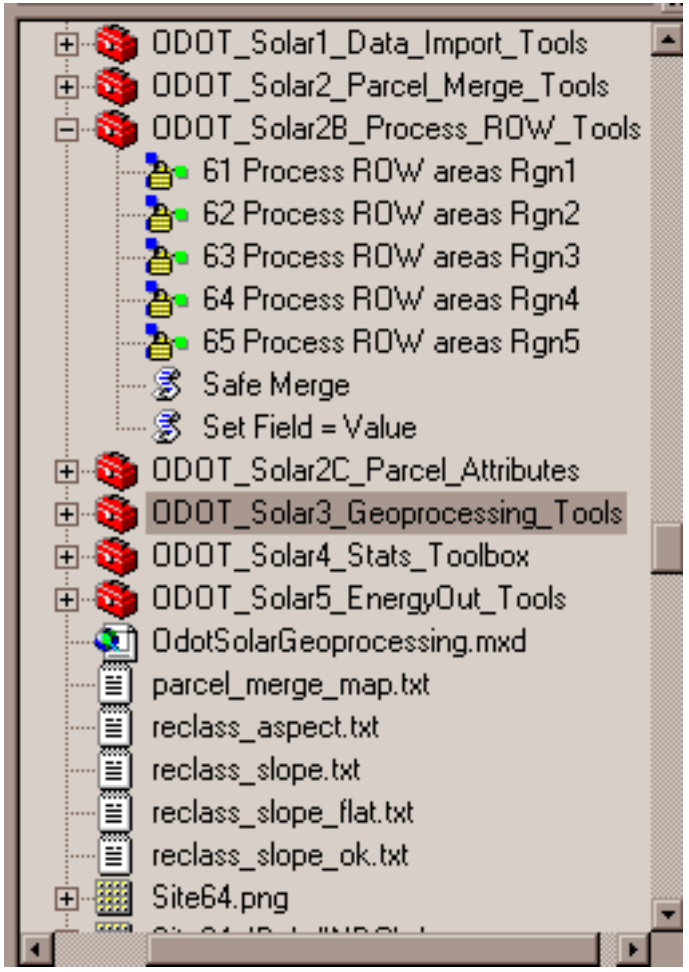


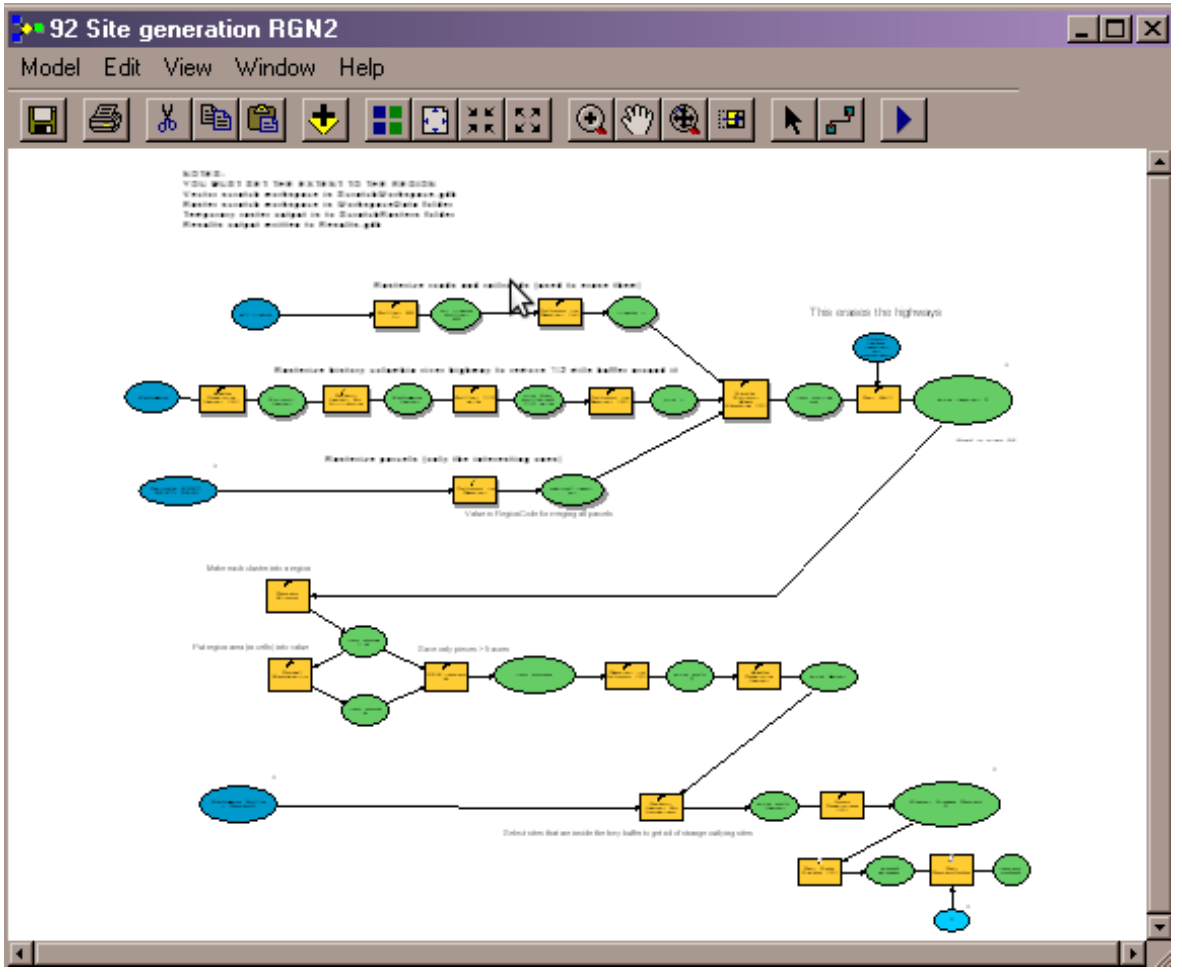
Models and Scripts

Seven ESRI Model Builder toolboxes

Each toolbox contains 5-15 models

Each toolbox has 5-10 python scripts





Results

ODOT is building 1.9M kwh Baldock rest area site.

Results from this project: 810 total, 344 “Maybe”, 57 “Yes”

57 sites graded as “Yes” would generate 449 million kwh

Nine times ODOT’s statewide requirement.

Oregon Department of Transportation

Alsea Geospatial, Inc.
www.alseageo.com

The people

ODOT Office of Innovative Partnerships

Lynn D. Averbeck, Project Director

Allison M. Hamilton

Alsea Geospatial, Inc

John Gabriel, project management

Brian Wilson, GIS programming and analysis

Ann Stewart, data management and GIS analysis

Lew Ladd, web site design