

Making our first map with Map Maker

This is intended to be a fun project that will demonstrate the use of some of the tools which can be used to build a map in Map Maker. By the end of it we should have a scaled map of a landscape feature, in this example the maze at Hampton Court Palace (see Figure 12) and have gained some insight into how Map Maker works. The software tools we shall be using to make our map are *Google Earth*, *DNR Garmin* and *Map Maker*, please ensure that they are installed on your computer. Sources for the software will be found near to the end of this document, under the heading ‘Software sources and acknowledgments’. All of the software has been tested in Windows XP and Windows Vista, though it might also work with some earlier versions of Windows. When using Google Earth an Internet connection will be required.

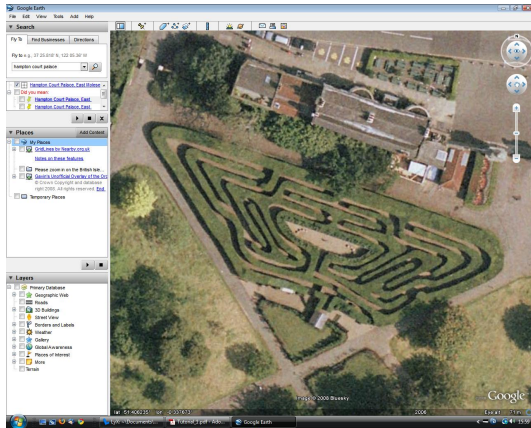


Figure 1: Hampton Court maze

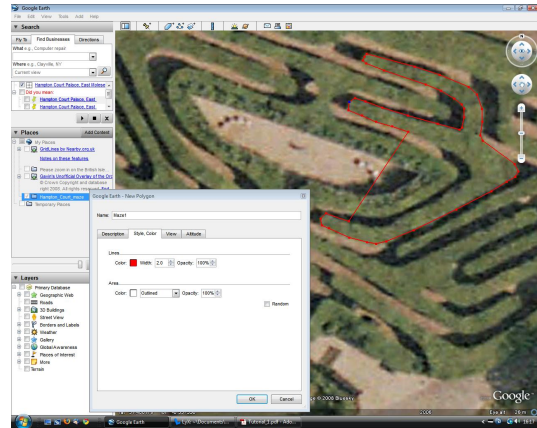


Figure 2: Partly-drawn polygon

The document is intended to be read in a PDF reader such as *Adobe Reader*, though it can of course be printed. However, all of the illustrations carry a fair amount of detail and can be zoomed in Adobe Reader by pressing the ‘+’ button (or by holding-down the ‘Ctrl’ key and rolling the mouse-wheel). The document also contains links, in red boxes, to locations within the document and links, in green boxes, to web pages and other locations on the Internet.

The mini-tutorial that follows is aimed at people equipped with the basic skills necessary to use personal computers for such tasks as word processing, installing software and moving files around. No knowledge of maps or mapping is assumed. It is hoped that by following the instructions given step-by-step almost anyone will be able to make a map.

Important note: as downloaded the software package DNR Garmin does not correctly convert latitude and longitude coordinates to the rectangular grid coordinates used by the British na-

tional grid. A simple fix for this problem is provided¹. By default DNR Garmin installs a file named 'epsg' in the folder 'c:\program files\dnr Garmin\proj\nad\'. Find this file and rename it to something like 'OLD_epsg'. Now click on this link and download the file 'epsg.zip' from the author's web site. Navigate to where you saved the downloaded file and right-click on it. From the drop-down menu select 'Extract All...'; in the box that pops-up click on 'Browse'; navigate to 'c:\program files\dnr Garmin\proj\nad\' and click the 'Extract' button. This will install the correct version of 'epsg'. This is all that needs to be done, DNR Garmin is now ready for use.

In this tutorial we will be:

- *Acquiring* the data we need to build our map. The data will be in the form of polygons traced from landscape features visible in Google Earth.
- *Transforming* the data into a format which can be loaded into Map Maker, using DNR Garmin.
- *Loading* the transformed data into Map Maker and displaying it as a scaled map.

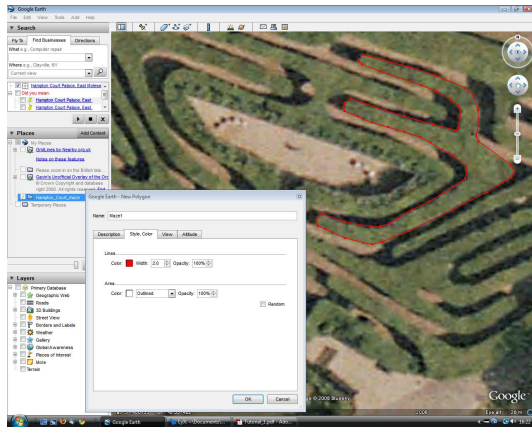


Figure 3: First polygon completed

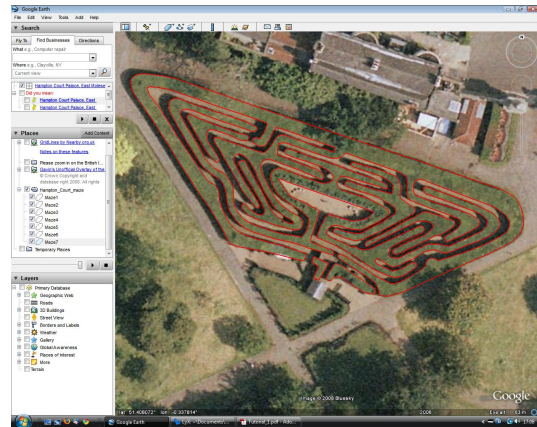


Figure 4: Tracing completed

Acquiring the data

Start Google Earth (GE), navigate to Hampton Court Palace and zoom-in on the maze, which is near to the road, about 330 metres due north of the palace. Your screen should now look like the one shown in Figure 1.

Find 'My Places' in the 'Places' pane of GE and right-click on it. From the drop-down menu that appears select 'Add' then go right and select 'Folder'. In the 'New Folder' box which appears

¹Those who are comfortable about editing text files might prefer to open the file 'c:\program files\dnr Garmin\proj\nad\epsg' in a plain text editor and search the file using the term '27700'. This will take you to the following line in the file: '# OSGB 1936 / British National Grid'. The line immediately below this line needs to be replaced with '<27700> +proj=tmmerc +lat_0=49 +lon_0=-2 +k=0.999601 +x_0=400000 +y_0=-100000 +ellps=airy +towgs84=446.448,-125.157,542.060,0.1502,0.2470,0.8421,-20.4894 +units=m +no_defs no_defs <>' All on one line, remove my leading and ending single-quotes, of course.

type a name for your project in the 'Name' field ('Hampton_Court_Maze' has been used here) then click 'OK'. The new folder will appear under 'My Places' in a pane on the left-hand side of the GE screen.

Now right-click on the newly-made folder ('Hampton_Court_Maze') select 'Add' from the drop-down menu, then go right and then down to select 'Polygon'. This will bring up a 'New Polygon' box. In the 'Name' field of the box give the polygon you are about to create a name ('Maze1' will do nicely). Now click the 'Style, color' tab and change the line width to 2.0 and the line colour to something that stands out, red in the example. Finally, under 'Area' set the polygon to be outlined, not filled. Now, if necessary, move the new polygon box to one side so that it does not obscure the feature around which you wish to trace (do not press 'OK').

We are now ready to start tracing the first feature of interest. Select a starting point on a hedge and click on it, then trace the outline of the hedge clicking at points where the line changes direction. Figure 2 shows a partly-drawn polygon. It should be noted that when you click to insert a point in a polygon, that point will be connected by a line to the previously inserted point and by another line leading to your first point. This can be confusing, but keep clicking round the outline of the hedge until you complete the polygon and everything will come out correctly. Don't bother to correct mistakes as you are tracing the polygon, when you have finished tracing you may go back to any point that is out of place and 'pull' it into the correct position. The completed polygon should resemble the one shown in Figure 3. When everything looks satisfactory, click 'OK' in the new polygon box. This will close the box and a new item entitled 'Maze1' will appear in the 'Hampton_Court_maze.' folder .

We must now trace the remaining hedges in the maze. Right-click on the 'Hampton_Court_maze' folder, add a polygon named 'Maze2', trace it and save it, doing everything in exactly way that we used for the first polygon. Repeat this procedure to trace the remaining five polygons, naming them 'Maze3', 'Maze4' and so on. When you have drawn them all your view in GE should resemble that shown in Figure 4.

At this stage, we will have seven polygons stored in the folder 'Hampton_Court_maze'. The final thing to do in GE is to export our new polygons as a KML file. Right-click on the folder 'Hampton_Court_maze' and select 'Save Place As' from the drop-down menu. In the box which pops-up, select a location in which to store the file (the Desktop perhaps, but anywhere where you can find the file again). Name the file 'Hampton_Court_maze' and then under 'Save as type:' select 'Kml (*.kml)'. Then press 'Save' and the KML file will be saved to the location that you chose. GE may now be closed.

Transforming the data

It is now time to convert our polygons, which were saved all in one Google Earth KML file, to a *projected shape-file* ready for loading into Map Maker. To do this we use the free software package *DNR Garmin*. Start DNR Garmin and wait while it loads. It will pop up a box reminding you that no GPS receiver is connected to the computer, dismiss this by clicking 'OK'. Depending on the configuration of your computer other warning boxes might also appear, if they do, in each case click on 'OK' to dismiss them. We must now tell DNR Garmin which datum and coordinate

systems to use; in our case this will be the British national grid. In DNR Garmin click 'File' and select 'Set Projection' from the drop-down menu. This will pop up a box; in the box click the 'EPSG' radio-button and in the 'POSC Codes:' field type '27700', then press return. Make sure that 'British National Grid' is highlighted then click 'OK'. These settings will 'stick' in DNR Garmin until you change them.

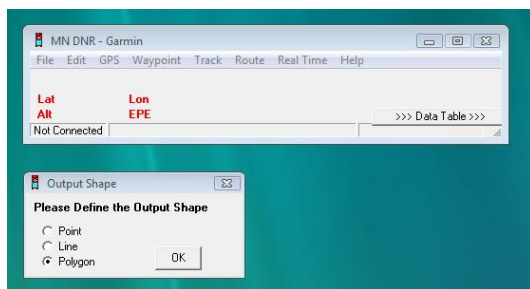


Figure 5: Setting the data type

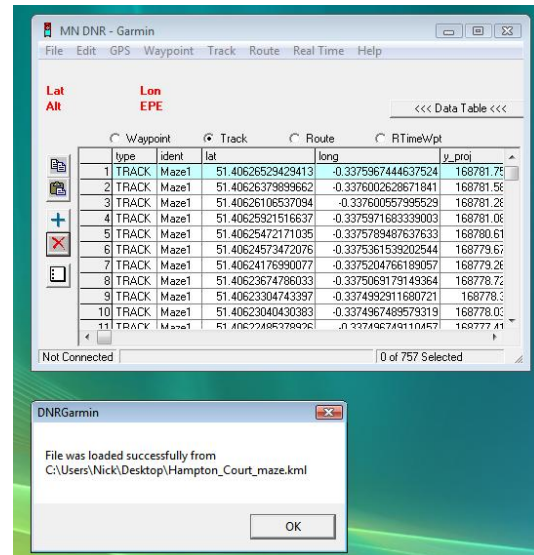


Figure 6: Loaded KML file

We shall now import our KML file into DNR Garmin. Click on 'File', select 'Load From' from the drop down menu and then go right and select 'File...'. This will pop-up a box. In the bottom right-hand corner of the box you will see a button labelled 'Text File (*.txt)', click on this and change the setting to 'Google Earth Format (*.kml)'. Then navigate to where you saved your KML file, select it and click on 'Open'. DNR Garmin will now pop-up a box asking you define the output shape, see Figure 5. We traced polygons, so click the 'Polygon' radio button and then click 'OK'. The KML file will load and pop-up a box to say that the file loaded properly, see Figure 6. Clear this box by pressing 'OK'.

At this stage you might care to make the DNR Garmin window wider so that the data which was loaded may be seen (drag the right-hand edge of the window). The latitude and longitude of every point (every *vertex*, in the jargon) of every polygon is shown in Columns three and four. The next two columns show these coordinates *projected* as Ordnance Survey grid references, the northings first and the eastings in the next column (this is not the usual way round, but do not be concerned about this).

We now have to export the polygon data from DNR Garmin in a form, a *shape-file*, that can be loaded into Map Maker. In DNR Garmin click on 'File', select 'Save To', then go right and click on 'File...'. This will pop-up a box, see Figure 7. Type a name for your file in the 'Name' field ('Hampton_Court_maze' for example). Then click on the 'Save as type:' bar, select 'ArcView Shape File (Projected) (*.shp)' and then click 'Save'. A box will pop-up, see Figure 8, asking

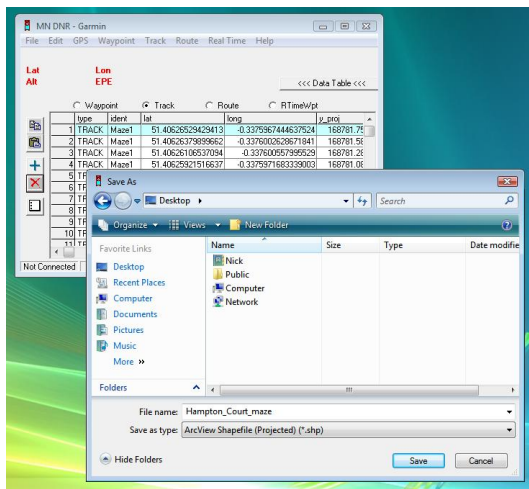


Figure 7: Exporting to shape-file

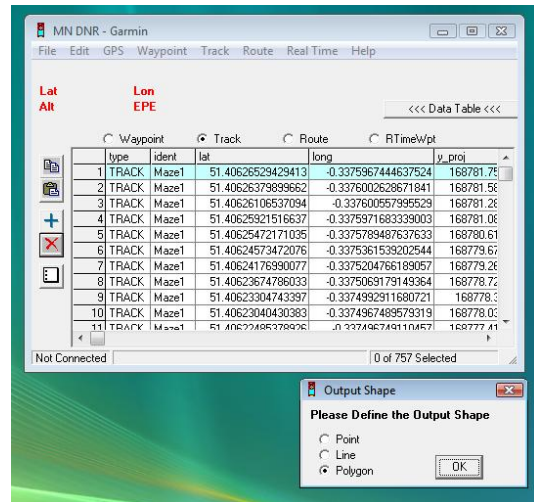


Figure 8: Define the shape of the object

you to define the output shape, our shapes are polygons so click the 'Polygon' radio button, then click 'OK'. A box will pop-up to inform you that file was written successfully, dismiss this by clicking on 'OK' and then close DNR Garmin.

If now you navigate to where you told DNR Garmin to store the shape-file you will find a file called 'Hampton_Court_maze.shp' (assuming that you named the shape-file to be exported from DNR Garmin 'Hampton_Court_maze'). You may also note that DNR Garmin created two other files 'Hampton_Court_maze.dbf' and 'Hampton_Court_maze.shx'. These two files contain important information about the shape-file and it is important that the three files should be kept together in the same folder. If ever you move the shape-file to a new folder, remember to move the other two files with it as well.

Loading the polygon shape-file into Map Maker

A wonderful moment has arrived and we shall now load the shape-file that we created with DNR Garmin into Map Maker. Start Map Maker, click on 'File' and from the drop-down menu select 'Add layer'. Map Maker will respond by popping-up a 'Choose file' box, see Figure 9. Click in the 'Files of type:' field and select 'ArcView Shape file (*.shp)' from the drop-down menu, then navigate to where your newly-created shape-file is stored. Click on the file and then click 'OK'. A layer set-up box will appear with two rows of tabs at the top, see Figure 10. Click the tab 'Assign according to...' and select 'All one style' from the list which appears. In the 'Choose style' box which appears highlight the 'agriculture' style (or any other style, but preferably one that has a green fill). Now click on the 'Labels' tab, see Figure 11, click on 'No label' and then click 'OK'.

If all goes well you should end up with a map resembling the one shown in Figure 12, but better, your tracing will be more accurate than the author's. We now have something quite

extraordinary, a true map of the maze at Hampton Court palace, set on the Ordnance Survey national grid to an accuracy of a metre or so. Now save your Map Maker project. Click 'File' and from the drop-down menu select 'Save project'. Give your project a name and click the 'Save' button. Grid lines like the ones shown in Figure 12 may be added to the Map Maker view by clicking on 'Navigate', selecting 'Screen grid' from the drop-down menu and then going right to check the box for the grid required. In this case the grid was set to display at intervals of ten metres.

Congratulations! You have made a map of the maze at Hampton Court palace², a real map too and not just a pretty picture. As you move your pointer across the screen you will see the grid coordinates for the position of the pointer change. The coordinates, shown at the bottom left of the MM screen, are Ordnance Survey twelve-digit grid references. Perhaps you would care to add another polygon to the map, or draw a line showing the shortest route to the centre of the maze. These are things that are easily done in Map Maker, but by now we have probably covered more than enough ground for our first project, so the author will leave it to you to experiment further.

As a final check on the accuracy of your handywork, view your map in Google Earth. Centre the maze nicely on your screen, click 'File' and from the drop-down menu select 'View in Google Earth'. Depending on which version of MM you are using (and your project settings, in *Pro*) your map should either register perfectly on the GE image, or register very slightly off (*Gratis* does not know about such things as the difference between true north and grid north). If your image overlays the GE image with an error of about 100 metres you will need to revisit DNR Garmin and install the *projections* file 'epsg' properly, in accordance with the instructions given above.

Summing-up and some notes

This perhaps trivial-seeming exercise is intended to demonstrate 'hands-on' one way of generating map data, transforming it and displaying it in Map Maker. Your author hopes that the exercise will have given you just a slight *feel* for Map Maker and for its potential. Map data does not, of course, have to be derived from Google Earth, for example GPS data or survey data might have been used instead. But heck, you have to start *somewhere*.

Here are some notes that might be of help when using the software packages discussed:

Google Earth. In Google Earth you can create the following '*objects*', as they are called: *points* (GE calls these 'placemarks'), *lines* (GE calls these 'paths') and *polygons* (GE does in fact call these 'polygons'). In the tutorial we drew polygons, 'Maze1', 'Maze2', and so on, and stored them in a GE folder called 'Hampton_Court_maze'. We then exported the folder 'Hampton_Court_maze' from GE as a KML file that contained *all* of the polygons. However, a GE folder should contain objects of only one type. When you are tracing a landscape feature, store your polygons in one GE folder, your lines in a different

²In the example, Figure12, your author has inserted a couple of barriers at strategic positions in the maze (for obvious reasons, something like these must exist even though they can not be seen in Google Earth).



Figure 9: Selecting a shape-file to load

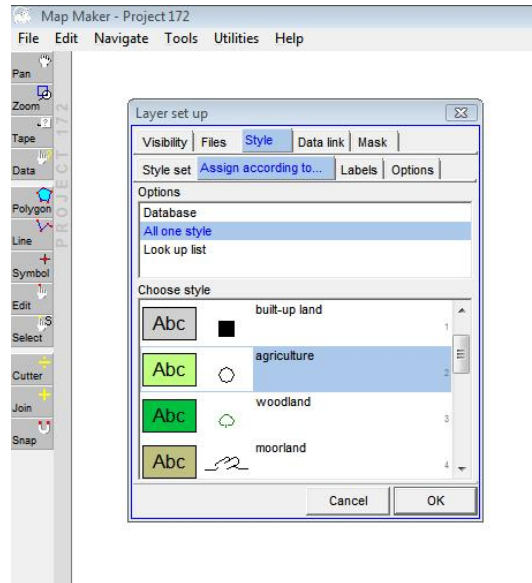


Figure 10: Setting a style for the layer

folder and your points in a different folder again. Then export each folder in turn from GE and save it to its own KML file for conversion by DNR Garmin. DNR Garmin can only convert KML files that contain objects of one type.

In the author's experience the main problem found when tracing shapes in GE is caused by the fact that, ideally, the satellite would be directly over the feature of interest at the time when the picture was taken, so that a perfect plan view was obtained. This is, of course, impossible for most of the time and as a result most GE imagery will show, for example, not just the roof of a building but also a distorted view of one or two of its sides. Figure 13 shows a GE image of a wind turbine by the side of the M4 Motorway, near Reading. Ignoring the dark shadow, note that this is not a perfect plan view. So, should we wish to put a GE point on the site of the turbine, where should we put it? On the top of the turbine, or at the centre of its base? There is a big difference between the two, something like twelve metres. The answer is, as always, at the centre of its base *at ground level*, where the author has set a marker showing its Ordnance Survey national grid reference³. When tracing the plan of a tall feature (or even a not-so-tall feature) in GE you have to try and trace the plan of the feature *on the ground*. This would not apply, of course, to features that are effectively at ground level, or where the GE image is pretty much a perfect plan, such as our maze at Hampton Court.

DNR Garmin. When importing a KML file DNR Garmin will ask whether the file contains polygons, lines, or points and you must supply the correct answer. When exporting a

³Did you know that you could get OS grid references from Google Earth? Well you can, in a slightly roundabout way. Go here and download Item 9, 'GB & Ireland Grid-Lines Layer'. It's a KML file containing a network link.

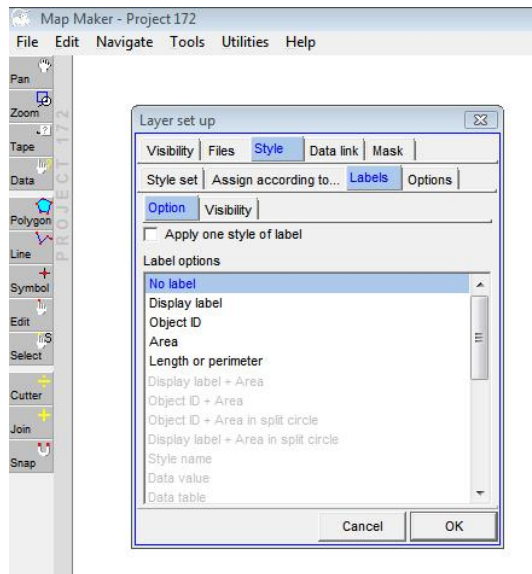


Figure 11: Set the 'No label' option

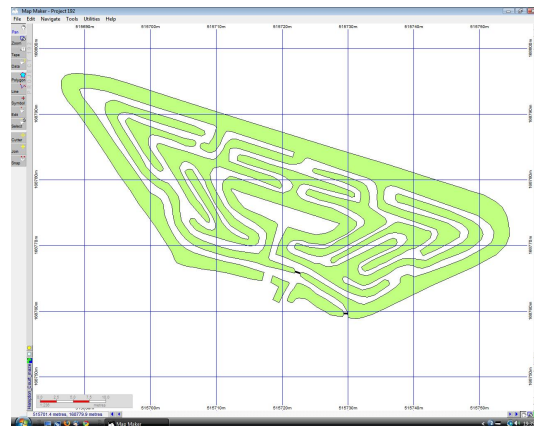


Figure 12: The completed maze

shape-file from DNR Garmin the program will ask you to whether the file is to be saved as a point shape-file, a line shape-file, or a polygon shape-file. If your input KML file contained lines, you must click the 'line' radio button, for polygons you must click the 'polygon' radio button and for points you must click the 'point' radio button.

Map Maker. In the tutorial we added a shape-file containing seven polygon, to our project. The shape-file was loaded into its own Map Maker *layer*. Maps are built in Map Maker by adding layers until the map is complete. Experiment with adding more layers to the 'Hampton Court maze' project, lines perhaps, or points. At any time you can see what layers are loaded in Map Maker by pressing the space bar and from here you can change the way in which the objects are displayed. This will entail selecting a different *style* for your objects. In Map Maker *styles* are probably the cause of the greatest puzzlement that the budding map maker will have to face. Perhaps your author will at some time write another mini-tutorial on styles, but until the dawning of that happy day, please read the manual.

Software sources and acknowledgments

Map Maker Gratis is the free version of a fully-featured map-making software package *Map Maker Pro* and may be downloaded from this web site. The tutorial was written for use with the Gratis version and the author of this document expresses his warm thanks to Map Maker Limited of Kintyre, Scotland, for making this truly remarkable software package freely available to the public.

DNR Garmin is free software produced by the Minnesota Department of Natural Resources and

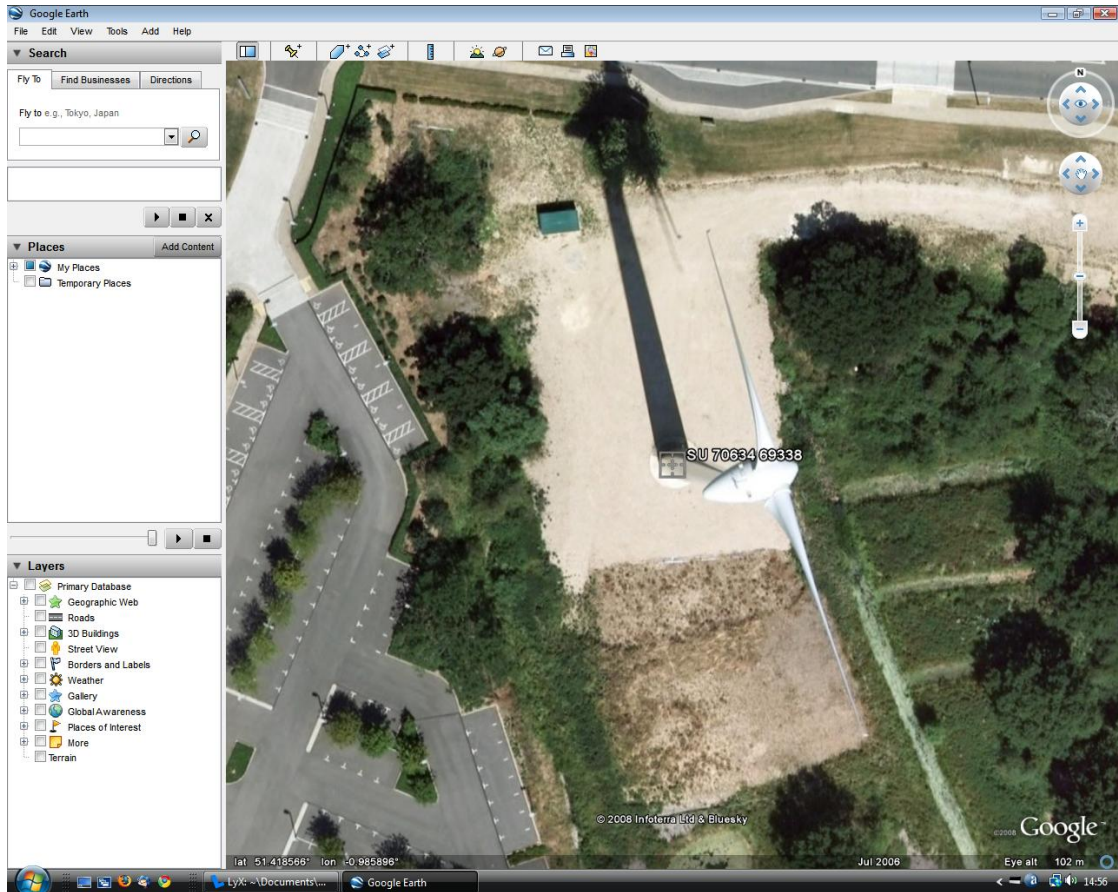


Figure 13: Wind turbine

may be downloaded from the MDNR's web site. Their generosity in making the program freely available is hereby acknowledged. It is however devoutly to be wished that they would fix the problem with the projections file, to save us from having to do it.

Google Earth may be downloaded here.

ENOUGH! If you would care to address any comments you might have on this mini-tutorial to the author at the email address given below, he would be grateful.

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November, 2008

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