

Surface Cost Analysis of a Pretend Pipeline Through Manning Provincial park

Mark Stephens

December, 2007

- [Abstract](#)
- [Introduction / background](#)
- [Data Source](#)
- [Data Manipulation](#)
- [Method/process](#)
- [Results](#)
- [Conclusions/Discussion](#)
- [Future works / developments](#)
- [References](#)

Abstract

My project deals with cost analysis of Manning Provincial park in southern British Columbia. Were I will be attempting to plan a pipeline through the park with the least disturbance to people, and the environment. This cell by cell analysis can be a powerful tool for the transportation industry.

Introduction

Pipeline, Hydro lines, and roads are expanding at a fast rate in British Columbia. This can cause problems when they run through Parks, wildlife reserves, or are with in view of roads or houses. this project deals with the mapping of a pretend pipeline through a sensitive area in British Columbia. The area that I have chosen is Manning Park it is 70,844 ha and has Highway 3 running through it. I chose Manning Park due to the fact that it is a popular park in southern British Columbia. Among the normal park activities like camping, fishing, hunting, and hiking the park also has a ski hill. All of these factors have to be taking in to account. Manning Park is, by the fact that it is a provincial park and is highly used by the public is therefore a sensitive area, and a pipeline that runs through it will have to take special precautions. My objectives are to map a pipeline through the park while having minimal disturbances to the environment, and minimal view ability from the road, with minimal disturbance to the public that uses the park.

Study Area and Data Source

The area that I have conducted the surface cost analysis in is the Manning Provincial park. The park is 77,844 Ha and is one the the more popular parks in southern British Columbia.

Data Source

- TRIM 2 Data for: 92H 5,6,7,15,16,17,23,24,25,26,27
 - DEM
 - Contours
 - Rivers
 - Roads
 - Water Features
 - Surface Features
- Slope
- Rivers Buffers
- Road Buffers
- Viewshed
- Aspect
- Road Points

Data Manipulation

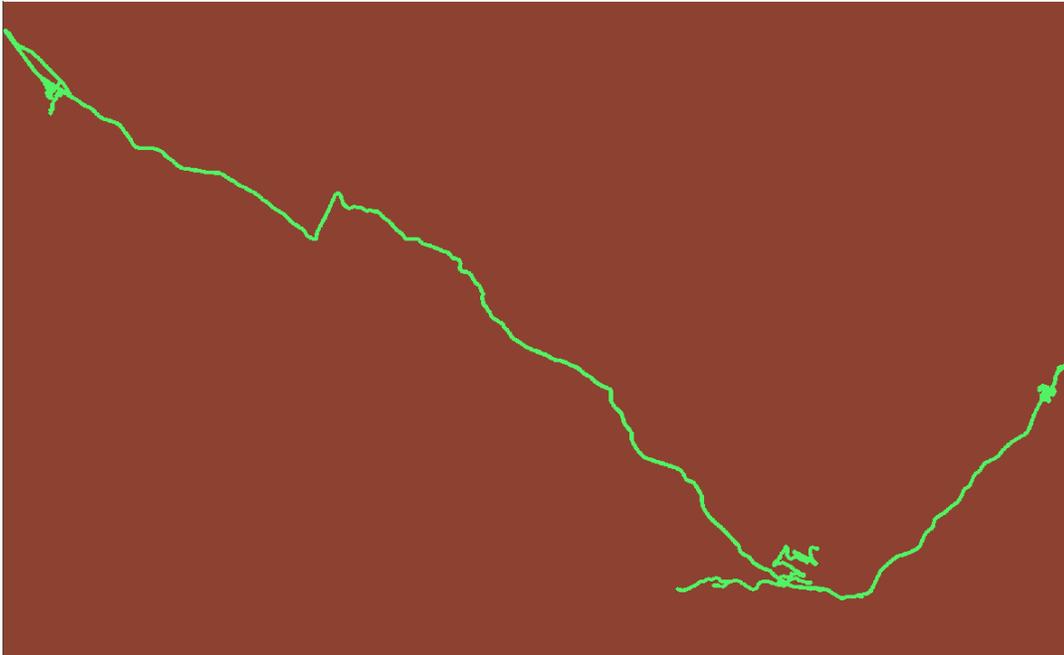
- The data use in this project came from TRIM2, because of this little needed to be done to the TRIM2 data. I generated the DEM witch came in the form of ACSII using ArcGIS Toolbox tool *ASCII to Raster*. I then clipped the data to my area-of-interest, once the clipping was done I then all the data was converted to UTM zone10 North, with the datum being NAD83.
- The the Rasters go from 0 to 10.

Methods / Procedure

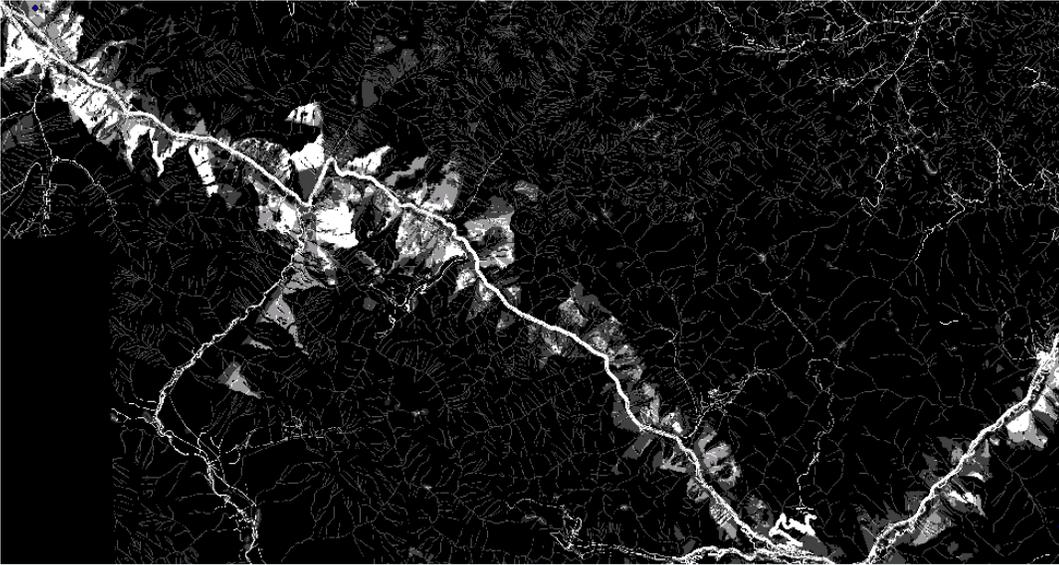
- First I converted Rivers,Roads,Water Features, and Surface Features in to raster. I did this because I would have to use the Raster Calculate later on to create the cost raster. I accomplished this by using the Spatial Analyst tool bar, under Convert then *features to raster*.
- The next step was to generate the other necessary rasters. For this project that was Slope, Aspect, Viewshed,River Buffers, and Road Buffers.
 - The slope and aspect were generated in much the same way using tools from the Spatial Analyst tool bar, using the Surface analyst.
 - The viewshed was a bit more complex. I first had to digitize points along the road so that the viewshed would work correctly. The DEM and the road points were put in as the inputs for the viewshed tool. The the following out put was generated.



- I then Buffered the Roads and Rivers, to 75 Meters. Because you do not want a pipeline running to close to them. This was accomplished by using the Buffering tool in the toolbox.

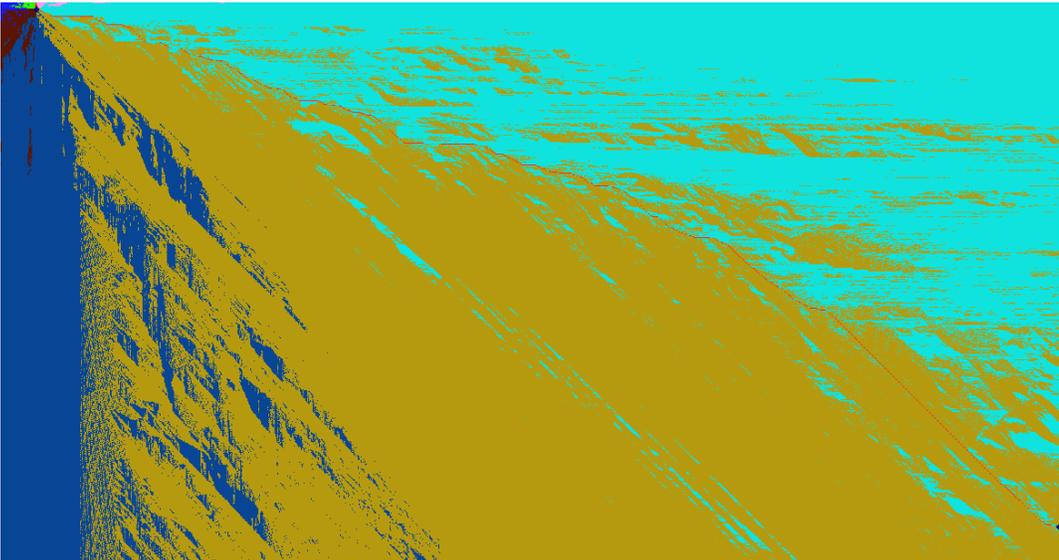


- Then all the raster layers had to be added together and multiplied by their weight. The resulting raster looking like this.



The Lighter being higher cost to travel over the cell.

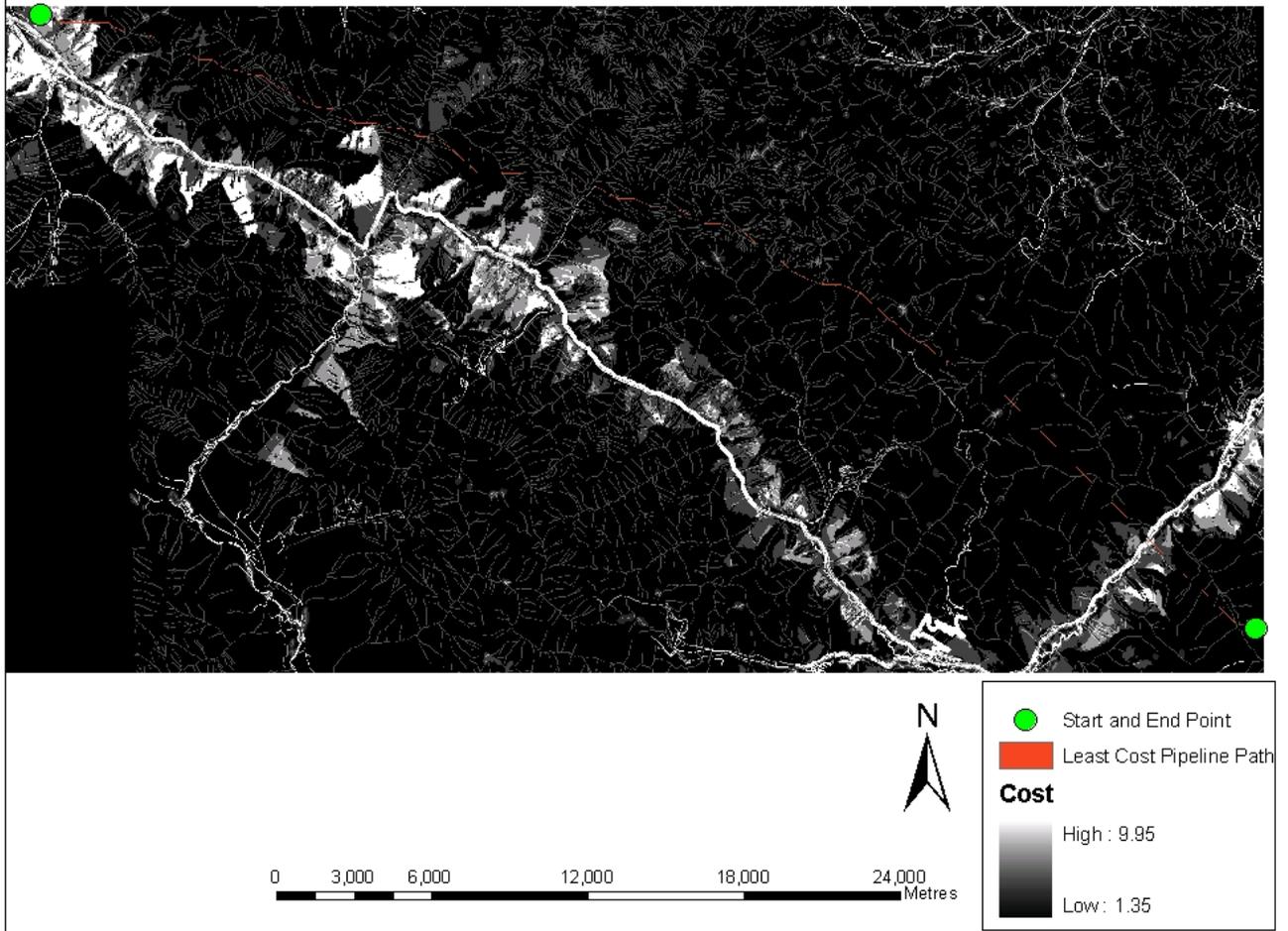
- Before running the Cost Path tool from the Toolbox I had to generate two other cost raster. These were done using the distance tools in the the toolbox under spacial analyst.
 - The first of witch was a cost distance raster.
 - The second was Cost Backlink Raster.



Results

- Once the the cost rasters were generated I used them as the inputs for the the Cost Path. I was able to use the Cost path tool to calculate the cost path. The resulting raster is shown by the map below.

Least Cost Pipeline Through Manning Park



Conclusions / Discussion

I found that I was able to calculate the least cost path with relative ease. The least cost path is a very effective way to map Roads, Hydro lines, Pipelines, and any other construction that uses a Right-of-Way. This method allows proposed construction to take place in areas, such as parks, that need to have special consideration taken in to account. I did find some difficulty in this process when it came to generation the cost raster. I forgot to take in to account the "No Data" field in my rasters. So when I added them and multiplied them by the cost i would get No data. After having this pointed out to me, I reclassified the No Data field to be 0. Once this was done i had no problems with the rest. One of the hardest parts of the project was determining the cost to multiple the rasters by. In the Ideal case it would be on a scale of 0.00 to 1.00 and the user would be given the costs.

Future Works / Developments

- As of now I have no future work planned for this project. One day it would be nice to to program this process to make it fully automated.

References

Websites:

- <http://www.innovativegis.com/basis/MapAnalysis/Default.htm>

Lecture Notes from Geography 413: Advance GIS.