

Lower River Floodplain Restoration and Levee/Towne Road Re-Alignment Noise Analysis

This project is not anticipated to create additional noise beyond the current background levels. Although Towne Road is being re-aligned closer to a number of residences, the volume and close proximity to East Anderson Road result in noise levels that are below the FHWA Noise Abatement Criteria (Title 23, Code of Federal Regulations, Part 772), and that are well below the background noise generated from East Anderson Road. The following abbreviated noise analysis addresses temporary construction noise and permanent traffic noise from the re-aligned Towne Road.

Sensitive Receptors

Sensitive noise receptors are, in general, those areas of human habitation or substantial use where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment. These can include residences, schools, hospitals, parks, and places of business requiring low levels of noise. Within 1300 feet of the centerline of the new route, the following receptors are present.

Table 1. Receptors Near the Project Site

Residence Name	Distance (ft.) to Towne Rd. (New Alignment)	Distance (ft.) to Towne Rd. (Old Alignment)	Distance (ft.) to E. Anderson Rd.
Shults	1092	221	344
Melancon	910	217	221
Najera	675	302	117
De Ford	419	533	129
Bohn	204	1146	153
Houk	403	1487	147
Cufley	363	1436	320
Freeman Trust	650	1672	242
Eberle	1025	1515	2040
PCC*	1288	1820	620
Brown**	988	1380	263

East Anderson Road Traffic Noise

Data for East Anderson Road traffic noise was based on Clallam County Road Logs and Traffic Counts (Clallam County, 2009). The legal speed through this portion of the project area is 35 mph as Sequim-Dungeness Way intersects East Anderson. Traffic volume was based on actual counts at East Anderson Road (MP 1.2) from 2009. This Average Daily Traffic Volume (ADT) was 1270 vehicles. This volume includes 72 percent cars, 21 percent medium trucks and 7 percent heavy trucks¹. It is important to note that this measurement was taken approximately ½

¹ Vehicle type was estimated from actual counts of Sequim Dungeness Way, north of Medsker Road, 4/2/2017-4/8/2017.

mile west of the project site and is likely to show a much lower volume than the vehicle use closer to the intersection of East Anderson Road and Sequim-Dungeness Way, a major route. Vehicle counts from 1999, taken on Sequim-Dungeness Way near this intersection (MP 4.04), showed an ADT of 2385

Towne Road Traffic Noise

According to 2017 Clallam County vehicle counts, the Average Daily Traffic (ADT) on Towne Road, measured near the intersection with East Anderson Road (MP 2.66) is 450 vehicles per day. This volume includes 75 percent cars, 20 percent medium trucks and 5 percent heavy trucks²

Construction Noise

For this current project description, the construction noise levels have been based on the most recent version of the Federal Highways Administration's (FHWA) Roadway Construction Noise Model Database (RCNM, USDOT, 2006). The data was derived from dozens (in some cases, hundreds) of samples taken of heavy construction equipment used in the Central Artery/Tunnel (CA/T) project in Boston and has the most comprehensive noise control specification ever developed in the U.S. (USDOT 2006). These noise levels were also compared to several actual measurements of equipment noise from the Elwha Bridge Replacement Project (Table 1). The noise levels from the Elwha Project were found to be at or below those from the FHWA data. This is not surprising since the CA/T project involved larger equipment than the Elwha Bridge Replacement project.

Table 2. Construction Equipment Noise Levels

Equipment	dB Measured Average L_{max} at 50 feet	
	From FHWA (2005)	Measured at Elwha^a
Excavator	81	71
Dump Truck	76	65
Grader ^a	85	-----
Backhoe	78	72
Paver	77	-----
Bulldozer	82	-----
Roller	80	-----
Pickup Truck	75	71.5 (large semi truck)
Front-End Loader	79	72

^a The Elwha levels are used for comparison only.

² Vehicle type was estimated from actual counts of Sequim Dungeness Way, north of Medsker Road, 4/2/2017-4/8/2017.

Following the rules³ for combining noise levels (WSDOT 2008) the combined noise from the above equipment is **88 dB**. This noise would be temporary and limited to daylight hours.

³ The maximum dB of the three loudest pieces of equipment are: 85 (grader), 82 (bulldozer), and 81 (excavator). The two loudest pieces differ by 3 dB, therefore 2 dB is added to 85 to equal 87 dB. The difference between 87 dB and the third loudest piece (81 dB) is 6 dB, therefore 1 additional dB is added to 87 to equal a combined noise of 88 dB.

Analysis

Two methodologies were used to assess noise impacts. To calculate the noise resulting from traffic using the re-aligned Towne Road route (as well as East Anderson Road), the **FHWA Low-Volume Traffic Noise Model, Version 2.5** (USDOT, 2004) was utilized. This is a simplified calculator that is useful for roads with low vehicle counts. A distance of 50 feet from centerline was used along with projected vehicles/hour rates from Towne and Anderson Roads. The results are shown in Table 3 and 4.

Table 3. FHWA Low Volume Calculator for Towne Road

Primary Lane		Opposing Lane	
Characteristics			
Pavement Type: Average	Grade (%): 2 Uphill	Pavement Type: Average	Grade (%): 2 Downhill
Traffic			
Lane Average Speed (mph): 35	Average Traffic (# Vehicles): 450	Lane Average Speed (mph): 35	Average Traffic (# Vehicles): 450
Cars (% of Total Volume): 75 % Medium Trucks (% of Total Volume): 20 % Heavy Trucks (% of Total Volume): 5 %		Cars (% of Total Volume): 75 % Medium Trucks (% of Total Volume): 20 % Heavy Trucks (% of Total Volume): 5 %	
Receiver Distance from Roadway (ft): 50			
Noise Abatement Criteria Activity Category: Activity Level B 67 dB(A)			
Calculate Noise (LAeq, 1 hour)			
Results			
Primary Lane Noise (LAeq, 1 hour): 51.3 dBA	Total Noise (LAeq, 1 hour): 54.3 dBA	Opposing Lane Noise (LAeq, 1 hour): 51.3 dBA	

Table 4. FHWA Low Volume Calculator for East Anderson Road

Primary Lane		Opposing Lane	
Characteristics			
Pavement Type: Average	Grade (%): 6	Pavement Type: Average	Grade (%): 6
Traffic			
Lane Average Speed (mph): 35	Average Traffic (# Vehicles): 1270	Lane Average Speed (mph): 35	Average Traffic (# Vehicles): 1270
Cars (% of Total Volume): 72 % Medium Trucks (% of Total Volume): 21 % Heavy Trucks (% of Total Volume): 7 %		Cars (% of Total Volume): 72 % Medium Trucks (% of Total Volume): 21 % Heavy Trucks (% of Total Volume): 7 %	
Receiver Distance from Roadway (ft): 50			
Noise Abatement Criteria Activity Category: Activity Level B 67 dB(A)			
Calculate Noise (LAeq, 1 hour)			
Results			
Primary Lane Noise (LAeq, 1 hour): 56.3 dBA	Total Noise (LAeq, 1 hour): 59.3 dBA	Opposing Lane Noise (LAeq, 1 hour): 56.3 dBA	

The results show that traffic-generated noise from Towne Road would be **54.3 dBA** (at 50 feet) and traffic-generated noise from East Anderson Road would be **59.3 dBA** (at 50 feet). It should be noted that the closest receptor to the re-aligned Towne Road would be the Bohn residence, which is 204 feet. Using this FHWA calculator, the projected noise from Towne Road traffic would be **48.5 dBA**.

To compare the anticipated construction noise and the projected traffic-generated noise from vehicles using the re-aligned Towne Road route, a noise attenuation table was developed, using procedures from the **WSDOT Biological Assessment, Advanced Training Manual** (WSDOT 2015). The levels were compared against the background traffic-generated noise levels for East Anderson Road. Construction noise was treated as a point source with a reduction of 7.5 decibels per doubling of distance. Traffic noise was treated as a line source with a reduction of 4.5 decibels per doubling of distance. All sites were treated as “soft” given the fair amount of pastures, trees and shrubs in the area. Table 5 shows the attenuation rates and results in graph form.

Table 5. Noise Attenuation Table.

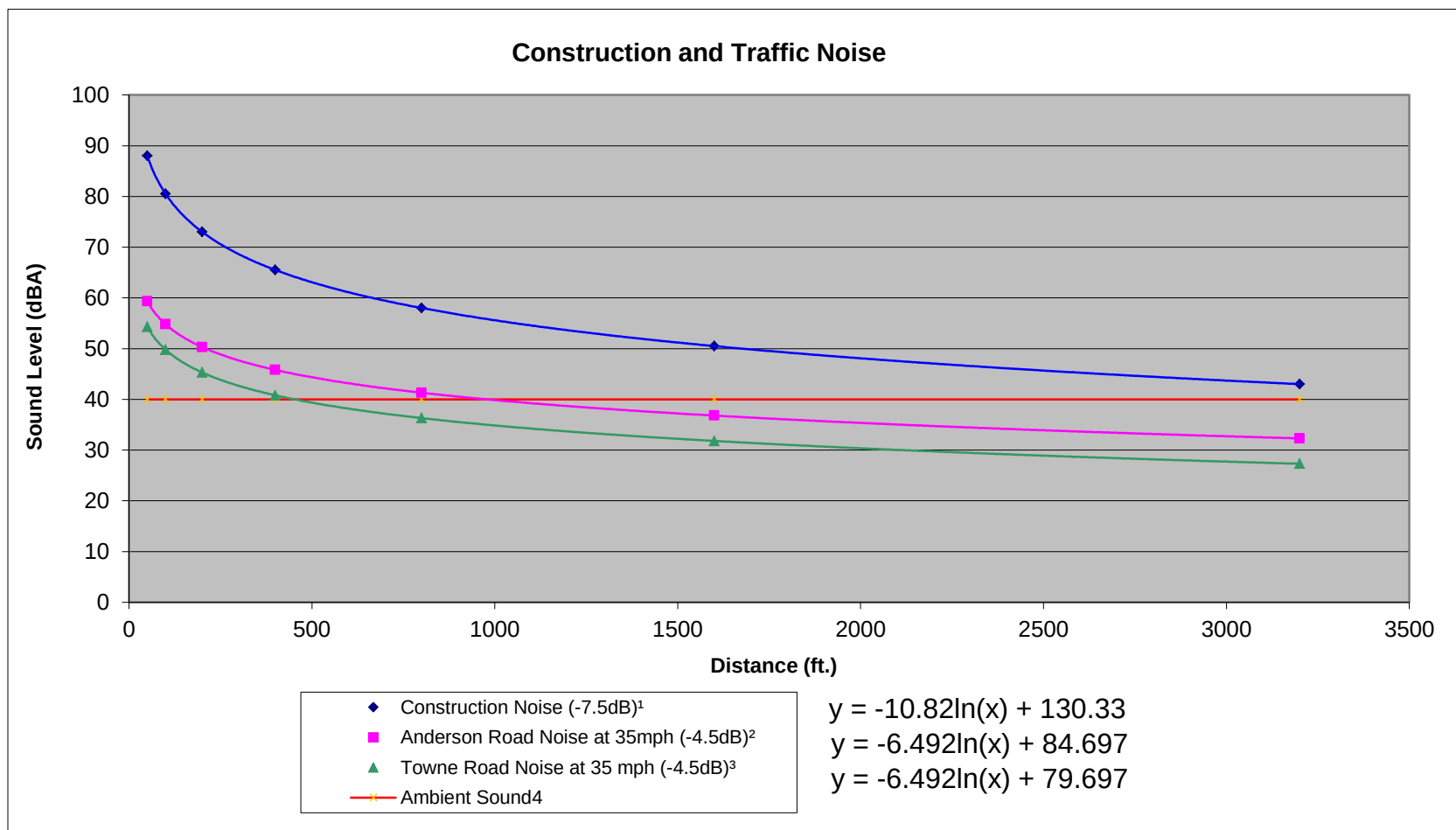
Distance (ft.)	Construction Noise (-7.5dB)¹	Anderson Road Noise at 35mph (-4.5dB)²	Towne Road Noise at 35 mph (-4.5dB)³	Ambient Sound⁴
50	88	59.3	54.3	40
100	80.5	54.8	49.8	40
200	73	50.3	45.3	40
400	65.5	45.8	40.8	40
800	58	41.3	36.3	40
1600	50.5	36.8	31.8	40
3200	43	32.3	27.3	40

¹Based on soft site conditions.

²East Anderson data based on ADT of 1270 vehicles per day, from Clallam County vehicle counts, 2009.

³Towne Road Noise data based on ADT of 450 vehicles per day, from Clallam Co. vehicle counts, 2017.

⁴Based on noise levels from a residential density of 227 people per sq. mile (Clallam County census data)



A comparison of receptors, distance and noise levels can be compiled into one table.

Table 6. Comparison of Receptors and Noise (all in dBA)

Residence Name	Distance (ft.) to Anderson Rd.	Distance (ft.) to Towne Rd. (New Alignment)	Distance (ft.) to Towne Rd. (Old Alignment)	Construction Noise	Anderson Rd. Noise 35 mph	Towne Rd. Noise (New Alignment) 35 mph	Towne Rd. Noise (Old Alignment) 35 mph	Ambient Sound
Najera	117	675	302	54.6	59.8	46.3	51.5	40
Melancon	221	910	217	56.6	61.4	44.4	53.7	40
Shults	344	1092	221	59.8	58.5	43.2	53.6	40
De Ford	129	419	533	65.0	53.1	40.5	38.9	40
Bohn	153	204	1146	72.8	52.0	45.2	34.0	40
Houk	147	403	1487	65.4	52.3	40.8	32.3	40
Cufley	320	363	1436	66.6	47.2	41.4	32.5	40
Freeman Trust	242	650	1672	60.2	49.1	37.6	31.5	40
Eberle	2040	1025	1515	55.3	35.2	34.7	32.2	40
PCC*	620	1288	1820	52.8	43.0	33.2	31.0	40
Brown**	263	988	1380	55.7	48.5	34.9	32.8	40

* to Towne Rd. - w of residence

** to Towne Rd. - e of residence

***PCC and Brown are located immediately adjacent to Towne Road; Anderson Road is N/A in these cases

Noise Abatement Criteria

The following table is taken from the WSDOT Manual Traffic Noise Analysis and Abatement Policy and Procedures (WSDOT, 2006). It identifies noise levels in that are considered an impact on various land use activity categories.

Table 4. Noise Abatement Criteria (NAC) Table

Activity Category	Leq (h) (dBA)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.(1)(3)
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	-	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.
Source: U.S. Department of Transportation, 1982; endnote source WSDOT, 2005.		

Conclusion

Noise from the Lower Dungeness River Floodplain Restoration and Levee/Towne Road Re-Alignment will not reach levels where mitigation is required. Traffic-generated noise from vehicles using the new route will not exceed the Noise Abatement Criteria established by the FHWA at any of the receptor sites. While the receptor-site residences are rated as Activity Category B, the greatest noise at the closest receptor will not even exceed the threshold for Activity Category A.

The noise from East Anderson Road is the overriding factor in this area. Noise outputs from this road are 12-13 dB above any noise expected from traffic on the re-aligned Towne Road route, or are at levels that are below the ambient (background) noise levels. Although construction-generated noise will be above this background noise, it will be temporary and largely limited to daylight hours.

References

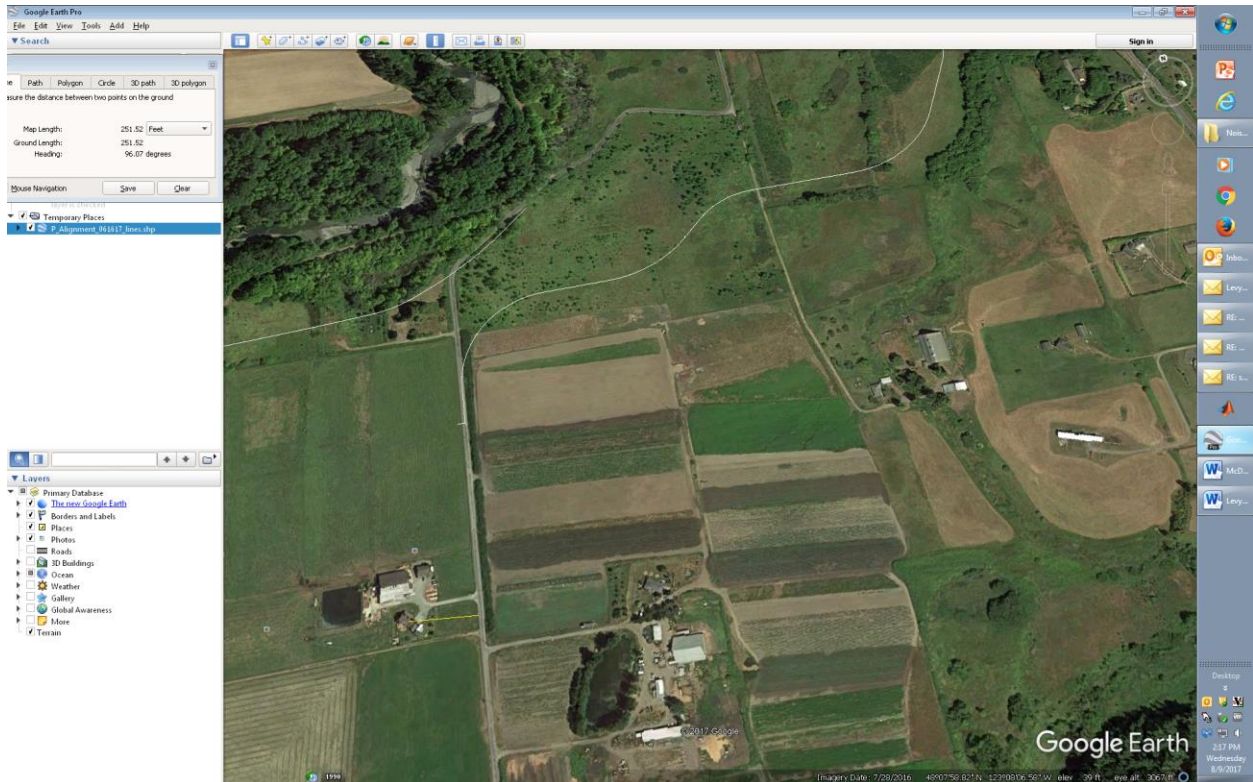
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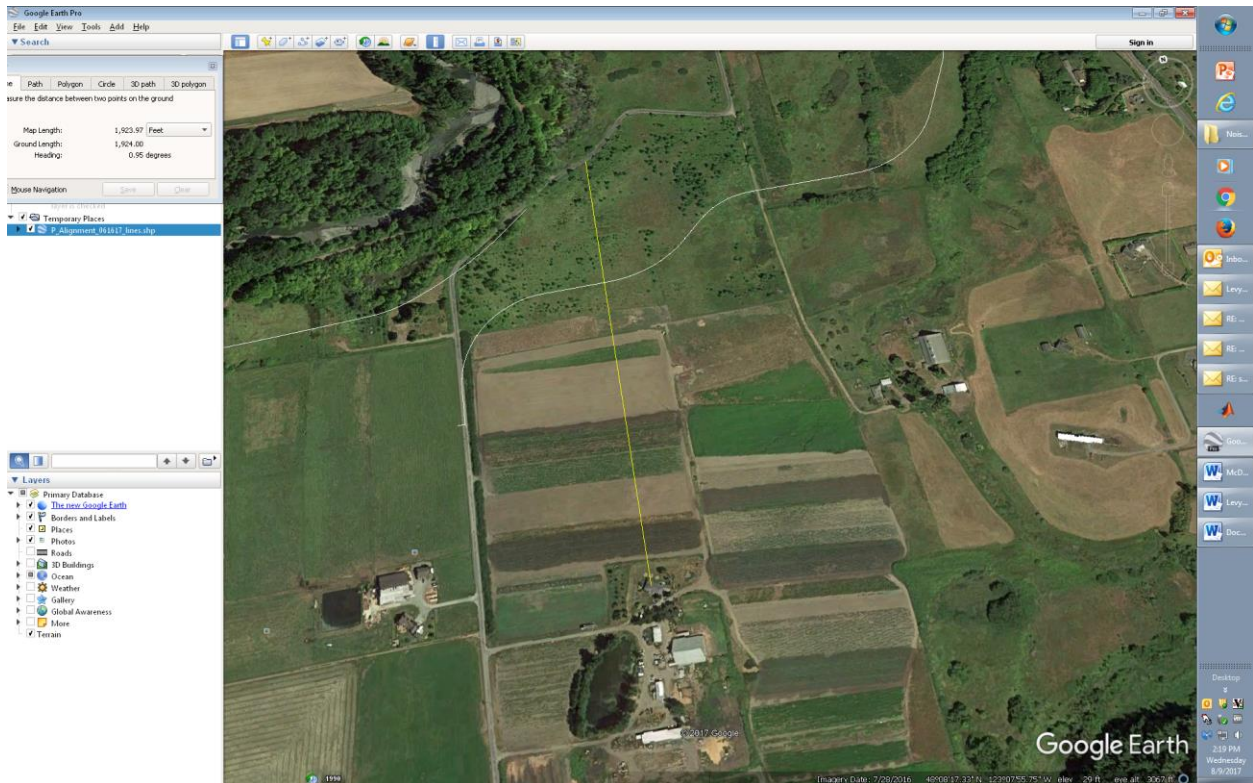
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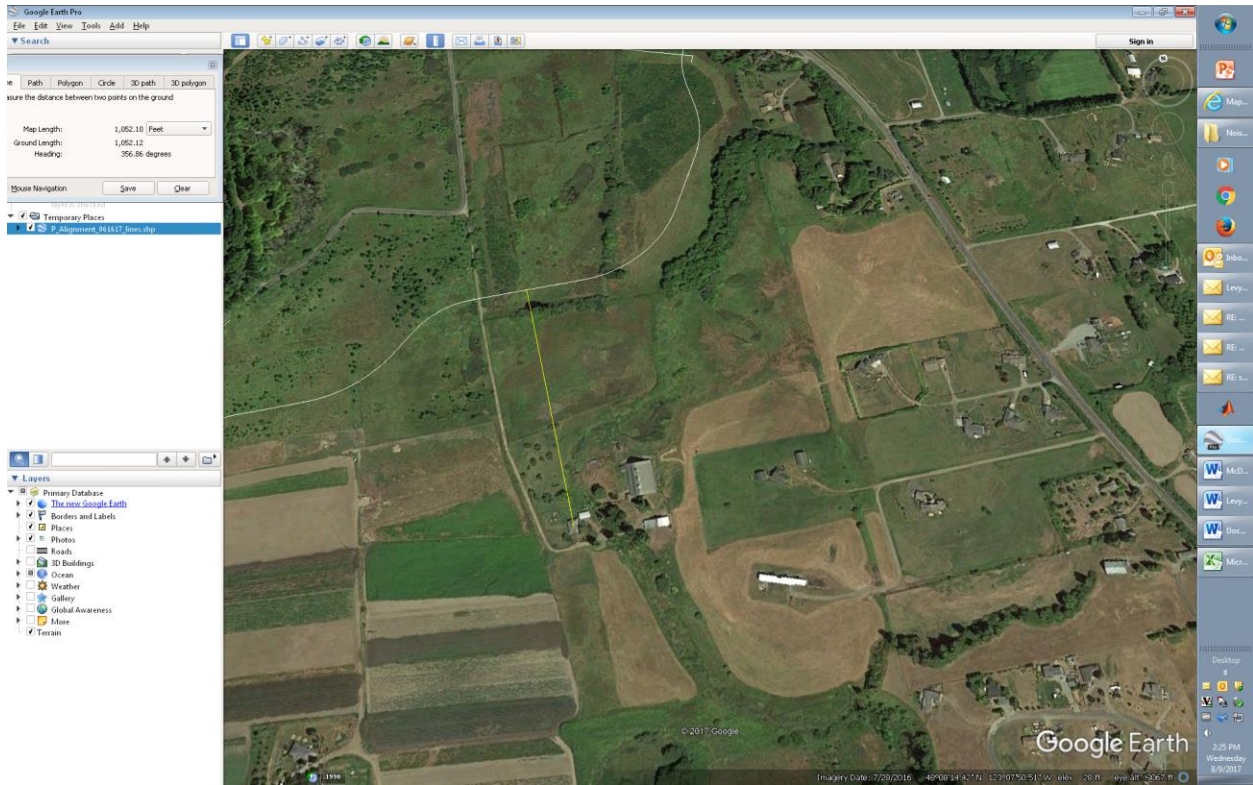
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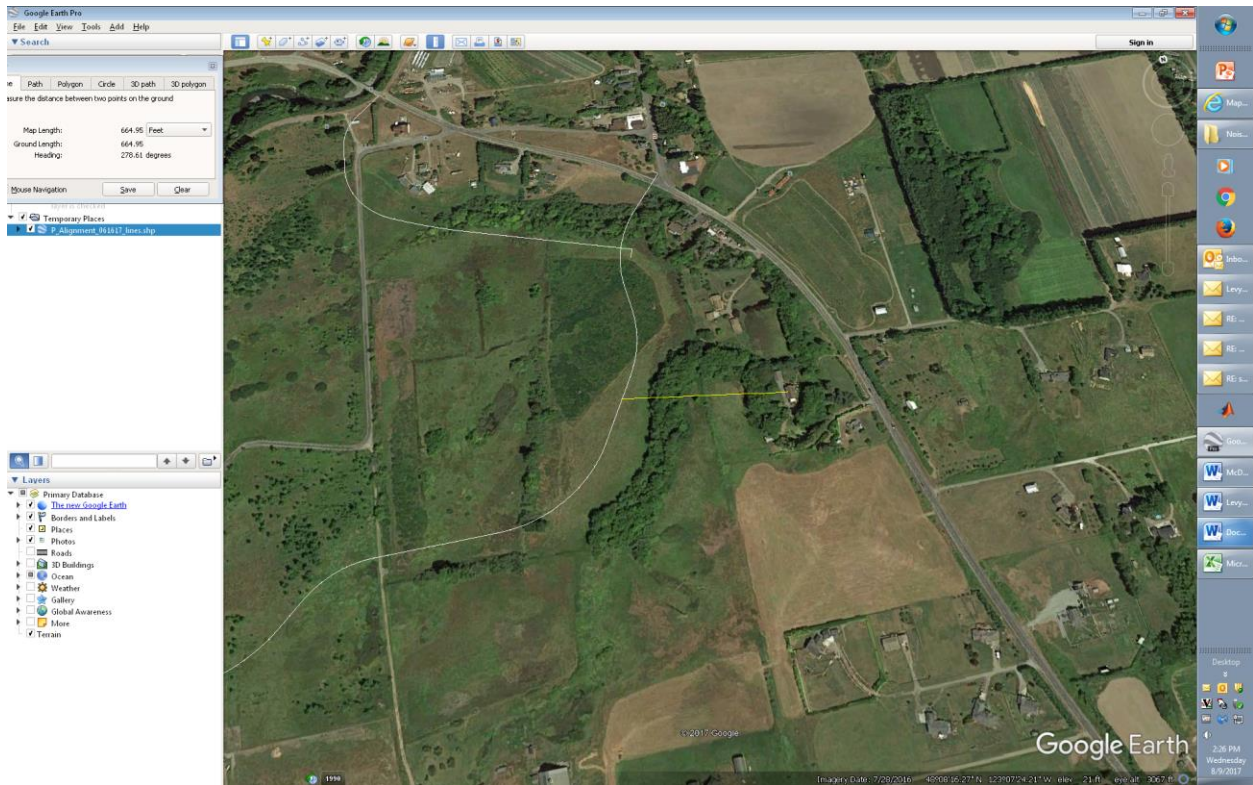
Brown



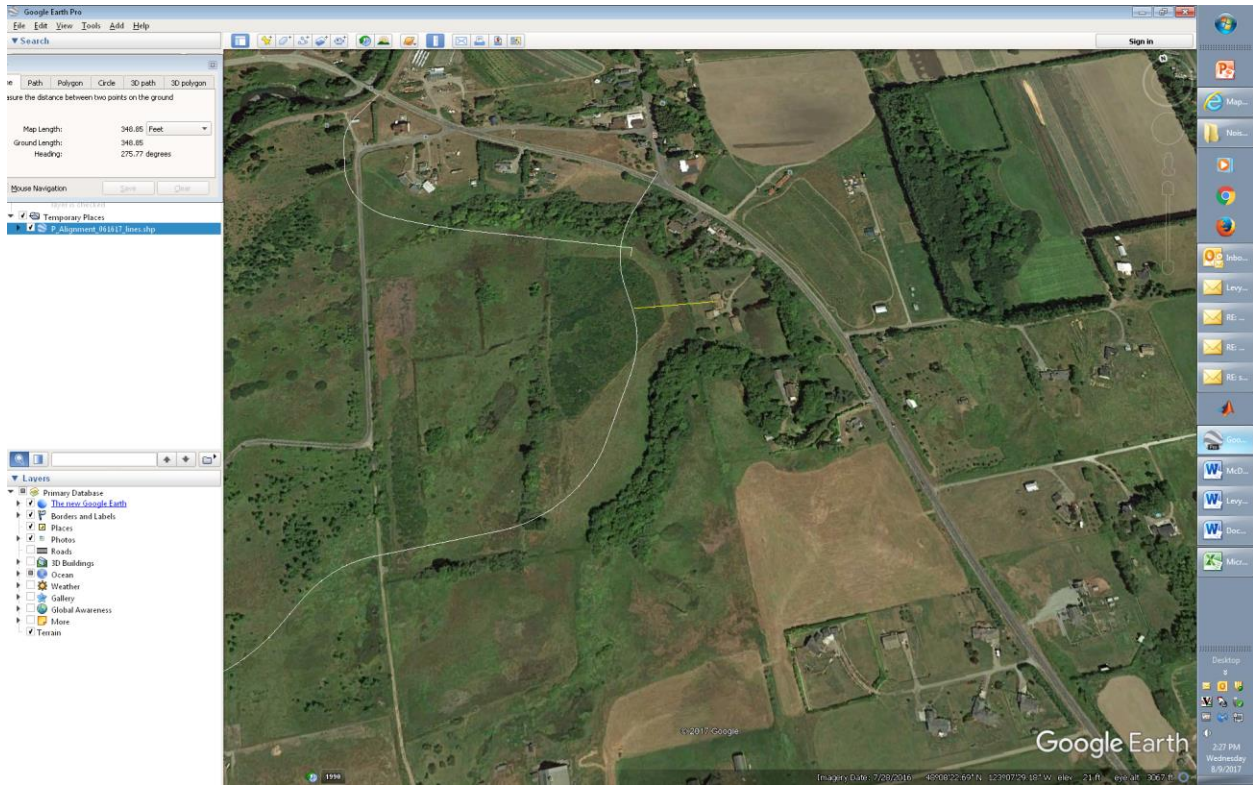
PCC Farmland Trust



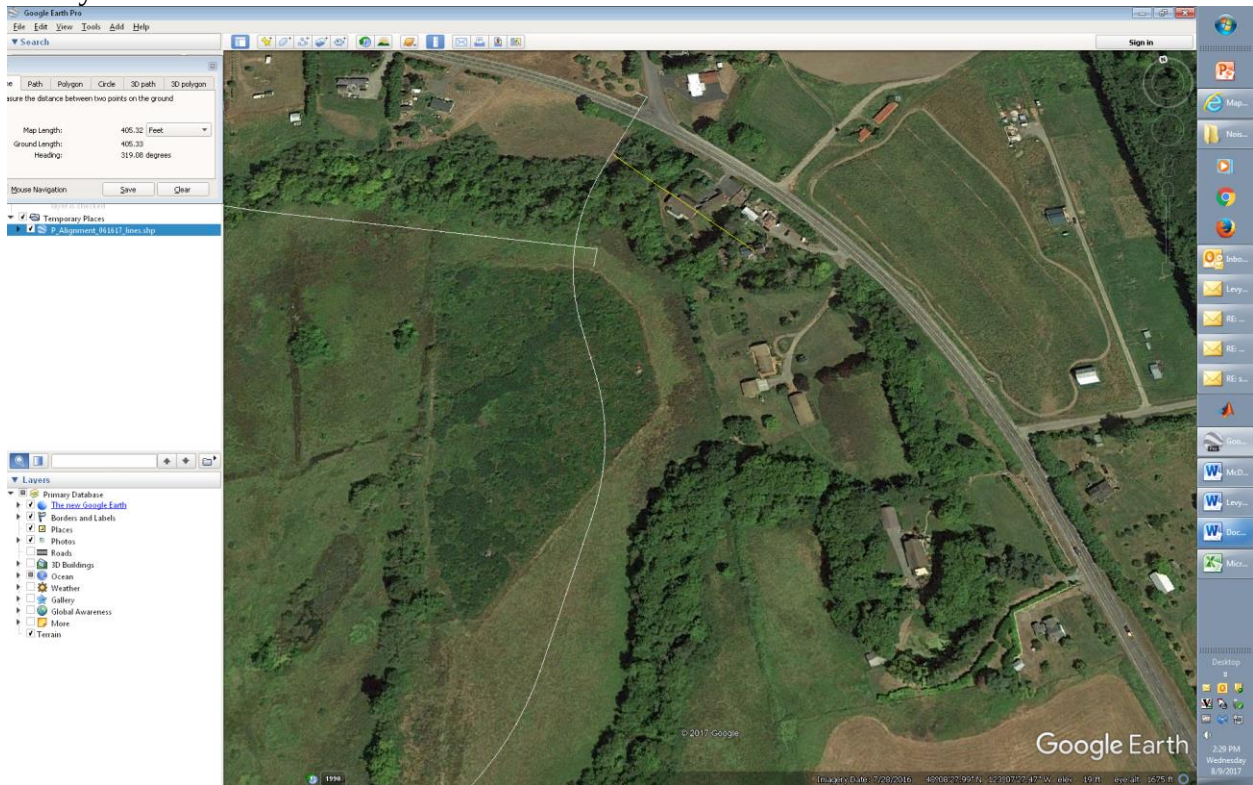
Eberle



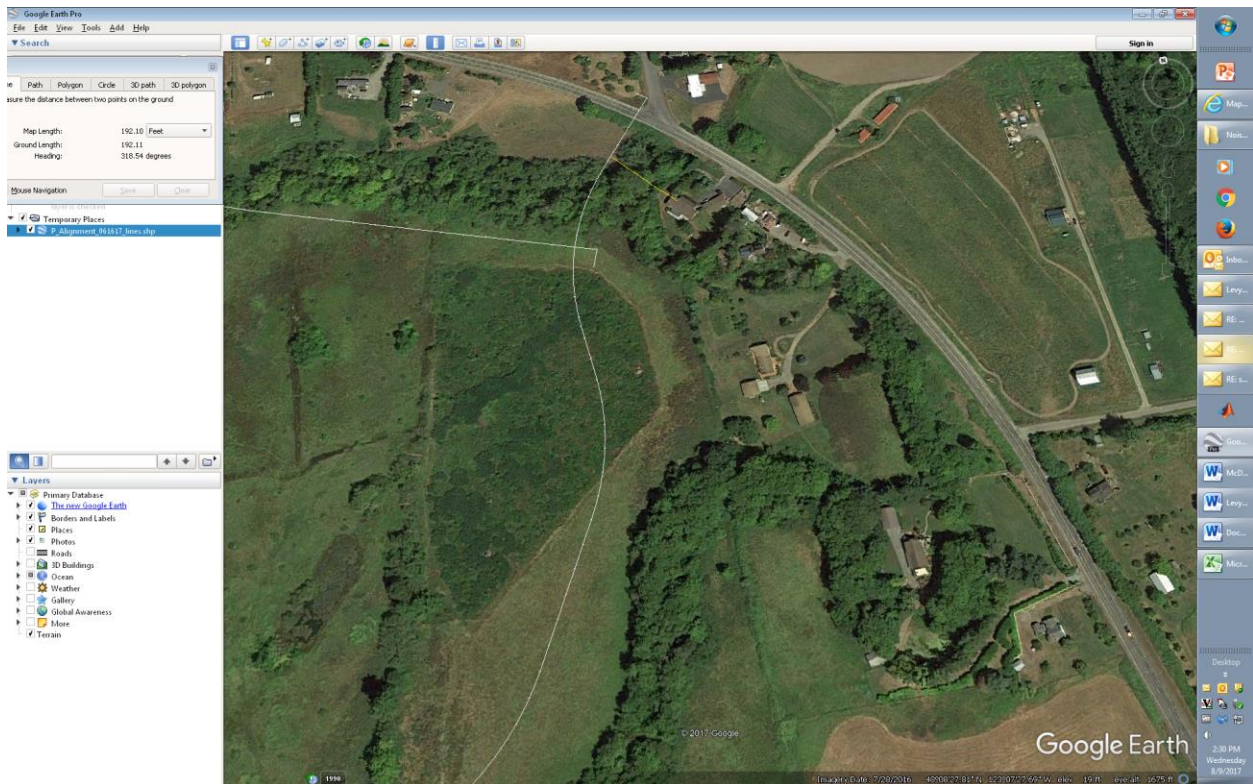
Freeman Trust



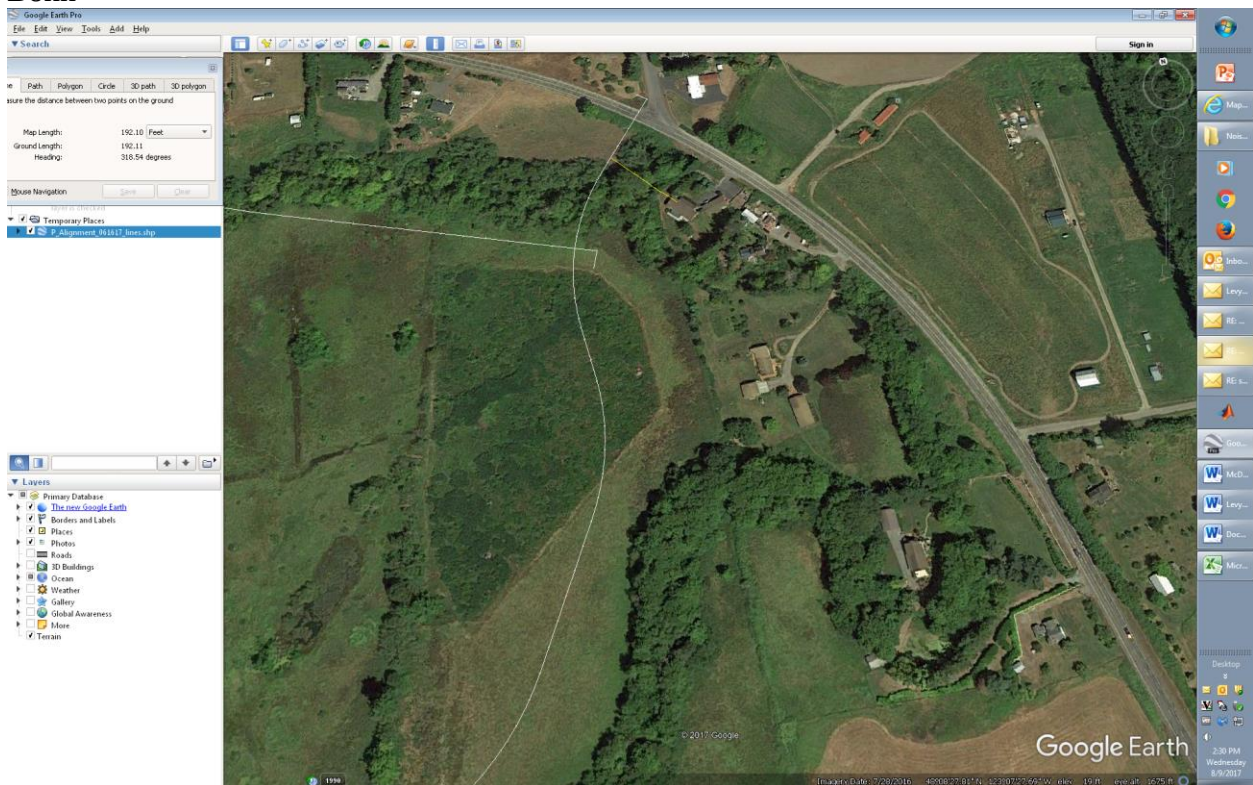
Cufley



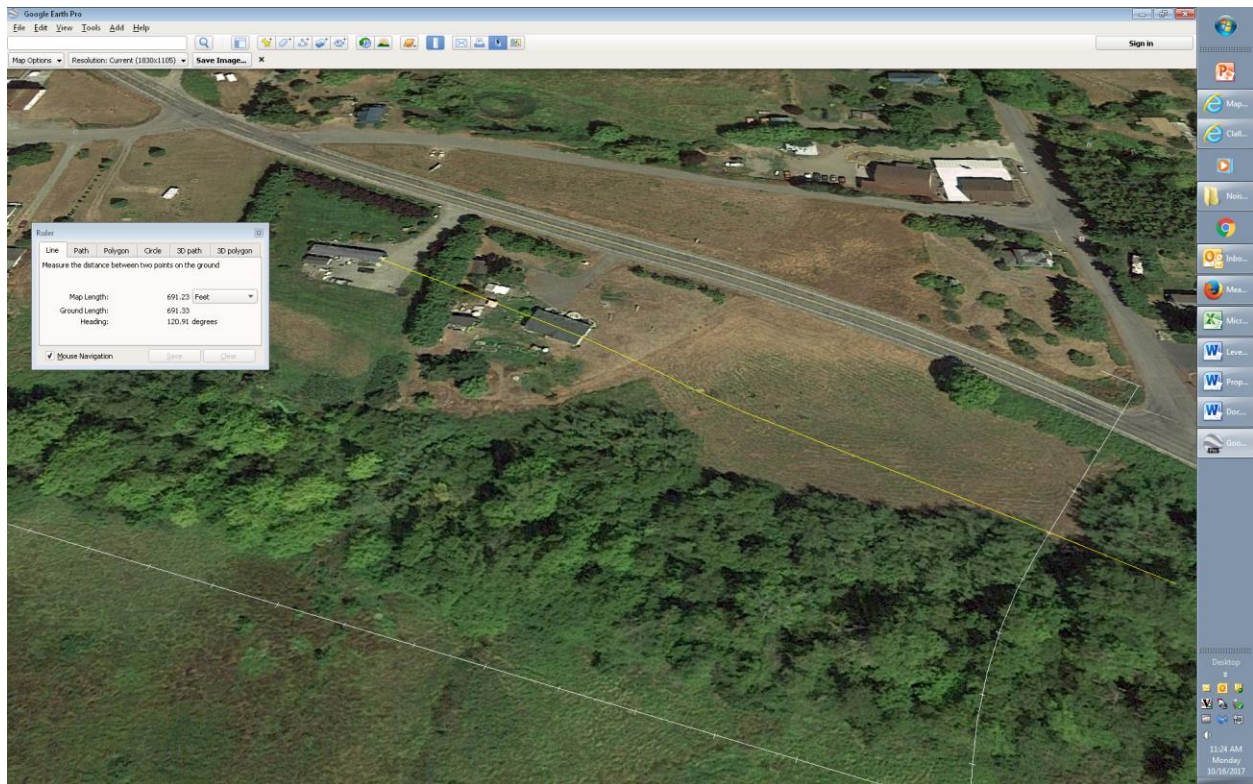
Houk



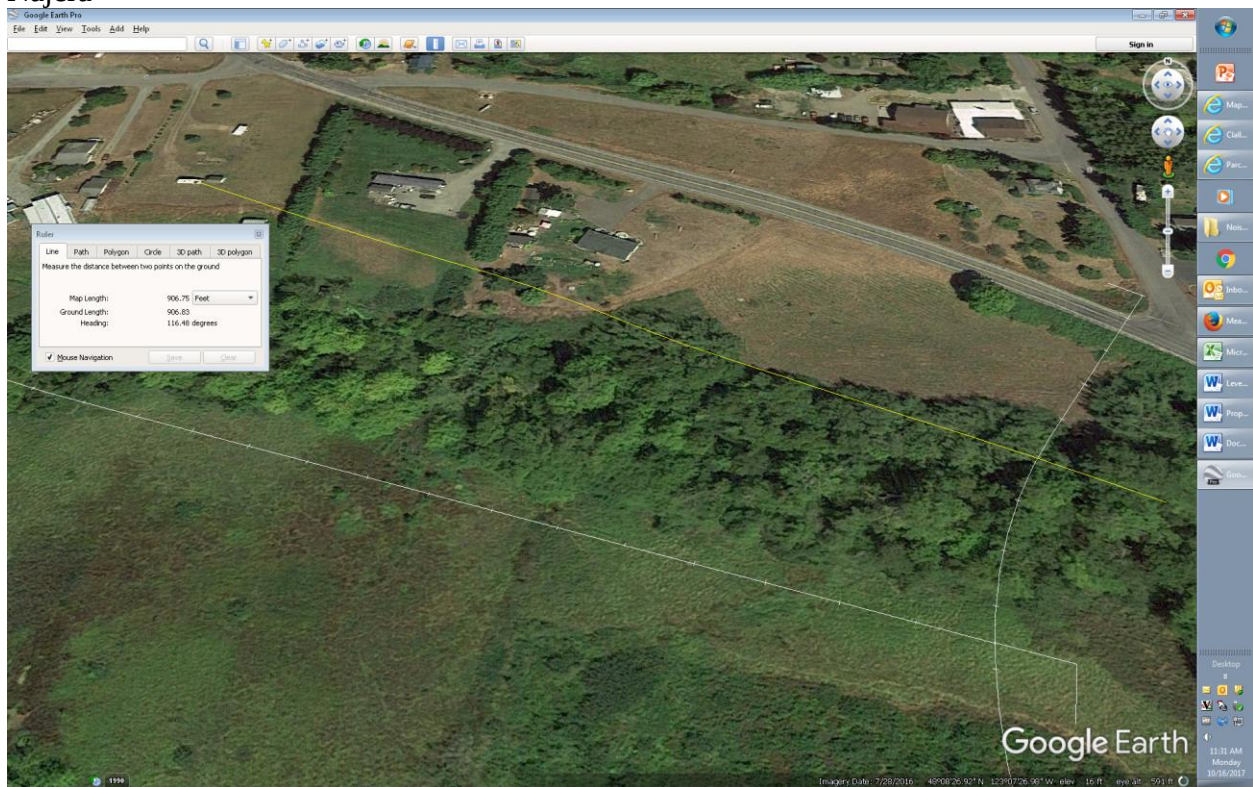
Bohn



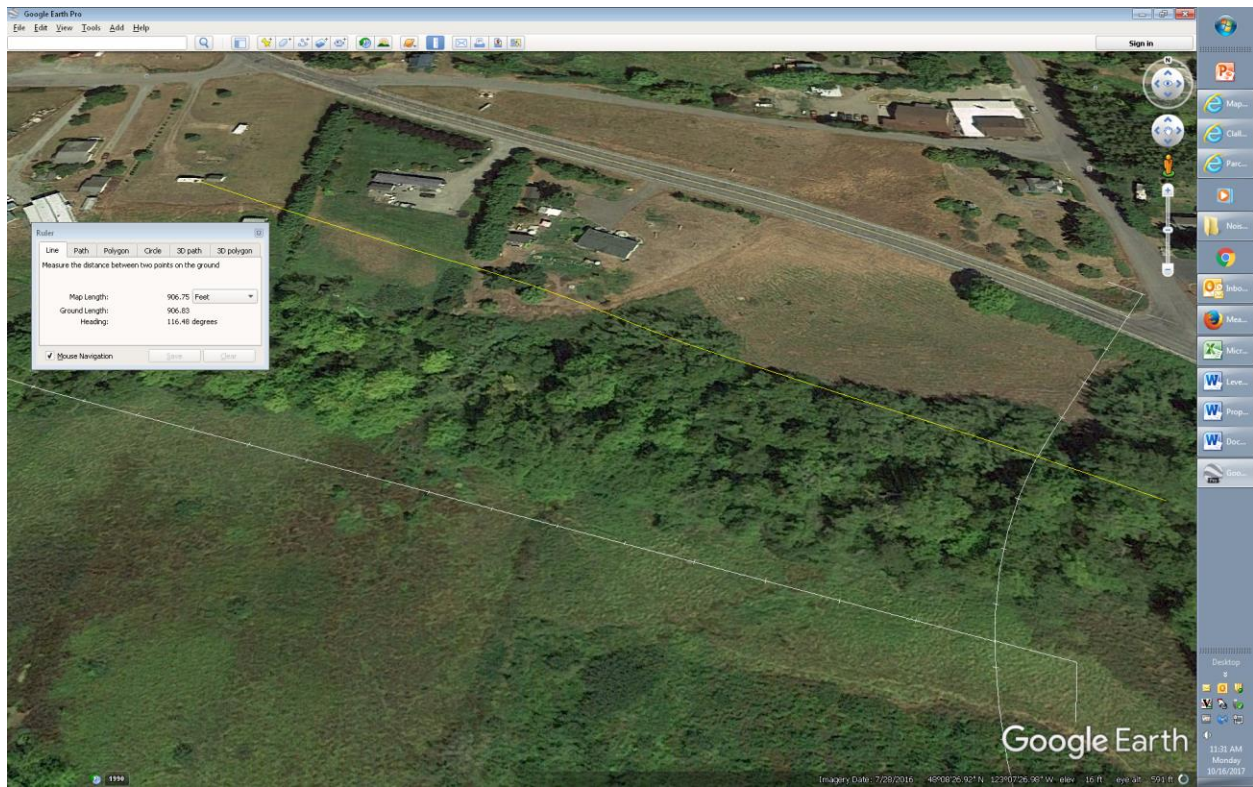
DeFord



Najera



Melancon



Shults