

Part VIII: Suitability Surfaces

After combining all the data layers described in the previous sections, four suitability surfaces (Figures 35, 36, 37, and 38) were created in order to perform the “least-cost path” (LCP) analysis. The LCP algorithm is applied to each surface to develop four alternative corridors.

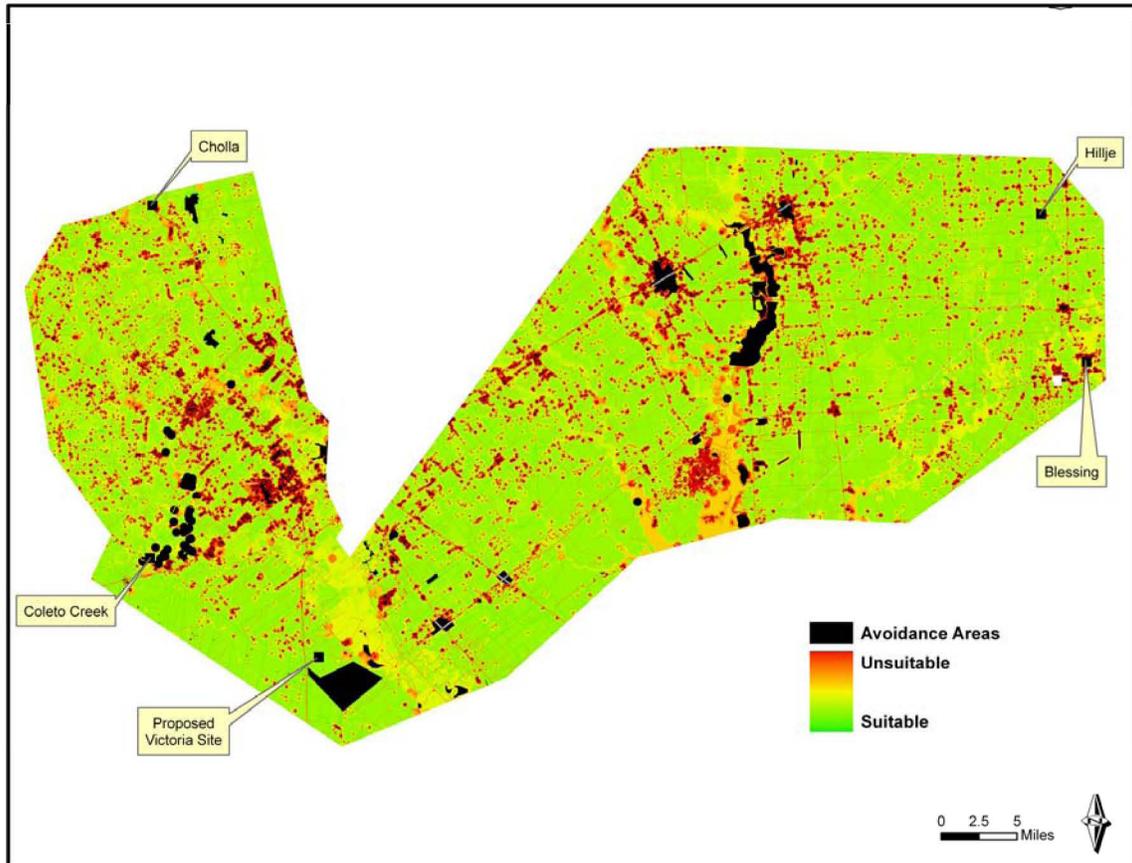
Built Environment Surface, the data layers in this group are given five times emphasis over the other two groups.

Natural Environment Surface, the data layers in this group are given five times emphasis over the other two groups.

Engineering Concerns Surface, the data layers in this group are given five times emphasis over the other two groups.

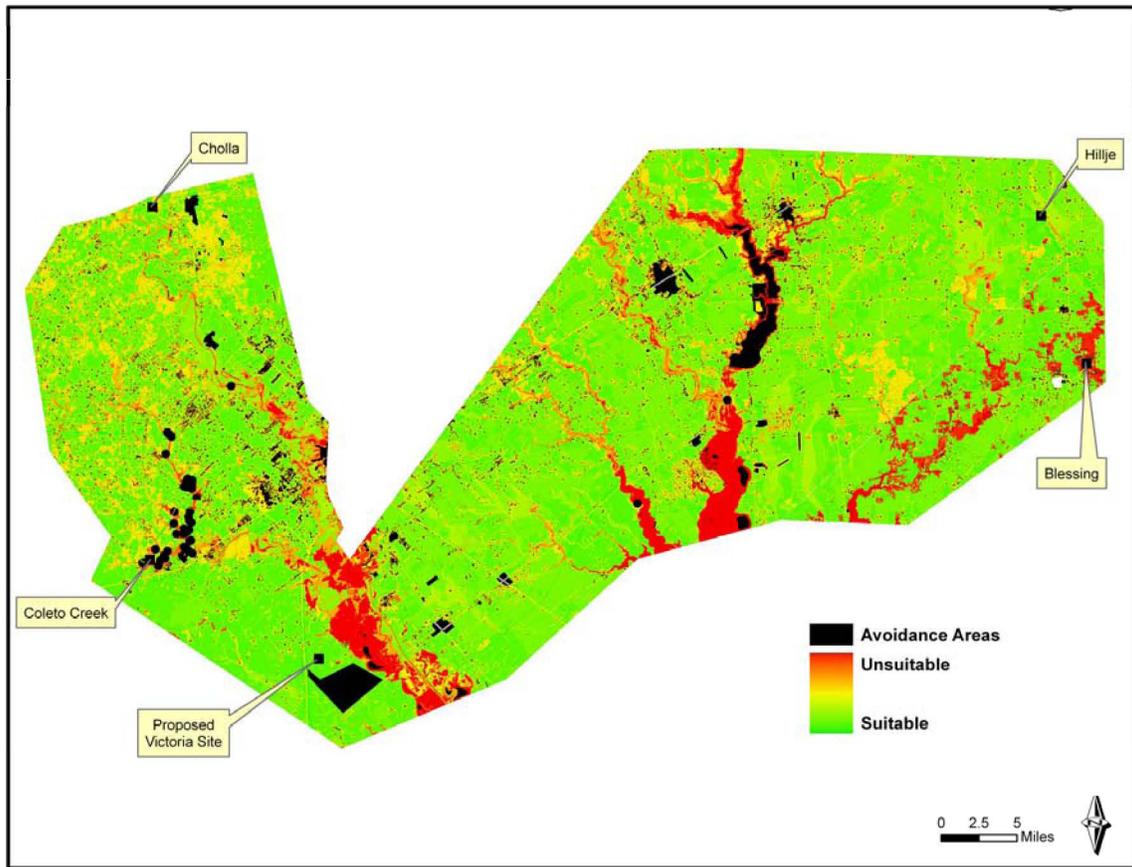
Simple Average Surface, no emphasis is applied on any one of three groups. A simple average is taken opposed to a weighted average, as applied to the surfaces above.

FIGURE 35: BUILT ENVIRONMENT SUITABILITY SURFACE



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FIGURE 36: NATURAL ENVIRONMENT SUITABILITY SURFACE



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FIGURE 37: ENGINEERING ENVIRONMENT SUITABILITY SURFACE

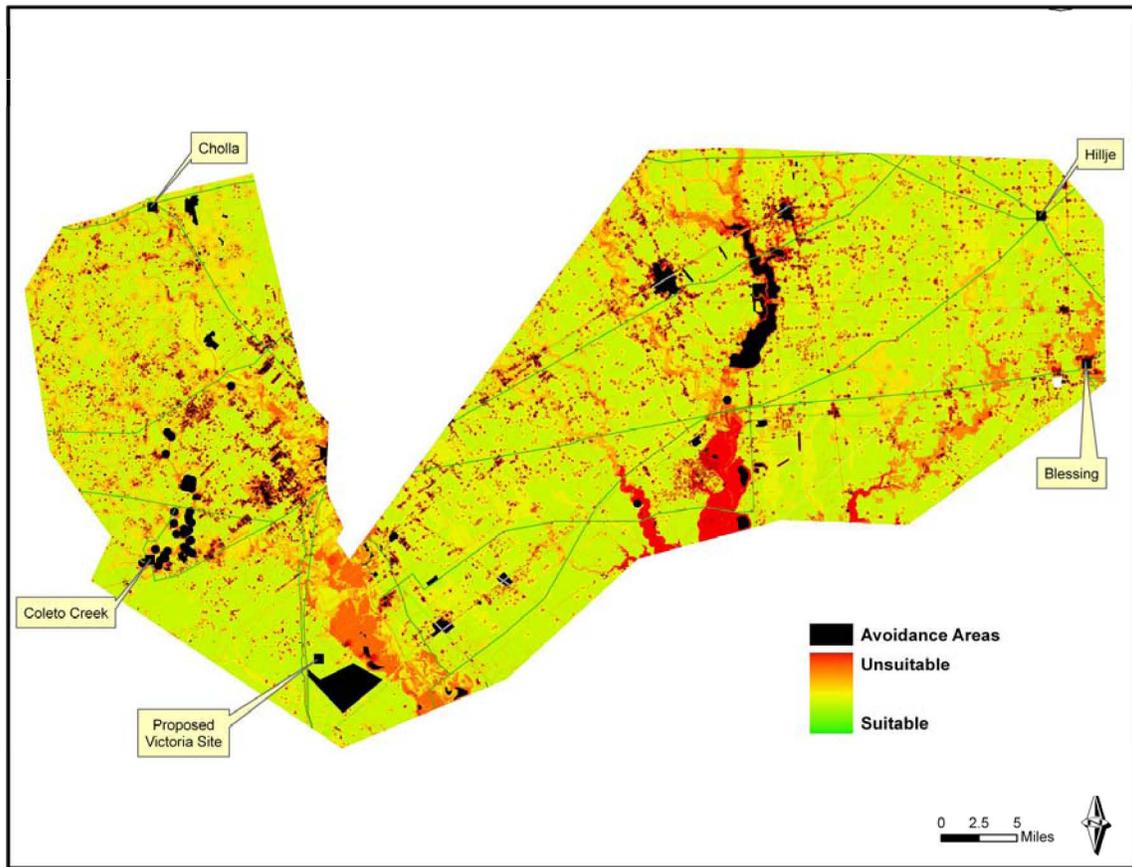
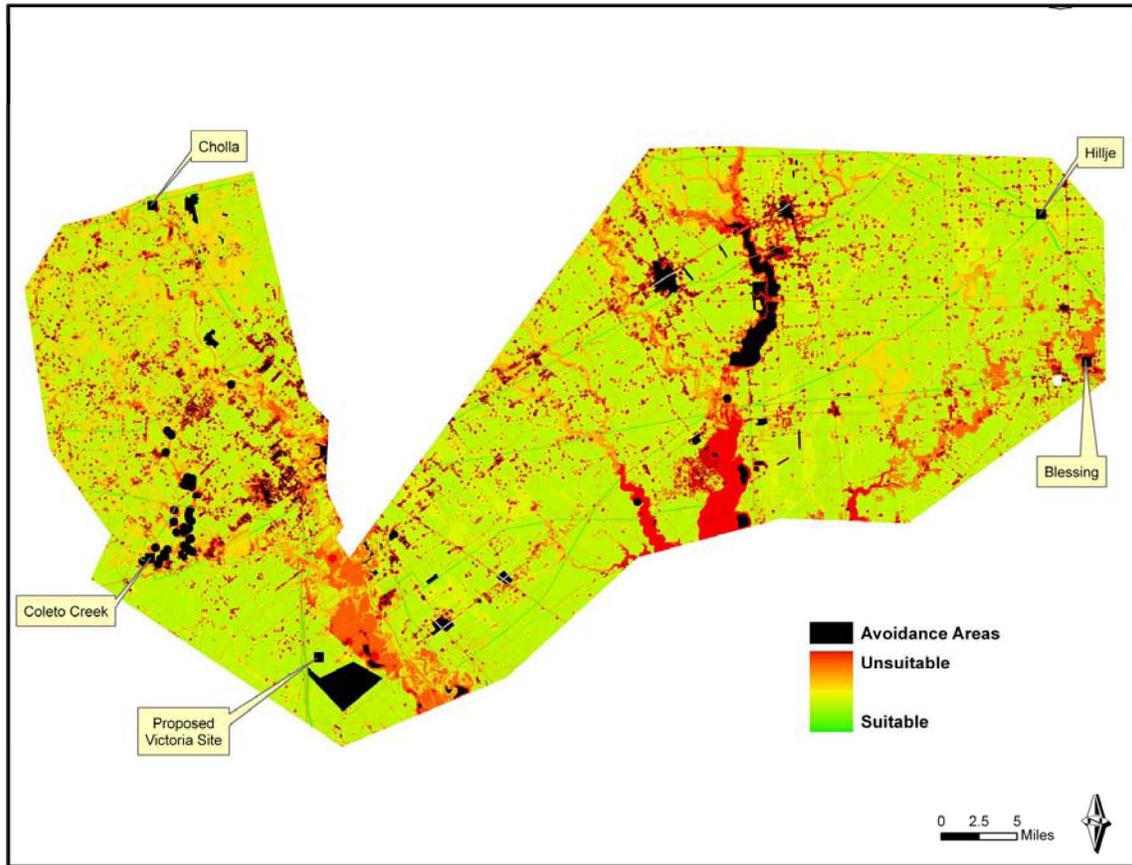


FIGURE 38: SIMPLE AVERAGE SUITABILITY SURFACE

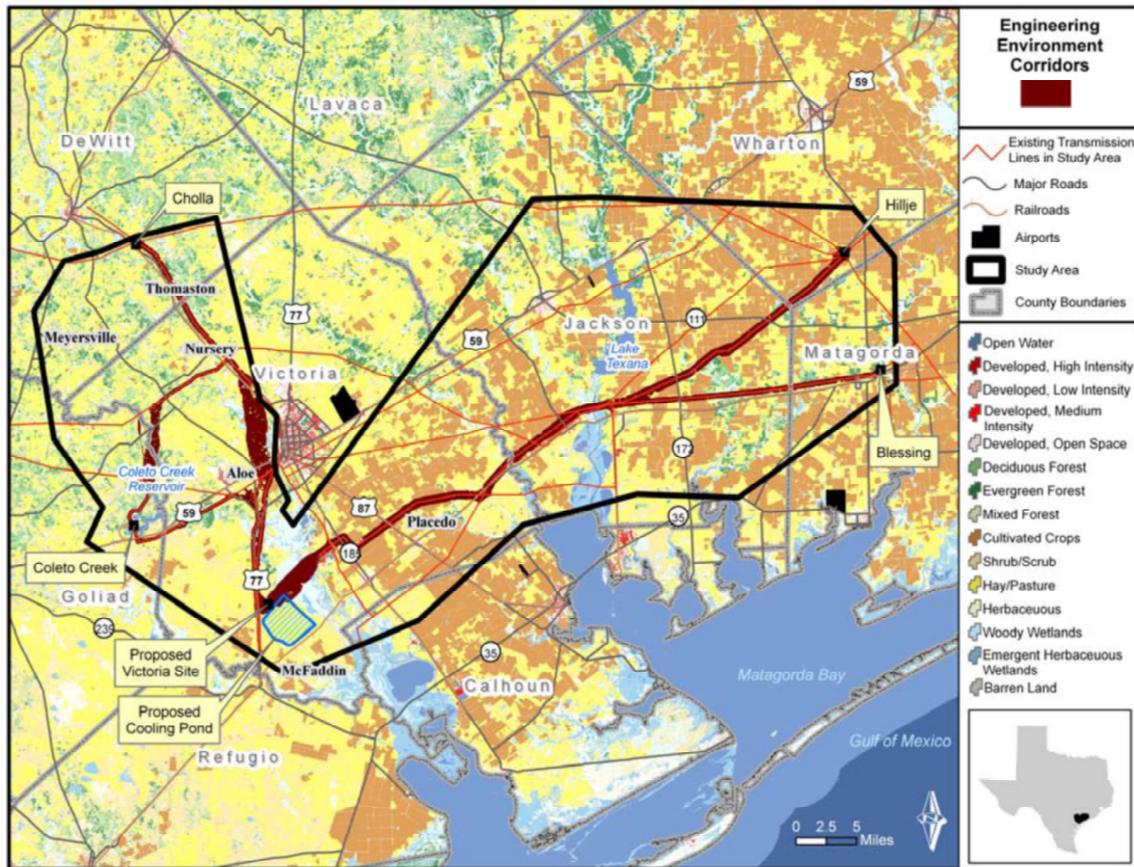


Part IX: Alternative Corridor Generation

1. Engineering Environment Alternative Corridor

When the feature suitability values and data layer weightings were combined and the least-cost path algorithm was applied to the Engineering Environment Suitability Surface, the result is the Engineering Environment Alternative Corridor displayed in Figure 39 below. The Engineering Environment of the Siting Model is heavily weighted toward co-location. As a result, the Engineering corridor primarily is located along the paths of existing transmission lines.

FIGURE 39: ENGINEERING ENVIRONMENT ALTERNATIVE CORRIDOR



The engineering corridor for the section between Victoria Site and Coletto Creek follows an existing transmission line north out of Victoria Site for approximately 9 miles. As the corridor approaches a dense urbanized area the corridor changes its direction to northwest and travels for approximately 2 miles cross-country. The corridor co-locates

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with another existing 138 kV transmission line that parallels U.S. Highway 77 southwest for approximately 9 miles. This 9 mile co-location ends at the Coletto Creek substation. On its way to Coletto Creek, the corridor crosses U.S. Highway 59 twice. The total length of this corridor is approximately 21 miles, 43% longer than the straight line distance between the Victoria Site and the Coletto Creek substation.

The engineering corridor for the section between Victoria Site and Cholla Site creates two distinct routes since there is a co-location opportunity with Victoria Site to Coletto Creek corridor. The eastern corridor follows an existing transmission line north out of Victoria Site for approximately 12 miles. The corridor continues going north with a cross-country route for approximately 8 miles. Then, it co-locates with an existing 138 kV transmission line that parallels U.S. Highway 87 for approximately another 12 miles toward northwest to Cholla Site. It crosses U.S. Highway 59 and a railroad. The total length of this corridor between Victoria Site and Cholla is approximately 34 miles, 9% longer than the straight line distance between the Cholla site and the Victoria Site.

The Victoria Site to Cholla Site western corridor provides an option to co-locate with the Victoria Site to Coletto Creek corridor. Starting at Coletto Creek substation, the western corridor co-locates with an existing 138 kV transmission line north for approximately 5 miles. Then, the corridor crosses Farm to Market Road 622 and continues cross-country for approximately 7 miles then it co-locates with an existing 138 kV transmission line toward northeast. Shortly after it crosses U.S. Highway 87 and a railroad, it follows U.S. Highway 87 by co-locating an existing 138 kV transmission line for approximately 12 miles toward northwest to Cholla Site. The total length of this corridor between Victoria Site and Cholla is approximately 30 miles excluding the Victoria Site to Coletto Creek co-location section which is approximately 21 miles. The western corridor is about 37% longer than the straight line distance between the Cholla site and the Victoria Site including the Victoria Site to Coletto Creek co-location section.

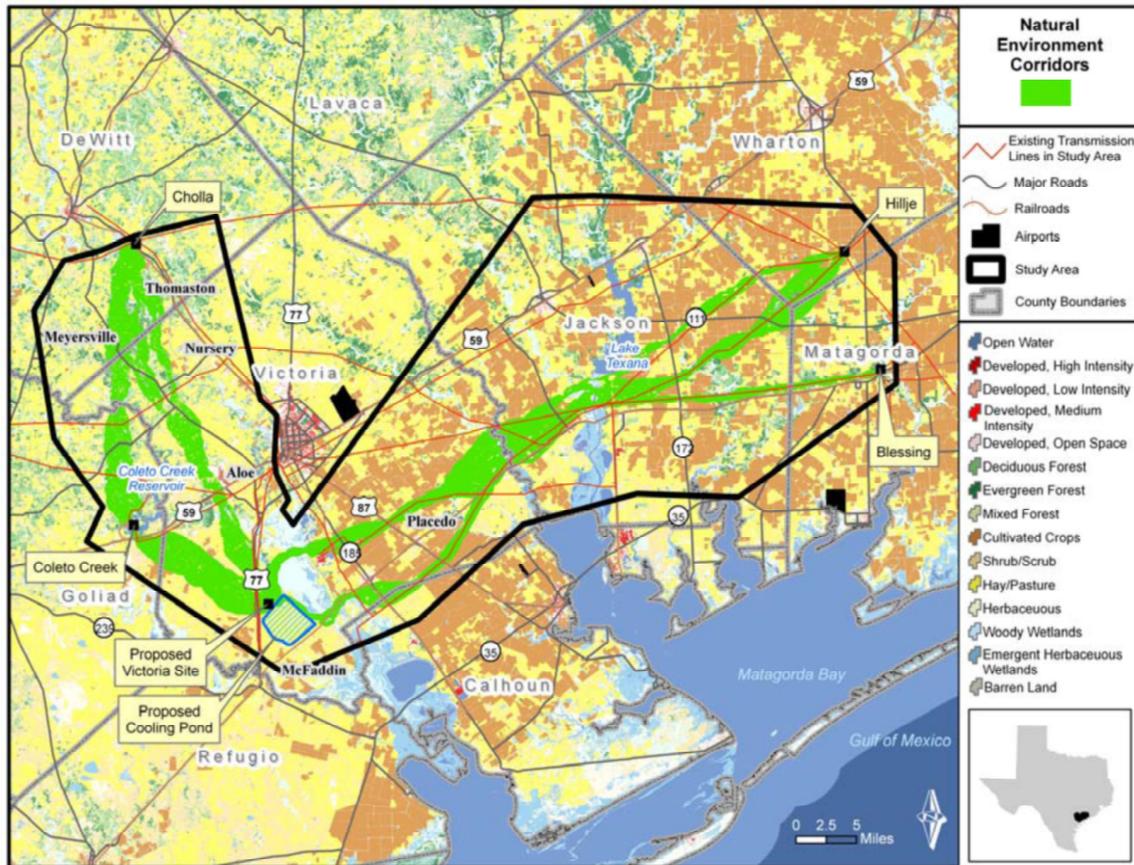
The engineering corridor for the next section of the project from the Victoria Site to the Hillje Substation crosses the Guadalupe River and its large wetland system in a northeast direction. It meets an existing 138 kV transmission line on the north side of the Invista Industrial site. The corridor proceeds along the existing 138 kV transmission line for approximately 16 miles to a point that intersects an existing 345 kV transmission line. At this point the corridor turns slightly more to the north and follows the existing 345 kV line into the Hillje Substation. The total length of this corridor is approximately 58 miles.

The engineering corridor for the next section of the project from the Victoria Site to the Blessing Substation took the exact path as the Victoria to Hillje corridor until reaching the intersection of the 345 kV transmission line to the Hillje Substation and an existing 138kV transmission line to the Blessing Substation. At this point the corridor turns to the east and traveled down the 138 kV transmission line for approximately 22 miles. The total length of this corridor is approximately 58 miles as well.

2. Natural Environment Alternative Corridor

When the feature suitability values and data layer weightings were combined and the least-cost path algorithm was applied to the Natural Environment Suitability Surface, the result is the Natural Environment Alternative Corridor displayed in Figure 40 below.

FIGURE 40: NATURAL ENVIRONMENT ALTERNATIVE CORRIDOR



The natural corridor between the Victoria Site and the Coletto Creek Substation takes a direct path. The corridor is approximately 3 miles wide through much of this area due to the large amount of open pasture through this area. The approximate length of this corridor is 13 miles.

The natural corridor between the Victoria site and the Cholla Site takes two distinct paths. The eastern path travels due northwest for approximately 18 miles then split into two parts and continue to the northwest for approximately 13 miles. This corridor crosses U.S. Highway 59 and two existing 138 kV transmission lines. The approximate length of this corridor is 31 miles.

The western corridor between Victoria site and the Cholla Site is through the Coletto Creek substation. It travels straight to the Coletto Creek substation approximately

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13 miles and it is approximately 3 miles wide through much of this area. Then, it travels straight north for approximately 23 miles and it is 2 miles wide. It crosses two existing 138 kV transmission lines and two Farm to Market Roads on its way to Cholla Site. The approximate length of this corridor is 36 miles including the Victoria Site to Coletto Creek section.

The natural corridor between the Victoria Site and the Hillje Substation takes three distinct paths. The northern path takes a similar path as the engineering corridor but is slightly further to the north when departing the Victoria Site. It follows the existing 138 kV transmission line from the Invista Industrial Site, but forms a much broader corridor to the existing 345 kV transmission line that runs to Hillje, providing an opportunity to join the 345 kV transmission corridor sooner than the existing 138 kV line. The length of this portion of the corridor to the intersection of the existing 345 kV line and the 138 kV line is approximately 33 miles.

The southern corridor leaves the Victoria Site in a southern direction, crossing the Guadalupe River and associated wetlands with an existing rail corridor. The path then meets the existing 345 kV transmission line corridors and proceeds to the intersection with the existing 138 kV transmission line that travels to the Blessing Substation. The length of this section is approximately 35 miles.

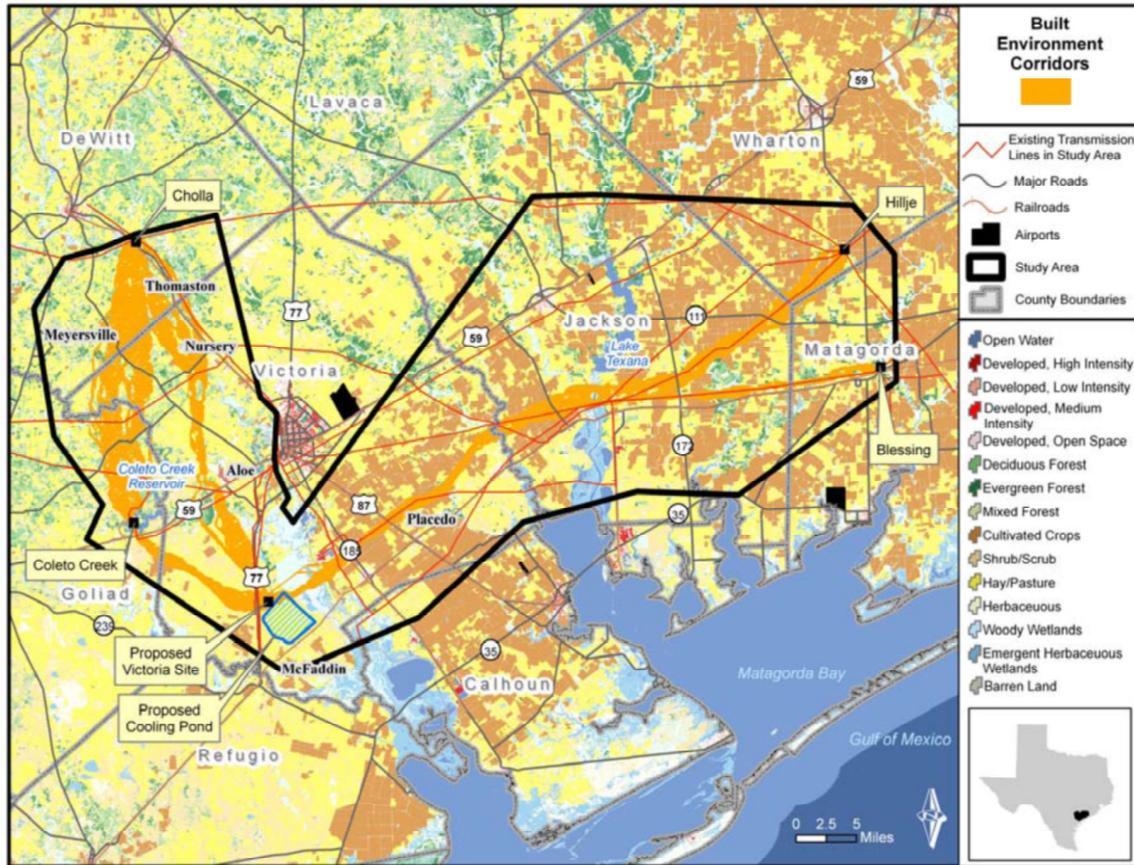
The natural corridor takes two separate paths again further northeast towards the Hillje substation. In this section the southern corridor co-locates with the existing 345 kV transmission line similar to the engineering corridor. The length of this section is approximately 24 miles. However, the corridor to the north takes a cross county path near the Palmetto Bend Dam of Lake Texana. It continues cross county until reaching the Hillje Substation, offset approximately 3.5 miles from the southern corridor and the existing 345 kV transmission line further south.

The natural corridor from the Victoria Site to the Blessing Substation takes a similar route as the engineering corridor. It takes similar paths as the natural corridor did to the Hillje Substation. However, once reaching the existing 138 kV transmission line to Blessing, it co-locates with the 138 kV line all the way to the Blessing Substation.

3. Built Environment Alternative Corridor

When the least-cost path algorithm was applied to the Built Environment Suitability Surface, the result is the Built Environment Alternative Corridor displayed in Figure 41 below.

FIGURE 41: BUILT ENVIRONMENT ALTERNATIVE CORRIDOR



The built environment corridor from the Victoria Site to the Coletto Creek takes a direct path similar to the natural corridor. The built corridor is much more refined, and is also shifted slightly to the south. The approximate length of this corridor is 13.5 miles.

The built environment alternative corridor takes two similar yet distinct paths from the Victoria Site to the Cholla Site as the natural corridor. However, the built corridor is much more refined on the east. It narrows almost to a half mile in some places, especially west of Aloe, a small town near US Highway 59. The approximate length of this corridor is 32 miles. The built corridor on the west follows a very similar path from the Victoria Site to the Cholla Site via Coletto Creek substation as the natural corridor. It is little bit wider than the natural and has more gaps in it. The approximate length of this corridor is 36 miles including the Victoria Site to Coletto Creek section.

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The built corridor from the Victoria Site to the Hillje Substation leaves the Victoria Site in a northeast direction, crosses the Guadalupe River and its associated wetlands, perpendicularly south of the Invista Industrial Site. It meets up with the existing 138 kV transmission line that leaves the industrial site near State Highway 185. It proceeds along the 138 kV line for approximately 8.5 miles. It turns in a more northerly direction, taking a cross county path and intercepts the existing 138 kV transmission line that leads to the Blessing Substation. It then travels along this line in an eastern direction until reaching the existing 345 kV transmission line that leads to the Hillje Substation. It co-locates with the existing line until reaching the substation. The approximate length of this corridor is 57 miles.

The built corridor from the Victoria Site to the Blessing Substation takes a similar path as the built corridor to the Hillje Substation. Like the other corridors. It departs from the Hillje corridor at the intersection of the existing 345 kV transmission line and the 138 kV transmission line that leads to the Blessing Substation. At this point, it co-locates with the 138 kV line to the Blessing Substation. The approximate length of this corridor is 56 miles.

4. Simple Average Alternative Corridor

The Simple Average Corridor is created by equally weighing each perspective to produce a corridor that equally considers all three perspectives. In most cases the simple corridor will resemble one or more of the preceding perspective corridors.

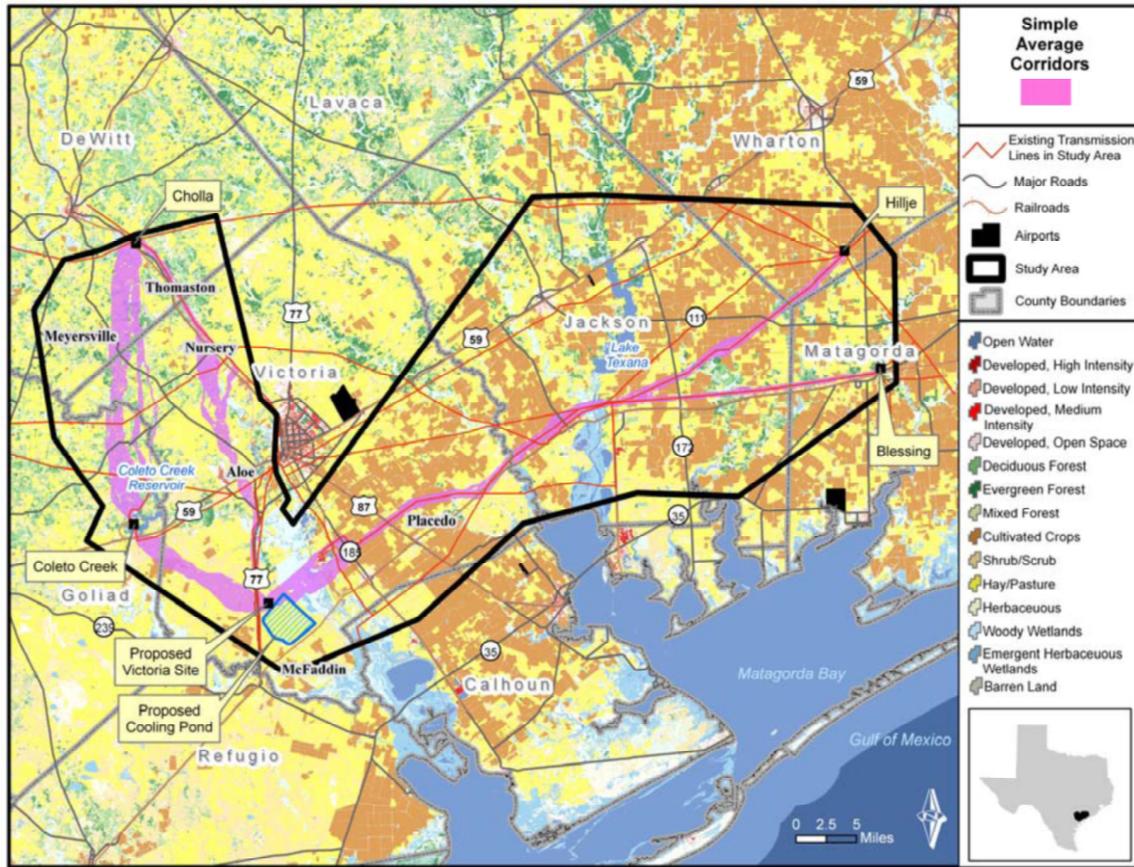
The corridor from the Victoria Site to the Coletto Creek mimics the built corridor. The corridor from the Victoria Site to the Cholla Site on the east side is just like the engineering corridor in the beginning, but it starts a secondary corridor for approximately 12 miles before it meets with the engineering corridor again in the south. The corridor from the Victoria Site to the Cholla Site via Coletto Creek substation on the west acts like the natural corridor until it reaches the Coletto Creek Substation.

For the sections from the Victoria Site to Hillje Substation and Blessing Substation, the path most resembles the engineering corridor. However, in a small section through the wetlands near the Victoria site, the corridor resembles both the engineering corridor and built corridor, finding both north and south paths around the Invista Industrial Site.

The corridor from Victoria Site to the Cholla Site is 32 miles on the east and 38 miles on the west including the corridor from the Victoria Site to the Coletto Creek which is approximately 14 miles; the corridor from the Victoria Site to Hillje Substation is approximately 57 miles; and the corridor from the Victoria Site to the Blessing Substation is approximately 57 miles.

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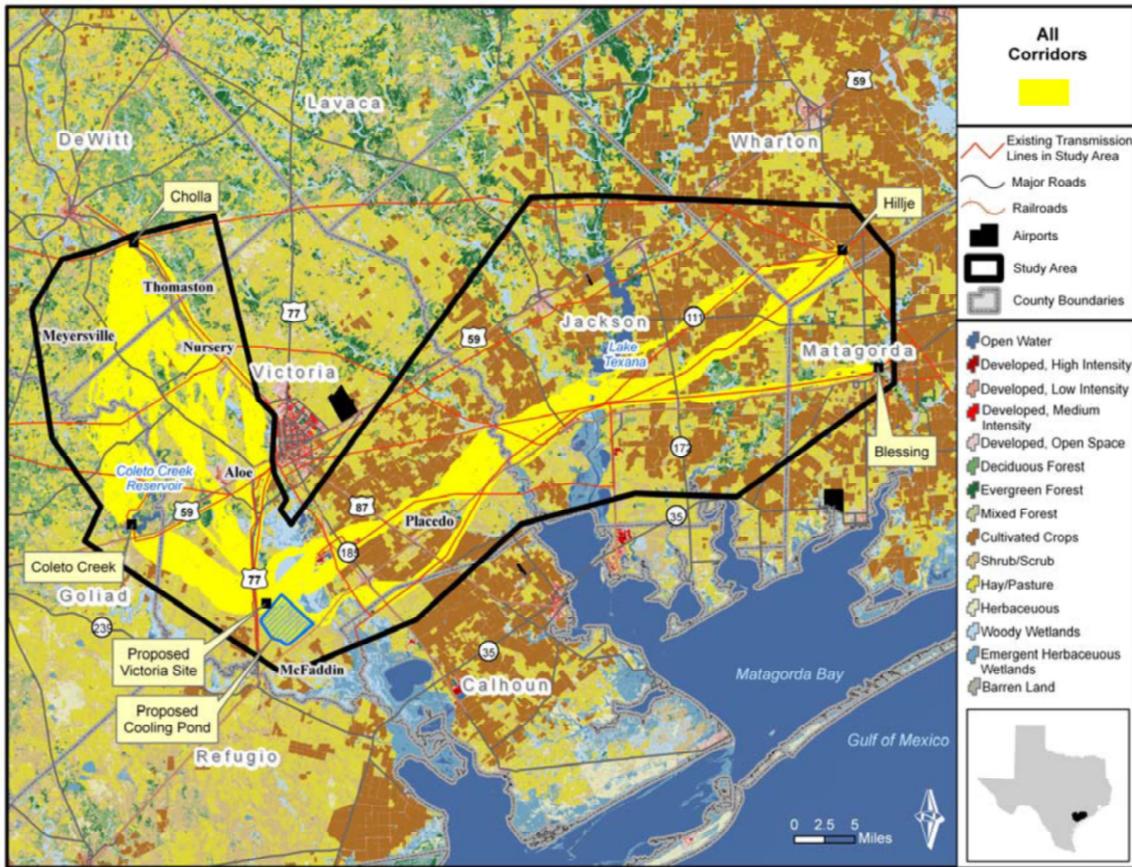
FIGURE 42: SIMPLE AVERAGE ALTERNATIVE CORRIDOR



5. Composite and Comparison of Alternative Corridors

A composite of all four Alternative Corridors is shown in Figure 43. For the most part the corridors are the same. However, in three locations the corridors differ significantly.

FIGURE 43: COMPOSITE OF ALTERNATIVE CORRIDORS



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TABLE 15: ALTERNATIVE CORRIDOR LAND USE ACREAGE

Land Use	Average Corridor Acres		Built Corridor Acres		Engineering Corridor Acres		Natural Corridor Acres		Composite Corridor Acres	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Open Water	559	0.54%	1043	0.62%	1180	1.69%	743	0.41%	2907	0.60%
Developed, Open Space	3614	3.52%	4457	2.67%	2709	3.88%	6596	3.65%	13987	2.86%
Developed, Low Intensity	394	0.38%	261	0.16%	540	0.77%	430	0.24%	1246	0.31%
Developed, Medium Intensity	101	0.10%	29	0.02%	193	0.28%	71	0.04%	326	0.09%
Developed, High Intensity	3	0.00%	0	0.00%	25	0.04%	4	0.00%	34	0.02%
Barren Land	96	0.09%	194	0.12%	77	0.11%	147	0.08%	428	0.06%
Deciduous Forest	9031	8.79%	15570	9.32%	6006	8.61%	10386	5.75%	36750	2.40%
Evergreen Forest	2528	2.46%	5590	3.35%	2344	3.36%	3247	1.80%	8793	2.61%
Mixed Forest	363	0.35%	5590	3.35%	316	0.45%	443	0.25%	1130	0.30%
Shrub / Scrub	16445	16.01%	21514	12.88%	9047	12.97%	27699	15.33%	60338	11.45%
Herbaceous	2835	2.76%	21514	12.88%	1832	2.63%	4255	2.36%	10095	1.59%
Hay / Pasture	43299	42.16%	57367	34.34%	23936	34.31%	78058	43.21%	157208	36.62%
Cultivated Crops	16639	16.20%	25899	15.50%	14990	21.48%	42256	23.39%	48862	33.06%
Woody Wetlands	5592	5.44%	6776	4.06%	5352	7.67%	5053	2.80%	15364	6.61%
Emergent Herbaceous Wetlands	1203	1.17%	1231	0.74%	1221	1.75%	1255	0.69%	2925	1.42%
Total Acreage	102702		167034		69768		180642		360393	

Victoria Site to Coletto Creek Alternative Comparison

For the section from Victoria Site to the Coletto Creek, three corridors use a predominantly straight line path to connect the two points. However, the engineering model differs greatly by utilizing existing transmission line corridors in the area. Although utilizing transmission corridors is considered favorable, this co-location option would result in a route approximately 8 miles greater. This is significant when the other perspectives point to a path roughly 14 miles in total length. Also, by following the existing lines further north and closer to the city of Victoria, the engineering corridor comes in closer proximity to more buildings and therefore would be a greater impact to the built environment than the other three corridors.

By delineating two representative routes in these corridors based on topographic maps, aerial photos, and field observations, we can compare the two corridors more thoroughly and realistically.

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- The northern representative route is within 300' of 59 buildings and within 1000' of 245 buildings.
- The southern representative route is within 300' of 3 buildings and within 1000' of 30 buildings.
- The northern representative route crosses 19 streams and rivers (including multiple crossing of Coletto Creek)
- The southern representative route crosses 3 streams.
- The length of the northern representative route is 21.6 miles.
- The length of the southern representative route is 13.8 miles. (approximately 36% shorter)

Although the southern representative route would be a new corridor, its impacts would be far less in both the built environment and natural environment. Much of the current land use between the Coletto Creek Substation and the Victoria Site is pasture land and would require little forest removal. In addition to the current favorable land use in the corridor, a proposed water transmission line between the Proposed Victoria Site Cooling Lake and the Coletto Creek Reservoir would present an opportunity to co-locate both linear infrastructures together.



PHOTO: Example of Urban Development along existing transmission line near the Raisin community

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Based on these observations it is recommended that a 3-mile wide corridor based on the alternative corridors generated by the built environment, natural environment, and averaged perspectives be studied further in order to place a right-of-way from the Victoria Site to the Coletto Creek Substation.

West of Hillje Substation Alternative Comparison

In this section of the project from the existing transmission line junction south of Lake Texana to Hillje Substation two corridors formed. Three corridors co-locate with the existing 345 kV transmission line completely. However, the natural corridor, in addition to co-locating with the existing transmission line, developed an additional path offset approximately 3.5 miles to the north.

The land uses in both areas are predominantly cultivated fields. Both have approximately the same building density. The key difference between the two paths is that one co-locates with a high voltage transmission line, while the other would create a new corridor with a similar voltage only 3.5 miles away. In addition, this corridor comes closer in proximity to Lake Texana and would open up a new corridor through some of the wetlands south of the lake.



PHOTO: Example of landscape in area near Hillje Substation

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Based on these observations it is recommended that a 3-mile width corridor based on the existing 345 kV transmission line be studied further in order to place a right-of-way in this area between Hillje Substation and the area south of Lake Texana.

East of Victoria Site Alternative Comparison

In this section of the line, two distinct corridors formed. All alternative corridors found paths out of the Victoria Site to the northeast, crossing the wetlands perpendicularly. However, the natural corridor also developed a southern route that utilizes a portion of a rail line and reaches the existing 345 kV transmission line sooner.

As with the section from Coletto Creek Substation to the Victoria Site, representative routes were developed for both corridors.

- The northern representative route is within 300' of 3 buildings and within 1000' of 22 buildings.
- The southern representative route is within 300' of 4 buildings and within 1000' of 22 buildings.
- The length of the northern representative route is 21.2 miles.
- The length of the southern representative route is 24.6 miles. (approximately 13.8% longer)
- 12 miles of the northern route co-locates with existing electrical transmission lines. (57%)
- 11 miles of the southern route co-locates with existing electrical transmission lines. (45%)

Both corridors would be able to cross much of the wetlands in the area by utilizing co-location opportunities either with proposed intake lines associated with the Victoria Site development, transmission pipelines, or the rail line to the south. They also occur in similar land use / land cover types, including mixed types of urban land use, forested wetlands, and a mix of cultivation and pasture. Little difference in building density occurs between the two areas as shown in the bulleted observation above. Both also utilized the two opportunities in the area to co-locate with existing electric transmission lines. Although the northern route co-locates more, the southern route co-locates with a transmission line that will be a similar voltage.

Based on these observations it is recommended that a 3-mile wide corridor based on both corridors be studied further in order to place a right-of-way in this area.

Corridor to Blessing Substation

In all four perspectives, a single corridor was produced to the Blessing Substation along the existing 138 kV transmission line that leads to the Blessing Substation and heads almost due west to intersect with the existing South Texas Project (STP) – Whitepoint 345 kV transmission line north of Lolita. Since only one corridor was produced and no other co-location opportunities existing in the area, it is recommended that a 3-mile wide corridor centered on the existing 138 kV transmission be recommended for further study in order to place a right-of-way to the Blessing Substation.

Victoria Site to Cholla Alternative Comparison

For the section from the Victoria Site to the Cholla Site, two distinct corridors formed. All alternative corridors found paths out of the Victoria Creek Site to the north. However, the engineering corridor developed a northeastern route that co-locates with an existing 138 kV transmission line that runs northwest-southeast by the U.S. Highway 87. Although utilizing transmission corridors is considered favorable, this co-location option would result in a route that has to relocate 6 residences. This is significant when the other perspectives point to a path approximately equal in length with no relocation of residences. Therefore, the representative route runs directly from the Victoria Site to the Cholla Site without a co-location opportunity in the northeast and named as the eastern representative route in here.

Victoria Site to Cholla Site via Coletto Creek Alternative can be considered as a co-location opportunity between Victoria Site and Coletto Creek. This increases the distance to the Cholla substation; however, it is favorable when co-location is considered. It has less impact to residences and is a more direct route. This option was identified as the western representative route in this comparison. Below is the comparison of the two different options that run from the Victoria Site to the Cholla Site.

- The eastern representative route is within 300' of 6 buildings and within 1000' of 139 buildings.
- The western representative route is within 300' of 6 buildings and within 1000' of 115 buildings.
- The eastern representative route crosses 20 streams and rivers.
- The western representative route also crosses 20 streams.
- The length of the eastern representative route is 34.3 miles.
- The length of the western representative route is 38.5 miles (including the 13.8 miles between Victoria and Coletto Creek that can be considered as co-location).
- 2.06 miles of the eastern representative route co-locates with existing electrical transmission lines. (5.95%)
- 14.96 miles of the western representative route co-locates with existing electrical transmission lines. (38.88%)

Although the eastern representative route would be a new corridor, it would be less expensive to build since it is approximately 4 miles shorter than the western representative route. However, the existing corridor between Victoria Site and Coletto Creek gives an opportunity to co-locate the first 13.8 miles of the western representative route and it has 24 fewer buildings within 1000 feet.

Based on these observations it is recommended that a 3-mile wide corridor based on both corridors be studied further in order to place a right-of-way in this area.

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*PHOTO: Example of landscape in area south of Nursery town
Taken at Lower Mission Valley Rd. Northwest of the study area
12/17/08*