Alternatives Analysis

Tillamook to Oceanside Transmission Line Tillamook, Oregon

Prepared for

The City of Tillamook

October 2012

Prepared by

Tillamook People's Utility District

1115 Pacific Avenue, Tillamook, Oregon 97141

ES051911022610PDX

Appendix B
Alternatives Analysis

Alternatives Analysis for the Tillamook to Oceanside Transmission Line, Tillamook, Oregon

1 Introduction

This report documents the detailed analysis of alternatives undertaken by the Tillamook People's Utility District (PUD) as part of the proposed 115-kilovolt (kV) Tillamook to Oceanside transmission line. The PUD analyzed a variety of potential routes for the proposed transmission line from the Bonneville Power Administration's (BPA's) Tillamook Substation to the proposed PUD Oceanside Substation near the Oceanside area. The main purpose of the proposed project is to install a transmission line that will connect the two substations. The route will begin at BPA Tillamook Substation located generally east of the City of Tillamook, traverse in a relatively direct route, meet established criteria, and end at the proposed substation site near the communities of Netarts and Oceanside.

2 City of Tillamook and Resource Agency Input

This alternatives analysis was conducted over the course of four years, beginning in 2009 and culminating in the selection of the proposed route. This analysis also incorporated input from various agencies and jurisdictions at the federal, state, and local levels. Near the start of the process, the PUD collected general input from agency staff and used this information to help generate specific criteria for evaluating potential alternatives. A description and assessment using these criteria is included below. The PUD also solicited input from various agencies on the specific route alternatives. For example, the PUD organized and conducted a specific meeting with attendees from various agencies on January 19, 2012, for the sole purpose of analyzing multiple alternative routes within the City of Tillamook, in the vicinity of the Hoquarton Slough. Input received during this meeting directly contributed to the selection of the proposed route through this area. In addition, the PUD has met with various decision-making bodies from the City of Tillamook on multiple occasions to review and discuss proposed routes through the City of Tillamook. These decision-making bodies have included the City Council, Planning Commission, Urban Renewal Agency and, in separate meetings, with the City Manager and planning staff. The proposed route through the City of Tillamook, specifically in the vicinity of the Hoquarton Slough and Front Street, is a direct result of input from the City of Tillamook. Specific meetings with various agencies include but are not limited to the following:

- **November 19, 2010** – Preapplication meeting with Tillamook County to discuss land use requirements and the applicable permitting process
- **December 2, 2010** – Agency kickoff meeting with the City of Tillamook, Tillamook County, U.S. Army Corps of Engineers (USACE), USFWS, DSL, and ODFW to introduce the project including the preliminary alignment
- **December 14, 2010** – Preapplication meeting with the City of Tillamook to discuss land use requirements and the applicable permitting process
- **January 6, 2011** – Meeting with James Aman, Bob White, and David Mattison to discuss mapbook and Front Street alignment
- **February 15, 2011** – Meeting with Barbara Johnson, Bob White, and the new Tillamook City Manager, Paul Wyntergreen, to discuss the upcoming City workshop
- **February 22, 2011** – Workshop with City of Tillamook Planning Commission and the Tillamook City Council to discuss the portion of the route proposed in the City of Tillamook
- **March 1, 2011** – Meeting with City of Tillamook Urban Renewal Agency to discuss proposed alignment in the vicinity of Front Street and the Hoquarton Slough
- **March 4, 2011** – Meeting with Bob White and Paul Wyntergreen regarding the requested cost estimate for underground route along Second Street for comparison to overhead on Hoquarton Slough

- **July 13, 2011** – Meeting with Ray Seiler, Barbara Johnson, Bob White, and Paul Wyntergreen to introduce Ray as new General Manager and discuss underground cost estimate and City Study Session
- **August 17, 2011** – Public meeting at the Tillamook County Library
- **September 19, 2011** – Meeting with Tillamook City Council to request signatures for proposed alignment
- **September 22, 2011** – Meeting with Bob White, Barbara Johnson, James Aman, Nancy Kloak, Paul Wyntergreen, and Suzanne Weber to clarify the City's action and to discuss alternative routes
- **October 6, 2011** – Meeting with Paul Levesque, Bob White, James Aman, and Nancy Kloak to discuss the Oregon Solutions Project and route locations
- **October 14, 2011** – Meeting with Bob White, James Aman, Nancy Kloak, Paul Wyntergreen, and Suzanne Weber to discuss findings of alternative routes (wetlands and Front Street)
- **January 17, 2011** – James Aman attended the City of Tillamook workshop which discussed FEMA properties deeded to City and their potential use
- **January 19, 2012** – Project update meeting with the City of Tillamook, Tillamook County, USACE, USFWS, National Marine Fisheries Service (NMFS), DSL, and ODFW to update agencies on project alignment and to specifically discuss three alternatives within the City of Tillamook
- **March 9, 2012** – Bob White attended meeting with City officials to discuss north and south side of Front Street route
- **April 16, 2012** – Meeting with Tillamook City Council to request signatures for proposed alignment

Following initial communication with relevant agencies and prior to detailed review of any specific alternative route, the PUD developed evaluation criteria to use in identifying and evaluating possible routes for the transmission line. The objective was to identify a route that would minimize conflicts and impacts and that could be permitted, constructed, and operated in a cost effective manner.

3 Evaluation Criteria

The evaluation criteria utilized for this analysis are divided into two groups: ***critical criteria*** that must be met in order to satisfy the minimum project requirements; and ***additional criteria*** that impact the type and degree of disturbance associated with the project. Both sets of criteria are described below.

3.1 Critical Criteria

Alternatives for the transmission line route had to meet the following critical criteria in order to achieve minimum project requirements and be considered for the proposed route:

- The route meets the main project purpose to connect the two substations.
- The necessary permits can be obtained from the City of Tillamook, Tillamook County, the U.S. Army Corps of Engineers, and Oregon DSL.
- The requisite easements and rights-of-way can be obtained.
- The line can be constructed at reasonable cost.
- The route is accessible for operations and maintenance in all but the most severe conditions.

3.2 Additional Criteria

Each alternative was also evaluated using additional criteria to determine how well each route performed. The additional criteria can be split into two groups: (1) items the PUD desires to minimize with construction and operation of the transmission line; and (2) items the PUD wants to maximize with the project. The results of this

rating system across the various alternatives are presented in Table 1 at the end of this report. The additional criteria are as follows:

3.2.1 Elements to Minimize

- Visual impacts
- Conflicts with existing land uses, structures, and congestion
- Impacts to cultural, archaeological, and biological resources
- Number of landowners and properties affected
- Impacts on existing vegetation
- Need for special structures or long spans
- Need for access roads
- Circuits serving the same geographic area, located in the same corridor

3.2.2 Elements to Maximize

- Ability to co-locate the line with existing linear corridors and utility rights-of-way
- Constructability and accessibility for maintenance during poor weather conditions
- Distance from existing structures, residences, etc.
- Length of straight sections

4 Evaluated Route Alternatives

The general area between the BPA Tillamook Substation and the proposed Oceanside substation is divided into four segments, as listed below. Separate route options within each of these segments were evaluated as part of the alternatives analysis. The first segment is the only one within the City of Tillamook. Thus, it is the only segment discussed in detail in this report.

- Segment 1 – From the BPA Tillamook Substation west to the west side of the City of Tillamook: the proposed route and eight alternatives were evaluated
- Segment 2 – From the City of Tillamook west to the west side of the Tillamook River: the proposed route and four route alternatives were evaluated
- Segment 3 – From the west side of the Tillamook River to the Stimson Lumber forest lands: the proposed route and eight route alternatives were evaluated
- Segment 4 – West through the Stimson and Green Crow forest lands to the Oceanside substation site: the proposed route and two route alternatives were evaluated

Again, only alternative routes associated with the general vicinity of the City of Tillamook are described in this report. The PUD reviewed eight different alternatives to the proposed route within Segment 1, which are described below and shown on Figures 1 through 8.

A description of these eight alternatives along with a general assessment of how each fared against the evaluation criteria is included below. A text description is included with each alternative to assess the route against the ***critical criteria*** described above in Section 3.1. Table 1, provided at the end of this report, shows the results for each alternative across the various ***additional criteria*** as presented above in Section 3.2. Note that Table 1 is divided into two distinct sections: 1) elements that there is a desire to minimize through route selection; and 2) elements that there is a desire to maximize through route selection. Accordingly, a “low” ranking associated with an element that there is a desire to minimize is considered desirable, while a “high” ranking associated with element that there is a desire to maximize is considered desirable.

4.1 Route A: Goodspeed Road

As illustrated in Figure 1, the Goodspeed Road alternative would traverse north from the BPA Tillamook Substation approximately 0.85 mile to the easterly extension of Goodspeed Road, turn west for approximately 2 miles crossing Highway 101 to the west end of Goodspeed Road. The alternative would then turn southwesterly for approximately 1.1 miles crossing the Trask and Tillamook Rivers before entering the forest lands owned by Stimpson Lumber.

This alternative would not meet all of the project critical criteria. The majority of the alternative would cross a floodplain. In fact, large stretches of this alternative would be underwater quite regularly during flood events. Thus, a transmission line along this alternative would not be accessible at all times, especially not under the most severe weather conditions. The alternative is also located across long stretches of wetlands and riparian areas, which could make permitting difficult. Finally, this alternative would add approximately 0.8 mile to the overall length of the line compared to the proposed route, making the project more expensive and more difficult to obtain all requisite easements.

Table 1 summarizes the Goodspeed Road alternative across the additional criteria. This alternative is one of the longer routes overall, which would generate additional visual impacts compared to other alternatives and would also disturb a greater amount agricultural. Regarding visual impacts, this alternative would also require four-legged lattice steel towers exceeding 100 feet in height above ground to accommodate the river crossings where proposed along this alternative. Where the line crosses Highway 101, it would also cross existing distribution lines. The transmission line would need to exceed 100 feet above ground to meet the requirements of the National Electric Safety Code (NESC). This alternative route has poor, wet soils, so special access roads would be required to some structure locations, which are capable of supporting construction vehicles for construction and maintenance. This alternative would have increased impacts on agricultural land and conflicts with existing agricultural uses mainly due to the need for special access roads and four-legged lattice steel towers necessary for the long spans near the river crossings.

There would be some congestion and conflict with existing transmission and distribution electrical lines, including:

- With the existing distributions lines located on the east and west side of Highway 101
- With the existing PacifiCorp Sugarloaf 115 KV transmission line that also traverses north from the BPA Tillamook Substation
- With the existing double-circuit distribution line that traverses north from the Tillamook PUD Wilson River Substation

In addition, this alternative would impact logging practices in the forest lands. Therefore, this alternative was not selected as the proposed route.

4.2 Route B: Hadley Road

As illustrated in Figure 2, the Hadley Road alternative would traverse north from the BPA Tillamook Substation approximately 0.35 mile to the easterly extension of Hadley Road, turn west for approximately 1.2 miles crossing Highway 101 to west end of Hadley Road. The alternative would continue westerly for approximately 3.1 miles crossing the Trask and Tillamook Rivers before entering into the forest lands owned by Stimpson Lumber.

This alternative would not meet all of the project critical criteria. Representatives from the Oregon DSL and ODFW indicated that this alternative would be difficult to permit through their respective applicable resource agencies when compared to the proposed route, due to potential impacts on the sensitive critical habitat located on the in the Sitka spruce forest along the north side of Hoquarton Slough and near the west end of Hadley Road. A transmission line along this alternative route would have significant impacts on the existing forested wetland (that is, spruce forest) at the west end of Hadley Road, west of Highway 101 and north of the Hoquarton Slough. Similar to the Goodspeed Road alternative, this alternative would cross large stretches of floodplain, which experiences frequent flood events. Thus, this alternative would not be accessible under inclement weather conditions.

Similar to the Goodspeed Road alternative described above, this alternative would also generate additional visual impacts compared to other alternative routes due to the increased length of having to go north prior to turning west. In addition, the location of the Highway 101 crossing and river crossings along this alternative would require the use of four-legged lattice steel towers exceeding 100 feet in height above ground. Thus, this alternative would become more visible than others. This alternative route has poor, wet soils, so special access roads would be required to some structure locations, which are capable of supporting construction vehicles for construction and maintenance.

Therefore, this alternative was not selected as the proposed route.

4.3 Route C: Hoquarton Slough

Figure 3 illustrates the Hoquarton Sough alternative, which is similar in most areas to the proposed route. This alternative would exit the BPA Tillamook Substation from the north, then immediately turn to the west, traversing around the north and west sides of the PUD pole yard, where it would turn west crossing the Port of Tillamook Bay (POTB) railroad main line into the spur right-of-way to Highway 101. It would cross Highway 101 and then parallel the south bank of the Hoquarton Slough. The alternative would traverse down the south bank of the slough and extend west to a farm field behind the Tillamook Hospital. The alternative would then turn to the southwest to enter an alignment along Highway 131 as it extends further west.

While this alternative generally meets most of the project's critical and additional criteria, the City of Tillamook owns several parcels of property on this alternative and would not grant signature on the requisite Conditional Use Permit application form due to the perceived visual and environmental impacts stemming from the location along the south bank of the slough. The City of Tillamook also indicated it has redevelopment plans for the general area and, for that reason, does not want a route directly adjacent to the slough.

Therefore, this alternative was not selected as the proposed route.

4.4 Route D: First Street

The City of Tillamook asked the PUD to evaluate the First Street alternative in an effort to minimize impacts to future plans for re-development of the Front Street – Hoquarton Slough area. Figure 4 shows the First Street alternative, which is similar in most areas to the proposed route. This alternative would exit the BPA Tillamook Substation from the north and then immediately turn to the west, crossing the POTB railroad main line into the spur right-of-way to Highway 101. It would cross Highway 101 along the north side of Front Street to the Ivy Avenue intersection. This is where the First Street alternative deviates from the proposed route; this alternative would turn south to First Street and then turn west along the south side of First Street to Ash Avenue, where it would turn northwest into the farm field behind the Tillamook Hospital.

This alternative would not meet all of the project critical criteria due to the higher cost for construction. This alternative would extend through the middle of the City of Tillamook in, around, and over existing development, including buildings and infrastructure. Thus, special features would be required in the design, such as wider and taller support pole heights and multiple angles requiring large self-supporting poles, which are expensive compared to conventional poles and create additional visual impacts.

This alternative would have the potential for significant conflicts with existing structures and congestion along Ivy Avenue and First Street. Many of the buildings and residences are built close to these streets. The transmission line would also have increased visual impacts resulting from pole heights exceeding 100 feet above ground and multiple angles when compared to the proposed route.

Therefore, this alternative was not selected as the proposed route.

4.5 Route E: Boyer Transmission Line Corridor

As illustrated in Figure 5, the Boyer transmission line corridor alternative would exit the BPA Tillamook Substation from the north, then immediately circle through the PUD pole yard to head south into the BPA Tillamook-Boyer transmission line corridor, crossing Third Street through the Tillamook Lumber mill to south side of Twelfth Street. The alternative would then turn west to the west end of Twelfth Street. It would continue west, crossing into farm

fields south of the City of Tillamook to the southerly extension of Elm Avenue where it would traverse in a northwesterly direction on the west side of the City of Tillamook to Third Street and then traverse west to enter an alignment along Highway 131.

This alternative would not meet all of the project critical criteria since the BPA Tillamook-Boyer transmission line corridor is not large enough to accommodate another transmission line and it would be difficult to obtain the additional space necessary from surrounding properties (such as the Tillamook Lumber mill). In addition, some of the areas along this alternative near the southwest edge of the City of Tillamook would be difficult to access during inclement weather due to the presence of a floodplain. This general area often has high velocity flood waters containing logs, stumps, and other debris that could damage support poles, requiring special design considerations to eliminate this possibility. These considerations greatly increase the overall cost of the project

The Boyer Road transmission line corridor alternative would have a number of conflicts and congestion impacts with the BPA Tillamook-Boyer transmission line and the distribution line that serves the Netarts and Oceanside area, and would be in close proximity to residences and buildings between Highway 6 and Twelfth Street. This alternative would also be highly visible since it largely encircles the City of Tillamook.

This proposed route would have a number of conflicts and congestion-related impacts, including:

- With the existing BPA Tillamook-Boyer transmission line; this corridor is extremely narrow and may not be buildable
- With the BPA Tillamook-Boyer transmission line and the close proximity to residences and buildings between Highway 6 and Twelfth Street
- With existing distribution lines on Third Street, Twelfth Street, Highway 101, and Highway 131
- With buildings along 12th Street including school buildings and a day care facility
- With agricultural uses along the south and west side of the City of Tillamook.

In addition, this alternative route would have major impacts on vegetation between Miller and Pacific Avenues which would impact Holden Creek and the Trask River. It is anticipated that nine or more support poles would be needed in this area. Therefore, this alternative was not selected as the proposed route.

4.6 Route F: Tillamook Lumber

As illustrated in Figure 6, the Tillamook Lumber alternative would exit the BPA Tillamook Substation from the north, then immediately turn to the west, traversing around the north and west sides of the PUD pole yard before heading south. The alternative would extend south within the POTB railroad main line right-of-way across Third Street through the Tillamook Lumber mill to south side of Twelfth Street. The alternative would then turn west to the west end of Twelfth Street and continue west, crossing into farm fields south of the City of Tillamook to the southerly extension of Elm Avenue. The alternative would then traverse in a northwesterly direction on the west side of the City of Tillamook to Third Street and then traverse west to enter an alignment along Highway 131.

This alternative would not meet all of the project critical criteria. Similar to the Boyer Road alternative, some of the areas along this alternative near the southwest edge of the City of Tillamook would be difficult to access during inclement weather due to the presence of a floodplain. This alternative is also in the same corridor as a distribution line to the Netarts and Oceanside area.

This alternative would have a number of conflicts with the POTB railroad and the Tillamook Lumber mill where several existing buildings are built close to the railroad tracks with tall obstructions crossing between the buildings. Furthermore, development of this alternative would have impacts on riparian vegetation between Miller and Pacific Avenues along Holden Creek and the Trask River.

This proposed route would have a number of conflicts and congestion-related impacts, including:

- With the POTB railroad and the Tillamook Lumber mill where several buildings are built close to the railroad tracks with tall obstructions crossing between the buildings

- With the bulk gasoline and liquid propane fuel storage facilities that are located along the POTB railroad
- With existing distribution lines on Third Street, Twelfth Street, Highway 101 and Highway 131
- With buildings along 12th Street including school buildings and a day care facility

It is anticipated that nine or more support poles would be needed in this area. Therefore, this alternative was not selected as the proposed route. Therefore, this alternative was not selected as the proposed route.

4.7 Route G: Second Street Underground

The City of Tillamook asked the PUD to evaluate the Second Street Underground alternative in an effort to minimize impacts to future plans for re-development of the Front Street – Hoquarton Slough area. As shown in Figure 7, this alternative would extend generally west from the BPA Tillamook Substation before crossing the POTB railroad main line into the spur right-of-way to a point just east of the northern extension to Madrona Avenue. It would then transition to buried underground transmission cables and would continue southerly across City of Tillamook-owned property and continue in a southwesterly direction across First Street to Laurel Avenue. The alternative would continue underground to Second Street, where it would traverse westerly to Cedar Avenue and then turn north to Front Street, transitioning back to an overhead transmission line. From there, it would turn west into the farm field behind the Tillamook Hospital, where it would turn to the southwest to enter an alignment along Highway 131.

This alternative would not meet all of the project critical criteria due to the higher cost of constructing an underground transmission line. Conservative construction costs collected from contractors in the industry are estimated at more than $5,000,000 for just the section of the transmission line proposed underground. For comparison, the construction cost of an overhead transmission line along an equivalent length down Front Street is less than $200,000. Underground transmission construction is a very specialized trade, with most manufacturers requiring the use of certified personnel to install and terminate the cables. Many of these contractors are located outside the northwest, which would result in significant delays to repair failed cables.

This route alternative would also require two large, self-supporting, dead-end structures measuring approximately 5 feet in diameter at the base at each of the underground cable locations. It would also require eight large (8-feet deep by 8-feet wide by 17-feet long) concrete vaults to be buried under the streets.

Therefore, this alternative was not selected as the proposed route.

4.8 Route H: City Proposal No. 1 and No. 2

The City of Tillamook asked the PUD to evaluate two additional alternatives in an effort to minimize impacts to the re-development of the Front Street – Hoquarton Slough area. These alternatives both cross Highway 101 to the north of the Hoquarton Slough. Figure 8 shows that these alternatives are almost identical except for one small section in the Sitka spruce forested wetland west of Highway 101 and north of the Hoquarton Slough. These alternatives would both extend north from the BPA Tillamook Substation and into agricultural land. The alternatives would then eventually turn west and extend over Highway 101. At this point, the alternatives diverge and City Proposal No.1 would extend southwest, while City Proposal No. 2 would head south. Both alternatives would cross the Hoquarton Slough and then traverse west into the farm field behind the Tillamook Hospital where they would turn to the southwest to enter an alignment along Highway 131.

Neither alternative meets all of the project critical criteria. Representatives from Oregon DSL and ODFW indicated that these alternatives would be difficult to permit compared to the proposed route, due to potential impacts on the sensitive critical habitat located in the forested wetland on the north side of the Hoquarton Slough. Visual impacts would also result from portions of these alternatives where the forested areas north of Hoquarton Slough would be cleared for the first time.

Therefore, this alternative was not selected as the proposed route.

5 Proposed Route – North Side of Front Street

Figures 1 through 8 also display the proposed route, which extends generally west out of the BPA Tillamook Substation within existing right-of-way for the POTB railroad main line and into the spur right-of-way along Highway 101. The route crosses Highway 101 along the north side of Front Street and then traverses due west to the farm field behind the Tillamook Hospital. It then turns to the southwest to enter an alignment along Highway 131.

The proposed route meets all of the critical project criteria. In communications with the City of Tillamook and various other resource agencies, the proposed route is perceived to be an option that can be permitted. In addition, initial conversations between the PUD and landowners indicate that the requisite easements can be obtained. However, the most important and unique aspect of this route compared to the others is that the vast majority of it can be accessed during all varieties of weather and weather events, including flooding. All of the routes through the City of Tillamook are subject to seasonal flooding. Some of the routes are also subject to possible flood debris damage. The accessibility during the flood events is an important selection criterion. The proposed route provides the best accessibility since all but three of the pole locations are located adjacent to all weather roads.

Although some impact to wetlands and riparian vegetation will occur along the proposed route, these are greatly minimized compared to the resulting environmental impacts from most of the other alternatives. This fact is due mainly to the avoidance of forested wetland and riparian areas along the Hoquarton Slough, to the west of Highway 101.

This proposed route would use existing rights-of-way along the north side of Front Street and Highway 131 thereby reducing impacts significantly. Several existing distribution poles could be replaced with taller transmission poles that would support both the distribution and transmission wires along Highway 131.

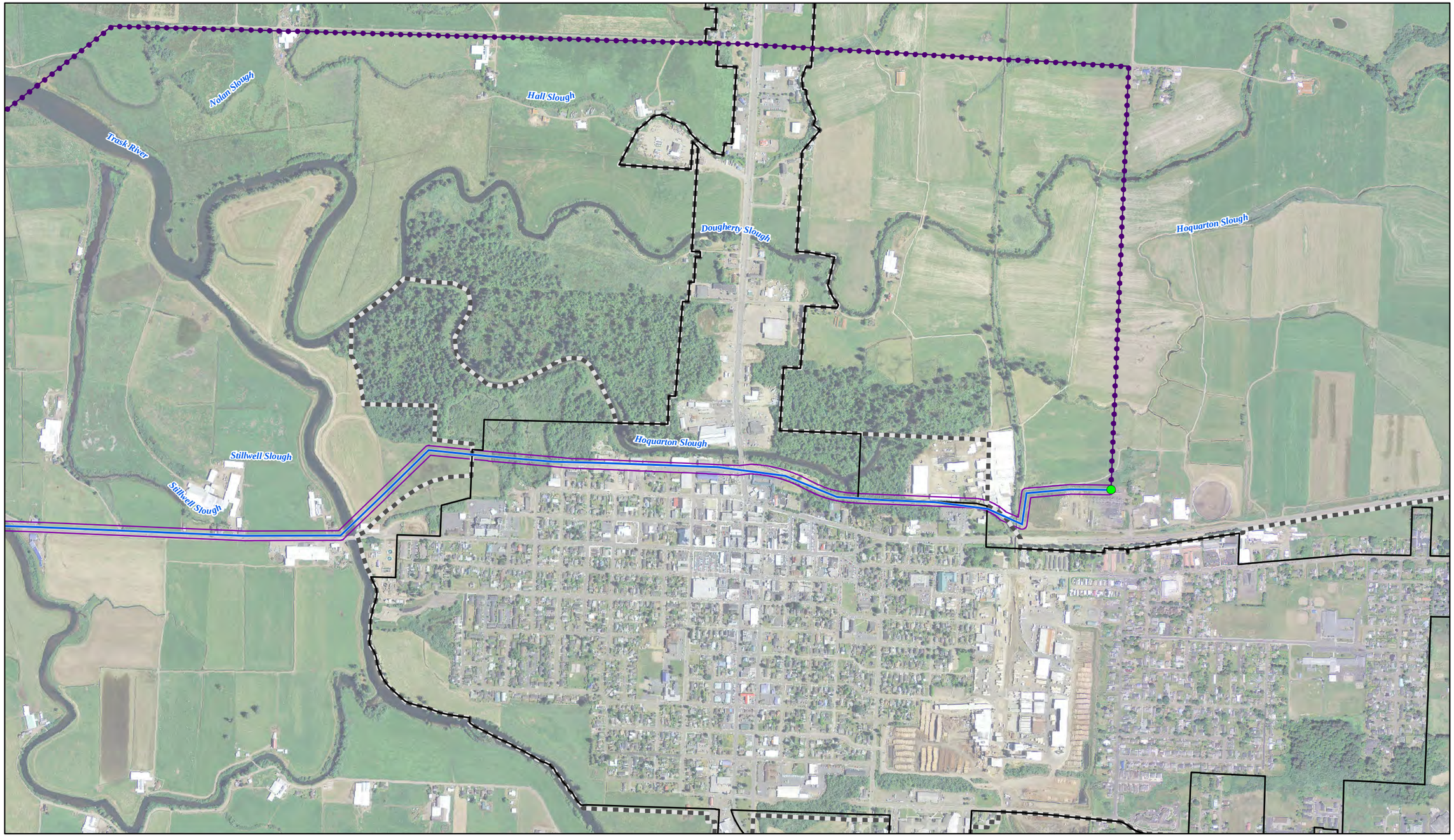
Finally, the proposed route offers the straightest, shortest, and most direct route through the City of Tillamook from the BPA Tillamook Substation. This results in various benefits. First, the maintenance of a straight line minimizes visual impacts by keeping the overall line shorter than other options, with fewer angle points, which reduces visual exposure to a larger audience. Second, a shorter line typically leads to fewer conflicts with existing landowners and uses. The proposed route keeps the number of affected landowners down compared to other alternatives. Finally, the shorter length of the proposed route keeps construction and maintenance costs down, which will directly benefit the rate payers within the City of Tillamook.

TABLE 1
Tillamook to Oceanside Transmission Line, Evaluation of Alternatives within the City of Tillamook using Additional Criteria

Route Name	Desire to Minimize								Desire to Maximize			
	Overall Length from Tillamook Substation to Trask River (miles)	**Visual Impacts (Low, Moderate, High)**	**Conflicts with Existing Land Uses (Low, Moderate, High)**	**Impacts to Cultural and Biological Resources[a] (Low, Moderate, High)**	**Number of Landowners and Properties Affected (through the City of Tillamook)**	**Impacts on Existing Vegetation (Low, Moderate, High)**	**Need for Special Structures and Long Spans (Low, Moderate, High)**	**Need for Access Roads (Low, Moderate, High)**	**Ability to Collocate (Low, Moderate, High)**	**Constructability and Accessibility during Poor Weather (Low, Moderate, High)**	**Distance from Existing Structures (Low, Moderate, High)**	**Length of Straight Sections (Low, Moderate, High)**
A: Goodspeed Road	3.0	High - Up to 90' in height at times	High - Conflicts with farm and logging uses	Unknown - Not reviewed for this criteria through the City	9	Moderate	High – four-legged lattice towers over 100'	High - special access roads needed	Moderate	Low	High	High
B: Hadley Road	2.1	High - Up to 90' in height at times	High - Conflicts with farm and logging uses	High – DSL and ODFW says not permitable	7	High	High - four-legged lattice towers over 100'	High - special access roads needed	Moderate	Low	High	High
C: Hoquarton Slough	1.6	High - Up to 90' in height at times	Moderate	Low	9	Moderate	None	None	Moderate to High	High	Moderate – close to several buildings	Moderate
D: First Street	1.7	High - Up to 90' in height at times	High	Low	5	Low to Moderate	High – high poles and sidewalk obstruction	None	Moderate to High	High	Low – close to many buildings	Low
E: Boyer Transmission Line Corridor	2.4	High - Up to 90' in height at times	High	Unknown - Not reviewed for this criteria through the City	16	High	High – crosses existing lines and high velocity flood waters	Moderate – special access roads needed	Moderate	Moderate	Low – close to many buildings	Low
F: Tillamook Lumber Route	2.3	High - Up to 90' in height at times	High	Unknown - Not reviewed for this criteria through the City	15	High	High – crosses existing lines and high velocity flood waters	Moderate – special access roads needed	Moderate	Moderate	Low – close to many buildings	Low
G: Second Street Underground	1.8	Low to Moderate	Low to moderate	Unknown - Not reviewed for this criteria through the City	7	Moderate	High – two large structures at either end and concrete vaults	None	Moderate to High	High[b]	Moderate –near many structures but underground	Low
H: City Proposal No. 1 and No. 2	1.9	High - Up to 90' in height at times	Moderate	High – DSL and ODFW says not permitable	10-13	High	Moderate – high poles needed	High – special access roads needed	Low	Low	Moderate – close to several buildings	Low
Proposed Route: North Side of Front Street[a]	1.1	High - Up to 90' in height at times	Moderate	Low	14	Low	Low	None	High	High	Moderate – close to several buildings	High

[a] Following field surveys, no cultural resources were located within the City of Tillamook
[b] Construction access is high, however, access for operations and maintenance is extremely low due to the route being underground.

Figures



LEGEND

- BPA Substation
- Goodspeed Road
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

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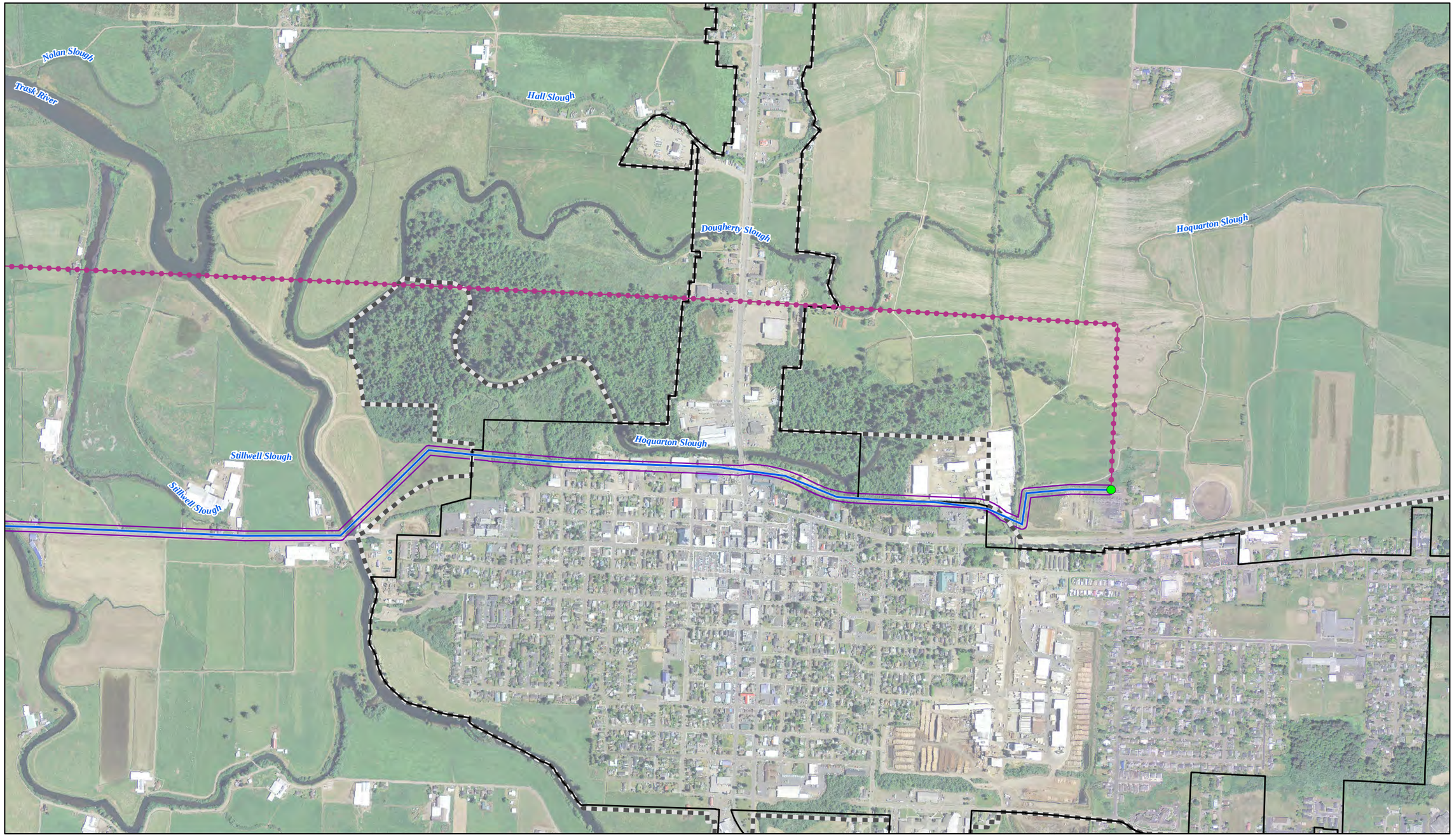
FIGURE 1
Alternative (A), Goodspeed Road
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD



LEGEND

- BPA Substation
- Hadley Road
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FIGURE 2
Alternative (B), Hadley Road
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD

LEGEND

- BPA Substation
- Hoquarton Slough
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
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FIGURE 3
Alternative (C), Hoquarton Slough
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD

LEGEND

- BPA Substation
- First Street
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

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FIGURE 4
Alternative (D), First Street
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD

LEGEND

- BPA Substation
- Boyer Transmission Line Corridor
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

N

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Feet

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FIGURE 5
Alternative (E), Boyer Transmission Line Corridor
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD

LEGEND

- BPA Substation
- Tillamook Lumber
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

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FIGURE 6
Alternative (F), Tillamook Lumber
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD

LEGEND

- BPA Substation
- Second Street Underground
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

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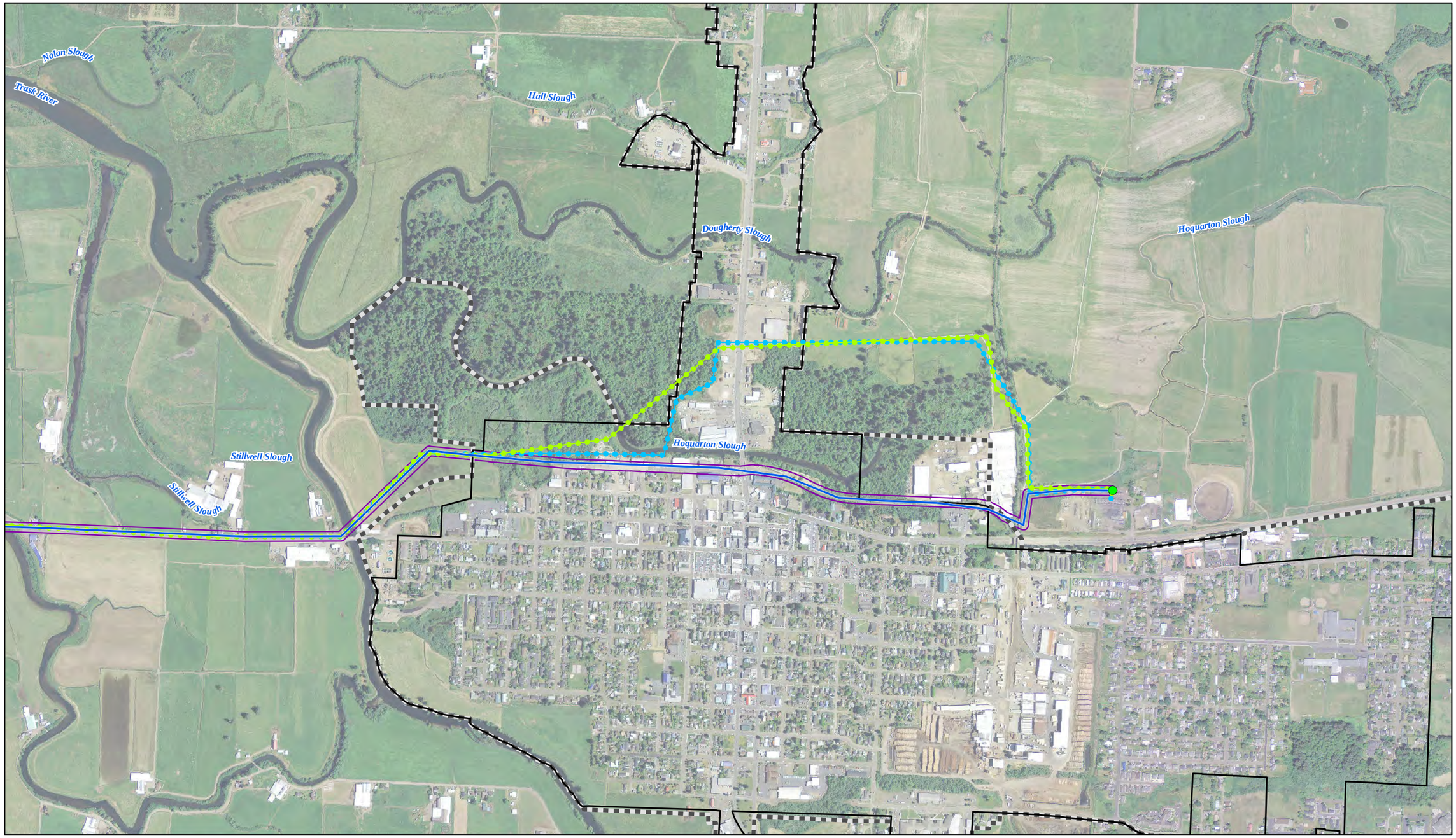
FIGURE 7
Alternative (G), Second Street Underground
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD



LEGEND

- BPA Substation
- City Proposal Number 1
- City Proposal Number 2
- Proposed Transmission Route
- 100-foot Easement
- Tillamook City Limit[1]
- Tillamook Urban Growth Boundary[2]

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Sources:
1) Tillamook County, 2008
2) OR Dept. of Land Conservation and Development

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FIGURE 8
Alternative (H), City Proposal No. 1 and No. 2
Alternatives Analysis
Tillamook-Oceanside Transmission Line
Tillamook PUD