# MITIGATION PLAN

## 1.0 INTRODUCTION

Mitigation planning has been an integral component of the Project from the initial Macro Corridor Study beginning in 1995 through the preparation of the DEIS, as shown on Figure 1. Chapter 2 and Appendix B of the DEIS describe the project description, which incorporates both standard and selective mitigation measures listed in the DEIS (Appendix D).

During the preparation of the FEIS, interested federal, state, and local agencies reviewed the locations and effectiveness of selective mitigation measures along alternative routes. Meetings occurred in March 2002 in Anchorage and Soldotna with the EPA, ADF&G, KPB, Kenai River Center, Alaska Department of Governmental Coordination, and the Municipality of Anchorage Planning and Park and Recreation Departments. The resulting mitigation plan provides specific locations of the mitigation measures applied in the DEIS and summarizes the effectiveness of these measures in avoiding or reducing environmental impacts.

Results of the mitigation plan provide the site-specific mitigation commitments that are required in the Record of Decision (ROD). This will ensure that decisions are made assuming all practicable means to avoid or reduce impacts have been adopted and if not, why not, as required in 40 CFR 15 (5.3(e)). This mitigation plan will also ensure that the mitigation measures presented in the DEIS and prescribed in this plan are incorporated into the ROD and adhered to during the implementation of the Project.

## 2.0 MITIGATION PLAN

The mitigation plan has been divided into five sections that include the following:

- Section 2.1 – Standard Practice Project Mitigation, describes measures to protect the environment as standard practice for the entire Project.
- Section 2.2 – Selective Mitigation Measures, describes and depicts each selective mitigation measure proposed for the Project.
- Section 2.3 – Design and Construction Mitigation, identifies the proposed structure types in relationship to existing utilities and specific design and construction-related mitigation measures for the Project.
- Section 2.4 – Selective Mitigation Measure Locations, provides specific locations for the selective mitigation measures.

- Section 2.5 – Impact Mitigation Summary, documents the combined mitigation measures applied to the environmental receptors and summarizes the overall effectiveness of the mitigation.

## 2.1 MITIGATION AND STANDARD PRACTICE MEASURES

Mitigation typically involves one or more of the following:

- *avoiding* the impact by not taking a certain action or part of an action
- *minimizing* impacts by limiting the degree of magnitude of the action and its implementation
- *rectifying* impacts by repairing, rehabilitating, or restoring the affected environment
- *reducing* the impact
- *compensating* for the impact by replacing or providing substitute resources or environments

As part of the Project description, certain measures to protect the environment are considered standard practice for the entire Project as described in the DEIS (Appendix D, Table D-1). These measures are referred to as "standard practice project mitigation" and are summarized in Table 1. The impact levels initially assigned (initial impact levels) to the Project assume that these standard practice project mitigation measures are implemented.

## 2.2 SELECTIVE MITIGATION MEASURES

Where warranted on a case-by-case basis, mitigation beyond these standard measures was recommended to further reduce adverse impacts to an acceptable or lesser level. These are called selective mitigation measures, and they include those measures or techniques to which the Project proponents commit on a case-by-case, or selective, basis after initial impacts are identified and assessed. For purposes of evaluating the alternative routes at the environmental analysis stage of a project, selective mitigation measures provide a planning tool for minimizing potential adverse impacts.

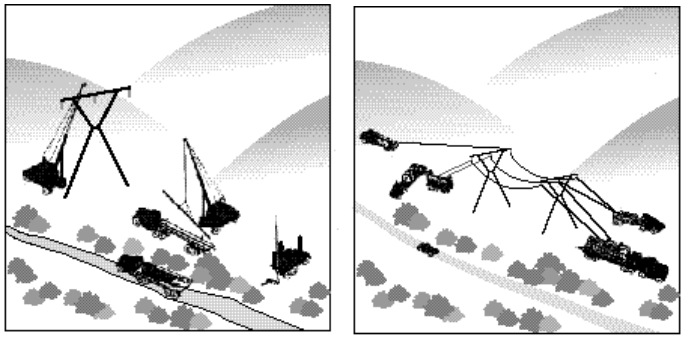
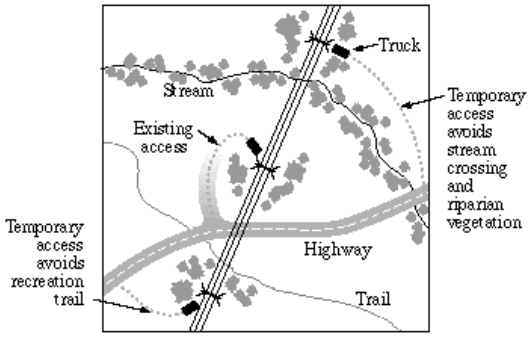
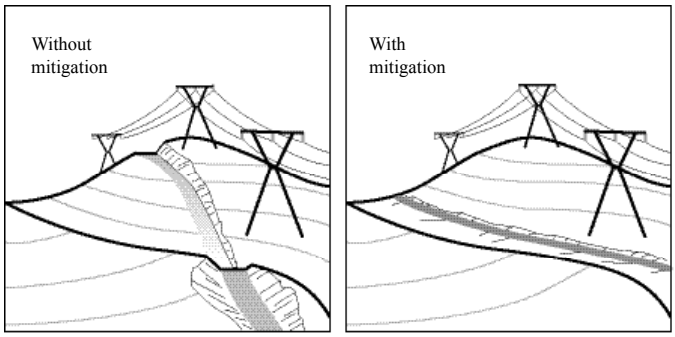
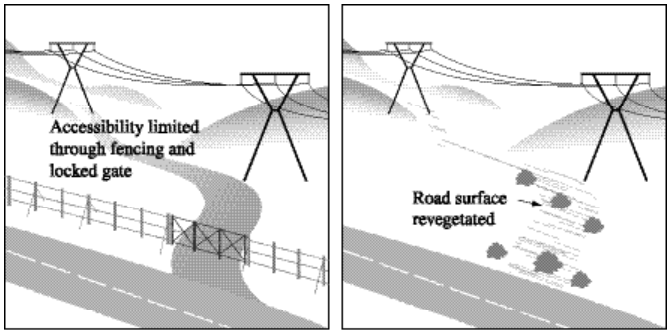
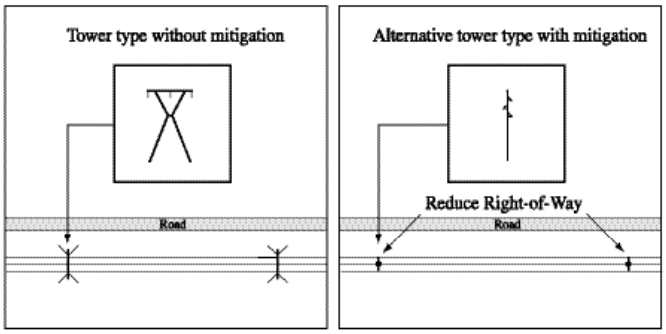
Illustrations of the 20 selective mitigation measures described in the DEIS (Appendix D, Table D-2) are presented on Figure 2 of the Mitigation Plan. This figure provides a description of each of the selective mitigation measures developed for the Project and a sketch typical of the application of each measure.

# Southern Intertie Project
# Siting Study and Mitigation Process

| | Task | Results / Benefits |
|---|---|---|
| Regional Studies | **Corridor Selection (1995-1996)**<br>used existing linear facilities to identify corridors<br>transmission lines<br>roads<br>pipelines | avoided new overland / cross country routes |
| NEPA | **Draft EIS (1996-2001)**<br><br>**Facility Siting**<br>established routes<br>transition sites<br>planned corridors<br>rights-of-way | avoided local area impacts<br>North Kenai Spur Road<br>planned transportation / utility corridor<br><br>consultation / public involvement |
| NEPA | **Concept Design Level**<br>eliminated Quartz Creek Route<br>project description / general mitigation<br>pole/tower type: single pole, shorten poles<br>winter construction / timing<br>undergrounding | avoid or reduce site-specific impacts<br>bird collision<br>tree trimming<br>sensitive habitat / wetlands<br>tourism conflicts<br>airports<br>parks |
| NEPA | **Impact Assessment / Selective Mitigation** | issues remaining:<br>KNWR related impacts on Enstar Route<br>bird collisions and visual impacts on Tesoro Route |
| NEPA | **Final EIS (Summer 2002)**<br>assessment refinement<br>mitigation refinement / effectiveness | minimize effects to site-specific impacts |
| NEPA | **Record of Decision (Fall 2002)** | stipulations for construction, operation, and maintenance |
| Permitting | **Permitting**<br>stipulations | stipulations for construction, operation, and maintenance |

| TABLE 1<br>STANDARD PRACTICE PROJECT MITIGATION MEASURES<br>INCLUDED IN THE PROJECT DESCRIPTION | |
|---|---|
| 1 | All construction vehicle movement outside the right-of-way will be restricted to predesignated access, contractor acquired access, or public roads. |
| 2 | The areal limits of construction activities will be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate survey or construction activity limits. |
| 3 | In construction areas where recontouring is not required, vegetation would be left in place wherever possible and original contour would be maintained to avoid excessive root damage and allow for resprouting. |
| 4 | In construction areas (e.g., marshaling yards, tower sites, spur roads from existing access roads) where ground disturbance is substantial or where recontouring is required, surface restoration would occur as required by the landowner or land-managing agency. The method of restoration would normally consist of returning disturbed areas back to their natural contour and reseeding (if required). |
| 5 | Towers and/or conductors would be marked with high-visibility devices where required by governmental agencies (FAA). |
| 6 | Prior to construction, all supervisory construction personnel would be instructed on the protection of cultural and ecological resources. To assist in this effort, the construction contract would address (a) federal and state laws regarding antiquities and plants and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them. |
| 7 | The IPG would continue to consider cultural resources during post-EIS phases of project implementation in accordance with the programmatic agreement that would be developed in conjunction with preparation of the environmental impact statement. This would involve intensive surveys to inventory and evaluate cultural resources within the selected corridor and any appurtenant impact zones beyond the corridor, such as access roads and construction equipment yards. In consultation with appropriate land-managing agencies and state historic preservation officers, specific mitigation measures would be developed and implemented to mitigate any identified adverse impacts. These may include project modifications to avoid adverse impacts, monitoring of construction activities, and data recovery studies. |
| 8 | The IPG would respond to complaints of line-generated radio or television interference by investigating the complaints and implementing appropriate mitigation measures. The transmission line would be patrolled by air on a regular basis so that damaged insulators or other line materials that could cause interference are repaired or replaced. |
| 9 | The IPG would apply necessary mitigation to eliminate problems of induced currents and voltages onto conductive objects sharing a right-of-way, to meet the appropriate codes. |
| 10 | Stream crossings will be as near as possible at right angles to streams. Bridges or culverts would be installed where necessary. All construction and maintenance activities shall be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and intermittent or perennial stream banks. Towers will be sited with a minimum distance of 200 feet from streams. |

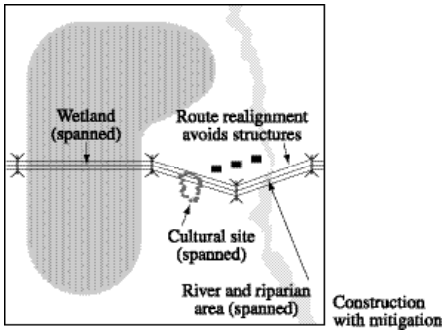
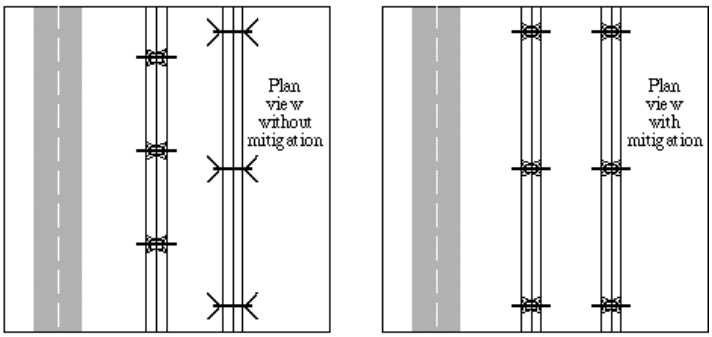
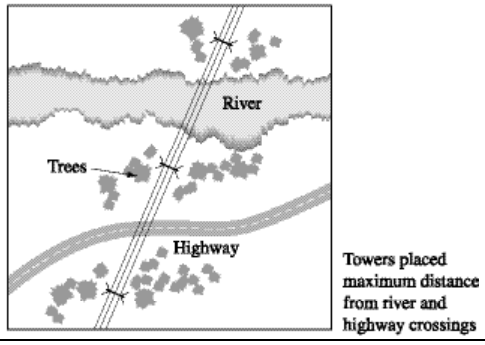
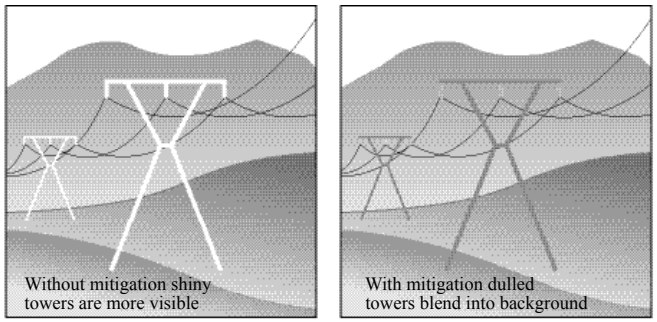
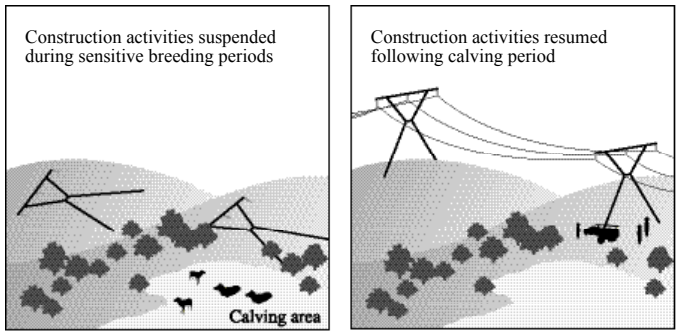
| TABLE 1<br>STANDARD PRACTICE PROJECT MITIGATION MEASURES<br>INCLUDED IN THE PROJECT DESCRIPTION | |
|---|---|
| 11 | All requirements of those entities having jurisdiction over air quality matters would be adhered to and any necessary permits for construction activities would be obtained. |
| 12 | Fences and gates would be repaired or replaced to their original predisturbed condition as required by the landowner or the land-managing agency if they are damaged or destroyed by construction activities. Temporary gates would be installed only with the permission of the landowner or the land-managing agency; and would be restored to its original predisturbed condition following construction. |
| 13 | During operation and maintenance of the transmission line, the right-of-way would be maintained free of non-biodegradable debris resulting from IPG activities. |
| 14 | Hazardous materials shall not be drained onto the ground or into streams or drainage areas. Totally enclosed containment shall be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials shall be removed to a disposal facility authorized to accept such materials. |
| 15 | No construction camps will be established along the right-of-way. Construction crews are expected to be able to find housing within communities in the study area. Construction crews will be transported to work sites daily. |
| 16 | Pre-construction surveys for plants and wildlife species designated as sensitive or of concern will be conducted in areas of known occurrence or habitat as stipulated by the land-managing agency during the development of the Construction, Operation, and Maintenance Plan once the transmission line centerline, access roads, and tower sites have been located and staked in the field. |
| 17 | Care will be taken to reduce the possibility of bear-human interactions during construction. Construction camps will not be established along the right-of-way and any waste generated during construction will be properly stored and disposed of, so that bears are not attracted to construction areas. Bear training will be provided to personnel. |
| 18 | Engineering design will include safeguards to prevent or reduce the possibility of fluid leaks due to damage to the cable from natural hazards in submarine and terrestrial environments. |
| 19 | Trenching of submarine cables in coastal marsh lands will be backfilled and reclaimed.<br><br>To the extent practicable, construction will be completed during winter months to avoid damage to areas of sensitivity. |

| DESCRIPTION OF SELECTIVE MITIGATION MEASURES | MITIGATION EXAMPLES |
|---|---|
| **1** In areas where soils and vegetation are particularly sensitive to disturbance, existing access roads/trails will not be widened or otherwise upgraded for construction and maintenance, except in areas where repairs are necessary to make existing roads/trails passable. |  |
| **2** To avoid disturbance to sensitive features (e.g., streams, recreation trails), access roads will not be constructed in those areas. Rather, construction and maintenance traffic will use existing roads or cross-country access routes (including the right-of-way). To minimize ground disturbance, construction traffic routes must be clearly marked with temporary markers such as easily visible flagging. The construction routes or other means of avoidance must be approved in advance of use. |   |
| **3** To minimize ground disturbance and/or reduce scarring (visual contrast) of the landscape, the alignment of any new access roads or cross-country routes will follow the landform contours in designated areas where practicable, providing that such alignment does not impact resource values additionally. |   |
| **4** To limit new or improved accessibility into the area, all access that is undesired or not required for maintenance will be closed using the most effective and least environmentally damaging methods appropriate to that area and developed with concurrence of the landowner or land manager. Low growing, native shrubby vegetation such as willow will be planted within the right-of-way. |   |
| **5** To minimize ground disturbance, operational conflicts, and/or visual contrast, the tower design will be modified or an alternative tower type will be used. |   |

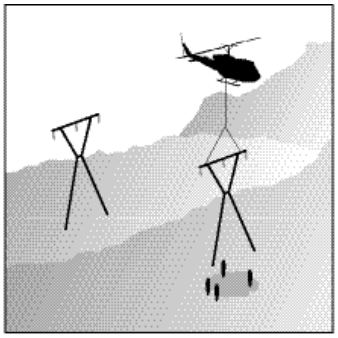
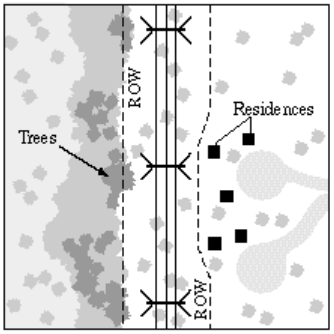
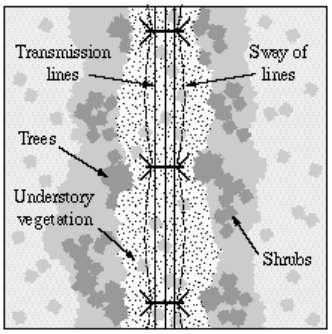
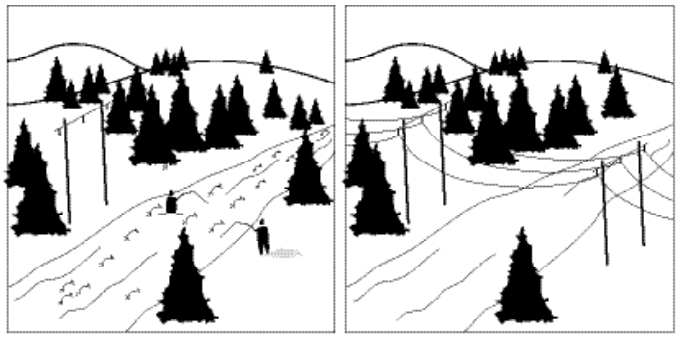
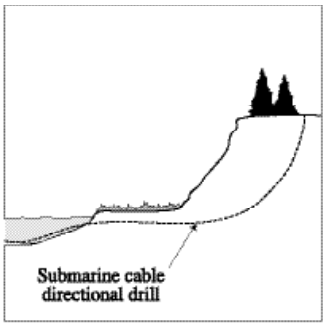
**SELECTIVE MITIGATION**

Southern Intertie Project

Figure 2

| DESCRIPTION OF SELECTIVE MITIGATION MEASURES | MITIGATION EXAMPLES |
|---|---|
| **6** To minimize the amount of sensitive features disturbed in designated areas, structures and access roads will be placed so as to avoid sensitive features such as, but not limited to, riparian areas, watercourses, residential uses, and cultural sites, and/or to allow conductors to clearly span the features, within limits of standard tower design. Avoidance may be accomplished by spanning sensitive features, shifting the alignment to the opposite side of an existing line, or realigning the route. |  |
| **7** To reduce visual contrast and/or potential operational conflicts, standard tower design will be modified to correspond with spacing of existing transmission line structures where feasible and within limits of standard tower design. The normal span will be modified to correspond with existing towers, but not necessarily at every location. |  |
| **8** To reduce visual impacts, potential impacts on recreation values and safety at highways and trail crossings, towers are to be placed at the maximum feasible distance from the crossing within limits of standard tower design. |  |
| **9** "Dulled" metal or corten finish on towers will be used to reduce visual impacts. |  |
| **10** With the exception of emergency repair situations, the construction, restoration, maintenance, and termination activities in designated areas (e.g., buffer zones) will be modified or curtailed during sensitive periods (e.g., nesting and breeding periods) for sensitive animal species. Sensitive periods and areas of concern would be approved in advance of construction or maintenance by the authorized officer. Winter construction during frozen conditions would be an alternative for avoiding sensitive periods or areas of wildlife concern, soft and wet ground conditions, and stream crossings. |  |

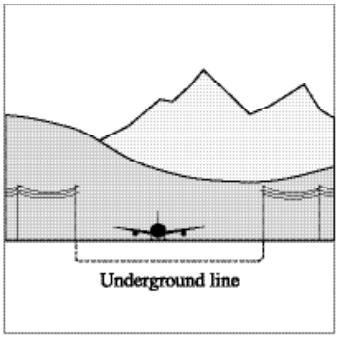
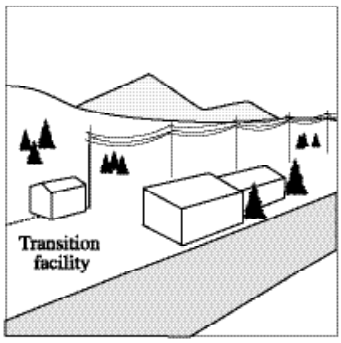
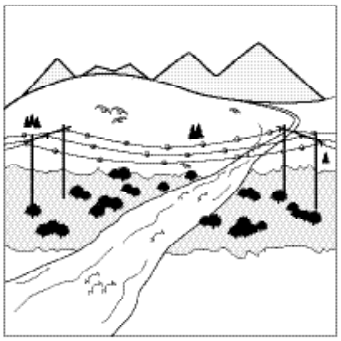
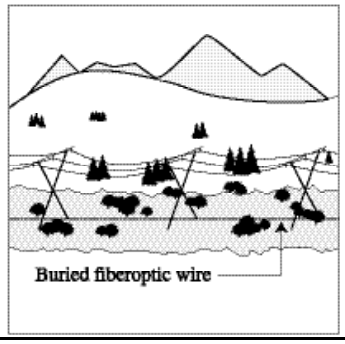
**SELECTIVE MITIGATION**
Southern Intertie Project
Figure 2

| DESCRIPTION OF SELECTIVE MITIGATION MEASURES | MITIGATION EXAMPLES |
|---|---|
| **11** Helicopter placement of towers during construction and helicopter patrol and maintenance may be used to reduce surface impacts in highly sensitive locations. |  |
| **12** To reduce visual contrast or avoid features (such as, but not limited to, land uses, jurisdiction, biological or cultural resources sites), clearing of the right-of-way will be minimized or in limited instances the right-of-way may be reduced (within the limits of conductor-clearance requirements and standard tower design). |   Right-of-way reduced to avoid residences and reduce vegetation clearing |
| **13** To minimize disturbance to vegetation resources and reduce visual contrast, clearing of trees in and adjacent to the right-of-way will be minimized to the extent practicable to satisfy conductor-clearance requirements (National Electric Safety Code). Trees and other vegetation will be removed selectively (e.g., edge feathering) to blend the edge of the right-of-way into adjacent vegetation patterns, as practicable and appropriate. |   Clearing of trees minimized |
| **14** Construction near anadromous fish streams will be timed and carried out in a manner that minimizes any potential impacts on subsistence, sport, and commercial fishing efforts, including avoidance of construction along anadromous streams during the peak salmon spawning periods. |  |
| **15** To avoid disturbance to coastal bluffs and marsh lands, such as in the Anchorage Coastal Wildlife Refuge, submarine cables will be installed with horizontal directional drilling. In the case of marsh lands, directional drilling would extend out beyond the lower extent of salt marsh vegetation. |   |

**SELECTIVE MITIGATION**

Southern Intertie Project

Figure 2

| DESCRIPTION OF SELECTIVE MITIGATION MEASURES | MITIGATION EXAMPLES |
|---|---|
| **16** Transmission line will be placed underground, where required, in parks and in the flight path of airstrips and airports. |  |
| **17** To minimize visual impacts, submarine to overhead transition facilities will be placed within a small enclosed building in context with the surrounding architecture. |  |
| **18** Cable system will be designed to limit fluid loss. | The submarine cable insulating oil system will be “pressurized” instead of “gravity fed”, which allows for a lower total amount of insulating oil in the system. |
| **19** Line diverters, spheres, or marking of lines will make them more visible to birds. |  |
| **20** Burying small diameter fiber optic wires normally carried above conductors may be considered in sensitive areas. |  |

**SELECTIVE MITIGATION**
Southern Intertie Project
Figure 2

## 2.3 DESIGN AND CONSTRUCTION MITIGATION

### 2.3.1 Proposed Structure Types and Existing Utilities

Figures 3a, 3b, and 3c show the location of the existing utilities that are paralleled or replaced by the proposed alternatives. These figures also illustrate where tower designs have been modified or an alternative tower type will be used for mitigation (see Measure 5 on Figure 2), and where transmission lines will be undergrounded to avoid sensitive areas (see Measure 16 on Figure 2).

These figures also illustrate where mitigation for avian collision would be applied (see Measures 19 and 20, Figure 2). A detailed discussion on the potential for avian collision and the effectiveness of mitigation is also provided in Chapter 2, Section 2.2.8 (pages 2-32 to 2-34) in Volume I of the FEIS.

### 2.3.2 Construction Season

Construction timing has been assigned to specific seasons to reduce environmental impacts along alternative routes, as illustrated on Figures 4a, 4b, and 4c (follows Figures 3a through 3c). Winter construction during frozen seasons has been proposed to avoid sensitive periods or areas of wildlife concerns, soft or wet ground conditions, and stream crossings. These figures also illustrate the avoidance of construction across the Turnagain Arm during beluga whale calving season and the migratory bird nesting season (Measure 10 on Figure 2).

### 2.3.3 Construction Methods and Access

Figures 5a, 5b, and 5c (follows Figures 4a through 4c) depict the methods by which each alternative would be constructed and construction access. The method of construction has been determined based on response to environmental conditions, timing of construction, and available access. As identified on these figures, special equipment including the use of swamp buggies and low ground pressure vehicles have been prescribed in areas of limited access and sensitive ground conditions (Measures 2 and 3, Figure 2). In addition, these figures illustrate where horizontal directional drilling would occur in order to avoid impacts to bluffs and coastal zone salt marsh areas (see Measure 15, Figure 2).

NOTE: When reviewing Figures 3 through 5 the designation of mileposts corresponds to the links as identified on the General Reference Map (located in the map pocket on the back cover of the FEIS, Volume 1).

## 2.4 SELECTIVE MITIGATION MEASURE LOCATIONS

Bar charts (Figures 6a through 6n) have been prepared to illustrate the specific milepost locations for each of the 20 selective mitigation measures described on Figure 2, as they have been applied to the Tesoro and Enstar alternatives (follows Figures 5a through 5c).

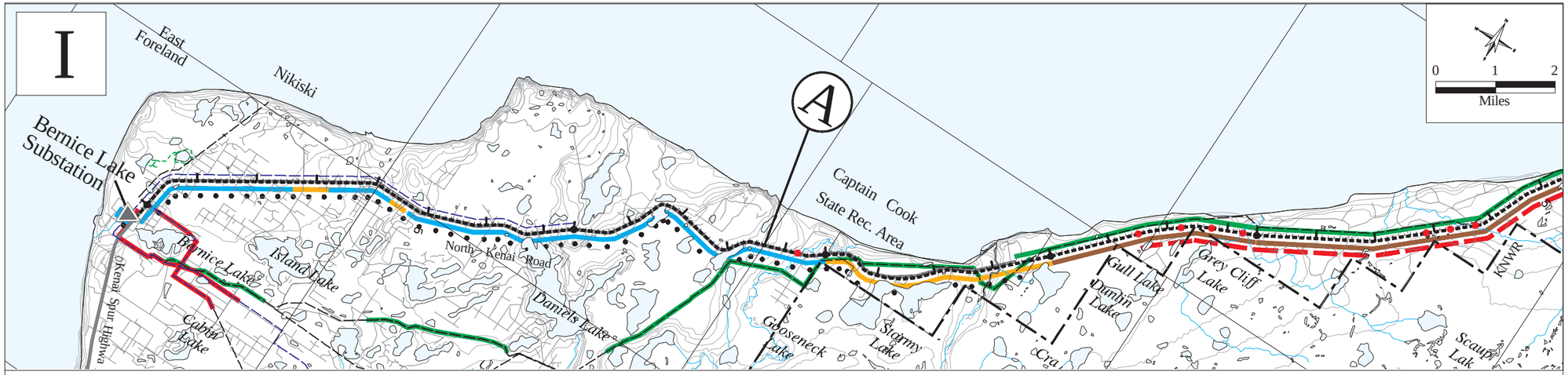
Included in each chart is (1) a milepost and link reference; (2) a general description of the area(s) crossed by each alternative including key environmental features (i.e., stream crossings and airstrips); (3) the conditions within which facilities have been sited (i.e., existing or planned utility corridor, or parallel to existing utilities or roads); (4) the specific location of each of the 20 selective mitigation measures (as applicable); and (5) the effectiveness of these measures including significant environmental impacts.

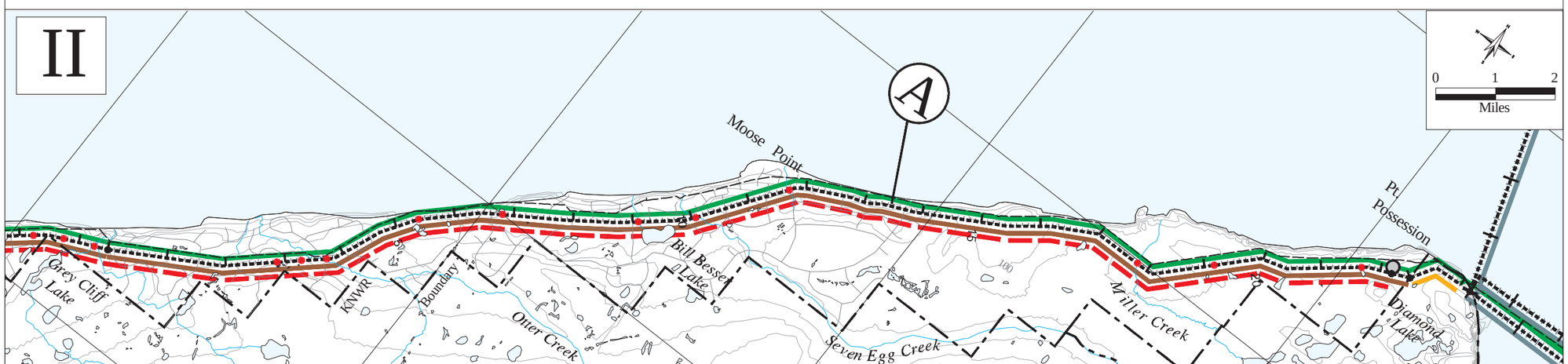
A map of the alternatives studied in detail follows these charts for ease of reference to each route option (including submarine cable crossings of the Turnagain Arm). For additional reference to specific links see the General Reference Map (located in the map pocket on the back cover of the FEIS, Volume I).

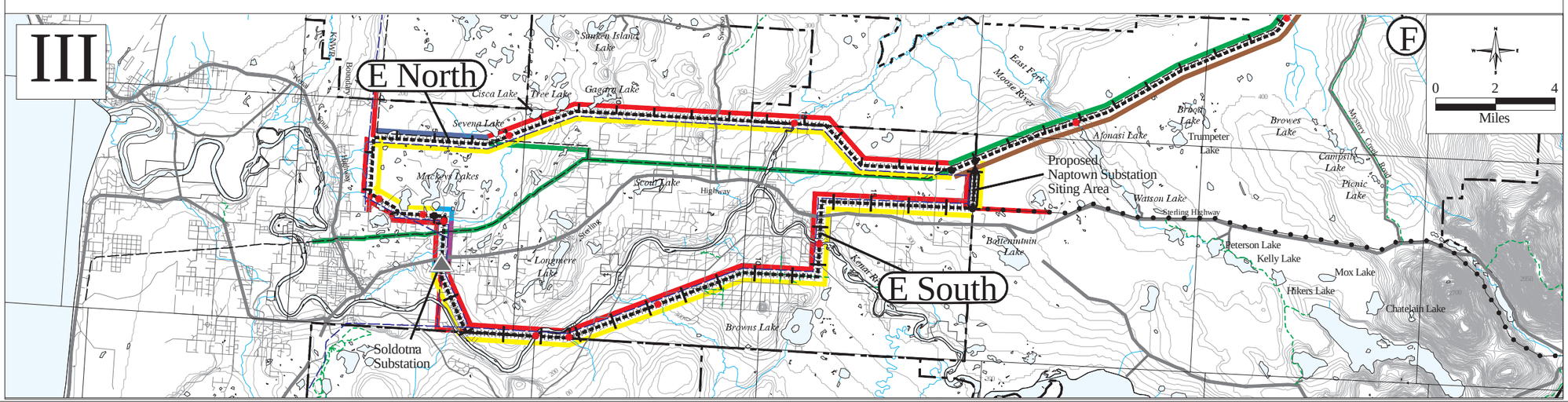
## 2.5 IMPACT MITIGATION SUMMARY

The impact mitigation summary table, Table 2 (follows Figure 7) documents the combined selective mitigation measures applied to the environmental receptors included in the DEIS, and summarizes the overall effectiveness of the mitigation measures. This table is intended to provide the reader with a breakdown of mitigation effectiveness by alternative route resource topics and concerns. Applicable mitigation measures and the site-specific features are also addressed in the table, and references are made to the applicable maps and resource topic (MV-2 through MV-31 in Volume II of the DEIS) that depict resource conditions.

# FIGURES 3a TO 3c
# FIGURES 4a TO 4c
# FIGURES 5a TO 5c
# DESIGN AND CONSTRUCTION MITIGATION




**PROPOSED STRUCTURE TYPES AND EXISTING UTILITIES SOUTHERN INTERTIE PROJECT FIGURE 3a**

## Legend

### Proposed Structure Types

- Single Pole Wood (5)
- Single Pole Steel (5)
- H-Frame (5)
- X-Frame (Project Description)
- Submarine Cable (Project Description)
- Underground Cable(16)

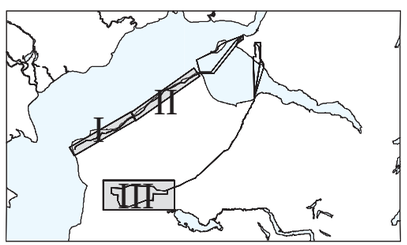
### Existing Utilities/ROW

- Utility Corridor
- Transmission Line
- Road ROW
- Pipeline
- Sub-Transmission Line
- Transmission Line and Pipeline

## Selective Mitigation Key

(5) Modify tower design.
(16) Underground transmission line.
- Wire marking location and/or bury fiber optic wire for birds (19, 20)

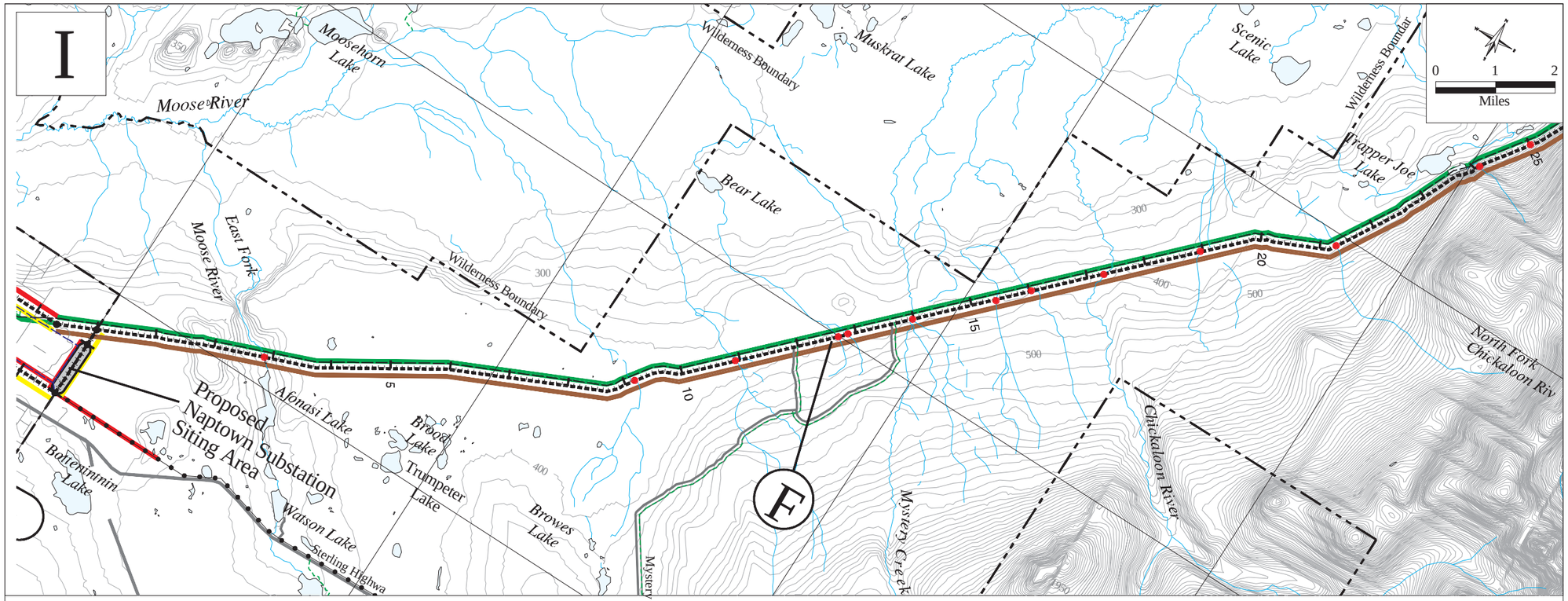
See Figure 2 for a complete description of measures.

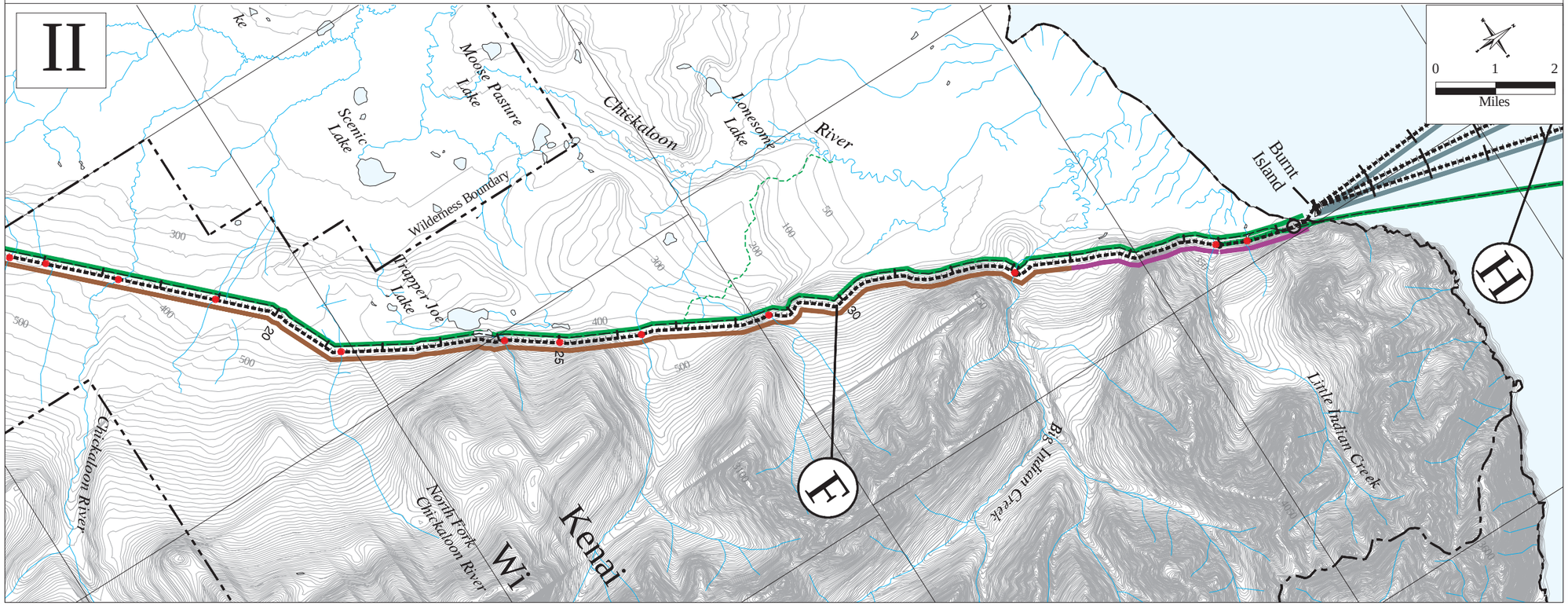



Base Map Sources:
Municipality of Anchorage (1994).
Chugach National Forest (1995).
Kenai Peninsula Borough (1994).
USGS 1:63,360 and 1:25,000 Quads.

06/14/02

# PROPOSED STRUCTURE TYPES AND EXISTING UTILITIES SOUTHERN INTERTIE PROJECT FIGURE 3b




## Legend

### Proposed Structure Types

- Single Pole Wood (5)
- Single Pole Steel (5)
- H-Frame (5)
- X-Frame (Project Description)
- Submarine Cable (Project Description)
- Underground Cable(16)

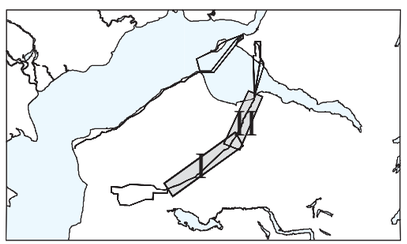
### Existing Utilities/ROW

- Utility Corridor
- Transmission Line
- Road ROW
- Pipeline
- Sub-Transmission Line
- Transmission Line and Pipeline

## Selective Mitigation Key

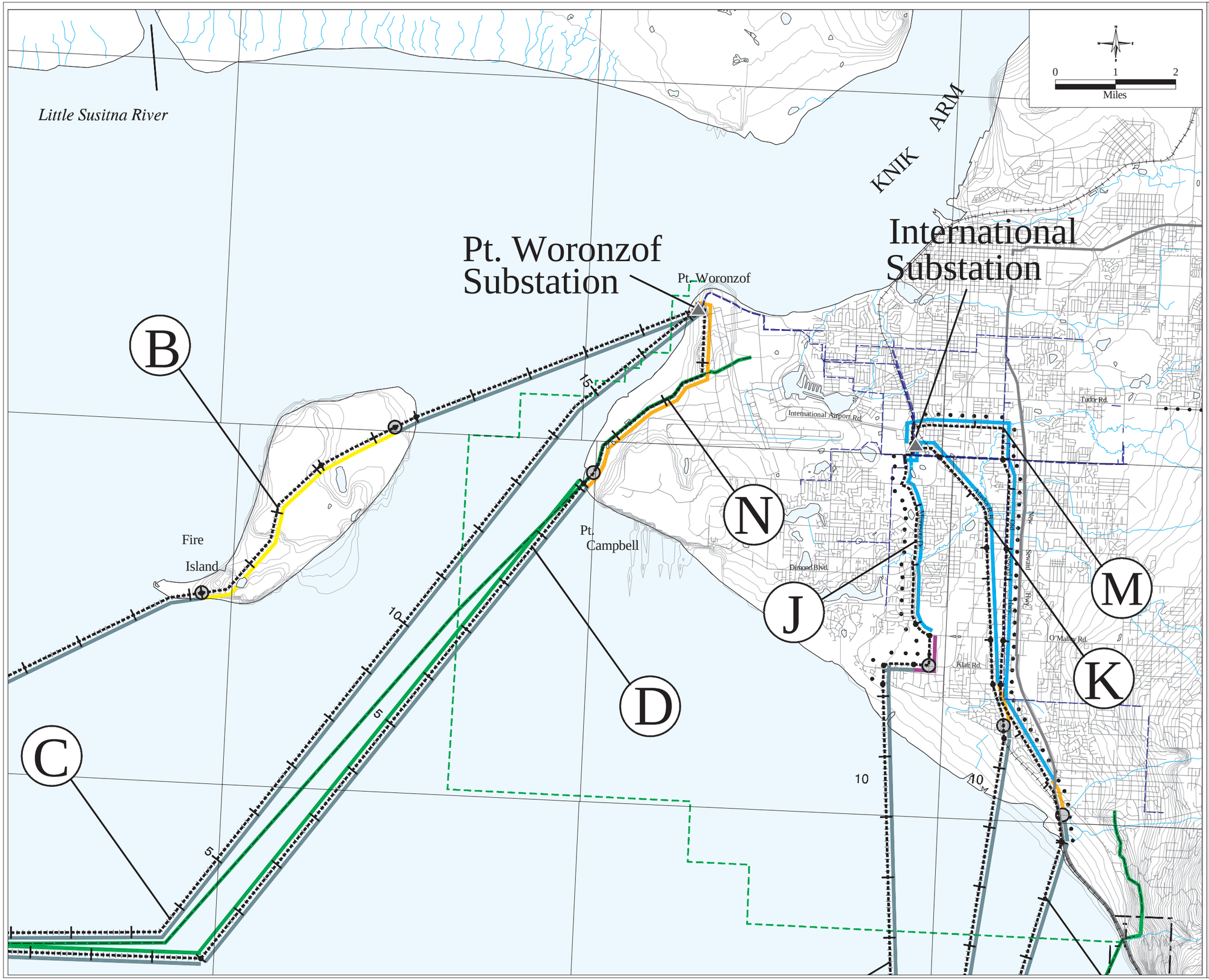
(5) Modify tower design.
(16) Underground transmission line.
- Wire marking location and/or bury fiber optic wire for birds (19, 20)

See Figure 2 for a complete description of measures.




Base Map Sources:
Municipality of Anchorage (1994).
Chugach National Forest (1995).
Kenai Peninsula Borough (1994).
USGS 1:63,360 and 1:25,000 Quads.

06/13/02




**PROPOSED STRUCTURE TYPES AND EXISTING UTILITIES SOUTHERN INTERTIE PROJECT FIGURE 3c**

## Legend

### Proposed Structure Types

- Single Pole Wood (5)
- Single Pole Steel (5)
- H-Frame (5)
- X-Frame (Project Description)
- Submarine Cable (Project Description)
- Underground Cable(16)

### Existing Utilities/ROW

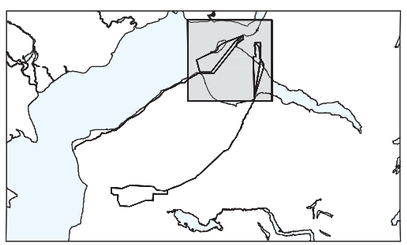
- Utility Corridor
- Transmission Line
- Road ROW
- Pipeline
- Sub-Transmission Line
- Transmission Line and Pipeline

## Selective Mitigation Key

(5) Modify tower design.
(16) Underground transmission line.
- Wire marking location and/or bury fiber optic wire for birds (19, 20)

Transmission Lines would be located within the ROW of the Alaskan Railroad, Minnesota Drive, Old Seward Highway, and International Airport Road.

See Figure 2 for a complete description of measures.



Base Map Sources:
Municipality of Anchorage (1994).
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USGS 1:63,360 and 1:25,000 Quads.

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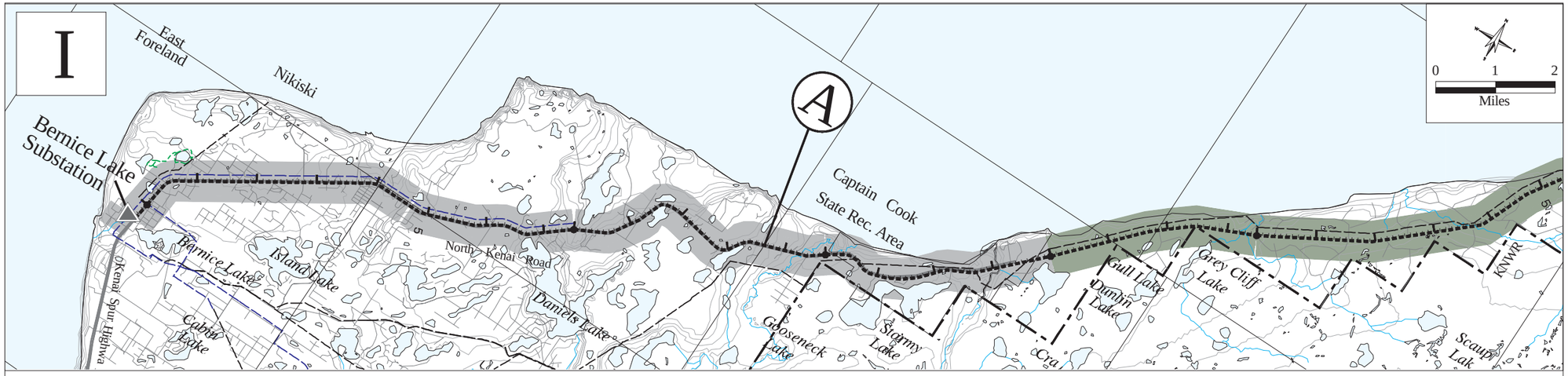
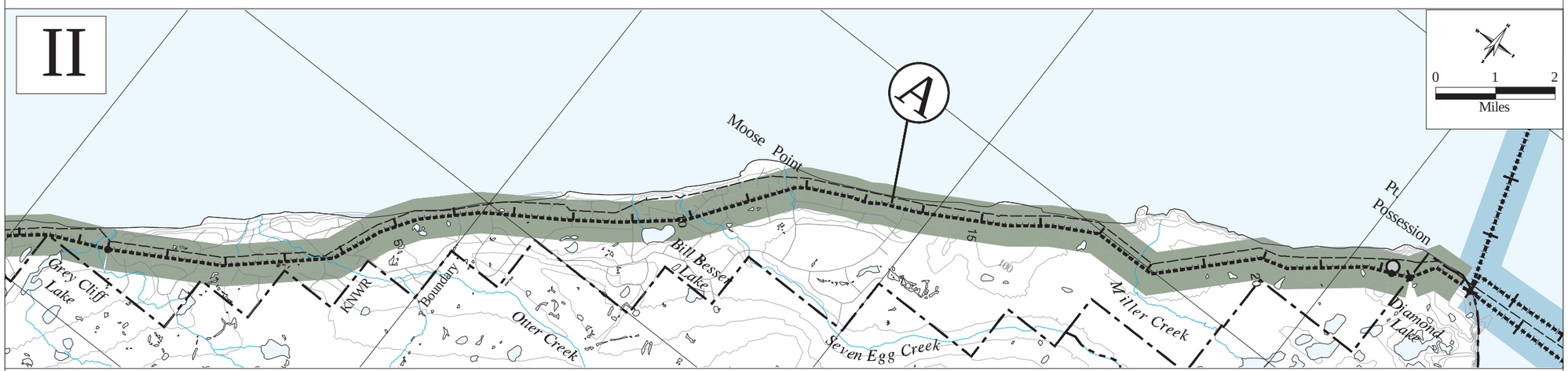
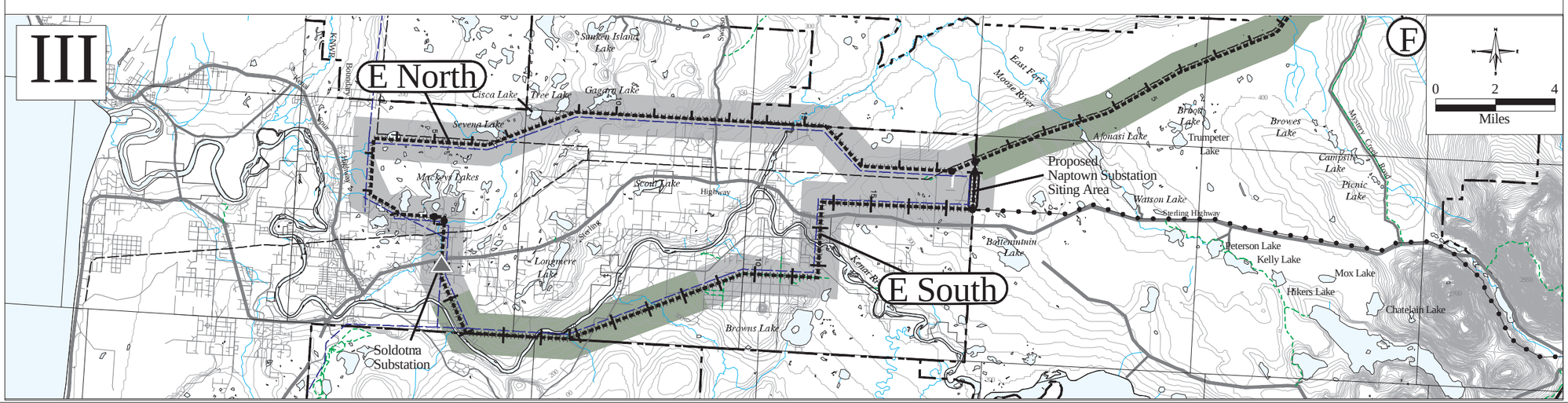



**CONSTRUCTION SEASON**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 4a**

## Legend

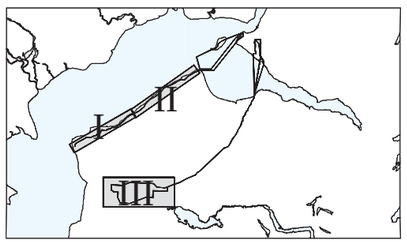
### Construction Season

- Summer - Thawed - April to October
- Winter - Frozen - November to March (10)
- Submarine - May to August (July to August to minimize impacts to Beluga Whale) (10)

## Selective Mitigation Key

(10) Seasonal construction.

See Figure 2 for a complete description of measures.




Base Map Sources:
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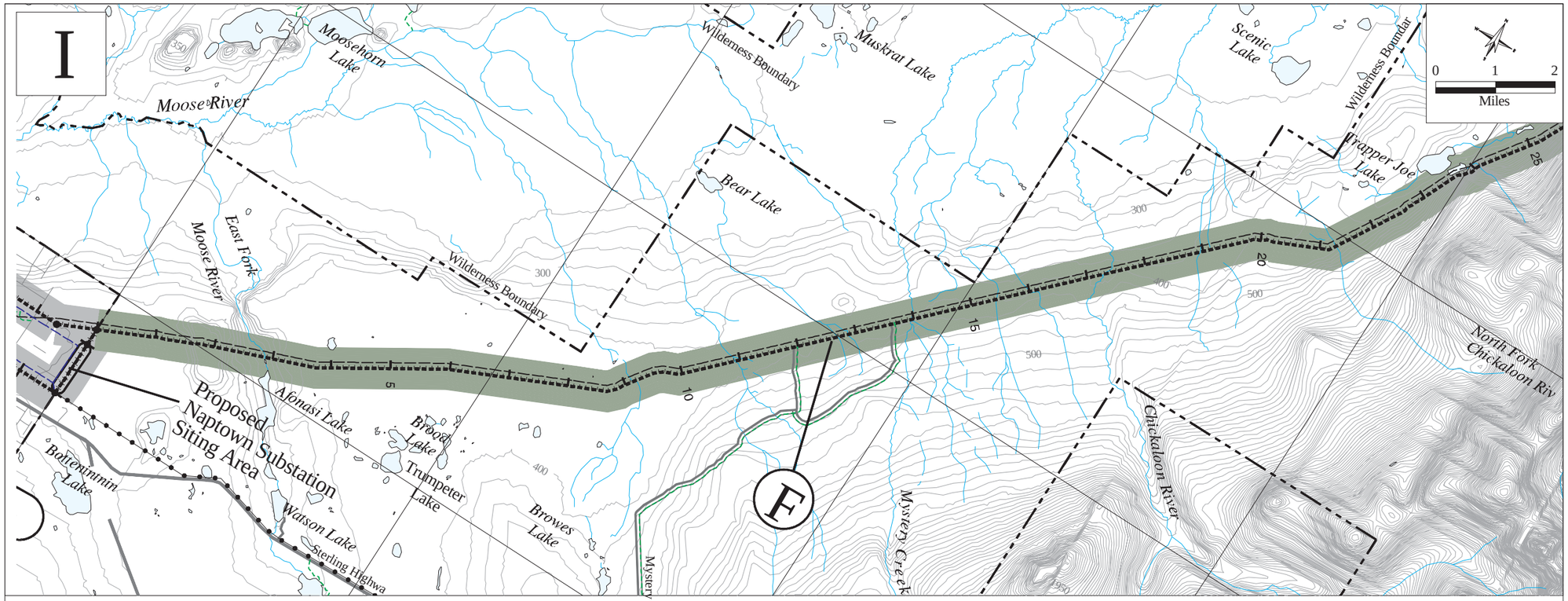
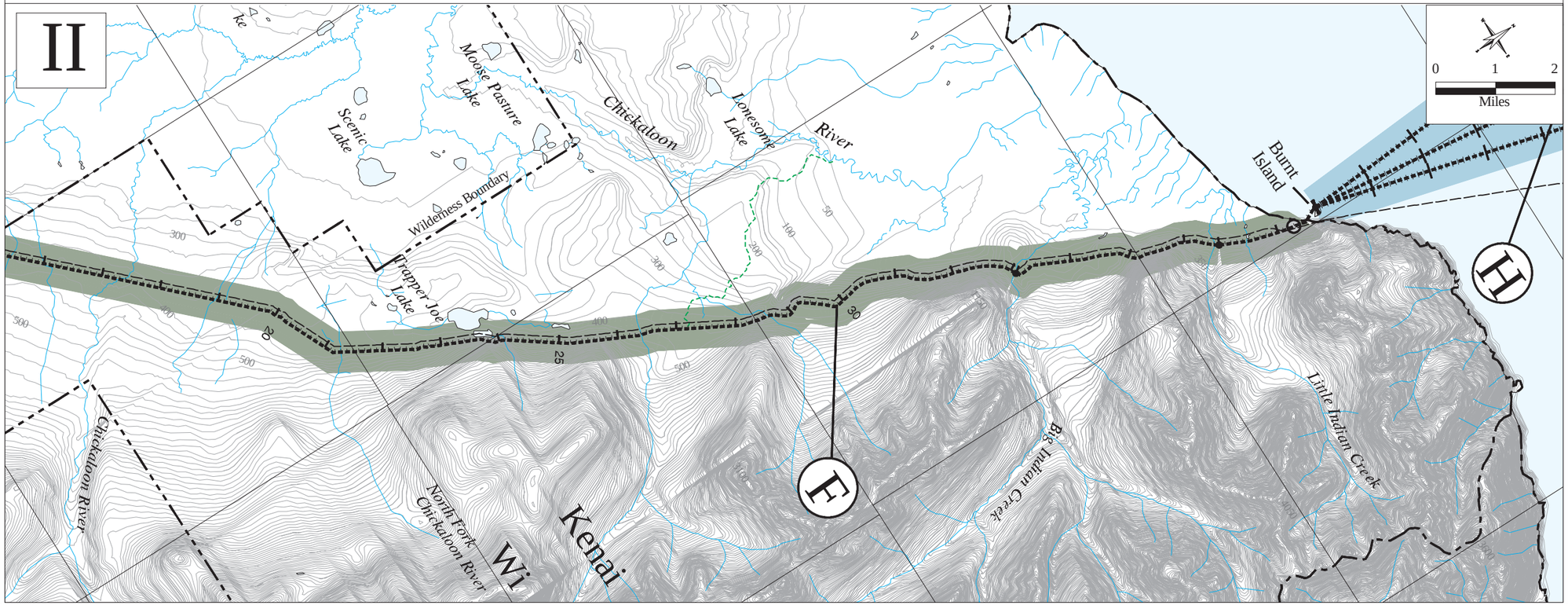
USGS 1:63,360 and 1:25,000 Quads.

06/13/02




**CONSTRUCTION SEASON**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 4b**

## Legend

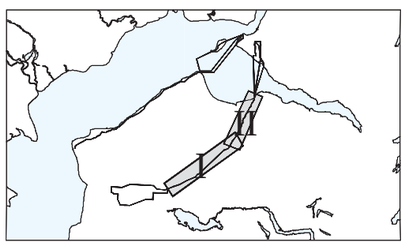
### Construction Season

- Summer - Thawed - April to October
- Winter - Frozen - November to March (10)
- Submarine - May to August (July to August to minimize impacts to Beluga Whale) (10)

## Selective Mitigation Key

(10) Seasonal construction.

See Figure 2 for a complete description of measures.




Base Map Sources:
Municipality of Anchorage (1994).
Chugach National Forest (1995).
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USGS 1:63,360 and 1:25,000 Quads.

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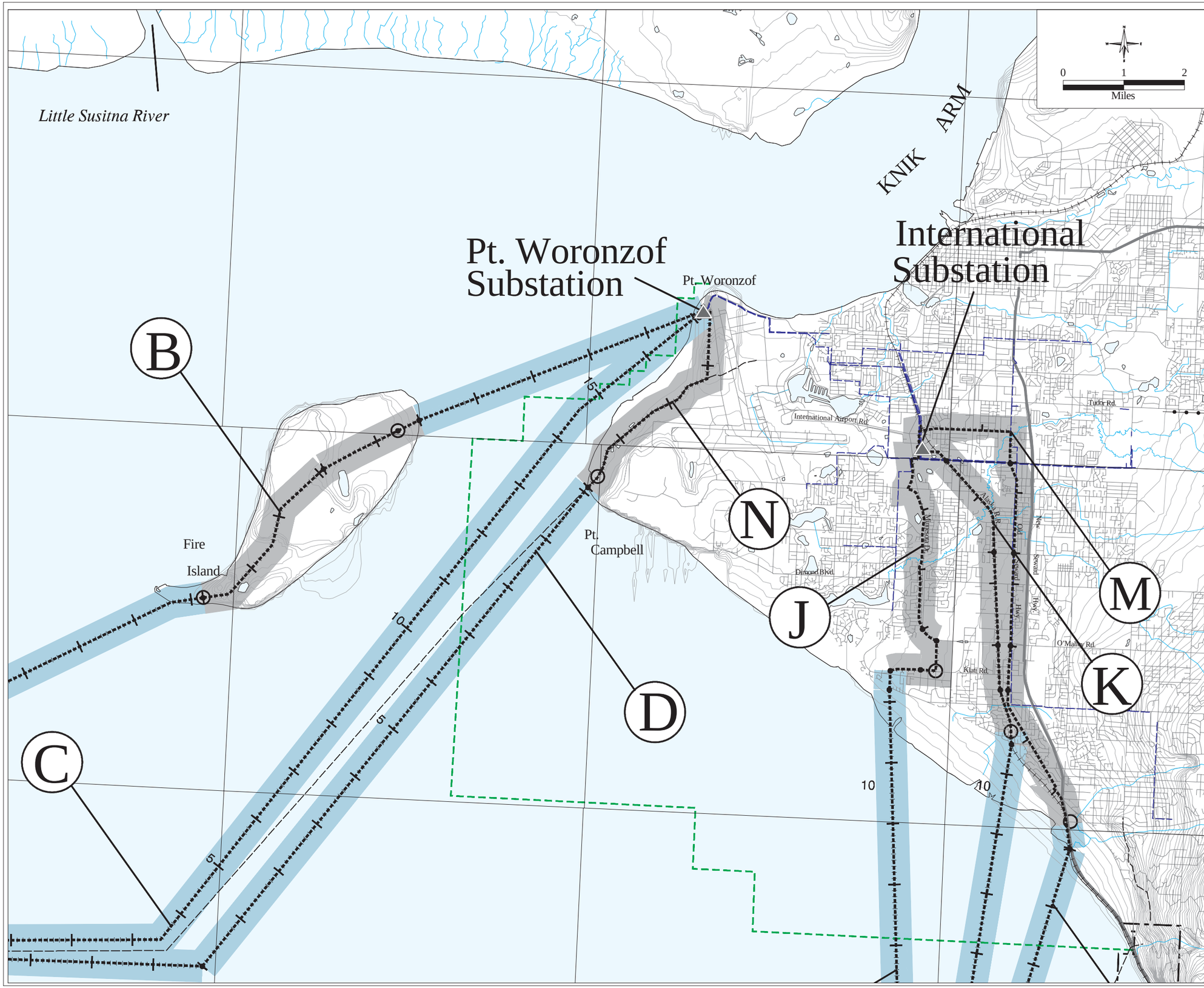
**CONSTRUCTION SEASON**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 4c**




## Legend

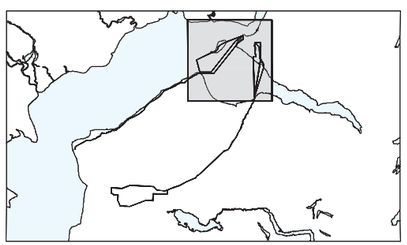
### Construction Season

- Summer - Thawed - April to October
- Winter - Frozen - November to March (10)
- Submarine - May to August (July to August to minimize impacts to Beluga Whale) (10)

## Selective Mitigation Key

(10) Seasonal construction.

See Figure 2 for a complete description of measures.



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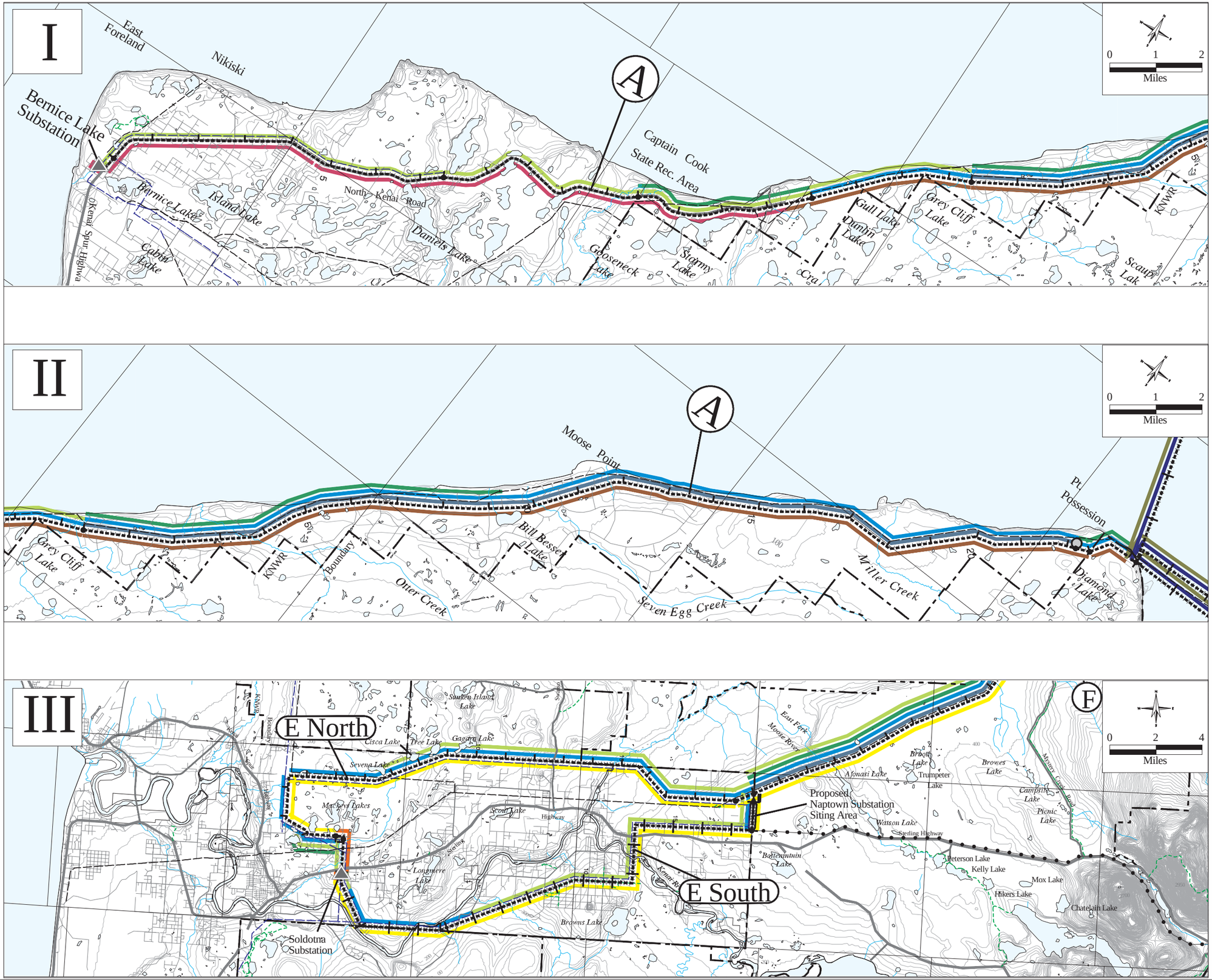



**CONSTRUCTION METHODS AND ACCESS**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 5a**

## Legend

### Construction Method

- Rubber-tired Vehicle - Pickup Trucks, Bucket Trucks, Loaders
- Tracked Vehicle - NODWELL, Bulldozers
- Special Equipment - Swamp Buggy, Low Ground Pressure Vehicles (2, 3)
- Aerial - Maintenance Helicopter, Fixed Wing Aircraft
- Submarine - Cable Barge and Special Equipment
- Horizontal Directional Drill Casing - HDD Drill Rig (15)
- Special Submarine Embedment - Special Submarine Water Jet Type or Marine Floor Trenching

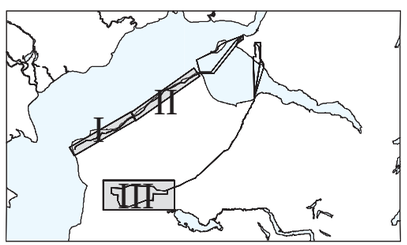
### Construction Access

- Paved Road
- Gravel Road
- Gravel Railroad Bed
- Four-wheel Drive Road
- Trail
- None

### Selective Mitigation Key

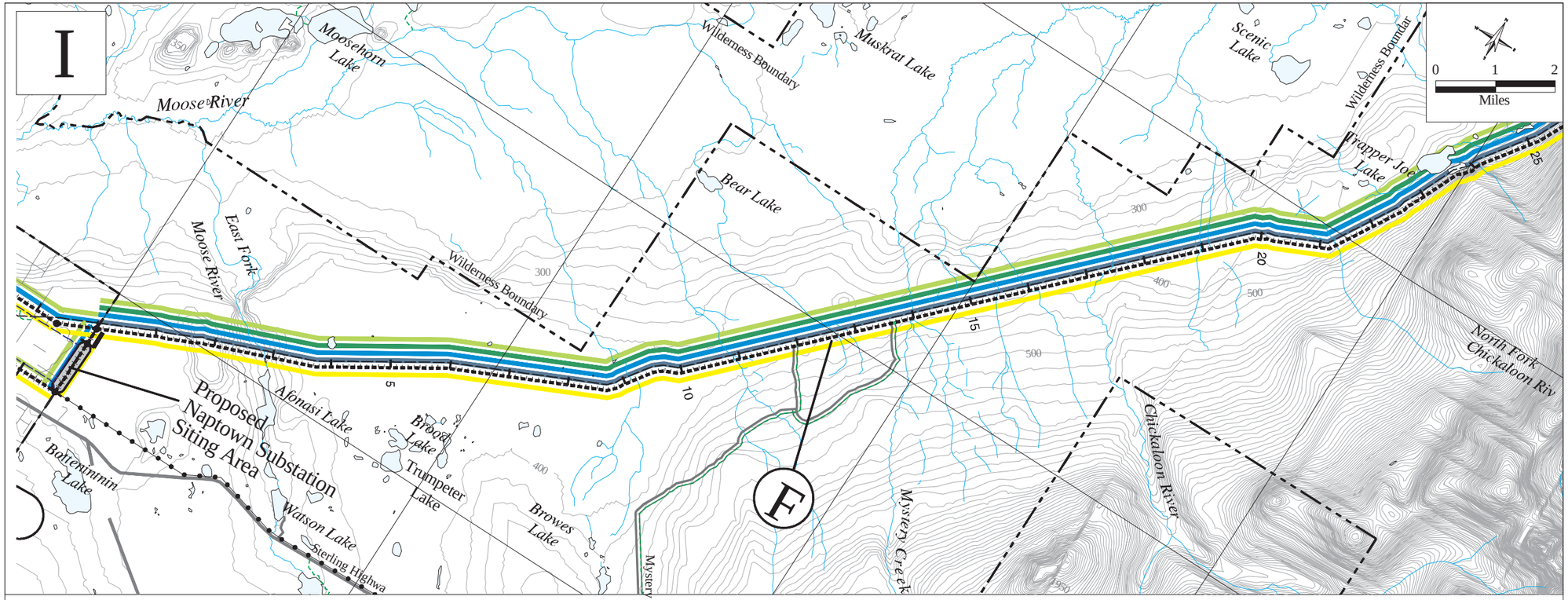
(2) Limited access.
(3) Minimize ground disturbance.
(15) Directional drilling.

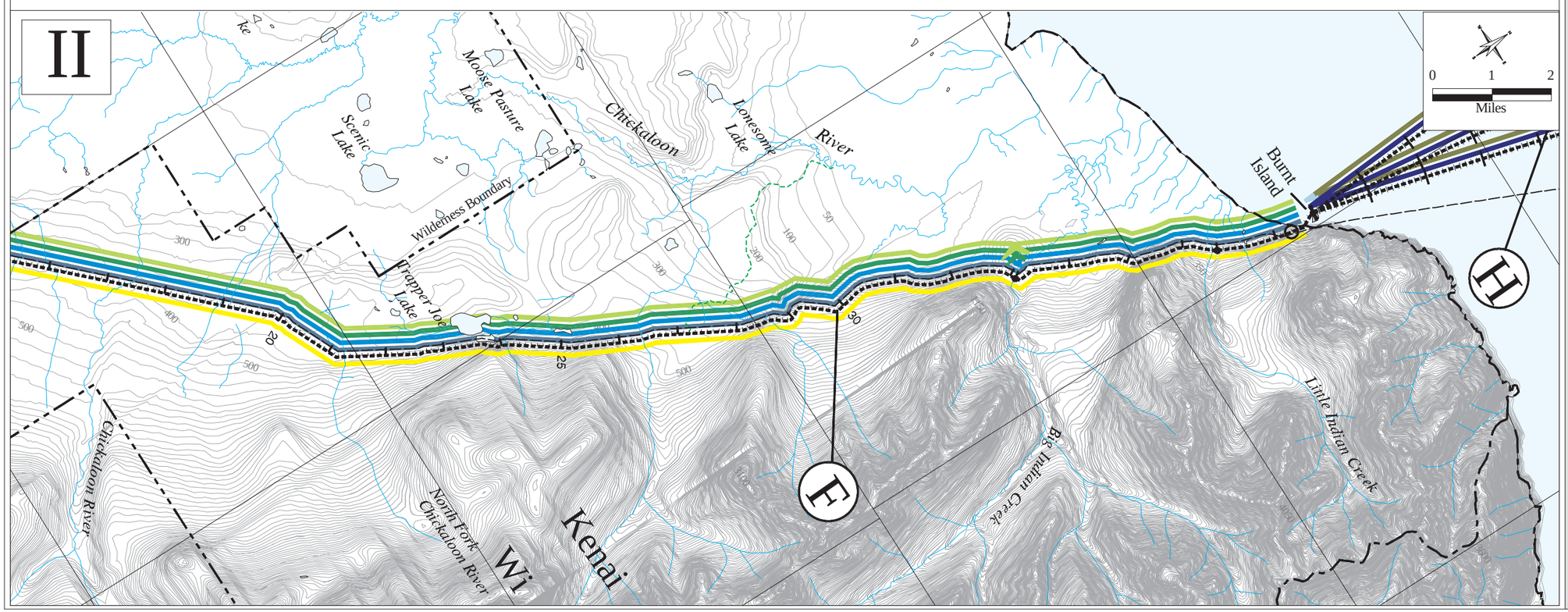
See Figure 2 for a complete description of measures.




Base Map Sources:
Municipality of Anchorage (1994).
Chugach National Forest (1995).
Kenai Peninsula Borough (1994).
USGS 1:63,360 and 1:25,000 Quads.

06/19/02




**CONSTRUCTION METHODS AND ACCESS**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 5b**

## Legend

### Construction Method

- Rubber-tired Vehicle - Pickup Trucks, Bucket Trucks, Loaders
- Tracked Vehicle - NODWELL, Bulldozers
- Special Equipment - Swamp Buggy, Low Ground Pressure Vehicles (2, 3)
- Aerial - Maintenance Helicopter, Fixed Wing Aircraft
- Submarine - Cable Barge and Special Equipment
- Horizontal Directional Drill Casing - HDD Drill Rig (15)
- Special Submarine Embedment - Special Submarine Water Jet Type or Marine Floor Trenching

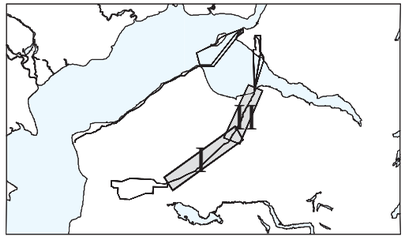
### Construction Access

- Paved Road
- Gravel Road
- Gravel Railroad Bed
- Four-wheel Drive Road
- Trail
- None

### Selective Mitigation Key

(2) Limited access.
(3) Minimize ground disturbance.
(15) Directional drilling.

See Figure 2 for a complete description of measures.

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USGS 1:63,360 and 1:25,000 Quads.

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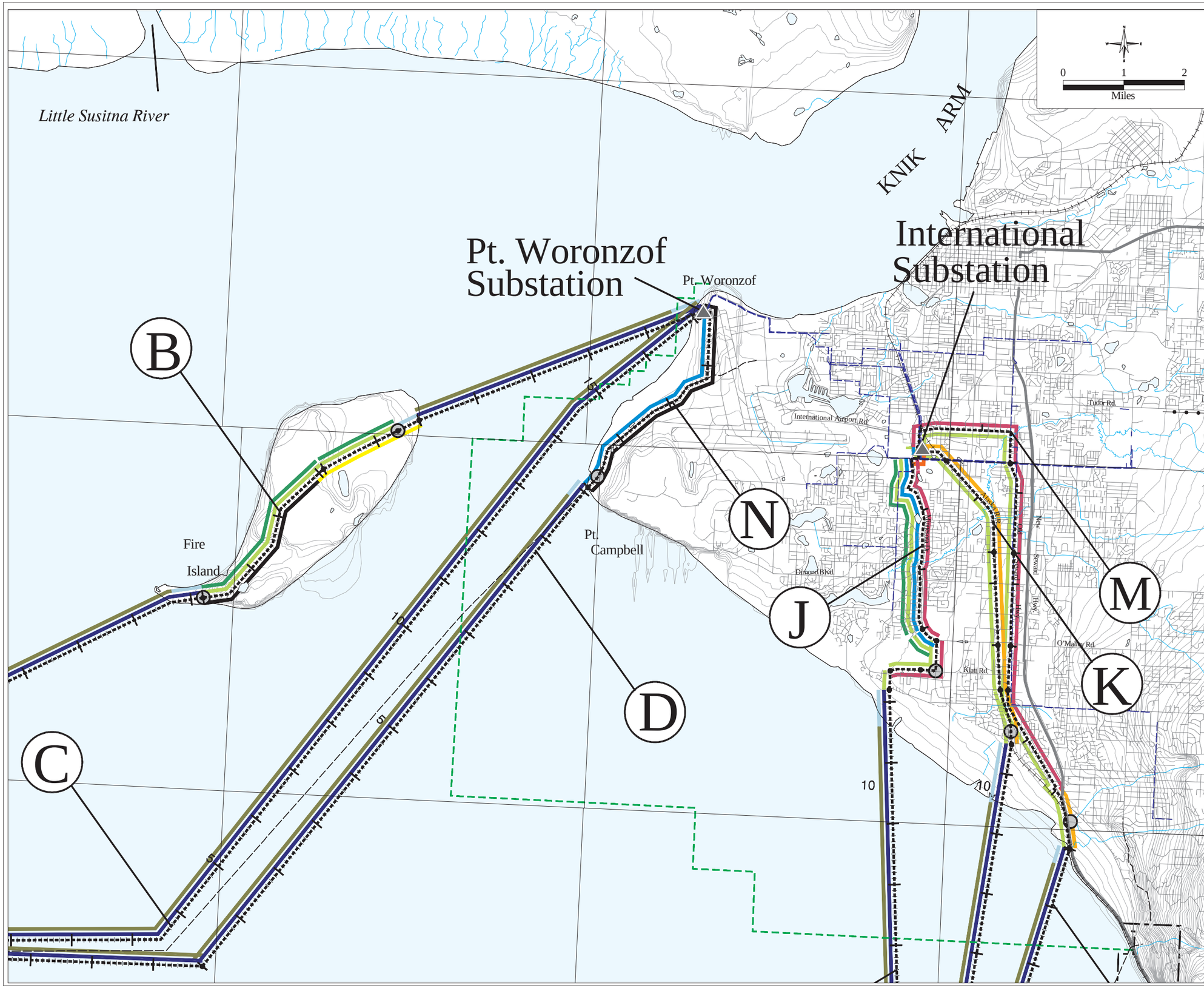



**CONSTRUCTION METHODS AND ACCESS**
**SOUTHERN INTERTIE PROJECT**
**FIGURE 5c**

## Legend

### Construction Method

- Rubber-tired Vehicle - Pickup Trucks, Bucket Trucks, Loaders
- Tracked Vehicle - NODWELL, Bulldozers
- Special Equipment - Swamp Buggy, Low Ground Pressure Vehicles (2, 3)
- Aerial - Maintenance Helicopter, Fixed Wing Aircraft
- Submarine - Cable Barge and Special Equipment
- Horizontal Directional Drill Casing - HDD Drill Rig (15)
- Special Submarine Embedment - Special Submarine Water Jet Type or Marine Floor Trenching

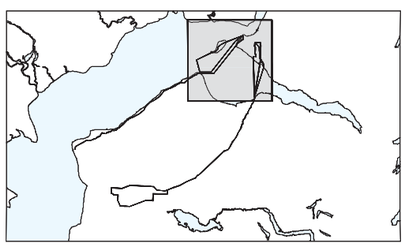
### Construction Access

- Paved Road
- Gravel Road
- Gravel Railroad Bed
- Four-wheel Drive Road
- Trail
- None

## Selective Mitigation Key

(2) Limited access.
(3) Minimize ground disturbance.
(15) Directional drilling.

See Figure 2 for a complete description of measures.



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Chugach National Forest (1995).
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USGS 1:63,360 and 1:25,000 Quads.

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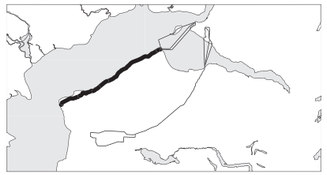
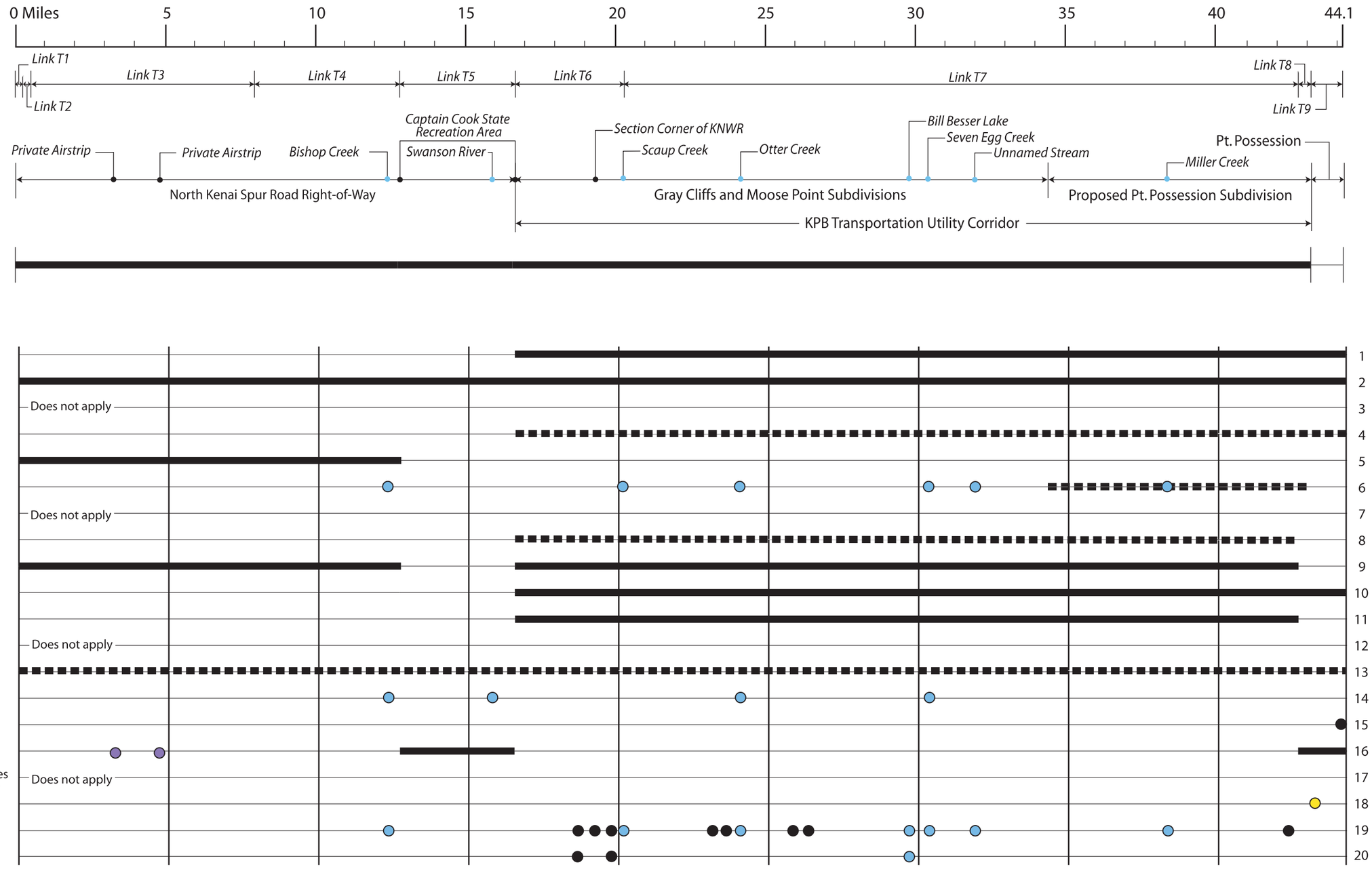
# FIGURES 6a TO 6n
# SELECTIVE MITIGATION LOCATIONS

# Route Option A: 44.1 Miles






## Legend

- Mitigation to be applied
- Mitigation to be applied in consultation with Kenai Peninsula Borough
- Stream/creek/river crossing
- Airstrip crossing
- Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

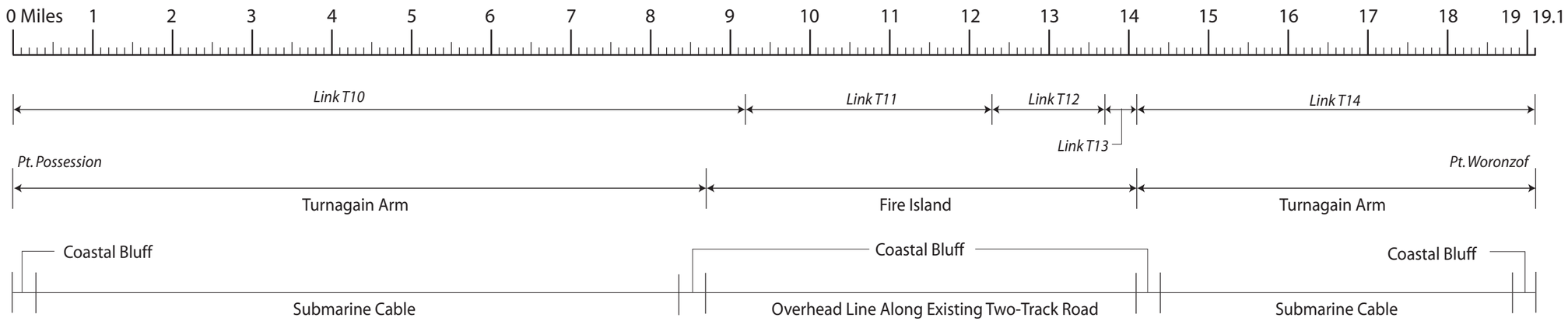
# Selective Mitigation Measures

## Tesoro Route: Option A

Southern Intertie Project

FIGURE 6a

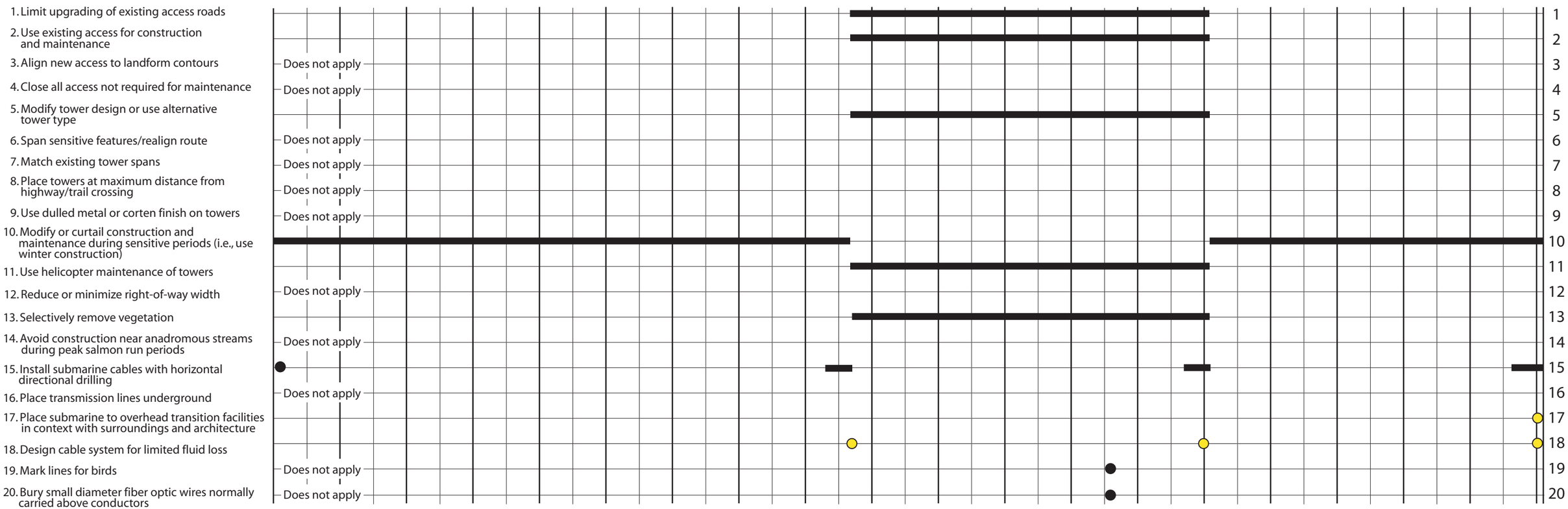
# Route Option B: 19.1 Miles




## Facility Siting Conditions

Turnagain Arm and Fire Island

## Selective Mitigation*




## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

Mitigation to be applied

Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

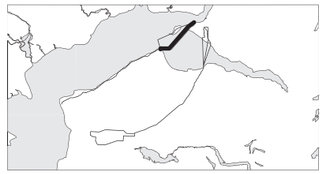
# Selective Mitigation Measures

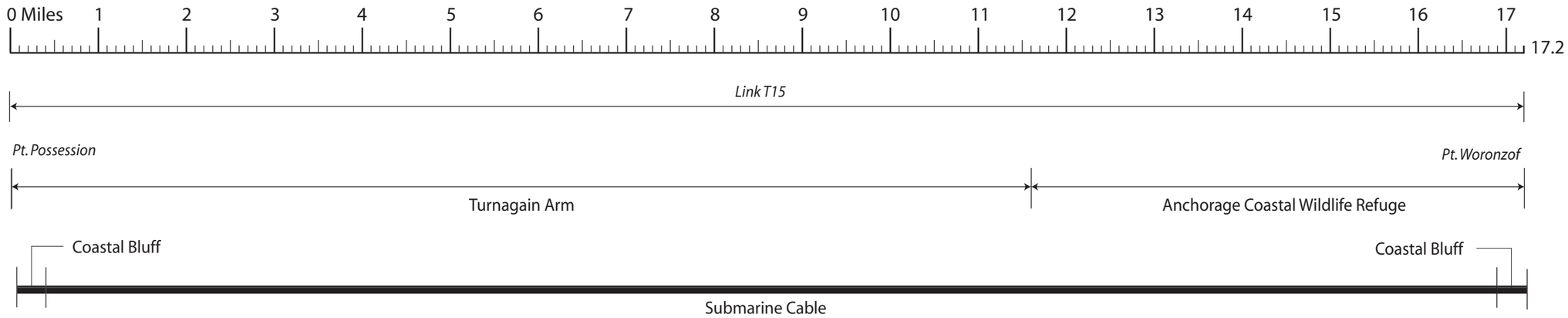
## Tesoro Route: Option B

Southern Intertie Project

FIGURE 6b

## Route Option C: 17.2 Miles

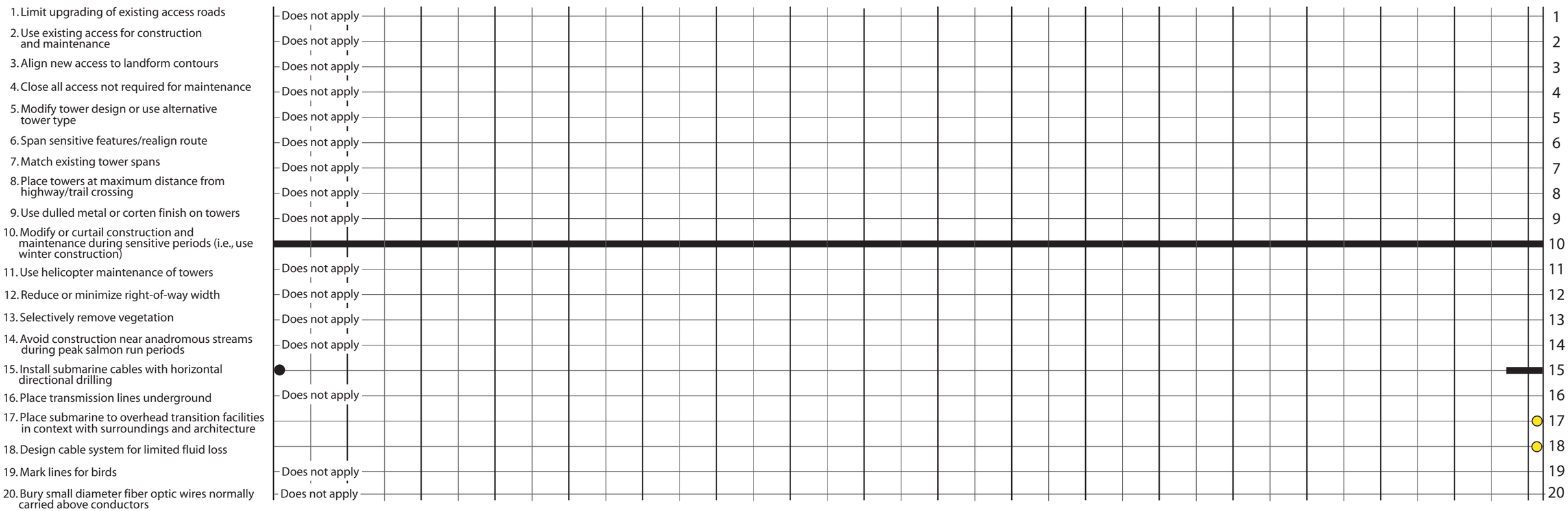





### Facility Siting Conditions

Turnagain Arm

### Selective Mitigation*




### Significant Residual Impacts (remaining with selective mitigation)

None

### Legend

Mitigation to be applied

Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

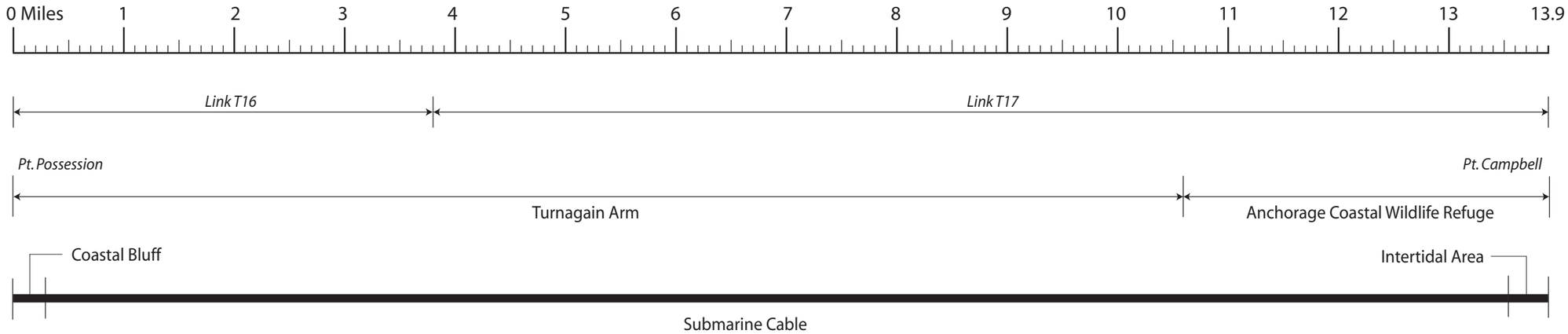
## Selective Mitigation Measures

### Tesoro Route: Option C

Southern Intertie Project

FIGURE 6c

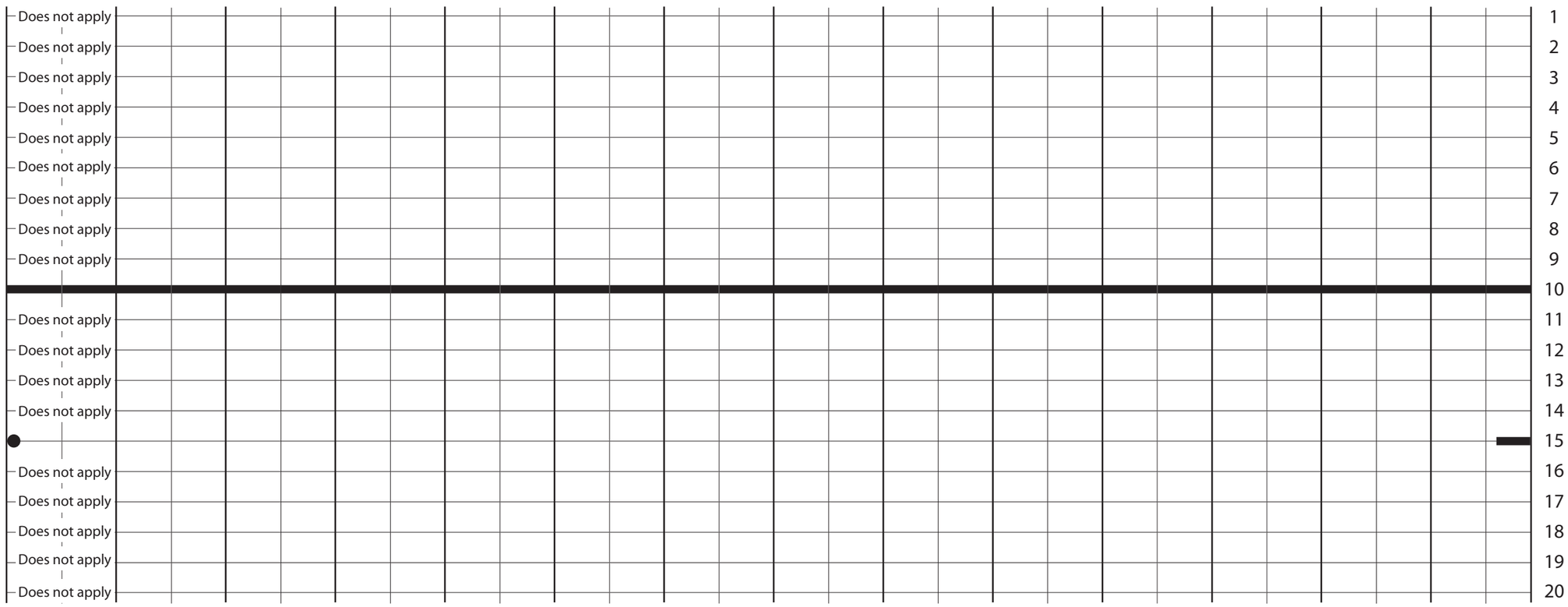
# Route Option D: 13.9 Miles




## Facility Siting Conditions

Turnagain Arm

## Selective Mitigation*




## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

Mitigation to be applied

* See Figure 2 for full definitions of selective mitigation measures

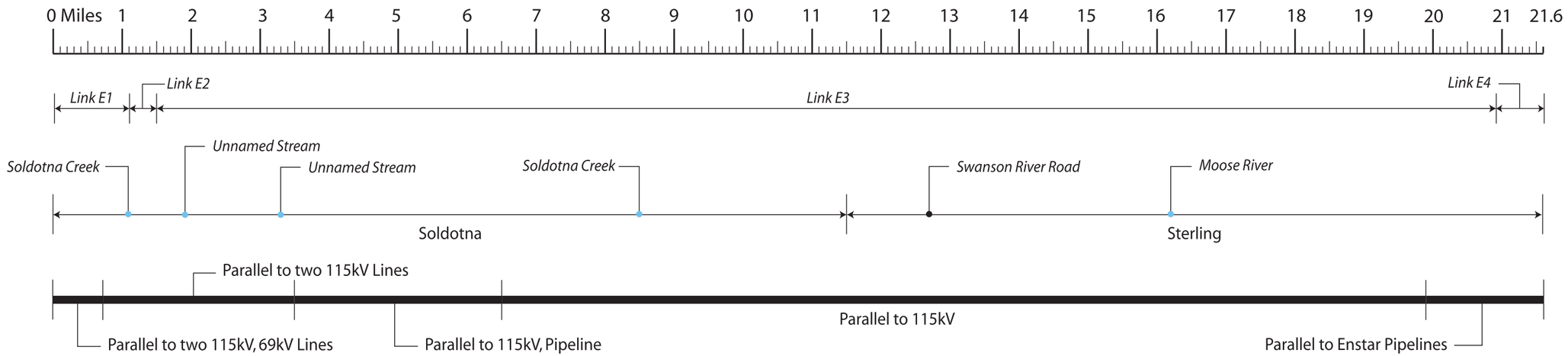
# Selective Mitigation Measures

## Tesoro Route: Option D

Southern Intertie Project

FIGURE 6d

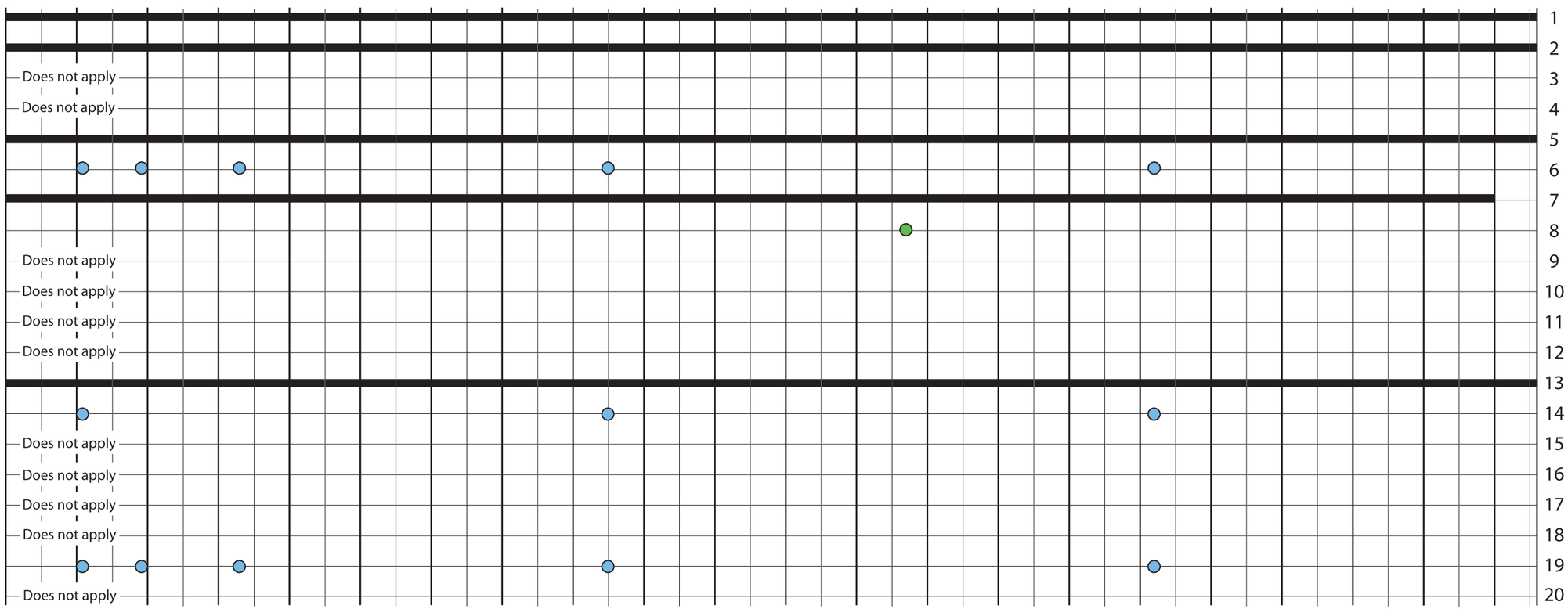
# Route Option E North: 21.6 Miles




## Facility Siting Conditions

Existing utility corridor

## Selective Mitigation*




## Significant Residual Impacts (remaining with selective mitigation)

## Legend

- Mitigation to be applied
- Stream/creek/river crossing
- Road/highway crossing

* See Figure 2 for full definitions of selective mitigation measures

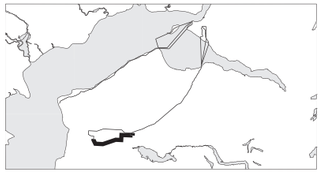
# Selective Mitigation Measures

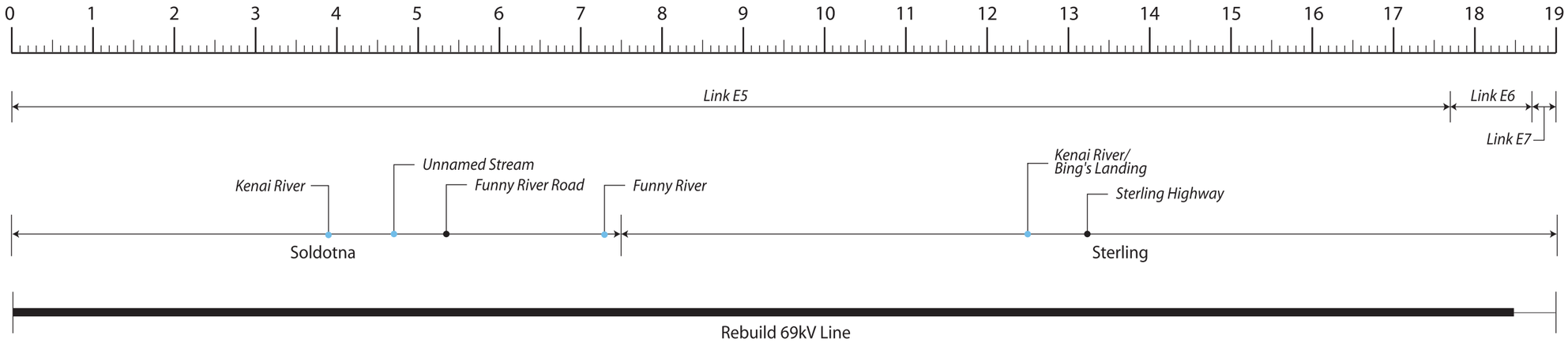
## Enstar Route: Option E North

Southern Intertie Project

FIGURE 6e

# Route Option E South: 19.0 Miles

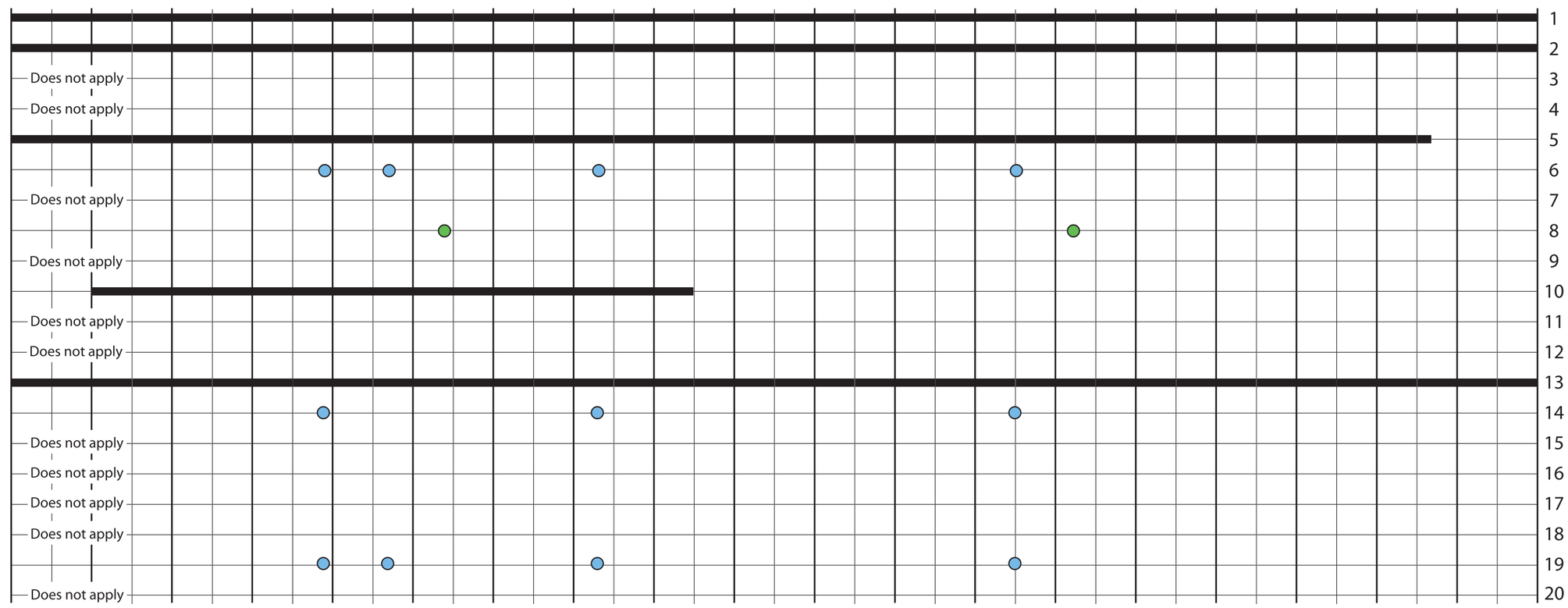





## Facility Siting Conditions

Existing utility corridor

## Selective Mitigation*




## Significant Residual Impacts (remaining with selective mitigation)

## Legend

- Mitigation to be applied
- Stream/creek/river crossing
- Road/highway crossing

* See Figure 2 for full definitions of selective mitigation measures

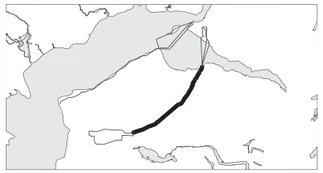
# Selective Mitigation Measures

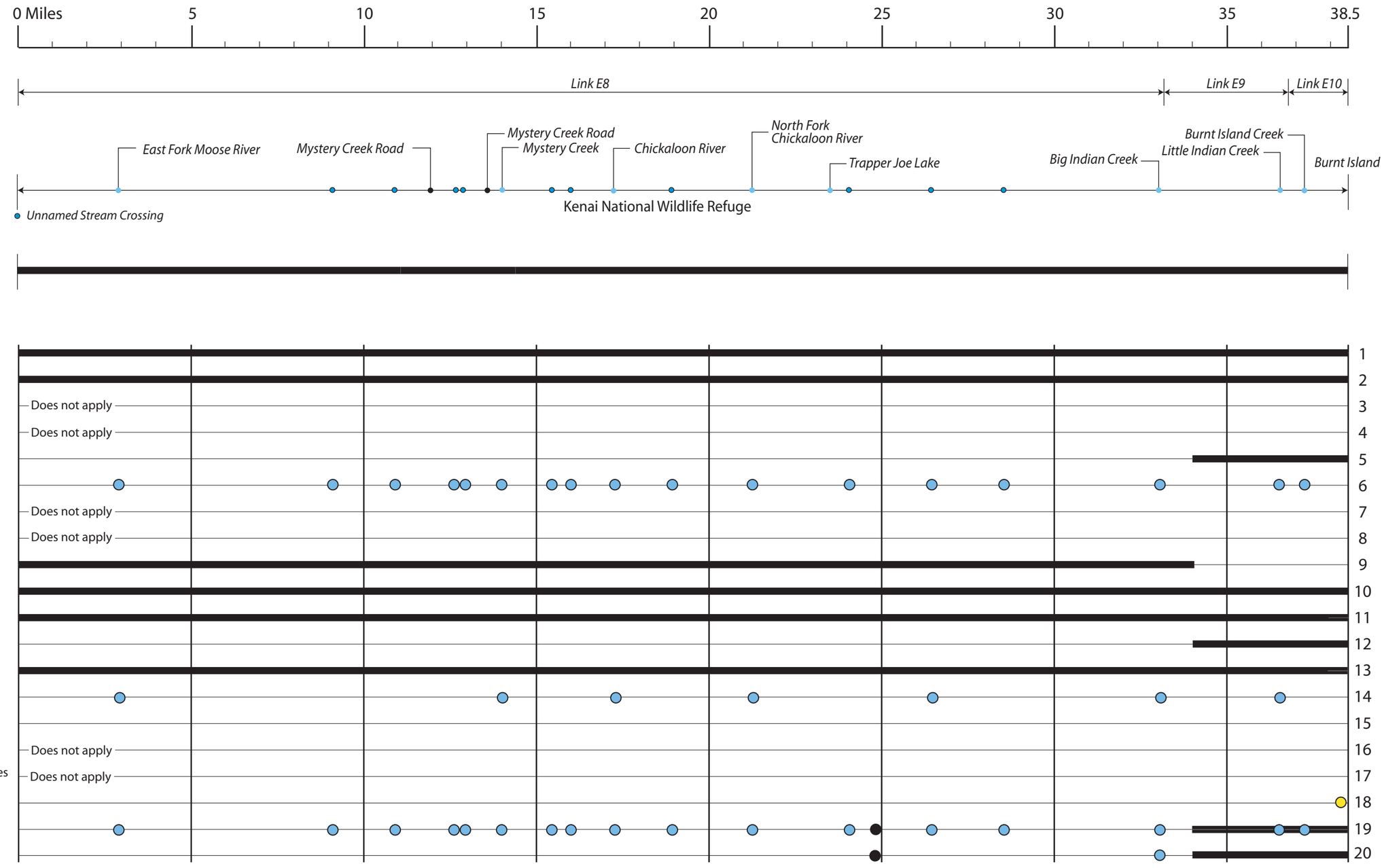
## Enstar Route: Option E South

Southern Intertie Project

FIGURE 6f

# Route Option F: 38.5 Miles






## Facility Siting Conditions

Parallel to Enstar Pipelines

## Selective Mitigation*

1. Limit upgrading of existing access roads
2. Use existing access for construction and maintenance
3. Align new access to landform contours
4. Close all access not required for maintenance
5. Modify tower design or use alternative tower type
6. Span sensitive features/realign route
7. Match existing tower spans
8. Place towers at maximum distance from highway/trail crossing
9. Use dulled metal or corten finish on towers
10. Modify or curtail construction and maintenance during sensitive periods (i.e., use winter construction)
11. Use helicopter maintenance of towers
12. Reduce or minimize right-of-way width
13. Selectively remove vegetation
14. Avoid construction near anadromous streams during peak salmon run periods
15. Install submarine cables with horizontal directional drilling
16. Place transmission lines underground
17. Place submarine to overhead transition facilities in context with surroundings and architecture
18. Design cable system for limited fluid loss
19. Mark lines for birds
20. Bury small diameter fiber optic wires normally carried above conductors

## Significant Residual Impacts (remaining with selective mitigation)

Vegetation
Brown Bear, Moose, Predators
Wetlands (potentially effective)
Land Use and Recreation
Visual
Birds - Bald Eagle, Trumpeter Swans, Waterfowl (potentially effective)

## Legend

- Mitigation to be applied
- Stream/creek/river crossing
- Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

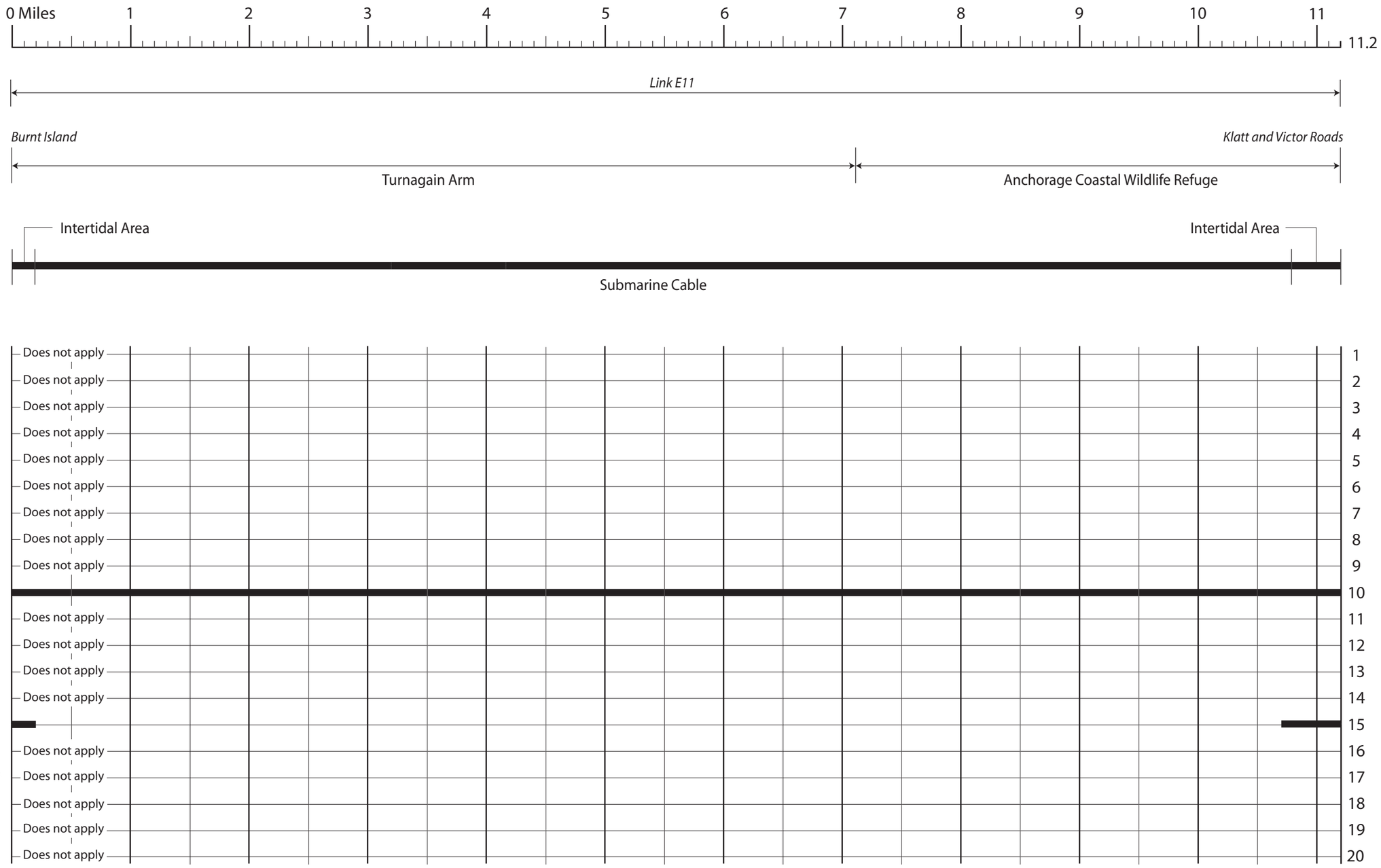
# Selective Mitigation Measures

## Enstar Route: Option F

Southern Intertie Project

FIGURE 6g

# Route Option G: 11.2 Miles




## Facility Siting Conditions

Submarine cable across Turnagain Arm

## Selective Mitigation*

1. Limit upgrading of existing access roads
2. Use existing access for construction and maintenance
3. Align new access to landform contours
4. Close all access not required for maintenance
5. Modify tower design or use alternative tower type
6. Span sensitive features/realign route
7. Match existing tower spans
8. Place towers at maximum distance from highway/trail crossing
9. Use dulled metal or corten finish on towers
10. Modify or curtail construction and maintenance during sensitive periods (i.e. use winter construction)
11. Use helicopter maintenance of towers
12. Reduce or minimize right-of-way width
13. Selectively remove vegetation
14. Avoid construction near anadromous streams during peak salmon run periods
15. Install submarine cables with horizontal directional drilling
16. Place transmission lines underground
17. Place submarine to overhead transition facilities in context with surroundings and architecture
18. Design cable system for limited fluid loss
19. Mark lines for birds
20. Bury small diameter fiber optic wires normally carried above conductors

## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

Mitigation to be applied

* See Figure 2 for full definitions of selective mitigation measures

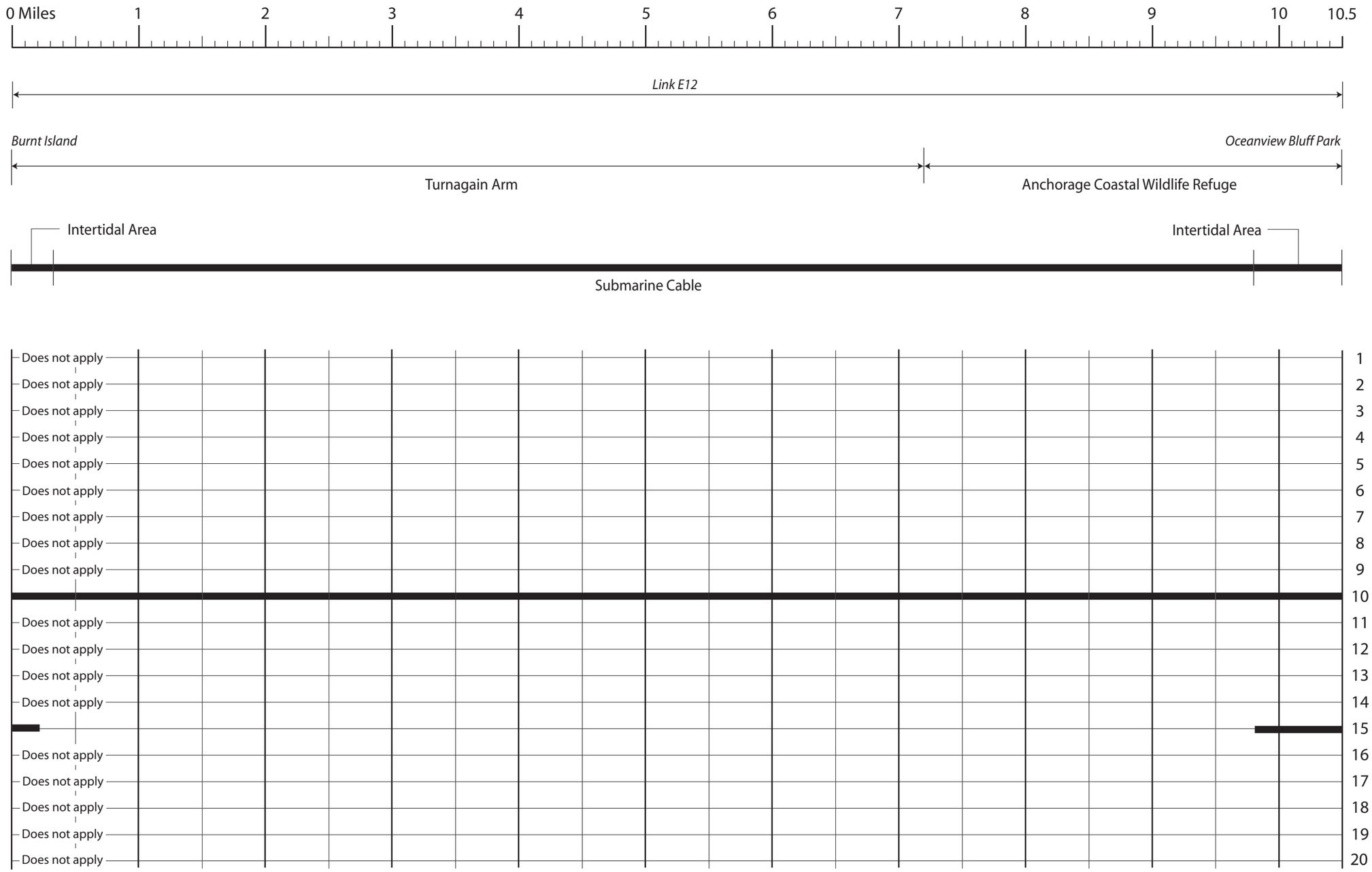
# Selective Mitigation Measures

## Enstar Route: Option G

Southern Intertie Project

FIGURE 6h

# Route Option H: 10.5 Miles




## Facility Siting Conditions

Submarine cable across Turnagain Arm

## Selective Mitigation*

1. Limit upgrading of existing access roads
2. Use existing access for construction and maintenance
3. Align new access to landform contours
4. Close all access not required for maintenance
5. Modify tower design or use alternative tower type
6. Span sensitive features/realign route
7. Match existing tower spans
8. Place towers at maximum distance from highway/trail crossing
9. Use dulled metal or corten finish on towers
10. Modify or curtail construction and maintenance during sensitive periods (i.e., use winter construction)
11. Use helicopter maintenance of towers
12. Reduce or minimize right-of-way width
13. Selectively remove vegetation
14. Avoid construction near anadromous streams during peak salmon run periods
15. Install submarine cables with horizontal directional drilling
16. Place transmission lines underground
17. Place submarine to overhead transition facilities in context with surroundings and architecture
18. Design cable system for limited fluid loss
19. Mark lines for birds
20. Bury small diameter fiber optic wires normally carried above conductors

## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

Mitigation to be applied

* See Figure 2 for full definitions of selective mitigation measures

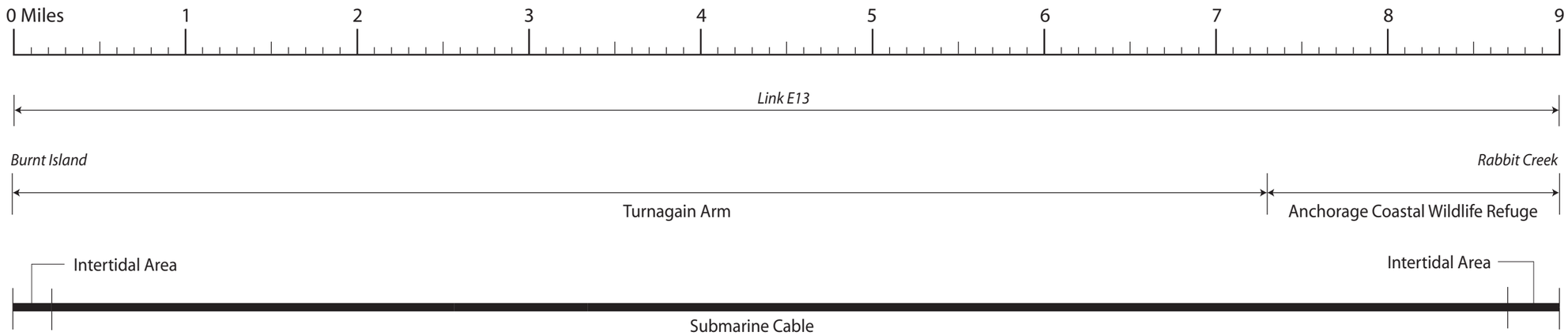
# Selective Mitigation Measures

## Enstar Route: Option H

Southern Intertie Project

FIGURE 6i

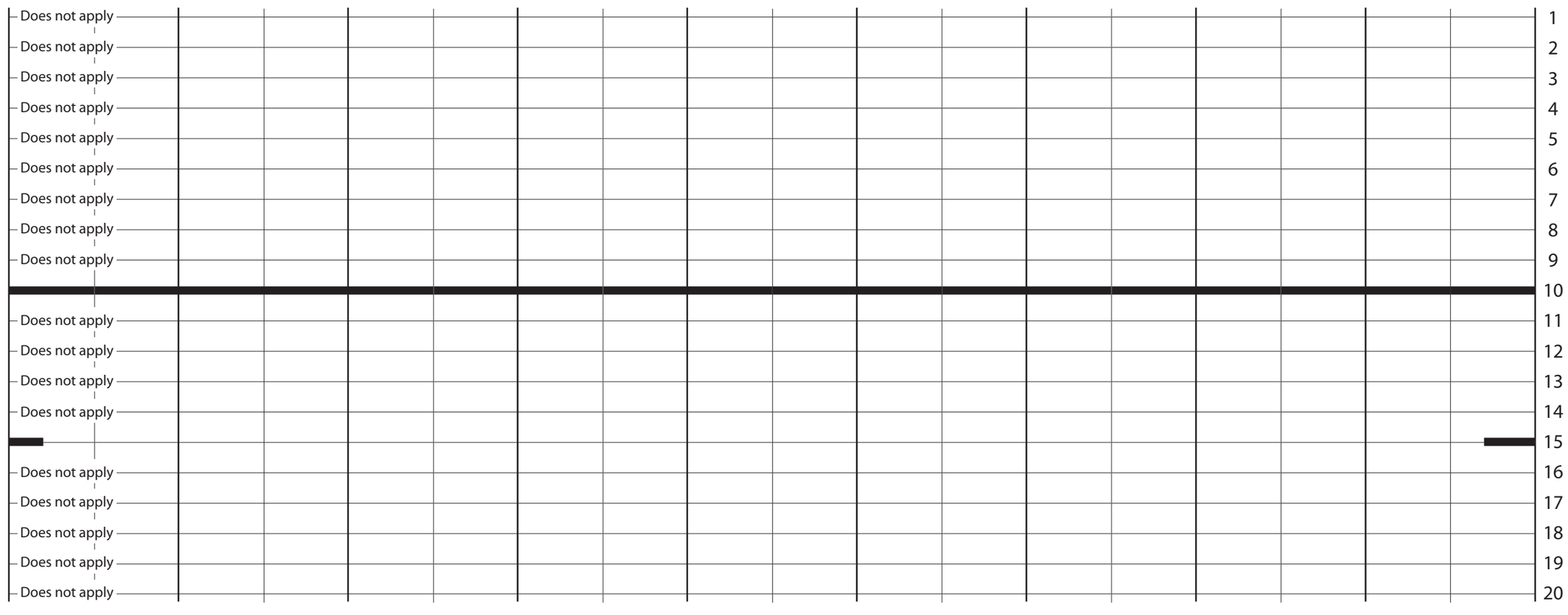
# Route Option I: 9.0 Miles




## Facility Siting Conditions

Submarine cable across Turnagain Arm

## Selective Mitigation*




## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

Mitigation to be applied

* See Figure 2 for full definitions of selective mitigation measures

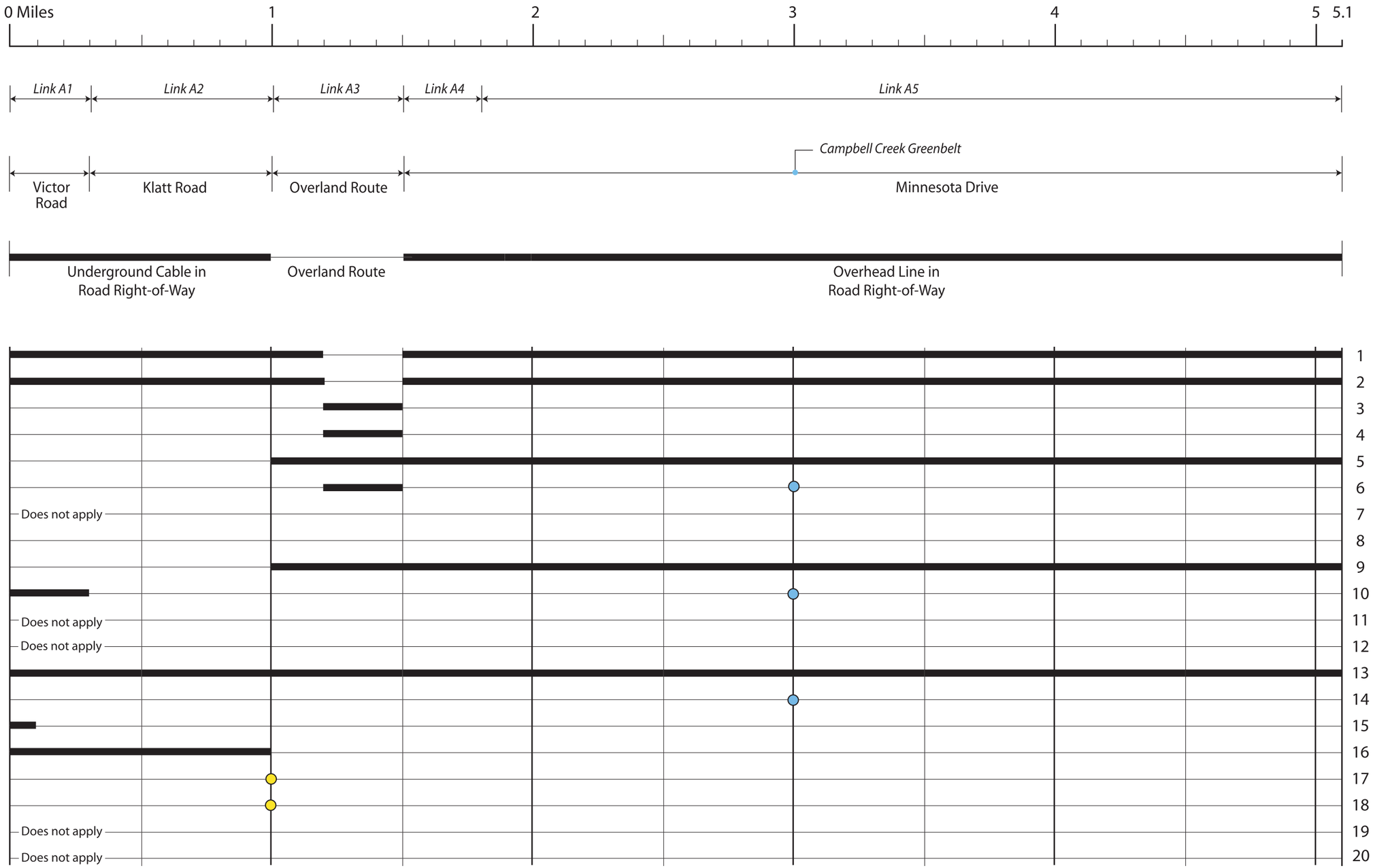
# Selective Mitigation Measures

## Enstar Route: Option I

Southern Intertie Project

FIGURE 6j

# Route Option J: 5.1 Miles




## Facility Siting Conditions

Underground and overhead transmission line in road right-of-way

## Selective Mitigation*

## Significant Residual Impacts (remaining with selective mitigation)

Visual- Residential Views
Landscape Scenery

## Legend

- Mitigation to be applied
- Stream/creek/river/greenbelt crossing
- Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

# Selective Mitigation Measures

## Enstar Route: Option J

Southern Intertie Project

FIGURE 6k

# Route Option K: 5.4 Miles

## Legend

- Mitigation to be applied
- Stream/creek/river crossing
- Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

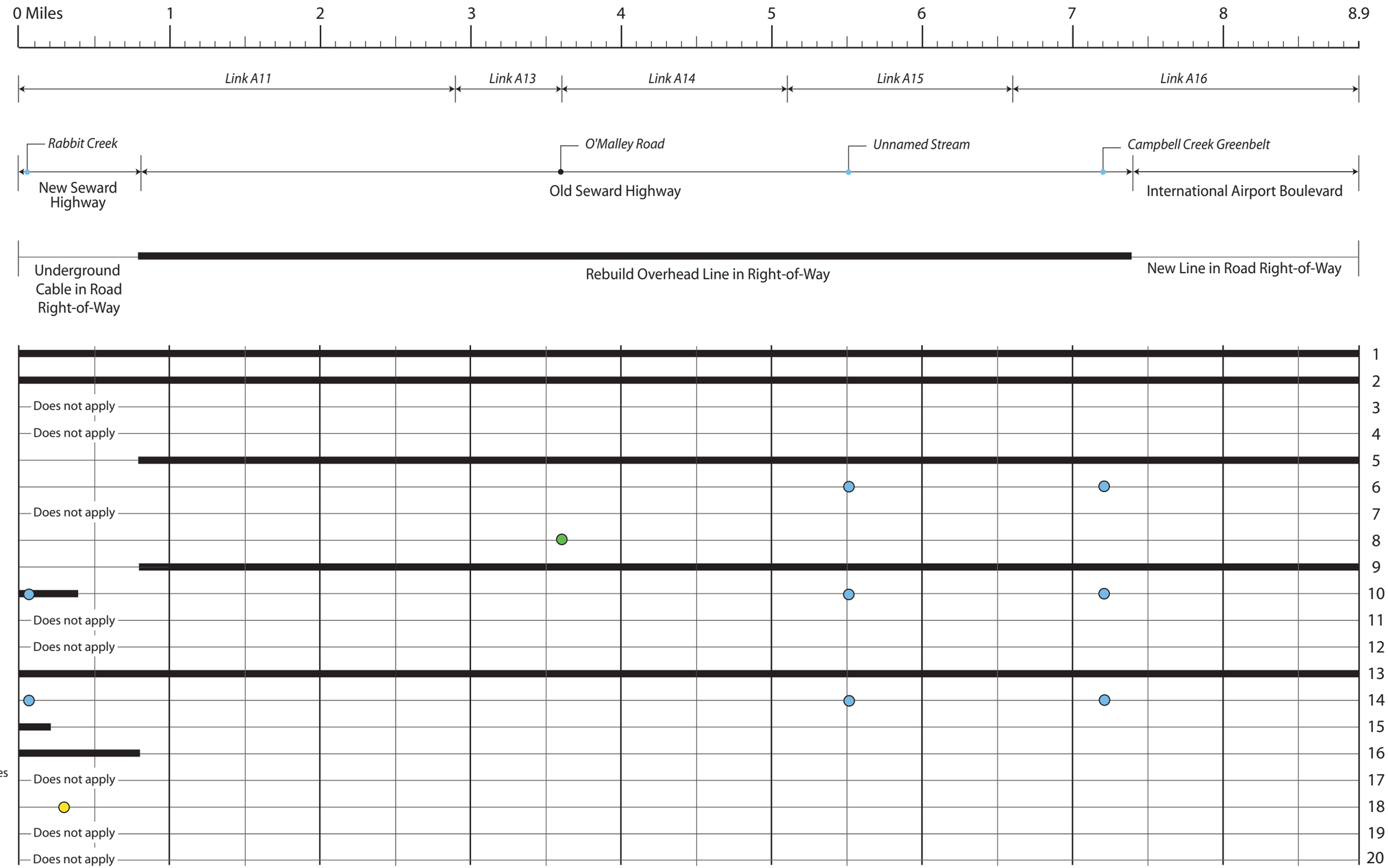
## Selective Mitigation Measures

### Enstar Route: Option K

Southern Intertie Project

FIGURE 6I

# Route Option M: 8.9 Miles




## Facility Siting Conditions

Rebuild distribution lines in road right-of-way

## Selective Mitigation*

1. Limit upgrading of existing access roads
2. Use existing access for construction and maintenance
3. Align new access to landform contours
4. Close all access not required for maintenance
5. Modify tower design or use alternative tower type
6. Span sensitive features/realign route
7. Match existing tower spans
8. Place towers at maximum distance from highway/trail crossing
9. Use dulled metal or corten finish on towers
10. Modify or curtail construction and maintenance during sensitive periods (i.e., use winter construction)
11. Use helicopter maintenance of towers
12. Reduce or minimize right-of-way width
13. Selectively remove vegetation
14. Avoid construction near anadromous streams during peak salmon run periods
15. Install submarine cables with horizontal directional drilling
16. Place transmission lines underground
17. Place submarine to overhead transition facilities in context with surroundings and architecture
18. Design cable system for limited fluid loss
19. Mark lines for birds
20. Bury small diameter fiber optic wires normally carried above conductors

## Significant Residual Impacts (remaining with selective mitigation)

Visual- Residential views
Landscape scenery

## Legend

- Mitigation to be applied
- Stream/creek/river/greenbelt crossing
- Road/highway crossing
- Transition facility

* See Figure 2 for full definitions of selective mitigation measures

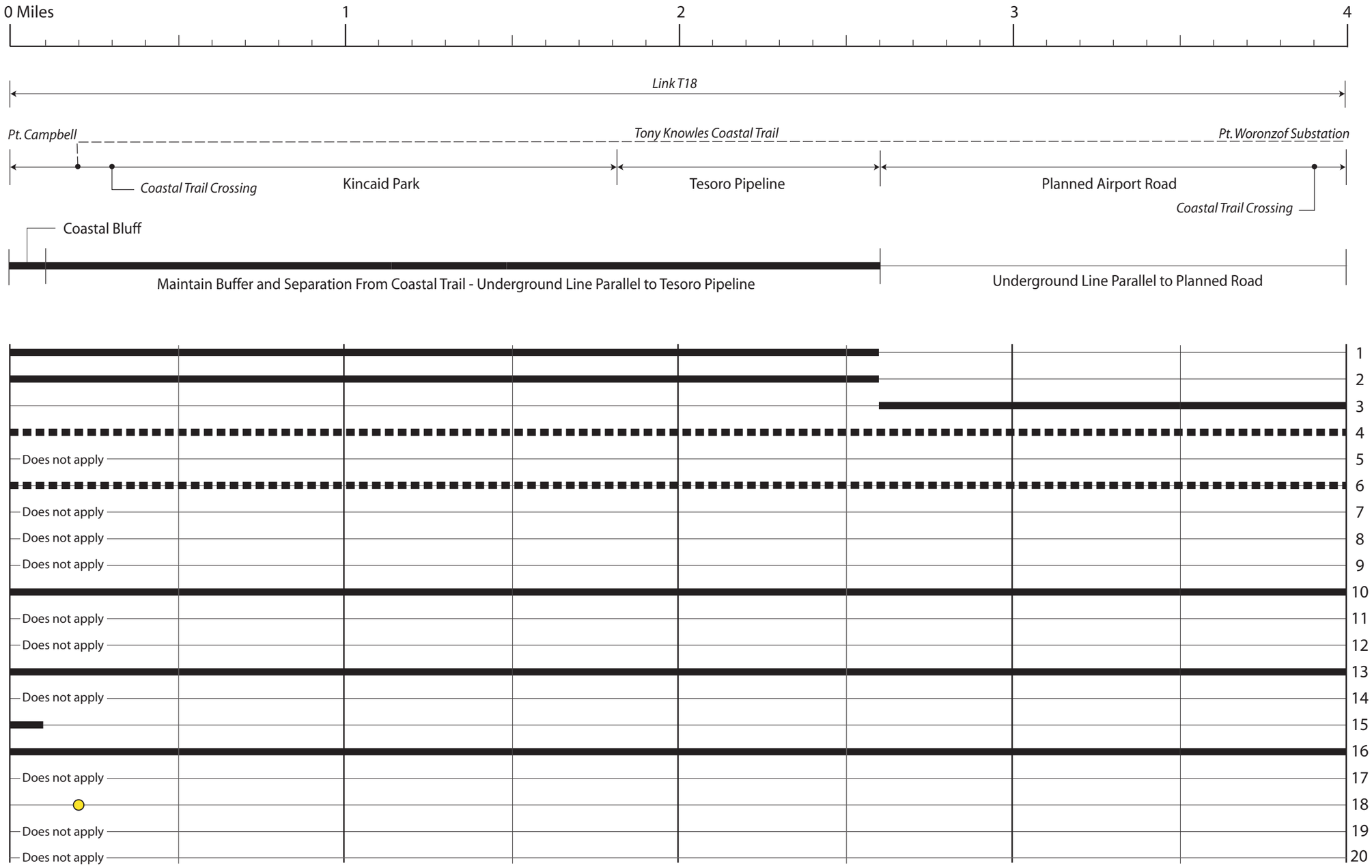
# Selective Mitigation Measures

## Enstar Route: Option M

Southern Intertie Project

FIGURE 6m

# Route Option N: 4.0 Miles




## Facility Siting Conditions

Underground line parallel to Tesoro Pipeline

## Selective Mitigation*

1. Limit upgrading of existing access roads
2. Use existing access for construction and maintenance
3. Align new access to landform contours
4. Close all access not required for maintenance
5. Modify tower design or use alternative tower type
6. Span sensitive features/realign route
7. Match existing tower spans
8. Place towers at maximum distance from highway/trail crossing
9. Use dulled metal or corten finish on towers
10. Modify or curtail construction and maintenance during sensitive periods (i.e., use winter construction)
11. Use helicopter maintenance of towers
12. Reduce or minimize right-of-way width
13. Selectively remove vegetation
14. Avoid construction near anadromous streams during peak salmon run periods
15. Install submarine cables with horizontal directional drilling
16. Place transmission lines underground
17. Place submarine to overhead transition facilities in context with surroundings and architecture
18. Design cable system for limited fluid loss
19. Mark lines for birds
20. Bury small diameter fiber optic wires normally carried above conductors

## Significant Residual Impacts (remaining with selective mitigation)

None

## Legend

- Mitigation to be applied
- Mitigation to be applied in coordination with Municipality of Anchorage and Airport Authority
- Submarine transition facility

* See Figure 2 for full definitions of selective mitigation measures

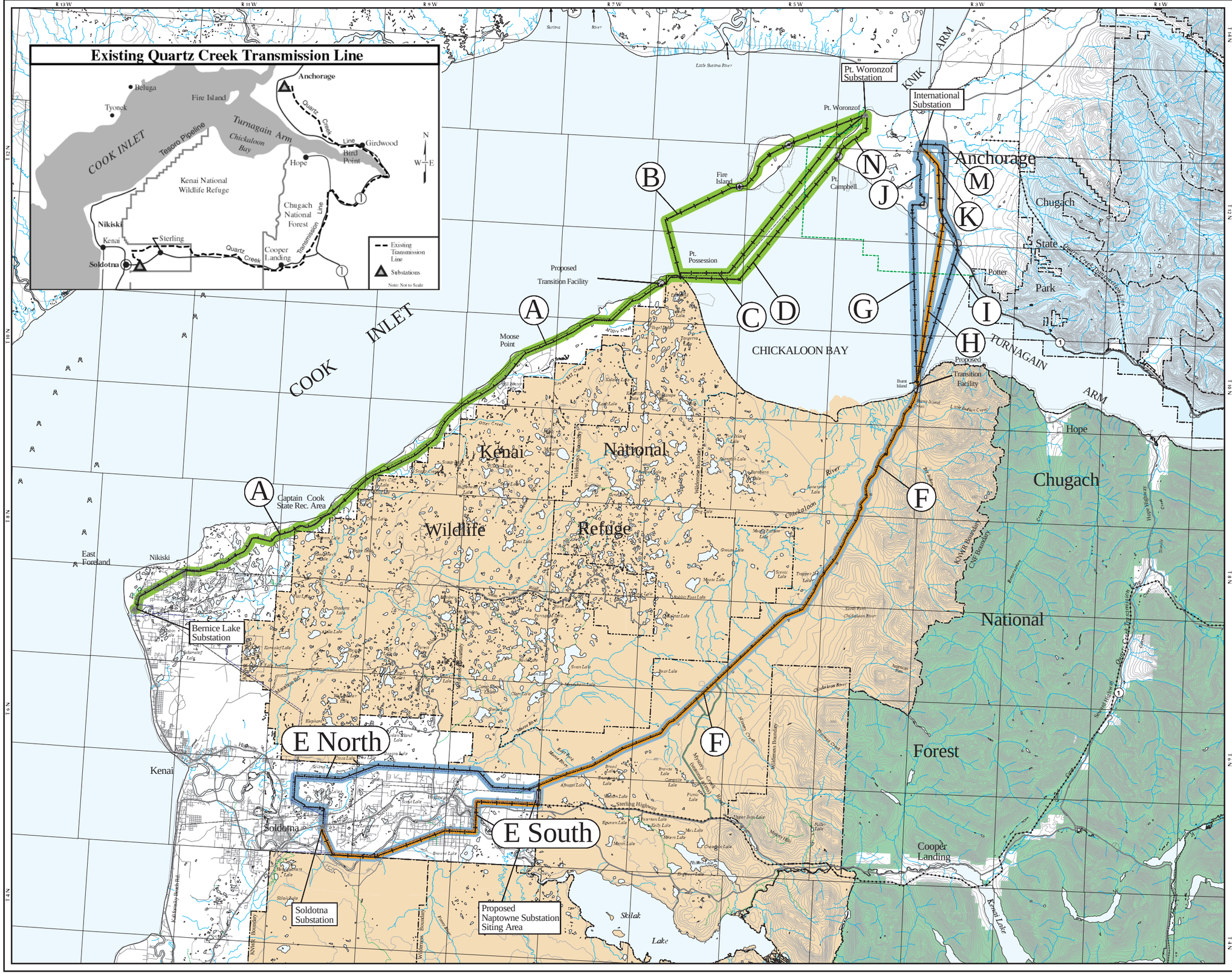
# Selective Mitigation Measures

## Tesoro Route: Option N

Southern Intertie Project

FIGURE 6n

# FIGURE 7
# ALTERNATIVES STUDIES IN DETAIL




**ALTERNATIVES STUDIED IN DETAIL SOUTHERN INTERTIE PROJECT FIGURE 7**

## Legend

- Applicant's Proposed Route
- Enstar Route Options
- Tesoro Route Options
- Chugach State Park
- Kenai National Wildlife Refuge
- Chugach National Forest
- Private, Borough, or State Selected Lands

Note: No-action alternative is shown in inset in upper left-hand corner of map.

Scale in Miles: 6 3 1 0 1 3 6

Base Map Sources:
Municipality of Anchorage (1994).
Chugach National Forest (1995).
Kenai Peninsula Borough (1994).
USGS 1:63,360 and 1:25,000 Quads.

Contour Interval: 200 Feet
Contour Labeling in Feet

06/17/02

# TABLE 2
# IMPACT MITIGATION SUMMARY

# TABLE 2
# IMPACT MITIGATION SUMMARY

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Earth and Water Resources:** Earth Resources Maps, Figures MV- 2,3,4 (Volume II of the DEIS) | | | | |
| **Tesoro** | Compressible soils (Qc) | 1, 10 | Dispersed | Impacts mitigated based on the use of existing access, tracked and low ground pressure vehicles, special equipment, and winter construction.<br>**Results - Highly effective** |
| | Slope Instability (Qg, Qs) | 15 | Pt. Possession and Pt Campbell– horizontal directional drilling | Impacts mitigated as structural impacts are avoided through horizontal directional drilling at Pt. Possession and Pt. Campbell.<br>**Results – Highly effective** |
| | Stream Crossings | 6, 10, 15, 16 | Bishop Ck – span<br>Swanson River – bore or attach to bridge<br>Scup Ck – span<br>Otter Ck – span<br>Seven Egg Ck – span<br>Miller Ck – span | Impacts mitigated by spanning streams (minimum 200' setback including the placement of foundations and structures), and temporary man-made and ice bridges. If local conditions do not allow for ice bridges, snow will either be brought in, or construction suspended.<br>**Results – Highly effective** |
| **Enstar** | Compressible soils (Qc) | 1, 10 | Chickaloon marsh, Rabbit Ck, Oceanview and Klatt Rd salt marsh crossings – horizontal directional drilling | Same as Tesoro Route |
| | Slope Instability (Qg, Qs) | 15 | Oceanview Park – horizontal directional drilling | Same as Tesoro Route |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Enstar (cont.)** | Stream Crossings | 6, 10, 15, 16 | Moose River drainage area<br>(4 crossings) - span<br>East Fork Moose River<br>(3 crossings) - span<br>Chickaloon River drainage area (7 crossings) - span<br>Mystery Creek - span<br>Chickaloon River drainage area (5 crossings) - span<br>Big Indian Creek - span<br>Little Indian Creek - span<br>Burnt Island Creek - span<br>Kenai River (2 crossings) - span<br>Funny River - span<br>Soldotna Ck (3 crossings) - span<br>Moose River -span<br>2 unnamed ck crossings - span | Same as Tesoro Route |

# TABLE 2
# IMPACT MITIGATION SUMMARY

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Wetlands:** Vegetation Cover/Wetlands Map, Figures M- 6,7,8 (Volume II of the DEIS) | | | | |
| **Tesoro** | All types listed under wetlands, bogs and meadows | 1, 2, 6, 10, 15 | Pt. Campbell salt marsh crossings – horizontal directional drilling | Impacts to Anchorage Coastal Wildlife Refuge salt marsh are mitigated by avoidance through directional drilling and impacts to wetlands, bogs and meadows will be substantially reduced by winter construction, use of existing access, tracked and low ground pressure vehicles and special equipment.<br>**Results - Highly effective, and Tesoro is considered the less damaging practicable alternative, without significant impacts to aquatic resources (USACE Draft Section 404(b)(1) Evaluation results, Appendix B in FEIS Volume I)** |
| **Enstar** | All types listed under wetlands, bogs and meadows | 1, 2, 6, 10, 15 | Chickaloon marsh, Rabbit Ck and Oceanview salt marshes crossings – horizontal directional drilling | Impacts to Chickaloon marsh, and Anchorage Coastal Wildlife Refuge salt marshes are mitigated by avoidance through directional drilling. While impacts to wetlands, bogs and meadows will be substantially reduced by winter construction, use of existing access, tracked and low ground pressure vehicles and special equipment, any impacts on these areas within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR.<br>**Results – Highly effective during construction, less effective at wetland crossings during operation and maintenance along Mystery Creek trail within KNWR, also more extensive presence of wetlands** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Upland Vegetation:** Vegetation Cover/Wetlands Map, Figures M- 6,7,8 (Volume II of the DEIS) | | | | |
| **Tesoro** | All types listed under Uplands | 1, 6, 10, 13 | Spruce bark beetle and mitigation including disposal of logs and slash | Impacts on upland vegetation will be reduced by not improving existing roads, minimizing clearing of the right-of-way, and selective removal of vegetation with the right-of-way. In order to discourage spruce bark beetle infestation, spruce logs and slash from clearing in closed mixed forests would be chipped, dispersed or hauled away. **Results – Partially effective** |
| **Enstar** | All types listed under Uplands | 1, 6, 10, 13 | Spruce bark beetle and mitigation including disposal of logs and slash | Same as for the Tesoro route, however, any impacts on areas within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR. **Results – Less effective than Tesoro due to poor existing access conditions and denser vegetative cover on steep slopes, especially in the Indian Creek Area** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Waterfowl:** Waterfowl Distribution Map (1968-2000), Figure MV- 9, and Vegetation Cover/Wetlands Map, Figures MV – 6,7,8 (Volume II of the DEIS) | | | | |
| **Tesoro** | Open bodies of water outside of forest or woodland areas (MV 6, 7, 8) and stream or river crossings | 1, 5, 10, 19, 20 | In areas within 1,312 feet of open bodies of water and wetlands (non-forested or non- developed), lines will be marked | Mitigation measures (marking wires) will reduce the potential for collision mortality, and disturbance to nesting birds is minimized through limiting access and seasonal construction<br>**Results – Substantially reduced potential for bird collision** |
| **Enstar** | Spring and fall concentration and staging areas, open bodies of water outside of forest or woodland areas ( MV 6, 7, 8) within 1,312 feet of alignment and stream or river crossings | 1, 5, 10, 19, 20 | In areas within 1,312 feet of open bodies of water and wetlands (non-forested or non- developed), lines will be marked<br>Near Chickaloon Flats concentration and staging areas (70') poles are prescribed between links E 9 and E 10 | Same as for the Tesoro route, including the installation of 70- foot high poles adjacent to the Chickaloon marsh lands, however any impacts on waterfowl within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR.<br>**Results – Substantially reduced potential for bird collision** |
| **Trumpeter Swans:** Nesting Area for Trumpeter Swans Map, Figure MV-10 (Volume II of the DEIS) | | | | |
| **Tesoro** | Nesting and brood rearing areas with a 2-mile influence zone | 1, 2, 10, 13, 19, 20 | Avoid nesting areas by at least 1-mile during nesting season and mark wires within 1,312 feet of nest sites in non-forested, non-developed areas | Avoiding spring construction and maintenance, recorded nesting areas and breeding periods and selective mitigation measures (marking, limiting access) will reduce the potential for collision mortality, and disturbance to nesting birds.<br>**Results – Substantially reduced potential for bird collision** |
| **Enstar** | Nesting and brood rearing areas with a 2-mile influence zone | 1, 2, 10, 13, 19, 20 | Avoid nesting areas by at least 1-mile during nesting season and mark wires within 1,312 feet of nest sites in non-forested, non-developed areas | Same as for the Tesoro route, however any impacts on Trumpeter Swans within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR.<br>**Results – Substantially reduced potential for bird collision** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Bald Eagles:** Nesting Areas for Bald Eagles (1979 – 2000), Figure MV-10 (Volume II of the DEIS) | | | | |
| **Tesoro** | Bald Eagle known nesting areas within a 0.5 influence zone | 1, 2, 6, 10, 13, 14 | Avoid any clearing within primary nest zone – 0.25 mile and avoid construction activities during nesting within – 0.5 mile | Avoiding spring construction and maintenance, recorded nesting areas and breeding periods and selective mitigation measures will reduce the potential for collision mortality, and disturbance to nesting birds.<br>**Results – Substantially reduced potential for bird collision** |
| **Enstar** | Bald Eagle known nesting areas within a 0.5 influence zone | 1, 2, 6, 10, 13, 14 | Avoid any clearing within primary nest zone – 0.25 mile<br>And avoid construction activities during nesting within – 0.5 mile | Same as Tesoro Route, however any impacts on Bald Eagles within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR.<br>**Results – Substantially reduced potential for bird collision** |
| **Lynx and Wolves:** Lynx Distribution Map, Figure MV-11 and Wolf Distribution Map, Figure MV-12 (Volume II of the DEIS) | | | | |
| **Tesoro** | Areas of higher abundance in non-developed and future development areas | 1, 10, 12, 13 | Non – site specific measures including construction timing, limiting access and clearing addresses general area | Modifying or curtailing construction and maintenance during sensitive periods, and limiting access and the clearing of right-of-way will reduce impacts on lynx and wolf.<br>**Results – Partially effective** |
| **Enstar** | Areas of higher abundance in non-developed areas | 1, 10, 12, 13 | Non – site specific measures including construction timing, limiting access and clearing addresses general area | Same as Tesoro Route, however any impacts on Lynx or Wolf within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR.<br>**Results – Partially effective** |
| **Black Bears:** Black Bear Habitat Map, Figure MV-13 (Volume II of the DEIS) | | | | |
| Tesoro | Black bear habitat, and presence of Devil's Club in non-developed areas | 1, 10, 12, 13 | Non – site specific measures including construction timing, limiting access and clearing addresses general area | Modifying or curtailing construction and maintenance during sensitive periods and limiting access and clearing will reduce impacts on Black Bear.<br>**Results – Highly effective** |

## TABLE 2
## IMPACT MITIGATION SUMMARY

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Black Bears (continued):** Black Bear Habitat Map, Figure MV-13 (Volume II of the DEIS) | | | | |
| Enstar | Black bear habitat, and presence of Devil's Club | 1, 10, 12, 13 | Non – site specific measures including construction timing, limiting access and clearing address general area | Same as Tesoro Route, however any impacts on Black Bear within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR. **Results – Partially effective, concern for increased access resulting from construction** |
| **Brown Bears:** Brown Bear Habitat Map, Figure MV-14 (Volume II of the DEIS) | | | | |
| Tesoro | Brown bear and riparian habitat including important summer feeding areas | 1, 6, 10, 12, 13, 14 | Span riparian areas by placing towers 200 feet from stream crossings and avoid construction along streams during peak salmon runs, limited access and clearing, and winter construction timing | Modifying or curtailing construction and maintenance during sensitive periods, spanning streams, and limiting access and clearing, along with proper storage of waste and bear training (standard mitigation measure 17) will reduce impacts on Brown Bear. **Results – Highly effective** |
| Enstar | Brown bear and riparian habitat including important summer feeding areas | 1, 6, 10, 12, 13, 14 | Span riparian areas by placing towers 200 feet from stream crossings and avoid construction along streams during peak salmon runs, limited access and clearing, and winter construction timing | Same as Tesoro Route, however any impacts on Brown Bear within the KNWR would be at a national level due to conflicts with the USFWS mandate to protect wildlife and their habitats on the KNWR. **Results – Partially effective, concern for increased access resulting from construction** |
| **Moose:** Winter Moose Distribution Map, Figure MV-15 (Volume II of the DEIS) | | | | |
| Tesoro | Areas of higher abundance in non developed areas | 13 | Selective vegetation clearing proposed in general | Selective removal of vegetation within the right-of-way might improve winter range if preferred browse species vegetate the cleared areas. **Results – Highly effective** |
| Enstar | Areas of higher abundance in non developed areas | 13 | Selective vegetation clearing proposed in general | Selective removal of vegetation within the right-of-way might improve winter range if preferred browse species vegetate the cleared areas however, because of conflicts with the KNWR Fire Management Plan, any impacts on the KNWR would be at a national level. **Results – Low effectiveness** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features or General Areas and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Anadromous Fish and Beluga Whales:** Anadromous Fish Streams and Beluga Whale Concentration Areas, Figure MV-17 (Volume II of the DEIS) | | | | |
| **Tesoro** | Anadromous Fish Streams<br><br>Beluga Concentration Areas | 1, 2, 4, 6, 10, 13, 14, 15, 16 | Span riparian areas by placing towers 200 feet from stream crossings, and avoid construction during peak salmon runs (winter construction).<br><br>NMSF prefers July to August construction season. Spring, May-June is the most sensitive due to salmon runs and calving | Mitigation measures will reduce impacts on anadromous fish streams by spanning streams, and beluga whales by avoiding peak runs and calving periods.<br>**Results – Highly effective** |
| **Enstar** | Anadromous Fish Streams<br><br>Beluga Concentration Area | 1, 2, 4, 6, 10, 13, 14, 15, 16 | Span riparian areas by placing towers 200 feet from stream crossings, and avoid construction during peak salmon runs (winter construction).<br><br>NMSF prefers July to August construction season. Spring, May-June is the most sensitive due to salmon runs and calving | Mitigation measures will reduce impacts on anadromous fish streams and beluga whales<br>**Results – Highly effective** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Land Use:** Land Use Maps, Figures MV-19,20,21 (Volume II of the DEIS) | | | | |
| **Tesoro** | Residential, institutional, and airports/airstrips | 1, 2, 4, 5, 6, 8, 10, 11, 12, 15, 16 | KPB CMP compliance including locating line within planned transportation corridor and North Kenai Road ROW with aerial easement; Compliance with FAA regulations to avoid VORTAC and use of markers and high visibility balls; Underground cable past 2 airports, though Captain Cook SRA, Pt. Possession lands, and Kincaid Park; span highway crossings | Impacts to land use are mitigated through selective measures.<br>**Results – Highly effective** |
| **Enstar** | Residential, institutional, and airports/airstrips | 1, 2, 4, 5, 6, 8, 10, 11, 12, 15, 16 | Rebuild 69kV line on Enstar South; Underground cable past Flying Crown airstrip; hazard warning ball at Moose River crossing; locate line within road ROW; revegetation in Oceanview Bluff Park; span highway crossings | Impacts to land use are reduced through selective mitigation measures however; impacts within the KNWR would be at a national level due to conflicts with the KNWR Comprehensive Conservation Plan.<br>**Results - Highly effective within KPB, and Anchorage. Incompatible with KNWR Comprehensive Conservation Plan** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Recreation:** Recreation Management Areas Maps, Figure MV-22, 23 and Recreation Use Areas Maps, Figures MV-24,25,26 (Volume II of the DEIS) | | | | |
| **Tesoro** | ACWR, Parks, SRA, KNWR, Trails, Recreation Sites | 1, 2, 4, 6, 8, 10, 12, 15, 16 | Underground cable though Captain Cook SRA, Pt. Possession lands, Kincaid Park; directional drilling under ACWR; seasonal construction (fall) will avoid conflicts associated with tourism along the Kenai Spur Highway and Captain Cook SRA | Impacts to recreation are mitigated through selective measures.<br>**Results – Highly effective** |
| **Enstar** | ACWR, Parks, SRA, KNWR, Trails, Recreation Sites | 1, 2, 4, 6, 8, 10, 12, 15, 16 | Replace park facilities and revegetation; directional drilling under ACWR; winter construction will reduce impacts to tourism on the KNWR | Impacts to recreation are reduced through selective mitigation measures however, impacts within the KNWR would be at a national level due to conflicts with the KNWR Comprehensive Conservation Plan.<br>**Results - Highly effective within KPB, and Anchorage. Incompatible with KNWR Comprehensive Conservation Plan** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Visual:** Landscape Scenery Map, Figure MV-28, Views from Residences, Recreation Areas, Travelways Map, Figures MV-29,30,31 (Volume II, DEIS) | | | | |
| **Tesoro** | Distinctive scenic quality class, park-like visual image type, immediate foreground and foreground views from residences, recreation areas, and travel ways | 3, 5, 6, 7, 8, 9, 12, 13, 15, 16, 17 | North Kenai Road; Captain Cook SRA; Pt. Possession; Kincaid Park; underground due to the proximity to Captain Cook SRA; directional drilling under ACWR; use of planned transportation corridor to allow for vegetative screening along Grey Cliffs and Moose Point Subdivisions; Reduce vegetation contrast in dense forest areas; underground along Tony Knowles Coastal Trail | Impacts to visual resources are reduced through selective mitigation measures.<br>**Results – Partially effective** |
| **Enstar** | Distinctive scenic quality class, park-like visual image type, immediate foreground and foreground views from residences, recreation areas, and travel ways | 3, 5, 6, 7, 8, 9, 12, 13, 15, 16, 17 | Winter construction through KNWR; Lowering tower heights in select areas through KNWR; changing structure types in Chickaloon area; directional drilling through coastal marsh; location of transitional facility in shed; towers placed at maximum feasible distance from crossings at recreation areas, highways and trails | Impacts to visual resources are reduced through selective mitigation measures; however, any impacts within the KNWR would be at a national level<br>**Results –Partially effective** |

**TABLE 2**
**IMPACT MITIGATION SUMMARY**

| Alternative | Resource Topic on Referenced Map and Map Legend Features | Applicable Selective Mitigation Measures | Key Site-Specific Features and Mitigation | Mitigation Effectiveness |
|---|---|---|---|---|
| **Cultural:** Cultural Sensitivity Map, Figure MV-31 (Volume II, DEIS) | | | | |
| **Tesoro** | High sensitivity areas | 2, 4, 5, 6, 12 | To be determined during pre-construction activities and surveys | To be determined during pre-construction activities and surveys<br>**Results - Effective** |
| **Enstar** | High sensitivity areas | 2, 4, 5, 6, 12 | To be determined during pre-construction activities and surveys | To be determined during pre-construction activities and surveys<br>**Results - Effective** |