PUBLIC NOTICE

Alaska Department of Environmental Conservation (DEC)
Wastewater Discharge Authorization Program/401 Certification
555 Cordova Street, Anchorage AK 99501-2617
Phone: 907-269-6285|Email: DEC-401Cert@alaska.gov

Notice of Application for State Water Quality Certification

Public Notice (PN) Date: June 25, 2021 **PN Reference Number: POA-1993-00713**
PN Expiration Date: July 25, 2021 **Waterway: Cook Inlet**

Any applicant for a federal license or permit to conduct an activity that might result in a discharge into navigable waters, in accordance with Section 401 of the Clean Water Act (CWA) of 1977 (PL95-217), also must apply for and obtain certification from the Alaska Department of Environmental Conservation that the discharge will comply with the CWA, the Alaska Water Quality Standards, and other applicable State laws.

Notice is hereby given that a request for a CWA §401 Water Quality Certification of a Department of the Army Permit application, Corps of Engineers' Reference Number POA-1993-00713, Cook Inlet, has been received for the discharge of dredged and/or fill materials into waters of the United States (WOUS), including wetlands, as described below and shown on the enclosed project figures/drawings. The public notice and related project figures/drawings are also accessible from the DEC website at http://dec.alaska.gov/water/wastewater/.

Any person desiring to comment on the project with respect to water quality, may submit comments electronically via the DEC public notice site (**preferred method**) at https://water.alaskadec.commentinput.com/?id=mBStM

Alternatively, you may direct written comments or requests for public hearing via email or mail to the address listed above by the Public Notice expiration date. All comments submitted via mail or email should include the PN reference number listed above in the subject heading. Mailed comments must be postmarked on or before the expiration date of the public notice.

Applicant: Hilcorp Alaska, LLC., Anna Dugan, Environmental Specialist, 3800 Centerpoint Drive, Suite 1400, Anchorage, Alaska 99503, (907) 777-8322, adugan@hilcorp.com; Agent: SLR International, Shauna Holben, Senior Scientist, 2700 Gambell Street, Suite 200, Anchorage, Alaska 99503, (907) 947-9137, sholben@hilcorp.com

Project Name: Kenai Gas Field Flowlines

Location: The proposed activity is located within Section 31, T. 5 N., R. 11 W.; Latitude 60.474849° N., Longitude -151.273019° W.; in Kenai, Alaska.

Purpose: The applicant's stated purpose is to provide system safeguards, reduce maintenance requirements, and increase reliability to meet Southcentral Alaska's gas needs.

Project Description: The applicant proposes to install two new gathering flowlines in the Kenai Gas Field. The two new flowlines, a 20-inch medium pressure, and 24-inch low pressure line would be installed alongside two existing lines. The existing flowlines will continue to be operated while the new flowlines are installed and will be left operational after the 20 and 24-inch flowline installation is complete. The

flowline route is approximately 5,600 feet in length between the two pads, with approximately 5,220 feet in wetlands.

The project will result in temporary impacts to 3.1 acres of WOUS, including wetlands, from trenching of the flowline route. Approximately 20,139 cubic yards of excavated material will be temporarily side-cast within a 2.63 acre area adjacent to the trenched area for less than 45 days. The temporarily side-cast material will be placed on a geotextile liner to avoid wetland impacts outside of the trenched area. Excavated material will be returned to the trench to the maximum extent practicable and any remaining material will be placed on adjacent uplands. Rig mats will be temporarily placed adjacent to the flowline route for equipment staging and site access. Once flowline installation is complete and any disturbed areas are returned to pre-existing conditions and contours, there will be no permanent impacts to WOUS.

After reviewing the application, the Department may certify there is reasonable assurance the activity, and any discharge that might result, will comply with the CWA, the Alaska Water Quality Standards, and other applicable State laws. The Department also may deny or waive certification.

The permit application and associated documents are available for review. For inquires or to request copies of the documents, contact dec-401cert@alaska.gov, or call 907-269-6285.

Disability Reasonable Accommodation Notice

The State of Alaska, Department of Environmental Conservation complies with Title II of the Americans with Disabilities Act (ADA) of 1990. If you are a person with a disability who may need special accommodation in order to participate in this public process, please contact ADA Coordinator Brian Blessington at 907-269-6272 or TDD Relay Service 1-800-770-8973/TTY or dial 711 within 5 days of the expiration date of this public notice to ensure that any necessary accommodations can be provided.

Hilcorp Alaska, LLC

Kenai Gas Field Gathering Flowlines Upgrade Project Description

June 2021

Hilcorp Alaska, LLC
3800 Centerpoint Dr. Suite 1400
Anchorage, Alaska 99503

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
APDES	Alaska Pollutant Discharge Elimination System
bgs	below ground surface
BMP	Best Management Practices
DRO	diesel-range organics
GAC	granular activated carbon
gal	gallon(s)
GPM	gallons per minute
HDD	horizontal directional drilling
Hilcorp	Hilcorp Alaska, LLC
KGF	Kenai Gas Field
KPB	Kenai Peninsula Borough
KWF	Kenai Watershed Forum
LNAPL	light non-aqueous phase liquid
PID	photoionization detector
ROW	right-of-way
RRO	residual-range organics
SHPO	State Historic Preservation Office
TAH	total aromatic hydrocarbons
TAqH	total aqueous hydrocarbons
TWUA	Temporary Water Use Authorization
USACE	United States Army Corps of Engineers
WOTUS	Waters of the United States

1.0 Introduction

Hilcorp Alaska, LLC (Hilcorp) proposes to install two new gathering flowlines (flowlines) in the Kenai Gas Field (KGF) in 2021. The two new flowlines, a 20-inch medium pressure and 24-inch low pressure line, will be installed between KGF Pad 34-31 and KGF Pad 14-6 alongside two existing lines: a 12-inch low pressure line and a 16-inch high pressure line. Figure 1 shows the KGF vicinity and Figure 2 shows the proposed flowlines installation route (flowline route). The existing flowlines will continue to be operated while the new flowlines are installed and will be left operational after the 20- and 24-inch flowline installation is complete.

Coordinates for the above-described infrastructure are shown in Table 1:

Table 1. Project Coordinates

Project Feature	Location Start	Location End	Latitude Start	Longitude Start	Latitude End	Longitude End
20-inch and 24-inch Gathering Flowlines	KGF Pad 34-31	KGF Pad 14-6	60.474849	-151.273019	60.459213	-151.2644289

2.0 Description of Project Activities

2.1 Project Purpose and Need

The purpose of the project is to provide system safeguards and to increase reliability to meet Southcentral Alaska's gas needs. Hilcorp has contractual demands that include a "needle-peak" option for a few weeks of high deliverability during the winter seasons. This project will help to safely increase gas deliverability from the KGF towards this effort. As Hilcorp supplies the largest volume of gas to Southcentral, we are the backstop to meet Southcentral Alaska's gas demand in the event that the Cingsa Storage operation were to encounter an issue. The KGF Flowlines upgrade project is the second phase of a three-phase approach to debottleneck the KGF facilities and will provide some critical spare capacity in the event of unplanned compressor maintenance during the winter. Currently, when an upset condition occurs at KGF Pad 34-31 (e.g. a compressor fails), gas deliverability to the Kenai Peninsula is interrupted until the upset condition can be corrected. An upset condition impacting gas deliverability typically takes several days to correct, between 4 days in a best-case scenario to 28 days depending on the severity of the upset. The last time a compressor failed was in the winter of 2020-2021 which led to pulling extremely hard from the gas storage wells and damage to one of the wells. This project is critical for gas deliverability to Southcentral Alaska because if an upset condition occurs during peak winter demand in 2021-2022 similar risk of damage to the gas storage wells will occur to meet market demand or possibly a shortfall of meeting peak demand for a few days to weeks could be encountered.

The project will also increase safety and reduce maintenance by allowing Hilcorp the ability to pig and dewater the KGF gas lines to prevent water carryover into the compressors. Increased and more reliable gas deliverability at KGF will serve a public need by helping to meet Alaska's gas supply demands during peak periods. While the new flowlines will provide increased gas deliverability, the existing 12-inch line will continue to be used to flow gas from the Cannery Loop gas wells. The existing 16-inch line will be used as needed to support future projects in the KGF. Hilcorp has plans within the next 1 to 2 years to upgrade the main KGF gas sales line by installing a pig launcher/receiver, replacing valves, and upgrading/replacing the associated tie-in piping. When these upgrades are performed, the 16-inch flowline

will be used to temporarily route sales gas. The 16-inch line will continue to serve as a backup flowline for the life of the KGF.

Hilcorp proposes completing this project prior to winter gas demand for 2021-2022 to avoid potential gas supply issues for Southcentral Alaska.

2.2 Schedule

Hilcorp plans to initiate flowline installation in summer 2021. The exact start of project construction will be dependent on the receipt of the U.S. Army Corps of Engineers (USACE) regulatory approval. Hilcorp will also monitor ground conditions for construction purposes and will begin project activities when the ground is sufficiently dry to reduce impacts to wetland areas and allow safe access of equipment; this is anticipated to be in August/September 2021. However, obtaining regulatory authorizations may delay the project to winter 2021/2022. Once started, the project is anticipated to take up to 45 days to complete.

2.3 Excavation and Flowline Installation

The two new flowlines will be buried between KGF Pads 34-31 and 14-6 and will be used to transport gas between the pads. The flowline route is approximately 5,600 feet in length between the two pads, with approximately 5,220 feet in wetlands, and traversing Kenai Peninsula Borough (KPB) and private land. Engineering drawings included in Appendix A show the flowline route and construction details. Figure 4 shows the proposed excavation dewatering and hydrotest discharge locations.

Flowline installation will be performed by trenching. The flowline route will be installed by excavating a 6-foot-deep trench (pipe will be buried 4 feet below ground surface [bgs]). In wetland areas, the trench will generally be 8 feet wide at the base and up to 26 feet wide at the top due to the nature of wetland soil and engineering requirements (refer to Sheet 4 in Appendix A). At the points where pipeline connections will be made, consisting of 10 areas each 20 feet long spaced every 500 feet along the flowline route, the trench will be 10 feet wide at the base and up to 28 feet wide at the top to allow sufficient space for safe worker access for welding and connecting of flowline sections (refer to Sheet 5 in Appendix A). In upland areas, the trench width will be 8 feet at the base and approximately 12 feet wide at the top.

Once the flowlines are placed in the trench, super sacks, made of uncoated woven polypropylene, will be placed every 10 to 20 feet along the length of the flowlines to keep the flowlines below grade after backfilling occurs. Hilcorp anticipates needing 783 super sacks to properly stabilize the flowlines. Each bag has a 28-cubic-foot capacity and will be half full of clean Kenai Sand obtained from a local sand and gravel company (refer to Sheets 5 and 16 in Appendix A). Equipment will be temporarily staged within a 45-foot corridor on rig mats adjacent to the flowline route during construction activities (refer to Sheets 4 and 5 in Appendix A).

Excavated trench material will be stockpiled on the ground next to the trench and utilized as fill after the flowline sections are placed, minimizing the amount of the time stockpiled soil remains on the previously disturbed area. The stockpiled soil may be shifted away from the trench in less stable areas to help reduce overburden on the trench and the likelihood of trench wall sluffing. Excavated native soils that are placed in wetland areas will be placed at least 5 feet from the trench sides on geotextile liner within an up to 27-foot corridor over an existing disturbed pipeline corridor (refer to Sheets 4 and 5 in Appendix A). Best management practices (BMPs) to prevent sediment transport from the stockpiled material will be implemented; BMPs include placement of geotextile liner beneath stockpiled soil and installation of silt fence alongside stockpiles (refer to Sheets 4 and 5 in Appendix A).

To the extent practicable, the vegetative mat (vegetation and soil that includes live roots) will be removed in large sections and segregated from the mineral subsoil so that the vegetative mat can be replaced back at the trench surface after backfilling, which will facilitate the natural revegetation of trenched areas. Any clean subsurface material not returned to the trench will be disposed of on adjacent uplands where it will be spread and seeded, if warranted. Trenched flowline sections will be returned to pre-project contours, except in saturated areas where backfill may be mounded to allow for settling. Appendix B, *Kenai Gas Field Gathering Flowline Upgrade Restoration Plan, Revision 1* (Restoration Plan), addresses revegetation and rehabilitation of areas that will be temporarily disturbed from installation of the KGF flowlines. The areas of disturbed vegetation are anticipated to be fully restored and no permanent impacts are anticipated to occur.

After flowline installation is complete, including reburial, the lines will undergo hydrostatic testing (also referred to as hydrotesting). Depending on the conditions during hydrotesting, fresh water may be used and discharged to the ground in accordance with the hydrotest discharge authorization (see Section 2.5), or chemicals such as glycol or methanol may be used to avoid freezing liquids in the pipe. If chemicals are used for hydrotesting, hydrostatic test water will be hauled off-site for proper re-use or disposal.

2.4 Excavation Dewatering

Sub-grade flowline installation via trenching may require dewatering. Excavation dewatering will be performed in accordance with the Alaska Pollutant Discharge Elimination System (APDES) Statewide Oil and Gas Pipelines General Permit. Excavation dewatering will comply with the APDES Permit requirements and the *Hilcorp Pipeline System Cook Inlet Area Best Management Practice Plan for Discharges and Disposals under Alaska Department of Environmental Conservation General Permit for Statewide Oil and Gas Pipelines* (BMP Plan). Dewatering will also be conducted in accordance with the Temporary Water Use Authorization (TWUA) obtained from the Alaska Department of Natural Resources (ADNR).

Up to four pumps, a combination of 4-inch pumps and 6-inch pumps, will be used to dewater and maintain a dry excavation during flowline installation. Trenching will occur in sections and discharge locations will be adjusted accordingly. Dewatering efforts are planned for 12 hours per day over a period of 30 days total. Maximum pump rates are 1,000 gallons (gal) per minute (GPM) for the 6-inch pump and 450 GPM for the 4-inch pump. Assuming a combination of pumps is used at maximum rate for 12 hours per day, a maximum daily withdrawal amount of 2,160,000 gal (or an equivalent volume at lower pump rate and longer pump time) is requested. An estimated maximum of 64,800,000 gal is requested, based on maximum pump rates for thirty 12-hour days. Note that historic excavation dewatering of pipeline projects are not typically dewatered at maximum pump rates. Once a location has been dewatered initially, it is expected that the pumps will only need to run intermittently to maintain a dry excavation; therefore, the actual water volumes are likely to be much lower than the proposed maximum.

2.4.1 Location of Discharge

Figure 4 shows the proposed excavation locations and Kenai Watershed Forum (KWF) wetlands mapping. Locations identified for potential excavation dewatering discharges are shown on the maps. The excavation area is located in the Kenai lowlands. The Kenai lowlands consist of topographically flat, discontinuous wetlands with organic soil from the surface to as deep as 6 feet bgs. Peat up to 5 feet thick can be found in the area. Beneath the organic soil layer lies a thin layer of fine-grained alluvium, then interbedded sand and sandy gravel to depths of over 20 feet. Discharges will be directed initially to well-vegetated upland areas to the extent possible; however, these areas generally drain toward adjacent wetland areas. As the majority of the flowline route is located within wetlands, discharge to wetlands is unavoidable. Based on KWF wetlands mapping, wetlands along the flowline route are relict glacial lakebed wetlands, with a variety of

features including ponded water and areas dominated by sedges and shrubs such as labrador tea, leatherleaf and dwarf birch[1]. Wetlands in this area eventually drain to the tidal wetlands and Cook Inlet.

2.4.2 Discharge Flow Rates

Maximum anticipated discharge flow rate: 2,160,000 gal per day

Average anticipated discharge flow rate: 500-50,000 gal per day (based on actual typical project discharge volumes)

Total anticipated discharge: 64,800,000 gal (maximum total estimated discharge for a combination of pumps running at maximum capacity for 12 hours a day for 30 days)

Discharge velocity at end of pipe: Maximum 11.5 feet per second

2.4.3 Receiving Water Bodies/Land Disposal Site Conditions

As discussed in Section 2.4.1, the excavation areas are generally located along the Kenai lowlands within the previously disturbed flowline right-of-way (ROW). Discharges will be directed to upland areas near the excavation locations to the extent possible; however, the area is largely surrounded by wetlands and discharge to wetlands is unavoidable. Discharges are to private and KPB owned lands. Privately owned parcels are largely undeveloped with the exception of the two KGF pads connected by the flowlines. Land owner approval will be obtained for construction activities, including proposed discharge locations as needed.

2.4.4 Excavation Dewatering Monitoring

Excavation dewatering discharges will be monitored and sampled in accordance with requirements outlined in Table 6 of the APDES Permit, Effluent Limits and Monitoring Requirements for Excavation Dewatering (Discharge 004):

[1] Wetland mapping accessed on 20 August 2020 via Kenai Peninsula Borough map viewer (https://gis.kpb.us/map/index.html?viewer=landcover) and Kenai Watershed Forum website (https://kenaiwatershed.org/science-in-action/cook-inlet-wetlands/wetland-types/lakebed-wetlands/).

Table 6: Effluent Limits and Monitoring Requirements for Excavation Dewatering (Discharge 004)

Parameter (Units)	Effluent Limits	Monitoring Requirements		
		Frequency	Location	Sample Type
Flow Volume [1] (gpd)	Report	Daily	Effluent	Estimate or Measured
pH [2] (S.U.)	6.5 - 8.5	Weekly	Effluent	Grab
SS [3] (mL/L)	0.2	Weekly	Effluent	Grab
Turbidity (NTU)	Report	Weekly	Upgradient [4]	Grab
Turbidity (NTU) No Mixing Zone	5 NTU above ambient [5]	Weekly	Effluent	Grab
Turbidity (NTU) Mixing Zone	5 NTU above ambient [6]	Weekly	Downgradient	Grab
Oil and Grease Visual [7]	No Discharge	Daily	Effluent	Visual
TAH [8] (µg/L)	Report	Once per event	Effluent	Grab
TAqH [8] (µg/L)	Report	Once per event	Effluent	Grab

Notes:

1. Record daily flow measurements, or estimates, in daily log. Report daily maximum for the month on the DMR and total monthly volumes in the comments section.
2. The effluent limit for pH shall be between 6.5 and 8.5. Report maximum and minimum for each month.
3. As measured using Imhoff Cone.
4. If measurement of upgradient and downgradient receiving water turbidity is not possible, then turbidity limits are not applicable. Report "Not Applicable" (N/A) for all turbidity measurements and provide comment as to why receiving water turbidity measurement is not possible.
5. If a mixing zone is not authorized, effluent turbidity may not exceed 5 NTU above ambient conditions when the ambient turbidity is 50 NTU or less. When the ambient condition is greater than 50 NTU, effluent shall not to exceed more than a 10 % increase up to a maximum increase of 15 NTU. For lake waters, turbidity may not exceed 5 NTUs above ambient turbidity. Report downgradient turbidity on DMR for information only.
6. If mixing zone is authorized, turbidity may not exceed 5 NTU above ambient conditions 500 feet downstream of the discharge when the ambient turbidity is 50 NTU or less. When the ambient condition is greater than 50 NTU, effluent shall not to exceed more than a 10 % increase up to a maximum increase of 15 NTU. For lake waters, turbidity may not exceed 5 NTUs above ambient turbidity. Report effluent turbidity on DMR for information only.
7. Observed daily while discharging. Maintain daily log and provide to DEC upon request.
8. An observation of a sheen triggers monitoring for TAH and TAqH. Permittee must collect one sample per event when an observation of a sheen has occurred.

The Excavation Dewatering Monitoring Forms will be completed to document the daily, weekly, and monthly monitoring requirements listed in the table above. The completed, signed forms will be retained in accordance with APDES Permit requirements (3 years).

2.4.5 Best Management Practices

Hilcorp will employ the following BMPs from the Hilcorp Pipeline System Cook Inlet Area BMP Plan as needed to monitor for contaminants, dissipate flow velocity, and prevent erosion and sedimentation:

- **BMP 2 – Inlet Screening/Filtering –** Hilcorp may use inlet suction screening/filtration to reduce the potential for debris and sediment in the pump and effluent. A shallow sump may be excavated to serve as the pump intake location.
- **BMP 3 – Visual Inspection –** Hilcorp will inspect and monitor disposals for visual signs of potential contamination (e.g., sheen or product) prior to discharge/disposal. Monitoring will be documented on a daily monitoring form. If sheen is observed, trained personnel will evaluate it to determine if it is biogenic or petroleum based using Alaska ADEC's Visible Oil Sheen Standard Operating Procedures (Attachment 5 of the BMP Plan). If the sheen is determined to be petroleum-based, Hilcorp will initiate the internal spill notification process and applicable external notifications as soon as practicable upon the observation of any oil sheen or product in the groundwater to be discharged/disposed. Work will also cease until the sheen or product can be removed and additional treatment measures can be evaluated.

- **BMP 4 – Energy Dissipaters/Diverters –** Hilcorp will place energy dissipaters and/or diverters under the hose at the discharge location to dissipate the flow velocity and prevent erosion at the discharge point.
- **BMP 6 – Sediment Filter Bag –** Water may be discharged through a hose with a sediment filter bag attached to the end to prevent sediments from being introduced into the environment. Hilcorp will maintain function of the sediment bag by regularly visually inspecting the bag for collected sediments. Sediments collected in the bag will be placed on the excavated soil pile to be replaced in the excavations after flowline work has been completed.
- **BMP 7 – Wattles/Straw Bales –** Reusable interlocking wattles (e.g., Dura Wattles) or straw bales may be placed on the ground surface around the perimeter of the discharge/disposal point(s) to serve as a sediment barrier, and reduce surface flow velocities. The wattles, if used, will be placed at locations to intercept potential surface flow (e.g., swales and other drainage pathways). The discharge area will be inspected for evidence of erosion or sediment transport and additional wattles will be placed or their locations adjusted as needed. Discharge points may also be relocated to minimize the potential for erosion based on site observations during the discharge.
- **BMP 8 – Sorbent Pads/Boom –** If sheen or product is identified within the effluent to be discharged/disposed (see BMP 3) it will be contained or removed with the use of sorbent pads or boom prior to being discharged/disposed. Sorbent boom may also be placed around the pump intake area.
- **BMP 12 – Regulate Effluent Release –** The rate of effluent discharge will be regulated and reduced, if needed, to prevent sediment and erosion issues.

Any indication of contamination in the water (i.e., sheen, odor, foam) will require either (1) that water is containerized and transported for disposal (i.e., no discharge will occur) OR (2) water will be treated through a granular activated carbon (GAC) canister, captured in a temporary tank, and sampled for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH). If TAH and TAqH results indicate the water is clean, it may then be discharged to the ground. The following BMPs will be employed to treat water that has hydrocarbon sheen:

- **BMP 10 – Portable Temporary Storage Bladders, Drums, Tanks, or Containers –** Water to be discharged/disposed may be pumped into a portable bladder, drum, tank, or container prior to discharge. If used, the pump head will be located below the water surface and above the bottom of the container. The container will serve as an oil water separator (if necessary) and settling tank to reduce the amount of suspended solids prior to discharge. Any visible product or sheen will be removed with sorbent pads and boom.
- **BMP 18 – Granulated Activated Carbon Canister –** Water that is observed to contain a petroleum-based sheen may be run through a GAC canister, which absorbs and removes petroleum hydrocarbons. The GAC unit will consist of a canister (e.g., 5 gallon bucket or 55 gallon drum) containing GAC. Water will be treated by running it through the GAC canister. Treated water will be containerized, visually inspected, and tested for compliance with water quality standards for TAH and TAqH prior to discharge/disposal. Flow rates and amount of water to be treated will be dependent upon the total volume of water to be treated, the canister size, and hydrocarbon concentration in water to be treated.

2.5 Hydrotest Discharge

Hilcorp proposes to perform hydrostatic testing of the new flowlines installed between KGF Pad 34-31 and KGF Pad 14-6 (Figure 2). Hilcorp may use chemicals (such as glycol or methanol) as freeze protection

during hydrotesting; in this case, the hydrotest water will not be discharged, but will be hauled off-site for proper disposal or reuse. If Hilcorp uses fresh water (from an existing permitted local water source) without any additives for hydrotesting the new flowlines, Hilcorp proposes discharging the water to uplands located to the northeast of KGF Pad 34-31; this upland area eventually flows to downgradient wetlands. Figure 4 shows the proposed discharge location. Discharges will be conducted in accordance with BMPs intended to limit disturbance to the surrounding environment caused by discharge of hydrotest water. Discharges will be conducted in accordance with the APDES Permit. Hydrotest discharges will comply with the General Permit requirements and the BMP Plan.

Hilcorp proposes to transport fresh water to KGF Pad 34-31 and transfer it into clean tanks on the pad. Hilcorp will use clean hoses to transfer water from the tanks to the flowlines. Each flowline will be pressured up and tested, after which Hilcorp will use an air compressor at KGF Pad 14-6 to push water back toward KGF Pad 34-31. Water will be transferred back into the tanks and discharged from the tanks. This will allow for any necessary monitoring to occur prior to discharge. Each flowline will be dried using the air compressor. Hilcorp estimates approximately 260,000 gallons of water will be used to hydrotest the two flowlines.

A similar process would be followed for hydrotesting the lines using freeze protection chemicals; however, in that situation there would be no discharge of the hydrotest fluids to the ground.

2.5.1 Location of Discharge

The proposed hydrotest discharge location is shown on Figure 4. The discharge will be to uplands northeast of KGF Pad 34-31, which may eventually flow to wetland areas identified by KWF mapping as tidal, riverine, and/or relict glacial lakebed wetlands (see Figure 3). Wetlands in this area eventually drain to Cook Inlet.

2.5.2 Discharge Flow Rates

Maximum anticipated discharge flow rate: 152,000 gal per day (full volume of 24-inch pipe)

Average anticipated discharge flow rate: 152,000 gal per day

Total anticipated discharge: 260,000 gal

Discharge velocity at end of pipe: Variable

2.5.3 Receiving Water Bodies/Land Disposal Site Conditions

As discussed in Section 2.5.1, discharge will be to uplands northeast of KGF Pad 34-31, which ultimately drain to wetland areas and Cook Inlet. Discharges are to an undeveloped portion of a KPB owned parcel of land.

2.5.4 Hydrotest Discharge Monitoring

Discharged hydrotest water will be monitored and sampled in accordance with requirements outlined in Table 7 of the APDES Permit, Effluent Limitations and Requirements for Hydrostatic Test Water (Discharge 005):

Table 7: Effluent Limitations and Requirements for Hydrostatic Test Water (Discharge 005)

Parameter (Units)	Effluent Limits	Monitoring Requirements		
		Frequency	Location	Sample Type
Flow Volumes [1] (gpd)	Report	Daily	Effluent	Estimate or Measured
pH [2] (S.U.)	6.5 - 8.5	Daily	Effluent	Grab
SS [3] (mL/L)	0.2	Daily	Effluent	Grab
Turbidity (NTU)	Report	Daily	Upgradient [4]	Grab
Turbidity (NTU) No Mixing Zone	5 NTU above ambient [5]	Daily	Effluent	Grab
Oil and Grease Visual [6]	No Discharge	Daily	Effluent	Visual
TAH [7] (µg/L) New or Non-hydrocarbon	Report	Once per event	Effluent	Grab
TAqH [7] (µg/L) New or Non-hydrocarbon	Report	Once per event	Effluent	Grab
TAH [8] (µg/L) Existing Hydrocarbon	10	Per Discharge	Effluent	Grab or Composite
TAqH [8] (µg/L) Existing Hydrocarbon	15	Per Discharge	Effluent	Grab or Composite

Notes:

1. Record daily flow measurements, or estimates, in daily log. Report daily maximum for the month on the DMR and total monthly volumes in the comments section.
2. The effluent limit for pH shall be between 6.5 and 8.5. Report maximum and minimum for each month.
3. As measured using Imhoff Cone.
4. If measurement of upgradient receiving water turbidity is not possible, then turbidity limits are not applicable. Report "Not Applicable" (N/A) for all turbidity measurements and provide comment as to why receiving water turbidity measurement is not possible.
5. Effluent turbidity may not exceed 5 NTU above ambient conditions when the ambient turbidity is 50 NTU or less. When the ambient condition is greater than 50 NTU, effluent shall not to exceed more than a 10 % increase up to a maximum increase of 15 NTU. For lake waters, turbidity may not exceed 5 NTUs above ambient turbidity.
6. Observed daily while discharging. Maintain daily log and provide to DEC upon request.
7. Water from new oil and gas or non-oil and gas infrastructure is not anticipated to have dissolved hydrocarbons. However, an observation of a sheen triggers monitoring for TAH and TAqH. Permittee must collect one representative sample per event when an observation of a sheen has occurred.
8. Existing infrastructure that has known to been in contact with petroleum is anticipated to have dissolved hydrocarbons. Permittee may collect a single representative grab sample for volumes less than or equal to 500,000 gallons. Permittees discharging greater than 500,000 gallons must collect a composite sample of 8 grab samples collected at equal intervals during the discharge event as described in the QAPP.

The Hydrotest Discharge Monitoring Inspection Forms will be completed to document the daily, weekly, and monthly monitoring requirements listed in the table above. The completed, signed forms will be retained in accordance with APDES Permit requirements (3 years).

2.5.5 Best Management Practices

Hilcorp will employ the following BMPs from the Hilcorp Pipeline System Cook Inlet Area Best Management Practices (BMP) Plan as needed to monitor for contaminants, dissipate flow velocity, and prevent erosion and sedimentation:

- **BMP 3 – Visual Inspection –** Hilcorp will inspect and monitor disposals for visual signs of potential contamination (e.g., sheen or product) prior to discharge/disposal. Monitoring will be documented on a daily monitoring form. If sheen is observed, trained personnel will evaluate it to determine if it is biogenic or petroleum based using ADEC's Visible Oil Sheen Standard Operating Procedures (Attachment 5 of the BMP Plan). If the sheen is determined to be petroleum-based, Hilcorp will initiate the internal spill notification process and applicable external notifications as soon as practicable upon the observation of any oil sheen or product in the groundwater to be

discharged/disposed. Work will also cease until the sheen or product can be removed and additional treatment measures can be evaluated.

- **BMP 4 – Energy Dissipaters/Diverters –** Hilcorp will place energy dissipaters and/or diverters under the hose at the discharge location to dissipate the flow velocity and prevent erosion at the discharge point.
- **BMP 7 – Wattles/Straw Bales –** If needed to further reduce sedimentation, reusable interlocking wattles (e.g., Dura Wattles) or straw bales may be placed on the ground surface around the perimeter of the discharge/disposal point(s) to serve as a sediment barrier, and reduce surface flow velocities. The wattles, if used, will be placed at locations to intercept potential surface flow (e.g., swales and other drainage pathways). The discharge area will be inspected for evidence of erosion or sediment transport and additional wattles will be placed or their locations adjusted as needed. Discharge points may also be relocated to minimize the potential for erosion based on site observations during the discharge.
- **BMP 12 – Regulate Effluent Release –** The rate of effluent discharge will be regulated and reduced, if needed, to prevent sediment and erosion issues.

Any indication of contamination in the water (i.e., sheen, odor, foam) will require either (1) that water is containerized and transported for disposal (i.e., no discharge will occur) OR (2) water will be treated through a granular activated carbon (GAC) canister, captured in a temporary tank, and sampled for total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH). If TAH and TAqH results indicate the water is clean, it may then be discharged to the ground. The following BMPs will be employed to treat water that has hydrocarbon sheen:

- **BMP 10 – Portable Temporary Storage Bladders, Drums, Tanks, or Containers –** Water to be discharged/disposed may be pumped into a portable bladder, drum, tank, or container prior to discharge. If used, the pump head will be located below the water surface and above the bottom of the container. The container will serve as an oil water separator (if necessary) and settling tank to reduce the amount of suspended solids prior to discharge. Any visible product or sheen will be removed with sorbent pads and boom.
- **BMP 18 – Granulated Activated Carbon Canister –** Water that is observed to contain a petroleum-based sheen may be run through a GAC canister, which absorbs and removes petroleum hydrocarbons. The GAC unit will consist of a canister (e.g., 5 gallon bucket or 55 gallon drum) containing GAC. Water will be treated by running it through the GAC canister. Treated water will be containerized, visually inspected, and tested for compliance with water quality standards for TAH and TAqH prior to discharge/disposal. Flow rates and amount of water to be treated will be dependent upon the total volume of water to be treated, the canister size, and hydrocarbon concentration in water to be treated.

3.0 Contaminated Sites

The tie-in pads, KGF Pad 34-31 and KGF Pad 14-6, are both active contaminated sites. KGF Pad 14-6, Alaska Department of Environmental Conservation (ADEC) file #2320-38-029, Hazard ID 2434, is the site of a historical gas condensate leak. Groundwater sampling at the site has detected light non-aqueous phase liquid (LNAPL), and concentrations of diesel-range organics (DRO), residual-range organics (RRO), 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, ethylbenzene, naphthalene, total xylenes, 1-methylnaphthalene, and 2-methylnaphthalene exceeding ADEC groundwater cleanup levels. Groundwater analytical results from the 2019 sampling event are consistent with historical observations, showing a continuing decrease in analyte concentrations. Groundwater sampling is conducted biennially and every 4th year. Groundwater flow at KGF Pad 14-6 has historically been observed to vary between west-northwest

and west-southwest during summer/fall sampling events and west in 2015 and 2017. The proposed flowline route is primarily upgradient (northwest) from KGF Pad 14-6; however, there is a portion of the route that crosses KGF Pad 14-6 and is located downgradient of groundwater sampling locations which have historically shown contaminants exceeding ADEC groundwater cleanup levels.

KGF Pad 34-31, ADEC file #2320-38-031, Hazard ID 3331, is an active natural gas drilling and production pad. Site investigations and groundwater monitoring have been conducted at the site since the 1980s. Cleanup of the reserve pit on site was initiated in 1992, resulting in 12,000 cubic yards of soil removed; impacted soil was left in place along the western wall due to existing active gas wells and infrastructure. Groundwater sampling at the site has indicated DRO exceeding ADEC groundwater cleanup levels. Groundwater monitoring is continuing for 1,2,4-trimethylbenzene, naphthalene, and 1-methylnaphthalene, in addition to DRO. Groundwater flow at KGF Pad 34-31 has historically been observed to flow generally to the west during summer/fall sampling events. The proposed flowline route is primarily upgradient and located southeast of KGF Pad 34-31.

There is only one monitoring well along the proposed flowline route (Well "A", see Sheet 15 of Appendix A). This is a historic monitoring well which is no longer in use and is located upgradient of known contamination associated with KGF Pad 14-6. After a thorough search of Hilcorp's historic electronic and hard copy records, Hilcorp was not able to locate any results of previous sampling activities associated with this well. Hilcorp was able to locate data from the KGF Pad 14-6 monitoring wells downgradient of Well A dating back to 1996, indicating any recovered data from Well A would be from before 1996 and not likely indicative of current conditions. Hilcorp has identified this monitoring well for removal in summer 2021.

If contamination is identified during any of the excavation activities, it will be reported in accordance with Hilcorp's spill reporting procedures. There are no other contaminated sites within 1,500 feet from the proposed flowline route.

During trenching activities within 1,500 feet of KGF Pad 34-31 and KGF Pad 14-6, field personnel will monitor for evidence of contaminated soil and/or water in accordance with the project Soil and Water Management Plan approved by the ADEC Division of Spill Prevention and Response – Contaminated Sites. Monitoring will include use of a photoionization detector (PID), as well as visual and olfactory observations. Evidence of contamination may include a hydrocarbon/chemical odor, stained soil, free product, or hydrocarbon sheen on water. If contamination is encountered, a third-party qualified environmental professional will be brought to site to perform analytical characterization sampling as needed. Initial soil excavated will be staged adjacent to the trench or at another staging area and will be treated as uncontaminated soil until visual or olfactory evidence of contamination is encountered, or PID monitoring indicates volatile organic compounds present in soil at readings greater than 20 parts per million by volume. Soil believed to be contaminated will be staged in lined and bermed soil stockpiles or other suitable waste storage containers that will be designed to support saturated soils. If necessary, the lined staging area will be retrofitted with a sump to prevent pooling of water within the storage area and potential spills of contaminated water to the ground surface.

Groundwater encountered within 1,500 feet of KGF PAD 34-31 and KGF Pad 14-6 will be tested for TAH and TAqH prior to discharge. Water to be discharged/disposed may be pumped into a portable bladder, drum, tank, or container prior to discharge in accordance with BMP 10 (see Section 2.4.5). Groundwater removed from the trenches during flowline construction and found to be contaminated may be transported to the Kenai Gas Field Grind and Inject facility for reuse or disposal, or the groundwater may be treated on site using a granular activated carbon system and discharged to the ground surface following acceptable analytical results. Uncontaminated water removed during trenching activities may also be discharged to the ground surface as provided in Section 2.4.

4.0 Fuel and Hazardous Materials Storage

During construction, diesel fuel and gasoline tanks may be temporarily staged by the construction contractor. Engine oil, hydraulic fluids, and antifreeze will also be used on the project for proper maintenance of construction equipment. These will be staged at KGF Pad 34-31 and/or KGF Pad 14-6. Fuel and hazardous substances will be stored within secondary containment or inside covered containment (e.g., connex).

All fuel and hazardous liquids will be stored in secondary containment capable of capturing the full liquid volume, plus 10 percent, and will be positioned more than 100 feet from any water body. All containers will be clearly marked with manufacturer's labels or in permanent ink with its contents. At least one spill kit capable of cleaning up a 5-gallon fuel spill will be maintained at the work site throughout the project and on each piece of heavy equipment. Secondary containment (e.g., duck ponds, drip pans) will be placed under vehicles and heavy equipment when topping off fluids and when left parked. All fluid transfers will be monitored for the duration of the transfer, and no liquid transfers or fueling will be conducted within 100 feet of streams. Garbage, trash, and other wastes will be stored in covered containers and disposed of at an approved site in accordance with local, state, and federal regulations.

5.0 Impacts to Wetlands

The KGF Gathering Flowlines Project will result in temporary impacts to jurisdictional Waters of the United States (WOTUS) located within the project area. Once flowline installation is complete and any disturbed areas are returned to pre-existing conditions and contours, there will be no permanent impacts to WOTUS. Figure 3 shows the KWF wetlands mapping relative to the project area. Hilcorp has avoided and minimized the impacts of this project to the maximum extent practicable and plans to restore the WOTUS area temporarily impacted by this project (see Appendix B, Restoration Plan).

This project will result in temporary impacts to 3.1 acres of wetlands from trenching of the flowline route. Approximately 20,139 cubic yards of excavated material will be temporarily side-cast within a 2.63 acre area adjacent to the trenched area for less than 45 days. The temporarily side-cast material will be placed on a geotextile liner to avoid wetland impacts outside of the trenched area. Excavated material will be returned to the trench to the maximum extent practicable and any remaining material will be placed on adjacent uplands. Rig mats will be temporarily placed adjacent to the flowline route for equipment staging and site access.

Table 2. Summary of KGF Flowlines Project Temporary Impacts to Waters of the U.S.

Temporary Impact Component	Fill Type	Estimated Temporary Wetland Impact (acres)	Estimated Fill Quantity (cy)	Dimensions
Flowlines trench	Flowlines stabilized/ weighted within trench using sand bags; remaining backfill is native soils	3.1	20,139	Trench will be approximately 5,220 feet long in wetlands by up to 28 feet wide
Temporarily stockpiled material from excavation	Native soils placed on geotextile liner	2.6	0	Excavated material will be reserved for trench backfill; may be stored alongside the trench in wetlands, 5,220 feet long by up to 27 feet wide

Temporary Impact Component	Fill Type	Estimated Temporary Wetland Impact (acres)	Estimated Fill Quantity (cy)	Dimensions
Temporary staging of equipment along flowline route	Rig mats, to be removed after flowline installation is complete	<5.5	0	Temporary staging will consist of rig mats positioned adjacent to the flowline to stage construction equipment

Avoidance and Minimization

The KGF Gathering Flowlines Upgrade Project, as described in this Project Description, has been designed to avoid and minimize impacts to wetlands to the maximum extent practicable. The project cannot be completed as originally proposed in September 2020 due to soil conditions in the wetlands that require more sloping of the trench wall to preserve worker safety. The wider trench reduces the available space for construction equipment and pipeline laydown and leaves insufficient area for temporary excavation materials storage on geotextile liner. Thus, while the total temporary impacts have increased due to soil stability requirements, the project impacts are still minimal and temporary.

Since the first design in September 2020, the project has undergone further engineering, construction, and safety review. This review identified additional space requirements for equipment, pipeline stress design, and most importantly, worker safety. For purposes of pipeline stress design, the project team identified a need to reduce forces at the bends near pad 31-34. A slight realignment was required, and it increased the flowline alignment in the wetland areas from 5,215 feet to 5,220 feet, which also increased the temporary wetland impacts from trenching and increases the volume of excavated material that would be temporary side-cast.

During final project engineering, it was determined that trenching with vertical walls by an excavator running over the trench is not feasible because the same issue of trench stability will occur when water beneath the frozen “active layer” of the wetlands enters the trench and causes sluffing. There is an additional issue caused by winter excavation which is the need for dewatering in freezing conditions.

- The primary concern is trench stability for excavator operators and construction personnel adjacent the trench. Previous project engineering did not include sufficient side slopes to prevent sluffing of the side walls for the predicted soil and saturation conditions in the area. Preventing trench sluffing is important for worker safety and required by in Occupational Safety and Health Administration (OSHA) and State of Alaska regulations.

- Trench sluffing would also impede crews from burying the pipes at design depth.

- Winter trenching would not result in significantly smaller impacts. The trench depth is purposefully below the frost line; therefore the trench walls would not hold back water in adjacent wetlands. Based on our experience installing pipelines in wetland areas in winter, water will still infiltrate the trench and undermine the trench wall, ultimately requiring the need for a wider trench than originally designed.

- As a result, the trench has been widened to allow sufficient space for safe worker access for welding and connecting of flowline sections. The maximum trench size will be 10 feet in width at the base and 28 feet in width at the top. To minimize the impacts due to trenching, in areas where the soils are more favorable, such as uplands and drier or more stable soil composition, trench width will be minimized to the extent practicable, and these decisions will be made during construction and approved by the competent person on site.

An expanded construction area was also added to the project plan to provide space for equipment movement and pipeline laydown, and to ensure that the side-cast materials pile and rig mat structures are sufficiently setback from the trench limits to keep bearing pressure on cut slopes to a minimum, thus minimizing trench width. An area of approximately 47 feet in maximum width (5.4 acres) is needed for temporary placement of rig mats for equipment access and staging. The area planned for temporary placement of side-cast materials on geotextile liner was expanded to a maximum of 27 feet in width (2.6 acres). See Appendix A, Sheets 4 and 5.

The project considered the following alternative design and construction elements but determined that they were impracticable for this project:

- *Trench boxes*. Trench boxes were initially considered to reduce the trench width while preserving worker safety. However, trench boxes are not able to be used for flowline installation projects such as this. Pipeline segments would have to be threaded under the crossbeams in the trench box and would not be removed once the pipelines have been placed and welded. Even if trench boxes were technically feasible, there are not enough trench boxes in the State of Alaska to shore up the length of the flowlines. It would furthermore increase the amount of equipment needed to cross and thus impact wetlands. The construction timeline would also increase, further impacting wetland areas.

- *Horizontal directional drilling.* Horizontal directional drilling (HDD) was considered in the design phase of this project; however, given the flowline length and available equipment limitations, it is not a practicable option. The length required for this flowline would require separate intermediate bores along the route. This method of installation would result in low points which greatly contribute to water accumulation in the flowlines resulting in slugging and damage to the compressors at both Pads 34-31 and 14-6. It would also require additional equipment and staging on pads in wetlands and would require a greater laydown area than is currently available for both the flowlines and the required drill spread. Due to the weight of the rig, rig staging would require either a gravel expansion of the existing gravel infrastructure or gravel placed on geotextile fabric. There is also a lack of geotechnical data for the area that would be needed to support HDD and flowline installation decision making.

- *Pile supported flowlines.* Pile supported, above ground flowlines were considered during the project design. However, an aboveground flowline installation was determined to be impracticable. Because of the ground type in this location, the pilings would be required to installed at a much greater burial depth than is typical for above ground pipelines. Installation would require equipment larger than what is needed for trenching, which could also require gravel placement in wetlands for stability and would increase the impact to wetland areas.

- *Flowline route along access roads.* The project considered a variety of routing options in selecting the final flowline path. A route adjacent to existing roads was considered but rejected on the basis of several factors. First there are no direct access roads between KGF Pad 34-31 and Pad 14-06. The route along the existing road system would run from KGF Pad 34-31 along its access road to the main Kalifornsky Beach Road. The flowline would then run adjacent to Kalifornsky Beach Road approximately 2,000 feet to the access road for KGF Pad 14-06. This route would increase the length of the flowlines from less than 1 mile to roughly 1.4 miles. Of particular concern to Waters of the U.S., most of this alternative route would also be within or immediately adjacent to wetlands, potentially increasing the total wetland impacts. Second, the route would also require changes to the roadway prism and introduce additional design difficulties due to a stream that flows from the east side Kalifornsky Beach Road to the west directly into Cook Inlet. Stability and erosion would be of primary concern. Lastly, and most importantly, installing pipelines adjacent to major

roads greatly increases the risk of third-party pipeline strikes when work is done on or near the roadway or on any of the neighboring utilities that run parallel to said road.

- *Winter project timing - design.* The project was initially considered for construction during winter and frozen conditions. However, as discussed above, the project as initially designed was impracticable. The project has since taken into consideration additional construction needs and field-based constructability observations to redesign the project and has determined that the project trench design will be the same regardless of project timing (e.g. summer versus winter construction). Frost depth in the area is fairly shallow, and the project anticipates needing the same trench width and excavated materials storage for summer and winter construction. Winter construction will not result in the minimization of temporary impacts from the project design.

- *Winter project timing – construction*. Based on worker safety, and field-based observations, Hilcorp knows based on experience that construction during summer/thawed conditions in this particular area will result in the same impacts on the wetland areas as winter construction. Hilcorp will minimize wetland impacts as described above to the maximum extent practicable. Excepting 2021, winters have been increasingly warmer, freeze up is not occurring as early, and frozen conditions are not persisting as they have in the past. Specifically, the flowline route was walked in March/April of 2020 and there was standing water along most of the route indicating early thaw. When the route was walked in June 2020 the ground was largely dry with limited ponding near KGF Pad 14-6. The route was also flown using a drone in July 2020, which showed minimal areas of ponding. An early winter thaw is predictable and is increasingly becoming the average. If the project is required to be attempted during frozen conditions, it is likely that this will turn into a multi-year project with complicated logistics. Sections will need to be completed as possible when the ground is most solidly frozen. An early thaw, when construction is still proceeding, would require a complete stop of construction activities, potentially stranding heavy equipment in wetlands, which could increase the severity of the impacts to wetlands, and greatly increase the costs of the project. Restoration activities would also be complicated when compared to summer work, as the wetland areas would be saturated.

- *Winter project timing – wetlands restoration*. Hilcorp has developed a complete wetlands restoration plan which incorporates adaptive management strategies to ensure that the impacts from the project are no more than minimal and temporary in nature (see Appendix B). For the reasons stated above, winter construction is not practicable for this project. In addition to the uncertainty of activities and resulting impacts in the event of an early thaw, summer conditions will also assist in wetland restoration efforts. USACE provided an example of a technique used a few years ago on an unrelated project by a different operator for peat slab extraction, storage, and replacement. This guidance requires frozen conditions and removal of the surface mat in square not smaller than 5 feet by 5 feet. Hilcorp asserts that restoration of wetlands from summer construction can be as successful as restoration from winter construction activities. Harvesting of a vegetative mat is typically easier to accomplish successfully when the ground is thawed. During summer, heavy equipment can remove vegetative mat in large, cohesive pieces more easily than during winter. The vegetative mat can be moved multiple times while remaining in cohesive pieces. Vegetative mat harvested when the ground is frozen may break into smaller pieces while being harvested and flip over when placed for storage. When placed back on the restoration site, it is difficult and prohibitively labor-intensive to make sure all the pieces are turned upright.

- *Winter project timing – purpose and need.* Delaying this project until winter 2021-2022, and any additional delays associated with an early thaw or average trending winter, will not meet the project purpose and need of providing natural gas capacity and system safeguards in order to meet Southcentral Alaska's "needle-peak" gas demand.

The KGF Gathering Flowlines Upgrade project has been designed and sited to avoid and minimize impacts to Waters of the U.S. to the maximum extent practicable as described below.

Siting

- The flowline route location was selected based on the need for new flowlines between KGF Pads 14-6 and 34-31, with limited options for route selection. The route selection is the most direct route between the two pads and takes advantage of already disturbed land along the existing flowline route.
- The undeveloped lands around the KGF Pads 14-6 and 34-31 consist primarily of wetlands and disturbance is unavoidable. However, impacts from buried flowline installation will be temporary in nature.
- The project avoids crossing flowing streams.
- Staging along the flowline route will be temporary and only be used as necessary for the direct installation of the flowlines. Rig mats will be used to avoid impacting wetlands. All other equipment will be staged on existing pads.

Design

- The trench is designed so as to minimize the width and associated wetland impacts to the maximum extent practicable while preserving worker safety. The proposed construction timeframe gives workers the best odds for a lower groundwater level to be able to employ steeper trench walls and thus less wetland impact.
- The trench is the minimum needed to prevent sidewall sluffing. This accounts for areas where welding of pipeline segments will occur and what OSHA standards require for trench width and stability.
- Piping is planned to be connected in 500-foot segments; the maximum length practicable without increasing the heavy equipment needs. Where the welding of these pipeline segments will occur, the trench width is designed to be the smallest practicable width and still meet the minimum required OSHA standards.

Access and Excavated Material Storage

- Equipment will access the project area using rig mats, avoiding additional impacts to wetlands from access road construction.
- Vegetation will be disturbed as little as is practical.
- Excavated native soils that are temporarily side-cast in wetland areas will be placed on a geotextile liner on the ground next to the trench to avoid additional wetland impacts outside of the trench footprint.
- The area identified for temporarily side-cast material, placed on geotextile fabric, will avoid undisturbed wetlands to the north of the flowline route. Instead, the materials will be placed within the already disturbed footprint of the adjacent buried flowlines. Those flowlines were installed decades ago.

Compensatory Mitigation and Restoration

No compensatory mitigation is proposed as the disturbance will be temporary, minimal, and localized. Hilcorp intends to fully restore areas that will be temporarily disturbed from installation of the KGF Flowlines. Although there is noticeable disturbance as a result of the previous flowline installation

completed decades ago, Hilcorp expects a much more successful restoration effort with this project. The restoration (if any) methods conducted as part of the original flowline construction are unknown, however restoration methods have developed and have become much more effective since that time. Appendix B, Restoration Plan fully details the steps that Hilcorp will take to fully restore temporarily impacted wetlands.

- To the extent practicable, the vegetative mat (vegetation and approximately the top 6 to 12 inches of soil including live roots) will be removed and segregated from the underlying soils. This top layer will be stockpiled on geotextile liner adjacent to the trench, segregated from the underlying mineral soils.
- The trench will be backfilled using the mineral subsurface soils first. Subsurface soils will be compacted, and the vegetative mat slabs will be returned to the surface of the trench, on top of compacted subsurface soils, facilitating natural revegetation of trenched areas. Slabs of vegetative mat will be installed slightly above original grade to allow for some settlement to occur. Any clean material not returned to the trench will be disposed of on adjacent uplands where it will be spread and seeded, if warranted.
- Hilcorp has committed to restoration of the areas that will be temporarily disturbed from installation of the KGF flowlines as described in Appendix B, Restoration Plan. Restoration, rehabilitation, and revegetation activities within the first three years following construction include reseeding with hydric grass mix, controlling priority invasive plant species, and allowing for natural revegetation, thus providing erosion control and supporting wildlife habitat functions. Monitoring will occur for at least three years after construction.
- The restoration areas will be monitored for invasive plant species. If invasive plants are observed, action will be taken to remove them.
- Full restoration of the temporary impacted area is expected within three years, however adaptive management will be utilized to confirm complete restoration of the impacted areas. Annual monitoring will track restoration progress and identify problems, if any. Depending on findings, a revised approach will be developed to address any problems.

Hilcorp has taken measures to avoid, to the maximum extent practicable, impacts to wetlands as part of the KGF Flowlines Project and therefore asserts that because no permanent impacts to wetlands will occur as a result of this project, no compensatory mitigation be required.

6.0 Cultural Resources

Charles M. Mobley & Associates conducted a records review and archaeological survey along the proposed flowline route in October 2020. No cultural properties were observed, either within the ROW or in areas of adjacent drier ground with greater archaeological potential. The final report, titled *Archaeological Survey for Hilcorp Alaska LLC's Kenai Gas Field Pipeline, Kalifornsky Beach Road, Kenai Peninsula, Alaska* was completed in November 2020. The report recommends a determination of no effect to historic properties as a result of the proposed project. A follow up report, to encompass a temporary construction area of 100 feet along the flowline route, was completed in March 2021. The second report also recommends a determination of no effect to historic properties as a result of the proposed project.

7.0 Permits and Authorizations

Hilcorp will obtain all required local, state, and federal authorizations before beginning the project. Table 3 presents required project permits and authorizations.

Table 3. List of Permits and Authorizations for KGF Gathering Flowlines Installation

Agency	Permit/Authorization	Notes
U.S. Army Corps of Engineers (USACE)	Section 404 Authorization	For flowline installation in wetlands
Alaska Department of Natural Resources (ADNR), Division of Mining, Land, and Water – Water	Temporary Water Use Authorization (TWUA)	For excavation dewatering (use of groundwater)
State Historic Preservation Office (SHPO)	Cultural/archaeological clearance	For flowline installation across undisturbed lands
Alaska Department of Environmental Conservation (ADEC), Division of Water	Statewide Oil and Gas Pipeline General Permit AKG320004	Authorizes discharges associated with flowline installation, excavation dewatering, and hydrotest discharges.
ADEC, Division of Water	Section 401 Certification	Water quality certification for flowline installation in watlands
ADEC Spill Prevention and Response – Contaminated Sites Program	Approved Soil & Water Management Plan	For excavation within 1,500 feet of contaminated sites.
Kenai Peninsula Borough (KPB)	Letter of Non-Objection / Right-of-Way agreement	Flowline installation/operation on KPB lands/Right-of-Way (ROW)
Private Landowners	Use/access agreements	Flowline installation/operation across private lands

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Figures

HARVEST ALASKA
Hilcorp Alaska, LLC

Map Date: 8/20/2020

Hilcorp Alaska, LLC
Cook Inlet, Alaska
Overview

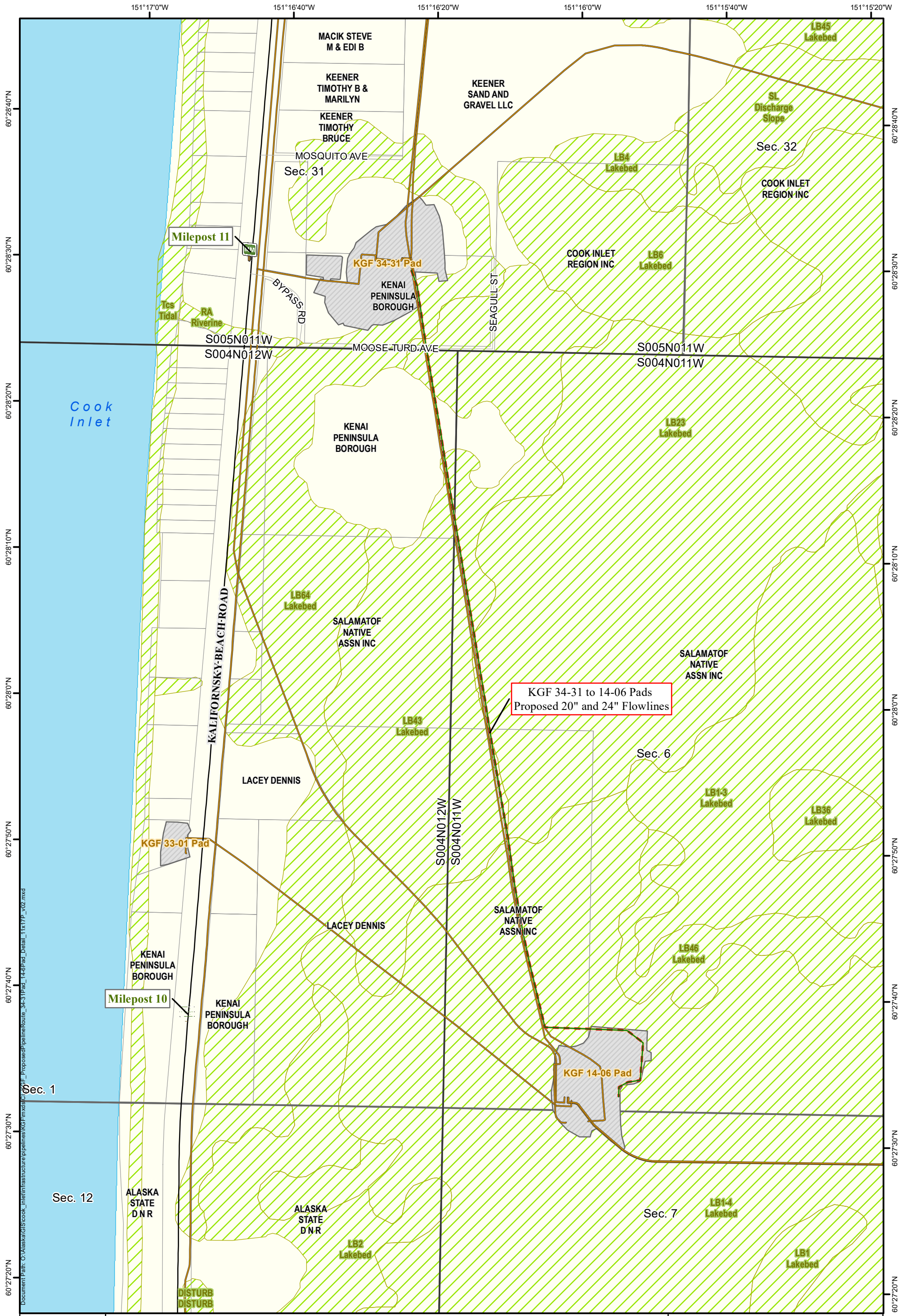
0 2 4 6 8 10 Miles

Hilcorp Alaska, LLC
3800 Centerpoint Dr. Ste.1400
Anchorage, AK 99503
Map Date: 8/28/2020

Kenai Gas Field
KGF 14-06 to 34-31 Pad
Proposed Flowline Route

Proposed 20in and 24in Pipeline Centerline (McLane Consulting 8/28/2020)
Existing Pipelines
KPB Parcels (Surface Ownership)

Alaska State Plane Zone 4 NAD 1983
0 300 600 feet
1 inch = 600 feet
N



Hilcorp Alaska, LLC
3800 Centerpoint Dr. Ste.1400
Anchorage, AK 99503
Map Date: 8/28/2020

Kenai Gas Field
KGF 14-06 to 34-31 Pad
Proposed Flowline Route

Proposed 20in and 24in Pipeline Centerline (McLane Consulting 8/28/2020)
Existing Pipelines
KPB Parcels (Surface Ownership)
Wetlands (Kenai Watershed Forum - 2012)
Ground Water Flow Direction (Approximate)

Alaska State Plane Zone 4 NAD 1983
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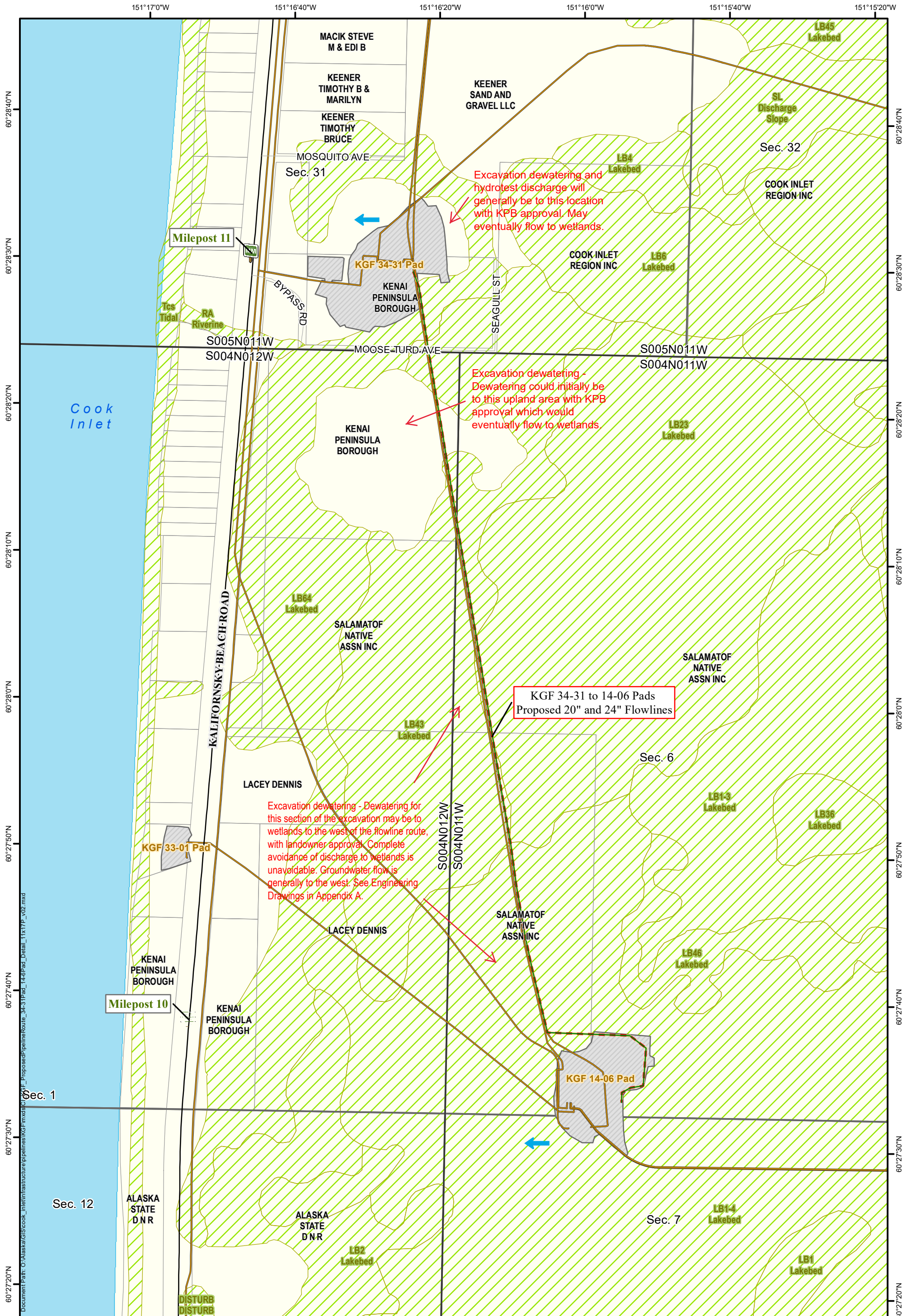
1 inch = 600 feet
N



Hilcorp Alaska, LLC
3800 Centerpoint Dr. Ste.1400
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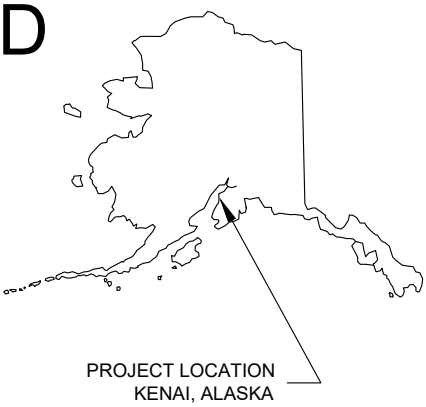
Wetlands (Kenai Watershed Forum - 2012)
Ground Water Flow Direction (Approximate)

Alaska State Plane Zone 4 NAD 1983
0 300 600 feet
1 inch = 600 feet
N

Appendix A

HILCORP ALASKA, LLC
KENAI GAS FIELD
LP / MP UPGRADE



PROJECT LOCATION
KENAI, ALASKA
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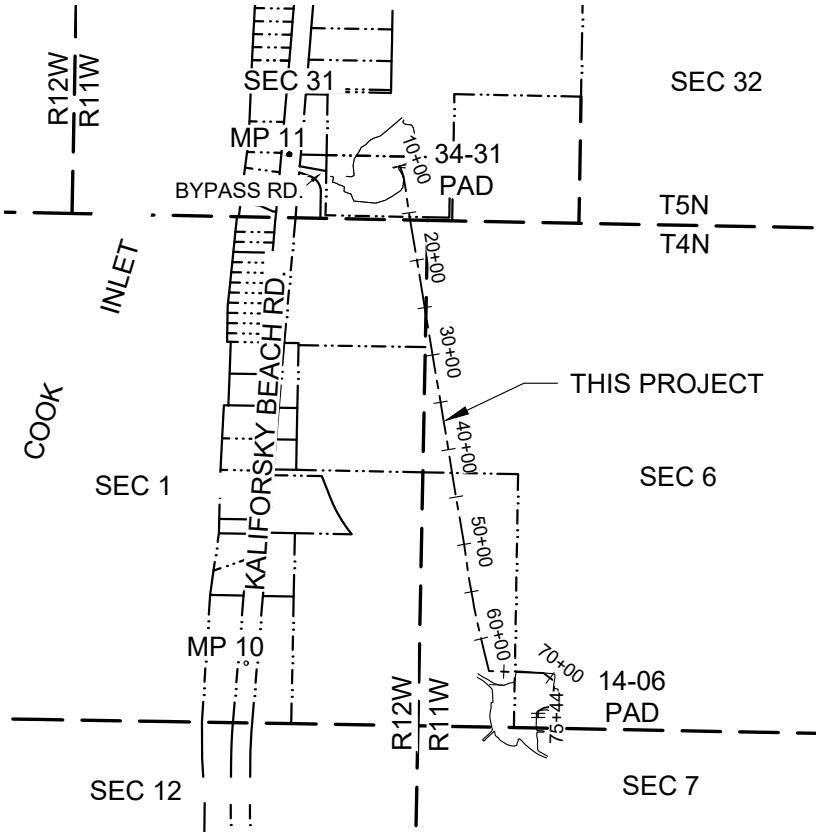
LONG: -151° 16' 11.8609" W



LEGEND

	SURVEY MONUMENT
	TREE LINE
	SECTION LINE
20	CONTOUR LINE
PL	EXISTING PIPELINE
	PROPERTY LINE
	PROPOSED TRENCH CENTERLINE
	KENAI WATER SHED FORUM (KWF) GIS WETLANDS

SCALE

0 2000 4000
FEET

VICINITY MAP

INDEX OF SHEETS

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LP / MP UPGRADE PROJECT

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Hilcorp Alaska, LLC

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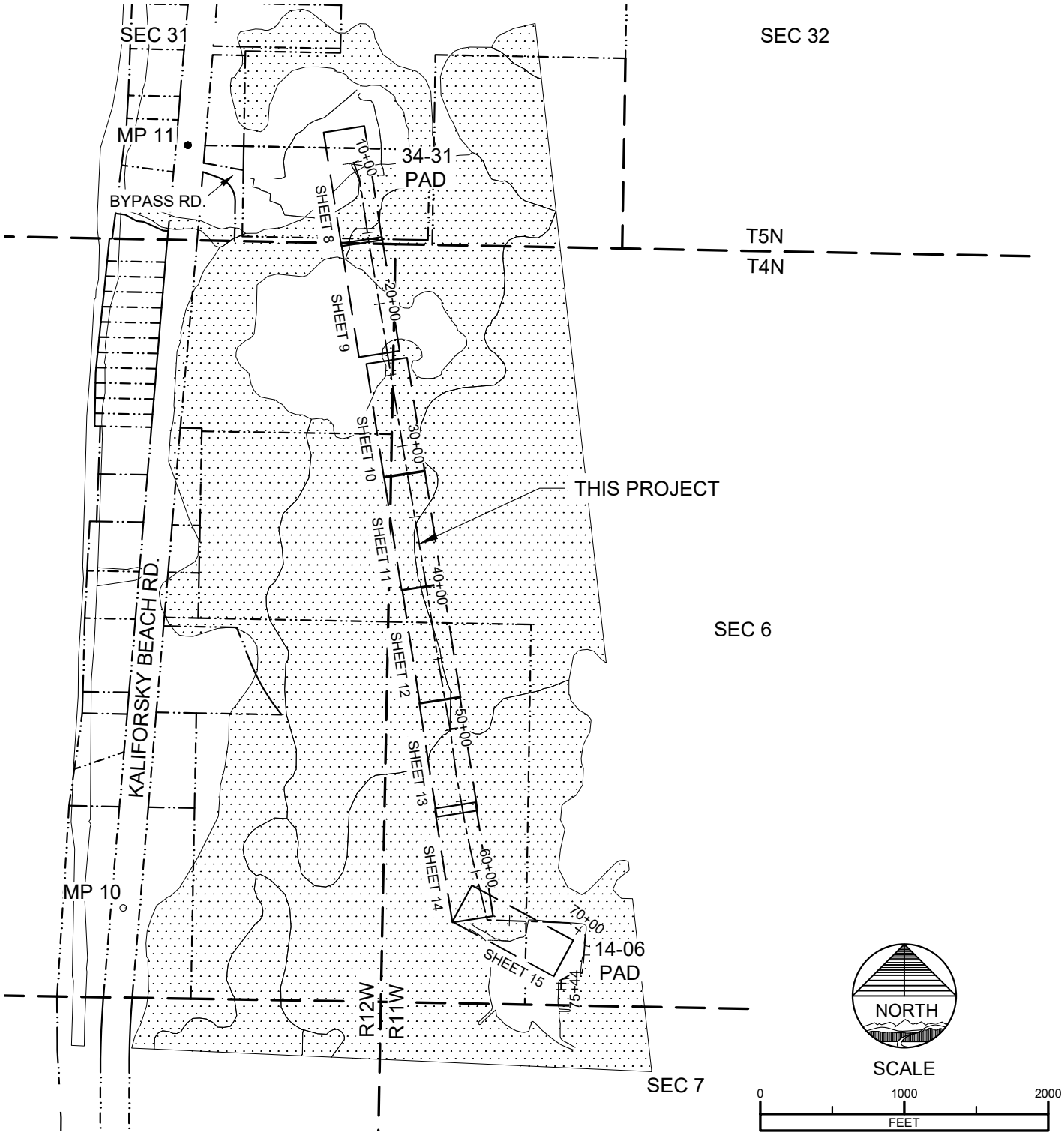

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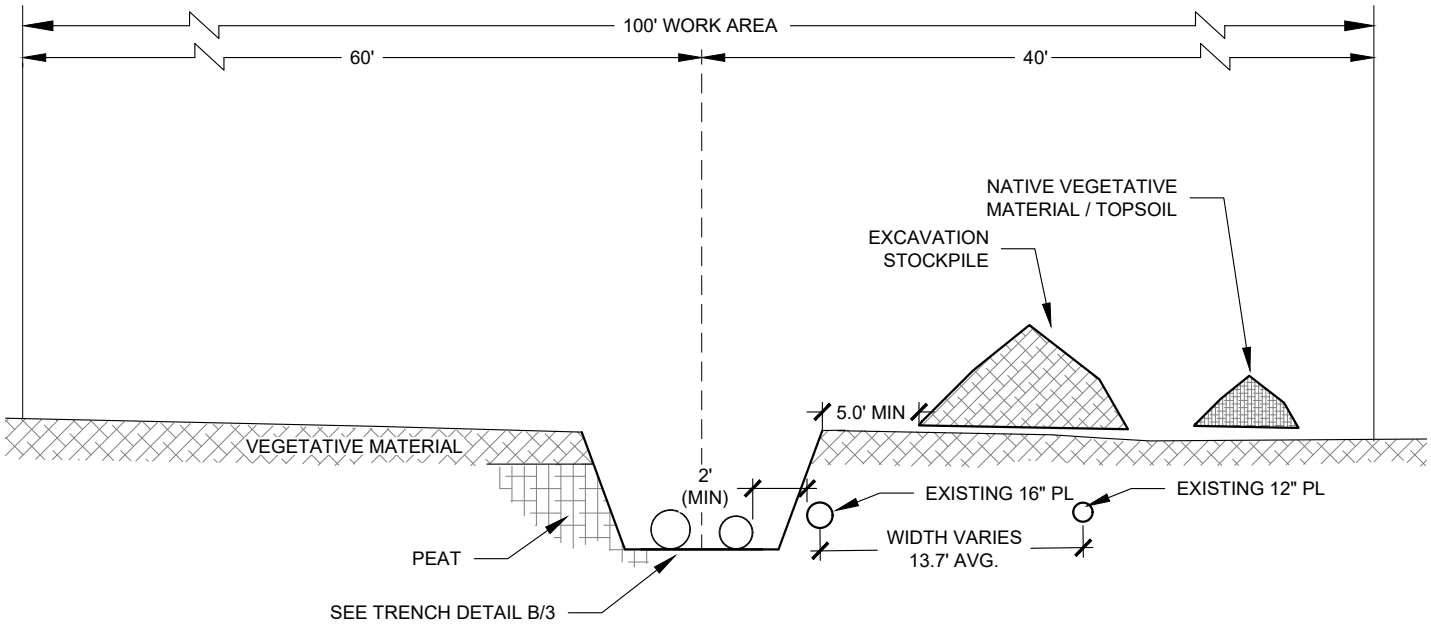
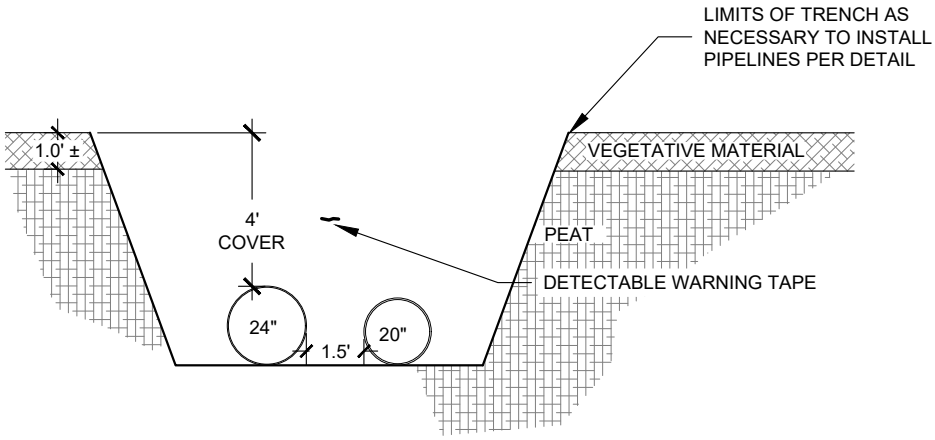


A/3 TYPICAL TRENCH SECTION - UPLAND
1' = 10' FACING SOUTH



B/3 TYPICAL TRENCH SECTION - UPLAND
1" = 5' FACING SOUTH

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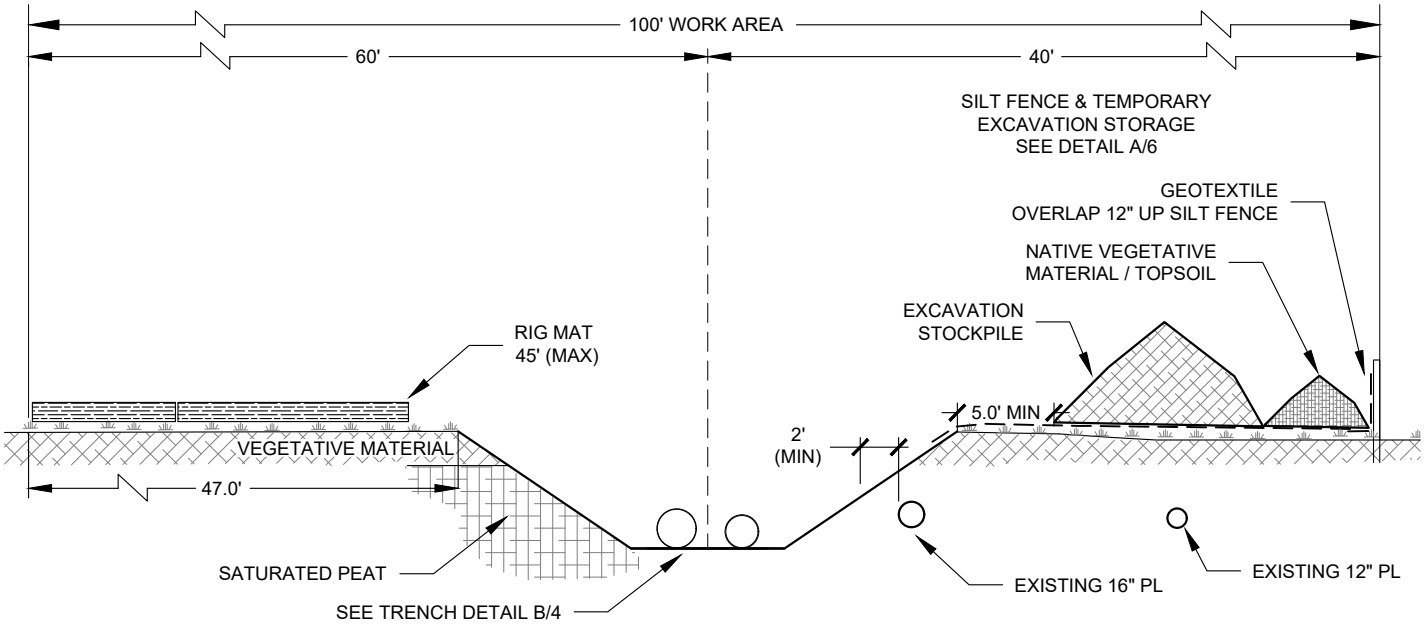

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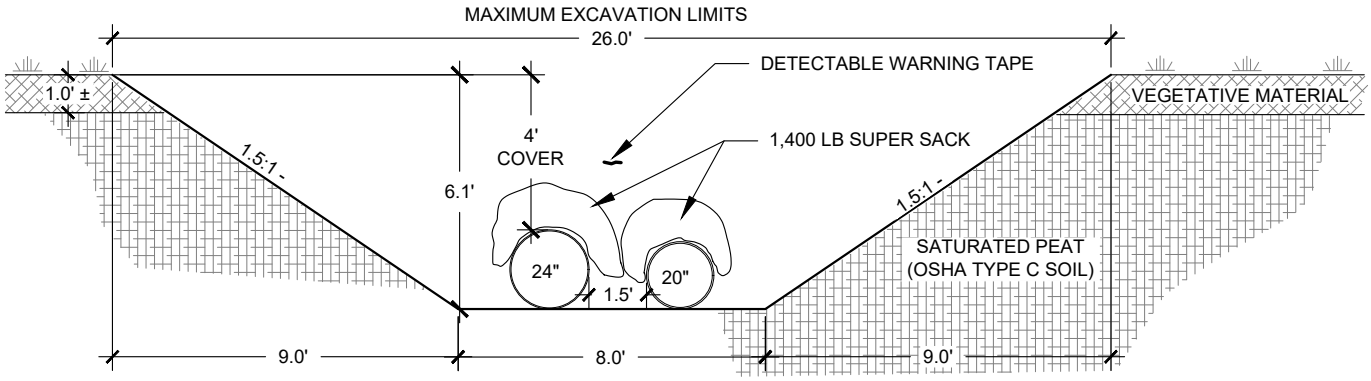
1' = 10' FACING SOUTH



B/4 TYPICAL SECTION TRENCH SECTION - WETLAND
1" = 5' FACING SOUTH

NOTES:
1) PLACE 1,400 LB SUPER SACK EVERY 20' ON 20" PIPELINE.
2) PLACE 1,400 LB SUPER SACK EVERY 10' ON 24" PIPELINE.

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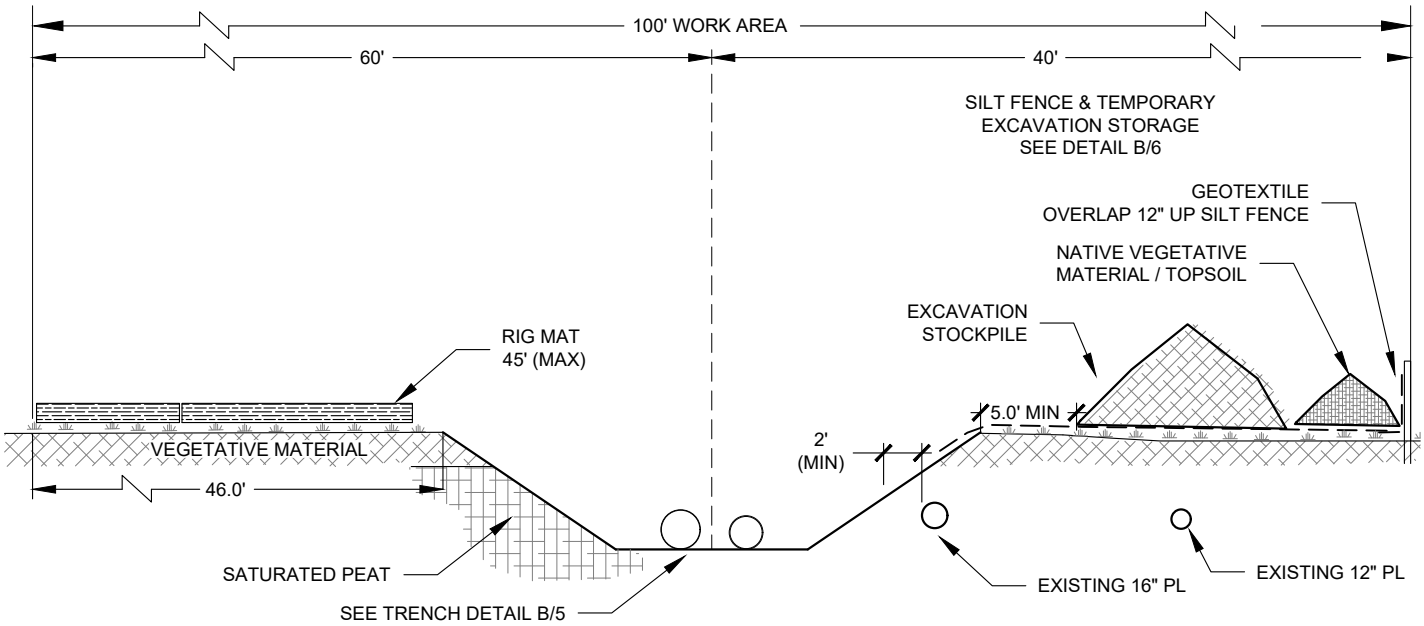
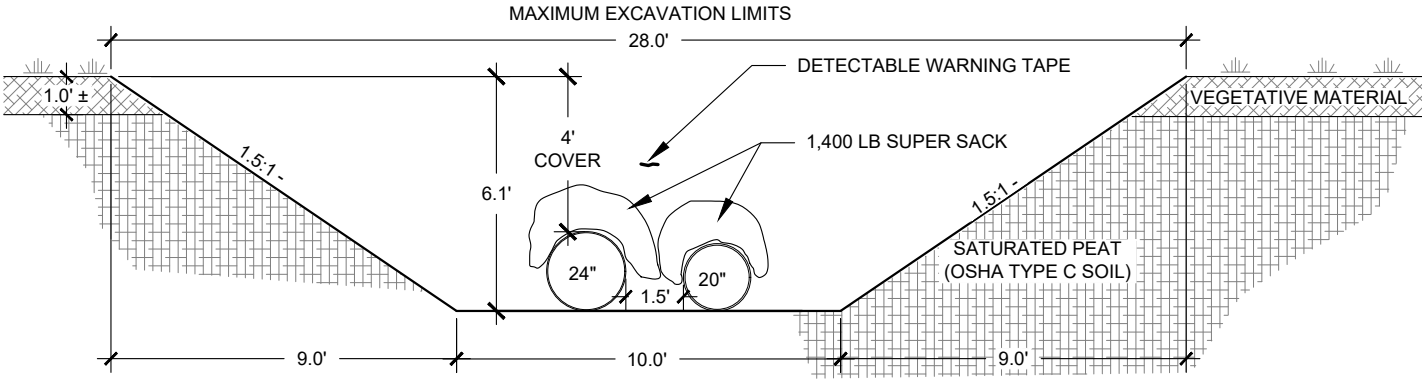


A/5 TYPICAL P/L CONNECTION TRENCH SECTION - WETLAND
1' = 10' FACING SOUTH - MAX INTERVAL 500'



B/5 TYPICAL SECTION TRENCH SECTION - WETLAND
1" = 5' FACING SOUTH

NOTES:
1) PLACE 1,400 LB SUPER SACK EVERY 20' ON 20" PIPELINE.
2) PLACE 1,400 LB SUPER SACK EVERY 10' ON 24" PIPELINE.

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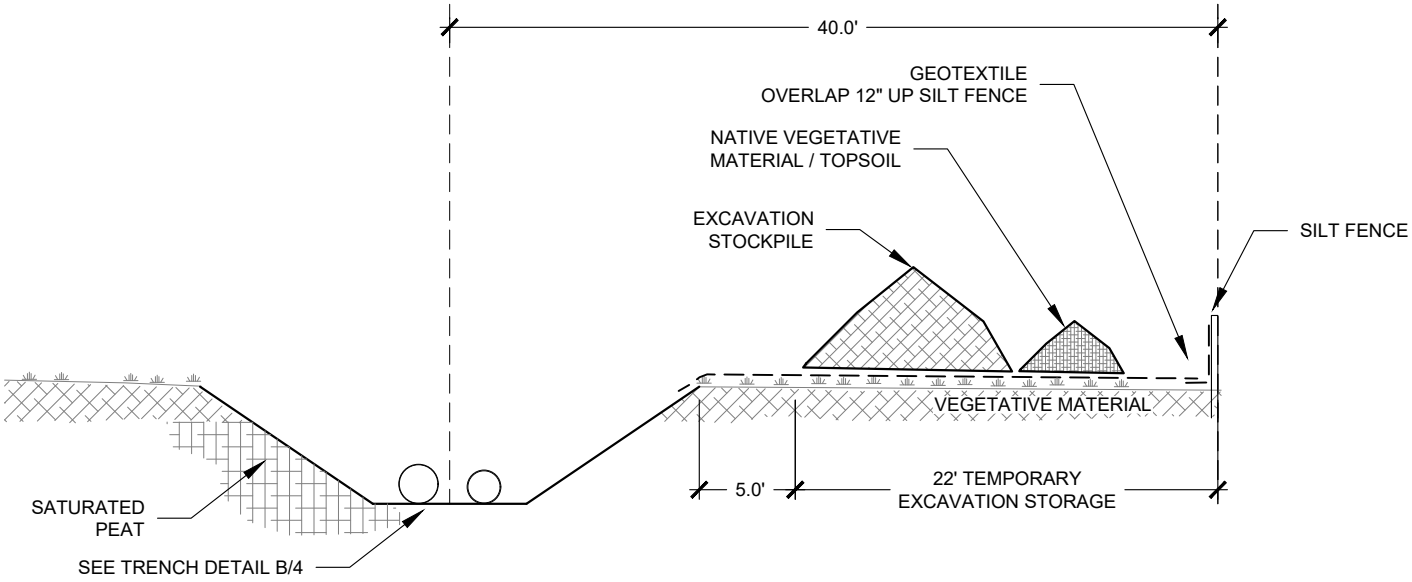
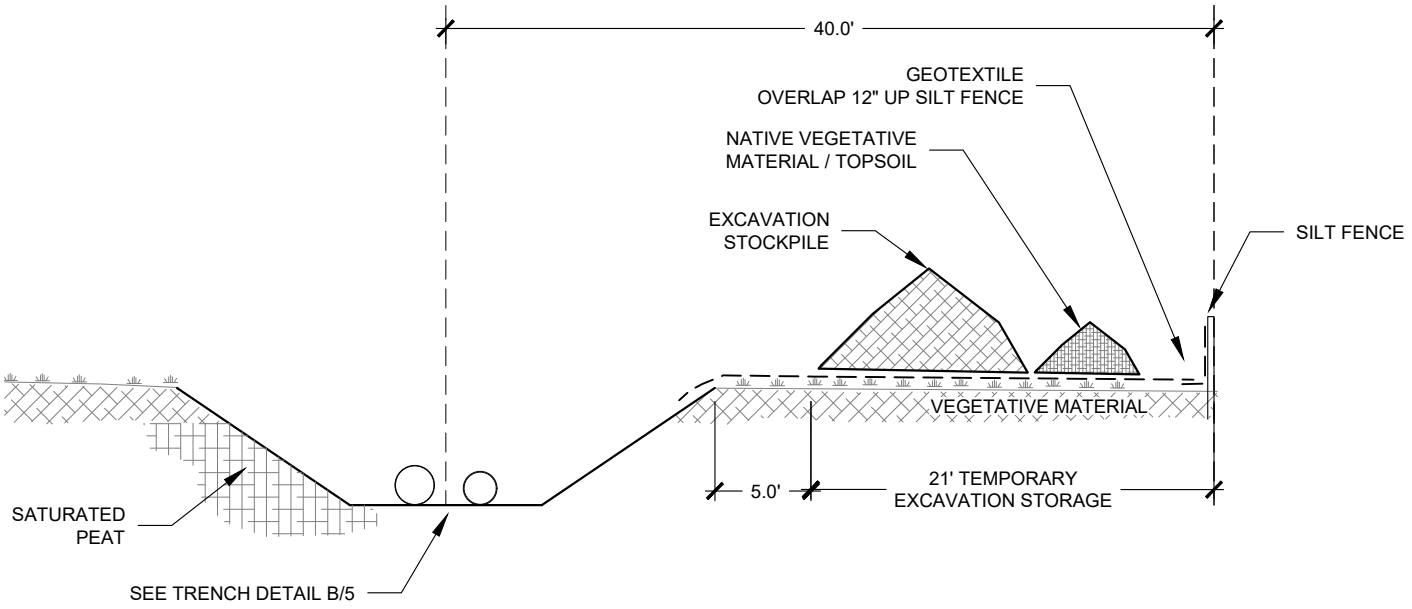


A/6 TEMPORARY EXCAVATION STORAGE TYPICAL SECTION - WETLAND
1' = 10' FACING SOUTH



B/6 P/L CONNECTION TEMPORARY EXCAVATION STORAGE TYPICAL SECTION - WETLAND
1' = 10' FACING SOUTH

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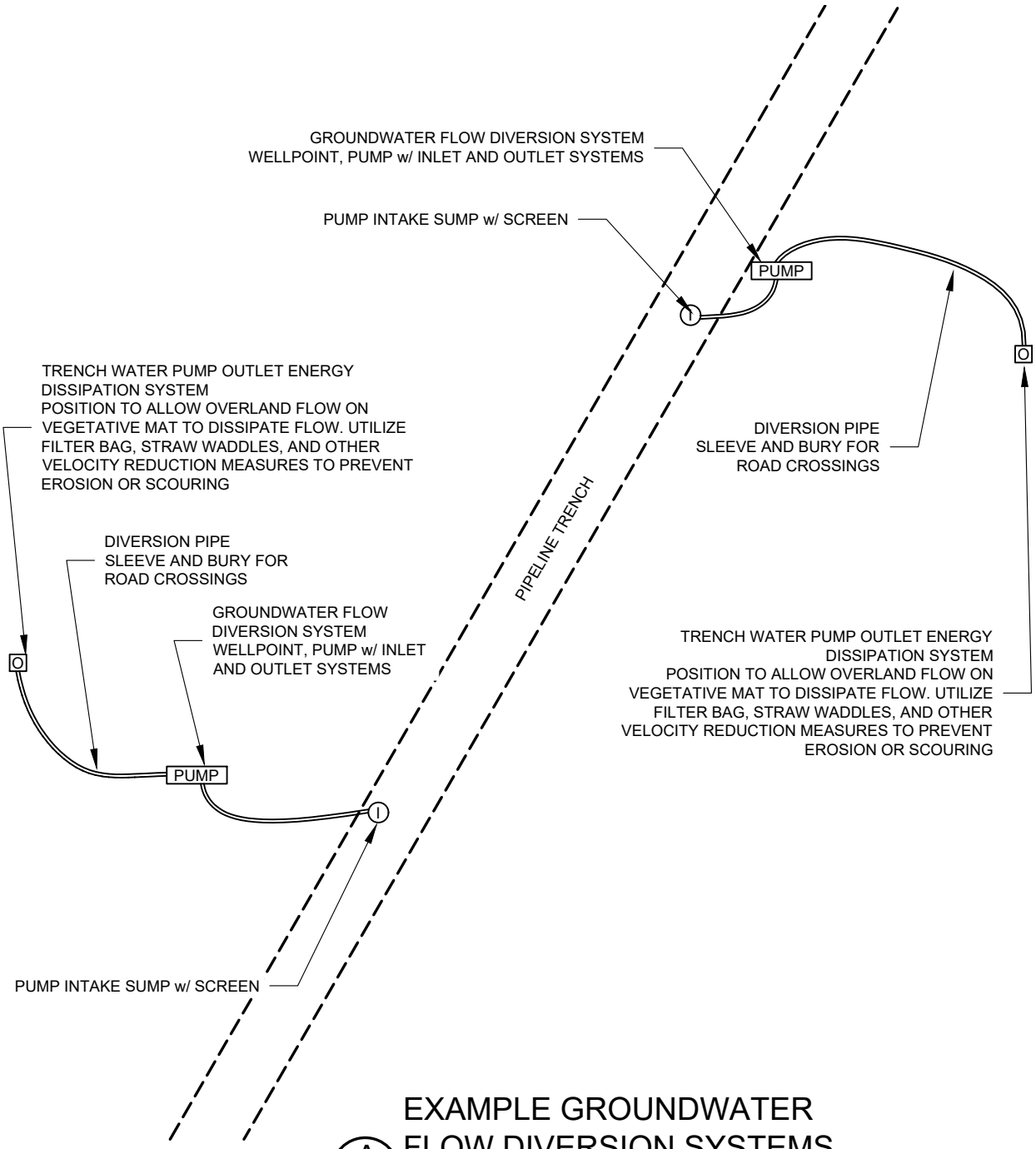

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7

EXAMPLE GROUNDWATER FLOW DIVERSION SYSTEMS

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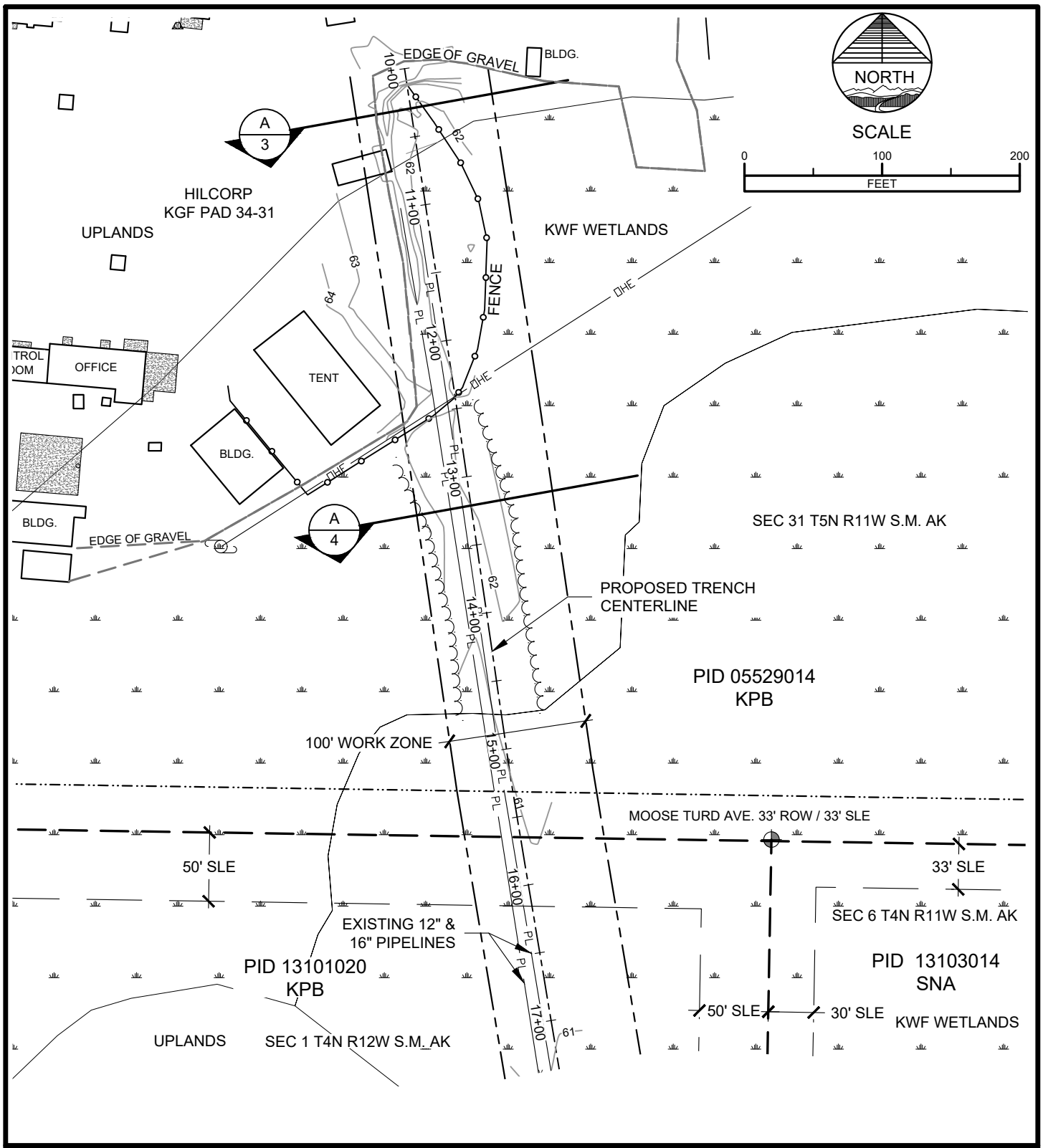

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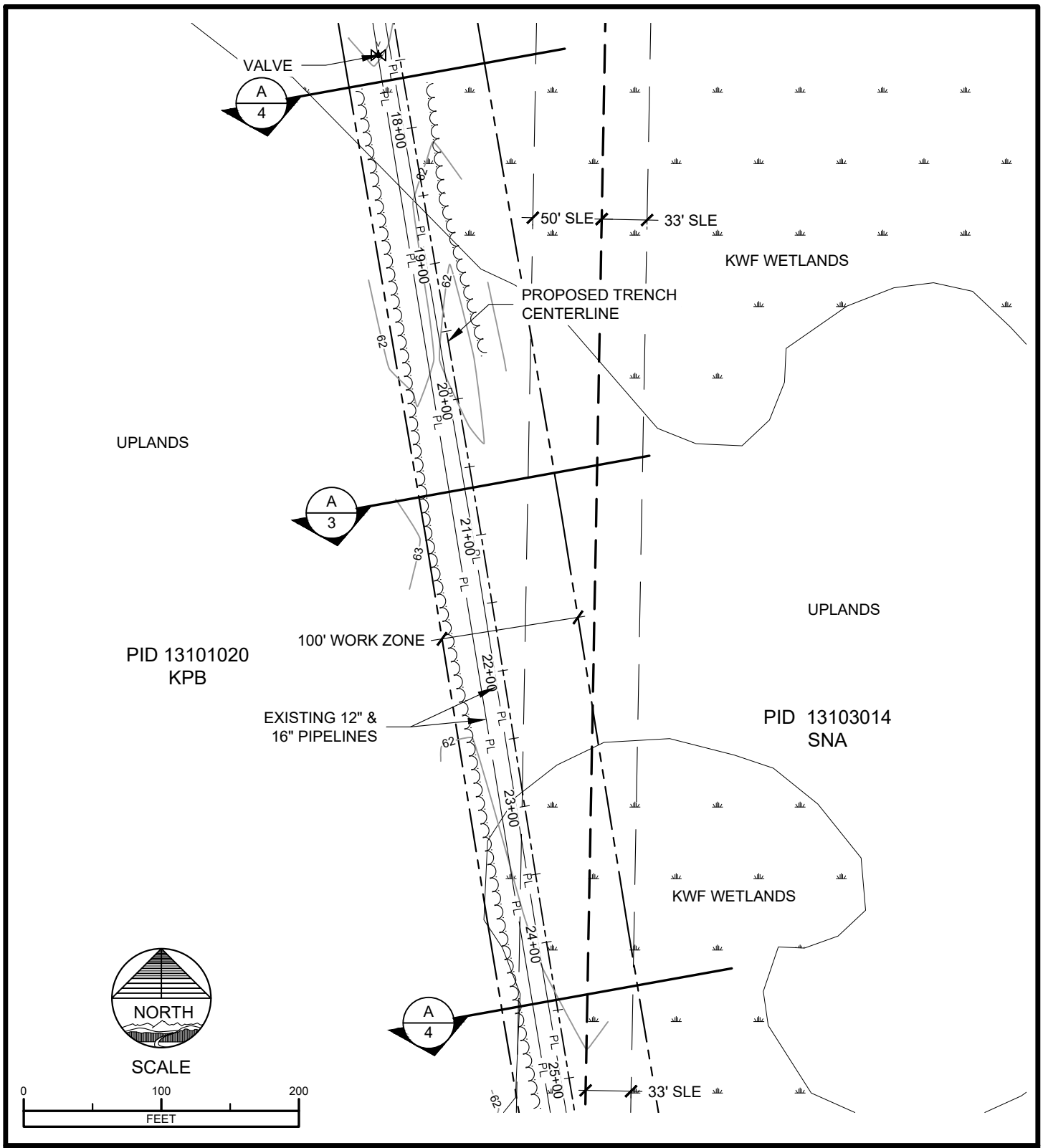

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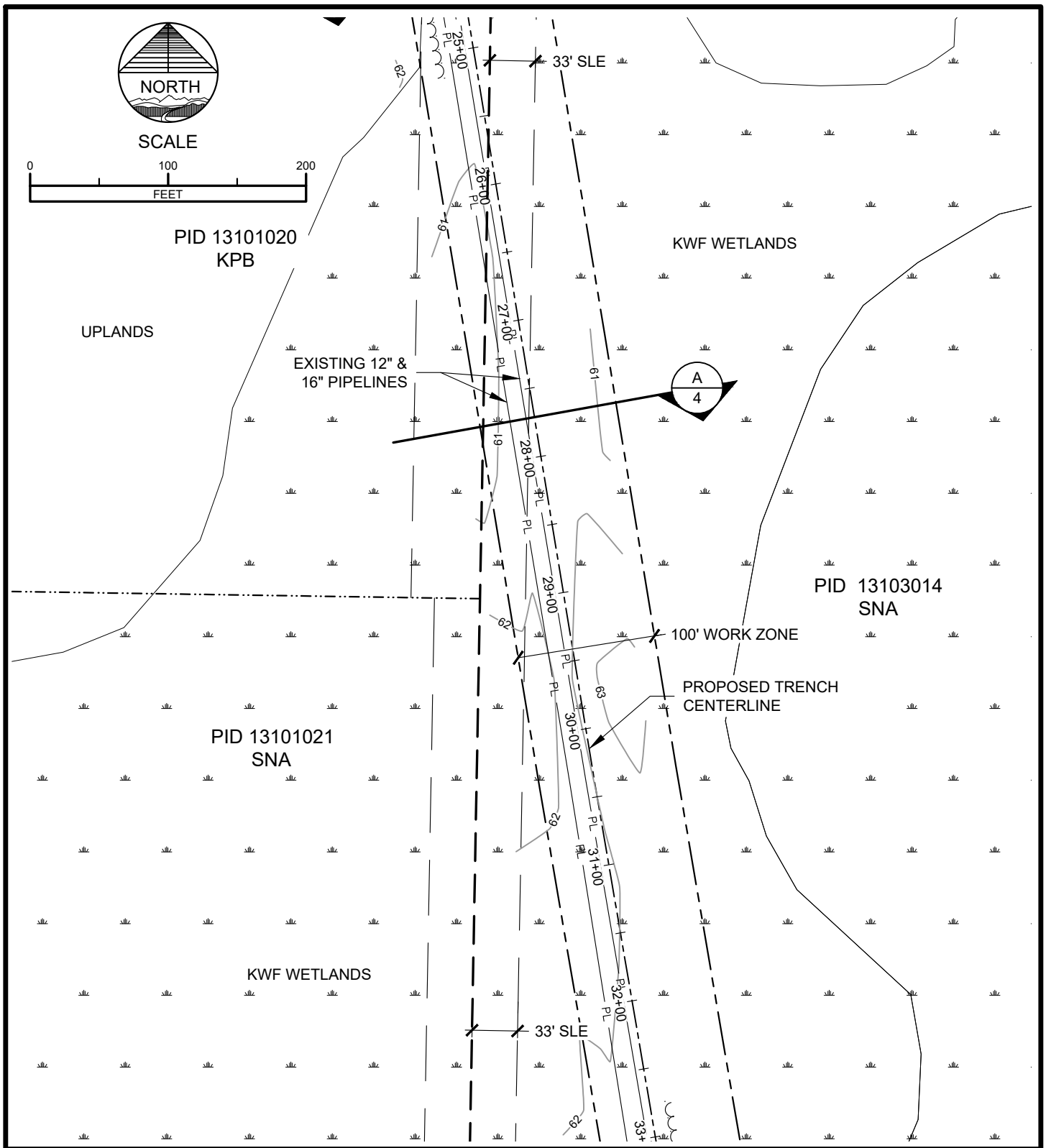

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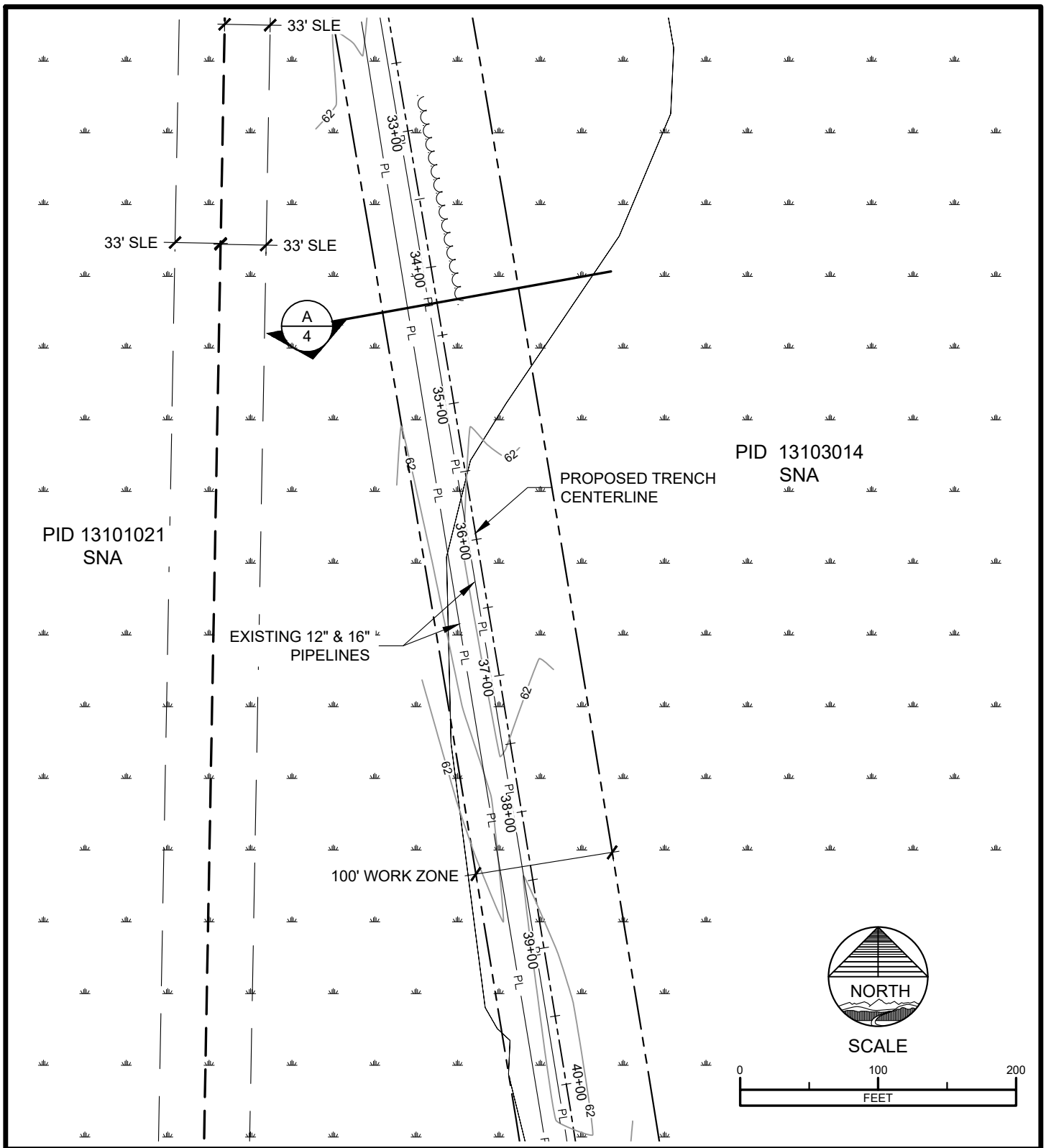

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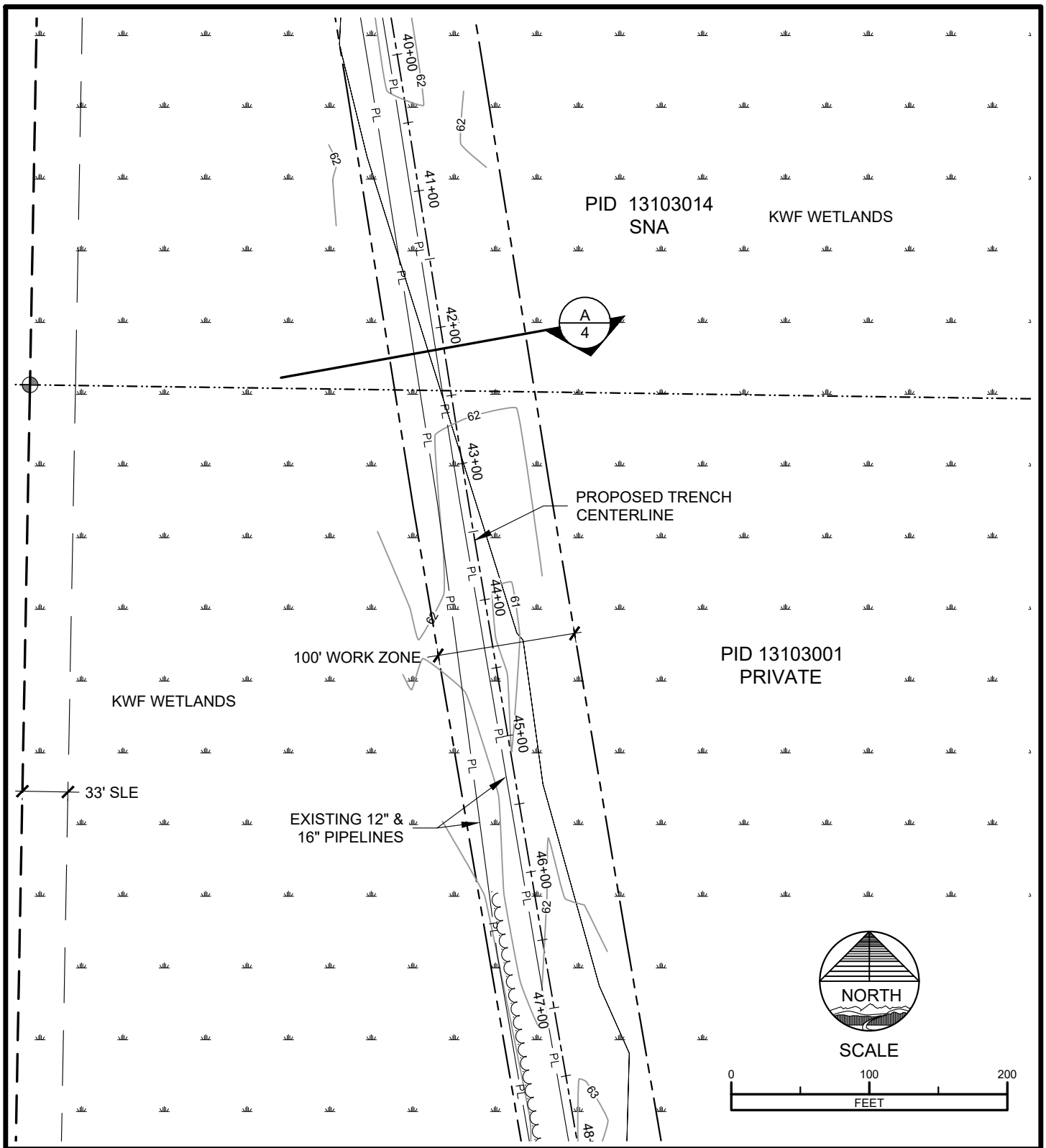

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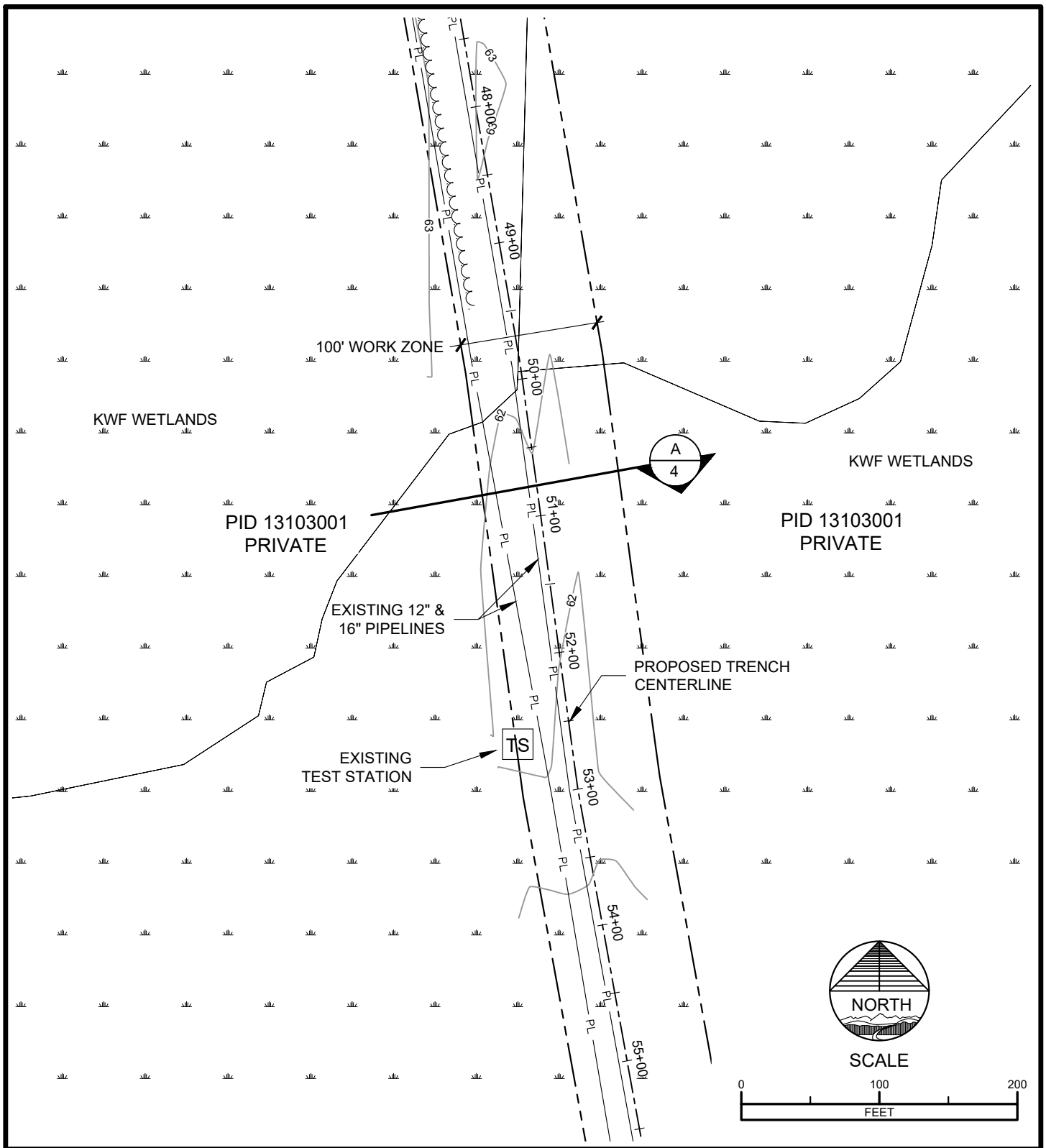

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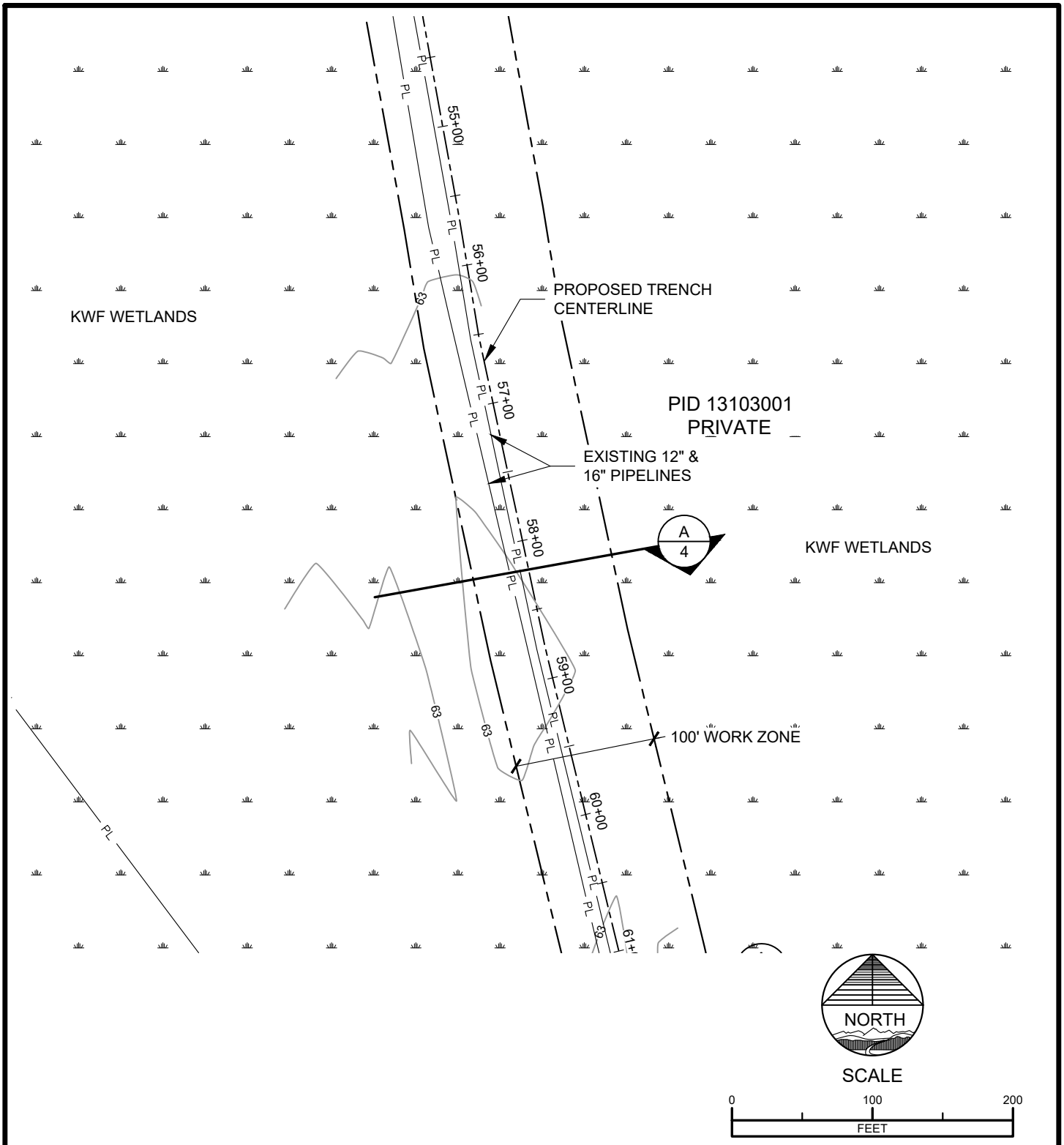

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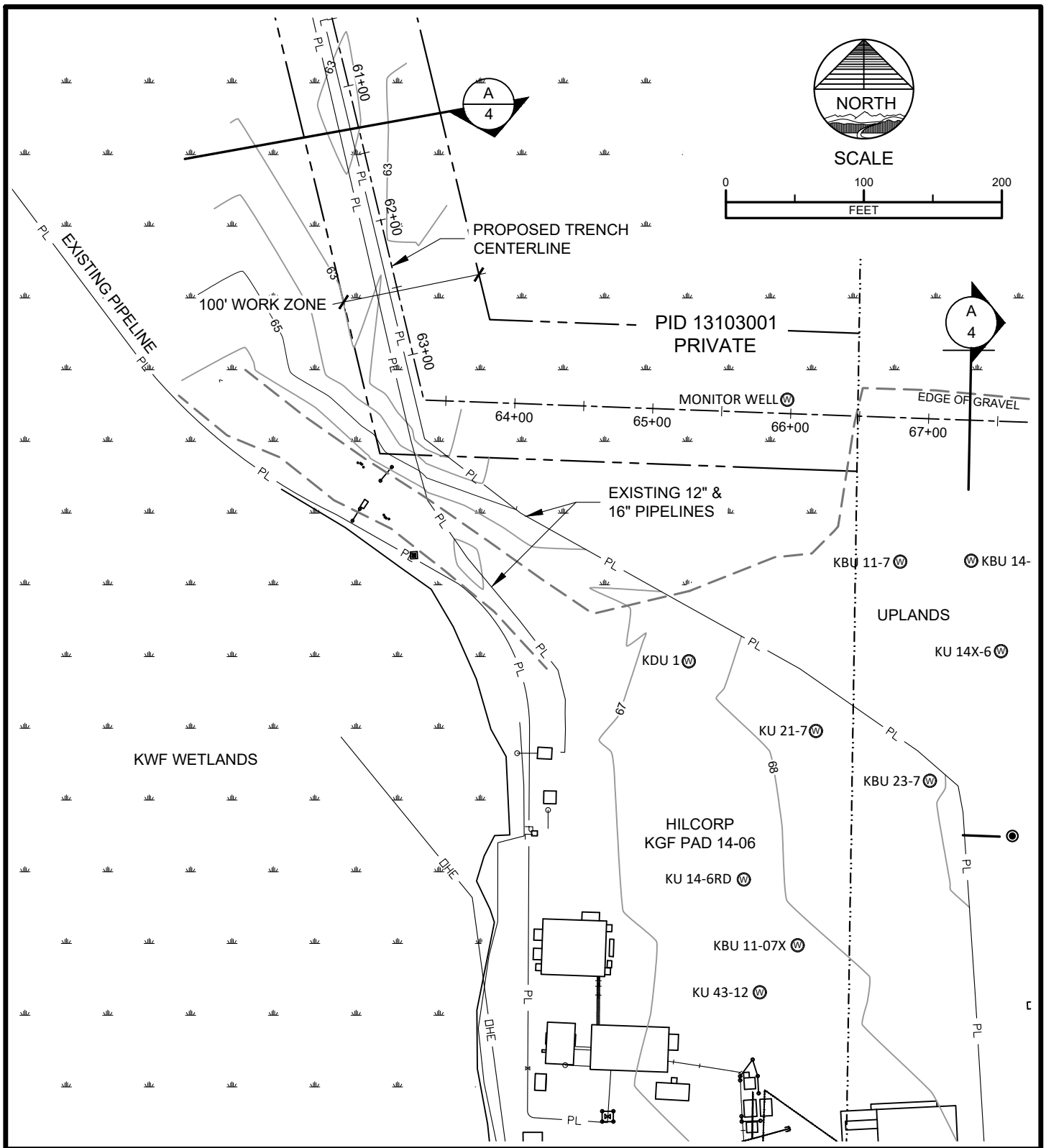

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WETLAND IMPACT				
TRENCH WETLAND IMPACT AREA	TEMPORARY EXCAVATION STORAGE WETLAND IMPACT AREA	TEMPORARY RIG MAT IMPACT AREA	WETLAND EXCAVATION (TRENCH)	WETLAND FILL
136,120.0 SF	114,640 SF	234,900.0 SF	543,744.9 FT3	543,774.9 FT3
3.1 AC	2.6 AC	5.4 AC	20,138.7 CYDS	20,138.7 CYDS

PIPELINE TRENCH DATA: TOTAL LENGTH IN WETLAND = 5,220.0 LF
TRENCH AREA = 103.7 SF, 26' WIDE, 6.1' DEEP
TRENCH AREA AT P/L CONNECTIONS EVERY 500' = 115.9 SF, 28'WIDE, 6.1' DEEP, 20' LONG, 10 LOCATIONS

Pipe:	NPS 20-inch, Grade B or greater				
Dimensions:		inches	feet	pounds	Per 20 Ft.
	Diameter of Pipe	20	1.666667		
	Wall	0.5			
	X-section Area	314.1657	2.181706		
	Length		1		
Weight of Water Displaced per lineal foot				136.14	
Pipe Weight per lineal foot				104.23	
Buoyancy				31.91	
Safety Factor		1.4		44.67	893.44
Use a 1,400 lb sand bag, spacing interval:			20		1400
	TOTAL REQUIRED FOR 5220 LF PIPELINE				**261**
Pipe:	NPS 24-inch, Grade B or greater				
Dimensions:		inches	feet	pounds	Per 20 Ft.
	Diameter of Pipe	24	2		
	Wall	0.375			
	X-section Area	452.3986	3.141657		
	Length		1		
Weight of Water Displaced per lineal foot				196.04	
Pipe Weight per lineal foot				94.71	
Buoyancy				101.33	
Safety Factor		1.4		141.86	1418.61
Use a 1,400 lb sand bag, spacing interval:			10		1400
	TOTAL REQUIRED FOR 5220 LF PIPELINE				**522**

Notes:
1. Use Builder's Bag 35" x 35" x 35" (H) Uncoated, Duffel/Open Top, Flat Super Sack, Web Tie Closure. 28 CF Capacity, Half full of Kenai Sand 28 x 0.5 x 100 lb/CF = 1400 lbs.
2. Bags are made of uncoated woven polypropylene 5 oz. fabric.
3. Soil weight not considered but will counteract buoyancy.

Appendix B

Hilcorp Alaska, LLC

Kenai Gas Field Gathering Flowline Upgrade Restoration Plan

April 2021 – Revision 1

Prepared by Lorene Lynn
Red Mountain Consulting, Inc.
for

Hilcorp Alaska, LLC
3800 Centerpoint Dr. Suite 1400
Anchorage, Alaska 99503

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Figure A-2. KGF Proposed Flowline Route Map
Figure A-3. KGF Proposed Flowline Route Wetlands Mapping
Figure A-4. Soils Map
Figure 1. The adaptive management cycle

ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BMPs	Best Management Practices
GPS	Global Positioning System
Hilcorp	Hilcorp Alaska, LLC
KGF	Kenai Gas Field
KPB	Kenai Peninsula Borough
KWF	Kenai Watershed Forum
NRCS	Natural Resource Conservation Service
PMC	Alaska Plant Material Center
ROW	right-of-way
USACE	U.S. Army Corps of Engineers
WOTUS	Waters of the United States

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1.0 Introduction

Hilcorp Alaska, LLC (Hilcorp) proposes to install two new gathering flowlines (flowlines) in the Kenai Gas Field (KGF) in 2021. The two new flowlines, a 20-inch medium pressure and 24-inch low pressure line, will be installed between KGF Pad 34-31 and KGF Pad 14-6 alongside two existing lines: a 12-inch low pressure line and a 16-inch high pressure line. The attached Figure A-1 shows the KGF vicinity and Figure A-2 shows the proposed flowlines installation route (flowline route). The existing flowlines will continue to be operated while the new flowlines are installed and will be left operational after the 20- and 24-inch flowline installation is complete.

This plan addresses restoration of areas that will be temporarily disturbed from installation of the KGF flowlines (See Engineering Drawings Sheets 1-15). Restoration activities within the first three years following construction include replacement of vegetative mat, sowing grass seed (in uplands), invasive plant species control, and allowing for natural revegetation, thus providing erosion control and supporting certain wildlife habitat functions. Monitoring will occur for at least three years following completion of construction and initial restoration treatments.

2.0 Author Information

Lorene Lynn is a Certified Ecological Restoration Practitioner (CERP #0190) and a Certified Professional Soil Scientist (CPSS #322282) with 15 years of experience in boreal forest restoration, tundra rehabilitation, soil survey and mapping, habitat assessments, natural resource planning, wetland delineation and functional assessment, and mining reclamation plans. She was also a federally-appointed member and the former Chair of the North Slope Science Initiative (NSSI) Science Technical Advisory Panel, reappointment pending. She has worked on dozens of ecological restoration and tundra rehabilitation projects across the state of Alaska. The projects have ranged in size from less than one acre to over 35 acres, each with the common goal to promote a self-sustaining plant community with qualities similar to the surrounding undisturbed plant communities.

3.0 Project Location Information

The two new flowlines will be buried between KGF Pads 34-31 and 14-6 in the KGF and will be used to transport gas between the pads. The flowline route is approximately 5,600 feet in length between the two pads. Coordinates for the above-described infrastructure are shown in Table 1:

Table 1. Project Coordinates

Project Feature	Location Start	Location End	Latitude Start	Longitude Start	Latitude End	Longitude End
20-inch and 24-inch Gathering Flowlines	KGF Pad 34-31	KGF Pad 14-6	60.474849	-151.273019	60.459213	-151.2644289

4.0 Project Description

Hilcorp plans to initiate flowline installation as soon as authorizations and permits are received in 2021, and flowline installation is estimated to be completed by the end of December 2021. The flowline route is approximately 5,600 feet in length between KGF Pad 34-31 and KGF Pad 14-6, with approximately 5,220 feet in wetlands, and traversing Kenai Peninsula Borough (KPB) and private land. The engineering

drawings show the flowline route and construction details. Flowline installation will be performed by trenching with an excavator.

The flowline route will be installed by excavating an approximately 10-foot-wide by 6.1-foot-deep trench (pipe will be buried 4 feet below ground surface [bgs]). The trench slopes will not exceed 1.5:1 with the top of the trench approximately 28 feet wide at the top of the trench. Once the flowlines are placed in the trench, super sacks, made of uncoated woven polypropylene, will be placed every 10 to 20 feet along the length of the flowlines to help stabilize the flowlines. As needed, equipment will be temporarily staged on rig mats adjacent to the flowline route during construction activities.

Excavated trench material will be stockpiled on the ground next to the trench and utilized as fill after the flowlines are placed. The stockpiled soil may be shifted away from the trench in less stable areas to help prevent slumping or oversaturation. Excavated native soils that are placed in wetland areas will be placed on a geotextile liner which will be removed after construction.

To the extent practicable, the topsoil/vegetative mat will be segregated from the mineral subsoil so that the topsoil/vegetative mat can be replaced back at the trench surface after backfilling, which will facilitate the natural revegetation of trenched areas. Any clean subsurface material not returned to the trench will be disposed of on adjacent uplands where it will be spread and seeded, if warranted. Trenched flowline sections will be returned to pre-project contours, except in saturated areas where backfill may be mounded to allow for settling. If during site monitoring the trenched flowline sections are observed to be below grade, additional soil may be imported, if the ecological benefits are deemed more beneficial than the impacts of importing soil.

The KGF flowlines will result in temporary impacts to jurisdictional Waters of the United States (WOTUS) located within the study area. Once flowline installation is complete and any disturbed areas are returned to pre-existing conditions and contours, there will be no permanent impacts to WOTUS. Figure A-3 shows the area of temporary impacts to WOTUS:

- Approximately 5,220 feet of the flowlines route will be trenched into wetlands. The total estimated area of impact is 3.1 acres. Impact from buried flowline installation will be temporary in nature.
- Equipment staging within wetlands will be temporary and will use rig mats to avoid impacting wetlands. These features will be removed at the end of construction activities and restored to pre-project conditions. During construction activities, if additional impacts to the ground surface or vegetation occur, these areas will be included in the restoration and monitoring activities.

This plan addresses restoration of wetlands impacted as requested by the U.S. Army Corps of Engineers (USACE) for Section 404 Authorization under Nationwide Permit 12. Restoration efforts include the trenched flowline alignment and areas impacted by trenching activities, if any.

5.0 Site Description

The KGF flowlines upgrade route is located within upland and wetland vegetation types, as classified in the Kenai Peninsula Borough (KPB) Lowland Wetland Mapping (KPB, 2020) (Figure A-3). The Kenai lowlands consist of topographically flat, discontinuous wetlands with organic soil from the surface to as deep as 6 feet bgs. Peat up to 5 feet thick can be found in the area. Beneath the organic soil layer lies a thin layer of fine-grained alluvium, then interbedded sand and sandy gravel to depths of over 20 feet. Based on Kenai Watershed Forum (KWF) wetlands mapping, wetlands along the flowline route are relict glacial lakebed wetlands, with a variety of features including ponded water and areas dominated by sedges and shrubs such as Labrador tea, leatherleaf, and dwarf birch. Wetlands in this area eventually drain to the tidal wetlands and Cook Inlet.

No site assessment of vegetation has been performed, but based on interpretation of satellite imagery dated May 24, 2019, vegetation is likely composed of both upland and wetland vegetation types typical to the region as shown in Table 2. Soils in the area range from well-drained to very poorly drained soils as shown in Table 3. A map of the soils in the area is attached as Figure A-4.

Table 2. Existing Vegetation Types at Seaview Gas Pipeline, Anchor Point, Alaska

Vegetation Type	Description
Upland	
Grass/forb meadow	A community dominated by bluejoint grass (*Calamagrostis canadensis*), common cow parsnip (*Heracleum maximum*), fireweed (*Chamerion angustifolium*) with lesser components of other native forbs such as Canadian burnet (*Sanguisorba canadensis*) and woolly geranium (*Geranium erianthum*) and non-native plants such as timothy (*Phleum pratensis*) and clover (*Trifolium* sp.). Found adjacent to roads and disturbances.
Mixed spruce/birch/balsam polar forest	A mixed needleleaf evergreen-broadleaf forest co-dominated by white spruce (*Picea glauca*), Kenai birch (*Betula kenaica*) and balsam poplar (*Populus balsamifera*). Common throughout uplands in the project area.
Tall alder shrub	A shrub community dominated by thin-leaf alder (*Alnus incana*). Common on forest edges and areas of recent disturbance.
Gravel or bare ground (existing disturbance)	Found on roads and other areas of disturbance, as well as along streams.
Wetland	
Lakebed	A varied landscape of sedges (*Carex* sp.), grasses (*Calamagrostis canadensis*), willows (*Salix* sp.) and some mixed forest types with Kenai birch (*Betula kenaica*), spruce (*Picea* sp.) and balsam poplar (*Populus balsamifera*).
Riverine	An ericaceous shrub bog community dominated by dwarf birch (*Betula nana*), sweetgale (*Myrica gale),* Labrador tea (*Ledum palustre* ssp. *decumbens*), crowberry (*Empetrum nigrum*) and lingonberry (*Vaccinium uliginosum).*

Source: KBP 2020

Table 3. Natural Resource Conservation Service Mapped Soils at Kenai Gas Field, Alaska

NRCS Soils Mapping Unit	
672	Soldotna-Nikolai complex, 0 to 4 percent slopes
677	Starichkof peat, 0 to 4 percent slopes

Source: NRCS 2020

6.0 Restoration Goals, Objectives, and Performance Standards

Restoration goals, objectives, and performance standards for the KGF Flowlines project are summarized in Table 4. Although a reasonably detailed plan has been developed, restoration requires a so-called adaptive management approach. Adaptive management addresses the uncertainty of ecosystem restoration by evaluating monitoring results and adjusting site treatments and management implementation based on lessons learned during the course of restoration activities (Figure 1).

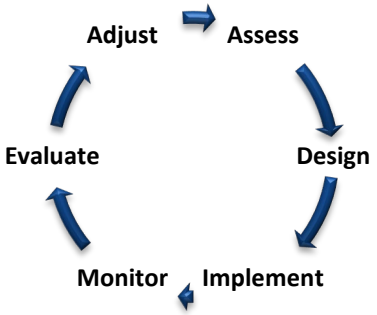

Figure 1. The adaptive management cycle.

Adaptive management, in essence, calls for flexibility. In keeping with the principles of adaptive management, this plan provides information and a general framework for restoration, with the understanding that some changes may be needed as restoration progresses. The performance standards listed in Table 4 will be used to assess restoration progress, but performance standards may have to be altered based on unforeseen developments in the restoration effort.

Control of invasive plants provides a simple concrete example of adaptive management. Although the plan calls for eradication of invasive plants, some invasive plants may become established on the site. If invasive plants are observed, action will be taken to remove them.

Annual monitoring will track restoration progress and identify problems, if any (see Section 7 - Monitoring Plan). Annual monitoring reports will raise concerns and suggest changes to the restoration approach, if any are needed. Changes to performance standards will occur in collaboration with agency representatives and land owners.

Table 4. Restoration Goals, Objectives, and Performance Standards for KGF Flowlines Project, Alaska

Goals	Promote establishment of indigenous plants, primarily through natural colonization, to establish a successional trajectory toward the plant community that will eventually have attributes and aesthetic qualities closely resembling the surrounding relatively undisturbed plant communities. To the greatest extent practicable, maintain an absence of priority invasive species[1].
Objectives	1) Maintain the ground surface at pre-existing elevations. 2) Promote recovery of indigenous plant species primarily through natural colonization and replacement of vegetative mat, and establish a vegetative community that resembles the surrounding plant communities. 3) Avoid introduction and spread of priority invasive plant species[1].
Performance Standards	Within 3 years (following restoration treatments): 1) Trench alignment has an elevation similar to the surrounding surface elevation and does not hold water continuously during the growing season, excluding areas that were flooded (in typical conditions) prior to trenching. 2) Revegetation Uplands: Cover by indigenous plant species (including nonvascular species) and/or seeded grasses that is equivalent to 60% of that found at a reference plot. Wetlands: Cover by indigenous plant species (including nonvascular species) that is equivalent to 60% of that found at a reference plot. 3) Priority invasive species[1] absent, or present and actively managed.

[1] Priority invasive species are listed in Hilcorp, 2019.

If vegetation is not progressing as expected, an evaluation of adverse conditions will inform decisions regarding what steps need to be taken. This may include an evaluation of recent climatic conditions, soil conditions, evidence of disease or insect infestations, or other factors observed during site visits. Depending on these findings, a revised approach will be developed in consultation with the appropriate agencies to address challenges with revegetation.

7.0 Work To Be Performed

7.1 Responsible Parties

As discussed in Section 3.0 Project Description, Hilcorp is submitting this restoration plan for wetland impacts and to address overall restoration needs of the project. Initial re-contouring and seeding will be performed by the selected contractor as a part of flowline installation. Follow-up treatments, monitoring, and reporting will be performed by a restoration specialist.

7.2 Site Preparation and Restoration Treatments

Upland and wetland vegetation types in this region hold strong potential to recover after disturbance. Vegetation within a narrow disturbance such as this one tends to naturally re-colonize with indigenous plant species. Because the flowline right-of-way (ROW) needs to be accessible, the target vegetation community for revegetation will be herbaceous or shrub communities that will not produce roots or canopies that could interfere with buried flowline integrity or hinder flowline inspection or repairs.

Contractors may clear vegetation along the flowline corridor by rotary mowing and hand clearing, as needed, to allow equipment access. Natural vegetation will be left intact to the maximum extent possible; however, grasses, brush, and trees may be cleared to allow for adequate access to the flowline route. Contractors will remove the vegetative mat (vegetation and approximately 6–12 inches of soil including live roots) using an excavator bucket and set it aside for placement on the surface of the trench once backfilling is complete. Excavators and other heavy equipment will be used to place excavated native fill, return the flowline trench sections to pre-project contours or mound fill in highly saturated sections, and place vegetative mat back into the flowline trench alignment. Hilcorp will inspect and approve of the finished grade prior to revegetation treatments. The stored vegetative mat will be watered, as needed, to maintain adequate moisture. If watering the stored vegetative mat is needed, watering will be completed using a small water truck or a pickup with a tank and a small pump. Vegetative mat removed from wetlands will be watered until saturated, while vegetative mat from uplands will be watered until the soil is wet to the touch one inch below the top of the rooting zone. Once the vegetative mat is replaced along the flowline route, no watering is planned. The vegetative mat will be placed at pre-construction elevations, thus reestablishing native hydrology.

In wetlands, if bare soil is present after placement of the vegetative mat, the soil will be fertilized only to allow for natural colonization. In uplands, if bare soil is present after placement of vegetative mat, contractors will perform re-contouring and scarification of the soil by creating tracks perpendicular to the contours with a tracked piece of heavy equipment to allow for better seedling establishment, where necessary. Following scarification, the soil will be fertilized and seeded with native grass species along trenched flowline sections where bare soil is present. Species selection for seeding bare soil in uplands will follow the Alaska Plant Material Center (PMC) Revegetation Manual for Alaska guidance (Wright, 2008) using certified weed-free seed in a mix appropriate for soil moisture conditions.

Native plant species are expected to naturally colonize any bare soil within the trench alignment, including areas that have been seeded with grasses. Likewise, disturbance will be mitigated through use of rig mats where possible to allow vegetation to rebound naturally once the construction activities are completed and rig mats are removed. The vegetation covered by rig mats, up to 45 days, is expected to recover fully. If any loss of vegetation is experienced in the work area adjacent to the trench, the same revegetation treatments as those proposed for the trench will be applied.

In the event of an unexpected increase in impact area, additional replanting options may be evaluated during Year 0 restoration activities (see Section 7.0). Best Management Practices (BMPs) for sediment erosion control will be installed and maintained throughout areas of construction.

8.0 Monitoring Plan

8.1 Monitoring Methodology

Monitoring will evaluate progress toward meeting goals, objectives, and performance standards within the performance period (Table 5). A qualitative assessment will be performed to include an ocular assessment of vegetation cover of both vascular and non-vascular species and a description of site stability and surface elevations.

Table 5. Monitoring Methodologies for KGF Flowlines Project Paired with the Performance Standards

Performance Standards	Monitoring Methodology
1) Trench alignment has an elevation similar to the surrounding surface elevation and does not hold water continuously during the growing season, excluding areas that were flooded (in typical conditions) prior to trenching.	Assessment of site stability and surface elevations (qualitative)
2) Cover by indigenous plant species (including nonvascular species) and/or seeded grasses that is equivalent to 60% of that found at a reference plot.	Grid-point intercept in one-square-meter grids with 100 points each (Lutes et al. 2006), with a minimum of 5 grids (quantitative)
3) Priority invasive species[1] absent or present and actively managed.	Invasive plant species survey (qualitative)

[1] Priority invasive species are listed in Hilcorp, 2019.

8.1.1 Repeat photography documentation

Documentation of restoration efforts will be recorded by repeat photography. At least five representative photograph points with fixed camera locations will be established within wetland areas. Photograph point locations will be selected to provide photographs with the greatest representation of conditions. Photograph location coordinates will be recorded using Global Positioning System (GPS) technology, and the compass heading of each photograph direction recorded. Photographs will be taken looking across the site, with additional photographs taken looking down at ground conditions. Photographic documentation will be included in annual monitoring documentation.

8.2 Monitoring Schedule

Qualitative monitoring will be conducted once annually during the growing season in Years 1 through 3, or until performance standards are met, to evaluate progress toward performance standards (Table 6).

Table 6. Schedule of Monitoring for KGF Flowlines

Year 0 (2021) (planned)	Years 1 and 2 (2022–2023) (planned)	Year 3 (2024) (planned)
Restoration Treatments within Wetlands: • Return flowline trench section to pre-project contours, or mounded in saturated conditions • Apply erosion control measures in areas of soil disturbance • Replace vegetative mat. Where bare soil remains, fertilizer (NPK 20-20-10) will be applied **Restoration Treatments within Wetland Areas Impacted from Inadvertent Release of Drilling Fluid:** • Re-contour by hand (i.e., excess drilling mud will be removed using shovels) or other means that do not damage the underlying and surrounding area • Natural revegetation (no seeding or planting) in areas with water. Fertilizer will be applied in non-inundated wetlands and transitional uplands	**Monitoring within Wetland Areas of Impact:** • Measure area of disturbance (may be determined from aerial photographs, if available) • Create species list • Evaluate vegetation establishment • Survey for priority invasive species • Evaluate site stability and surface elevation • Establish photograph points and photograph site • Determine need for further action	**Monitoring within Wetland Areas of Impact:** • Evaluate vegetation cover • Survey for priority invasive species • Evaluate site stability and surface elevation • Photograph site
Restoration Treatments within Uplands: • Return flowline trench section to pre-project contours • Apply erosion control measures in areas of soil disturbance • Seed areas of bare soil seed mix per Plant Material Center guidelines (Wright, 2008)	**Monitoring within Uplands:** • Create species list • Evaluate vegetation establishment • Survey for priority invasive species • Evaluate site stability and surface elevation • Determine need for further action	**Monitoring within Uplands:** • Evaluate vegetation establishment • Survey for priority invasive species • Evaluate site stability and surface elevation
Documentation: • Completion report	**Documentation:** • Document annual inspections in an internal monitoring document	**Documentation:** • Document final inspection in an internal monitoring document

9.0 Documentation

9.1 Completion Report

A short completion report will be prepared and provided to the USACE representative after completion of restoration treatments conducted in Year 0. The completion report will include a description of work completed and photographs of site conditions before and after restoration activities.

9.2 Annual Monitoring

Hilcorp will document annual restoration inspections in an internal monitoring document. If any issues arise requiring corrective action or a change in treatment approach, Hilcorp will coordinate with the USACE and other applicable agencies to address issues as needed.

10.0 References

Hilcorp Alaska, LLC. 2019. Invasive Plant Management Plan for Hilcorp Areas of Operation (Beaver Creek, Swanson River, and Wolf Lake Fields). Kenai National Wildlife Refuge, Kenai Peninsula, Alaska. September 2019 Update. 10 pgs. + Attachments.

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FIGURES

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HARVEST ALASKA

Hilcorp Alaska, LLC

Map Date: 8/20/2020

Hilcorp Alaska, LLC
Cook Inlet, Alaska
Overview

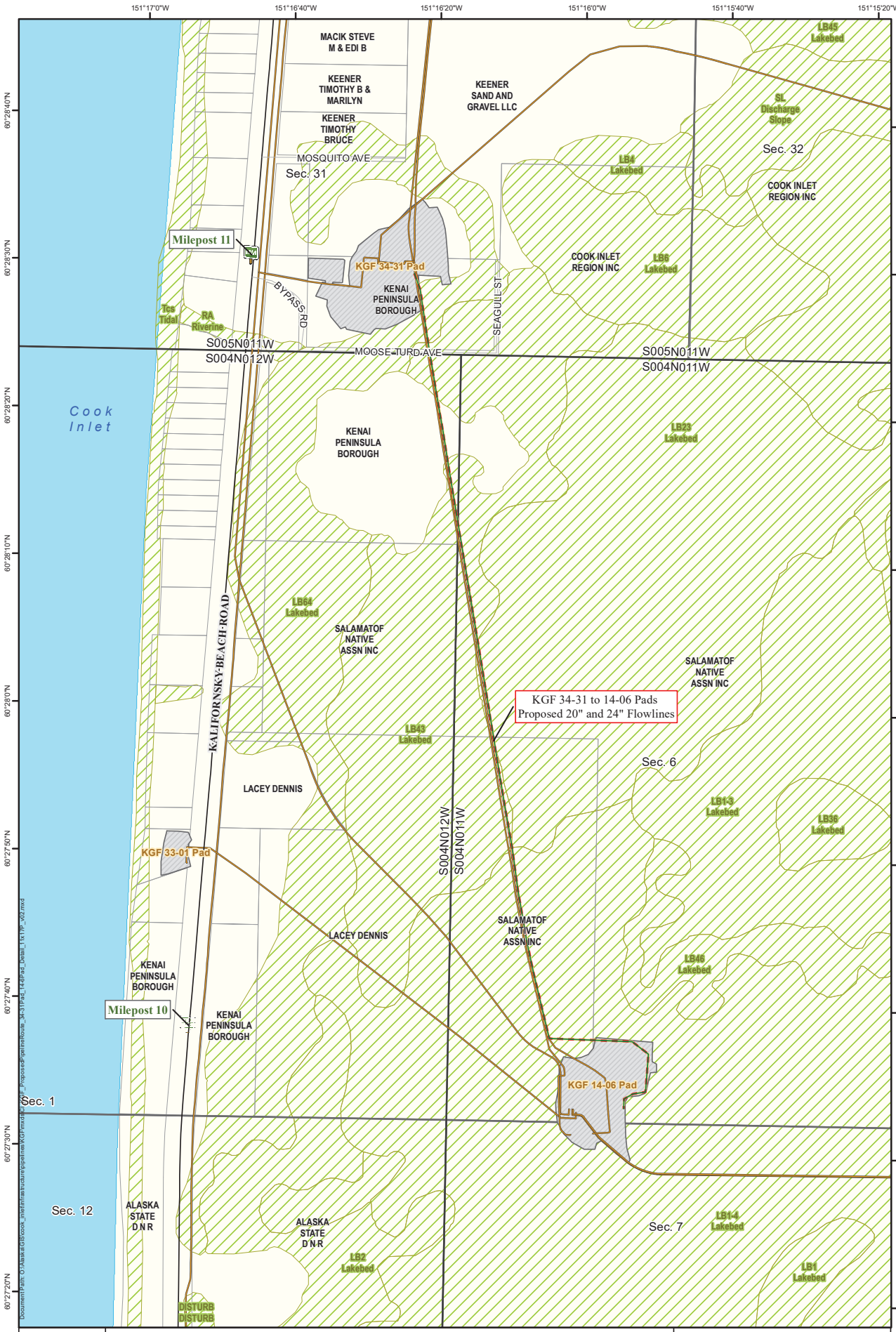
0 2 4 6 8 10 Miles

Hilcorp Alaska, LLC
3800 Centerpoint Dr. Ste.1400
Anchorage, AK 99503
Map Date: 8/28/2020

Kenai Gas Field
KGF 14-06 to 34-31 Pad
Proposed Flowline Route

Proposed 20in and 24in Pipeline Centerline (McLane Consulting 8/28/2020)
Existing Pipelines
KPB Parcels (Surface Ownership)

Alaska State Plane Zone 4 NAD 1983
0 300 600 feet
1 inch = 600 feet



Hilcorp Alaska, LLC
3800 Centerpoint Dr. Ste.1400
Anchorage, AK 99503
Map Date: 8/28/2020

Kenai Gas Field
KGF 14-06 to 34-31 Pad
Proposed Flowline Route

Proposed 20in and 24in Pipeline Centerline (McLane Consulting 8/28/2020)
Existing Pipelines
KPB Parcels (Surface Ownership)
Wetlands (Kenai Watershed Forum - 2012)
Ground Water Flow Direction (Approximate)

Alaska State Plane Zone 4 NAD 1983
0 300 600 feet
1 inch = 600 feet
N

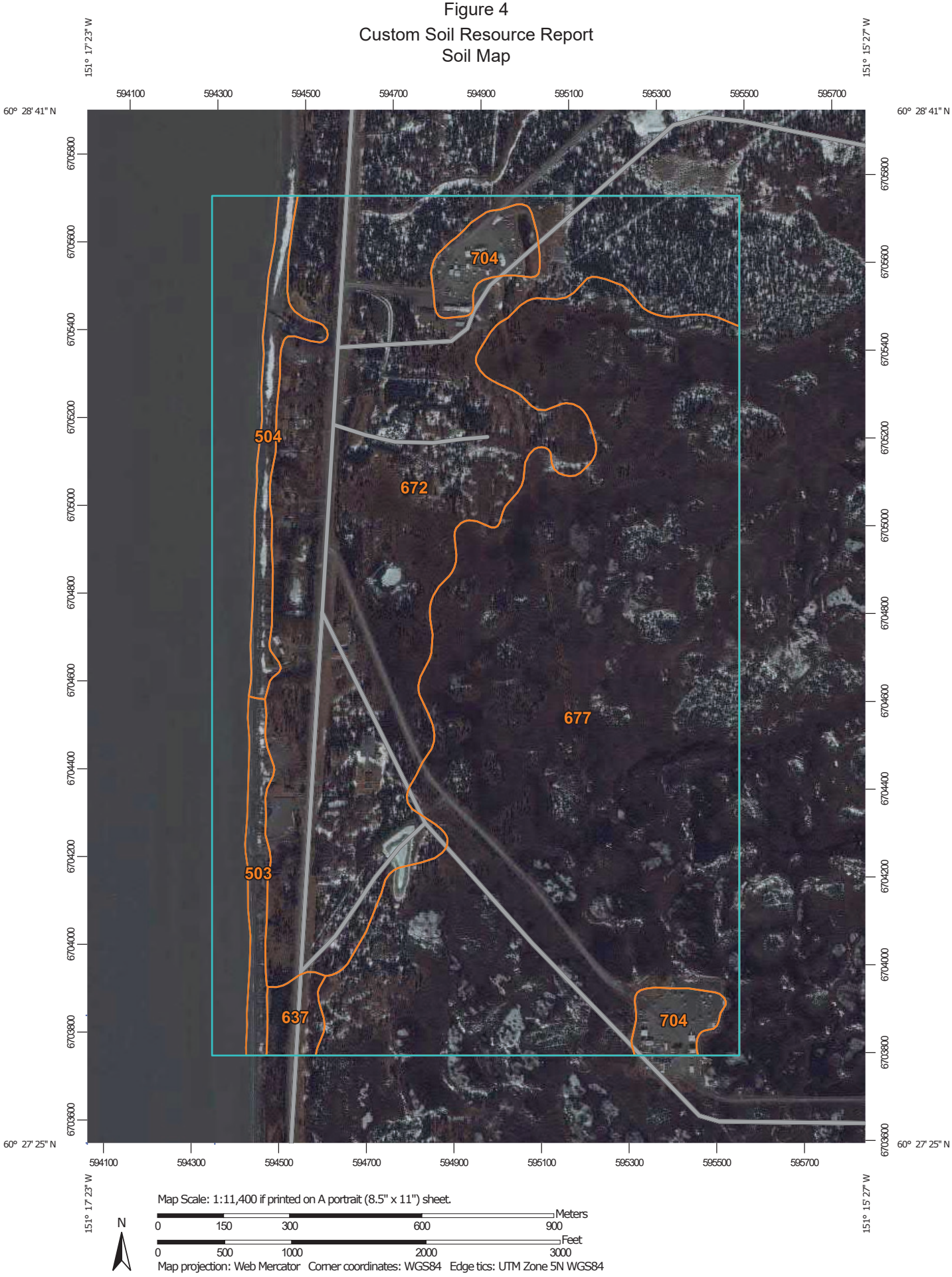



Figure 4
Custom Soil Resource Report
Soil Map