# Applicant Proposed Mitigation Statements

Background:

To develop a complete individual permit application under Section 404 of the Clean Water Act, certain information pertaining to how Armstrong Energy, LLC (Armstrong) is proposing to mitigate impacts to waters of the U.S. (WOUS) is necessary. The information is provided to satisfy box 23 of the ENG Form 4345.

Applicant's Proposed Mitigation:

1. Avoidance of impacts to aquatic ecosystems, including wetlands:

The following measures will be taken to avoid impacts to the greatest extent practicable:

WOUS:

- Drill sites are located east of the Colville River and as far east as practicable, while still meeting the Nanushuk Development Project (Project) purpose and need to produce commercial quantities of crude oil from the target reservoirs. The location of drill sites avoids placement of surface facilities west of the East Channel of the Colville River (East Channel) and avoids associated transportation and pipeline infrastructure to access this area.
- Connection to the existing gravel road system allows use of the existing Deadhorse Airport to support field logistics. This eliminates the need for a new project specific airstrip to transport personnel and associated regular fixed-wing air travel impacts in the project area. As a result, less storage space is required at each drill site to accommodate required site support materials, fuels, hazardous substances, and solid waste, reducing the overall size of each pad.
- The Project is not requesting additional pad space for a dedicated gravel stockpile. Instead, gravel will be transported directly from the material site and placed within the permitted project footprint.
- Existing barge infrastructure at Oliktok Point will be used to avoid the need to construct new marine facilities to support sealift module delivery.
- Seasonal ice pads and roads will be used to support winter pipeline and gravel infrastructure construction, avoiding the need for additional fill to support construction.
- Drilling for vertical support members (VSMs) will occur from an ice road and drilling cuttings will be sidecast onto the ice around each VSM, avoiding a discharge of fill material into WOUS, since the sidecasting will not change the bottom elevation of a WOUS or replace any portion of a WOUS with dry ground. The drilling cuttings will be removed once VSM installation is complete.
- Trenching will occur during the winter, and all trenched materials will be temporarily sidecast onto an ice pad adjacent to the trench. Trenched materials will be taken off the ice pad and backfilled into the excavation once trenching is complete. This will avoid a discharge of fill material into WOUS.

- Power cables and fiber optic cables will be installed on the horizontal support members (HSMs) using messenger cables, avoiding the need for power poles and associated fill.
- At pipeline-river crossings, all pipelines, HSMs, and suspended cables will be elevated to maintain adequate freeboard.

Table 1 shows the acreage associated with the quantifiable avoidance mitigation measures listed above.

**Table 1- Acreage of Quantifiable Avoidance Measures**

| Avoidance Measure | Acres Avoided |
|---|---|
| Connection to the existing gravel road system and use of the existing Deadhorse Airport to support field logistics | 32 |
| The Project is not requesting additional pad space for a dedicated gravel stockpile. | 13 |
| Use of existing barge infrastructure at Oliktok Point | 2 |
| Use of seasonal ice pads to support winter pipeline and gravel infrastructure construction | 24 |
| Drilling VSM's from an ice road with drilling cuttings temporarily sidecast onto the ice around each VSM and removed after VSM installation is complete | 38 |
| Winter trenching with all trenched materials temporarily sidecast onto an ice pad and backfilled into the excavation after trenching is complete | <1 |
| Installation of power cables and fiber optic cables on HSMs using messenger cables | <0.1 |
| **Total Avoidance Measures** | **109** |

Wildlife:

- Power and fiber optic cables will be installed on the HSMs using messenger cables, avoiding the use of overhead powerlines. Avoidance of overhead powerlines reduces the potential for bird strikes and limits creation of predator perching opportunities on power poles.

Cultural Resources/Subsistence:

- To the extent possible, project facilities will be located outside of a 500-foot buffer from documented cultural resources.

Noise:

- A new project specific airstrip will not be developed as part of the Project. This avoids regular fixed wing air traffic into the project area reducing noise/disturbance impacts to local residents, subsistence users, and wildlife, as well as air quality impacts.

- Power generated at the central processing facility (CPF), located at the Nanushuk Pad, will be supplied to each drill site through a power cable to reduce noise impacts at each of the drill sites.

2. Minimization of unavoidable impacts to WOUS, including wetlands:

The following measures will be taken to minimize impacts to the greatest extent possible:

WOUS:

- Locating drill sites as far east as practicable from the Colville River minimizes the distance of gravel road and pipeline needed to tie into existing infrastructure.
- Drill site 3 (DS3) has been relocated to a suitable location outside of the Colville River floodplain, thus minimizing placement of gravel within the floodplain.
- Gravel roads and pads are located outside of the Alaska Department of Natural Resources half-mile setback from the Colville River, to the extent practicable, minimizing potential impacts to the watershed and subsistence users in the project vicinity.
- Roads will have standard minimum thickness (5 feet minimum) to protect underlying permafrost by insulating and maintaining stable permafrost conditions.
- Pads will have standard minimum thickness (6 feet minimum) to protect underlying permafrost by insulating and maintaining stable permafrost conditions. Pads are at least 1 foot thicker than roads due to higher thermal loads associated with pads.
- The following engineering methods will be employed to minimize heat transfer from infrastructure on pads to the underlying permafrost:
    - In well conductors, the gap between the well conductor and inner pipe will be filled with polyurethane foam.
    - Thermosyphons will be installed adjacent to well rows and at-grade heated structures (e.g., the warehouse and cold storage).
    - Heated at-grade structures will be constructed with 4 to 8 inches of rigid insulation installed approximately 24 inches below the foundation/floor slabs.
    - Flare stack height will be selected to reduce ground level radiant heat intensity to levels that will protect personnel, structures, and equipment as well as avoid permafrost degradation (typically 1,500 btu/hr/$ft^2$).
- Gravel roads provide all-season access to parallel export/import and infield pipelines for visual inspection and routine and emergency maintenance and repairs. This also reduces the need for tundra travel associated with these activities. Roads and pipelines will be located within 1,000 feet of each other where feasible.
- On-site processing minimizes the length of the multiphase pipeline and potentially allows for a smaller total processing facility footprint relative to constructing pre-processing facilities at each drill site.

- No processing of multiphase fluids will occur at drill site 2 (DS2) or DS3, avoiding the need for processing infrastructure at each site and reducing the overall gravel footprint.
- All on- and off-pad pipelines will be elevated above grade on VSMs to reduce impacts to permafrost.
- The export/import pipeline will be co-located with an existing pipeline and gravel road associated with the Kuparuk River Unit between drill site 2M (DS2M) and the Kuparuk CPF2. Where available, co-location with existing pipelines and roads minimizes impacts to the aquatic environment compared to having the two features spaced farther apart.
- Project roads are located to reduce impacts to hydrology through minimization of the placement of gravel fill within the floodplain. In addition, the placement of the Miluveach and Kachemach River bridges at narrow portions of the rivers minimizes placement of gravel fill in the floodplain and piers below ordinary high water.
- Road widths have been designed, in part, based on the weight and size of vehicles expected to travel on them. Infield roads will be constructed at 34 feet wide surface to minimize gravel fill relative to the 35-foot wide gravel access road, which is designed for self-propelled motorized transports.
- Gravel road footprints have been further minimized by using 2:1 side slopes instead of 3:1 side slopes and reducing the access road width from 38 feet to 35 feet.
- Pad and road layouts consider topography and maintenance of natural drainage patterns and avoid ponds, lakes, and streams, where possible to minimize gravel requirements, maintain natural drainage patterns, and minimize water ponding. When natural drainage patterns are crossed, roads will be designed perpendicular to the general flow direction to the extent practicable. Layout design also considers the effects of spring breakup, and other flood events.
- In addition to minimum gravel thickness criteria, gravel facilities located within the floodplain will be built to more conservative elevations based on hydrologic conditions to minimize potential effects on hydrology.
- Drill sites are oriented with the long axis parallel to the prevailing northeast/southwest wind direction to minimize snow drift and related maintenance activities. Drill site orientation could minimize potential effects on hydrology during spring breakup.
- Pads and roads will be designed to limit point sources of runoff to the surrounding tundra. Instead, both snowmelt and rain water on the pad will primarily seep directly through the gravel.
- Drill site locations are designed to minimize distances of infield roads and pipelines, with considerations for hydrology, wetlands, and subsistence use.
- All pads are sized to minimize overall gravel requirements while maintaining space for a sufficient number of well heads to meet the overall project purpose. Well head spacing has been reduced from 30-feet to 20-feet to further minimize drill site footprint.
- Bridge abutments will be designed using sheet piles to minimize the gravel fill footprint, road embankment erosion, and stream scour.

- External corrosion inspections of pipelines will be conducted during winter and will be supported by approved tundra travel vehicles to avoid impacts associated with summer tundra travel.
- Drainage culverts will be sited and designed at streams and concentrated drainages to pass the 50-year flood event with a headwater elevation not exceeding the diameter of the culvert to minimize potential impacts to hydrology. Prior to construction, an engineer will walk and slope-stake roads to determine precise location of drainage structures and determine on-site conditions for final layout.
- Fish passage culverts will be designed at stream crossings where the Alaska Department of Fish and Game (ADF&G) determine fish are present and design will be in accordance with ADF&G Title 16 fish passage standards. Flow velocities at culvert outlets will be analyzed, and outlet erosion control measures will be designed as necessary to prevent channel degradation.
- Cross-drainage culverts will be installed within the access and infield roads to reduce impoundment and allow conveyance of surface water flow that intersects the road, in order to maintain natural drainage patterns. As a general guideline, cross-drainage culverts will be sited approximately every 500 feet along the alignment during initial design efforts, although exact placement of culverts will depend on actual in-field local drainage patterns.
- Regular ice road use will be limited to construction activities to minimize the need for annual withdrawal of water for ice road construction. Ice roads are not planned for use on a regular basis to support drilling and operations.
- In accordance with permits, ice road crossings of designated streams and rivers will be slotted, breached, or weakened upon completion of use.
- Pending commercial agreements and availability of supply, seawater purchased from a third party will be used to supply make up water, minimizing use of local freshwater sources.
- During drilling and operations, grind and inject facilities (Underground Injection Control, or UIC, Class I well) will be available for disposal of Resource Conservation and Recovery Act exempt and non-hazardous waste. There will be up to four total UIC wells, with one at each drill site and one at the operations center. This will minimize the risk of fluid spills during transport of fluids to an off-site disposal facility.
- Discharge of domestic wastewater to the tundra at the project site is not planned during normal conditions. As a result, a number of impacts would be minimized, including the potential for soil erosion from water discharge and potential impacts to water quality, vegetation, birds, and wildlife.
- Personnel will be required to stay on gravel or ice surfaces to minimize impacts to the tundra unless their specific job duties require them to be on the tundra, and that activity is properly permitted.

- Except for removal of snow and ice in excess of 4 inches from work areas, disturbance of the tundra, including vegetation and organic cover, will be avoided during gravel placement to minimize impacts to permafrost.
- Dust control measures will be implemented to reduce the incidence of dust on vegetation or snow.
- Snow removal management measures will be implemented to reduce the potential for gravel fill to be pushed off pad during snow removal.
- At the conclusion of production, abandonment of project facilities will be conducted in accordance with Alaska Department of Natural Resources Division of Oil and Gas North Slope Areawide Lease Mitigation Measures and in compliance with all permit and lease requirements.

Table 2 shows the acreage associated with the quantifiable minimization mitigation measures listed above.

**Table 2- Acreage of Quantifiable Minimization Measures**

| Minimization Measure | Acres Minimized |
|---|---|
| Design road widths based on weight and size of the specific vehicles expected (e.g., infield roads at 34-foot wide surface versus access road at 35-foot wide surface) | 1 |
| Size all pads to minimize overall gravel requirements while meeting the overall project purpose | 13 |
| Minimize gravel road footprints by using 2:1 side slopes and reducing access road width from 38 feet to 35 feet | 46 |
| **Total minimization measures** | **60** |

Vegetation:

- Ice roads will be routed and constructed to minimize impacts to sensitive vegetation such as willow, per North Slope Borough (NSB) requirements.

Air Quality:

- Air emissions will be minimized through compliance with ambient air quality standards as demonstrated through computer modeling approved by Alaska Department of Environmental Conservation (ADEC).
- No incinerator will be located on site, thereby reducing overall project air emissions.
- Natural gas-fired combustion turbines will be used for power generation and compression, which minimizes the use of diesel-fired emission units. Combustion turbines will be equipped with appropriate technologies to ensure efficient combustion, increased fuel efficiency, and reduced greenhouse gas (GHG) emissions rates.

- Most combustion turbines at the CPF will be equipped with waste heat recovery units for process and space heat, reducing GHG emissions.
- Armstrong will use a safety flare for emergency control of excess gas, instead of venting the excess gas, to reduce GHG emissions.
- Armstrong will implement good combustion practices for all fuel-fired equipment including regular maintenance according to manufacturer's recommendation to reduce potential GHG emissions.

Wildlife:

- Roads and pipelines will be separated by a minimum of 500 feet, where feasible, to minimize caribou disturbance and excessive snow drift accumulation and reduce the risk of vehicle impacts to the pipeline.
- All pipelines, HSMs, and suspended cables will be a minimum of 7 feet above tundra surface except where pipelines intersect a road or pad or are constructed within 100 feet of an existing pipeline that is elevated less than 5 feet.
- Project facilities were located to reduce impacts to wildlife by moving the Miluveach River Bridge and access road away from ADF&G-identified sensitive brown bear denning habitat.
- A Polar Bear Interaction Plan and a Wildlife Avoidance and Interaction Plan will be developed to provide personnel with guidance to minimize the possibility of wildlife interactions and impacts to bears and human safety.
- Facility lighting will be designed to minimize the impact of lighting on visual aesthetics and minimize the occurrence of bird strikes. The facility lighting will minimize light visible from outside of project facilities by using downward illumination such as downcast floodlights and excluding use of horizontally aimed floodlights, locating mast poles away from the pad edge, using lighting fixtures with lamps contained within the reflector, and shading externally facing windows on buildings.
- Placement of new gravel fill on tundra will not occur during the bird nesting season to minimize the potential for disturbances to nesting birds and broods.
- Pipelines will have a non-reflective finish to reduce reflectivity and potential impacts to wildlife from visual disturbances.
- Project facilities are located to reduce impacts to hydrology and fish through minimization of the gravel fill footprint within 500 feet of fish-bearing water bodies, where practicable.
- All water withdrawal will be conducted in compliance with water withdrawal authorizations and fish habitat permit stipulations to maintain adequate lake volumes in fish-bearing lakes.

Cultural Resources/Subsistence/Socioeconomics:

- Impacts to subsistence use areas will be minimized through location of project facilities (including the Miluveach River Bridge) away from subsistence use areas near the mouth of the Miluveach River.

- Bridge locations have been chosen to minimize impacts to boaters and subsistence use areas.
- Armstrong will work with the Kuukpik Corporation to establish access agreements for use of project gravel roads and ice roads to increase potential access routes for subsistence activities.
- Armstrong will provide regular project updates to the community and leadership in Nuiqsut during project development, and will incorporate measures to address concerns into project designs, where practicable. Additionally, Armstrong will continue to communicate regularly with the community and leadership in Nuiqsut throughout construction and operations.
- Armstrong will interface with the Kuukpik Subsistence Oversight Panel to minimize conflict with subsistence users.
- Armstrong will work with the Kuukpik Corporation, the City of Nuiqsut, and the NSB to ensure Nuiqsut and NSB residents have opportunities to apply for work on the Nanushuk Development Project and will provide local North Slope companies with opportunities to compete for contract work associated with the Project. Armstrong will also work with contractors, trade associations, Alaska Process Careers Consortium, and Iḷisaġvik College to develop training programs for North Slope residents, if needed.

Spill Prevention and Response Planning:

- External pipe walls will be coated with fusion bonded epoxy. Pipelines containing temperature controlled fluids and multiphase product will include an insulation system consisting of polyurethane foam insulation covered with an interlocked sheet metal jacket. Pipeline facilities will include pig launchers and receivers capable of handling in-line inspection tools, and maintenance and cleaning tools.
- Where pipelines cross road embankments, coated and insulated pipelines will be encased in structural steel pipe casings buried within the roadway section. Casings for pipeline-road crossings will extend a minimum of 2 feet beyond the road embankment toe.
- All pipelines will be designed above ground and the Miluveach and Kachemach River crossings are located in the vicinity of proposed roads, allowing for better access for leak detection, maintenance, and potential spill response.
- Gravel road connection to existing infrastructure provides reliable year-round, rapid access to project facilities in the event of an emergency, including a blowout, oil spill, or need for medical evacuation.
- Periodic surveillance of the pipelines will be conducted in accordance with federal regulatory and American Society of Mechanical Engineers (ASME) B31.4 requirements and in accordance with ADEC regulations (18 Alaska Administrative Code 75). Leak detection systems and surveillance will be compliant with ASME codes and state and federal standards. For pipeline-river crossings, either isolation valves or vertical loops will be used, depending on the type of pipeline.

- All fuel and hazardous substances used by the Project will be handled and stored on site in compliance with state and federal regulatory guidance and the Project's Oil Discharge Prevention and Contingency Plan (ODPCP) and Spill Prevention Control and Countermeasures (SPCC) Plan. All fuels and chemicals will be stored in appropriate primary containment. Secondary containment areas will be designed in compliance with all applicable permits and regulations.
- Fuels and other products will be transported to the project area using licensed, commercial transporter following federal Department of Transportation regulations for safe transport of materials to minimize the spill risk.
- Trained North Slope employees and contractors who are familiar with North Slope oilfields will be employed, providing personnel who are familiar with industry requirements regarding environmental and regulatory compliance standards. Personnel will be trained on Nanushuk Operational Plans, including oil handler training, waste management, snow removal, spill prevention, and wildlife interaction, which will minimize the potential for impacts during daily operations.
- Dedicated spill response equipment will be positioned throughout the field to minimize spill response time. This allows responders to address a potential spill and start response as soon as possible, while minimizing the amount of fluid that may be released and associated impacts. The locations and types of oil spill response equipment, and equipment deployment times will be identified in detail in the project ODPCP.
- Armstrong will maintain its membership with Alaska Clean Seas and the Mutual Aid Agreement with other operators on the North Slope to provide resources to respond to spills, which may require resources other than those readily staged on pad. Membership in Alaska Clean Seas supports faster response time, especially if additional equipment or personnel are required to address an accidental release.

Noise:

- Routine helicopter use will be avoided during regular development, drilling or production activities, minimizing noise and related impacts to aesthetics, wildlife, and subsistence.

3. <u>Compensation for unavoidable impacts to waters of the U.S., including wetlands:</u>

Pursuant to the Section 404(b)(1) Guidelines (40 Code of Federal Regulations [CFR] 230; Guidelines), after all appropriate and practicable avoidance and minimization measures have been applied, USACE may then consider requiring compensatory mitigation for unavoidable impacts to ensure that the activity complies with the Guidelines and the USACE's Public Interest Review regulations (33 CFR 320.4(r); 33 CFR 332.1(c)). "Compensatory mitigation is required only to the extent that it is appropriate and practicable."[1]

[1] U.S. Environmental Protection Agency, Department of the Army, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Wetlands Initiative (AWI) – Summary Report, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska. (May 13, 1994). Available at https://dec.alaska.gov/water/wwdp/wetlands/docs/1994_Wetlands_Initiative.pdf.

The extensive avoidance and minimization measures incorporated into the Nanushuk Development Project to protect the WOUS are discussed in Sections 1 and 2 above. In evaluating whether to require compensatory mitigation, the agency must first analyze whether compensatory mitigation is appropriate for a project. If so, then the agency must evaluate whether compensatory mitigation is practicable for the project. For the reasons discussed below, Armstrong submits that compensatory mitigation is not appropriate for the Nanushuk Development Project. Accordingly, the following analysis addresses only the appropriateness determination.

*Regulatory Background*

USACE, the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) have acknowledged that Alaska is a special case for application of the Guidelines. After extensive evaluations and engagement with stakeholders, these federal agencies developed the 1994 Alaska Wetlands Initiative (AWI) Summary Report. The AWI was developed in response to concerns raised by a panel of stakeholders and the general public regarding the rigidity of the National Section 404 regulatory program's implementation in Alaska.

The EPA and USACE clearly state at the end of the AWI Summary Report that compensatory mitigation is required to offset impacts of discharges *only* in circumstances where it is appropriate and practicable to do so. In a joint guidance document issued contemporaneously with the AWI Summary Report, EPA and USACE explained how compensatory mitigation would be evaluated in Alaska, consistent with the Guidelines: "*In cases where potential compensatory mitigation sites are not available due to the abundance of wetlands in a region and lack of enhancement or restoration sites, compensatory mitigation is not required under the Guidelines.*"[2]

The national regulatory standards and criteria for the application of compensatory mitigation adopted by USACE and the EPA in 2008 expressly maintained the agencies' previous guidance regarding the application of compensatory mitigation in Alaska. USACE and EPA adopted the *Compensatory Mitigation for Losses of Aquatic Resources, Final Rule* (2008 Mitigation Rule; 33 CFR Part 332 and 40 CFR Part 230), in response to instructions from Congress to develop regulatory standards and criteria for the use of compensatory mitigation in the Section 404 program. 73 Fed. Reg. 19,594, 19,595 (Apr. 10, 2008).

The 2008 Mitigation Rule addresses *how* compensatory mitigation is structured, but not *when* compensatory mitigation is required. In response to a specific question about the continuing applicability of the conclusions expressed in the AWI Summary Report, USACE and the EPA stated that the 2008 Mitigation Rule "does not change the circumstances under which compensatory mitigation is required for [Department of the Army] permits. Therefore, it does

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[2] EPA, USFWS, and NMFS, AWI Summary Report, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska at 3; *see also* AWI Summary Report, Attachment 2, Applying the No Overall Net Loss of Wetlands Goal in Alaska.

not change the May 13, 1994, Alaska mitigation statement cited above. We have modified appropriate provisions of this rule to clarify the flexibility and discretion available to district engineers when determining compensatory mitigation requirements for [Department of the Army] permits." 73 Fed. Reg. 19,594, 19,619 (Apr. 10, 2008); *see, e.g.,* 33 CFR 332.1(c)(2), which states, "Compensatory mitigation for unavoidable impacts *may* be required to ensure that an activity requiring a Section 404 permit complies with the Section 404(b)(1) Guidelines." (emphasis added).

*Appropriateness Analysis*

The present national goal of no net loss of wetlands is based on functions and values, rather than acre-for-acre restoration or creation, and is applied on a permit-by-permit basis. The EPA and USACE have repeatedly recognized that the goal of no net loss cannot be met on every permit action or for every permitted loss of wetlands.[3]

The no net loss of wetlands goal is applicable throughout the United States, but the EPA and USACE have clarified that physiographic conditions in Alaska are such that in some areas "opportunities for compensatory mitigation may not be available."[4] The agencies confirmed that, in such cases, permits can and should be issued without a compensatory mitigation requirement.

Unique wetland conditions recognized in Alaska, and, in particular, the North Slope, include the following: low historical loss of wetlands in relationship to the vast wetlands abundance, a large percentage of wetlands within Federal or State managed conservation units, limited upland habitats, and problematic environments such as mountainous terrain and permafrost. Since the Guidelines are to be applied in a flexible manner[5] and because compensatory mitigation is not required in cases where the potential mitigation sites are not available due to regional hydrology and topography, the USACE should require compensatory mitigation on the North Slope sparingly, and only as it is demonstrated to be warranted on a project-specific basis.[6]

Compensatory mitigation is not warranted for this Project. Armstrong's Nanushuk Development Project falls within three 10-digit Hydrologic Unit Code (HUC) watersheds[7]: the Colville River Delta Watershed (HUC 1906030410), the Kachemach River Watershed (HUC 1906030411), and the Miluveach River Watershed (HUC 1906030412). These three watersheds total approximately

[3] *See, e.g.*, EPA, USFWS, and NMFS, AWI Summary Report, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska at 3; AWI Summary Report, Attachment 2, Applying the No Overall Net Loss of Wetlands Goal in Alaska at 1 ("because compensatory mitigation may not be appropriate and practicable in all cases, no overall net loss of wetlands may be achieved for each individual permitted loss of wetlands").

[4] EPA, USFWS, and NMFS, AWI Summary Report, Attachment 2, Applying the No Overall Net Loss of Wetlands Goal in Alaska at 1.

[5] 40 CFR Part 230.3(q).

[6] EPA, USFWS, and NMFS, AWI Summary Report, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska at 3.

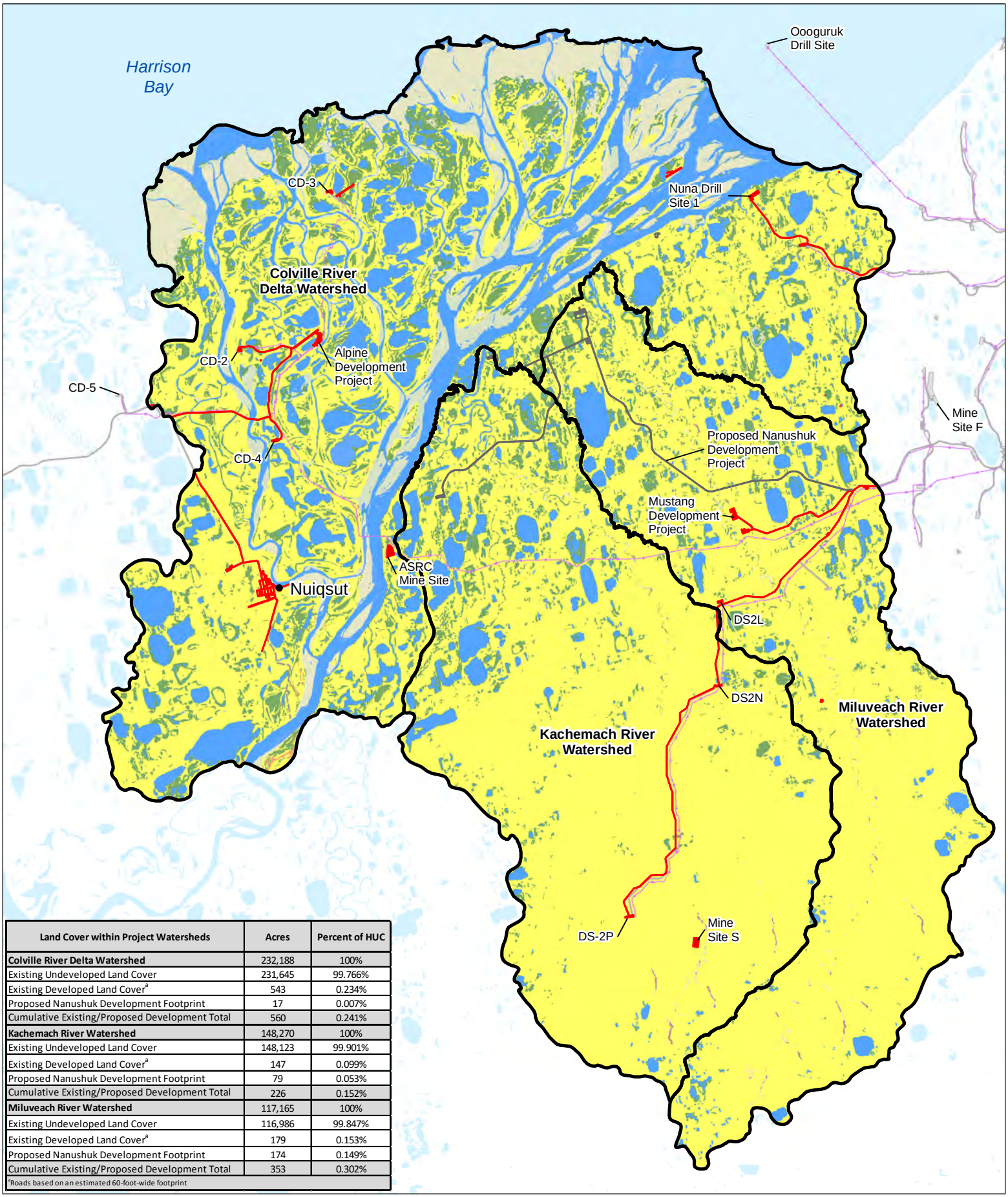
[7] Original USGS 10-digit HUC watershed boundaries near confluence of Colville River Delta, Kachemach River, and Miluveach River watersheds have been updated by HDR, Inc. using detailed aerial imagery and topographic data.

500,000 acres. Based on U.S. Geological Survey Land Cover dataset with addition of existing developments, approximately 0.15 percent of those 500,000 acres has been directly impacted by placement of gravel fill (Figure 1). Similarly, USFWS National Wetland Inventory (NWI) mapping indicates less than 1 percent (0.85 percent) of the area is classified as uplands (Figure 2).

As described above, Armstrong's avoidance and minimization measures have resulted in savings of approximately 170 acres of fill (see Tables 1 and 2). As a result, direct impacts from the Project would result in a loss of approximately 271.6 acres of WOUS, (0.05 percent of aquatic resources within the three watersheds), resulting in a cumulative conversion of less than 1 percent (0.2 percent) of aquatic resources to uplands. This demonstrates the enormous abundance of undisturbed wetlands within project drainages, relative to the project footprint.

Armstrong contends that compensatory mitigation is not appropriate for the relatively insignificant areal extent of the Project within these drainages. Indeed, the Nanushuk Development Project occurs in precisely the type of region identified by USACE and EPA as *inappropriate* for compensatory mitigation: a "region . . . where wetlands constitute the overwhelming majority of land cover type, and there is a lack of available upland sites for creating wetlands or degraded wetlands sites for enhancement or restoration."[8] Therefore, given the extensive avoidance and minimization measures incorporated into the Project, the Project's small footprint relative to the wetlands resources within the project watersheds, and the unsuitability of the project area for compensatory mitigation, Armstrong takes the position that compensatory mitigation is inappropriate and should not be required for the Nanushuk Development Project.

[8] EPA, USFWS, and NMFS, AWI Summary Report, Attachment 1, Mitigation Requirements of the Clean Water Act Section 404 Regulatory Program: Applying Flexibility in Alaska at 3.




| Land Cover within Project Watersheds | Acres | Percent of HUC |
|---|---|---|
| **Colville River Delta Watershed** | 232,188 | 100% |
| Existing Undeveloped Land Cover | 231,645 | 99.766% |
| Existing Developed Land Cover[a] | 543 | 0.234% |
| Proposed Nanushuk Development Footprint | 17 | 0.007% |
| Cumulative Existing/Proposed Development Total | 560 | 0.241% |
| **Kachemach River Watershed** | 148,270 | 100% |
| Existing Undeveloped Land Cover | 148,123 | 99.901% |
| Existing Developed Land Cover[a] | 147 | 0.099% |
| Proposed Nanushuk Development Footprint | 79 | 0.053% |
| Cumulative Existing/Proposed Development Total | 226 | 0.152% |
| **Miluveach River Watershed** | 117,165 | 100% |
| Existing Undeveloped Land Cover | 116,986 | 99.847% |
| Existing Developed Land Cover[a] | 179 | 0.153% |
| Proposed Nanushuk Development Footprint | 174 | 0.149% |
| Cumulative Existing/Proposed Development Total | 353 | 0.302% |

[a]Roads based on an estimated 60-foot-wide footprint

HUC 10 Watersheds
Nanushuk Project Footprint
Existing Facilities
Existing Roads
Existing Pipelines
Proposed Colville River Access Road

Existing Developed Land Cover
Undeveloped USGS Land Cover
Barren Land
Dwarf Shrub
Emergent Herbaceous Wetlands

Open Water
Perennial Ice/Snow
Sedge/Herbaceous
Shrub/Scrub

0 2 4 Kilometers
0 1.5 3 Miles

Notes: CRS: Alaska State Plane,NAD83, Zone 4
Imagery dated 2010

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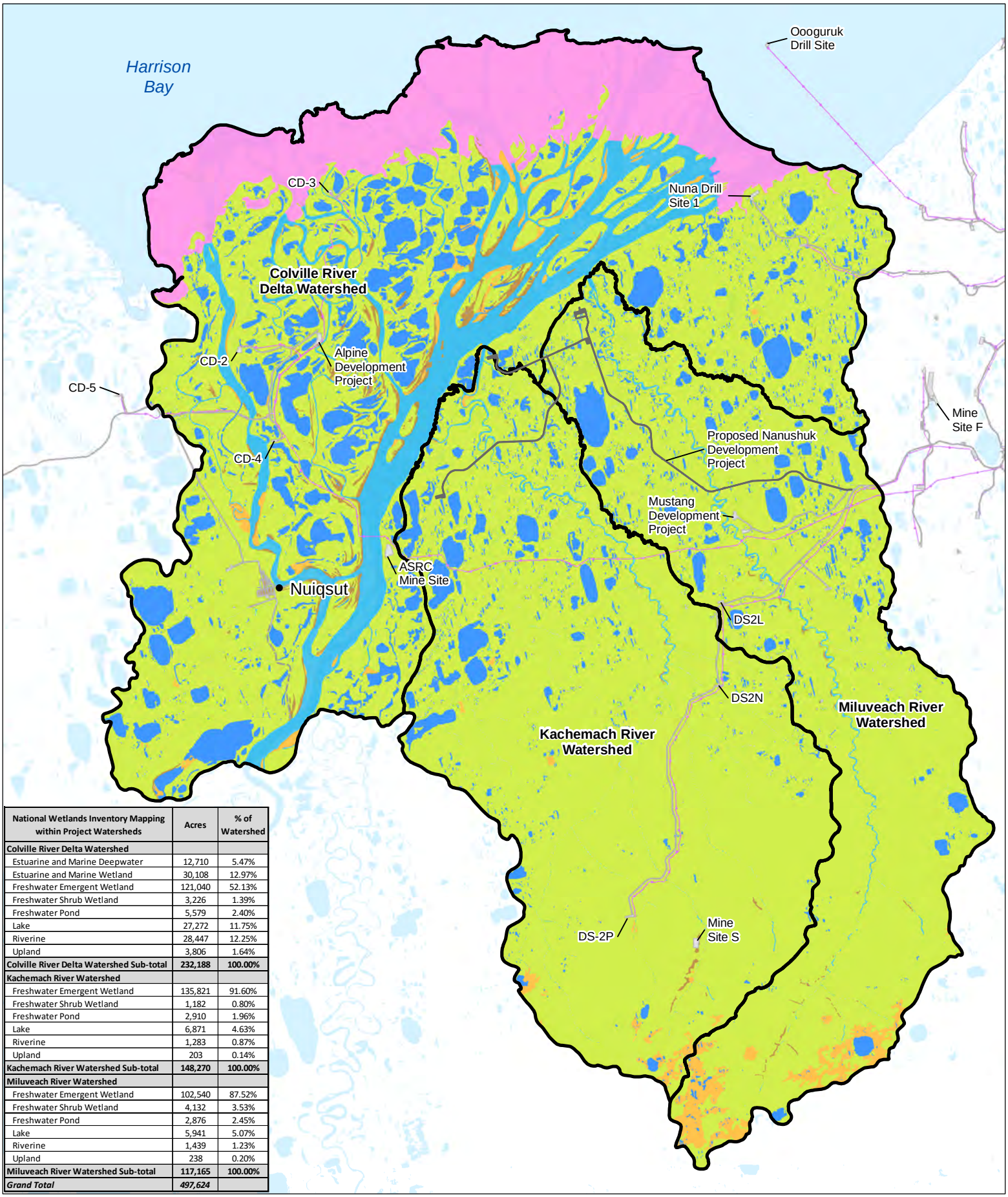
Armstrong Energy, LLC

Existing Development within HUC 10 Watersheds

Figure 1

| By: HDR Inc. | DATE: 6/30/2017 | Rev: |
|---|---|---|




| National Wetlands Inventory Mapping within Project Watersheds | Acres | % of Watershed |
|---|---|---|
| **Colville River Delta Watershed** | | |
| Estuarine and Marine Deepwater | 12,710 | 5.47% |
| Estuarine and Marine Wetland | 30,108 | 12.97% |
| Freshwater Emergent Wetland | 121,040 | 52.13% |
| Freshwater Shrub Wetland | 3,226 | 1.39% |
| Freshwater Pond | 5,579 | 2.40% |
| Lake | 27,272 | 11.75% |
| Riverine | 28,447 | 12.25% |
| Upland | 3,806 | 1.64% |
| **Colville River Delta Watershed Sub-total** | **232,188** | **100.00%** |
| **Kachemach River Watershed** | | |
| Freshwater Emergent Wetland | 135,821 | 91.60% |
| Freshwater Shrub Wetland | 1,182 | 0.80% |
| Freshwater Pond | 2,910 | 1.96% |
| Lake | 6,871 | 4.63% |
| Riverine | 1,283 | 0.87% |
| Upland | 203 | 0.14% |
| **Kachemach River Watershed Sub-total** | **148,270** | **100.00%** |
| **Miluveach River Watershed** | | |
| Freshwater Emergent Wetland | 102,540 | 87.52% |
| Freshwater Shrub Wetland | 4,132 | 3.53% |
| Freshwater Pond | 2,876 | 2.45% |
| Lake | 5,941 | 5.07% |
| Riverine | 1,439 | 1.23% |
| Upland | 238 | 0.20% |
| **Miluveach River Watershed Sub-total** | **117,165** | **100.00%** |
| ***Grand Total*** | ***497,624*** | |

HUC 10 Watersheds
Nanushuk Project Footprint
Existing Facilities
Existing Roads
Existing Pipelines
Proposed Colville River Access Road

**National Wetlands Inventory**

Estuarine/Marine Wetland and Deepwater
Freshwater Emergent Wetland
Freshwater Shrub Wetland
Lake or Freshwater Pond
Riverine
Upland

0 2 4 Kilometers
0 1.5 3 Miles

Notes: NWI mapping from USFWS
CRS: Alaska State Plane,NAD83, Zone 4
Imagery dated 2010

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ARMSTRONG Energy, LLC

# NWI Mapped Wetlands within HUC 10 Watersheds

Figure 2

By: HDR Inc. | DATE: 6/30/2017 | Rev: