3.14 Air Quality and Climate Change

3.14.1 Affected Environment

3.14.1.1 Local Air Quality

All areas in the Kenai Peninsula Borough (Borough), including Cooper Landing, meet the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO), airborne particulates, airborne lead, sulfur dioxide, ozone, and nitrogen dioxide set by the Environmental Protection Agency (EPA). The project area is not within a Federally designated air quality non-attainment area, maintenance area, or an Alaska Department of Environmental Conservation (ADEC) air quality area of concern for CO or particulate material (PM_{10} and $PM_{2.5}$).

The Clean Air Act designates the Kenai National Wildlife Refuge (KNWR) a Class II air quality area. The act requires KNWR to preserve, protect, and enhance air quality on its lands. Wilderness areas that are Class II air-quality areas, such as the Mystery Creek and Andrew Simons Wilderness units in the project area, receive additional protection from the Wilderness Act, which requires the KNWR to minimize the effect of human use or influence on natural ecological processes and to preserve untrammeled natural conditions within designated Wilderness. Class II designated areas allow moderate pollution increases. Projects must be evaluated for exceedances not only of the NAAQS but for Class II "increments."

Airborne dust from natural and manmade sources is the most common air pollutant on the Kenai Peninsula. Sources of dust include gravel pits, unpaved roads, unvegetated areas, and river floodplains. Other air pollutants include volcanic ash, and smoke from wild forest fires and prescribed burns. During fire season, typically from March to October, the ADEC regularly issues air quality advisories for portions of the Kenai Peninsula when smoke conditions could affect public health. Vehicle emissions and smoke from operating woodstoves usually disperse quickly and typically do not reach hazardous levels within the project area.

Weather data collected from the National Weather Service in the Cooper Landing area indicate the majority of the winds come from the west. Crosswinds through the region are negligible, except at Kenai Lake, where the conjoining valleys from the southeast bring crosswinds from higher elevations and glacier ice fields. The average prevailing winds through the project area are approximately 7 mph (NOAA 2011). As a result, air quality related to dust and particulate material in Cooper Landing and the project area is generally considered good.

Automobiles, including trucks, heavy equipment, and other construction equipment, generate emissions from burning gasoline and diesel fuels, which contain air pollutants such as CO and nitrogen oxides (NOx). At high concentrations, these chemicals are known to affect human health and ecosystems.

3.14.1.2 Climate Change and Greenhouse Gas Emissions

The earth's climate is changing as a result of the buildup of heat-trapping greenhouse gas (GHG) emissions. Carbon dioxide (CO_2) is the largest component of these emissions. Other prominent emissions include methane (CH_4), nitrous oxide (N_2O), and hydrofluorocarbons (HFCs). These emissions are different from criteria air pollutants since their effects in the atmosphere are global

rather than localized, and also because they remain in the atmosphere for decades to centuries, depending on the gas.

GHG emissions have accumulated rapidly as the world has industrialized, with concentration of atmospheric CO_2 increasing from roughly 300 parts per million (ppm) in 1900, to over 400 ppm today. Over this timeframe, global average temperatures have increased by roughly 1.5 degrees Fahrenheit (1 degree Celsius). The most rapid increases have occurred over the past 50 years. Scientists have warned that substantial and potentially dangerous shifts in climate and weather are possible without substantial reductions in GHG emissions. They commonly have cited 2 degrees Celsius (1 degree Celsius beyond warming that has already occurred) as the total amount of warming the earth can tolerate without serious and potentially irreversible climate effects. For warming to be limited to this level, atmospheric concentrations of CO_2 would need to stabilize at a maximum of 450 ppm, requiring annual global emissions to be reduced 40 to 70 percent below 2010 levels by 2050 (IPCC 2014). State and national governments in many developed countries have set GHG emissions reduction targets of 80 percent below current levels by 2050, recognizing that post-industrial economies are primarily responsible for GHGs already in the atmosphere.

An inventory of Alaska's GHG emissions found that about 35 percent of all emissions were from the transportation sector (ADEC 2008). Other statewide contributors include industrial activities and the fossil fuel industry (50 percent), residential and commercial fuel use (8 percent), electricity (6 percent), and waste and agriculture (1 percent). There is no inventory of local GHG emissions for the Borough. Given the lack of industrial activity in the project area, it is likely that transportation and residential and commercial fuel use are the major contributors in the project area.

The EPA has begun to regulate GHG emissions in multiple sectors of the economy. A major regulatory program, known as the Clean Power Plan, was finalized by EPA in October 2015 to reduce GHG emissions from existing fossil-fueled power plants, and to set emissions standards for new, reconstructed, or modified power plants (Note: On October 10, 2017, the EPA announced it was withdrawing these regulations and soliciting suggested replacements). Since 2010, the EPA has also regulated GHG emissions of some new and modified emissions sources under the Prevention of Significant Deterioration program rules (40 Code of Federal Regulations [CFR] § 52.21), but the U.S. Supreme Court, in June 2014, reduced the extent of EPA's ability to regulate such sources under the Clean Air Act. With respect to highway vehicles, EPA and the National Highway Traffic Safety Administration have jointly issued final fuel economy standards, specifically to reduce GHG emissions, both in 2010 (for model year 2012-2016 vehicles) and in 2012 (for model year 2017–2025 vehicles).

Alaska has warmed more than twice the rate of the rest of the United States (Haufler, Mehl and Yeats 2010); therefore, climate changes are much more noticeable in Alaska than in other regions of the United States. Potential threats associated with climate change in Southcentral Alaska include, but are not limited to: changes to sea levels, increased storm intensities, warming ocean and stream temperatures, increased retreat of glaciers, changing precipitation amounts and patterns, changing fire regimes, and increased invasive species. Of these threats, the ones most likely to affect the project area would be warming stream temperatures, changing precipitation, changing fire regimes, and spreading of invasive species. While other areas in Alaska have concerns with melting permafrost soils, there is no known permafrost in the project area.

3.14.2 Environmental Consequences

This section describes the effects of the project alternatives on local air quality, specifically related to changes in vehicle emissions and construction activities. As determined by ADEC Division of Air Quality and in accordance with the criteria given in Federal Transportation Conformity regulations, under 40 CFR § 93, Subpart A, this project is in an area where the State Implementation Plan for air quality does not contain any transportation control measures. Therefore the conformity procedures in 40 CFR § 93 do not apply.

From a quantitative perspective, global climate change is the cumulative result of numerous and varied GHG emissions sources (in terms of both absolute numbers and types), each of which makes a relatively small addition to global atmospheric GHG concentrations. In contrast to broad-scale actions, such as actions involving an entire industry sector or very large geographic areas, it is difficult to isolate and understand the GHG emissions impacts for a particular transportation project. Furthermore, presently there is no scientific methodology for attributing specific climatological changes to a particular transportation project's emissions.

Within this Environmental Impact Statement (EIS), the resiliency of the project alternatives in the face of anticipated climate changes are discussed below in Sections 3.14.2.1 and 3.14.2.2. The discussion of the project's contribution to GHGs and climate change are addressed as a cumulative impact in Section 3.27.7.10.

3.14.2.1 No Build Alternative

Direct and Indirect Impacts

The project area is not located in a non-attainment area and has no record of violating National Ambient Air Quality Standards (ADEC 2009). Considering the historically good air quality in the project area, the No Build Alternative is not expected to exceed air quality standards in the project area or to have any adverse regional effects compared to existing conditions.

Vehicle emissions generally are proportional to the number of vehicle miles traveled. The number of trips on the highway and within the project area is anticipated to increase by the same amount under the No Build Alternative or build alternatives within the life of the project (by 2043). Emissions in the project area associated with vehicle miles traveled would be expected to increase but would be offset in part by higher efficiencies in the vehicle fleet nationwide, in response to stricter fuel efficiency and emissions standards.

EPA is requiring refiners to reduce diesel fuel sulfur for over-the-road trucks, and is continuing to propose and finalize rules to reduce emissions of criteria pollutants and air toxics pollutants from both diesel and gasoline engines. These new rules would both reduce hazardous air pollutant emissions from vehicles in the project area and from other mobile sources in the Borough. The new emissions standards are expected to contribute to a continuation of the long-term downward trend in emissions from individual vehicles.

Congestion in the project area would be expected to increase over time under the No Build Alternative. By 2043, much or all of the existing highway is projected to be on the verge of stop-and-go congestion during busy summer weekends. Engine efficiency typically is lower and emissions overall higher under congested conditions. While emissions would be unlikely to exceed standards under the No Build Alternative, they would likely be worse than current conditions. Air quality degradation can affect visibility, plants, animals, soil, water quality, and

cultural resources. Traffic congestion likely would be worst in the community of Cooper Landing, and emissions from idling slow-moving vehicles at busy times could create noticeably poorer air quality for roadside businesses, homes, walkways, and public facilities such as the Cooper Landing Boat Launch Ramp. Near designated Wilderness, access to the Sportsman's Landing experiences congestion that likely affects air quality during periods of high use. Under the No Build alternative, that congestion would continue and likely would exacerbate concentrations of air pollutants as traffic grew.

The No Build Alternative is not anticipated to exceed the NAAQS. It is anticipated that improvement in per vehicle emissions would offset the traffic increase so that the incremental changes to pollutants are anticipated to be negligible.

The resiliency of existing surface transportation infrastructure under potential climate changes is not clearly known. Changing precipitation patterns are likely to affect the frequency and extent of roadway flooding. Roads considered most susceptible to flooding include those bordering rivers and constructed along valley bottoms (MacArthur, et al. 2012), which includes much of the existing Sterling Highway within the project area. The existing segment of highway near Milepost (MP) 54 immediately adjacent to the Kenai River, which has been overtopped by floodwaters in the past, is anticipated to continue to experience flooding. Existing culverts may be undersized to accommodate extreme flow volumes. Higher flows can cause changes in river channels and sediment deposition as well as increase the risk of scour, which can threaten the structural stability of bridges and culverts. The potential increase of non-native and invasive species within the highway corridor may require additional management for responding and preventing the spread of invasive species.

3.14.2.2 Issues Applicable to the Build Alternatives

Any impact to air quality would be low and of the same type for each of the build alternatives. For this reason, discussion of each alternative is not broken out separately. There is one difference to keep in mind throughout the following paragraphs: The Cooper Creek Alternative would run through a substantial portion of the Cooper Landing community, and therefore temporary traffic-related exhaust smells, dust, and emissions may be experienced by community residents, visitors, and businesses under this alternative. The same is true for temporary construction impacts to air quality. The other build alternatives would be routed around the community in its entirety, and permanent air quality impacts associated with highway traffic, although currently minor, would decrease further in the community compared to current conditions.

Direct and Indirect Impacts

Considering the historically good air quality in the project area, none of the build alternatives is expected to exceed air quality standards in the project area or to have any adverse regional effects.

Local Air Quality Impacts

Air pollutant monitoring data collected near urban highway corridors in the Lower 48 states see far greater traffic levels than occur in this rural area of Alaska. Because of the relatively small amounts of traffic in the project area (on either the existing or proposed new sections of highway), it is clear that the project would not exceed any NAAQS or Prevention of Significant Deterioration Class II allowable increment. In areas designated as nonattainment or maintenance

with respect to NAAQS for PM_{10} and $PM_{2.5}$, EPA guidance provides some examples of "projects of local air quality concern," where a quantitative dispersion hot-spot analysis is recommended. Even considering that the project area is *not* a nonattainment area or a maintenance area for PM_{10} or $PM_{2.5}$, the most relevant listed project type (considering the subject project) in EPA's guidance is:

> *A project on a new highway or expressway that serves a significant volume of diesel truck traffic, such as facilities with greater than 125,000 annual average daily traffic (AADT) and 8% or more of such AADT is diesel truck traffic* (Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas; Publication EPA-420-B-10-040, December 2010, Appendix B)

Based on the above EPA guidance, for a project to be considered for quantitative hot-spot analysis, the total daily traffic (AADT) on a road segment (two-way total) should be at least 125,000 vehicles per day and diesel trucks should be at least 10,000 vehicles per day. Neither total traffic nor diesel truck traffic on any of the road segments considered in this EIS would approach these traffic levels. Therefore, an air quality modeling analysis is not warranted for this project.

Vehicle emissions are generally anticipated to be proportional to the number of vehicle miles traveled. The number of trips on the highway and within the project area is anticipated to increase the same under all alternatives, including the No Build Alternative, within the life of the project (by 2043). Future traffic would not reach levels that would approach or exceed any of the NAAQS. The small differences between the lengths of any of the build alternatives (0.6–0.7 mile longer than the existing highway) would not create an appreciable difference in air quality impacts among the alternatives. For a discussion of the contribution of the GHG emissions of the project to global climate change, see Section 3.27.7.10 (Cumulative Impacts).

Within the KNWR (and adjacent to designated Wilderness), the build alternatives are anticipated to have the same air quality effects because they have the same passing lanes, shoulders, turn pockets, etc., and have the same traffic. Only the Juneau Creek Alternative would use property from the designated Wilderness area, and therefore would shift mobile sources of air pollution (vehicles) into areas currently designated as Wilderness. It is anticipated that the improvements to per vehicle emissions over time would make any incremental deterioration of air quality to this Class II area negligible. The increase in emissions associated with vehicle miles traveled would be partially offset by increased engine efficiency and associated reductions in emissions, as explained above under the No Build Alternative.

Impacts likely would be offset further by improving the traffic flow along the highway corridor, thereby reducing congestion and allowing vehicles to operate at constant travel speeds. Vehicles traveling at constant, higher speeds are typically more fuel efficient than those operating within stop-and-go traffic congestion. All build alternatives would reduce traffic congestion. For these reasons, none of the build alternatives is anticipated to have any substantial adverse effect on project area air quality. No indirect impacts to air quality are anticipated, because the build alternatives would not induce growth or provide new access to areas proposed for development. As such, any of the proposed alternatives, through their compliance with State standards for visible and particulate air quality, would be consistent with the air quality standards set forth in the *2002 Chugach National Forest Revised Land and Resource Management Plan* (Forest Service 2002a) and KNWR Comprehensive Conservation Plan (USFWS 2010a).

Climate Change Impacts

As discussed in Section 3.14.1, key potential climate changes associated with the project area include warming stream temperatures, changing precipitation events, changing fire regimes, and spreading of invasive species. The project corridor soils are not known to include permafrost layers, so there is little concern that melting permafrost would affect bridge or road infrastructure.

Warming stream temperatures change habitat important for salmon and other fish species, as well as the terrestrial species that depend on them. Salmon provide commercial, subsistence, and recreational harvests upon which many individuals and community members heavily rely (Haufler, Mehl and Yeats 2010). Changes in climatic conditions may not eliminate salmon stocks in the region but may introduce stress on many stocks adapted to present conditions. Project infrastructure is unlikely to be directly impacted by warming stream temperatures. Seasonal traffic volumes may change in response to changes in fish returns.

Precipitation is anticipated to increase, and more precipitation is expected to fall as rain instead of snow (Haufler, Mehl and Yeats 2010). Warming lengthens the growing season; has effects on timing of snowmelt and runoff, as well as amounts of snow cover and runoff; and can shift the transition of monthly temperatures from being below freezing to above freezing. These changes may require the size, number, and/or design of culverts, ditches, and other drainage infrastructure to be designed with these changes in mind. New and replacement bridge designs would be designed to avoid encroachments into floodplains identified using climate change models. For the Cooper Creek and G South alternatives, the surface elevation of the rebuilt highway in the MP 54 area that is prone to flooding would be raised to reduce the likelihood of flooding.

Changing fire regimes may have an impact to forest ecosystems. Fire as a major disturbance to forest ecosystems has already been observed to be increasing in the Kenai Peninsula (Haufler, Mehl and Yeats 2010). While fire has been a historical disturbance factor on the Kenai Peninsula, the frequency and size of fires have been increasing. With increasing temperatures, drier forest conditions expected in summer, and expanded areas of beetle-killed forests likely, fire conditions are predicted to get more severe. The increases in frequency and severity of fires are unlikely to impact existing or proposed infrastructure; however, the creation of a second road through the Cooper Landing area would provide increased access for emergency responders and a potential additional route for residents to evacuate the area. Upgrading the National Highway System to new standards would create a safer and more efficient evacuation route for all western Kenai Peninsula residents (See Chapter 1, Purpose of and Need for the Project).

Climate change will likely create additional favorable conditions for the establishment and spread of invasive species. The potential increase of non-native and invasive species within the highway right-of-way may require more intensive management for responding to, and preventing the spread of invasive species.

Construction Impacts

Construction activities associated with the build alternatives would result in temporary impacts to air quality from increased dust and from particulate matter contained in vehicle and equipment emissions. Dust from dirt, rock, and other fine materials can become airborne when being transported in uncovered trucks and when vehicles cross dry, unpaved dirt surfaces. Ambient CO and NOx levels are expected to increase during construction, due to concentrated activity by

large construction equipment, but are not expected to exceed air quality standards. Most of the construction activity and associated emissions would take place during the warmer parts of the year, when atmospheric dispersion tends to be greater than in the colder winter months. Also, the construction-related exhaust emissions would take place across the construction area, rather than being concentrated at a single location.

These effects would be similar for all alternatives. The Cooper Creek Alternative includes a segment of construction within the developed community of Cooper Landing, so there is greater potential for temporary dust and emission effects to people in the community under that alternative.

Mitigation

None of the build alternatives would cause air quality to approach or exceed NAAQS. While no mitigation is necessary to abate long-term impacts to air quality, several mitigation measures would be used to minimize adverse air quality impacts during construction, as required by the Alaska Pollutant Discharge Elimination System Construction General Permit. Airborne dust would be minimized by applying water during construction, sweeping periodically, disposing of solid waste properly, and stabilizing all disturbed soils as soon as possible. The specific best management practices (BMPs) proposed and their frequency of use would be determined by the contractor and outlined in the project Storm Water Pollution Prevention Plan (SWPPP). Additional BMPs typically identified in the SWPPP that may minimize air quality impacts during construction include maintaining routine maintenance and servicing schedules on construction equipment, and identifying contractor operating procedures to avoid unnecessary idling by vehicles, trucks, and heavy equipment.

Additional hydraulic and hydrologic studies will be performed during the design process of any of the build alternatives. Compliance with Executive Order 11988 (Floodplain Management) would occur as part of the Borough and Kenai River Center Multi-Agency permit process (see Section 3.24.2.2 Permits) during design. New and replacement bridges would be designed to avoid encroachments into floodplains identified using climate change models.

DOT&PF will require the contractor to follow BMPs during project construction, including the use of weed-free products, coordination with local weed prevention groups, and adhering to the DOT&PF Integrated Vegetation Management Plan to reduce the introduction and spread of invasive species. Maintenance to prevent the long-term spread of invasive species goes beyond the timeline of the project and would instead become the responsibility of the DOT&PF Maintenance and Operations section. See Section 3.20.2 for more detail.

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