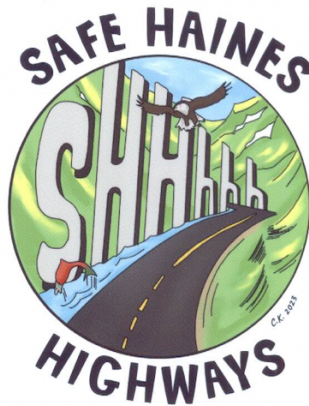


# **The Haines Highway Ore Transport Corridor: An Analysis of Potential Impacts**

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April 21, 2023

Requested by:



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## Introduction

A number of Haines residents recently organized as the ad hoc group *Safe Haines Highways* (SHH). The principal members of SHH live along the Alaska Highway System truck corridor that runs from the Dalton Cache U.S. Border Station to the Haines municipal dock at Lutak Inlet. SHH commissioned Lois Epstein, P.E.<sup>1</sup> of **LNE Engineering and Policy** to research and analyze the likely impacts of the Haines Highway truck corridor becoming a haul road for ore concentrates from a small number of active and proposed mines in Alaska and the Yukon.

The Canadian/Japanese consortium American Pacific Mining/Dowa Metals & Mining Company currently is exploring what could become a major underground<sup>2</sup> mine, known as the [Palmer VMS Project](#)<sup>3</sup> (Palmer Project), approximately 34 miles northwest of Haines, Alaska. This mining operation could produce large quantities of copper and zinc ore concentrates. Much smaller amounts of gold and silver also may be produced.

The Palmer mine plans to truck copper and zinc ore concentrates down the Haines Highway through Haines to the Lutak Dock where it would be shipped overseas for smelting. The proposed mine also may ship barite ore concentrate to Prince Rupert in British Columbia.<sup>4</sup> Copper and zinc ore concentrate shipping may be by barge to Skagway from Haines and then via a larger vessel to overseas smelters.<sup>5</sup>

One or more mines in the Yukon also could utilize the Haines Highway truck corridor and the Lutak Dock. This report examines the possibility of additional impacts from the currently operating [Minto Metals](#)<sup>6</sup> copper, gold, and silver mine approximately 155 road miles north of Whitehorse and from the potential [Nickel Shāw Project](#)<sup>7</sup> nickel, copper, platinum and other minerals mine located off the Alaska Highway approximately 20 miles northwest of Burwash Landing.

### *Mineral Extraction and Processing*

Industrial mining must separate copper and other minerals of value from the rocks they come from. To reduce transportation costs, some processing of the target minerals typically occurs near mines to produce ore concentrates. Mine developers transport ore concentrates from the

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<sup>2</sup> Constantine Metal Resources Ltd. (2022, Mar. 7). *Amended NI 43-101 Technical Report Palmer Project Alaska, USA* (p. 1-25). <https://minedocs.com/22/Palmer-PEA-Amended-03072022.pdf>

<sup>3</sup> American Pacific Mining Corp. (n.d.). *Palmer VMS Project*. <https://americanpacificmining.com/projects/palmer-vms-project/>

<sup>4</sup> *Ibid.*, p. 1-12.

<sup>5</sup> *Ibid.*, p. 18-22.

<sup>6</sup> Minto Metals (n.d.). <https://mintometals.com/>

<sup>7</sup> Nickel Creek Platinum (2023, Jan.). *Nickel Shāw Ni-PGM Project*. <https://www.nickelcreekplatinum.com/Home/default.aspx>

mines to smelters leaving waste materials behind. Smelters concentrate minerals further using heating and melting. For the mines transporting ore concentrates to Haines, the concentrates would be transported to the Lutak Dock via large covered trucks, some or most with multiple trailers, and then shipped to smelters.

## **Summary of Key Findings**

1. The round trip travel of 40-60 metric tonne trailer trucks carrying ore concentrates on the Haines Highway, passing through Haines to the Lutak Dock, and returning to their respective mines likely would have significant impacts on Haines residents' quality of life. Adverse impacts on Haines residents' quality of life are especially likely because of the relatively small number of trucks and other vehicles travelling on Haines roads currently.

The number of trucks passing daily through portions of Haines could increase by as much as 72% during 150 days each year, with 62 additional trucks if all three mines were operating (using current mine production estimates). Future mine production increases would result in greater impacts. These figures do not include the number of mine service vehicles that also would travel the truck corridor because those numbers are not readily quantifiable.

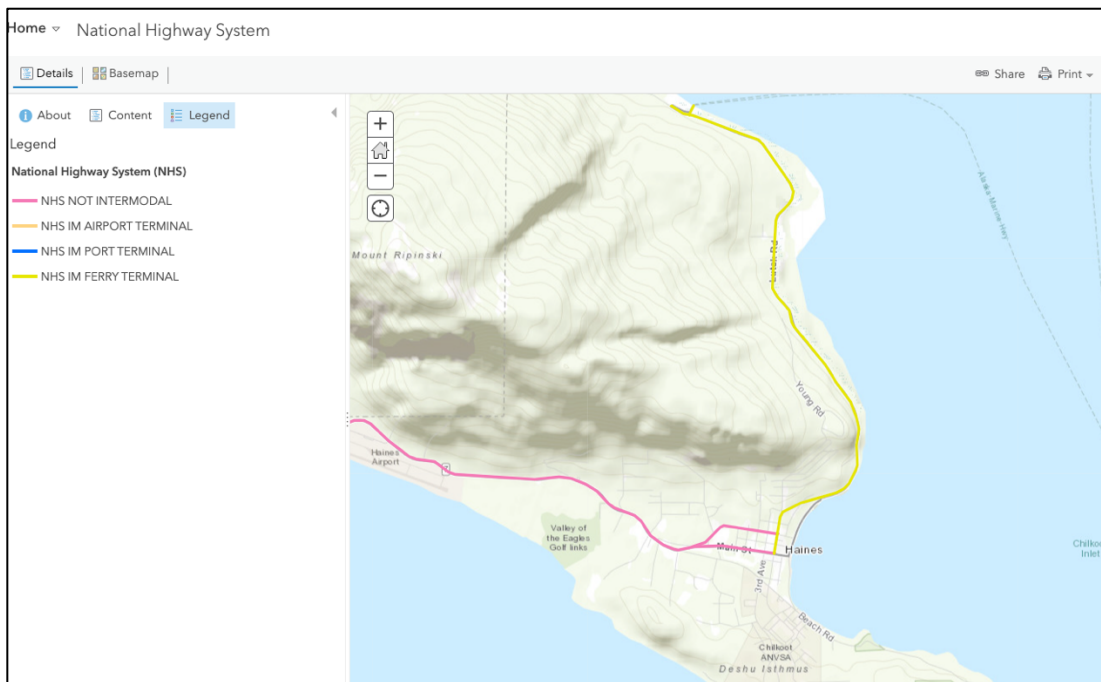
2. Ore concentrate trucks and mine service vehicles would:

- Increase road and bridge repair frequencies and State of Alaska costs,
- Affect the safety of people in other vehicles and people not in vehicles who are near the truck corridor, such as children on their way to school. There are approximately ten school bus stops on the Haines Highway where children could be impacted by trucks slowing down, stopping, or passing school buses in order to remain on schedule. For example, children often walk to/from bus stops in the dark when the surface condition of the highway could be compromised by snow and/or ice making truck traffic even more dangerous than during daylight. Additionally, because the truck corridor in downtown Haines, i.e., Union Street and Second Avenue, divides the residential area of town from the Haines School complex, children walking or riding bicycles to school would need to cross the truck route. In addition to trucks needing to be responsive to children and adults approaching or in crosswalks, trucks would expose children and adults to increased levels of exhaust, dust, and noise near crosswalks.
- Impact other vehicles' speeds when they cannot pass mining trucks. Conversely, trucks may travel at faster speeds than the comfort level of local traffic. There also may be adverse safety impacts from the "snow tornadoes" created by passing or oncoming trucks.
- Increase ambient noise for up to 16 hours a day,
- Likely result in ore concentrate spills or spills from other vehicles that could adversely impact fisheries and harvesting of subsistence foods,
- Increase animal collisions and injuries/roadkill, e.g., moose and eagles, proportionate to the percentage of increased vehicle movements,
- Potentially decrease Haines's appeal as a tourist and/or retiree destination and thus result in fewer local jobs and a decrease in local sales tax revenue, and

- Reduce property values near the highway and property tax revenues dependent on property values.

3. Figure 1 shows the Alaska Highway System (part of the National Highway System) corridor that large trucks must travel to/from and through Haines. The Alaska Department of Transportation and Public Facilities (Alaska DOT) operates and maintains this route including setting speed limits. The corridor's infrastructure would not need to be modified to allow ore concentrate trucks of appropriate sizes and weights to travel on it. All bridges on Alaska Highway System routes in Haines Borough are listed in Good or Fair condition. The recent Haines Highway reconstruction project, however, is experiencing significant concrete failures at 19 mile and should be evaluated with respect to the loads and weights expected from ore concentrate traffic.

**Figure 1**  
**Alaska Highway System Corridor for Truck Traffic**



4. Ore concentrate trucks generally do not travel for eight hours at night. If the trucks were operating 150 days per year with 62 round trips on those days, there would be roughly four ore trucks per hour or one ore truck passing by every 15 minutes for 16 hours each day. If they were operating 250 days per year with 38 round trips on those days, there would be roughly one truck passing by every 25 minutes for 16 hours each day. The number of trucks passing through Haines would depend on mine production rates, the size of the trucks used, the hours the trucks operated, and the number of trucking days each year.

5. Federal crash data for large trucks show that:

- Occupants of other vehicles were involved in 72% of large truck fatal crashes nationally during 2011-2020 and nonoccupants, e.g., pedestrians, were involved in 11%,
- 50% of fatal crashes of large trucks nationally in 2020 occurred on non-interstate arterial roads like the Haines Highway, Lutak Road, and Union Street, 18% on collector roads such as Main Street, and 13% on local roads, and
- Snow and sleet caused 50% of the large truck fatal crashes in Alaska in 2020, a much higher percentage than is the case nationally; Wyoming was second at 30%.

6. The Red Dog Mine in northwest Alaska utilizes trucks to transport zinc ore concentrate 55 miles to its port so the mine and port situation are similar to the Palmer Project. Spill data from the Alaska Department of Environmental Conservation for the Red Dog Mine show what could happen on the Haines Highway. Since 2014, there have been six truck rollovers resulting in concentrate releases from 6,000-145,000 lbs.

7. There are problems with how Alaska DOT ensures compliance with large truck requirements:

- Alaska is unique in not having a gross vehicle weight limit as long as trucks comply with axle, allowable vehicle configuration, and Federal Bridge Formula and individual bridge weight limits,
- There are no fixed inspection/weigh stations for large trucks or vehicles carrying hazardous materials entering Southeast Alaska from Canada via the Haines or Klondike Highways. These stations assess truck size and weight. The only border enforcement inspection and weighing station for trucks entering Alaska from Canada is in Tok,
- Alaska DOT may not know about all oversize and overweight vehicles on state highway system routes if oversize/overweight permits are not requested by large truck operators,
- Since the vast majority of large trucks within the state do not pass through Southeast Alaska, it is unclear how many Alaska DOT compliance and enforcement personnel currently are now, and in the future, focused on trucks traveling the Haines Highway, and
- The federal Motor Carrier Management Information System (MCMIS) database shows zero fatalities and injuries attributable to large trucks in Haines Borough for Calendar Years 2018-2022 and *zero roadside and traffic inspections for large trucks*.

8. In addition to direct adverse impacts from ore concentrate transportation by truck, there could be indirect adverse impacts as well. An ore truck caused a significant incident involving a 500 gallon diesel fuel spill that closed the Klondike Highway into and out of Skagway for several days during the winter of 2020.

9. The Urban Institute recently issued a comprehensive study entitled *The Polluted Life Near the Highway: A Review of National Scholarship and a Louisville Case Study*. The study presents research on the air, noise, and resulting health impacts from exposure to road and highway traffic including specific information on the impacts of large trucks. It provides strong evidence for the following conclusions:

“We organize scholarly evidence that shows that people living, working, and learning within 150 to 300 meters (about 500 to 1,000 feet) of highways are disproportionately

subject to dirty air and loud ambient noise. This, in turn, causes health problems, including lung disease, stroke, and premature birth. Roadways also tend to reduce the property values of nearby residences.”

Alaska law specifically requires residential property owners to provide buyers with a Disclosure Statement that includes the question, “Are you aware of any noise sources that may affect the property, including...traffic...?” These legal disclosures likely would reduce residential property values along the truck corridor.

Appendix A provides detailed answers to the questions posed to **LNE Engineering and Policy** by SHH and source documentation for these findings.

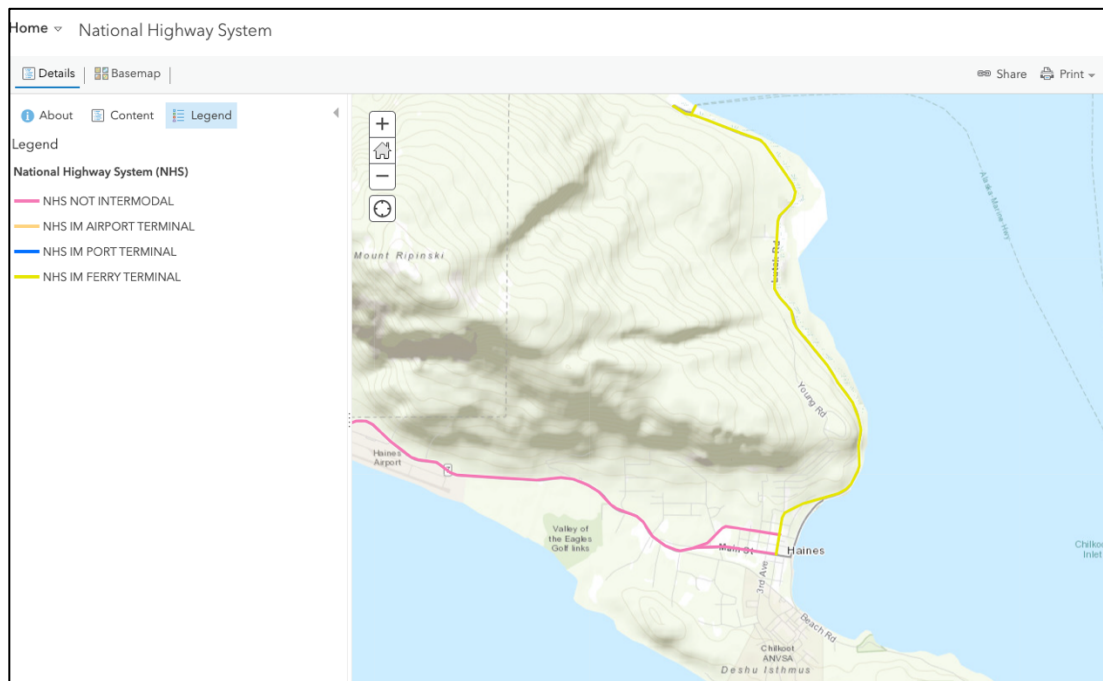
**APPENDIX A**  
**Answers to Questions Posed by Safe Haines Highways**

1. Does the portion of the trucking corridor encompassing Porcupine Crossing Bridge (Chilkat Lake Road intersection with the Haines Highway), Union Street, Second Avenue and Lutak Road meet State of Alaska and federal requirements for ore hauling vehicles and trailers with respect to weight, width, vehicle length, visibility, and the transport of hazardous substances?

Yes. As discussed below, the corridor would not need to be modified to allow ore concentrate trucks of appropriate sizes and weights to travel on it.

Figure 1, reprinted below, shows the Alaska State Highway System, part of the National Highway System, corridor from the Haines Highway, through Haines, to the Lutak Dock that large trucks must travel:<sup>8</sup>

**Figure 1**  
**Alaska Highway System Corridor for Truck Traffic**



The Alaska Department of Transportation and Public Facilities (Alaska DOT) operates, e.g., setting speed limits, and maintains these roads, not Haines Borough.

<sup>8</sup>AKDOT\_GIS (2020, Oct. 27). *National Highway System*.  
<https://akdot.maps.arcgis.com/home/webmap/viewer.html?webmap=b6c45b88412e48659e5d1ab7d8e187c3>

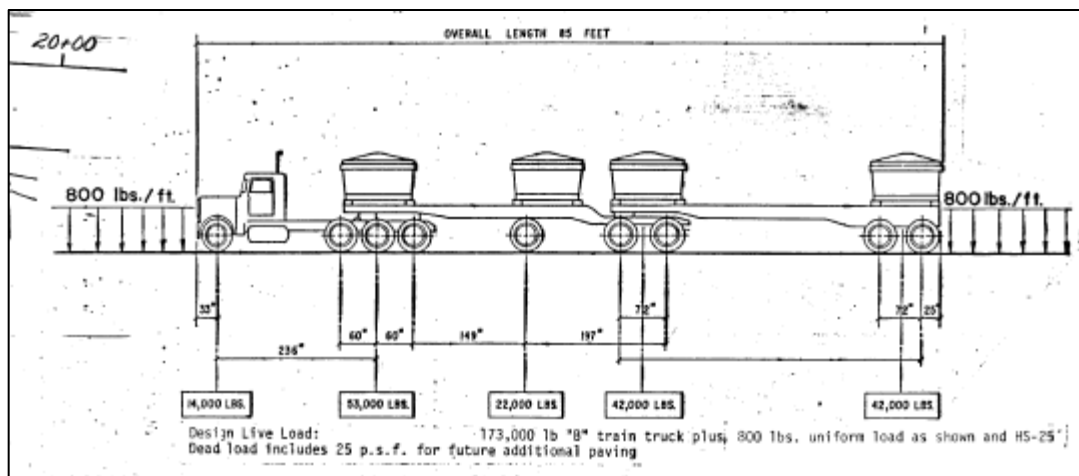


Federal<sup>9</sup> and state<sup>10</sup> requirements regulate large trucks. These requirements cover vehicle length, allowable weight on bridges which is calculated based on the number of axles, seasonal requirements, permits needed, and other factors including vehicle configurations (e.g., does a truck have one or two cargo trailers?). The requirements strengthen safety and minimize damage to roads and bridges.

Alaska law allows some large trucks to exceed certain federal limits. When requested by truck operators, Alaska DOT issues permits to overweight and oversize vehicles for *non-divisible* [emphasis added] loads that exceed Alaska weight limits up to 25 percent. These permits “establish time limitations for movement, designate routes, limit the number of trips, or otherwise restrict the movement of oversize or overweight vehicles and loads.”<sup>11</sup>

All bridges along the Alaska Highway System corridor to the Lutak Dock are designed to carry the load shown in Figure 2 which is known as a “B” train:<sup>12</sup>

**Figure 2**  
**Maximum Load for Freight Carried by the Alaska Highway System**



All bridges on Alaska Highway System routes in Haines Borough are in Good or Fair condition as shown in Table 1<sup>13</sup>, however, there may be an increase in road and bridge repair frequencies and State of Alaska costs due to increased use by these heavy vehicles.

<sup>9</sup> 49 CFR Parts 300-399.

<sup>10</sup> 17 AAC Chapter 25.

<sup>11</sup> 17 AAC 25.320.

<sup>12</sup> Information from Leslie Daugherty, PE, SE, Chief Bridge Engineer, Alaska DOT, February 22, 2023 (phone communication).

<sup>13</sup> Federal Highway Administration (2022). *Long-Term Bridge Performance (LTBP) Infobridge: Data*.

<https://infobridge.fhwa.dot.gov/Data/SelectedBridges> Select for State Name: Alaska, Owner Agency: State Highway Agency, and County Name: Haines.

**Table 1**  
**Haines Borough Bridges Owned/Operated by Alaska DOT**

1 - State Name	8 - Structure Number	22 - Owner Agency	3 - County Name	27 - Year Built	29 - Average Daily Traffic	6A - Features Intersected	7 - Facility Carried By Structure	CAT10 - Bridge Condition	Bridge Age (yr)
2 - Alaska	0387	State Highway Agency	100 - Haines Borou	1979	90	CHILKOOT RIVER	LUTAK SPUR	Fair	43
2 - Alaska	1216	State Highway Agency	100 - Haines Borou	2017	110	KLEHINI RIVER	PORCUPINE CROSSING	Good	5
2 - Alaska	0804	State Highway Agency	100 - Haines Borou	1984	43	HAINES FERRY TERMINAL	MARINE HWY ROUTE	Fair	38
2 - Alaska	0745	State Highway Agency	100 - Haines Borou	1991	110	BIG BOULDER CREEK	HAINES HIGHWAY	Good	31
2 - Alaska	0744	State Highway Agency	100 - Haines Borou	1991	110	LITTLE BOULDER CREEK	HAINES HIGHWAY	Good	31
2 - Alaska	0743	State Highway Agency	100 - Haines Borou	1999	160	MUNCASTER CREEK	HAINES HIGHWAY	Good	23
2 - Alaska	0742	State Highway Agency	100 - Haines Borou	1958	340	CHILKAT RIVER	HAINES HIGHWAY	Fair	64

## Regulatory and Enforcement Deficiencies

There are problems with how Alaska DOT ensures compliance with large truck requirements:

- Alaska is unique in not having a gross vehicle weight limit as long as trucks comply with axle, allowable vehicle configuration, and Federal Bridge Formula and individual bridge weight limits,
- There are no fixed inspection/weigh stations for large trucks or vehicles carrying hazardous materials entering Southeast Alaska from Canada via the Haines or Klondike Highways. These stations assess truck size and weight. The only border enforcement inspection and weighing station for trucks entering Alaska from Canada is in Tok,
- Alaska DOT may not know about all oversize and overweight vehicles on state highway system routes if oversize/overweight permits are not requested by large truck operators,
- Since the vast majority of large trucks within the state do not pass through Southeast Alaska, it is unclear how many Alaska DOT compliance and enforcement personnel currently are now, and in the future, focused on trucks traveling the Haines Highway, and
- The federal Motor Carrier Management Information System (MCMIS) database shows zero fatalities and injuries attributable to large trucks in Haines Borough for Calendar Years 2018-2022 and *zero roadside and traffic inspections for large trucks*.<sup>14</sup>

<sup>14</sup> Federal Motor Carrier Safety Administration (2023, Mar. 31). MCMIS data are preliminary for 22 months to allow for changes. <https://ai.fmcsa.dot.gov/gis/tools/safetysurvey/> Zoom in on Alaska, select MCMIS, Report Options, Year, and Vehicle Type (Large Truck) and hover over Haines Borough for data.

The Klondike Highway has a weigh-in-motion (WIM) site at MP 2.5 that can measure approximate axle weights as vehicles move across pavement sensors. According to Alaska DOT, “a WIM site has been desired on the Haines Highway for a long time,”<sup>15</sup> A Haines Highway WIM site appeared in the 2016-2019 Statewide Transportation Improvement Program (STIP) approved by US Department of Transportation (US DOT) for federal matching funds, however the Haines Highway WIM site was not funded by Alaska and has not appeared in more recent STIP documents.

2. *Provide a review of the accident/incident records of ore-hauling vehicles/tractors/trailers on other public and private roads in Alaska, or in similar areas outside of the State.*

State and federal accident/incident, also known as crash data do not break out ore-hauling vehicles/tractors/trailers from data for other large trucks. Alaska DOT collects crash data for large trucks that it provides to the US DOT which extensively analyzes those data.

Recent national and state crash and fatality data analyses for large trucks can be explored using a very helpful interactive US DOT dashboard.<sup>16</sup> The dashboard breaks out fatal crash data by numerous characteristics. Key takeaways include:

- Occupants of other vehicles were involved in 72% of large truck fatal crashes nationally during 2011-2020 and nonoccupants, e.g., pedestrians, were involved in 11%,<sup>17</sup>
- 50% of fatal crashes of large trucks nationally in 2020 occurred on non-interstate arterial roads like Haines Highway, Lutak Road, and Union Street, 18% on collector roads such as Main Street, and 13% on local roads,<sup>18</sup>
- Snow and sleet caused 50% of the large truck fatal crashes in Alaska in 2020, a much higher percentage than is the case nationally; Wyoming was second at 30%,<sup>19</sup>
- 8% of fatalities in crashes were attributable to large trucks from 2011-2020 in Alaska (55/694), which is at the lower end among states,<sup>20</sup> and
- A very low percentage of fatal crashes attributable to large trucks in Alaska and nationally 2020 involved alcohol impairment.<sup>21</sup>

The Federal Motor Carrier Safety Administration collects large truck crash and inspection data from states that can be viewed in the MCMIS database. MCMIS shows zero fatalities and

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<sup>15</sup> Lisa Idell-Sassi, Alaska DOT, February 17, 2023 (email communication).

<sup>16</sup> National Highway Traffic Safety Administration (2023, Apr. 4). *Large Trucks*.

[https://explore.dot.gov/views/DV\\_FARS\\_LRT/Home?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y](https://explore.dot.gov/views/DV_FARS_LRT/Home?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y)

<sup>17</sup> *Ibid.*

<sup>18</sup> NHTSA, *op. cit. Fatal Crashes Involving Large Trucks, by Environmental Characteristics*.

[https://explore.dot.gov/views/DV\\_FARS\\_LRT/EnvironmentalCharacteristics?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y](https://explore.dot.gov/views/DV_FARS_LRT/EnvironmentalCharacteristics?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y)

<sup>19</sup> *Ibid.*

<sup>20</sup> NHTSA, *op. cit. Large Trucks*.

<sup>21</sup> NHTSA, *op. cit. Alcohol Involvement of Large-Truck Drivers in Fatal Crashes*.

[https://explore.dot.gov/views/DV\\_FARS\\_LRT/Alcohol?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y](https://explore.dot.gov/views/DV_FARS_LRT/Alcohol?%3Aembed=y&%3Aiid=1&%3AisGuestRedirectFromVizportal=y)

injuries attributable to large trucks in Haines Borough for Calendar Years 2018-2022.<sup>22</sup> Non-normalized data on fatal and non-fatal large truck crashes by state also are available from MCMIS.<sup>23</sup>

An ore truck caused a significant incident on the Klondike Highway during the winter of 2020. This incident showed there are indirect adverse effects of ore transportation by large trucks as well as direct. According to The Skagway News:<sup>24</sup>

“What we found out was that the ore truck was trying to get back to Whitehorse as quickly as possible and it ended up stalling up and not being able to make the hill,” [Skagway Police Sgt. Ken] Cox said. The driver stopped at the 11 Mile, just below Moore Bridge, to put on his chains. The fuel truck attempted to pass the ore truck because he feared that his heavy vehicle would get stuck in the snow.

“He was afraid if he stopped he wouldn’t be able to get started again,” Cox said. “He attempted to go around that vehicle (and) as he was getting right up alongside the vehicle, he has a rear pup trailer that is also full of fuel, it hit the side dump of that ore truck trailer and punctured the tank.”

The fuel truck spilled 500 gallons of diesel fuel. The Klondike highway into and out of Skagway was closed for several days.<sup>25</sup>

The Red Dog Mine near Kivalina, Alaska produces zinc ore concentrate and has had spills during the many years of its operation from the ore concentrate trucks travelling to the mine’s port. According to the Alaska Department of Environmental Conservation’s (DEC’s) website focused on contamination of the entire Red Dog Mine Road:<sup>26</sup>

“The mine started operation in 1989 and is currently scheduled to operate until at least 2032...truck rollovers ha[ve] resulted in zinc, lead, and cadmium contamination of those areas and along the 55 mile connecting road. The areas impacted by the releases includes land owned by NANA, the State of Alaska, and the federal government (Cape Krusenstern National Monument)...The mine continues to monitor, assess the risks, and clean up past and ongoing spills and releases of ore concentrate. The ore concentrate collected as part of the cleanup is reprocessed at the mine. The mine continues to take steps to reduce the releases of ore concentrate during the transport of it from the mine to barges at the port. Ongoing site

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<sup>22</sup> FMCSA, *op. cit.*

<sup>23</sup> Federal Motor Carrier Safety Administration (2023, Mar. 31). MCMIS data are preliminary for 22 months to allow for changes. <https://ai.fmcsa.dot.gov/CrashStatistics/rptSummary.aspx>. Select **Large Trucks**.

<sup>24</sup> De Angelus, A. (2020, Jan. 26). Klondike Highway closed road after fuel spill. *The Skagway News*.

<https://skagwaynews.com/2020/01/26/fuel-spill-on-klondike-highway-road-closure-indefinite/>

<sup>25</sup> --- (2020, Jan. 28). South Klondike Highway remains closed. *Whitehorse Daily Star*.

<https://www.whitehorsestar.com/News/south-klondike-highway-remains-closed-1>

<sup>26</sup> Alaska Department of Environmental Conservation (2023). *Site Report: Red Dog Mine*.

<https://dec.alaska.gov/applications/spar/publicmvc/csp/sitereport/1423>

work includes cleanup of ore concentrate releases and spills on and along the road and at the port area...”

Table 2 shows the results of a search of Alaska DEC’s spills database for “rollovers” associated with the Red Dog Mine. The rollover data are incomplete as not all rollover or other spills are reported using the same identifying characteristics, nor were spills prior to 2014 available. Table 2 shows six truck rollover spills since 2014, mostly very large spills of zinc concentrate:<sup>27, 28</sup>

**Table 2**  
**Alaska DEC Spill Data on the Red Dog Mine Road**

SPILL NUMBER	SPILL NAME	SPILL DATE	FACILITY NAME
20389936501	DeLong Mtn Logistics 3 ton concentrate spill MP 21	12/30/2020	Port road, Mile 21
20389927202	Red Dog Mine 50k Lb Zinc Concentrate	9/30/2020	Red Dog Mine - Buddy Creek
19389917101	Red Dog Mine 36k Lbs Zinc Concentrate	6/20/2019	Teck Alaska Inc., Red Dog Operations
16389936601	Red Dog Mine MP 49 10000lbs Zinc Con.	12/31/2016	Red Dog Mine, near Material Site 13
15389927601	Red Dog Port Rd Zn concentrate truck rollover	10/3/2015	Port Road
14389923201	Red Dog Zinc Concentrate Trailer Release	8/20/2014	Haul Road

3. Estimate the number of round trips per day based on the Palmer Project, Minto Mine, and one or more other Yukon mines given the average ore tonnage produced for shipment currently or forecast by the companies in their promotional literature.

The three mine projects analyzed in this document are the Palmer Project (exploratory, Haines Borough), Minto Mine (operating, Yukon), and the Nickel Shāw Project (exploratory, Yukon). The number of trucks per day passing through Haines would depend on mine production rates, the size of the trucks used, and the number of allowable trucking days. The ore concentrate truck projections in this document do not include the number of mine service vehicles that would travel along the same truck corridor.

<sup>27</sup> Alaska Department of Environmental Conservation (n.d.). *PPR Spills Database Search*. [https://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch?Spill\\_DateFrom=&Spill\\_DateTo=4%2F4%2F2023&Spill\\_Area=3&Spill\\_Subarea=9&Spill\\_Region=47&Spill\\_Location=665&Spill\\_SubstanceType=&Spill\\_Substance=&Spill\\_CauseType=1&Spill\\_Cause=21&Spill\\_Number=&Spill\\_SearchButton=Search&Search\\_Type=Facility&Facility\\_FacilityName=&Facility\\_Address=&Facility\\_City=&Facility\\_ZipCode=&Facility\\_FacilityType=&Affiliate\\_CompanyName=Red+Dog&Affiliate\\_ContactName=](https://dec.alaska.gov/Applications/SPAR/PublicMVC/PERP/SpillSearch?Spill_DateFrom=&Spill_DateTo=4%2F4%2F2023&Spill_Area=3&Spill_Subarea=9&Spill_Region=47&Spill_Location=665&Spill_SubstanceType=&Spill_Substance=&Spill_CauseType=1&Spill_Cause=21&Spill_Number=&Spill_SearchButton=Search&Search_Type=Facility&Facility_FacilityName=&Facility_Address=&Facility_City=&Facility_ZipCode=&Facility_FacilityType=&Affiliate_CompanyName=Red+Dog&Affiliate_ContactName=)

<sup>28</sup> Downloaded data from Alaska DEC PPR Spills Database confirm the size of four of these six spills. For two of the spills, however, downloaded data show the following differences from the Table 2 results: the 6/20/2019 release is listed as 5,300 lbs. and the 12/31/2016 release is listed as 145,200 lbs. of zinc concentrate. It is unclear why there are these discrepancies in spill amounts.

The Municipality of Skagway hired contractors a number of years ago to estimate the number of ore trucks and ships needed for different quantities of ore export. Table 3 (Table 6-1 in Skagway’s report) shows these estimates.<sup>29</sup>

**Table 3**  
**Trucking Needs for Different Annual Quantities of Ore Concentrate**

Annual Tonnes Shipped	Typical Shipping Lot Size	Number of Ships per Year	Minimum Tonnes Stored	Number of 120-foot Storage Bays	Number of 50-tonne Trucks per Year	Number of 50-tonne Trucks per Day 250 d/yr	Number of 50-tonne Trucks per Day 150 d/yr
60,000 <sup>1</sup>	13,000	4.6	20,000	2.7	1,200	5	8
100,000 <sup>2</sup>	13,000	7.7	40,000	5.5	2,000	8	13
140,000 <sup>3</sup>	13,000	10.9	60,000	8.2	2,800	11	19
180,000 <sup>4</sup>	13,000	13.6	80,000	10.9	3,600	15	24
220,000 <sup>4</sup>	13,000	16.9	100,000	13.6	4,400	18	30
260,000 <sup>5</sup>	13,000	20.0	120,000	16.4	5,200	21	35
300,000 <sup>6</sup>	13,000	23.1	140,000	19.1	6,000	24	40
300,000+	13,000						

Notes: Assumes average shipment: 13,000 tonnes, storage 20,000 tonnes, and density of 160 pounds per cubic foot.  
 1 truck per 15 minutes at 16 hours per day maximum = 64 trucks per day.  
 Yukon study allowed 350 trucks per day for highway.  
 Sherwood 180-foot bay stores 13,000 tonnes with heavy dozing but more cost effective at 11,000 tonnes.  
 Capacity of 120-foot bay = 7,333 tonnes.  
 Striped area indicates possible demurrage constraint.

<sup>1</sup> Existing Sherwood Minto.  
<sup>2</sup> Extended building to end of pad (720-foot length).  
<sup>3</sup> Extended building to north on new foundation.  
<sup>4</sup> Add new building beside existing (relocate service station).  
<sup>5</sup> Extend second building (relocate tank farm).  
<sup>6</sup> Consider off-site storage.

Using the methodology in this table, if the “Annual [Metric] Tonnes Shipped” of concentrate is known, the number of trucks needed per year can be calculated, and that number can be converted to trucks per day. Since trucks return to mines without cargo, the number of trucks calculated per day must be doubled to estimate the number of highway trips.

To analyze the truck traffic likely to occur on the Haines Highway that would pass through Haines to reach the Lutak Dock, we need to know the estimated annual tonnes of concentrate likely to be shipped by each mine. According to calculations of concentrate produced contained in a study analyzing the Palmer Project’s Preliminary Economic Assessment (PEA) from 2019, American Pacific Mining Corporation/Dowa Metals Palmer Project would produce 363 ktonnes of copper concentrate and 790 ktonnes of zinc concentrate over 11 years of operations<sup>30</sup> or 105,000 tonnes annually.

<sup>29</sup> Municipality of Skagway (September 2008). *Skagway Port Development Plan* (p. 6-4).

[https://www.skagway.org/sites/default/files/fileattachments/clerk039s\\_office/page/28411/1\\_final\\_report\\_skagway\\_port\\_development\\_plan\\_reduced\\_size.pdf](https://www.skagway.org/sites/default/files/fileattachments/clerk039s_office/page/28411/1_final_report_skagway_port_development_plan_reduced_size.pdf)

<sup>30</sup> Rivers Without Borders (2020, Mar. 18). *Technical Review of Constantine Metal Resources Ltd, Palmer Project, Alaska, USA, NI 43-101 Technical Report* (p. 7 and Appendix B).

The amended PEA from 2022 states that the Palmer Project would utilize 40 tonne trucks to transport ore concentrate to the Lutak Dock, then it would barge the concentrate to an ore terminal in Skagway.<sup>31</sup> With 150 days per year of ore transport, an estimated 17 ore concentrate trucks would travel round trip each day from the Palmer Project; with 250 days per year of ore transport there would be 10 ore concentrate trucks round trip each day. If the mine exports barite concentrate as a byproduct of the copper and zinc project, a “highly novel” mining plan as “there are no other identifiable producers of barite that produce it as a byproduct,”<sup>32</sup> there would be additional trucks transporting concentrate from the Palmer Project to the Lutak Dock.

Until March 2023 when the Skagway Ore Terminal was shut down, the Minto Mine owned by Minto Metals exported 40,000 tonnes per year of copper concentrate from Skagway to Japan<sup>33</sup> using 60 tonne tandem side-dump trailers.<sup>34</sup> With 150 days per year of ore transport, an estimated 4 ore concentrate trucks would travel round trip each day from the Minto Mine; with 250 days per year of ore transport there would be 3 ore concentrate trucks round trip each day.

The Nickel Shāw Project (formerly the Wellgreen Project) expects to produce nickel, copper, and platinum group metals. The deposit was discovered in 1952 however the mine only produced ore in 1972-73 and it has had many different owners. The current owner is Nickel Creek Platinum Corporation. An Alaska Industrial Development and Export Authority 2021 report stated that the Nickel Shāw Project could produce 57,000 tonnes per year of concentrate.<sup>35</sup> Assuming ore concentrate trucks of 40 tonnes, similar to the proposed Palmer Project, with 150 days per year of ore transport, an estimated 10 ore concentrate trucks would travel round trip each day from the Nickel Shāw Mine; with 250 days per year of ore transport there would be 6 ore concentrate trucks round trip each day.

Based on the above truck numbers, Table 4 summarizes the projected daily ore concentrate truck trips travelling along the Haines Highway to and from the Lutak Dock if all three mines were in operation. Since trucks generally do not travel for eight hours at night, if they were operating 150 days per year, there would be roughly four ore concentrate trucks per hour in total or one truck passing by roughly every 15 minutes on those days. If they were operating 250 days per year, there would be in total roughly one truck passing by roughly every 25 minutes.

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<https://static1.squarespace.com/static/5f1f1abd3074810bbe085953/t/5f207b179eb94c7ad743b5fa/1595964212351/Kuipers-Review-Constantine-Palmer-Project-PEA-Final-032020.pdf>

<sup>31</sup> Constantine Metal Resources Ltd., *op. cit.* (p. 18-22).

<sup>32</sup> Rivers Without Borders, *op. cit.* (p. 3).

<sup>33</sup> Alaska Industrial Development and Export Authority (2021, Oct.). *Skagway Ore Terminal: Evaluation – Final Report* (p. 2).

[https://www.aidea.org/Portals/0/Meeting%20Docs/2021BoardMeetings/102721/6.D Skagway Ore Terminal Evaluation Report.pdf](https://www.aidea.org/Portals/0/Meeting%20Docs/2021BoardMeetings/102721/6.D%20Skagway%20Ore%20Terminal%20Evaluation%20Report.pdf)

<sup>34</sup> *Ibid.* (p. 26).

<sup>35</sup> *Ibid.* (p. 23).

**Table 4**  
**Projected Daily Ore Concentrate Truck Trips in Both Directions**

<b>Mine</b>	<b>Size of Ore Concentrate Truck</b>	<b># trucks/day, both directions, operating 150 days/year</b>	<b># trucks/day, both directions, operating 250 days/year</b>
Palmer	40 tonne	34	20
Minto	60 tonne	8	6
Nickel Shāw	40 tonne	20	12
<b>Total</b>		<b>62</b>	<b>38</b>

4. *Generally and comprehensively characterize safety concerns from the sharing of the corridor between ore-hauling vehicles and the traffic from local commuters, businesses, school buses, independent travelers, pedestrians, bicycles, and tour industry vehicles at multiple times of the year.*

Ore concentrate trucks and mine service vehicles would share the corridor with local commuters, businesses and their customers, school buses, independent travelers, pedestrians, bicycles, and tour industry vehicles. It is reasonable to assume that significantly increased numbers of large trucks on the route means increased interactions with other vehicles and those not in vehicles who are using or are near the route.

#### **Adverse Impacts on Corridor Users and Others Near the Route**

Ore concentrate truck and mine service vehicle interactions with other vehicles and those not in vehicles would:

- Affect the safety of people in other vehicles and people not in vehicles who are near the truck corridor, such as children on their way to school. There are approximately ten school bus stops on the Haines Highway where children could be impacted by trucks slowing down, stopping, or passing school buses in order to remain on schedule. For example, children often walk to/from bus stops in the dark when the surface condition of the highway could be compromised by snow and/or ice making truck traffic even more dangerous than during daylight. Additionally, because the truck corridor in downtown Haines, i.e., Union Street and Second Avenue, divides the residential area of town from the Haines School complex, children walking or riding bicycles to school would need to cross the truck route. In addition to trucks needing to be responsive to children and adults approaching or in crosswalks, trucks would expose children and adults to increased levels of exhaust, dust, and noise near crosswalks.
- Impact other vehicles' speeds when they cannot pass mining trucks. Conversely, trucks may travel at faster speeds than the comfort level of local traffic. There also may be



adverse safety impacts from the “snow tornadoes” created by passing or oncoming trucks.

- Increase ambient noise for up to 16 hours a day during the time large trucks operate,
- Increase animal collisions and injuries/roadkill, e.g., moose and eagles, proportionate to the percentage of increased vehicle movements,

The environmental and human impacts of increased truck traffic were not analyzed in the 2016 Haines Highway MP 3.5 to MP 25.3 Environmental Assessment even though a strong case could be made that they should have been. The EA states:<sup>36</sup>

“The two mining prospects currently in exploration closest to tidewater in Haines are the Constantine Mine, in the Haines Borough and the Wellgreen Platinum Mine in the Yukon near the Alaska Highway Beaver Creek border station (see Figure 4-21.1). Both mines have confirmed they are in exploration to determine if ore production is feasible. Neither has made a commitment to produce ore or is at a stage in development where they could make a decision to produce ore.□ Neither mine is currently authorized to develop facilities for the extraction nor production of minerals, and additional review and approval processes would be required for those types of activities. *The use of Haines Highway to haul ore is not a reasonably foreseeable future action*” [emphasis added].

### **How Much Increased Traffic Would There Be?**

Figure 3 shows the locations near Haines where Alaska DOT has Annual Average Daily Traffic (AADT) stations and where there is a Continuous Count Station (CCS).<sup>37</sup> AADT measures traffic in both directions at a specific location.

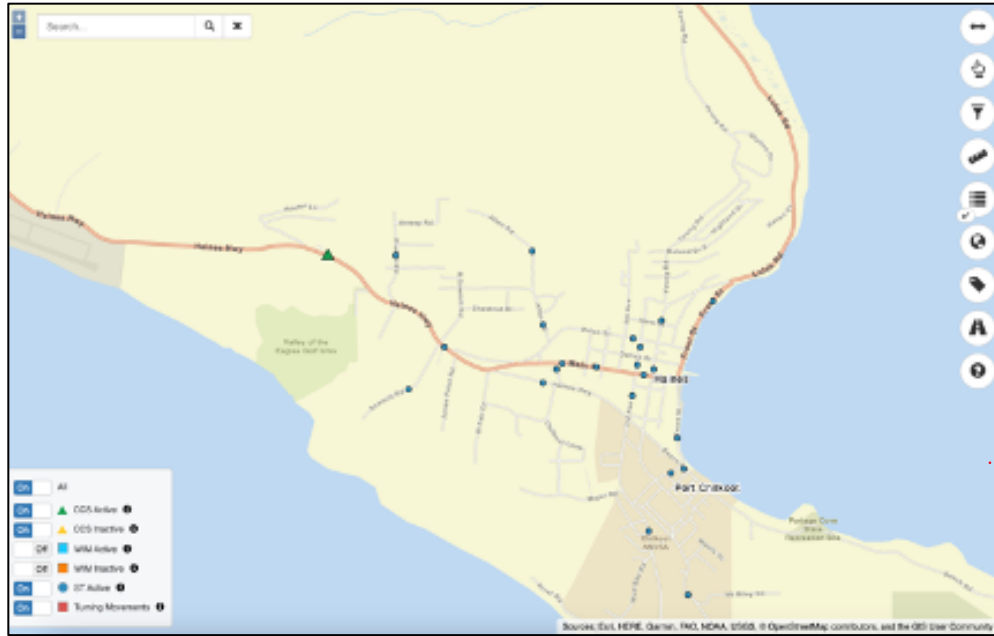
Table 5 shows 2021 traffic and truck data from Alaska DOT for six locations in Figure 3 along the truck corridor. The table also shows the projected percentage increases if 62 ore concentrate trucks (see Table 4) passed these points 150 days each year. These percentage increases *do not include increased traffic from mine service vehicles*. Table 5 shows that while overall AADT would not increase significantly, the percentage increases in trucks along the corridor for 150 days per year would be high.

### **Figure 3 Map Showing Traffic Monitoring Near Haines**

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<sup>36</sup>Alaska Department of Transportation and Public Facilities (2016, Aug.). *Haines Highway MP 3.5 to 25.3, Haines, Alaska: Final Revised Environmental Assessment, Finding of No Significant Impact, and Section 4(f) Evaluation* (p. 210). [https://dot.alaska.gov/sereg/projects/haines\\_hwy/assets/8.15.2016/02\\_FRE\\_A\\_5-15-2016.pdf](https://dot.alaska.gov/sereg/projects/haines_hwy/assets/8.15.2016/02_FRE_A_5-15-2016.pdf)

<sup>37</sup> Alaska Department of Transportation and Public Facilities (n.d.). *Alaska Traffic Data*. <https://alaskatraficdata.drakewell.com/publicmultinodemap.asp> Zoom in to Haines.



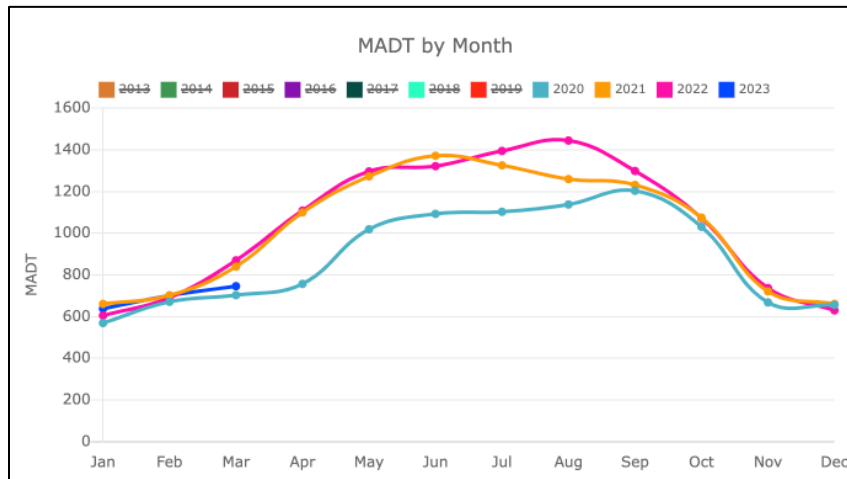
**Table 5**  
**2021 Traffic and Truck Data and the Potential Percentage Increases with Ore Trucks**

<b>Station ID and Location</b>	<b>AADT</b>	<b>Percent increase in AADT w/ore trucks (150 days/yr)</b>	<b>2021 trucks</b>	<b>2021 trucks plus ore trucks (during 150 days/yr)</b>
<b>Station ID:</b> 16100002, Haines Highway	1,020	2.5%	10%	61%
<b>Station ID:</b> 67017096, Haines Highway between Old Haines Highway & Sawmill Rd.	720	3.5%	16%	54%
<b>Station ID:</b> 67017097, Main St. between 6 <sup>th</sup> Ave. and Allen Rd.	860	3.0%	10%	72%
<b>Station ID:</b> 61017099, Main St. between 2 <sup>nd</sup> Ave. and 3 <sup>rd</sup> Ave.	1,050	2.4%	NA	-
<b>Station ID:</b> 61078085, Union St. between 6 <sup>th</sup> Ave. and Front St.	470	5.4%	NA	-
<b>Station ID:</b> 61078082, 2 <sup>nd</sup> Ave./Lutak Rd. between Union St. and Front St.	860	3.0%	NA	-

The Haines Highway CCS location south of the airport contains the most complete traffic data. Figure 4 shows Monthly Average Daily Traffic (MADT) for the Haines Highway CCS location south of the airport.<sup>38</sup> Figure 4 shows the highest traffic counts going into AADT occur from April until October.

<sup>38</sup> Alaska Department of Transportation and Public Facilities (n.d.). *ADT Charts Report AKDOT\_CCS 000016100002*.  
[https://alaskatraficdata.drakewell.com/adcharts.asp?node=AKDOT\\_CCS&cosit=000016100002&minyear=2013&maxyear=2023](https://alaskatraficdata.drakewell.com/adcharts.asp?node=AKDOT_CCS&cosit=000016100002&minyear=2013&maxyear=2023)

**Figure 4**  
**Monthly Average Daily Traffic for Haines Highway South of Haines Airport**



**How Would Increased Truck Traffic Impact School Bus Stops?**

AADT data from Alaska DOT for 2021 shows 200 or fewer vehicles on Haines Highway north of the Wells Bridge in both directions, 400 or fewer vehicles from the Wells Bridge to Haines Airport in both directions, and 1,020 vehicles south of the airport in both directions.<sup>39, 40</sup> Figure 5 shows Haines Highway school bus stop locations. If 62 additional ore concentrate trucks and an unknown number of mine service vehicles were added on 150 days (see Table 4), there would be at least 13% more vehicles on Haines Highway north of the Wells Bridge which would represent the greatest impact, 6% more vehicles from the Wells Bridge to Haines Airport, and 2.5% more vehicles south of the airport.

The greatest percentage increases in vehicles on Haines Highway would occur from November through March when traffic is less than during the other months (see Figure 4). These are the months when roads are most impacted by snow and ice conditions.

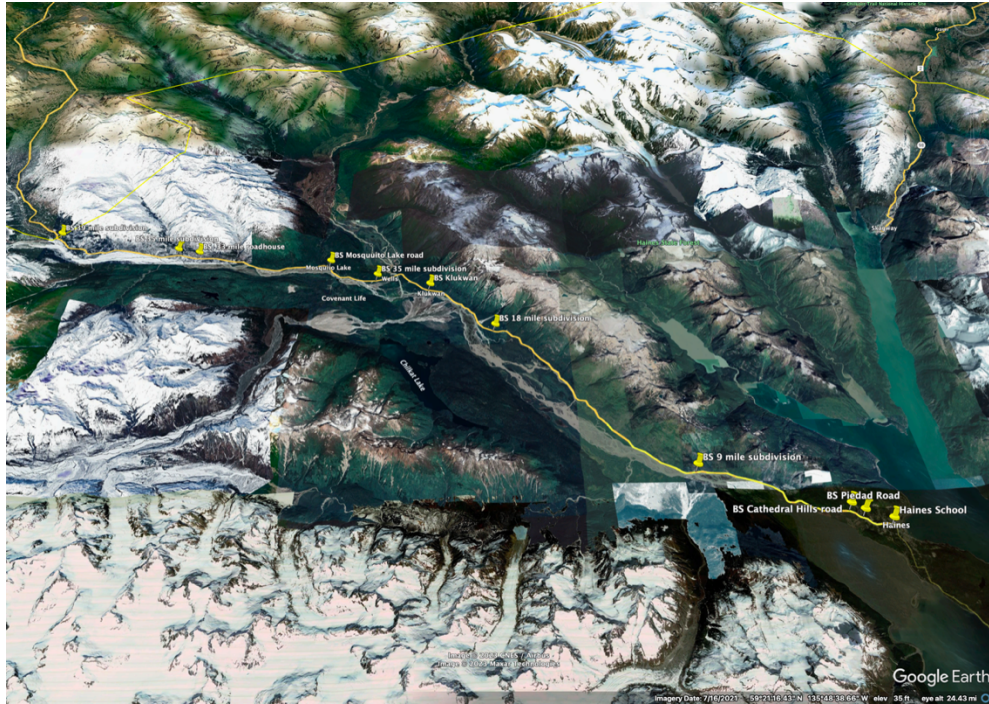
**Figure 5**  
**Haines Highway School Bus Stop Locations**

<sup>39</sup> Hover over the AADT stations on the *Alaska Traffic Data* website:

<https://alaskatraficdata.drakewell.com/publicmultinodemap.asp> Zoom in to Haines.

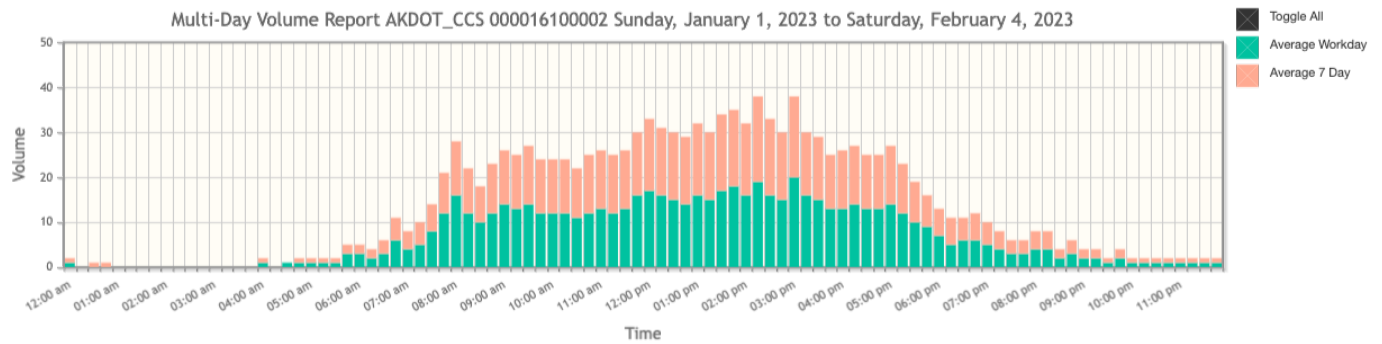
<sup>40</sup> Note that 2021 and 2022 data are less than pre-pandemic levels of traffic. See the yearly data analyses for the Haines Highway CCS location south of the airport at

[https://alaskatraficdata.drakewell.com/adcharts.asp?node=AKDOT\\_CCS&cosit=000016100002&minyear=2013&maxyear=2023](https://alaskatraficdata.drakewell.com/adcharts.asp?node=AKDOT_CCS&cosit=000016100002&minyear=2013&maxyear=2023).



In addition to the time of year of truck movements, the time of day of truck movements has impacts on school bus stop safety. As shown in Figure 6’s data from the Haines Highway CCS location south of the airport, traffic is greatest from 6 am to 10 pm. Ore concentrate trucks would add to this traffic. Workday/school day traffic currently is highest at 8 am and from 12-3 pm:<sup>41</sup>

**Figure 6**  
**Haines Highway CCS: Average Traffic Volume by Hour, 1/1/23 – 2/4/23**



Large trucks require significantly more time and space to stop for pedestrians or other vehicles than passenger cars and pickup trucks. According to a factsheet issued by the State of Utah (see Appendix B), for vehicles travelling 65 mph under ideal road conditions, a passenger vehicle

<sup>41</sup> Alaska Department of Transportation and Public Facilities (2023). *Multi-Day Volume Report*. [https://alaskatraficdata.drakewell.com/tfdaysreport.asp?node=AKDOT\\_CCS&cosit=000016100002&reportdate=2023-01-01&enddate=2023-04-06&graphtype=2&hidden=1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35](https://alaskatraficdata.drakewell.com/tfdaysreport.asp?node=AKDOT_CCS&cosit=000016100002&reportdate=2023-01-01&enddate=2023-04-06&graphtype=2&hidden=1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35)

weighing 4,000 pounds requires 316' to stop and a tractor-trailer weighing 80,000 pounds requires 525' to stop. Because the Haines Highway speed limit is 55 mph, these stopping distances would need to be adjusted, however there still would be large differences in stopping distances for large trucks vs. passenger vehicles even at slower speeds. During much of the year the road conditions would not be considered ideal and the stopping distance for large trucks would be even greater.

5. *Generally and comprehensively characterize the potential impacts on property values, local tax revenues, local economy, subsistence use, and health concerns due to increased levels of noise, particulate pollution, vibration and odor. Compare to other similar communities if data are available.*

In November 2022, the Urban Institute issued a comprehensive study entitled *The Polluted Life Near the Highway: A Review of National Scholarship and a Louisville Case Study*.<sup>42</sup> Appendix C contains key excerpts and details from this study that should be reviewed by readers of this report.

The study presents research on the air, noise, and resulting health impacts from exposure to road and highway traffic, including specific information on the impacts of large trucks. It provides strong evidence for the following conclusions:

“We organize scholarly evidence that shows that people living, working, and learning within 150 to 300 meters (about 500 to 1,000 feet) of highways are disproportionately subject to dirty air and loud ambient noise. This, in turn, causes health problems, including lung disease, stroke, and premature birth. Roadways also tend to reduce the property values of nearby residences.”<sup>43</sup>

Ore concentrate spills or spills from other vehicles could adversely impact fisheries and harvesting of subsistence foods, and decrease Haines' appeal as a tourist and/or retiree destination and thus result in fewer local jobs and a decrease in local sales tax revenue. If property values fall, local tax revenues also will fall as property values decrease. Notably, Alaska law specifically requires residential property owners to provide buyers with a Disclosure Statement that includes the question, “Are you aware of any noise sources that may affect the property, including...traffic...?”<sup>44</sup> Such legal disclosures likely would reduce residential property values along the truck corridor.

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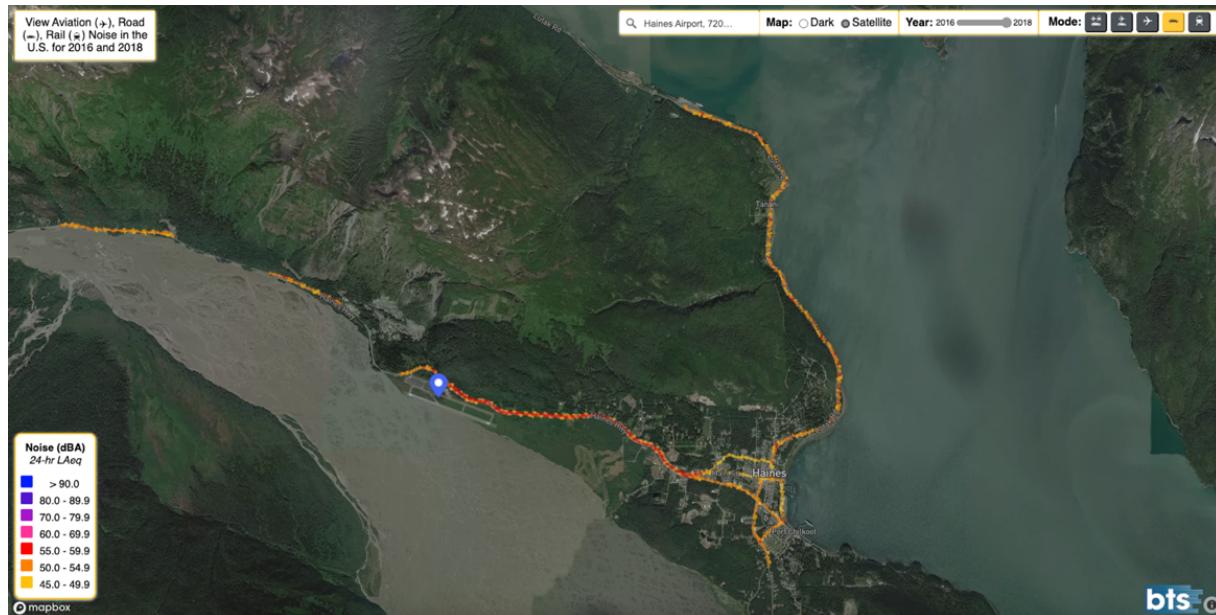
<sup>42</sup> Urban Institute (2022, Nov.). *The Polluted Life Near the Highway: A Review of National Scholarship and a Louisville Case Study*. <https://www.urban.org/sites/default/files/2022-11/The%20Polluted%20Life%20Near%20the%20Highway.pdf>

<sup>43</sup> *Ibid.* (p. 1).

<sup>44</sup> Alaska Department of Commerce, Community, and Economic Development (2021, Dec.). *State of Alaska Residential Real Property Transfer Disclosure Statement* (p. 11). <https://www.commerce.alaska.gov/web/portals/5/pub/rec4229.pdf>

Figure 7 from the Bureau of Transportation Statistics shows road noise levels near Haines as of 2018.<sup>45</sup>

**Figure 7**  
**National Transportation Noise Map Selecting for Road Noise**



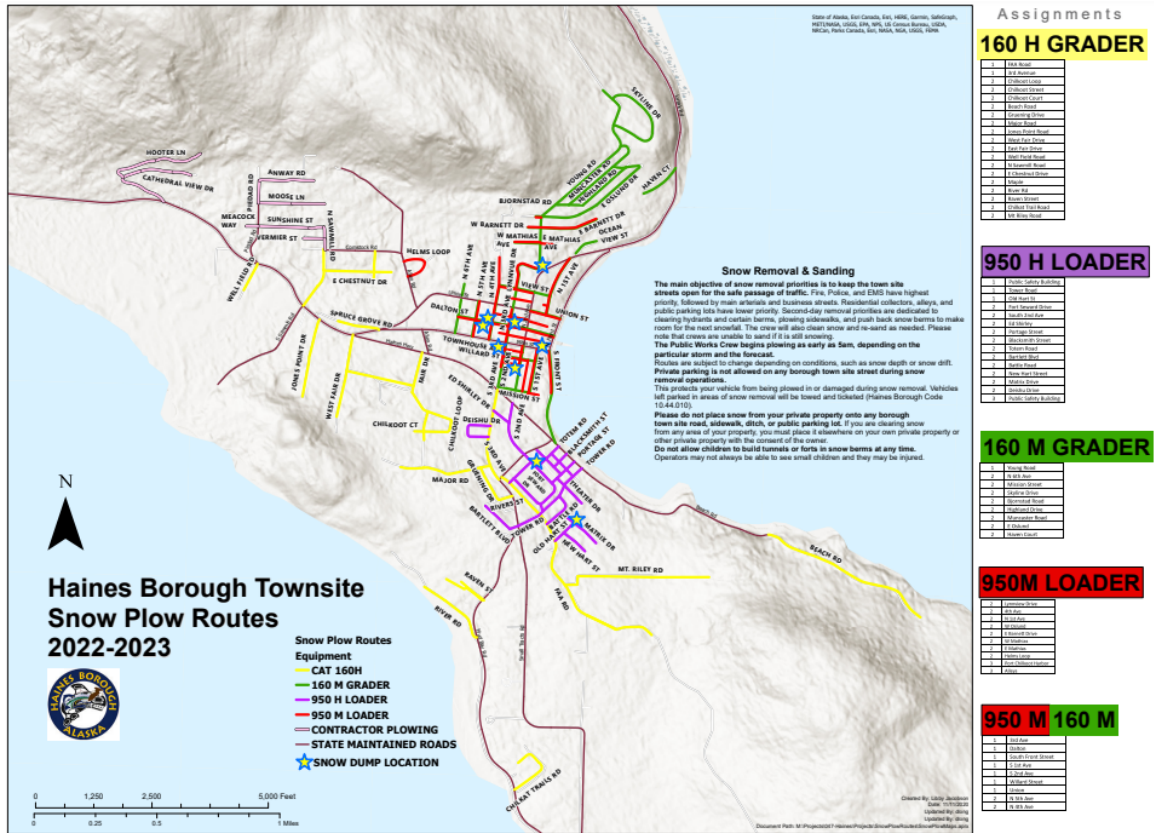
6. *Report on the frequency of DOT snowplowing/sanding service on the haul route from the Canadian border to the Lutak dock; hours/days of operation, first and last plowing of the day, etc., and how that might affect traffic/safety issues throughout the week.*

The truck corridor along Haines Highway through Haines to/from the Lutak Dock would be plowed by Alaska DOT. Figure 8 shows Haines Townsite’s snow plowing routes,<sup>46</sup> identifying which routes are plowed by the state and which by Haines Borough.

<sup>45</sup> Bureau of Transportation Statistics (n.d.). *National Transportation Noise Map*. <https://maps.dot.gov/BTS/NationalTransportationNoiseMap/> Select the car icon and Location: Haines Airport (data are from 2018).

<sup>46</sup> Haines Borough (n.d.). *Haines Borough Townsite Snow Plow Routes 2022-2023*. [https://www.hainesalaska.gov/sites/default/files/fileattachments/public\\_facilities/page/32799/townsitesnowplowroutes2022-2023.pdf](https://www.hainesalaska.gov/sites/default/files/fileattachments/public_facilities/page/32799/townsitesnowplowroutes2022-2023.pdf)

**Figure 8**  
**Haines Borough Snow Plow Routes**

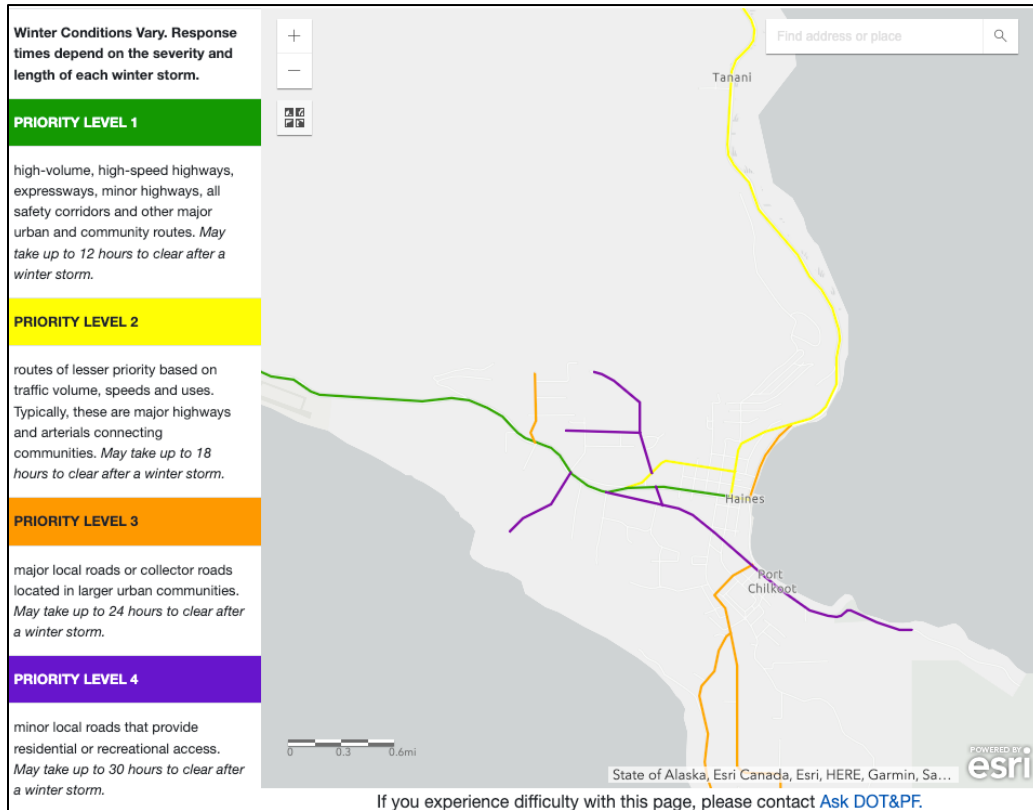


State roads have different snow plowing priorities, as shown in Figure 9.<sup>47</sup> **GREEN** routes, (Priority Level 1) should be cleared within 12 hours, **YELLOW** routes (Priority Level 2) within 18 hours, **ORANGE** routes (Priority Level 3) within 24 hours, and **PURPLE** routes (Priority Level 4) within 30 hours.

Based on the local and state information available, snow plowing should occur relatively equally on both weekdays and weekends. Figure 9 shows that the state places a higher priority on plowing Main Street (Priority Level 1) than it does on Union Street and Second Avenue (Priority Level 2). This prioritization could result in greater safety concerns on Union Street and Second Avenue, particularly if ore concentrate trucks travel on those roads.


<sup>47</sup> Alaska Department of Transportation and Public Facilities (n.d.). *Winter Road Maintenance Priority Map*. <https://dot.alaska.gov/stwdmno/wintermap/> Zoom in to Haines. Website note: "Most sidewalks are assigned the same priority level as the adjacent roadway, but will have a different level of service and response time due to the availability of resources."

**Figure 9**  
**State of Alaska Snow Plowing Priorities and Time to Plow for Haines Borough**






## APPENDIX B Utah Stopping Distance Factsheet<sup>48</sup>



# SEMI TRUCKS CAN'T STOP LIKE CARS

## Give Big Rigs Plenty of Room



An 80,000-pound, fully-loaded semi can weigh 20 times more than an average car or truck. Even with terrific braking systems, trucks simply can't stop as quickly as passenger vehicles.

**DO THE MATH**

Total stopping distance for a car or truck can be calculated as follows:

**Perception**  
How far you travel before you understand what's happening

**+**

**Reaction**  
How far you travel before your foot hits the brake

**+**

**Braking**  
How far your car travels once the brakes engage before the car stops

Semis also have to factor **brake lag**, or the time it takes for all the brakes on a truck to fully engage.


**TOTAL STOPPING DISTANCES**

Comparison of Stopping Distances at 65 mph





Stopping distance can be greatly affected by road surfaces, weather conditions or debris. Give yourself even more room when driving around big rigs.


For further information on how to drive Truck Smart visit the following sites or email [TruckSmart@utah.gov](mailto:TruckSmart@utah.gov):











<sup>48</sup> Utah Department of Transportation (n.d.). *Semi Trucks Can't Stop Like Cars: Give Big Rigs Plenty of Room*. [https://trucksmart.udot.utah.gov/wp-content/uploads/2016/08/Truck\\_Smart\\_Stopping\\_Distance\\_Fact\\_Sheet.pdf](https://trucksmart.udot.utah.gov/wp-content/uploads/2016/08/Truck_Smart_Stopping_Distance_Fact_Sheet.pdf)

## APPENDIX C

### Key Excerpts from the Urban Institute's Report on Air, Noise, and Health Impacts from Roads and Highways

METROPOLITAN HOUSING AND COMMUNITIES POLICY CENTER



## The Polluted Life Near the Highway

A Review of National Scholarship and a Louisville Case Study

*Gabe Samuels and Yonah Freemark  
November 2022*

*This is a highlighted excerpt. The full report is available from  
<https://www.urban.org/sites/default/files/2022-11/The%20Polluted%20Life%20Near%20the%20Highway.pdf>*

**Roadways are a ubiquitous feature of life in the United States, being used by most Americans for most trips. Much of American society, including the jobs, housing, schools, and recreational centers in metropolitan areas, is clustered in neighborhoods close to highways. But life near roads—while convenient from a transportation perspective—has a major downside: constant exposure to air and noise pollution produced by the cars, trucks, and motorcycles that drive by all times of the day and night.**

In this report, we summarize research on the effects of exposure to air and noise pollution. We organize scholarly evidence that shows that people living, working, and learning within 150 to 300 meters (about 500 to 1,000 feet) of highways are disproportionately subject to dirty air and loud ambient noise. This, in turn, causes health problems, including lung disease, stroke, and premature birth. Roadways also tend to reduce the property values of nearby residences. In the United States, a disproportionate share of people of color and people with low incomes live near highways. Limiting exposure to highways could help extend life expectancy, improve quality of life, and increase social equity...

## Limitations

Our approach has several limitations. First, although we summarize national studies related to the impact of living and working near highways, we do not measure the concentration of air pollution or other public health matters directly. Second, our estimates assume that exposure to roadway-produced pollution extends evenly over a certain distance away from roads. Yet differences in environment, including wind patterns, physical infrastructure such as sound barriers, and living infrastructure such as trees, may also influence exposure to highway pollution. Our analysis also did not take into account the impacts of other non-roadway air and noise pollution sources, such as [airports]...

## Effects of Air and Noise Pollution on Life Near Highways

Considerable evidence confirms that residents living closer to highways are exposed to more hazardous air and noise pollution than the population overall. Likely because of this exposure, highway-adjacent residents are at an increased risk for lung disease, heart problems, and premature birth. Researchers find that these effects are most common within 300 meters (about 1,000 feet) of highways, where pollution considerably exceeds background levels (table 1). In this section, we review scholarship that examines the incidence and effects of highway pollution.

**TABLE 1**

### Evidence on Health Effects of Living or Attending School Near Major Roadways

#### A review of scholarship on highway exposure

Within 100 meters	Within 200 meters	Within 300 meters
<ul style="list-style-type: none"> <li>For children at schools, exposure to PM<sub>2.5</sub> and NO<sub>x</sub> are 30 percent and 37 percent higher, respectively, than at comparable schools elsewhere<sup>a</sup></li> <li>Increase in acute myocardial infarction of 5 percent<sup>b</sup></li> <li>Higher cardiopulmonary mortality risks of 1.95 percent<sup>c</sup></li> <li>Increased lung cancer risks attributable to NO<sub>2</sub> and PM<sub>2.5</sub> exposure by 10 units<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>Increase in odds of stroke mortality of 8 percent at 150 meters<sup>e</sup></li> <li>Greater exposure to ultrafine particles, black carbon, NO<sub>x</sub>, and CO than those living further away, elevating risks of asthma and reduced lung function<sup>f</sup></li> <li>1.3 times increased odds of preeclampsia; 1.6 times increased odds of pProm; and 1.4 times increased odds of preterm births<sup>g</sup></li> </ul>	<ul style="list-style-type: none"> <li>Higher concentrations of CO and black carbon<sup>h</sup> (Baldauf et al. 2008)</li> <li>Higher likelihood of autism for children of pregnant women during the third trimester<sup>i</sup></li> <li>Increased risks of coronary heart disease<sup>j</sup></li> </ul>

**Source:** Authors' review of scholarship on highway adjacency.

<sup>a</sup>van Roosbroeck et al. (2007); <sup>b</sup>Tonne et al. (2007); <sup>c</sup>Hoek et al. (2002); <sup>d</sup>Hystad et al. (2013); <sup>e</sup>Pedde, Szpiro, and Adar (2017);

<sup>f</sup>Brugge, Durant, and Rioux (2007); <sup>g</sup>Yorifuji et al. 2015; <sup>h</sup>Baldauf et al. (2008); <sup>i</sup>Volk et al. (2011); <sup>j</sup>Kan et al. (2008);

**Notes:** CO = carbon monoxide; NO<sub>x</sub> = nitrogen oxides; NO<sub>2</sub> = nitrogen dioxide; PM<sub>2.5</sub> = particulate matter made of fine inhalable particles, with diameters generally 2.5 micrometers and smaller; pProm = premature rupture of membranes before 37 weeks of pregnancy.

## Causes of Highway Pollution

All vehicles that use roadway networks contribute to pollution, affecting human health. The US Department of Transportation (DOT) Bureau of Transportation Statistics conducts an annual breakdown of estimated emissions rates per vehicle type, distinguishing between light-duty vehicles, light-duty trucks, heavy-duty vehicles, and motorcycles.<sup>4</sup> Of these, heavy-duty vehicles, defined as trucks with more than two axles or four tires, are the largest emitters, contributing 32 percent of all mobile source emissions of nitrogen oxides in 2017 and 25 percent of total US transportation sector carbon dioxide emissions in 2019 (Lattanzio 2022). Tailpipe exhaust in the form of inhalable particulate matter, however, is the source of most vehicular pollution from fossil fuel-powered vehicles. As of 2021, over 95 percent of new passenger vehicles sold in the US were powered at least partly by fossil fuels, and virtually no trucks or other large vehicles—the heaviest polluters—were electrified.<sup>5</sup>

Several studies identify notable pollution contributions from nontailpipe emissions (Denier van der Gon et al. 2013; Habre et al. 2021), including tire wear, brake wear, road wear, and resuspended road dust. These will persist even as electric zero-emission vehicles become more common (Alexandrova, Kaloush, and Allen 2007). Electrification, however, may reduce tailpipe exhaust and pollution from brake wear, provided roadways feature free-flow vehicular movement rather than stop-and-go traffic with heavy braking (Grigoratos and Martini 2015).

Passenger and freight vehicles emit an array of pollutants into the surrounding air, including black carbon, NO<sub>x</sub>, and carbon monoxide (Baldauf, Thoma, Hays, et al. 2008; Brugge, Durant, and Rioux 2007). Researchers consistently find elevated concentrations of inhalable particulate matter, specifically PM<sub>2.5</sub> and PM<sub>10</sub> (measures of the size of particles), downwind of highways (Askariyeh et al. 2020), with concentrations not declining to background levels until 100 to 300 meters away from roads (Baldauf, Thoma, Hays, et al. 2008; Pattinson, Longley, and Kingham 2015; Zhu et al. 2002). Nitrogen dioxide levels similarly decay as distance from expressways increases, declining to background levels at 300 meters (Beckerman et al. 2008). Pollution levels are often just as high—if not higher—near arterials as along limited-access Interstates, because Interstates often feature more free-flowing traffic and less braking (Boehmer et al. 2013).

There are, of course, nonroadway air pollution sources<sup>6</sup> that contribute to overall emissions. These include other mobile sources such as airplanes; stationary sources such as factories, industrial facilities, oil refineries, and power plants; area sources including agriculture, buildings, and fireplaces; and natural sources such as wildfires, wind-blown dust, and volcanoes.

Noise pollution, although often overlooked in research on traffic-related pollution, can also harm those nearby. Pollutive noises are caused by vibrations in vehicle bodies as well as engine operating sounds.<sup>7</sup> All vehicles emit some noise pollution, although some, such as heavy trucks and those due for maintenance, are more responsible than others (Farooqi et al. 2020). Other sources of nonvehicular noise pollution include commercial, industrial, and community noise (Farooqi et al. 2020). Aircraft, specifically propeller aircraft (Omimi and Azimi 2017), and freight shipping (Halliday et al. 2017; Williams et al. 2015) also contribute to harmful noise pollution.

## Health Problems Associated with Pollution

Air and noise pollutants are hazardous to human health. People living near highways, particularly congested ones, experience poor lung health, including chronic obstructive pulmonary disease (Peng et al. 2021; Schikowski 2008), lung cancer (Hystad et al. 2013; Pope et al. 1995), asthma (Brugge, Durant, and Rioux 2007; Commodore et al. 2021; Meng 2008), and reduced lung-function growth among young people (Brugge, Durant, and Rioux 2007; Gauderman et al. 2007). Other research shows increased rates of potentially fatal heart problems as a product of air pollution sourced from roadways (Hoek et al. 2002; Kan et al. 2008; Pope et al. 1995; Tonne et al. 2007). Other related health problems include greater incidence of stroke (Pedde 2017) and several pregnancy-related issues, including premature birth and autism among children (Currie and Walker 2009; Pattinson Longley, and Kingham 2015; Yorifuji et al. 2015). These problems are worse for individuals who are elderly or exhibit other comorbidities (Deryugina et al. 2019; Simoni et al. 2015).

Noise pollution is associated with the development of type 2 diabetes (Thacher 2021), heart problems (Münzel 2020) and declines in fitness (Pyko et al. 2017; Roswall et al. 2017). Spending time near consistent noise sources can lead to frequent activation of the human “fight or flight” response, which can increase stress levels and blood pressure, accelerate heart rates, and weaken vascular and digestive systems over time.<sup>8</sup> It is also a cause of poor sleep and impaired cognitive performance, including among children (Thompson et al. 2022). These can lead to an increased risk of driving errors and collisions (Basner and McGuire 2018). Reduced cognition can also harm work and school productivity along with physical and mental health, both of which have long-term implications for personal and economic well-being. Pollution can also have psychological effects; one study found that people living further from highways thought less about air pollution than those living closer (Pattinson, Longley, and Kingham 2015).

This multitude of health problems takes a toll on the global population. Researchers estimate that PM<sub>2.5</sub> and ambient ozone pollution caused by vehicular exhaust could be linked to around 361,000 premature deaths worldwide in 2010 and 385,000 premature deaths in 2015 (Anenberg et al. 2019). One study estimated that 19,800 US deaths were caused by vehicular air pollution in 2017, though this figure declined from 27,700 in 2008 (Choma et al. 2021), indicating that continued efforts to cut emissions could further reduce associated deaths.

## Indoor Air Pollution

According to some measures, Americans spend around 90 percent of their time indoors, and people can be just as susceptible to air pollution inside as outside.<sup>10</sup> Road-sourced pollution can negatively affect indoor air quality in offices and residential buildings near highways (González-Martin et al. 2021), especially in older homes (Liang et al. 2021). Indoor air pollution is caused by both external and internal sources, ranging from cleaning materials to central heating and cooling systems,<sup>11</sup> but efforts to dilute these internal pollutants through ventilation from outdoor air can actually degrade indoor air quality, particularly in roadway-adjacent buildings.<sup>12</sup> This suggests that being inside near a highway does not necessarily ensure that people are exposed to fewer pollutants.

## Values of Property Adjacent to Highways

Public investment in roadways and limited support for public transportation over the past 70 years have supported the creation of a largely automobile-dependent society. In Louisville, for example, almost 90 percent of workers drive to their jobs, according to 2016–20 American Community Survey data. As a result, the road and highway system serves as the key infrastructure for moving people and goods. By connecting people to employment, recreation, and services, highways help vehicle owners access entire regions (Tillema, Van Wee, and Ettema 2010), though they fail to ensure mobility for those who cannot afford to own a car or do not want to. Highways also have relational impacts on the location of residential, commercial, and industrial land uses, all of whose development goes on to influence future roadway construction and peoples' lifestyles.

Yet, because of air and noise pollution, researchers find that highways and the automobiles that move along them have negative impacts beyond health effects. Though the evidence is mixed, some research shows that proximity to roadways reduces property values: noise pollution has a significant negative impact on housing prices, with decreases for each additional decibel generated by highway traffic of 0.3 to 0.8 percent (Allen, Austin and Swaleheen 2015; Nelson 1982; Theebe 2004). Other studies show that proximity to highways can reduce home values by between 4 and 10 percent (Allen, Austin and Swaleheen 2015; Hughes and Sirmans 1992; Nelson 1982; Seo, Golub, and Kuby 2014), although these effects are negligible when homes are adjacent to access ramps (Allen, Austin and Swaleheen 2015; Seo, Golub, and Kuby 2014).

Negative public health impacts and lower property values are just two manifestations of the effects of highway-sourced pollution on sleeping, working, and learning in specific places. Living near roads may also reduce quality of life, increase risk of traffic collisions—for people in cars as well as pedestrians and cyclists—and curtail access to neighborhood features such as open space and retail. In sum, there are many reasons to desire less-intrusive roadway infrastructure. Some policymakers agree; we turn to their actions in the next section.

## Notes

- <sup>1</sup> “Louisville Metro Air Pollution Control District 2020–2021 Report,” Louisville–Jefferson County Air Pollution Control District, 2021, <https://louisvilleky.gov/air-pollution-control-district/document/2020-2021-apcd-report>.
- <sup>2</sup> “Comprehensive Plan,” Louisville–Jefferson County Metro Government, 2019, <https://louisvilleky.gov/government/planning-design/comprehensive-plan>.
- <sup>3</sup> Louisville–Jefferson County Metro Government. “Plan 2040 Core Graphics.” November 11, 2018. <https://louisvilleky.gov/planning-design/document/updatedcoregraphics2018pdf>.
- <sup>4</sup> “Estimated US Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel,” Bureau of Transportation Statistics, April 30, 2021, <https://www.bts.gov/content/estimated-national-average-vehicle-emissions-rates-vehicle-vehicle-type-using-gasoline-and>.
- <sup>5</sup> Yonah Freemark and Wes Jenkins, “With Carbon Emissions Higher Than Ever, Can We Tax Polluting Cars to Reduce Vehicle Pollution?,” *Urban Wire* (blog), Urban Institute, June 21, 2022, <https://www.urban.org/urban-wire/carbon-emissions-higher-ever-can-we-tax-polluting-cars-reduce-vehicle-pollution>; Mark Vaughn, “Electric Big Rigs Are Coming—and We Drive Four of Them,” *Autoweek*, May 24, 2021, <https://www.autoweek.com/news/green-cars/a36506185/electric-big-rig-semi-trucks/>.
- <sup>6</sup> “Where Does Air Pollution Come From?,” National Park Service, updated January 17, 2018, <https://www.nps.gov/subjects/air/sources.htm>.
- <sup>7</sup> Hiroaki Nakashima, Takahiro Shinkai, and Takashi Kakinuma, vehicular suction noise transmission system, US Patent 9,926,896, filed March 9, 2016, and issued March 27, 2018.
- <sup>8</sup> Kea Wilson, “The Other Type of Car Pollution That Harms Us All,” *StreetsBlogUSA* (blog), September 14, 2020, <https://usa.streetsblog.org/2020/09/14/the-other-type-of-car-pollution-that-harms-us-all/>.
- <sup>9</sup> Part of the disproportionate exposure to air pollution may be because people of color are more likely to live in urban areas. David Reichmuth, “Air Pollution from Cars, Trucks, and Buses in the US: Everyone is Exposed, but the Burdens Are Not Equally Shared,” *Union of Concerned Scientists* (blog), October 16, 2019, <https://blog.ucsusa.org/dave-reichmuth/air-pollution-from-cars-trucks-and-buses-in-the-u-s-everyone-is-exposed-but-the-burdens-are-not-equally-shared/>.
- <sup>10</sup> “Indoor Air Quality,” US Environmental Protection Agency, updated September 7, 2021, <https://www.epa.gov/report-environment/indoor-air-quality>.
- <sup>11</sup> “Introduction to Indoor Air Quality,” US Environmental Protection Agency, updated December 16, 2021, <https://www.epa.gov/indoor-air-quality-iaq/introduction-indoor-air-quality>.
- <sup>12</sup> Ray Wu, “How Building Managers Can Improve Indoor Air Quality and Reduce Energy Use at the Same Time,” *Fast Company*, March 17, 2022, <https://www.fastcompany.com/90732280/how-building-managers-can-improve-indoor-air-quality-and-reduce-energy-use-at-the-same-time>.

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