

# Implementation of INVEST Operations and Maintenance Module at Denali National Park & Preserve



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16. Abstract Western Federal Lands Highway Division (WFLHD) and National Park Service (NPS) used the Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) operations and maintenance (OM) module to evaluate the sustainable operations and maintenance policies and procedures at Denali National Park and Preserve (DNP) on the Denali Park Road. Much of the analysis and scoring effort was conducted through online research, plans and policy review, and discussions with DNP staff. A meeting was held with DNP and NPS staff to review missing information and talk through how DNP addresses and achieves some of the criterion. This rating effort undertook evaluation of DNP with regard to all the OM module criteria.  DNP is a non-typical transportation agency or roadway maintenance provider and their mission does not explicitly mention transportation services. However, their mission statement includes providing access to parks for education, recreation and other public uses. Therefore, providing maintenance of the road within the park is integral to them achieving their mission. Further, being that the NPS and DNPs mission statements are first and foremost to preserve the unimpaired natural and cultural resources, the ability to prioritize and rely upon sustainable operation and maintenance practices is paramount to successfully achieving the mission. As such, the DNP performed very well and is in the platinum scoring range under the INVEST OM version 1.2 criteria.  We recommend that DNP staff develop best management practices to document their sustainability effort. This will enable them to improve upon their already impressive sustainability efforts in Denali National Park and Preserve. We have also provided additional recommendations to improve INVEST OM module for similar implementation.			
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## Executive Summary

Western Federal Lands Highway Division (WFLHD) and National Park Service (NPS) used the Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) operations and maintenance (OM) module to evaluate the sustainable operations and maintenance policies and procedures at Denali National Park and Preserve (DNP) on the Denali Park Road. Much of the analysis and scoring effort was conducted through online research, plans and policy review, and discussions with DNP staff. A meeting was held with DNP and NPS staff to review missing information and talk through how DNP addresses and achieves some of the criterion. This rating effort undertook evaluation of DNP with regard to all the OM module criteria.

DNP is a non-typical transportation agency or roadway maintenance provider and their mission does not explicitly mention transportation services. However, their mission statement includes providing access to parks for education, recreation and other public uses. Therefore, providing maintenance of the road within the park is integral to them achieving their mission. Further, being that the NPS and DNPs mission statements are first and foremost to preserve the unimpaired natural and cultural resources, the ability to prioritize and rely upon sustainable operation and maintenance practices is paramount to successfully achieving the mission. As such, the DNP performed very well and is in the platinum scoring range under the INVEST OM version 1.2 criteria.

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# 1 Introduction

Western Federal Lands Highway Division (WFLHD) partnered with the National Park Service (NPS) to investigate how the Denali National Park and Preserve (DNP) in Alaska manages and implements sustainable operations and maintenance policies and practices at the park and more specifically on the Denali Park Road (park road). This analysis was conducted using the Federal Highway Administration’s (FHWA) Infrastructure Voluntary Evaluation Sustainability Tool (INVEST) operations and maintenance (OM) module. This was an implementation project to not only see how DNP performs within the sustainability criteria, but to analyze how DNP could improve sustainability practices in OM and also test the INVEST OM criteria with a non-typical road maintenance provider.

NPS is committed to making DNP a “green” park. The NPS has developed goals to reduce energy and water consumption, create and maintain environmentally-friendly buildings, reuse or recycle waste, reduce pollution, make green purchases, and promote a better understanding of the effects of climate change on natural and cultural resources. The DNP has developed an environmental management system, designed and built a LEED certified (platinum) visitor center, and promoted sustainability through its unique transportation/transit systems. This report details the evaluation process and results of how the DNP road performs within the INVEST OM module version 1.2. It also documents analysis conducted to determine what additional measures DNP could take to improve the sustainability of OM practices.

## Why INVEST?

DNP presented itself as a unique opportunity to investigate how the INVEST OM module performs when evaluating the policies, procedures, and practices of a non-typical transportation agency or roadway maintenance provider, such as the NPS. INVEST was developed with a broad range of transportation agencies in mind; from state departments of transportation, to regional agencies, to cities. This analysis provides insight into how the INVEST OM module performs for an agency that provides transportation maintenance ancillary to their primary mission and objectives, which in DNP’s case is to protect the wilderness (excerpt below).

## Unique Denali National Park & Preserve

DNP is part of the greater national parks system. The NPS mission is not similar to a traditional roadway provider such as a state department of transportation whose intent is often to move people efficiently and safely. The NPS’s mission statement is as follows:

*The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.*

DNP is six million acres of wild land with one single 92-mile-long park road. The park road is paved for only the first 15 miles, the remainder is constructed with gravel. Private vehicle use past the paved section of the park road is restricted to administrative traffic, visitor travel via the transit bus service or a tour bus, and a limited number of permitted special use vehicles such as professional photographers and campers.<sup>1</sup>

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<sup>1</sup> NPS. 2012. Denali Park Road. Final Vehicle Management Plan and Environmental Impact Statement.

The Vehicle Management Plan sets a cap on the number of vehicles allowed on the restricted section of the park road to 160 vehicles per 24-hour period.<sup>2</sup>

Maintenance of the park road for its entire length begins during March and continues through September of each year. The operational season for the park road begins approximately May 15<sup>th</sup>, depending on weather and road conditions, and ends with road closure pending weather conditions in September. Due to extreme temperature range and poor subsoil conditions this road requires continuous maintenance. The annual cost for maintaining the park road is \$1.9 million of which \$1.3 million is dedicated to the road maintenance beyond mile 15.<sup>3</sup> The maintenance and operations include plowing, de-icing, dust suppressants (Calcium Chloride), gravel reclamation, and gravel replacement. The DNP maintenance staff internal sustainability goals include reducing demand for new gravel by reclaiming it from the side of the park road and reducing fuel consumption for maintenance vehicles.

Because of the special conditions that occur at DNP, the park road offers a unique look into the performance and usefulness of INVEST OM for public agencies that have other intents and purposes than providing transportation access. The DNP Mission is as follows:

*We protect intact, the globally significant Denali ecosystems, including their cultural, aesthetic, and wilderness values, and ensure opportunities for inspiration, education, research, recreation and subsistence for this and future generations.<sup>4</sup>*

## 2 INVEST OM Evaluation Approach

The INVEST OM scoring effort was initiated and performed by the Federal Highway and their contractor. Others were contacted to help gather and provide documentation and information about DNP's practices and policies including the DNP Road Supervisor, other staff from DNP, and the NPS Alaska Region Transportation Program Manager.

The scoring effort took place in three steps. Initially, a desktop study and review of documentation provided by DNP, NPS, WFLHD, and other information found through internet searches, was performed. A site field visit and staff interviews were performed in September 2014. This initial effort used INVEST 1.0 in late 2014. This research found that many pieces of information were still needed in order to complete the INVEST OM rating evaluation. The review was put on hold through late 2015 so that DNP and WFLHD could gather the identified materials, documents, and reports while managing the heavy working season and demands at DNP.

The next step occurred in late 2015 and early 2016 when the project picked back up once additional information was provided. At this time, the scorecard was transferred to INVEST 1.2 to continue the scoring effort. This modification had negligible effects on the scoring effort for DNP. The new information and documentation were added into the scorecard and then presented to NPS staff.

This presentation kicked off the third effort of the information gathering and final scoring. During the review with staff additional sustainability efforts were identified and discussed. In many instances, the

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<sup>2</sup> NPS. 2012. Denali Park Road. Final Vehicle Management Plan and Environmental Impact Statement.

<sup>3</sup> NPS. 2016. Maintaining the Character of the Denali Park Road beyond Mile 15. <http://www.nps.gov/articles/character-of-park-road.htm>.

<sup>4</sup> NPS. 2014. Denali National Park and Preserve Foundation Statement.

INVEST OM criteria were not explicitly relevant to DNP or did not clearly align with the purpose of the NPS and DNP mission statements. Although DNP executes numerous sustainability efforts, they are not always documented in the format requested within the INVEST OM criteria. Therefore, at this stage, qualitative information was gathered from individuals present at the meeting. Where applicable, points were awarded if DNP provides a similar program, policy, or management tool that met the intent of the OM criteria.

### 3 INVEST OM Scoring

The INVEST OM analysis revealed a handful of prominent findings for both DNP and the FHWA’s INVEST managers. Being that the NPS and DNP’s mission statements are first and foremost to preserve the unimpaired natural and cultural resources, the ability to prioritize and rely upon sustainable operation and maintenance practices is paramount to successfully achieving the mission. As such, the DNP performed very well and is in the platinum scoring range under the INVEST OM version 1.2 criteria.

A very high level overview of the DNP INVEST OM scoring is provided in Table 1 with overarching highlights described below.

**Table 1. Denali National Park & Preserve INVEST Operations and Maintenance Score Breakdown**

Criteria ID	Operations and Maintenance Criteria	Score/Points
OM-01	Internal Sustainability Plan	15/15
OM-02	Electrical Energy Efficiency and Use	10/15
OM-03	Vehicle Fuel Efficiency and Use	15/15
OM-04	Reduce, Reuse and Recycle	15/15
OM-05	Safety Management	13/15
OM-06	Environmental Commitments Tracking System	13/15
OM-07	Pavement Management System	4/15
OM-08	Bridge Management System	8/15
OM-09	Maintenance Management System	9/15
OM-10	Highway Infrastructure Preservation and Maintenance	15/15
OM-11	Traffic Control Infrastructure Maintenance	8/15
OM-12	Road Weather Management Program	12/15
OM-13	Transportation Management and Operations	0/15
OM-14	Work Zone Traffic Control	5/15
		<b>Total: 142/210</b>

### 4 Scoring: Detailed Description of Rating by Criterion

#### OM-01 Internal Sustainability Plan 15/15

*Focus on sustainability improvements within the agency’s internal operations that affect all three principles of the triple bottom line.*

In April 2012 the NPS adopted the *Green Parks Plan* (GPP). The GPP defines a collective vision and long-term strategic plan for sustainable management of NPS operations.<sup>5</sup> It satisfies the intent of this criterion as it has goals and objectives. In 2012, DNP issued a *Climate Change Response*, which is a monitoring and

<sup>5</sup> NPS. 2013. Green Parks Plan (GPP). Advancing our Mission through Sustainable Operations. <http://www.nps.gov/greenparksplan/>

reporting publication produced by the park. It details the efforts DNP is taking to monitor, manage, and adapt to climate change as well as how DNP is mitigating its impact on climate change.<sup>6</sup> DNP tracks its efforts toward meeting GPP goals. One such example is the DNP Sustainability PowerPoint which documents all of DNP's sustainability efforts.<sup>7</sup>

## OM-02 Electrical Energy Efficiency and Use

10/15

*Reduce the consumption of fossil fuels during operation and maintenance of agency owned and/or operated facilities through improvements in efficiency and the use and/or generation of renewable energy sources.*

NPS is responsible for responding to the Department of the Interior's Sustainable Buildings Implementation Plan, which dictates that "all new construction and major renovation of bureau buildings must comply with the Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings set forth in the 2006 Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding. The NPS SBIP identifies the requirement from Executive Order 13514 that by the end of fiscal year 2015, 15 percent of agency buildings 5,000 square feet or larger meet the Guiding Principles. For the NPS, there are approximately 1,910 buildings that are greater than 5,000 square feet, which means that the NPS has to achieve guiding principle compliance in 287 buildings to meet the 15 percent target."<sup>8</sup> At DNP, the Eielson Visitor Center earned LEED platinum rating in 2008 and the Denali Visitor Center earned LEED silver rating in 2005.<sup>9</sup>

Doyon/ARAMARK Joint Venture, a concessioner at Denali National Park and Preserve, has an ISO 144001 certified environmental management system (EMS).<sup>10</sup> In 2009, Doyon/ARAMARK implemented the following programs under its EMS applicable to the electricity conservation program:

- Replacement of incandescent light bulbs with compact fluorescent bulbs and tubes;
- Installation of motion detecting sensors for light switches;
- Work instructions (housekeeping staff and employees) for managing lights out/windows closed/heaters off when not in use; and
- Purchase of 186,000 KWh Renewable Energy Certificates

Points were not received for requirement OM-02.5a which requires the agency to execute a contract for a minimum of two years of renewable energy. DNP does not purchase Renewable Energy Certificates and it has never had a renewable energy contract.

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<sup>6</sup> NPS. 2012. DNP Climate Change Response (CCP).

[http://www.nps.gov/dena/learn/management/upload/Climate\\_Change\\_Response\\_Denali\\_2012.pdf](http://www.nps.gov/dena/learn/management/upload/Climate_Change_Response_Denali_2012.pdf)

<sup>7</sup> Sustainability at Denali National Park and Preserve, 2013 PowerPoint. Provided by Amit Armstrong of WFLHD.

<sup>8</sup> NPS. 2016. Sustainable Operations and Climate Change. Sustainable Buildings Implementation Plan.

<http://www.nps.gov/sustainability/sustainable/implementation.html>.

<sup>9</sup> NPS. 2010. List of LEED Buildings. <http://www.nps.gov/sustainability/documents/sustainable/List-of-NPS-LEED-Buildings.pdf>.

<sup>10</sup> NPS. 2010. Environmental Achievement Award Winner. Denali Park Joint Venture Environmental Management System. [http://www.nps.gov/commercialservices/ea\\_awards\\_announcement.htm](http://www.nps.gov/commercialservices/ea_awards_announcement.htm).



## OM-03 Vehicle Fuel Efficiency and Use

15/15

*Reduce fossil fuel use and emissions in vehicles used for operations and maintenance.*

The NPS retains and updates a 5-year Fleet Management Plan.<sup>11</sup> Within the GPP the NPS set the objective to increase the use of high-efficiency and low-GHG-emitting vehicles and will reduce fossil fuel consumption by 20 percent by 2015 from the 2005 baseline.<sup>12</sup> In 2012, the DNP fleet included 11 hybrid and three 100% electric vehicles. Further, they found that the savings from “smart” vehicle plug-ins in winter reduced their electric use by 19,066 kilowatt-hours.<sup>13</sup> DNP partners with a variety of other agencies (Alaska Energy Authority, US EPA, UniSea, and others) to search for alternative fuels, including fish-derived biodiesel.<sup>14</sup>

## OM-04 Reduce, Reuse and Recycle

15/15

*Create and pursue a formal recycling and reuse plan for agency operated facilities and maintenance activities.*

NPS is required to respond to Federal Executive Orders (EO). In response to EO 13423 – Strengthening Federal Environmental, Energy, and Transportation Management – NPS developed a *Solid Waste Management Quick Reference Guide*.<sup>15,16</sup> DNP makes great strides to pursue all opportunities to reduce, reuse, and recycle. The 2013 PowerPoint *Sustainability at Denali National Park and Preserve*, also provides a lengthy overview of the efforts DNP undertakes to ensure minimal waste generated in the park heads for the landfill.

These efforts were more formally documented within the National Parks Conservation Association’s *DNP Waste Characterization Study*.<sup>17</sup> The Study focuses on the impact of park facilities on the environment and human welfare, and encourages NPS employees to adopt sustainability in their daily activities. NPS has also been assisting partners and facilities in the national parks that are not directly maintained or operated by DNP, such as concessioner-owned and leased buildings. An established goal within the GPP is for the NPS to divert 50 percent of solid waste from landfills by 2015 through recycling and other practices. The goal will be achieved through the sustainable management of materials used in NPS operations, from the use of locally sourced materials in construction, to the diversion of solid waste from landfills.

## OM-05 Safety Management

13/15

*Maximize the safety of the existing roadway network through a systematic and comprehensive review of safety data and the allocation of resources in planning and programming to support safety in operations and maintenance.*

The NPS established an Occupational Safety and Health Program in September 2008, which provides information, guidance, and direction on how to carry out the activities mandated in Director’s Order #50B.<sup>18</sup> The Director's Order #50B mandates specific employee safety and health related activities to be conducted within National Park Service worksites. A requirement is that National Park Service (NPS) will

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<sup>11</sup> NPS. 2004. Fleet Management Strategic Plan.

<sup>12</sup> NPS. 2013. GPP.

<sup>13</sup> DNP. 2012. CCP.

<sup>14</sup> Sustainability at Denali National Park and Preserve, 2013 PowerPoint; page 77.

<sup>15</sup> Although EO 13423 was revoked and replaced with EO 13693 – Planning for Federal Sustainability in the Next Decade – the Solid Waste Management Quick Reference Guide remains a valuable tool for NPS and DNP.

<sup>16</sup> NPS. Park Facility Management Division. 2007. National Park Service Solid Waste Management Quick Reference Guide. [http://www.nps.gov/sustainability/documents/Waste/SW\\_Ref\\_Guide\\_final.pdf](http://www.nps.gov/sustainability/documents/Waste/SW_Ref_Guide_final.pdf)

<sup>17</sup> National Parks Conservation Association. 2015. DNP Waste Characterization Study.

<sup>18</sup> NPS. 2008. Occupational Safety and Health Program Reference Manual 50B. <http://www.nps.gov/policy/RM50Bdoclist.htm>.

meet or exceed applicable safety, health, environmental and related trade codes and standards. It should be remembered that these codes and standards represent the minimum acceptable level of safety. The manual provides policy guidance for occupational safety and health, safety training, motor vehicle safety, contractor safety, off-the-job safety, watercraft safety and concessioner safety.

Further, the NPS Transportation Program relies on a Transportation management system for important decision making.<sup>19</sup> At DNP, the established Strategic Plan sets goals.<sup>20</sup> Goal 5 addresses safety and states: Employees are valued for their contributions and have what they need to successfully and safely do their jobs. An objective of Goal 5 is to provide employee training to equip them to safely conduct their work. DNP does not extensively measure progress towards safety goals as described by this criterion, therefore several points were not received for OM-05.5.

## OM-06 Environmental Commitments Tracking System 13/15

*Ensure that environmental commitments made during project development related to operations and maintenance are documented, tracked, and fulfilled.*

The NPS maintains an Environmental Management System (EMS) that is used by DNP.<sup>21</sup> As an example, the EMS provides a tool for tracking solid waste management.<sup>22</sup> The Doyon/ARAMARK concessioner, won the NPS 2010 Environmental Achievement Award for their Environmental Management System.<sup>23</sup> Because DNP only maintains one road, the use of a GIS-based Environmental Compliance Tracking System is not warranted; several points were not received due to this requirement (OM-06.4).

## OM-07 Pavement Management System 04/15

*Leverage a pavement management system to balance activities that extend the life and function of pavements with impacts to the human and natural environment.*

The NPS has a Transportation Program with four transportation management systems including a Pavement Management System, Bridge Management System, Transportation Safety Management System, and Congestion Management System.<sup>24</sup> DNP uses these management systems to adequately track and monitor their roadway system. The 2008 Adaptive Management Strategy for the Denali Park Road details how traffic on the park road can be reduced if monitoring detects impacts to the high priority physical, social and wildlife indicators.<sup>25</sup> Further, the Denali Park Routine Road Maintenance, Repair and Operating Standards describe the routine preventive maintenance activities, repair and operating procedures employed to achieve the physical condition of the Denali Park Road described in the DNP Road Design Standards.<sup>26,27</sup>

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<sup>19</sup> NPS. 2015. Transportation Management Systems.

[http://www.nps.gov/transportation/transportation\\_management\\_systems.html](http://www.nps.gov/transportation/transportation_management_systems.html).

<sup>20</sup> DNP. 5-Year Strategic Plan 2011-2015.

<sup>21</sup> NPS. 2009. Director's Order #13A: Environmental Management Systems. <http://www.nps.gov/policy/DOrders/DO-13A.htm>.

<sup>22</sup> NPS. 2014. Welcome to the Sustainable Practices Database. Facility: Denali NP, Summary: Solid Waste Management.

<sup>23</sup> NPS. 2010. Environmental Achievement Award Winner. Denali Park Joint Venture Environmental Management System.

<sup>24</sup> NPS. 2015. Transportation Management Systems.

[http://www.nps.gov/transportation/transportation\\_management\\_systems.html](http://www.nps.gov/transportation/transportation_management_systems.html).

<sup>25</sup> DNP. 2008. Vehicle Management Plan Adaptive Management Strategy for the Denali Park Road.

[http://www.nps.gov/dena/learn/management/upload/BACI\\_12052008.pdf](http://www.nps.gov/dena/learn/management/upload/BACI_12052008.pdf).

<sup>26</sup> NPS. 2005. Denali Park Routine Road Maintenance, Repair and Operating Standards.

<sup>27</sup> Denali National Park and Preserve. 2007. Road Design Standards.

<http://www.nps.gov/dena/learn/management/upload/Final%20Road%20Design%20Standards%202007.pdf>

A requirement of this criterion is to set pavement system performance goals and monitor progress towards the goals (OM07.3). Goals are not set for DNP because of the influence and annual impact weather conditions have on the park road. First, the majority of the park road is not paved but is gravel. A 2003 Environmental Assessment for a Gravel Acquisition Plan identified five alternatives for gravel borrow sources for rock, gravel and sand to maintain the park road and park facilities for at least 10 years. Due to the fierce weather conditions and damage caused to the park road, the ability to maintain the gravel conditions and enhance the performance of the park road in a strategic and material-reduction manner is somewhat limited. Although every effort to mitigate the impacts of severe weather are sought, if a force of nature ultimately diminishes or destroys the park road's ability to provide safe travel conditions, measures will need to be sought to fix the park road. The efforts and procedures to fix the park road once routine maintenance cannot fix the issue are described in the DNP Road Design Standards and the Denali Park Routine Road Maintenance, Repair and Operating Standards.<sup>28,29</sup>

A requirement of this criterion is to provide system modeling, scenario analyses, trade-off analyses, and system optimization rather than a "worst-first" approach (OM-07.4a, b, c, and d). In general, the park road does not require this level of sophistication to identify and prioritize projects. Besides regular routine maintenance, there are the occasional major issues that arise on the park road, such as landslides onto the park road. Because the park road is a singular road, and not an integrated system of interconnected roads, prioritizing projects is not an issue. Further, DNP is testing sustainable pavement solutions but does not have provisions or specifications developed (OM-07.5)

## OM-08 Bridge Management System

08/15

*Leverage a bridge management system (BMS) to balance activities that extend the life and function of bridges with impacts to the human and natural environment.*

The tools presented in response to OM-07 Pavement Management System satisfy this criterion as well. The BMS does not leverage data to detail and demonstrate sustainable outcomes, a requirement of OM-08.4.

## OM-09 Maintenance Management System

09/15

*Leverage a Maintenance Management System (MMS) to inventory, assess, analyze, plan, program, implement, and monitor maintenance activities to effectively and efficiently extend the life of the system, improve the service, and reduce the impacts to the human and natural environment.*

The tools presented in response to OM-07 Pavement Management System satisfy this criterion as well. In addition, DNP uses the NPS's Facility Management Software System (FMSS) to understand and analyze resource allocation and funding needs related to the three maintenance division programs of Facility Operations, Maintenance, and Investments.<sup>30</sup>

DNP projects are identified in the DNP Resource Stewardship Strategy 2008-2027, which is a program planning document that serves as a bridge between the qualitative statements of desired conditions established in the park General Management Plan (GMP) and the measurable goals and implementation

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<sup>28</sup> Denali National Park and Preserve. 2007. Road Design Standards.

<http://www.nps.gov/dena/learn/management/upload/Final%20Road%20Design%20Standards%202007.pdf>

<sup>29</sup> NPS. 2005. Denali Park Routine Road Maintenance, Repair and Operating Standards.

<sup>30</sup> DNP. 2004. Business Plan

actions determined through park strategic planning.<sup>31</sup> Appendix C of the Consolidated GMP provides a prioritized list of maintenance projects.<sup>32</sup> Points were not received because their systems don't tie into its PMS and BMS and exchange information (OM-09.4) and they do not have a maintenance quality assurance process that relates maintenance to performance (OM-09.5a, b).

### OM-10 Highway Infrastructure Preservation and Maintenance 15/15

*Make paved roadway surfaces, bridges, tunnels, roadsides, and their appurtenance facilities last longer and perform better by undertaking preservation and routine maintenance on them.*

The Denali Park Routine Road Maintenance, Repair and Operation Standards and the NPS Fleet Management Strategic Plan provide the information relevant to this criterion.<sup>33,34</sup>

### OM-11 Traffic Control Infrastructure Maintenance 08/15

*Increase safety and operational efficiency by maintaining roadway traffic controls.*

The 2012 Denali Park Road Final Vehicle Management Plan establishes the use restrictions placed on the park road.<sup>35</sup> DNP relies on a very restrictive form of traffic control not for the purposes of reducing congestion or improving the reliability of the facility but to limit the use, wear and tear, and impact on the natural lands of DNP. Another reason for the park road use restrictions is to increase safety, which is one of the intents of this criterion. Points were not received for requirement OM-11.2 because the plan doesn't address have all the quantifiable performance metrics, such as level of service, readability of signage, and adequacy of lighting, as required. These items have no relevance to the park road in DNP.

### OM-12 Road Weather Management Program 12/15

*Plan, implement, and monitor a road weather management program (including snow and ice control) to reduce environmental impacts with continued or better level of service.*

The park road at DNP is highly dependent upon the weather. It is only open between roughly May 15<sup>th</sup> and September, with efforts beginning in March to get the park road up to operational standards. The GMP establishes limits to road use which responds to inclement weather.<sup>36</sup> The Denali Park Routine Road Maintenance, Repair and Operation Standards provides standards for road work to meet certain weather needs as well as when to not pave or work on the park road due to weather conditions.<sup>37</sup> DNP does not have a Maintenance Decision Support System as required per OM-12.5.

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<sup>31</sup> DNP. 2009. Resource Stewardship Strategy 2008-2027.

[https://www.nature.nps.gov/water/planning/assets/docs/RSS/DENA\\_RSS.pdf](https://www.nature.nps.gov/water/planning/assets/docs/RSS/DENA_RSS.pdf).

<sup>32</sup> NPS. 2006. Consolidated General Management Plan for Denali National Park and Preserve.

<http://www.nps.gov/dena/learn/management/gmp.htm>.

<sup>33</sup> NPS. 2005. Denali Park Routine Road Maintenance, Repair and Operating Standards.

<sup>34</sup> NPS. 2004. Fleet Management Strategic Plan.

<sup>35</sup> DNP. 2012. Denali Park Road Final Vehicle Management Plan and Environmental Impact Statement.

<sup>36</sup> NPS. 2006. Consolidated General Management Plan for Denali National Park and Preserve.

<http://www.nps.gov/dena/learn/management/gmp.htm>.

<sup>37</sup> NPS. 2005. Denali Park Routine Road Maintenance, Repair and Operating Standards.

## OM-13 Transportation Management and Operations

00/15

*Maximize the utility of the existing roadway network through use of technology and management of operations strategies.*

The nature and utility of the DNP road does not require the need for technological or operational management methods as described in this criterion. Installing such tools would have no benefit to the park, operational quality of the park road, and would likely cause significant maintenance issues and costs. This criterion is not relevant to the DNP mission or the park road's purpose. No points were issued from this criterion.

## OM-14 Work Zone Traffic Control

05/15

*Plan, implement, and monitor Work Zone Traffic Control (WZTC) methods that maximize safety of workers and system users with continued or better level of service.*

DNP adheres to NPS standards for traffic control as relevant. The park is unique, however, and requires significant traffic control above and beyond what is typical, such as complete closure of the park road from September through March and limitations to the number and type of vehicles that can be on the park road. Still, many of the requirements of the criterion are not relevant to DNP, such as using Intelligent Transportation Systems to anticipate and reduce congestion (OM-04.3). The typical type of congestion experienced on highways and other state and/or regional transportation facilities is not experienced on the park road.

## 5 Analysis of Sustainability Efforts at Denali National Park & Preserve

The INVEST evaluation revealed that DNP really does go above and beyond in their efforts to be as sustainable as possible.

### Highlights of Best Practices

The NPS has overall management plans and systems that the individual national parks are responsible to follow and implement during every day work efforts. These management tools, including the NPS Environmental Management System, Green Parks Plan, Transportation Management Systems, Fleet Management Strategic Plan, and the Sustainable Buildings Implementation Plan, among others, all create a foundation that facilitate DNP to manage the park and the park road to high standards with respect to sustainability.

DNP has a number of specific plans and tools developed to guide their daily work efforts, including but not limited to:

- DNP 5-Year Strategic Plan 2011-2015
- 2012 DNP Climate Change Response
- 2012 DNP Denali Park Road Final Vehicle Management Plan
- 2009 DNP Resource Stewardship Strategy 2008-2027
- 2008 Vehicle Management Plan Adaptive Management Strategy for the Denali Park Road
- 2007 DNP Road Design Standards

- 2006 Consolidated General Management Plan for Denali National Park and Preserve
- 2005 Denali Park Routine Road Maintenance, Repair and Operating Standards
- 1996 Denali Entrance Area and Road Corridor Final Development Concept Plan

Particularly for DNP, there are a number of reasons why sustainable operations and maintenance practices are more feasible than they may be in other national parks or for other agencies. As discussed, NPS and DNP mission statement are both grounded in protection and preservation of the wilderness and ensuring the ability of park(s) are available for future generations. This enables DNP to seek alternative and sustainable solutions to their park maintenance and operation practices.

In 2012 DNP prepared a response to climate change.<sup>38</sup> This document provides a list of ways DNP is responding to climate change through science, adaption, mitigation and communication, including:

- Using **science** to help manage the park, such as glacier monitoring, lake ice and snow measurements and monitoring, and measurements of vegetation plots.
- Identifying **adaptation** opportunities, such as incorporating climate change in the Denali Foundation Statement, use of prescribed fire in managing changes in fire size and frequency, and training completed by park managers to implement Climate Change Scenario Planning.
- **Mitigating** their influence on climate change at the park through use of shuttle and tour buses to reduce traffic and emission on the park road, use of solar, hydro-electric power, and employee travel to wilderness work sites on foot instead of helicopter when feasible.
- **Communicating** with staff and visitors about how climate change has affected the park and how to be more “green” when visiting the park.

The location of DNP has influence over the sustainability measures instituted by the workers at the park and encouraged for its visitors. DNP is located in remote Alaska wilderness and is about a five-hour driving travel time from the larger cities of Anchorage and Fairbanks. Processing and eliminating garbage and waste is difficult, which has enabled the park to facilitate a robust recycling practice. Many of the visitors to DNP have an interest in keeping the park clean and reducing their impact on the natural and physical realm. DNP provides education and information to visitors for how to keep their trip “green.”<sup>39</sup> Further, because travel on the park road is highly restricted for the majority of its length, the ability to monitor how individuals are disposing of their waste is more easily managed.

To protect and enhance the wilderness, DNP enforces strict management over the park road. The 2012 Denali Park Road Final Vehicle Management Plan established the use restrictions placed on the park road.<sup>40</sup> The limitations include limiting private vehicle use to the first 15 miles of paved roadway. The remaining road is restricted to administrative traffic, visitor travel via the transit bus service or a tour bus, and a limited number of permitted special use vehicles such as professional photographers and campers. Further, DNP instituted an adaptive management strategy which allows for restriction adjustments, often to mitigate negative impacts as opposed to a neutral or positive impacts, based on studies and identified impacts to wildlife, physical and social indicators.<sup>41</sup>

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<sup>38</sup> NPS. 2012. DNP Climate Change Response (CCP).

[http://www.nps.gov/dena/learn/management/upload/Climate\\_Change\\_Response\\_Denali\\_2012.pdf](http://www.nps.gov/dena/learn/management/upload/Climate_Change_Response_Denali_2012.pdf)

<sup>39</sup> DNP. 2013. How to Green Your Visit to Denali.

<sup>40</sup> DNP. 2012. Denali Park Road Final Vehicle Management Plan and Environmental Impact Statement.

<sup>41</sup> DNP. 2008. Vehicle Management Plan Adaptive Management Strategy for the Denali Park Road.

## Opportunity for Improvement

A limitation of the DNPs sustainable operations and maintenance practices is the tracking and recording of their everyday efforts. While there are multiple management plans, understanding exactly how they approach particular efforts relevant to the INVEST OM criteria was difficult to ascertain. DNP staff are doing their best to implement the mission of NPS and DNP. At times, the ability to make the most sustainable decision is hindered by lack of relevant implementing procedure on particular subjects. Staff is often faced with immediate road maintenance issues that need to be solved quickly and under the stress of severe and unpredictable weather conditions. DNP would benefit from the documentation of preferred procedures and ideal decision making solutions for those times when a split-second decision, solution or approach is needed immediately.

Tracking and documentation of everyday practices will ensure that the best, most sustainable solution to a wide variety of everyday issues is sought first, rather than reinventing the wheel or pursuing a solution that may be of lower cost or less time consuming.

## 6 Next Steps

We recommend that DNP staff develop best management practices to document their sustainability effort. This will enable them to improve upon their already impressive sustainability efforts in Denali National Park and Preserve.

## 7 Recommendations for Improving INVEST

During this evaluation we realized that INVEST OM criteria were developed for state and local transportation agencies. As presented throughout this report, one of many functions of DNP, and the NPS in general, is to maintain their roads within the park. Since NPS does not primarily function as a transportation agency; several criteria were not applicable to NPS. Examples include:

- OM-11 Traffic Control Infrastructure Maintenance: While some national parks have a larger network of roads and allow private vehicle use throughout parks, many do not. And in these instances, it is more sustainable to not have expensive traffic control infrastructure.
- OM-13 Transportation Management and Operations: Similar to the assessment of OM-11, many national parks have no reason to use technology to manage their road systems.

Currently, the INVEST system rates agencies with consideration of their scope of influence; whether they are state or regional agencies. However, there may be value in adding an option to allowing agencies to select a “not relevant” in response to some criteria or sub-criteria. Under the current rating system, even if an agency can prove that the criteria is irrelevant, by not selecting that they meet a criterion it is counted against them. INVEST staff should consider adding a “not relevant” option that would reduce the total points over all. Realizing this may make it easier or harder for these agencies to attain a better rating, some consideration could also be given to modifying how each “not relevant” response influences the required points necessary to achieve each rating level.