National Park Service
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Cape Cod National Seashore
Wellfleet, Massachusetts

Cape Cod National Seashore
Satellite Vehicle Maintenance Facility Feasibility Study

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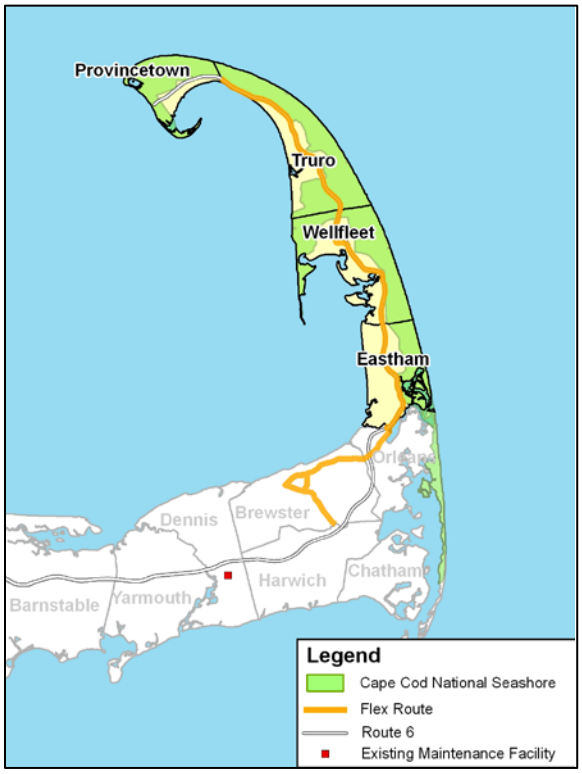
Section 1: Introduction and Existing Conditions

This report summarizes the opportunities and constraints for a possible new satellite vehicle maintenance facility on the Outer Cape, as well as information on several alternative options. The purpose of the report is to provide the National Park Service (NPS) – Cape Cod National Seashore (CACO) and other stakeholders with information on potential benefits, costs, and other considerations that can help guide investment priorities.

Background on satellite facility concept

Although most visitors to the National Seashore arrive by private vehicle, promoting alternative transportation has been a policy priority as a means of improving the visitor experience and reducing the adverse resource impacts of visitor transportation. The main form of alternative transportation to National Seashore sites and beaches is local bus service operated by the Cape Cod Regional Transportation Authority (CCRTA), particularly the Flex route and Provincetown-Truro shuttle route. One of the operational challenges with these bus routes has been the deadhead[1] time and mileage associated with moving vehicles in and out of Outer Cape service from CCRTA's current maintenance facility located in Dennis, particularly during congested summer conditions.

Figure 1
Orientation Map: Cape Cod National Seashore



This study was funded under the Alternative Transportation in Parks and Public Lands (ATPPL) program in order to assess the feasibility of a satellite vehicle maintenance facility on the Outer Cape. Such a facility would reduce operating costs associated with the Flex and Shuttle routes and could improve the reliability

[1] "Deadheading" refers to movements by transit vehicles outside of revenue service. Deadhead travel includes leaving or returning to the garage or yard facility, changing routes, or other situations in which there is no expectation of carrying revenue passengers.

of the transit service by reducing out-of-service time for buses. A satellite facility could potentially also be used for maintenance and repair of Cape Cod National Seashore's own maintenance vehicles and shuttles. The original concept also included the possibility of an alternative fueling station (biodiesel) and a partnership with one or more of the towns on the Outer Cape, who might realize cost savings from having Fire and Public Works vehicles serviced locally rather than towed off-Cape. This would address longstanding local needs for more fueling options and for more advanced maintenance capabilities within the local area.

Overview of research methods

In order to prepare a concept-level design and rough cost estimate for the satellite facility, the study team conducted site visits, interviews, and document reviews to gather information on required sizing and features. A construction consultant was also engaged to provide design assistance and prepare a more detailed cost estimate. To understand partnership potential, a brief survey was distributed to the Public Works and Fire Departments of the four Towns of the Outer Cape. The survey asked about their current vehicle fleets, maintenance and re-fueling practices, and their willingness to consider other options.

This study was originally focused only on the concept of a satellite maintenance facility. During the course of the research, however, the study team also worked with CACO, the Cape Cod Commission, and stakeholders such as the Outer Cape Inter-Municipal Coordination Committee, to identify other potential alternatives that could prove cost-effective in meeting at least some of the primary objectives of the satellite facility, namely:

- Reduced deadhead time and cost for CCRTA services on the Outer Cape
- Enhanced vehicle maintenance capabilities for CACO
- Improved availability of alternative fuels on the Outer Cape
- Reduced maintenance costs and out-of-service time for heavy vehicles for one or more partner Towns.

Based on discussions with CACO and an initial review, three additional alternatives were selected for further research on costs and relative advantages. These alternatives are summarized in Section 2 below.

Context: Current Vehicle Fleets and Maintenance Practices

CCRTA currently maintains a fleet of roughly 110 vehicles at its primary maintenance and fueling facility in Dennis, most of which serve the Mid-Cape and Upper Cape areas. In interviews, CCRTA staff indicated that the relevant portion of the fleet for the proposed satellite facility would comprise 7-10 buses on the Provincetown-Truro shuttle service, 2-5 buses for the Flex route, 2-5 "b-bus" (demand-response) vehicles, and 2-4 supervisory vehicles. Outer Cape schedules and services have since been reorganized somewhat, for example with the Flex service extended to Provincetown year-round, but the overall vehicle totals remain in the same range.

At present, CCRTA stores Flex and Shuttle vehicles overnight at the Highlands Center in Truro (the former North Truro Air Force Station) during the summer season, and at MacMillan Pier in Provincetown during the winter. In summer, periodic vehicle checks are performed by a mechanic traveling out from Dennis, and buses refuel at the Provincetown Department of Public Works (DPW). At other times of year, refueling and service are conducted at the Dennis facility.

The distance from the Outer Cape to the CCRTA facility in Dennis can require significant deadhead time, particularly during peak summer congestion. However, CCRTA's current maintenance practices have mitigated the need for deadheading: vehicles can be stored overnight on the Outer Cape and (at least seasonally) can be re-fueled without leaving the Outer Cape. CCRTA is nonetheless interested in other solutions, such as a satellite maintenance facility, because of some community opposition to the use of the

Highlands Center site for bus storage and the possibility that this area may at some point become unavailable.

Cape Cod National Seashore has a small but diverse fleet of medium-duty maintenance vehicles that could potentially be maintained at the satellite facility. CACO's fleet also includes several bicycle shuttles and parking trams (power units and trailers) that could be stored or serviced at an Outer Cape facility.

Figure 2
Examples of CCRTA and NPS Vehicles Used in Design of Satellite Facility Concept
(L-R: CCRTA Paratransit Vehicle and Transit Bus; Cape Cod National Seashore Trams and Trailers)

Town fleets and maintenance practices, as reported by Town staff in response to our 2009 questionnaire, are summarized in the table below. Full responses from the Towns are presented in Appendix B. One of the themes of the responses was that while all Towns have at least some in-house capabilities, more advanced maintenance and repair work can require the towing of vehicles to off-Cape facilities, at a cost of up to $500 plus staff time. Each Town expressed at least some interest in the idea of being a partner in an Outer Cape maintenance facility, while also being sensitive to the exact location of the facility, particularly with respect to fueling.

Table 1
Summary of Outer Cape Vehicle Fleets and Maintenance Practices
Source: US DOT Volpe Center via Questionnaire

Town	Heavy Duty Vehicles	Medium Duty Vehicles	Est. Annual Maint. Costs	Maintenance Practices
Eastham: DPW and Fire Dept.	10	6	$75,000	Oil changes & lubrication done in-house; other activities are contracted out. Contractor facilities in Sagamore, Orleans, and Wakefield.
Provincetown: Highway Dept.	7	7	$82,000	Vehicles are all maintained in-house.
Truro: DPW and Fire Dept.	18	9	Not reported	Vehicles are all maintained in-house.
Wellfleet: DPW and Fire Dept.	15	20	$105,000	DPW vehicles serviced 50% in-house and 50% by contract. FD vehicles serviced 20% in-house and 80% by contract. Farthest service locations are in Hyannis (for DPW) and Walpole (for FD).

Section 2: Review of Alternatives

Option 1: Satellite Maintenance Facility

This option is the Outer Cape satellite maintenance facility as originally envisioned in the ATPPL application for this project and described above. The size of the facility was based on an assumed fleet of 45 vehicles to be serviced: 25 from CCRTA and the National Seashore (based on the fleet sizes noted above) plus 20 vehicles from a potential partner Town (or Towns), which is a rough average of the four Towns surveyed.

A site visit to the current CCRTA facility and interviews with maintenance staff were conducted to understand the key elements needed for the satellite facility. Based on feedback from CCRTA staff, the proposed facility was envisioned as having a similar "look and feel" to the current Dennis facility, with most of the same capabilities in terms of vehicle maintenance and fueling, but with the overall size scaled down to reflect the smaller fleet being serviced. CCRTA maintenance staff also reported a need to expand service bays from 20 to 25 feet in width to ensure safe operation and reduce occupational hazards. Further details on the specific equipment requirements and square footage estimates are available in the interim report of July 2009, but the key features included:

- Four service bays, including two with lifts
- Lifts oriented in tandem to accommodate larger vehicles
- A wash bay
- Storage space for 25 vehicles (Town vehicles would be stored elsewhere)
- Office, locker, and living space for 4-5 personnel
- Diesel and gasoline fueling tanks.

Total interior space required for the facility was estimated at just over 12,000 square feet. As detailed in the consultant's report in Appendix A, construction costs were estimated using a combination of industry averages and actual construction costs of the Dennis facility. CCRTA's actual costs from the Dennis facility were viewed as providing one of the more reliable sources of information on construction costs on Cape Cod for this type of structure, but were adjusted to 2012 dollars to account for the increases in the costs of building materials that have occurred in the past few years.

Other assumptions were as follows:

- Costs do not include land acquisition; 3-5 acres of land are expected to be required for the proposed facility, with all utilities readily available
- Soil conditions are good for foundation and septic design
- No hazardous waste is present on the conceptual site
- No major traffic studies will need to be performed prior to construction
- Costs associated with LEED certification are not included
- Fueling equipment costs are based on gasoline and diesel only
- A 10% contingency is built in to the estimate to provide an allowance for inherent uncertainties and the potential for additional costs
- The cost estimate is for upfront construction costs only and does not include operations and maintenance costs or monthly utilities.

Table 2 presents a summary of the major line-item cost elements for the facility, and Figure 3 shows a sketch-level rendering of the potential facility layout.

Table 2
Cost Estimate for Satellite Vehicle Maintenance Facility. All figures are approximate.
Source: US DOT Volpe Center cost analysis

Description of Cost	Dennis facility, actual costs (2005 dollars)	Adjusted to 2012 dollars via const. cost index	Adjusted for size of satellite facility (2012 dollars)	Comments
Final building cost with change orders. (Does not include vehicle washer, vehicle lifts, overhead lube system, or vehicle exhaust system)	$4,299,886	$6,102,828	$4,734,127	Includes: concrete, masonry, steel, wood, thermal & moisture protection, doors, windows, finishes, signage, toilet accessories, lockers, plumbing, fire protection, HVAC, electrical, kitchen appliances, tire changer, brake lathe, benches, drill press, grinder, & battery tester.
Design fee: Final design and construction phase services. (Does not include conceptual and preliminary design.)	$530,022	$752,260	$583,548	
Client project management	$79,695	$113,111	$87,743	
Miscellaneous cost (testing, moving, furniture, IT, etc.)	$264,000	$374,695	$290,661	
Other costs	$356,198	$505,552	$392,170	Includes conceptual design, preliminary design, site survey, soil testing, etc.
Sub Total	$5,529,801	$7,848,447	$6,088,250	
Price per square foot (except washer and lift areas)	$350	$497	$497	Washer area=$584/SF, lift area=$583/SF in 2012$
Site costs	$881,405	$1,250,978	$1,250,978	Includes: All work outside the building such as grading, drainage, parking, lighting, etc.
Equipment: vehicle washer, vehicle lifts, overhead lube system, vehicle exhaust system	$467,318	$663,264	$510,000	Washer=$225K, two lifts=$160K, lube system=$50K, and exhaust system=$75K in 2012$
Land acquisition	$650,000	$922,545	Not included in estimate	
TOTAL	$7,528,524	$10,685,234	**$7,849,228**	
With Contingency (10%)			**$8,634,151**	

Figure 3
Conceptual Facility Layout
Source: US DOT Volpe Center cost analysis

Scale: 1: 240

Cost-Effectiveness

As shown above, total costs for the conceptual facility were estimated at $8.6 million, plus land acquisition. In a best-case scenario, where a suitable parcel of land could be made available at no direct cost, and the facility's staff could be transferred from Dennis with no additional costs, the satellite facility would still need to generate cost savings of around $500,000 per year or more in order to cover the cost of capital and the ongoing overhead costs associated with the building.

The study team constructed a basic spreadsheet model of CCRTA's potential cost savings from the use of an Outer Cape facility. Values for key assumptions were based on a discussion with Lisa Maragnano of CCRTA's contractor PTM, and by reference to the published schedules, and included the following:

- 5 buses in service on the Flex route and 2 on the Provincetown-Truro shuttle in summer
- 2 buses in service on the Flex route in winter
- A 12-week summer season and 40-week winter season
- 2 deadhead runs per vehicle per day (i.e. one from Dennis to the Outer Cape in the morning, and one return in the evening)
- Total bus operating costs of $53.73 per vehicle-hour[2]
- Average bus fleet fuel economy of 7 miles per gallon
- Approximate distance of 16.3 miles (30 minutes travel time, plus allowance for summer traffic *f* congestion) between Dennis facility and satellite facility *f*

The model further assumed that current storage and refueling locations in Provincetown and Truro would no longer be available for use. This was intended as a conservative assumption to avoid undercounting the potential cost savings. Based on these assumptions, the incremental time and mileage costs of deadheading CCRTA vehicles from Dennis to the Outer Cape and back are in the range of $77,000 per year. The figure is substantially less if the Highlands Center and/or MacMillan Pier continue to be available at least part-time.

There are also some practical limitations to achieving the full benefits of an Outer Cape satellite facility. For example, CCRTA indicated that some deadheading may be unavoidable simply because they have been unable to recruit enough drivers who live on the Outer Cape. It may also prove difficult to transfer maintenance staff from Dennis to the Outer Cape facility without disrupting work in Dennis, for example if particular staffers have specialized expertise that must remain at the main facility.

Some additional savings would be realized from reduced deadheading of the Outer Cape's b-bus fleet, and by reducing the need for mechanics to travel out from Dennis for routine maintenance checks. Reduced vehicle mileage would also translate into environmental benefits in the form of reduced emissions. A satellite facility located toward the southern end of the Outer Cape could also be suitable for reducing deadhead time and mileage for vehicles on the Hyannis to Orleans "H20" route, which has 3-4 buses entering service in Orleans each morning. However, each of these areas of savings is very modest compared to the upfront cost of the facility. Overall, an Outer Cape facility would not be cost-effective by conventional measures.

The $77,000 figure for annual deadhead savings is significantly lower than the $260,000 that had been estimated in the ATPPL application for this project, for two main reasons. First, the frequency of Flex service has been scaled back in the years since its initial planning and implementation, meaning that there are fewer vehicles used on each service day for which deadheading from Dennis would be required. Second, the more recent calculations are based on the *incremental* deadhead time and mileage of continuing to use Dennis, versus what would be required from an Outer Cape location to the starting point for revenue service. Even with an ideal Outer Cape location, there would continue to be some

[2] This is the cost per vehicle-hour of revenue service as reported in the 2008 National Transit Database (NTD). PTM quoted an internal figure of $38.17 per vehicle-hour, but this analysis uses the higher figure to account for potential indirect costs and avoid possible underestimation.

deadhead mileage. Indeed, half of the vehicles on the Flex route begin revenue service in Harwich, for which Dennis is closer than almost any Outer Cape location beyond Eastham.

In addition to CCRTA's reduced deadheading, further cost savings could be realized by project partners such as NPS and one or more Towns, since an Outer Cape facility would reduce out-of-service time and the frequency with which vehicles need to be sent off-Cape for maintenance. However, these potential savings are again quite limited compared to construction costs. Cape Cod National Seashore's own vehicle maintenance needs are relatively modest, and each of the Towns spends only $75,000 to $105,000 per year for medium- and heavy-duty vehicle maintenance, only a portion of which could conceivably be reduced by the presence of a local maintenance facility.

Location

Information on potential locations for the satellite facility was received from local stakeholders through the Outer Cape Inter-Municipal Coordination Committee, through responses to our Town survey on vehicle maintenance, and from Volpe Center staff working on the Cape Cod National Seashore Parking and Transit study. One of the key considerations is that each of the four Towns has existing fueling and maintenance arrangements, and would generally prefer not to travel far beyond the Town boundaries for any new maintenance facility. This limits the range of potential partnerships for any given site, and tends to favor locations in the more central parts of the Outer Cape, i.e. roughly from North Eastham to South Truro. A further constraint is that NPS policy generally restricts the use of National Seashore land for these purposes, and few suitable Town-owned parcels were identified.

Two sites that have been suggested by stakeholders as potentially suitable for a maintenance facility are the former Tilcon plant in Eastham and a re-developed Highlands Center. Land on both of these sites has already been disturbed/developed, thus reducing (though not eliminating) some of the environmental concerns about additional paved surface or habitat destruction. The Tilcon site in particular has the advantage of being located near Route 6 and the Flex route. However, both sites would entail challenges: the Tilcon site may require environmental remediation, and the Highland Center site would be controversial due to perceptions that a heavy-vehicle maintenance facility is not compatible with other planned uses for the site.

Given the low cost-effectiveness associated with this satellite maintenance facility option as a whole, more detailed investigation of site-specific conditions and constraints has not been undertaken. If further planning for this option were to be pursued, sites would need to be evaluated on factors including:

- Location relative to the Flex and Shuttle routes
- Total acreage, parcel shape, grade, and soil conditions
- Availability of utility services
- Road access and impacts on traffic patterns
- Environmental remediation
- Neighboring land uses and community sentiment.

Recommendation: Unless operating costs or scheduled transit operations significantly increase, this option does not appear to be a viable use of capital funds.

Option 2: Satellite Bus Storage

This option focuses solely on the key need that was identified in the original project application: an Outer Cape location for the overnight storage of Flex and Shuttle buses to reduce deadheading costs. Although CCRTA's needs for Outer Cape storage are currently being met through the use of MacMillan Pier and the Highlands Center, it is possible that these arrangements will be revisited – particularly in the case of the Highlands Center, where bus storage may be viewed as incompatible with the vision of a cultural

center. Therefore, this option is worth exploring as a means of identifying alternative sites that could fulfill the need for vehicle storage.

Compared to a maintenance facility, the infrastructure and equipment needs for a parking area are quite basic: an area of graded and paved surface; some form of access control; and potentially a canopy for protection from weather. (Weather protection would help reduce the vehicles' exposure to salt air and corrosion.) To allow independent entry and exit of buses, a space of approximately 10 feet by 60 feet is needed for each vehicle. A relatively small 0.5- to 1-acre parcel could therefore be sufficient, depending on the number of vehicles and other factors such as the shape of the parcel, the layout of driveways and access points, and landscaping. The site could be used year-round or only during the peak summer season, depending on CCRTA's needs and any other competing or complementary uses for the site. Due to the relatively modest land requirements, the range of potential sites is much broader. Additional sites that have been suggested by stakeholders are a portion of the White Crest Beach parking lot and the Massachusetts DOT facility in Truro. A portion of the Nauset Regional High School lot could also potentially be used on a seasonal basis, which would allow CCRTA's peak summer service season to be matched up with the school's off-peak season, in a fairly central location. Again however, site-specific constraints have not been analyzed.

Recommendation: Due to the relatively low capital costs needed and the potential for improved operations, this option may be a good candidate for further analysis in conjunction with the CCRTA.

Option 3 – "Scaled Back" Satellite Maintenance Facility

This option focuses on the potential for a smaller, more cost-effective facility with bus storage, limited maintenance capabilities, and potential refueling infrastructure. The rationale for this option is that it would address some key needs of CCRTA and the Outer Cape towns, such as alternative fuels, vehicle washing, and overnight storage, while avoiding some of the major costs associated with a full-fledged maintenance facility. A scaled-back satellite facility could, for example, handle periodic maintenance and minor repairs, while larger maintenance jobs would stay at existing facilities. A typical approach would be to re-use an existing structure, addressing relatively minor retrofit needs such as a heavy-duty lift in a single maintenance bay (roughly 1500 square feet); an additional 2,000 square feet for other maintenance and storage; a wash bay; specialized tooling; re-paved parking areas; security infrastructure; and fuel tanks and other fueling infrastructure.

Due to the wide range of capabilities that such an alternative facility could encompass, a cost estimate may range from property acquisition costs alone (retaining an existing site with little to no modification), to roughly $2 million for the installation of specialized equipment at an otherwise move-in ready location. Cost estimates for specific "à la carte" capabilities are as follows:

- Heavy Duty Lift: $80,000 - $100,000
- Washer Bay: $225,000
- Overhead Lube System (one bay only): $20,000
- Exhaust System (one bay only): $15,000
- Con-Vault above-ground, Fire Marshall-approved dual 5,000 gallon fuel tank with dispenser: $100,000 + installation.

Since much of the costs associated with a new maintenance facility are related to site preparation and building, the re-use of an existing site that is developed (and zoned appropriately) could significantly reduce the costs involved and provide a more cost-effective approach than Option 1. While the local stakeholders interviewed did not identify a specific site on the Outer Cape for this concept, there may be future opportunities to acquire a suitable property, for example if a former service station or other automotive business comes on the market.

Recommendation: Overall, a scaled back facility could offer a unique blend of options to suit current and future needs of CCRTA, the National Seashore, and/or one or more Town partners. Additional maintenance needs could be met through scheduling at the existing CCRTA facility or in concert with a mobile maintenance service as discussed below in Option 4.

Option 4 – Mobile Maintenance Unit

Several local stakeholders noted the potential advantages of using a mobile maintenance unit rather than a fixed maintenance facility. A mobile maintenance unit is a heavy-duty truck that is equipped with specialized vehicle maintenance and repair equipment, including a lift and diagnostic tools. As its name implies, a mobile maintenance unit provides the flexibility of being able to come to the site where vehicle repairs are needed, rather than vice versa. This is an important advantage on the Outer Cape, where the distances to repair facilities can be substantial. The mobile concept also opens up the door to greater partnership opportunities than a fixed facility, since it eliminates the concern about the facility being too far from Town facilities and makes the resource more readily shared.

Mobile units' capabilities vary, but they generally include inspections and scheduled maintenance, and can often include repair services that are comparable to those of a fixed repair facility. A typical unit costs in the range of $100,000 to $150,000 and includes the following set of capabilities:

- Full periodic maintenance (PM) schedules
- Safety inspections (e.g. state inspection stickers)
- Roadside repairs
- Minor and major service work including tune-ups and oil changes
- Brake, suspension and transmission work.

Certain types of repairs involving the extraction of the engine or major components are beyond the capabilities of mobile units. In these cases, the damaged vehicle must be driven or towed to a conventional repair facility. Mobile Diesel Medic, a mobile maintenance service based in the San Francisco Bay Area, stated in an interview that roughly 98% of their maintenance calls could be performed with a mobile maintenance unit.

Neil Andres, maintenance director for the Eastham Department of Public Works, noted that one key benefit of using a mobile inspection service is that "the shop comes to you" – that is, multiple vehicles can be inspected or serviced at their normal storage location, minimizing out-of-service time and towing costs. On the other hand, the typical "book" charge for service from a mobile maintenance unit is roughly double that of a conventional repair facility, due to the additional time and costs associated with set-up, prep time, and travel time. This suggests that a mobile unit is most advantageous in situations where multiple vehicles can be serviced at once, or when out-of-service time is particularly costly, either in direct financial terms or in terms of impacts on transit operations or other essential services.

There are several different business and partnership arrangements through which stakeholders on the Outer Cape could employ a mobile maintenance unit. The first decision would be whether to purchase a mobile maintenance vehicle, versus simply entering into a service contract with a private-sector service provider. In the case where the vehicle is purchased, an additional determination required would be whether to operate and maintain the mobile unit using in-house staff from the National Seashore, CCRTA, and/or the Towns, or instead to contract these tasks out to a concessionaire. To the extent that local partners are involved, part of this determination would be the need to ensure compliance with Massachusetts law governing contracting out of public sector services, known as the Pacheco Law.

One potentially workable partnership would be for the National Park Service, the CCRTA, and/or a partner Town to purchase the vehicle using capital funds, with the costs of ongoing operations and

maintenance shared via cooperative agreement or Memorandum of Understanding (MOU). The agreement would need to spell out how the mobile unit's time and operational costs would be divided – for example, by daily or weekly rotating schedule, or on a fee-for-service (cost-recovery) basis. The value of any in-kind contributions to the maintenance partnership, such as staff time or parts, would also need to be considered. Due to the potential air quality benefits, there is a possibility of utilizing federal-aid highway funds under the Congestion Mitigation and Air Quality (CMAQ) program. This funding source is programmed by the Cape Cod Metropolitan Planning Organization.

Purchasing a service contract from an existing provider is a more straightforward and flexible arrangement, and allows the partner agencies to pursue this strategy without the need for upfront capital funding. One key question in this case is whether CACO and its potential partners have enough vehicle repair needs to warrant the assignment of a full-time dedicated vehicle. If not, the cost of sending in a mobile maintenance unit on-demand from the Upper Cape or the Boston area would erode some of the attractiveness of this option, though it might prove useful initially as a means of testing out the mobile unit without a long-term service commitment. In an informal interview with Dynamic Mobile Repair of Wakefield, Massachusetts, the firm's general manager noted that their typical rule-of-thumb is that a dedicated vehicle and technician can be assigned when maintenance spending rises to the level of approximately $120,000 to $140,000 per year. Based on current maintenance practices and expenditures, this level could indeed be reached on the Outer Cape, but only if the National Seashore were to partner with multiple Towns and/or with the CCRTA. Since this could entail the transfer of some in-house work to the mobile unit contract, the full implications for staffing and budgets would need to be considered. Dynamic Mobile Repair reported that they typically operate with their own vehicles, but would be open to a scenario in which they use a maintenance unit that has been purchased by the partners. Storage needs for the mobile maintenance unit itself are minimal and could be handled at existing facilities or by the maintenance contractor.

Table 3
Summary of Potential Options for Mobile Maintenance Unit (MMU)

Description	Pros	Cons	Partnership Arrangements
Own & Operate: Purchase MMU ($100,000 to $150,000) and operate using in-house maintenance staff.	Dedicated vehicle for Outer Cape. May be able to access capital funding sources (e.g. NPS, CMAQ).	Greater risk and capital expense vs. service contract with existing firm. May require training staff on MMU operations.	MOU among project partners governing cost allocation, staffing, and use of the MMU.
Own Vehicle but Contract for Service: Purchase MMU and operate using staff from outside maintenance contractor.	As above, plus makes use of contractor expertise in MMU operations.	Contracting out may present legal or labor relations issues. Atypical approach for MMU service would require more complex contract.	MOU among project partners governing cost allocation and use of the MMU.
Basic Service Contract: MMU sent on-demand from Upper Cape or mainland. Standard rates.	Lowest-risk option: can use MMU only as circumstances require. Low-cost way to assess the effectiveness of the MMU approach.	Extra travel time reduces cost-effectiveness. Labor/ legal issues with contracting.	Each entity pays for own use of MMU on a fee-for-service basis.
Service Contract with Dedicated Vehicle. MMU and technician assigned to Outer Cape.	Dedicated vehicle reduces travel time and improves responsiveness.	Requires commitment to use MMU for approx. $120,000+ per year in service work. Labor/ legal issues with contracting.	MOU among project partners governing cost allocation and use of the MMU.

Regardless of the approach that is chosen, significant coordination among potential partners will be needed. A recommended next step would be to form a task force, perhaps under the auspices of the Outer Cape Inter-Municipal Coordination Committee, that would evaluate the viability of a shared mobile maintenance unit by gauging interest and studying institutional and financial options. The primary issues that the task force would need to examine are:

- Partners' preferences for in-house vs. contracted maintenance
- Inventory of partners' maintenance activities for which a mobile unit would be preferred over current practices and associated costs
- Operational changes from use of the mobile unit
- Ability to have a mobile unit dedicated to the Outer Cape, given projected maintenance needs
- Staffing and labor issues and (for Towns) any limitations due to the Pacheco Law
- Legal mechanisms (e.g. MOU) to govern cost-sharing among partners and the use of the mobile unit.

Recommendation: If funding and institutional issues can be addressed, this option offers the possibility of reduced maintenance costs and improved capabilities and operational flexibility. While it does not address the original need for overnight bus storage to reduce deadheading, it could be combined with Option 2 to do so.

Conclusion

The primary goal of this feasibility study was to assess the suitability of a satellite vehicle maintenance facility on the Outer Cape as a means of addressing some of the operational challenges and maintenance needs of Cape Cod National Seashore and its partners. The central finding of the study is that while such a satellite facility would indeed reduce deadheading time for transit vehicles serving the Outer Cape, and potentially yield other maintenance efficiencies, these savings would be greatly outweighed by the substantial upfront capital costs need for construction of the facility. Moreover, certain changes that have taken place since the project was originally proposed, such as reductions in the frequency of transit service on the Outer Cape, have reduced the prospects for cost-effectiveness.

This report has presented an overview of three alternative approaches that would yield at least some of the advantages of a satellite facility at much lower cost: a simple overnight storage space for transit vehicles, a scaled-down satellite maintenance facility, and a mobile maintenance unit. Each of these approaches has its own set of tradeoffs and partnership considerations. Based on the information collected in the study and stakeholder feedback received, the mobile maintenance unit appears to warrant further examination as means of addressing many of the Outer Cape's maintenance needs in a cost-effective way. Key implementation issues such as forging an effective partnership for sharing the mobile resource and its costs, developing an acceptable service agreement, and addressing the potential impacts on existing in-house maintenance and staffing, are beyond the scope of this report but would need to be addressed by project partners before proceeding. Finally, it is also important to consider the virtues of a "no action" alternative. Current vehicle maintenance arrangements on the Outer Cape involve certain inefficiencies such as towing vehicles long distances for service, yet may represent the most cost-effective approach for a region with relatively low population density and modest maintenance needs.

Appendix A: Engineering Cost Estimate

June 15, 2009

Scott Lian
Volpe Center
55 Broadway
Cambridge, MA

RE: Cape Satellite Facility

Dear Mr. Lian:

I have completed the task of putting together a cost estimate for the Outer Cape Satellite Maintenance Facility. The cost is based on the previous task that I completed for you of the schematic design and square footage needed for the new facility. As you know, the adjacent towns and fire departments may want to participate in maintaining their fleet at this facility. I have put together an approximate square footage cost of this new facility and can be used just in case this facility needs to be expanded for these other towns to participate. This will make it easy to calculate these costs for the additional spaces once we know which towns and their square footage needs are.

In order for me to complete this task, I looked at the actual cost to construct the bus maintenance facility in Dennis, Massachusetts. I visited the actual site of the facility and talked with Thomas Mackenzie of PTM of Cape Cod, Inc. Thomas gave a tour of the site and building. See my previous meeting minutes provided to you on this visit. Based on this site visit and the design elements that worked and needed improvement, I put together the required equipment list, building layout and square footage needs for the new building. See my floor plan and tables for the space design and requirements that I gave you previously. The actual costs of the Dennis, MA facility was provided by Dennis Walsh of the Cape Cod Regional Transit Authority. These actual costs included the building costs, design costs, client project management costs, site costs (All work outside the building such as grading, drainage, parking, lighting, etc.), land acquisition costs, equipment costs, miscellaneous costs (testing, moving, furniture, IT, etc.), and funds spent previously (conceptual design, preliminary design, site survey, soil testing, etc.). The building costs included: concrete, masonry, steel, wood, thermal & moisture protection, doors, windows, finishes (tile, paint, carpet), signage, toilet accessories, lockers, plumbing, fire protection, HVAC, electrical, dishwasher, stove, other kitchen appliances, tire changer, brake lathe, benches, drill press, grinder, and battery tester. All these costs totaled $7,528,524. This cost is in 2005$ when the building construction was awarded and all the fees were based on that year. The cost per square foot for this building was approximately $350. This is also in 2005$. This cost per square foot only includes all of the above mentioned costs except three costs: site costs, land acquisition costs, and equipment costs. The reason for the exclusion from the square footage cost is

that these costs do not directly impact the square footage cost, they are independent. These three costs are added to the subtotal cost. See the attached table in this letter.

The costs of the new building are based on research of the current construction industry, existing Dennis, MA facility, other similar facilities built, current prices with equipment manufacturers, current material costs, labor costs, and review of the cost trends in the Massachusetts area. Construction prices have been fluctuating drastically over the last five years. They have not been following the same trends over the last 20 years. This is due to many reasons such as hurricane Katrina, oil prices, supply and demand, etc. Construction prices increased 36% from January 2004 to the end of 2008. In 2008, the prices increased up to 10%. There are certain materials that increased a lot, such as steel increased 15-18% in 2008, along with oil prices fluctuating a lot last year. The trend for 2009 is around 3%. The cost of the new facility is in 2012$ because this is the year that this facility is suppose to be built. I used an average construction increase of 7% per year until 2009 and used 3% increase for this year and an average of 4% per year from then until 2012. As you can see from the table, the average cost per square foot for the new building will be approximately $497. This includes the same as the Dennis, MA facility and excludes the three same categories. If you include the washer, lube, exhaust, and lift equipment, the average cost per square foot for the new building will be approximately $584 for the wash area and $583 for the lift area. The total cost of the new facility will be approximately $8.6 million. This includes a 10% contingency and does not include the land acquisition cost like the Dennis, MA facility does. Since a site has not been selected yet and the real estate costs have fluctuated drastically over the recent years, I did not put a cost to this. It is anticipated that approximately 3-5 acres are needed and the cost of this could vary from $800K to $1.3 million. These costs of the new facility are based on the size designed and the amount of equipment from the previous study mentioned above.

Since the site has not been selected, we are only in pre-conceptual design, and there are several things that may change the costs, I based my costs on the following assumptions:

- The 3-5 acres site selected is a flat site with no major hills. There is no ledge that needs to be blasted. It is not near a major wetland. Not located in a flood plain. Not located near any endangered species. The site needs your usual environmental, state, local and federal permits, nothing that requires major permitting.

- All utilities are readily available such as gas, water, sewer, electric, telephone, etc. and you don't have to go miles to tie into any of these.

- All soil conditions are good for foundation design and septic design. The soil has a good percolation rate for septic design.

- The list of fleet required for this new facility is correct.

- There is no hazardous waste in any of the existing facilities on the new site that is purchased. The soil is not contaminated and does not need any remediation.

- No large traffic engineering studies need to be performed in order to allow this project to move forward.

- No cost consideration was included for making the building LEED certified.

DESCRIPTION OF COST	EXISTING DENNIS FACILITY COSTS (2005$)	EXISTING DENNIS FACILITY COSTS (2012$)	NEW FACILITY COSTS (2012$)	ADDITION TO NEW FACILITY COSTS (2012$)	COMMENTS
Final building cost with change orders. (Does not include vehicle washer, vehicle lifts, overhead lube system, or vehicle exhaust system)	$4,299,886	$6,102,828	$4,734,127		Building costs include: concrete, masonry, steel, wood, thermal & moisture protection, doors, windows, finishes (tile, paint, carpet), signage, toilet accessories, lockers, plumbing, fire protection, HVAC, electrical, dishwasher, stove, other kitchen appliances, tire changer, brake lathe, benches, drill press, grinder, and battery tester.
Design fee: Includes only final design and construction phase services. (Does not include conceptual and preliminary design.)	$530,022	$752,260	$583,548		
Client project management	$79,695	$113,111	$87,743		
Miscellaneous cost (testing, moving, furniture, IT, etc.)	$264,000	$374,695	$290,661		
Funds previously spent	$356,198	$505,552	$392,170		Includes conceptual design, preliminary design, site survey, soil testing, etc.
Sub Total	$5,529,801	$7,848,447	$6,088,250		
Price per SF (for all areas except washer and lift areas)	$350	$497	$497		washer area=$584/SF, lift area=$583/SF

Site costs	$881,405	$1,250,978	$1,250,978		Includes: All work outside the building such as grading, drainage, parking, lighting, etc.
Equipment: vehicle washer, vehicle lifts, overhead lube system, and vehicle exhaust system	$467,318	$663,264	$510,000		washer=$225K, two lifts=$160K, lube system=$50K, and exhaust system=$75K
Land acquisition	$650,000	$922,545	Not included		
TOTAL	$7,528,524	$10,685,234	$7,849,228		
Contingency (10%)			$8,634,151		

If you have any questions or need any additional information, please give me a call.

Sincerely,

David Agnello, PE, LEED-AP

Appendix B: Town Survey Responses on Maintenance Needs

Survey 1 of 4
Town Name: Eastham
Departments: Department of Public Works (DPW) and Natural Resources. Provider of fuel for Police, Fire Department, Regional Schools and School Bus Contractor
Fleet Manager Contact: Neil Andres, 508.240.5973, nandres@eastham-ma.gov

Fleet Size and Service Requirements

1. How many medium- and heavy-duty vehicles do you currently own or operate?
    a. 6 heavy-duty trucks, 4 loaders/tractors and provide fuel for 6 heavy- and medium-duty Fire Department vehicles.
2. Where do you currently have your medium- and heavy-duty vehicles serviced (in-house, contractor, etc)?
    a. Oil change and grease in-house, remaining maintenance and service work is performed by a contractor.
3. If not on-site, how far away is the service facility and what 'dead-head' charges are associated with transportation to and from the facility?
    a. South East Truck is located in Sagamore; Cape Cod Truck is located in Orleans; New England Detroit Allison is located in Wakefield. Towing charges to Wakefield are approximately $400. Staff time and miles to bring vehicles off-cape include two people and two vehicles to drop off and pick up. Eastham Fire Department uses Cape Cod Truck and Service in Chatham.
4. How many light-duty vehicles do you currently own or operate?
    a. DPW – 11 vehicles, Fire Dept. – 3 vehicles, Police Dept. – 6 vehicles with 6 remaining MISC vehicles.
5. Where do you currently have your light-duty vehicles serviced?
    a. Minor work (oil change, grease, wiper blades) is performed in-house while maintenance or warranty items are performed at CJ's Garage in Eastham, or Beard Chevrolet in Hyannis.
6. What are your annual maintenance costs?
    a. $75,000 per year for the town covers vehicle repairs and parts. Some of this expense is on items such as solid waste trailers, mowers, etc. Roughly $1,500 per year, per vehicle is a good estimate.

Maintenance Facility Wants and Needs

7. Would you be interested in a proposed maintenance facility located somewhere on the outer cape?
    a. Yes
8. How far would you be willing to travel to use a shared-use maintenance facility?
    b. To Wellfleet or Orleans if not located in Eastham
9. Is there a general area that would make sense for your needs?
    c. The Wellfleet / Eastham Border along Rt. 6
10. Do you have a potential site in mind that may be useful for such a facility?

d. Harding’s Garage in Wellfleet, former Cape Cod Disposal Company located at 724 State Highway

11. What, if any, requirements other than maintenance and fueling would you utilize?
    e. Storage – No
    f. Electrical Charging – Not at this time
    g. Emergency Supply ‘Depot’ – Possibly

Vehicle Fueling Requirements

12. Where do you currently fuel your vehicles?
    a. On-site
13. Do you own any flex-fuel vehicles that run E85?
    b. Yes
14. Is there local capacity to fuel those vehicles?
    c. No
15. Do you run any vehicles on biodiesel?
    d. Yes, all our diesel vehicles are fueled on-site with biodiesel
16. What is your annual or monthly (gallon) consumption for:
    e. Diesel – 10,000 gallons / year
17. Is the ability to fuel your vehicles on biodiesel a priority for you?
    f. Yes, we would like to continue to use a B5 blend
18. Do you have any interest in other alternative fueling capabilities?
    g. Yes, Compressed Natural Gas (CNG) and Electric Recharging Stations

Survey 2 of 4
Town Name: Provincetown
Departments: Municipal, Police, Fire Department, Department of Public Works, School Buses
Fleet Manager Contact: Sharon Lynn, Town Manager, slynn@provincetown-ma.gov
Fleet Size and Service Requirements

1. How many medium- and heavy-duty vehicles do you currently own or operate?
    a. 14
2. Where do you currently have your medium- and heavy-duty vehicles serviced (in-house, contractor, etc)?
    a. In-house
3. If not on-site, how far away is the service facility and what 'dead-head' charges are associated with transportation to and from the facility?
    a. Did not respond
4. How many light-duty vehicles do you currently own or operate?
    a. 20
5. Where do you currently have your light-duty vehicles serviced?
    a. In-house
6. What are your annual maintenance costs?
    a. $82,000 per year for all vehicles

Maintenance Facility Wants and Needs

7. Would you be interested in a proposed maintenance facility located somewhere on the outer cape?
    a. No, only if it could be a joint arrangement with Provincetown and the Seashore. None of the general areas would be suitable. The closest being Truro/Wellfleet would cost Provincetown vehicles at least 20 minutes of wasted fuel and time not to mention traffic due to weather or congestion.
8. How far would you be willing to travel to use a shared-use maintenance facility?
    a. Did not respond
9. Is there a general area that would make sense for your needs?
    a. Provincetown on Race Point Road shared with the National Seashore
10. Do you have a potential site in mind that may be useful for such a facility?
    a. Either our existing Highway garage or the Seashore Facility about a mile down the road from the garage.
11. What, if any, requirements other than maintenance and fueling would you utilize?
    a. Everything that a Highway Department would be responsible for storing would apply, such as sand/salt storage, vehicle storage, sign machine and capabilities to make your own [signs], road patching equipment, rebuilding of catch basins and catch basin cleaning, street sweeping and the facility

would have to have a backup generator to power operations in bad weather or other disaster conditions.

Vehicle Fueling Requirements

12. Where do you currently fuel your vehicles?
    a. We have our own diesel and gas fueling facilities at the Highway garage.
13. Do you own any flex-fuel vehicles that run E85?
    a. Did not respond
14. Is there local capacity to fuel those vehicles?
    a. Did not respond
15. Do you run any vehicles on biodiesel?
    a. Yes
16. What is your annual or monthly (gallon) consumption for:
    a. Did not respond
17. Is the ability to fuel your vehicles on biodiesel a priority for you?
    a. No
18. Do you have any interest in other alternative fueling capabilities?
    a. No – the reason we say no to the alternative fuels is the capital costs that it would take to replace our vehicle fleet or adapt existing fleet (if possible)

Survey 3 of 4
Town Name: Wellfleet
Departments: Fire Department
Fleet Manager Contact: Mark Vincent, DPW Director and Paul Lindberg, DPW Asst. Director, 508.349.0315; Dan Silverman, Fire Chief, 508.349.3754
Fleet Size and Service Requirements

1. How many medium- and heavy-duty vehicles do you currently own or operate?
    a. 15 heavy-duty and 20 medium-duty (including 4 ambulances)
2. Where do you currently have your medium- and heavy-duty vehicles serviced (in-house, contractor, etc)?
    a. Mix of in-house (20% FD, 50% DPW) and outside contractor (80% FD, 50% DPW)
3. If not on-site, how far away is the service facility and what 'dead-head' charges are associated with transportation to and from the facility?
    a. Typically the furthest service area is in Hyannis although service for large fire vehicles can be as far away as Walpole, MA
4. How many light-duty vehicles do you currently own or operate?
    a. One small pickup truck
5. Where do you currently have your light-duty vehicles serviced?
    a. In-house
6. What are your annual maintenance costs?
    a. Estimated annual cost per vehicle: $2000 (DPW), $4300 (Fire Dept)

Maintenance Facility Wants and Needs

7. Would you be interested in a proposed maintenance facility located somewhere on the outer cape?
    b. I believe the town would be interested in a local maintenance facility that could handle specialty repairs on fire vehicles and apparatus. I would consider sending DPW vehicles to the facility after weighing the results of the feasibility study.
8. How far would you be willing to travel to use a shared-use maintenance facility?
    c. Approx. 35 miles – Hyannis area max.
9. Is there a general area that would make sense for your needs?
    d. The Truro / Wellfleet border and Wellfleet / Eastham border would work equally well for us
10. Do you have a potential site in mind that may be useful for such a facility?
    e. The NPS Marconi site would make the most sense
11. What, if any, requirements other than maintenance and fueling would you utilize?
    a. Storage – Limited Amount
    b. Electrical Charging – No
    c. Emergency Supply Depot - No

Vehicle Fueling Requirements

12. Where do you currently fuel your vehicles?
    a. On-site at DPW, Fire Station and Transfer Station
13. Do you own any flex-fuel vehicles that run E85?
    a. No
14. Is there local capacity to fuel those vehicles?
    a. Not Applicable
15. Do you run any vehicles on biodiesel?
    a. No
16. What is your annual or monthly (gallon) consumption for:
    a. Gasoline (E10): 175 gallons per month
17. Is the ability to fuel your vehicles on biodiesel a priority for you?
    a. We have tried biodiesel but have encountered maintenance issues (i.e., clogged filters, gelling, etc.) and are now using low sulphur diesel
18. Do you have any interest in other alternative fueling capabilities?
    a. No

Survey 4 of 4
Town Name: Truro
Departments: Department of Public Works, Fire Department, Police Department
Fleet Manager Contact: Tim King, DPW Director, 508.237.0060; Brian Davis, Chief Engineer, 508.487.2548, chief@trurofirerescue.org; Chief John Thomas, 508.487.9730, chief@truropolice.org

Fleet Size and Service Requirements

1. How many medium- and heavy-duty vehicles do you currently own or operate?
   a. 21 heavy-duty, 6 medium-duty
2. Where do you currently have your medium- and heavy-duty vehicles serviced (in-house, contractor, etc)?
   a. In-house with some contractor work
3. If not on-site, how far away is the service facility and what 'dead-head' charges are associated with transportation to and from the facility?
   a. Did not respond
4. How many light-duty vehicles do you currently own or operate?
   a. 14
5. Where do you currently have your light-duty vehicles serviced?
   a. In-house
6. What are your annual maintenance costs?
   a. $200-300 per vehicle per month

Maintenance Facility Wants and Needs

7. Would you be interested in a proposed maintenance facility located somewhere on the outer cape?
   a. Yes
8. How far would you be willing to travel to use a shared-use maintenance facility?
   a. Approximately 20-25 miles
9. Is there a general area that would make sense for your needs?
   a. Wellfleet / Eastham border for maintenance if needed, Truro / Wellfleet border for fueling
10. Do you have a potential site in mind that may be useful for such a facility?
    a. No
11. What, if any, requirements other than maintenance and fueling would you utilize?
    a. Storage – "would be nice"
    b. Electrical Charging – Did not respond
    c. Emergency Supply Depot – Did not respond

Vehicle Fueling Requirements

12. Where do you currently fuel your vehicles?
    a. Gasoline – off-site, diesel – on site
13. Do you own any flex-fuel vehicles that run E85?
    a. No

14. Is there local capacity to fuel those vehicles?
    a. Not Applicable
15. Do you run any vehicles on biodiesel?
    a. Yes
16. What is your annual or monthly (gallon) consumption for:
    a. Gasoline (E10): 1340 gallons / year
    b. Diesel: 1100 gallons / year
17. Is the ability to fuel your vehicles on biodiesel a priority for you?
    a. Not a big priority
18. Do you have any interest in other alternative fueling capabilities?

    No

REPORT DOCUMENTATION PAGE

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Satellite Vehicle Maintenance Facility Feasibility Study

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6. AUTHOR(S)

F. Scott Lian, Sean Peirce, and Kenneth Miller

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Public distribution/availability.

13. SUPPLEMENTARY NOTES

This report addresses alternative transportation decision factors as indicated below (Y/N/NA):
(Y) Non-construction options; (N) park carrying capacity; (Y) life-cycle/ops. & maintenance costs; (Y) cost-effectiveness.

14. ABSTRACT

This report analyzes the benefits and costs of a potential satellite vehicle maintenance facility on the outer portion of Cape Cod. A satellite facility had been proposed as a means of servicing the local transit vehicles that bring visitors to Cape Cod National Seashore, reducing deadhead time and mileage, and potentially opening up partnership opportunities with municipalities on the Outer Cape. The report concludes that a full-fledged satellite facility is unlikely to be cost-effective under current conditions, and presents information on a range of alternative options, including a mobile maintenance approach.

15. SUBJECT TERMS

transit vehicle maintenance, mobile maintenance, Cape Cod National Seashore

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			F. Scott Lian
None	None	None	NA	13	19b. TELEPHONE NUMBER *(Include area code)* 617-494-2811

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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