

Fall 2020

DES 3520-001 Design Product Studio 2, Tsoutsounakis



Access, Protection, Transport, and Guidance Across Bears Ears



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Multi-Disciplinary Design, University of Utah

Partnership | BLM

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“A primary objective of the BLM’s travel and transportation management is to establish a long-term, sustainable, multi-modal travel network and transportation system that address the need for public, authorized, and administrative access to and across BLM managed lands and related waters.”

[Bureau of Land Management Agency]

“The Bureau of Land Management, BLM, proposes to amend its off road-vehicle regulations to add a definition for electric bikes (e-bikes). E-bikes should be treated the same as non-motorized bicycles, expressly exempt those e-bikes from the definition of off-road vehicles. This proposed change would facilitate increased recreational opportunities for Americans, especially those with physical limitations, and would encourage the enjoyment of the lands and waters managed by the BLM”

[Bureau of Land Management Agency]



Visitors have a variety of different travel options when exploring monument lands. There are pros and cons to each travel method, affecting visitors, the land, management, or some combination of the three.



OHV's provide the fast transportation, however they harm the land, are heavily restricted, and are the most expensive form of transport.



Bikes have less impact on the land, have more access, however can be expensive, provide slower transportation speeds, and are physically taxing.



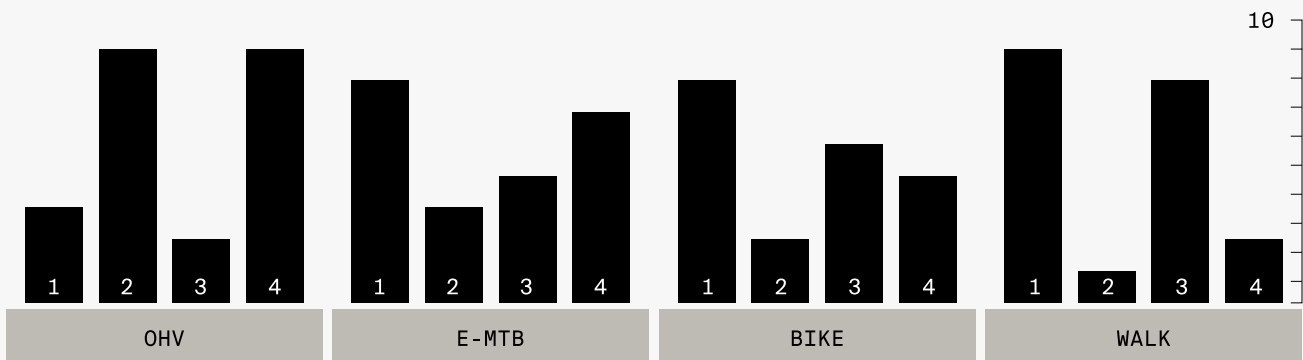
E-bikes offer benefits similar to OHVs like fast and fun transport, while limiting damage to the environment and providing wider access.

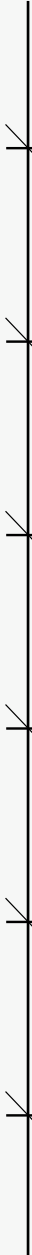


Walking causes the least damage to the environment and grants the widest access, however, is the slowest form of transport and the most physically taxing.

This graph shows how the four primary travel methods, OHVs, E-MTBs, Bikes, and Walking compare to each other via accessibility, environment effects, rules and regulations, and the average cost.

- 1 Environmental Impacts
- 2 Inaccessibility
- 3 Cost to Users
- 4 User Limitations





01 Erosion:

Soil compacting, surface changes, rilling, gullyng, and loss of vegetation increase rates of erosion.



02 Soil Compacting:

Repeated forces compact soil harming root systems and expediting erosion.



03 Dust Storm:

OHV travel, especially at high speeds, kicks dust into the air and churns soil increasing likely-hood of dust storms.



04 Wildlife Disturbance:

Wildlife responds to OHV traffic with stress, leading to displacement, mortality and reproductive failure.



05 Pollution:

Vehicles emit dust and carbon-dioxide while also risking oil and chemical leaks.



06 Plant Disruption:

Native vegetation can be trampled and destroyed, micro-habitats change species composition, and travel offers chance for spread of weeds and invasive species.



Management :

The Monticello Field Office of the BLM manages nearly 1.8 million surface acres of land. Visitors might choose to participate in hiking, biking, and the use of OHV's on BLM lands. That is not to mention the other management responsibilities of the BLM including grazing, maintenance, and environmental study.

Designated Routes:

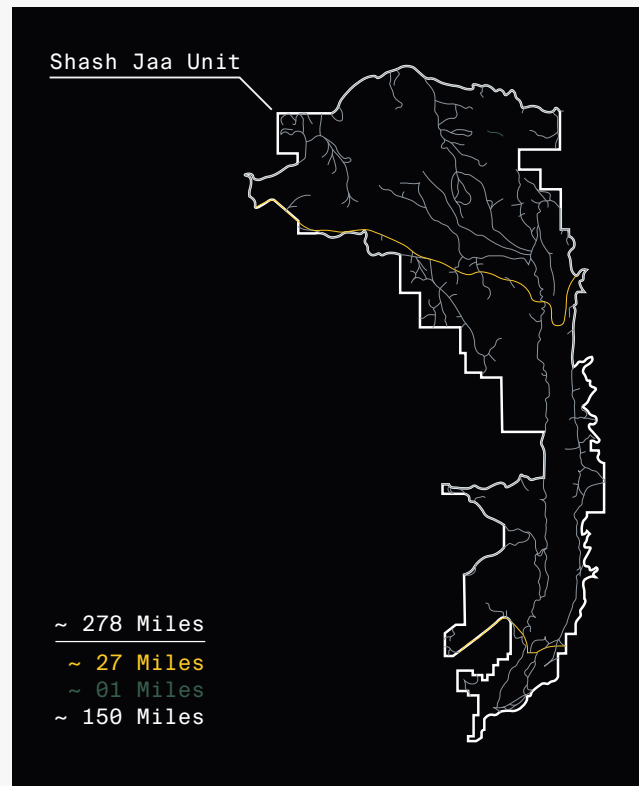
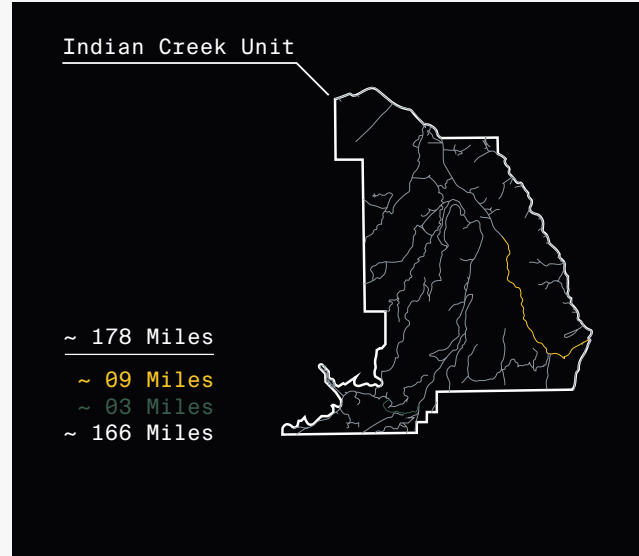
Within both the Sash Jaa and the Indian Creek units of Bears Ears National Monument there are number of designated travel routes. These routes include primitive roads, ATV & dirt bike trails, and larger main roads. Combined, there are roughly 465 miles of such roads.

The Challenge:

With such a vast amount of land and wide range of responsibilities, it is impossible to completely manage visitor activity on designated routes alone. Furthermore, without such management, many visitors, either with or without intention, veer off designated paths, making the challenge of tracking and controlling activity even greater.

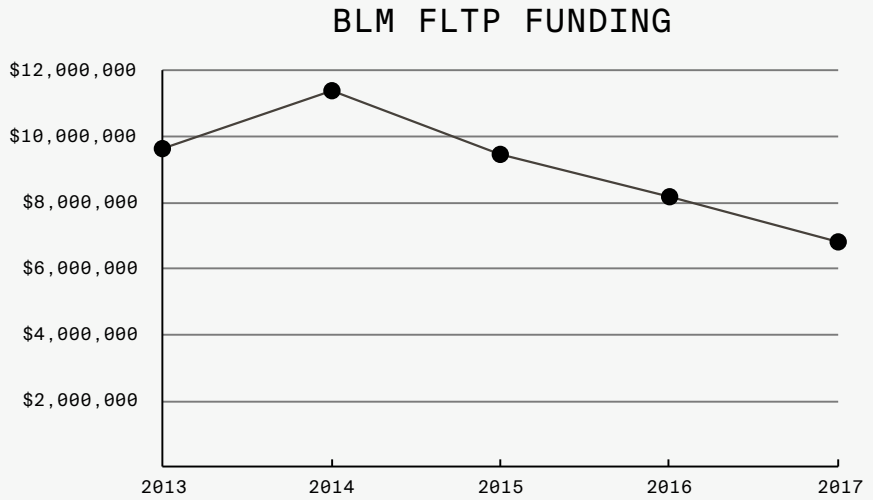
Legend

- Primitive Road
- Primary Road
- ATV+Dirt Bike Trail



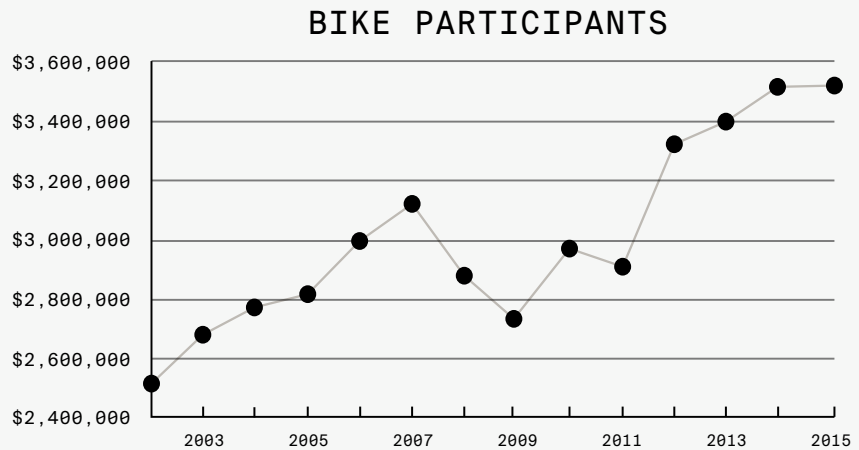
Graph 1:

The BLM Federal Lands Transportation Program Funding has been steadily decreasing since 2013



Graph 2:

Bike participants on BLM lands have been on a steady incline since 2002. This incline is likely to continue with the rising popularity of e-Bikes giving access to more people.



Significance:

With the transportation funding going down and bike usage on BLM land going up, the opportunity to leverage increased bike traffic for funding reveals itself.



Multiple Routes:

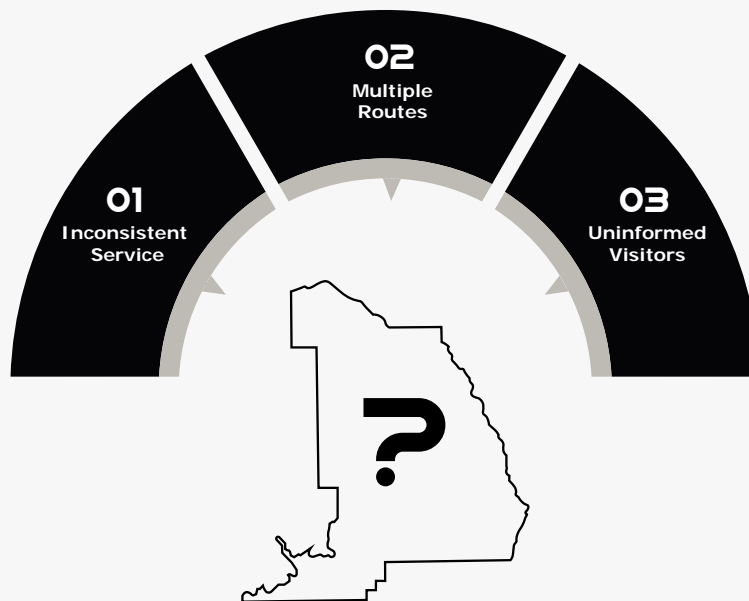
Either by intention or accident users commonly travel off trail or along unofficial, user created trails. The resulting spiderweb poses challenges for enforcement as well risks damage to both the environment and cultural sites within Bears Ears.

Inconsistent Service:

When users are attempting to navigate on BLM lands there is no guarantee that they will have cell phone service, which to many, eliminates their means of navigating,

Uninformed Visitors:

Due to trail proliferation, and the scale of land managed, there will not be a trail marking or sign on every road, and visitors are not guaranteed to see or stop at an information center during their visit. Furthermore, many visitors do not understand or consider the cultural and ecological significance of the land they are standing on.





OHVs:

OHVs are a common form of transport recreation on BLM land, however, they harm the environment and can be difficult to manage across large areas.



Rules:

Regulations imposed on each form transport recreation determines how and where they can be used safely, limiting access to some visitors.



Current Travel:

Alongside OHVs, there are other forms of transport recreation that offer different benefits however, each is accompanied by their own undesired impacts.



Navigation:

Trail proliferation has been cited as an issue across public lands, either by intention or due to a lack of information, visitors commonly veer off trail.



Management:

The scale of land and trail systems that needs to be managed coupled with a lack of management recourses makes enforcement near impossible.

To help visitors of all ability's access the natural and cultural landscapes within Bears Ears by providing a platform for the rental of site tailored e-Bikes. Such bikes will provide transport and education to visitors, funding and control to management, as well as protection to the land.



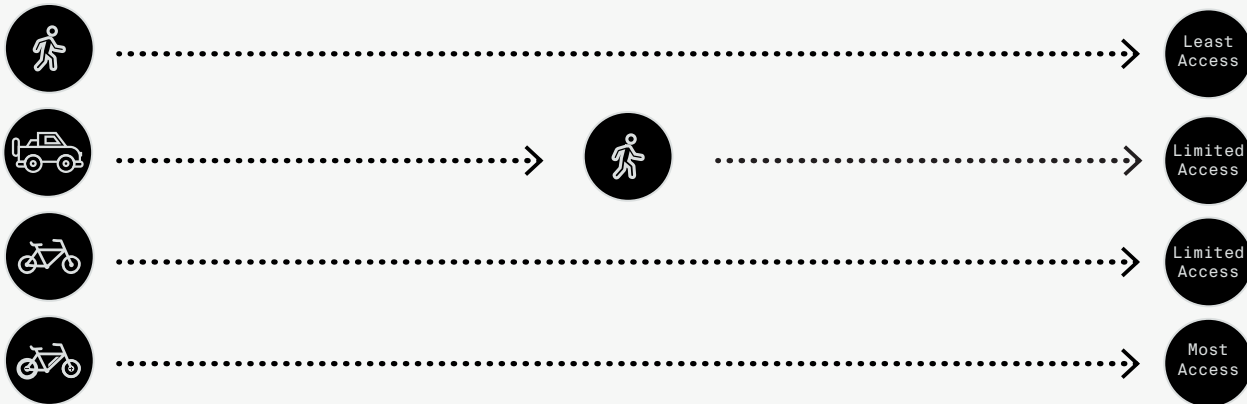
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“The integration of a small electric motor onto bicycles has reduced the physical demand required to operate an e-bike and, in turn, has increased the public's access to recreational opportunities. Including for people with limitations stemming from age, illness disability or fitness, and in more challenging environments, such as high altitudes or mountainous terrain.”

General Access Path



Specific Transport Methods



Walking is the most basic form of transport, however, in the desert heat of Utah over long distances, such activity will prove strenuous and time consuming.

Cars and OHV's of course offer access without physical exertion, however their access is limited, meaning many locations will require getting out to walk, or will remain inaccessible.

Biking offers many of the same benefits of walking, however requires you to have and bring your own bike and although will offer greater reach than walking, will still prove strenuous for many.

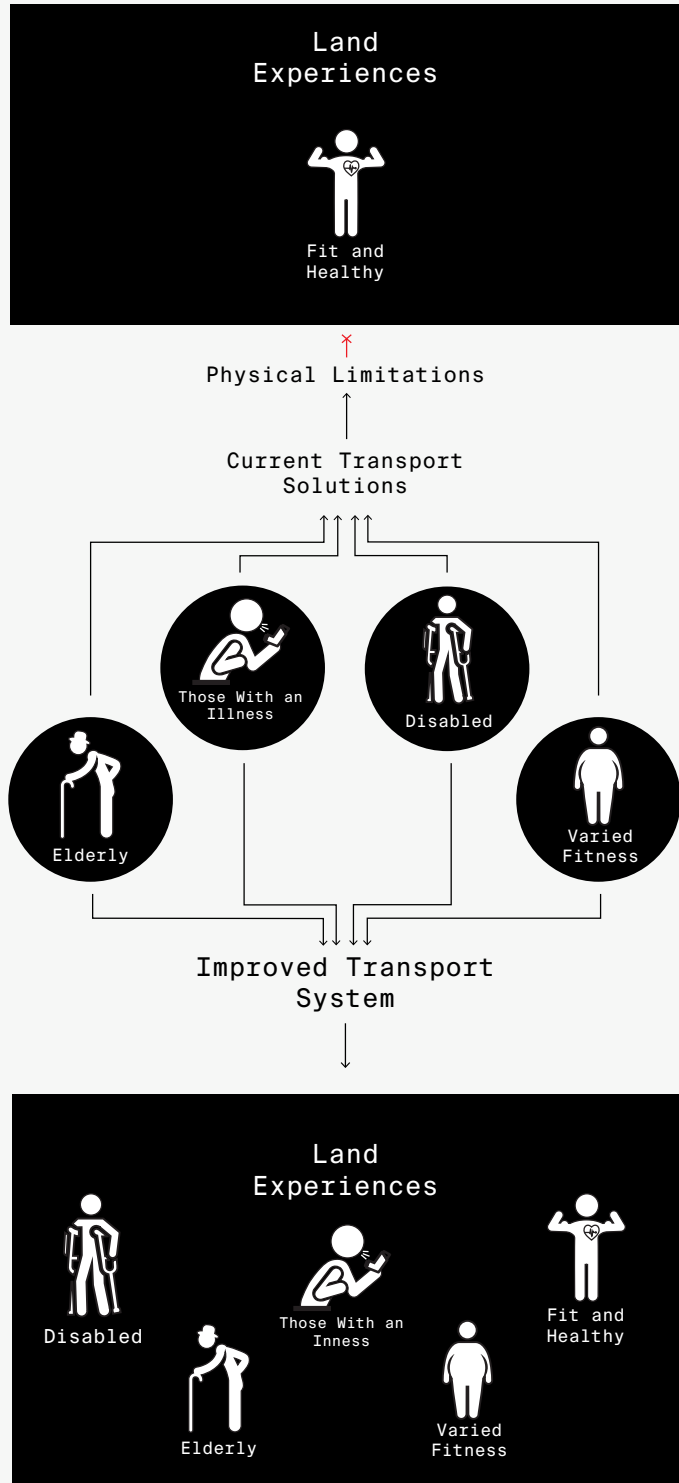
E-Bikes that offer pedal assist give the widest range of access while also relieving physical strain, giving access to those who would struggle otherwise.



Upon arriving at Bears Ears National Monument, visitors need transport to their desired recreation sites. Whether they are hiking to a cultural site, simply taking in the view, or enjoying other recreation on BLM land, they require transport. There are of course a variety of reasons people chose the various modes of transport they do, however for some, the choice of transport method is not simply one of preference.

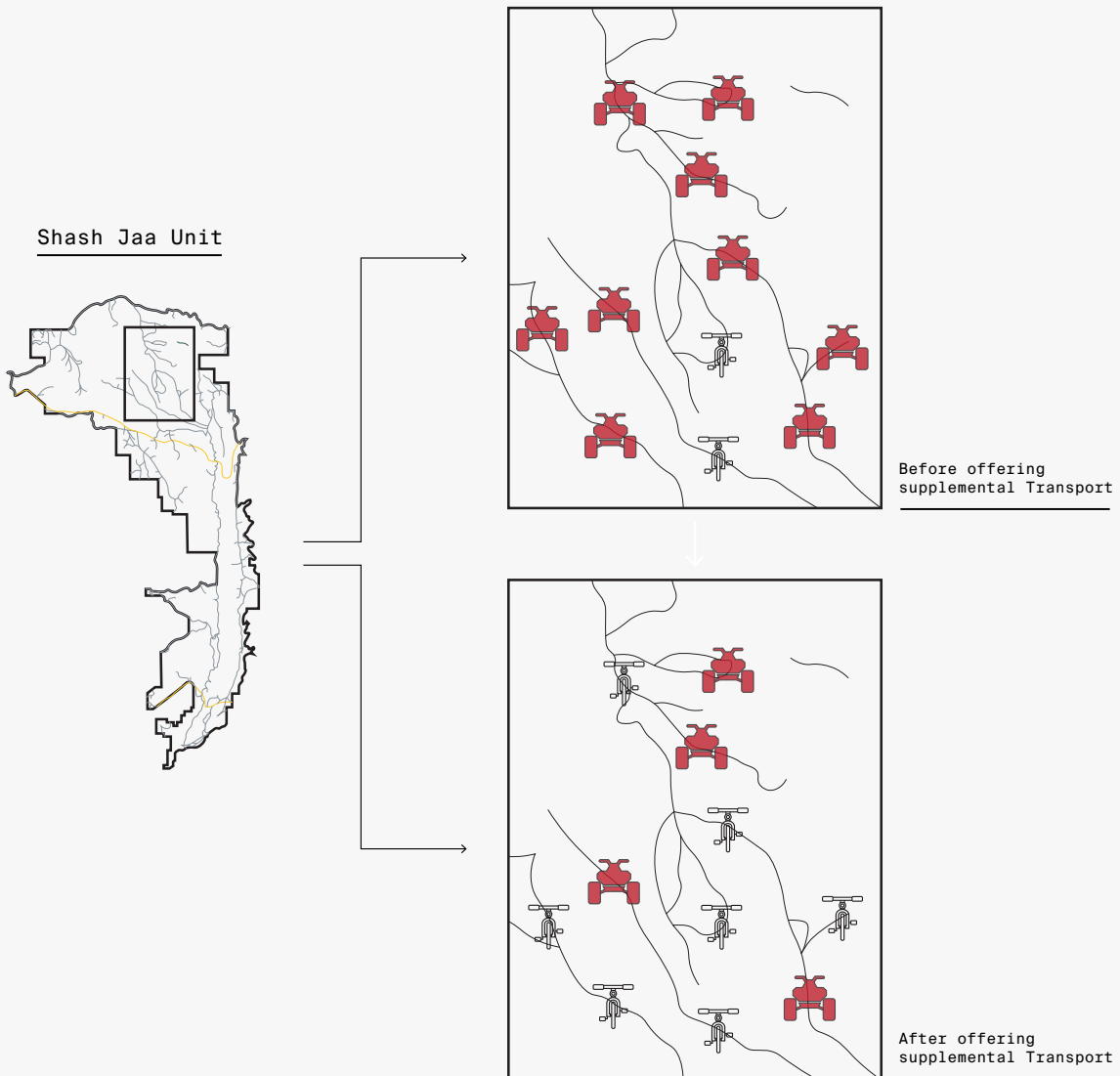
Depending on your fitness levels, struggles with disease or illness, disabilities, or other physical limitations, you may not be able to partake in outdoor activities as those around you. Walking or biking to a desired destination may be physically out of reach for many, forcing them to chose transport methods such as OHVs. However, OHVs and similar transport methods are often accompanied by restricted access, thereby limiting a users potential destination choices.

Pedal Assist e-Bikes bridge the gap between motorized and human powered travel, thus benefiting from both increased access and motor assisted travel. By closing the gap in access between those that are able bodied and those that are not, e-Bikes could give better access to a wider user group throughout bears ears.



Traveling across bears ears is primarily done over primitive roads, however shorter expanses of primary roads and OHV trails also exist within Bears Ears. OHVs, including personal vehicles, are a common choice of travel for such a destination given there speed, carrying capacity, off road capabilities, and fun of use. However, such vehicles also offer a variety of draw backs including disruptive noise, pollution, and harmful impacts to the land.

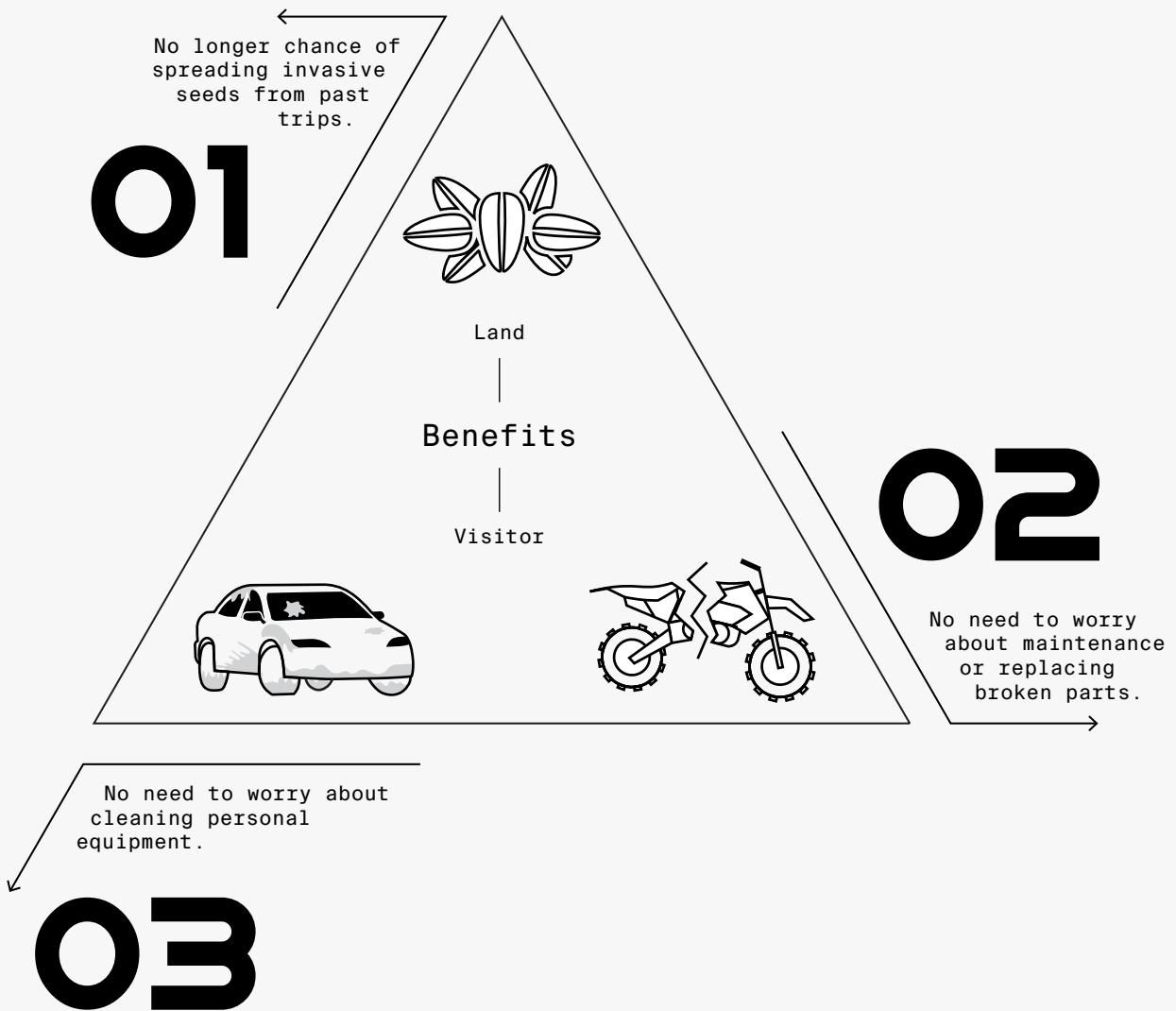
E-bikes offer many of the same benefits of travel that OHVs do, and can be made to accommodate cargo in many of the same ways. By offering site tailored e-Bike travel, some users may opt to take a rental bike to their desired destination rather than go by OHV travel, thus reducing the number of OHVs traveling across Bears Ears and in turn reducing the overall impact of OHVs on the land, environment, and other visitors.



By creating a localized transport system, many of the variables and unknowns associated with visitor recreation can be mitigated while simultaneously benefiting all involved parties.

Because visitors won't have to bring and use their own gear, they save the hassle of cleaning up after the trip is over. Furthermore, they need not worry about broken parts and maintenance should they have problems or an accident during their trip.

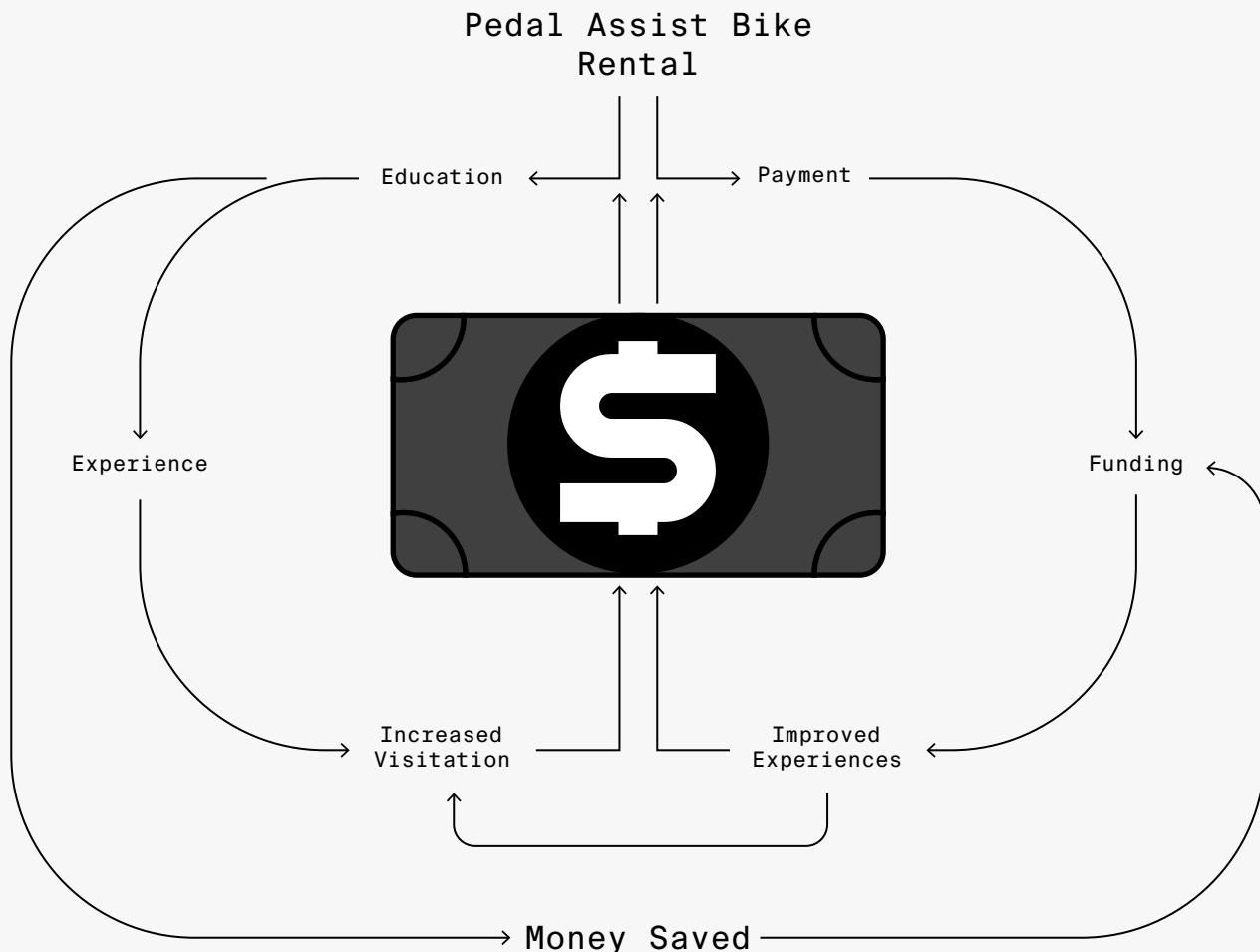
Visitor owned cars, OHV's, and bikes are likely used in a variety of locations introducing the possibility of invasive species hitching a ride from one habitat to another. A localized transport system eliminates this threat for the bikes are repeatedly used on the same land.



The creation of on site rental transportation also brings with it the opportunity for management to benefit economically. Through visitors paying for a rental bike and an experience within the park, funding is generated for the B.L.M. Such funding could then be used to benefit the land through maintenance and protection. Through improved experiences, visitors are more likely to return and spread the word of the experience they had. This will lead to more rentals which in turn generates more funding, thus repeating the cycle.

Furthermore, the process of renting a bike gives an opportunity for interaction with visitors. Through interaction, visitors could receive education about monument etiquette and trail systems, allowing them to have both a fun and respectful experience within the monument. Having the correct experience means visitors are more likely to enjoy themselves and avoid frustrations, inviting them to return and spread the word of their experience.

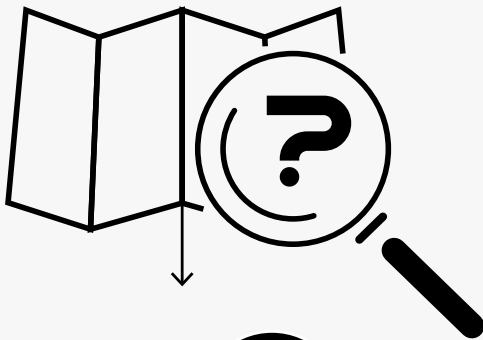
Additionally, visitors are less likely to damage the land or cultural sites by being more informed, thus saving the money that would otherwise be spent on enforcement and maintenance.



Managing all the visitors within the land and trails that the BLM governs is an impossible task, however it is possible to control and monitor at least a portion of the land's visitors. Through a site managed transportation system, GPS could be integrated into vehicles and management tools, allowing staff to keep an eye on a portion of the parks visitors with limited staff and tools.

Furthermore, implementing such a tracking system would allow management to deal with those disobeying land rules and etiquette. This could lead to fines, generating revenue for the park, or for better understanding of what causes and allows for misbehavior within the monument.

Additionally, looking at implementing a park regulated transport system reveals an opportunity to gain insight from visitors. Through interaction either with the vehicle, staff, information sites, or digital tools available on mobile devices, visitors can provide feedback and locations of problems on the land. Specific sites could be marked and later dealt with by management.



Visitor Monitoring

By controlling the means of transport management can implement their own tracking methods through GPS, allowing them to track and monitor visitors within the park.



User Interaction

By giving visitors a means to interact with land management, it is possible for user experiences to benefit the land and help management.



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The System:

To create a platform for the rental of site tailored e-Bikes a system is created between the bike, accompanying mobile app, and physical rental locations to provide users with the desired experience while benefiting management, the land itself, and accessibility for all visitors.

The App

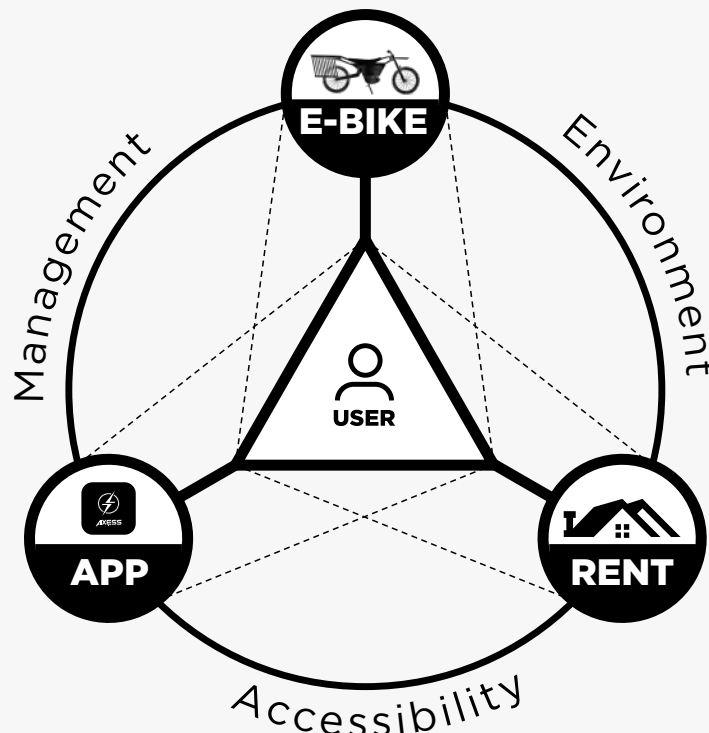
The app facilitates benefits offered by the bike as well as makes navigating the various features easier than on the bike itself. The app also gives additional functionality to users by providing tailored trips, downloadable content, and increased control of bike settings.

The Bike:

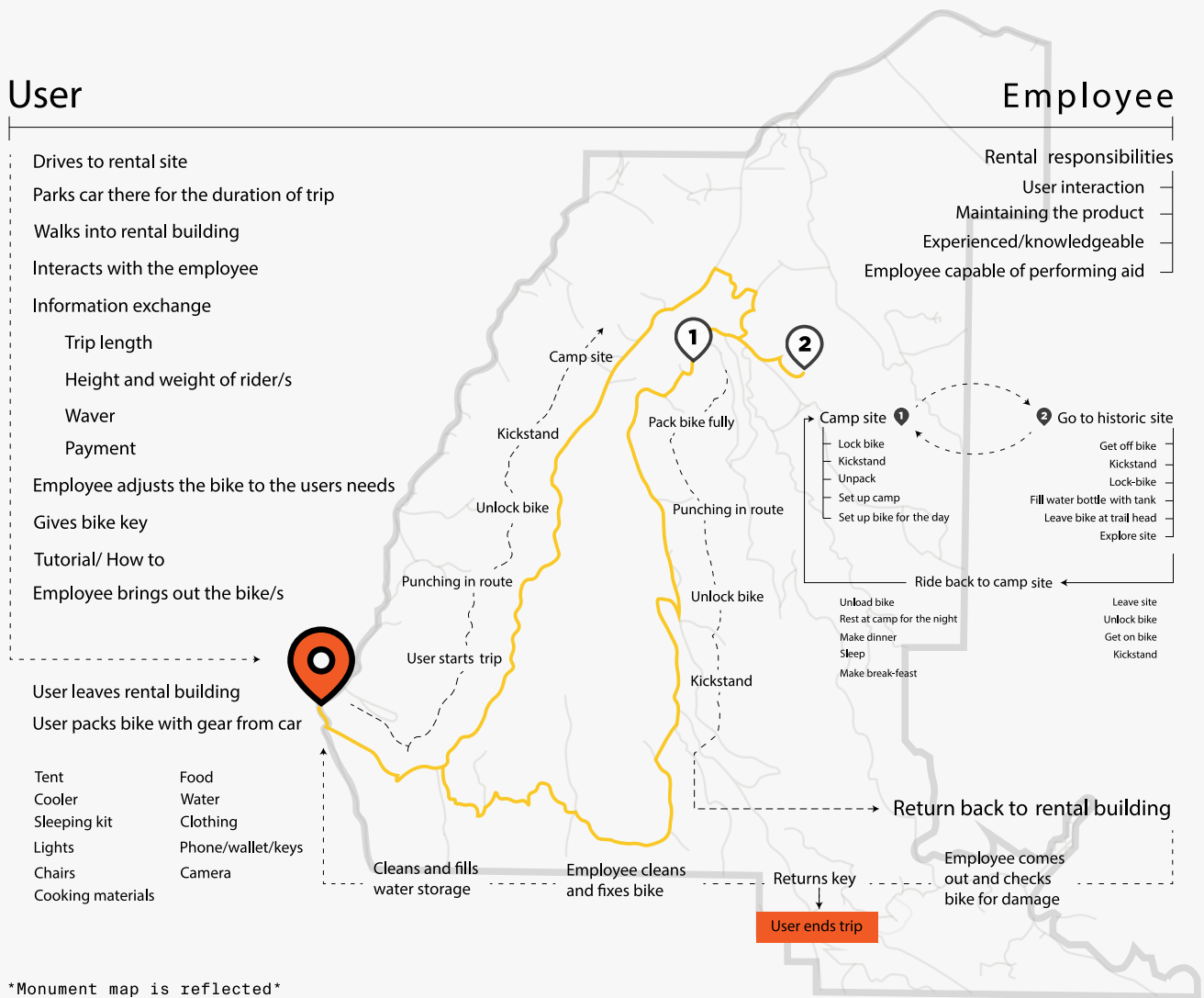
The bike benefits management by providing tracking information on users and allowing users to report vandalism and site damage. Furthermore the bike serves as an alternative experience to OHV travel with fewer drawbacks to other users as well as the land.

The Rental Site

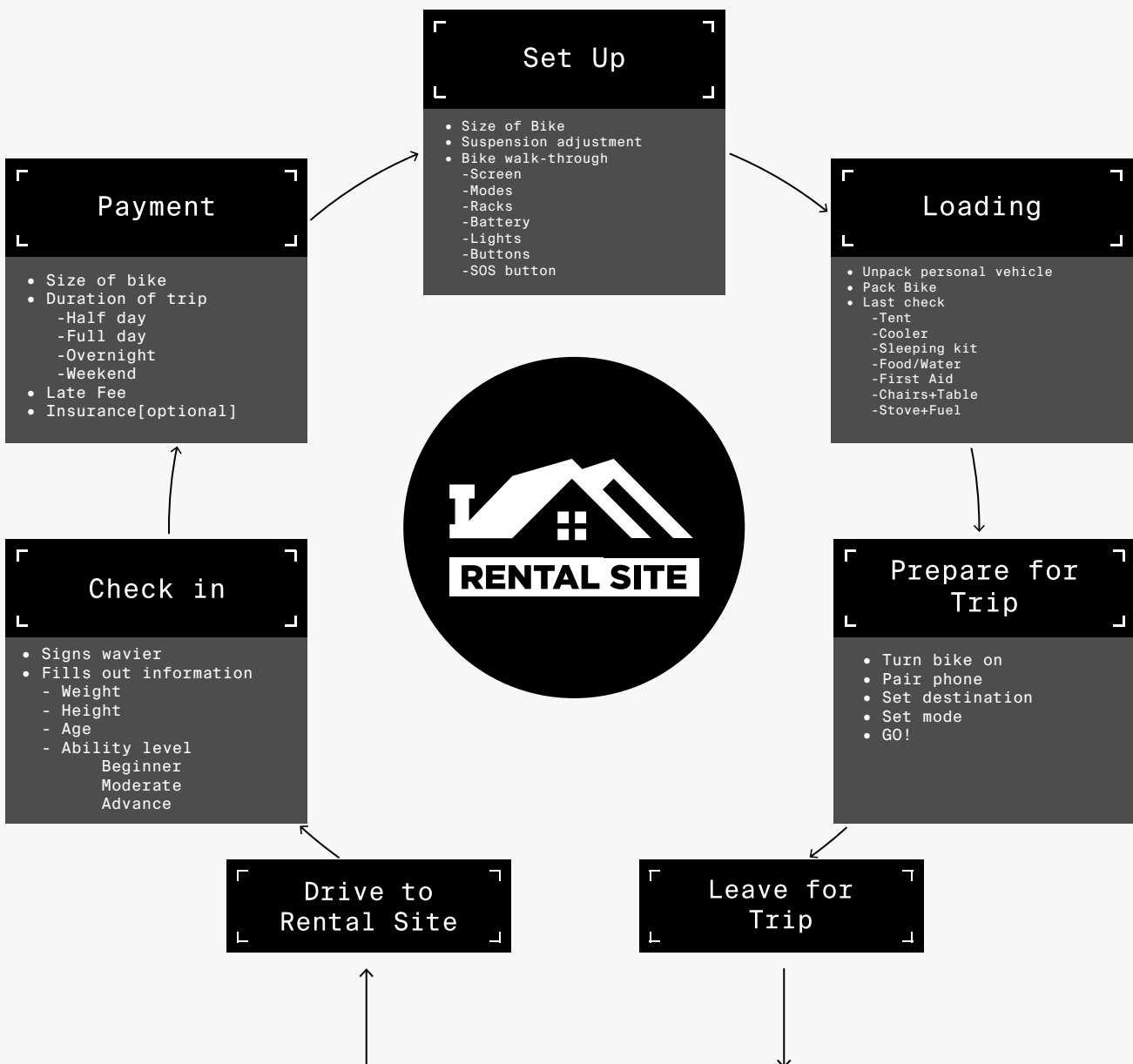
The rental sites benefit the land by providing users important information for having a respectful visit within the monument. Furthermore, the site gives users a place to leave their cars or OHVs behind before entering the monument.



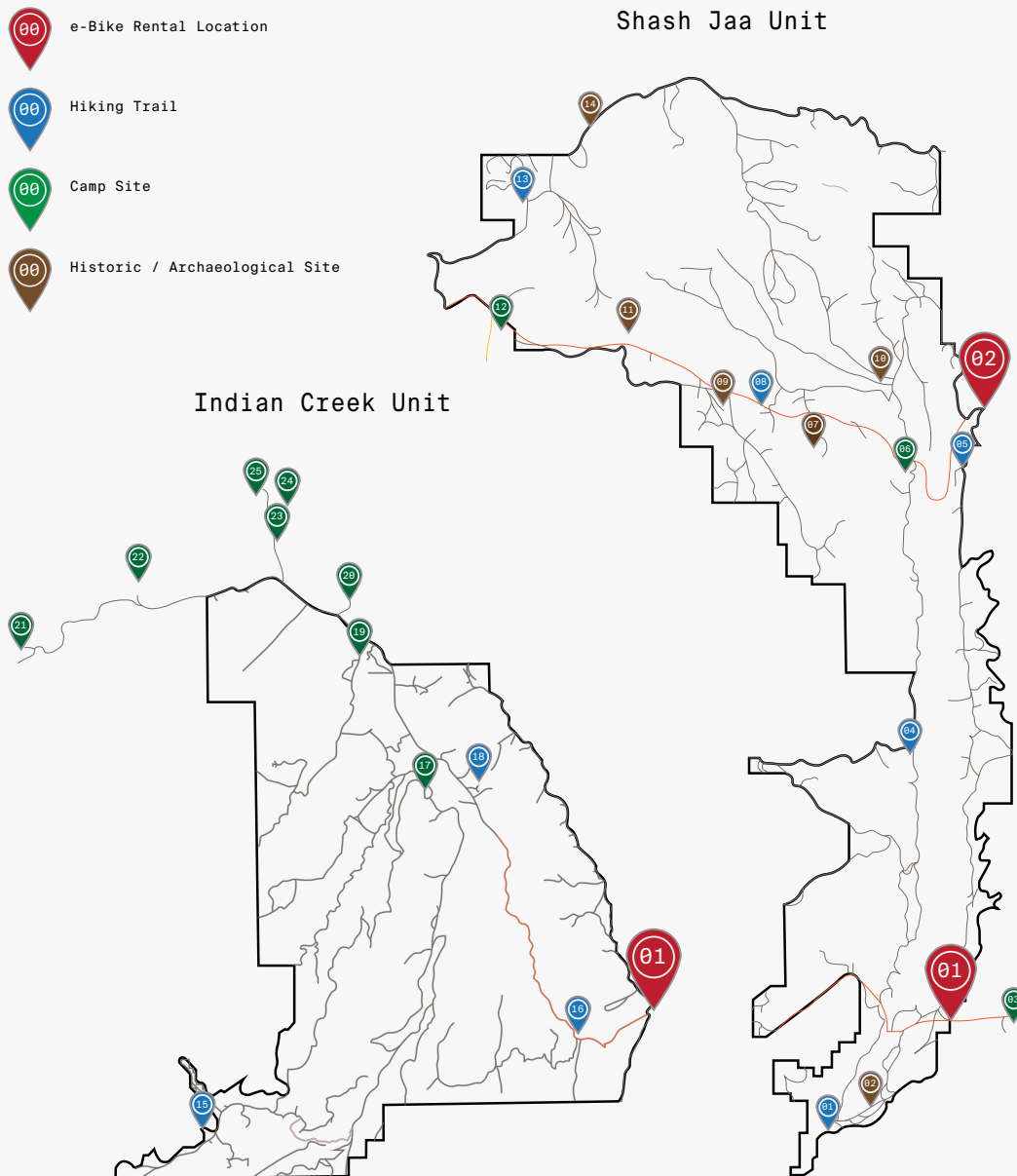
Here we have created a potential journey map for users that are planning on taking an overnight trip. This map takes you through step by step how a user would interact with our system design from start to finish. Including the interaction between the user and employee, the various gear items a user could bring for an overnight trip, and the procedure of operating the Axxess E-bike throughout the land in different scenarios such as camp sites, historical sites, and returning the E-bike.



This diagram represents the user interactions with the rental site aspect of our system design. It takes the user through the seven main steps which are drive to the rental site, check in, payment, set up, loading, preparation for the trip and lastly user leaves to being there trip. This map, as well as those proceeding it, gave us a better picture of user interaction within our system, allowing us to account for their actions and needs in our final design response.



In order to tailor our Bike and overall platform to the landscape we mapped out all the primary, primitive, and OHV roads within Bears Ears. These would be the roads traveled on our bikes and in doing so we were also able to map all the historic sites, camp sites, and hiking trails within Bears Ears. Having looked at these maps we then added our own proposed rental sites at the intersections of the primary roads and monument borders as we anticipated these would be the most likely spots users would travel across on a journey into Bears Ears.



Having mapped out our Rental Sites, the roads, and the attractions within the monument, we were then able to map distances from our proposed rental sites to those attractions within the monuments and account for the types of roads that would be traveled in order to access those destinations. This information informed the battery size, cargo requirements, and other factors that would then influence the final bike, and overall platform design.

Shash Jaa Unit: Distances to Sites of Interest from Rental Sites

- | | |
|--|---|
|  San Juan Hill: 5.87 miles from Proposed Rental Site |  Mule Canyon Trail: 10.3 miles from Proposed Rental Site |
|  River House: 4.73 miles from Proposed Rental Site |  Mule Canyon Kiva: 13 miles from Proposed Rental Site |
|  Sand Island Recreation Site: 2.2 miles from Proposed Rental Site |  Arch Canyon: 8.13 miles from Proposed Rental Site |
|  Lower Fish Creek: 12.1 miles from Proposed Rental Site |  Salvation Knoll: 14.87 miles from Proposed Rental Site |
|  Butler Wash Trail: 2.39 miles from Proposed Rental Site |  Hole in the Rock: 19 miles from Proposed Rental Site |
|  Comb Wash: 5.46 miles from Proposed Rental Site |  Bears Ears Buttes: 27 miles from Proposed Rental Site |
|  Cave Towers: 10.2 miles from Proposed Rental Site |  Arch Canyon Overlook: 23.87 miles from Proposed Rental Site |

Average Distance: 11.37 Miles
Min: 2.2 Miles
Max: 27 Miles

Indian Creek: Distances to Sites of Interest from Rental Sites

- | | |
|--|---|
|  Salt Creek: Not Accessible from Proposed Rental Site |  Needles Outpost: 23.8 miles from Proposed Rental Site |
|  News Paper Rock Panel: 2.6 miles from Proposed Rental Site |  Hamburger Rock: 20.73 miles from Proposed Rental Site |
|  Bridger Jack Mesa: 18.33 miles from Proposed Rental Site |  Hamburger?: 23.2 miles from Proposed Rental Site |
|  Indian Creek: 11.6 miles from Proposed Rental Site |  Indian Creek Falls: 22.33 miles from Proposed Rental Site |
|  Superbowl: 17.6 miles from Proposed Rental Site | |
|  Creek Pasture: 18.4 miles from Proposed Rental Site | |
|  Squaw Patch: 28.27 miles from Proposed Rental Site | |

Average Distance: 16.99 Miles
Min: 2.6 Miles
Max: 28.27 Miles



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All Axxess e-Bikes are equipped with GPS tracking, allowing management to track all bikes in real time and locate users violating trail guidelines.

Management also gains the ability to collect data over time, data that can be then used to modify and improve the experience for subsequent users.



GPS TRACKING



Trail Proliferation was one of the primary concerns the BLM noted when discussing problems within the landscapes. To ensure Axess e-Bikes are not contributing to further trail proliferation, they are programmed to first notify the user, and if required to automatically shut off if users take the bikes off trail. They would then need to be pushed back to a designated road before they could be started again.

To enforce users to not contribute to trail proliferation the bike will automatically shut off and the user will be notified via the app and bike screen.



Navi Guerra | Cody Snow



In order to embark on tailored experiences within Bears Ears, users will be asked to park at a Rental Site just outside monument boundaries. After receiving their rental users will unload gear from their cars and load it onto the bike

- 1 The rear and side racks are designed to be modular, utilizing tube stile designs that can be used as anchor points for ratchet straps, bungee cords, or other methods of securing various sized bags.
- 2 NOTE : Heavier items should be placed closest to the center of the bike, Large battery and forks are intended to balance weight distribution.
- 3 The front rack is indented to contain loose items, however may also be used to carry small bags if necessary.

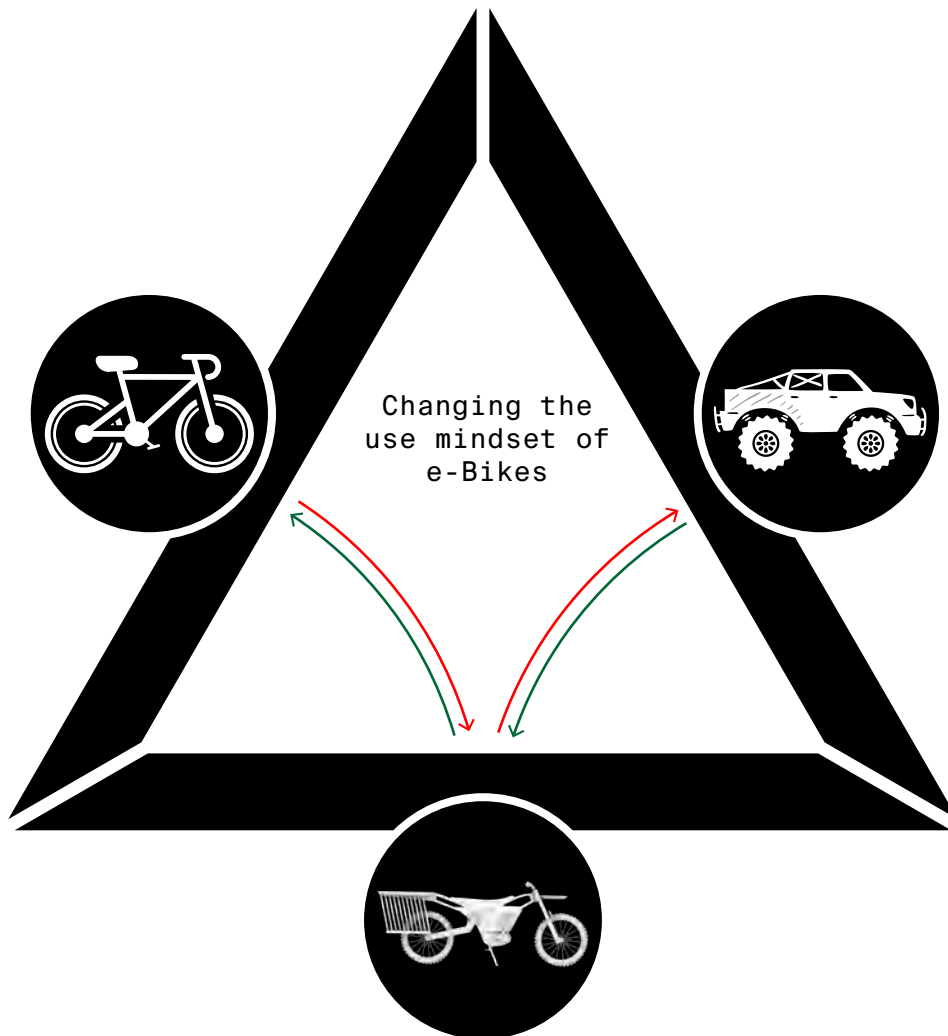


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Traditionally, e-Bikes have been considered the “more destructive” alternative to traditional bikes and mountain bikes. They are heavier, travel faster and further, and require electricity to operate. Thus they might cause trails normally intended for bike and foot travel to degrade faster. For these reasons e-Bikes might be seen in a negative light as a transportation method.

However, we are instead implementing e-Bikes as an alternative to OHV travel, and here, they are the “less destructive” alternative. They are lighter, travel slower, require electricity over fuel, and are quieter all while providing an experience that is equally fun for the user. By changing the mindset around e-Bikes, they might be used to help the earth rather than cause further harm.



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THANK YOU

