Chapter Three
Developing the Trail Concept Plan

Know before You Go. Find Out before You Ride Out.

Up to this point, the only visual concept of the project may have been a project area boundary displayed on a map or perhaps a boundary with a bubble-diagram of potential facilities or opportunities. The trail concept plan will be the first tangible document that displays what the vision could look like on the ground. It's an exciting step.

The trail concept requires a broad vision. What will be provided and what could it look like? But vision doesn't end there. For a quality project, vision will be required in every step of the planning, design, and implementation process. In developing the concept plan, planners should shift their vision from the regional scale down to the landscape scale. Creative vision will be required to search for opportunities that may not be so obvious and to link those opportunities into a trail system of logical loops that will provide quality recreation experiences and resource protection.

Developing a concept plan is like working on a giant jigsaw puzzle. The vision, inventory, resource data, opportunities, and constraints are the pieces. How do they all fit together? Can they fit together in more than one way?

The first step is to have a thorough knowledge of the project area. In developing a concept plan, the planners must understand:

- **The riders and their desired experiences.** Planners cannot provide for the riders' needs until they understand those needs. Who are the riders? What are the vehicle types and sizes? What are their motivations and desired experiences?
- **The landscape.** What are the soil types? Are there any soils with naturally occurring asbestos, arsenic, or other harmful elements? Are there any contaminated soils on site? If there is rock, what kind is it? What are the vegetative types? What is the topography? Are there springs, perched water tables, or permafrost?
- **The issues.** The issues can include everything from noise, dust, wildlife disturbance, and water quality to potential conflicts with non-motorized recreationists. If there are clubs, is their support unified? Are there conflicts with stakeholders?
- **The politics.** What is the level of agency commitment? Are there multiple agencies or ministries involved? Are they all supportive? Is there community support and club support? Is there anyone against the project and, if so, why?
- **The climate.** What is the range of temperatures? Are there one, two, three, or four seasons? What is the average annual rainfall and snowfall? Does the rain come as gentle daily showers or intense thunderstorms? What are the humidity levels? What are the wind patterns? Will the use be seasonal?
- **The resource values.** Are there high cultural values, wildlife values, water values? Are there threatened, endangered, or sensitive (TES) plant or animal species? What are the land management allocations?
- **The statutory requirements.** What are the state or provincial licensing requirements, registration requirements, and definitions of OHVs? What legislation may be applicable (federal, state and or local laws regarding clean water, wildlife and fisheries protection, forest management, operator use restrictions, legal and designated routes, environmental protection, etc.)?
- **The existing condition.** What uses are currently occurring in the project site? What levels of use? Seasons of use? What impacts, if any, are occurring? In looking at the existing trails, roads, skid trails, game trails, and stock trails, how durable are the soils? What grades and length of grades appear to be resilient and sustainable?

- **Management constraints.** Are there budget or time constraints? Can only certain types of work be done due to the source of funding or deliverables in a grant? Does new construction have to be minimized? Does management desire the incorporation of all existing roads and trails, or only those portions that can be made sustainable? Are there road or trail density constraints?
- **Vision.** What is the intent and goal of the project? What facilities are to be provided? Will the project be an open riding area or will there be trails or a trail system, or a mixture of trails and open riding areas? Will the trails be used in the winter by a different user group?

The answers to these questions will affect how the various pieces of the puzzle are fit together. Time to get started.

Section 1: Compile and Refine the Data

Just like the jigsaw puzzle analogy, the best place to start is by assembling the obvious pieces like the border. For the trail concept plan, this equates to examining the constraints and eliminating the "no-go" zones, marking out the "partial-go" zones, and identifying the "don't-want-to-go" zones. A query of the GIS resource layers should quickly identify polygons for these three zones.

Control Points

Control points are features that have a direct influence on where a trail goes. There are two types of controls: a place where riders have to be (positive control point), and a place where riders can't be (negative control point). The planners' first trips to the project area should focus on identifying control points. The more of these that are found early on, the more solid the trail concept plan will be. When an impassable ravine or other feature not previously identified is found, the process can come to a halt. The feature needs to be added to the concept plan and the trail corridors adjusted accordingly. Sometimes these adjustments can significantly alter the concept plan, and that consumes time and project dollars.

Some common **positive control points** are trail termini, road and creek crossings, points of interest, etc.

Termini of the Trail. Certainly, the first thing planners need to know is where a trail starts and ends. Does it start at the trailhead, staging area, campground, or someplace else? With existing facilities, sometimes the termini are obvious, but if the project area is a clean slate, the first order of business is to determine where the trailheads, campgrounds, or other facilities will be located. Depending on the site, this task can be a challenge.

Road Crossings. First of all, is it legal to cross the road? If it is legal, where are the crossing locations that have flat approach grades and adequate sight distance given the speed of the traffic on the road. Some road crossings may require a permit from the road authority. If so, these should be obtained early in the planning process.

Points of Interest. Planners should identify unique features, interpretive points, and naturally occuring features which add interest and seat time to the riders' experience.

Creek Crossings. Every agency and area has different criteria for stream crossings, especially if it is a fish-bearing stream or a tributary to a community water source. The first thing planners need to do is determine the classification for the stream and any associated agency, state, federal, or provincial laws or regulations. As with roads, some streams may require a permit with seasonal constraints to work in the stream.

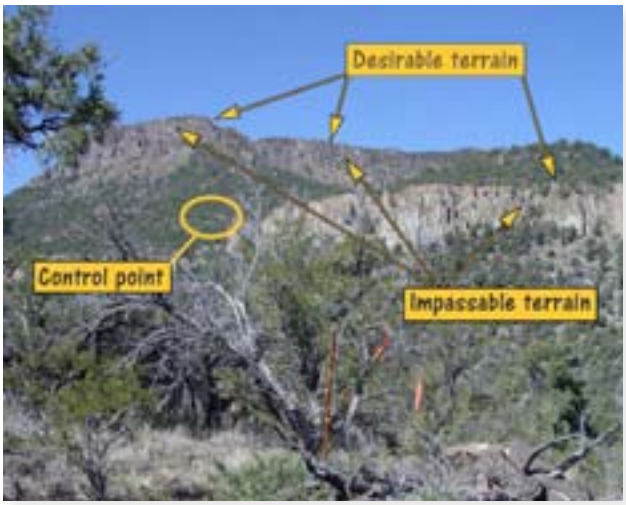
The best practice for crossing perennial streams is to avoid tire contact with the water. This offers the most protection for the stream and the environment by minimizing the risk of sedimentation. This involves the installation of a bridge, culvert, or in low flow streams, well-placed cobble rock to keep the tires out of the water.

If it is legal and appropriate to cross the stream on-grade with a ford, a qualified person must determine where the crossing points are that have good approach grades, a narrow riparian corridor, and the lowest stream flow. These ford crossing points become control points.

Where bridges are required, proper bridge sites also become control points. These are sites where there are stable banks for the bridge abutments to set; where the stream is down in a channel so there is a good elevation drop from the top of the bank down to the stream level; where the stream flow is straight to minimize scouring of the banks; and where the bridge span will be the shortest possible. Planners can find these sites, but usually an engineer will be required to assess the site and perform any necessary engineering surveys.

Saddles. These are a break or the lowest points in a ridge line. Some regions refer to them as gaps or notches. If a trail needs to cross a ridge, a saddle will require the least elevation gain and loss. In very rugged, technical terrain, the saddle may be the only place to cross the ridge line.

Existing Road Infrastructure. When it comes to major stream crossings with bridges, major culverts, or pipe arches, it can be a good strategy to try to utilize existing road infrastructure for these crossings. Not only does it save project dollars, it can reduce potential environmental impacts. Contact the road authority and obtain any necessary permits. There will need to be additional signing for mixed use and that should be addressed in the sign plan.



This picture shows cliffs which are impassable terrain for traversing up or down the slope. However, being on top of the cliffs is desirable terrain with a WOW opportunity for a trail. The only way to access the rim is through a gap in the rock which also becomes a control point.

Some common **negative control points** are impassable, unstable, or undesirable terrain and prohibited or restricted areas.

Impassable Terrain. These controls could be cliffs; deep, heavily eroded ravines or gullies; lakes and ponds; or fault lines.

Unstable Terrain. These could be landslides, slumps, avalanche chutes, or any area with steep ground and unstable soils. On slopes of more than 30 percent, avoid areas that have a shallow lens of soil on top of slab rock. A terrain stability map can help identify these areas, though often they need to be ground-truthed for accuracy.


After searching ¼-mile upstream & downstream, this was the only bridge site that would work to cross this very sensitive stream. It was not perfect (few are), but there was topographic relief on both sides, a straight channel, and minimal scour of the banks. This site became a positive control point. The next challenge was to get the trail down to it.


Steep scree slopes like this are high maintenance for trails. Many occur in snow country where snow creep will constantly drag rocks into your trail tread.

Undesirable Terrain. Wet areas fall into this category as well as those areas that will be wet like flood plains. While rock rubble fields like scree can create a beautiful and technically challenging trail, they can be high maintenance because rock is constantly sloughing off into the trail. The wider the tread, the bigger the issue. If the trail is to be wide and of low difficulty, scree becomes a negative control point.

Examine the Constraints

Prohibited Areas. What are the areas where a trail can't be put? These areas are usually dictated by resource management rather than by the physical characteristics of the site. As no-go zones, they become negative control points. Examples of these areas are rare or sensitive vegetation areas, bald eagle management areas (BEMAs), areas of critical environmental concern (ACECs), and community water intakes or water reservoirs.

Cultural resource sites usually fall into the no-go category; however, if they are subsurface, sometimes they can be crossed if they are mitigated by trail hardening or by additional monitoring of the tread depth. Seek and follow the recommendations of the archaeologist.

Private property boundaries and agency boundaries are generally no-go areas unless agreements are in place to cross into areas of other ownership. The lease or tenure boundaries for active mineral extraction are generally no-go areas depending on how firm the project area boundary is.

Restricted Areas. Bird nest sites, especially those of TES species or indicator species, are often restricted. A trail can't go under the nest, but it can go a specified distance away from the nest. Planners should find out the restricted area for that particular species and draw a circle around each known nest site. These partial-go zones also become negative control points. Rattlesnake dens or other dens may have similar protection. Some cave entrances, particularly those with sensitive bats, may be restricted. Water features like wells, springs, and water troughs often have a restricted area around them.

A den of rattlesnakes in a culvert

Some areas like deer or elk winter range may have seasonal restrictions such as winter closures. The requirements, if any, change by agency, state, or province. Planners should take the time upfront to identify these areas. It will make the plan more solid and environmentally defensible.

Riparian areas are often restricted. Trails can often cross them at 90 degrees to minimize impact, but they usually can't meander through them. The number of crossings may also be restricted. In some cases, trails through riparian areas need to be elevated or hardened. Some jurisdictions may require a permit to cross riparian areas.

Big game connectivity corridors are often restricted. Like riparian areas, a trail can usually cross them at 90 degrees, but not meander through them. Often there is a buffer zone around private property. Some reservoirs, especially those associated with community water intakes, also may have a buffer zone.

Undesirable Ground. Each project has areas where there could be trails, but it's not desirable to have trails. The first is flat ground. Flat ground? Isn't it cheaper to build a trail on flat ground? Actually, no. A trail on flat ground can become a trench over time making it difficult to drain water off the trail. Flat ground can hold water that saturates the soil and creates mudholes. It is also more difficult to maintain the designed tread width on flat ground since riders will push out the edges to pass or to get around standing water that can't drain. This results in trail braiding and widened trails.

Closely associated with flat ground are wet areas: riparian areas, bogs, wetlands, springs, or any area where the water table is at or close to the ground surface. These areas have saturated soils and are rich in flora and fauna diversity. It is best to avoid them. Wet areas are certainly red flag areas and usually become negative control points.

Large, open grassy, or sparsely vegetated areas go on this list also. Unless there is some topography or rocks, it is difficult to maintain the integrity of a serpentine alignment in these areas since riders can see the next curve and cut cross-country to intercept it. The alignment eventually becomes braided and straight. Unless natural or manmade barriers are used to protect the alignment, the designers are forced to flag in a very lazy S that is close to straight. This increases speed, increases impacts, and decreases seat time.

Flat ground, wet ground, lack of woody vegetation to deter use can lead to impacts.

Tip, Trick or Trap?

Trap: Building, maintaining, and managing use is MORE difficult on flat ground than on sloped ground. Slopes of 15% to 45% are ideal.

Depending on the type of riding, open areas can also be an issue. Any area that may have speed events should not have a large amount of trail in an area where sights are visible for long distances. The riders will cut the trails in order to gain position. This will result in trail braiding and straighter trails.

Although flat ground is thought to be erosion-proof since water doesn't run off of it, flat ground is more susceptible to erosion due to lack of drainage. Water collects on the surface and it is difficult and expensive to remove.

The more difficult the machine is to turn, the less likely a serpentine trail in an open area will stay intact. However, an OHV trail with a tight set of curves creates a technical challenge.

Trails through meadows fall into this category, but trails through recently harvested cut blocks or through recent burns do not. The natural environment is dynamic, not static, so change is a given. The planners and designers must visualize how a denuded area will look in 2 years, 5 years, and 15 years. Depending on the growing environment, the pace of recovery can be amazingly dramatic.

Though very scenic, this trail would be better located on higher ground and in the trees to provide varied views of the meadow without being in the meadow. Note the lazy S alignment. In the wet season, this trail probably intercepts and carries water from the yellow arrow to the blue arrow.

This fall line trail cannot drain, is not fun to ride, and is not in harmony with the natural landscape. Trails need to lay lightly on the land, not conflict with it.

Three of the areas of concern just discussed are shown on this map.

This motorcycle trail follows the spine and fall line of the ridge. It is becoming rocky because the soil fines are being washed away by the lack of drainage control.

Once again, avoid fall line trails. They generally have sustained (long, unbroken) grades and poor drainage so water is typically channeled down the trail. It usually requires manmade structures to provide drainage, and these are costly and difficult to construct correctly, expensive to maintain, decrease the rider experience, and can fail in a significant weather event. Sometimes in technical terrain with tightly spaced controls on each side, the only option is to use the fall line. In these cases, mitigations like more drainage structures, trail hardening, or increased maintenance frequency are required.

Tip, Trick or Trap?

Trap: Do not fall for fall line trails; they will fail

Ridgetop trails can also be undesirable. If the slope of the ridgeline is uniform with a long and sustained grade, these trails become fall line trails. The sight line is often long on these trails and this tends to increase rider speed and decrease rider experience. The better alternative is to design a trail that serpentines up and crosses from one side of the ridge to the other. This breaks up the sight line and increases the trail aesthetics, creates positive drainage, and increases the rider experience by constantly changing the viewshed of the rider.

Examine the Opportunities

This next phase is the fun part. It's time for the planners and designers to look at desirable terrain.

The ideal ground has a 15 to 45 percent sideslope with deep, stable soil and vegetative cover. Trees are preferred over brush, brush over grass, grass over a barren slope. Patches of thick trees or brush allow the designers to lay in a tight, technical serpentine alignment that slows down the riders, adds seat time, adds difficulty, and adds trail distance. Dense vegetation helps control tread width and protects the integrity of the alignment by deterring short-cutting of the curves.

A challenge for the planners and designers is to provide technical difficulty for the riders and still have a durable trail. For ultimate durability, look for rocks: boulder fields, rock gardens, solid slab rock that is on a slope, rimrock, slickrock, rock ledges or stepups, and hummocky broken ground. Rock provides opportunities for challenging trails while still maintaining durability.

This is approaching the upper limit in slope, but still good ground. Trees anchor the trail, hold the soil, inhibit splash erosion, control trail widening, and deter off-trail use.

Slab rock like this is a designer's dream. It provides challenge, fun, and durability. After being in the trees, popping out on an outcrop like this provides vegetative and topographic change plus a scenic opportunity. The moss and lichens on the rocks can be very beautiful.

Broken, uneven sideslopes with benches provide terrain diversity that gives the designers opportunities to reduce grade to provide drainage and flatter areas to change direction with a climbing turn. Terrain diversity also adds to the rider experience.

Desirable features include dramatic, unusual, or subtle features like rock formations; topographic edges like cliffs and rimrock; vegetative edges like the edges of meadows, cutblocks, and burns; old-growth forest; unique vegetation (twisted character trees, fields of wildflowers, tiny patches of moss or lichens, etc.); and vegetative changes such as moving from open to dense vegetation.

Rimrocks may be impassable terrain, but being on top of them is WOW terrain; a feature that will create a memorable experience.

Understand the Human Element

Where do riders (or any recreationists) want to go?

- **The Highest Point.** It is human nature to get to the highest point of land, not only for the view but also for the sense of achievement.
- **Water.** Lakes, ponds, creeks, springs, waterfalls are a natural attaction.
- **Viewpoints.** Whether it's the highest point of land or just a break in the trees, people love scenic views of the landscape.
- **Historic and Interpretive Sites.** Riders enjoy seeing old mines, cabins, ghost towns, abandoned equipment, mills, etc. Those along with any interpretation of the natural environment enhances the riders' experience.
- **Wildlife Viewing.** Riders of all ages enjoy seeing wildlife, including deer, elk, turkeys,

This is a great example of a poorly located trail on good broken ground with benches. This trail could have been more fun, longer, and durable if it had utilized the terrain and vegetation. The trail goes right up the spine or fall line of the ridge. This proved to be unsustainable, so pavers were installed to harden the trail. This is also a great example of investing a large amount of time and money into a bandage fix on an existing trail that doesn't solve the real issue of poor location.

bears, beavers, raptors, wild horses, and even snakes.

- **Food.** There is something about getting a burger on the trail that is very appealing to most riders. Food is a natural human attraction.

What do all of these six items have in common? They all provide a destination, a goal for the ride; they all provide photo opportunities; they all extend the time the riders are on the trail; they all provide an opportunity for riders to socialize with their group, which is an important element in OHV recreation; and they all add to the quality of the recreation experience. Around the campfire at the end of the day, these will be the highlights that everyone will talk about. These are the places that riders want to go. If at all possible, the planners should get them there.

It was difficult to get through the control and onto the top of the cliffs, but once there, this trail was destined to become the signature trail of this trail system.

Tip, Trick or Trap?

Tip: Invest in a good pair of hiking boots. OHV reconnaissance is best done on foot

Why? From a quality recreation and an effective OHV management standpoint, planners should always try to work with human nature rather than against it. The trail should take people where they want to go. It's the WOW factor; that is what riders should say at the end of the trail. Planners should strive to find the WOW points and put them on the inventory and into the trail concept plan.

Designers with vision controls the viewshed of the riders. They can be creative like artists, framing the picture for the rider. WOW!

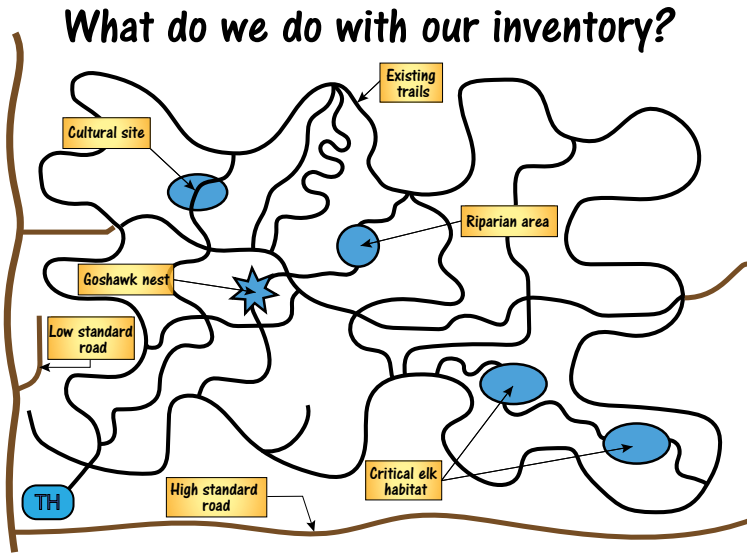
Tip, Trick or Trap?

Tip: For effective OHV management, it is always to your advantage to work with human nature, rather than against it

WOW features: durable, scenic, fun, challenging.

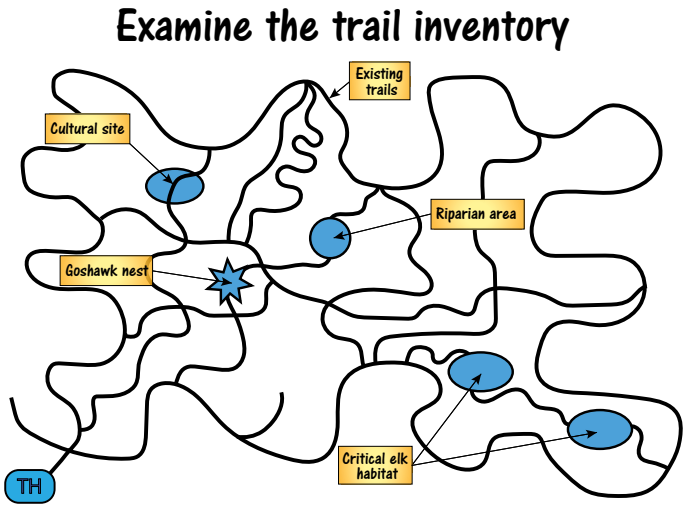
Section 2: Assemble the Data into a Trail Concept Plan

Now that the data has been gathered, it's time to organize and manipulate that data so it can start making sense. The inventory data will be displayed as a maze of points, lines, and polygons. To make sense of them, planners and designers should assign colors or other attributes to the data and then organize it into groups. Groups could be roads, trails, resource data, water features, opportunities, and constraints. This is what a typical inventory could look like with trails and roads as lines and resource concerns as shapes.

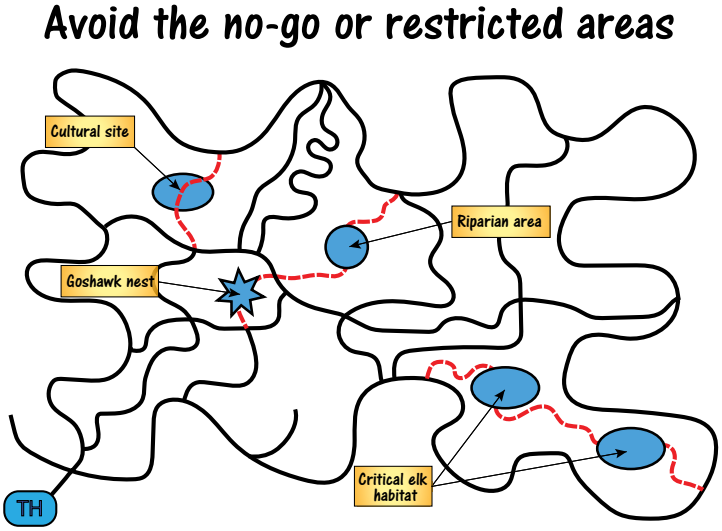


Examine the Trail Inventory

Planners should first look at the trail data and eliminate the obvious. Look at the trails that lead into the no-go or restricted zones. If the assumption is made that all of the resource areas of concern require avoidance, then the trails leading into those areas would be slated for closure in the trail concept plan.

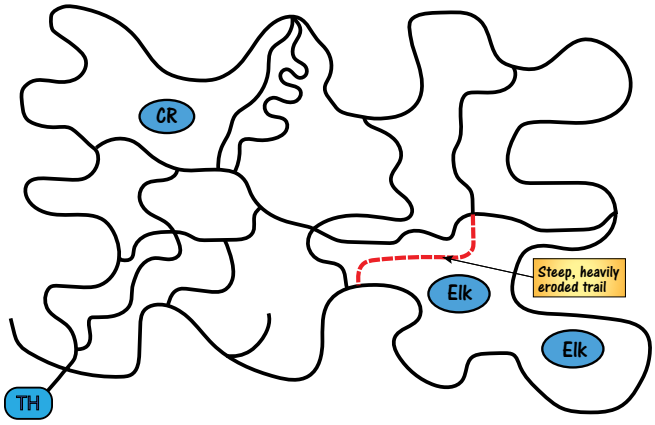


Next, planners should look at the trail inventory and data dictionary information and identify: a) which trails or sections of trail are sustainable and provide a quality recreation experience; b) which trails or sections of trail need some relocation or reconstruction to become sustainable and provide a quality experience; and c) which trails or sections of trail are non-sustainable, cannot be made sustainable, or do not provide a quality experience. Those trails in "a" and "b" will remain on the trail concept plan for the time being. Those trails in "c" will be slated for closure. Sometimes, there isn't enough information in the inventory to make these determinations at this time, but often the planners can make subjective assumptions by looking at the alignment and grades of the existing trails. If the alignment is straight and gains 100 feet of elevation in only 200 feet (50 percent trail grade), it is probably a hillclimb or fall line trail and is probably not sustainable.

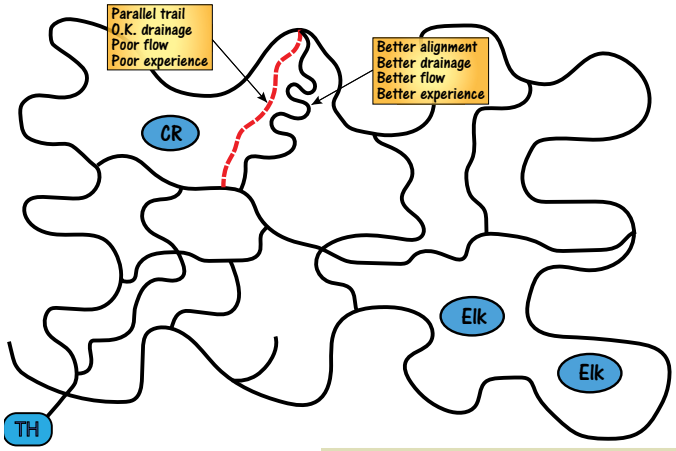


If there are two trails that parallel each other and both go from Point A to Point B, examine the inventory data to determine which one has the most sustainable characteristics and provides the best recreation experience. Keep the most sustainable one and consider the other for closure. If both trails can be made sustainable and one provides a higher degree of challenge, consider keeping both trails if they fall within trail density or other constraints.

Eliminate non-sustainable trails



Eliminate un-needed trails



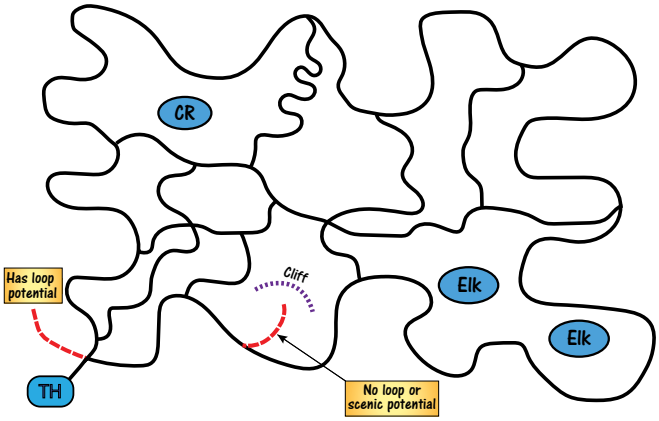
Often, the existing trails do not flow in the proper direction. They go up the slope, but sustainable trails go across the slope. If the existing trails do not provide access toward a desirable area or feature, they will become possible candidates for closure. The point here is to start eliminating the obvious. These trails can always go back on the trail concept plan if needed once the process progresses.

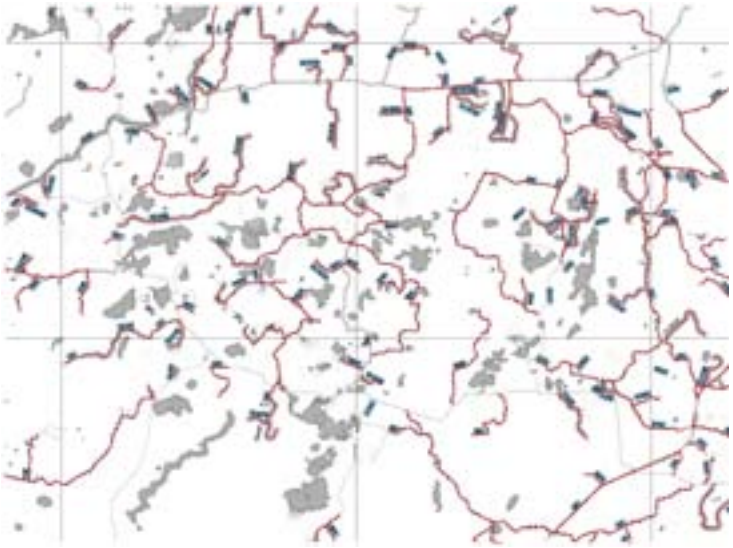
Tip, Trick or Trap?

Tip: Destination trails are only good if there's a destination at the end of them

Next, planners should look for dead-end trails. There are two types of dead-end trails: those that end at a destination and those routes that just end. The former are opportunities, the latter can be traps. If a trail ends at a viewpoint, unique feature, or structure (i.e., a destination), then the trail will work as a dead-end trail. If the trail just ends, planners should look for a way to loop it back into another trail. From an OHV management perspective, no one likes to ride out to the end of a trail and turn around and come back the same way. This significantly detracts from the quality of the recreation experience. Instead, riders will tend to look for various ways to connect into another road or trail and this can lead to a proliferation of user-created trails and potential resource impacts, and management has lost control of the use. If for some reason it is impossible to make a loop out of a dead-end trail, consider slating it for closure.

Eliminate dead-end trails





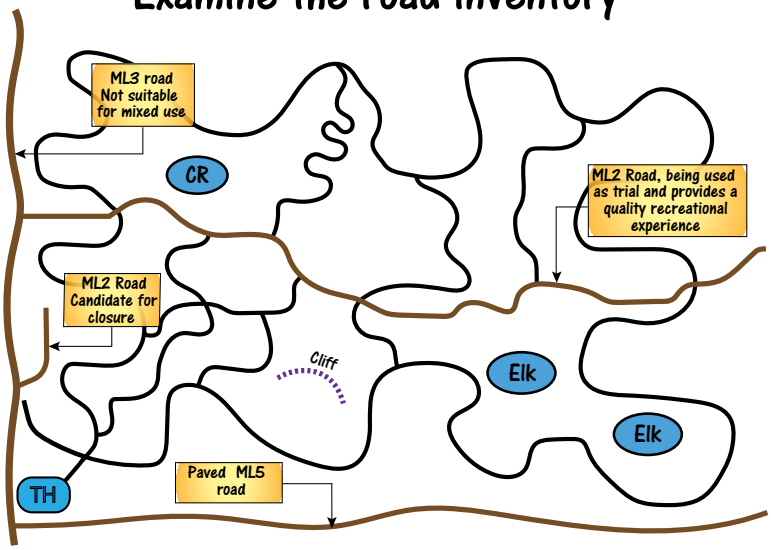
To the astute planner, these dead-end routes should signal a red flag from an OHV management and recreation experience standpoint. Work with human nature, not against it.

Examine the Road Inventory

There is a wide range of road classifications and standards from interstate highways to primitive logging roads. For simplicity, it works quite well to have just two standards or two colors for roads: one for primitive low-standard roads that are suitable for high-clearance vehicles; and one for higher standard roads that are maintained for passenger cars. These would correspond with the USDA For-

est Service road classifications of Maintenance Level 2 roads (ML2) and Maintenance Level 3-5 roads. Just like the trails, planners should look for the obvious. Which roads can have mixed use? Which roads can be closed and converted to trails? Which roads will require the least maintenance? Which roads provide a transportation experience and which provide a recreation experience? Answering these questions will help the planners determine the roads or sections of roads that could or should be incorporated into the trail concept plan.

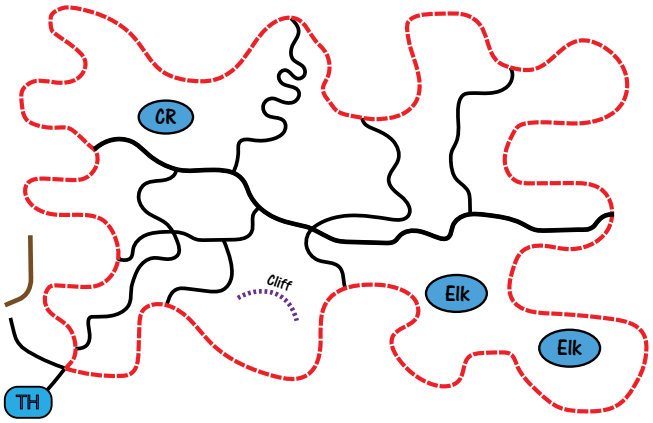
Examine the road inventory



Establish a Perimeter Trail

It isn't always possible or desirable to have a perimeter trail, but there are advantages to having one. Potentially, it will be the longest trail in the trail system and that is always desirable from a mileage and seat time standpoint. The perimeter trail can also serve as the boundary trail and can help riders recognize the outer limits of the project area. The perimeter trail is a loop in itself, but it also provides loop opportunities for all of the connector trails that tie into it. In this example, the perimeter trail has nine trail connection points that create a wide variety of potential loop opportunities.

A perimeter trail has advantages

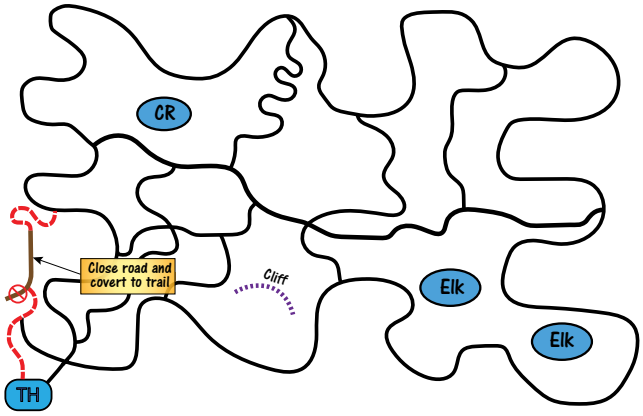


Note: The entire perimeter trail does not have to have the same identifier (trail number or name) although it can be desirable. Also, all segments of the perimeter trail do not have to have the same difficulty level although again, it is desirable to have consistent difficulty. If the difficulty does change from trail segment to segment, make sure the riders have the option to maintain the original difficulty level by taking another loop.

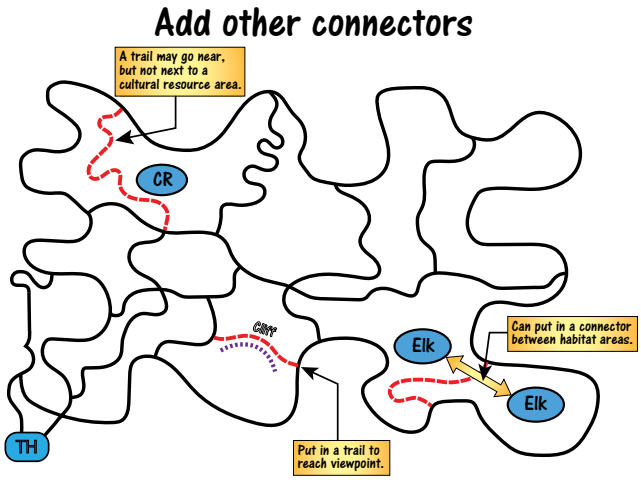
Connect the Remaining Pieces

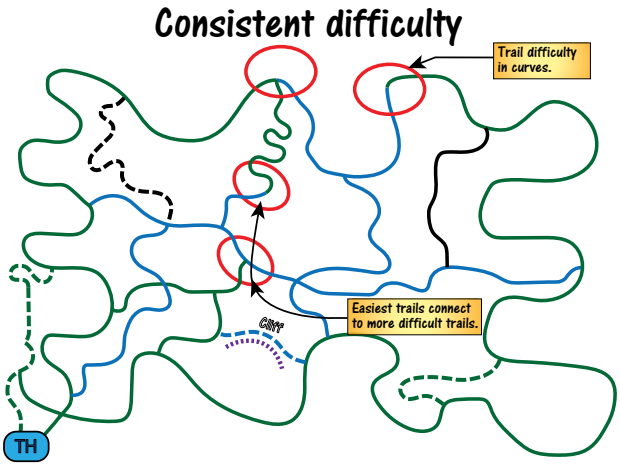
So far, planners have eliminated trails or portions of trails, but now they need to connect the remaining pieces into a trail system with logical loops separated by difficulty level or by the recreation experience offered. Connecting the suitable roads, the suitable trails, positive control points, and opportunities into a system of trails and loops while avoiding the negative control points, prohibited areas, restricted areas, and undesirable areas can be a challenge.

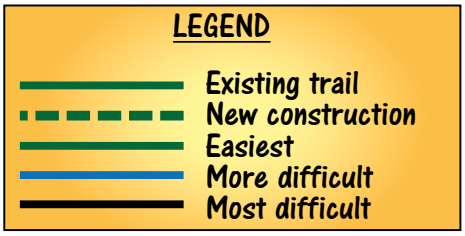
Add a connector out of the trailhead

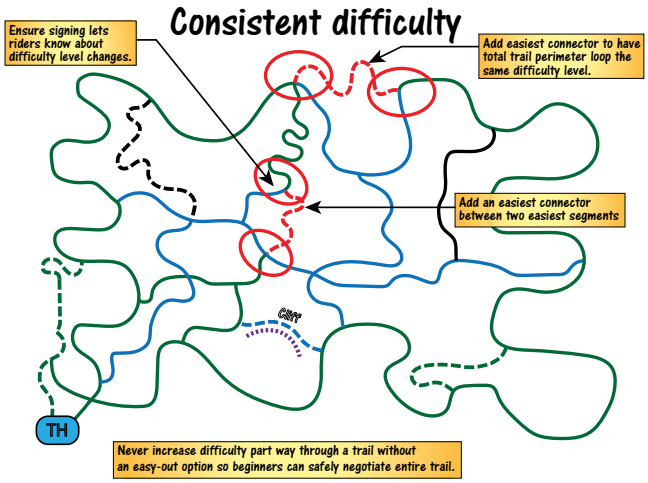


To quickly disperse riders and reduce encounters and tread impacts, it's desirable to have more than one trail out of the trailhead. Having several small loops in the proximity of the trailhead provides warm-up loops for riders and short practice loops for kids and families.









The example shows a dead-end trail and a road suitable for closure that can be used to provide two more loops. This example also shows that the planner had to eliminate the trail through two critical elk habitats. After talking with a wildlife biologist, it was agreed to cross the big game connectivity corridor between the two habitat areas as long as the length of trail within the corridor was minimized. The planner also found an opportunity to capitalize on some technical terrain in the northwest corner of the project area that avoided the cultural resource site. The dead-end trail that went to the base of the cliff was eliminated. There is a great scenic view from the top of the cliff and a trail across the rim was added to enhance the experience.

Establish Difficulty Levels

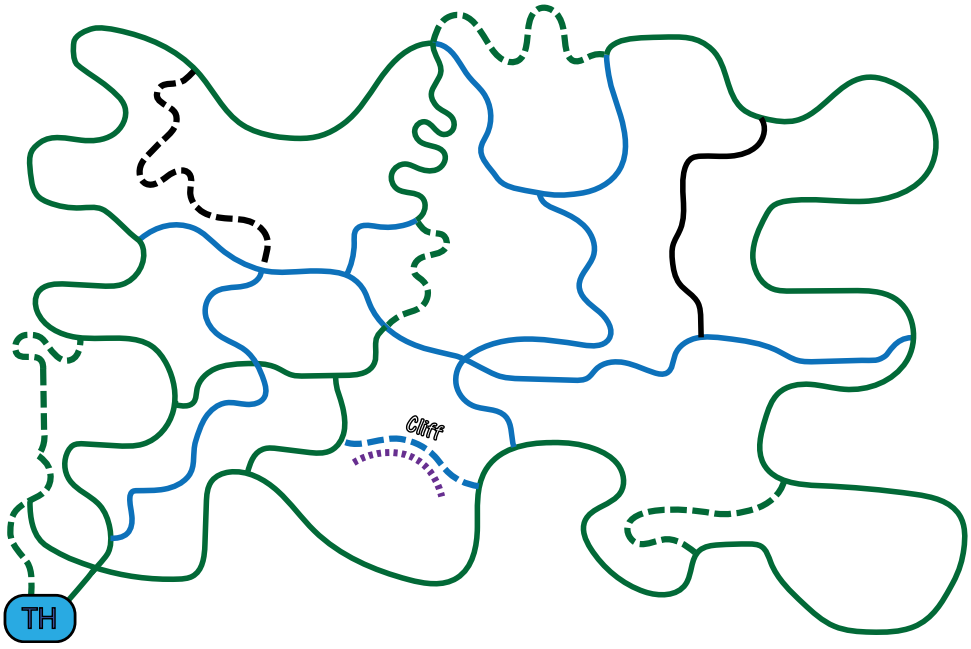
This step-up is a great technical feature to keep, however the trail on both sides of it was much easier and less experienced riders became trapped here. Rather than increase the difficulty level for the whole trail, an easier route around this feature was built.

Often there isn't enough detailed information to establish difficulty levels at this time, but if some of the difficulty is known, planners can start plugging that information into the trail concept plan. Planners and designers often hear: "I want more of the tough, technical stuff." The reality is that the percentage of riders desiring that experience is the lowest, so often the most difficult trails are the ones that are under-utilized. Planners still need technical trails to provide that opportunity, but the bulk of the recreational riders are seeking the easiest and more difficult trails.

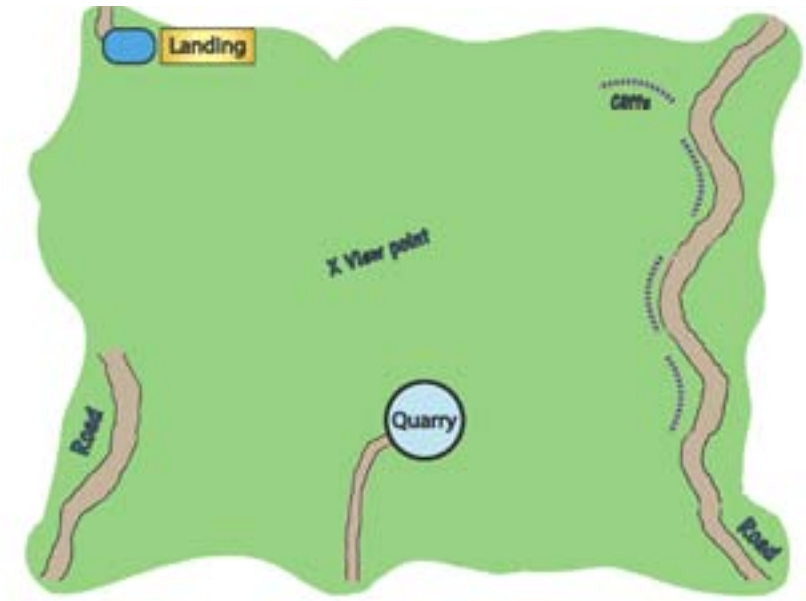
Planners can assign the standard colors for difficulty with green being easiest, blue being more difficult, and black being most difficult. In general as the difficulty increases, clearing and tread widths decrease, grades can increase, and obstacle size and number increase.

To help manage risk and avoid trapping riders by forcing them to ride over their skill level, there are two guidelines: a) difficulty levels must only change at trail junctions, not between; and b) never terminate an easier trail on a more difficult trail. If there is one or more short sections of more difficult terrain on a trail, instead of increasing the difficulty level of the entire trail, planners should consider making an easier trail around that section in line with the difficulty level of the rest of the trail. These easier sections around an obstacle are called easy-outs.

The completed concept plan



For this example, the planner saw there were four areas with issues. In the center, two easiest trails terminated on a more difficult trail. The solution was to correct the inconsistent difficulty by connecting the two easiest trails together with an easy route and leaving the more difficult trail as a loop (but signing it as more difficult).

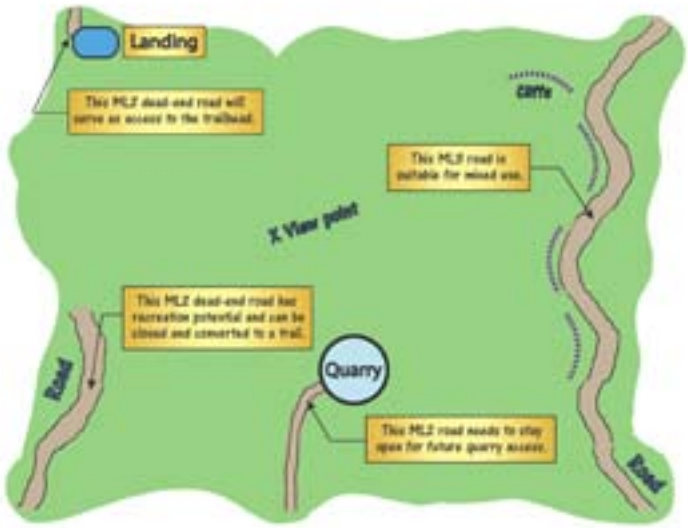


At the top on the perimeter trail was a section of trail that was more difficult with the easiest trail on each end. There was no way to loop around that section and still be on an easy trail. Using the planner's knowledge of the ground and examining the contour map, it was decided to build an easiest connector trail to avoid the more difficult section. This added another loop to the trail system and made the difficulty of the perimeter trail consistent.

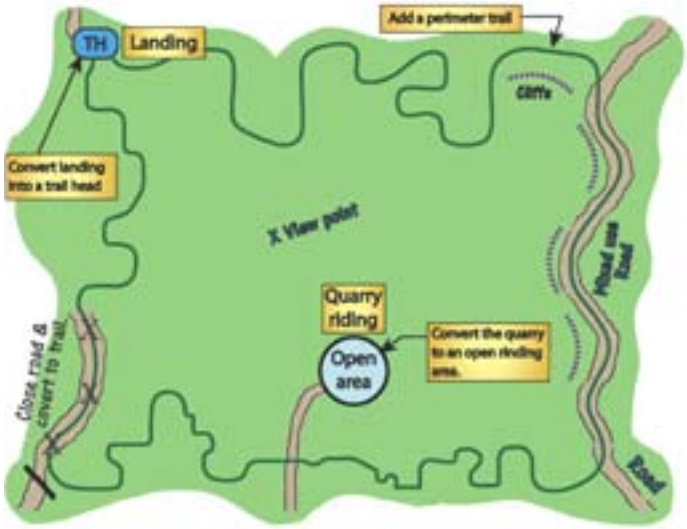
And the trail concept plan (above) is now complete.

In another example (starting at left), the inventory shows that there were no existing trails, but there were some interesting features like the viewpoint, cliffs, a landing, and a rock quarry.

The landing was large enough to be converted into the trailhead. The rock quarry, though still in occasional use, was suitable to serve as a good open riding area. There was a great potential viewpoint in the center, and the rocky ground above the cliffs could provide some good technical riding opportunities.

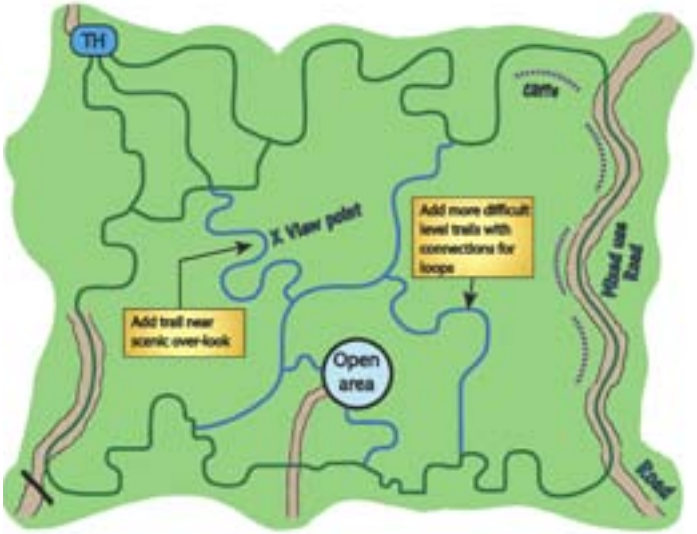


Planners started the trail concept plan by examining the road inventory.

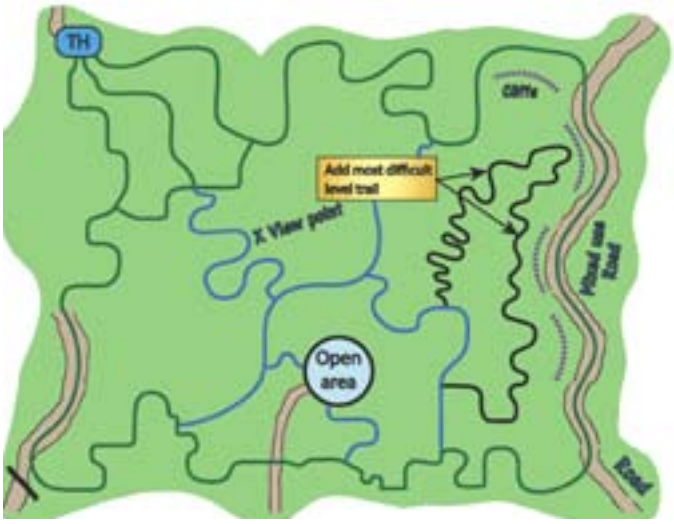


They continued by establishing a perimeter trail that incorporated the road options discussed above.

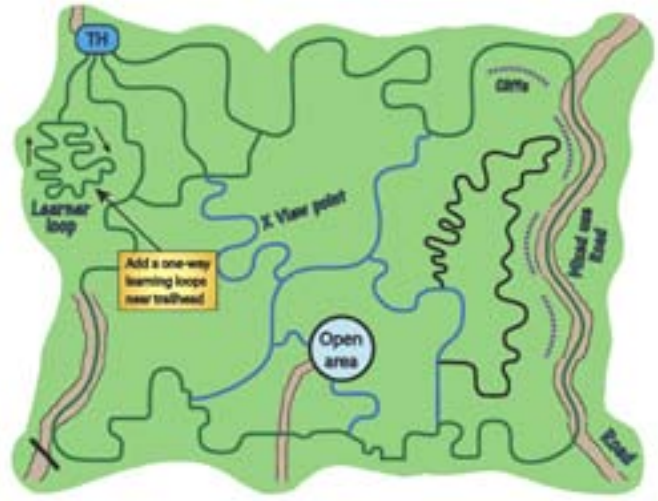
Next, they added some loops out of the trailhead. These serve as warm-up loops and as a means to disperse riders quickly out of the trailhead area.



Then they added some more difficult loops and connected the open area into the system. In doing so, planners also connected in the outstanding viewpoint. Note: Since the viewpoint is a signature feature of the trail system, it is desirable to have the access trail be an easiest trail so that everyone can access it. In this scenario, however, that was not possible due to the grades and technical rocky ground surrounding the viewpoint.



Planners then drew on some most difficult trail to take advantage of that rocky ground by the cliffs.



And finally, they added a learner loop adjacent to the trailhead. This is a directional one-way trail. All other trails in the trail system are two-way. The trail concept plan is now complete.

Tip, Trick or Trap?

Trap: Many design guides specify the number of turns per ¼ mile

The trail alignment should be constantly turning. This creates flow, enhances the rider experience, increases seat time by decreasing speed, inhibits water flow and presents more opportunities for effective drainage, and decreases tread maintenance.

Take a Break

Planning a trail concept is a tough mental process and should not be done hastily. At this point, planners should put down the trail concept plan for a couple of days. Then they can go back and review the plan again. Planners should review if they have maximized the opportunities and minimized the constraints. Can they add more loops or miles? Do they see something differently? If they do, then they can fine-tune the plan. If they don't and still agree with all of the previous decisions, it's time to move on.

Develop Trail Data

Once planners are satisfied with the quality of the product, they can start building a database or spreadsheet with the following trail information:

- How many total miles of trail will be provided?
- How many miles of trail for each use type?
- How many miles of trail construction for each use type?
- How many miles of trail reconstruction for each use type?
- How many miles of roads will be closed?
- How many miles of existing trails will be closed?

Send It Out for Review

Planners should now present the completed trail concept plan on an appropriate base map that at least displays topography, administrative and project boundaries, and key resource areas to the planning team and the project management. When the draft is reviewed and approved by the specialists, the planners should present the proposed concept plan to OHV clubs or other interested stakeholders. If substantive comments are received, planners should incorporate them into the trail concept plan, or if the comments call for a different approach, they should incorporate it into an alternative.

Develop Alternatives

If it is necessary to develop alternatives, now is the time to do that. In developing the concept plan, planners have analyzed a lot of data and made myriad decisions. At this stage, planners should keep most of what they have, but take the options that they didn't use and incorporate them into alternatives. Then they can develop a trail database for each alternative.

A Case in Point…

Planning for the Riders' Needs

The Maryland Department of Natural Resources (DNR) managed large areas of land that contained no designated OHV routes, however unauthorized OHV use was taking place leading to resource degradation. The Department realized that closure alone would not solve the issue of unmanaged OHV recreation; they also needed to provide designated areas for OHV use. The DNR began working with local riders to develop a plan. Initially, they considered creating a test area that would prove the concept that providing OHV recreation was a part of managing OHV use. To this end, they developed a concept plan containing 15 miles of trail with a difficulty level of easiest. To validate this idea they shared the concept with OHV consultants. After a review, the consultants agreed that providing OHV designated routes was a great move, however, the test area needed to be an OHV destination with miles of quality trails and varying difficulty levels. Having only one small designated OHV area with only easiest difficulty level trails can lead to further resource damage. Riders want to do the right thing and stay on designated trails. Too few trails can lead to resource damage from over-use. Not meeting the riders' needs for skill levels can lead to user-created trails.

The Maryland DNR is now working to develop an alternative concept plan which will better meet the needs of the riders. Had the DNR not sent their concept plan out for review, it may have built a trail system that would have failed to meet the riders' needs.

Develop Generic Design Guidelines

Generic design guidelines can be written for each type of trail and will give broad design parameters for an OHM trail, ATV trail, ROV trail, or 4WD trail. Sometimes, the guidelines are called design parameters, but the term "guidelines" is preferred because it infers flexibility (the word "parameters" can infer a set of limits). The design guidelines can be used in environmental documents to help establish acres of impact. They also give the stakeholders, and eventually the trail designers, a description of the intended vision for each type of trail.

It should be noted that a guideline is just that: a guide that gives potential ranges. Those ranges can and will change from the north side to the south side of the area and as soil type and vegetative cover changes. Some design guidelines have been developed for national application but that just won't work because there are too many regional and local variables. It is best to take a sample guideline and modify it for local conditions based on local knowledge and field experience. Some guidelines are also becoming so detailed that, if interpreted literally, the designers can be or feel restricted from seizing onsite opportunities. The have also been applied as the "rule" but this doesn't work either. There are principles, but few rules. This book is about making informed decisions based on actual site conditions. Planners can't do that if their decision space is administratively removed.

Develop Generic TMOs

It is too early in the process to develop trail management objectives (TMO) for each trail, but a generic TMO document can be written for each type of trail separated by difficulty level. This will provide important information and continuity to the person doing the location and design. Once the trails are located on the ground and all adjustments have been made to the concept plan, trail numbers, names, and agency identifiers will be added and the trail concept plan will then become the design plan or final project plan. At that time, TMOs can be written for each trail. If there is a need for the management of the trail to change, the TMOs should be updated.

The process of developing the concept plan is now complete; however, the plan is a working document so it will change as better resource data, additional inventory data, or better field knowledge of the project site is obtained. It is important to point out that a concept plan is just that, a concept. Its accuracy and completeness are directly dependent on the amount of time invested

in the field and office to develop it. Some plans are compiled in a couple of days, and others are developed over a period of weeks or months.

The plan will now be handed over to the person doing the trail location and design (L&D). Certainly, for a seamless, consistent, and cost-efficient process, it is highly desirable for the planner and the designer to be one in the same. The designer will take to the field and perform a thorough reconnaissance of the entire project area; that person will validate or complete the road and trail inventory data; confirm the control points and look for others; and start to ground-truth the feasibility of the concept plan. Obviously, the more time spent in developing the concept plan, the less time will be needed to validate it and refine it. To do a good job of trail layout, the designer will need to become familiar with nearly every square foot of the project area, which can involve a considerable investment of time and money. That is why it is cost-effective for the planner and designer to be one in the same. The designer can build on the previous knowledge rather than starting from zero.

	Sample ATV Trail Design & Difficulty Guidelines			
	(These guidelines are to assist in design, construction, and maintenance. Any guideline should be adjusted to reflect local experience and actual site conditions.)			
		Easiest	**More Difficult**	**Most Difficult**
Grade: Grade should roll and not be sustained	Typical grade	< 20%	< 25%	< 30%
	Max. Pitch	Maximum grades are the exception, not the rule		
	Grade	15% - 20%	20% - 30%	> 30%
	Length	Variable 50’ - 100’ dependant on soils,use type and use intensity, and climate. As grade increases, length on grade should decrease.		
Clearing:	Width	60” to 72”	50” to 60”	50” (maximum)
	Height	7’	6’	6’
	Helmet and leg slappers	Few	Many	Common
Tread:	Width (minimum)			
	Sideslope <25%	60”	50”	50”
	Sideslope 25% - 70%	60” to 72”	55” to 60”	50”
Surface:		Some roots or rocks, obstacles rarely exceed 6-8” and are imbedded solidly in tread; obstacles generally on tangents; tread plane relatively flat with 15% max. outslope for short sections; sweeping curves and some circular climbing turns, more open alignment with circular longer radius curves; sand acceptable and some sections of slippery clay or loose material.	Many roots or rocks, obstacles rarely exceed 8-10” and are loose; obstacles on tangents and some on curves; tread plane flat to irregular with 25% max. outslope for short sections and long sections with less outslope; climbing turns and some circular switchbacks; sections of tight alignment with circular short and long radius curves; sand acceptable and long sections of slippery clay or loose material.	Very many roots or rocks; many obtacles exceed 10”; obstacles on tangents and curves; tread plane very rough and irregular with long sections exceeding 25% outslope; non-circular climbing turns and switchbacks; long sections of very tight alignment with non-circular curves; entire trail may be soft sand, slippery clay, loose material or mud.
Exposure:		None	some, potential injury	Could be common, potential serious injury.
Maintenance:		Trais receive appropriate maintenance to remain within their TMO, maintain effective signing, and to protect resource values.		

Need more? Learn more here...

Designing Sustainable Off-Highway Vehicle Trails, Kevin G. Meyer, USDA Forest Service, Technology & Development Program, 1123-2804P-MTDC, 2013

Management Guidelines for OHV Recreation, Tom M. Crimmins, National Off-Highway Vehicle Conservation Council, 2006, System and Route Planning

A Look Back...

Here are some of the key trail concept plan development elements discussed in this chapter:
- Provide for the riders needs through good planning

The project planner must understand:
- The riders and their desired experiences
- The landscape
- The issues
- The politics
- The climate
- The resource values
- The statutory requirements
- The existing conditions
- Management constraints
- The vision

As planners compile and refine their data, they must:
- Examine the constraints
- Identify control points
- Examine the opportunities
- Understand the human element

In assembling the data into a trail concept plan, planners should:
- Examine the trail and road inventory
- Establish a perimeter trail into logical loops and connect the pieces
- Avoid or minimize dead-end trails
- Establish difficult levels
- Take a break from the project
- Send it out for review
- Develop alternatives, generic design guidelines, and generic TMOs