Community Growth Best Management Practices for Conservation of the Elm Springs/Tontitown Recharge Zone

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Introduction

Benton and Washington County with all or parts of 19 other counties in northern Arkansas are included in the Ozark Highlands. The Ozark Highlands include portions of Arkansas, Oklahoma, Kansas, Missouri, and Illinois. This is a region of karst topography, eroded to form steep hills, valleys, and bluffs. Karst is a distinctive topography in which the landscape is largely shaped by the dissolving action of water on carbonate bedrock (usually limestone, dolomite, or marble). This geological process which occurred over thousands of years resulted in unusual surface and subsurface features ranging from sinkholes, losing streams, and springs, to complex underground drainage systems and caves. Surface waters transported through underground conduits, contribute to the groundwater basin.

The area once covered in a shallow tropical sea, formed when ancient marine organisms died, and their calcium rich shells and skeletons sank to the bottom of the sea forming thick calcareous deposits. These deposits became today's bedrock of limestone and dolomite. Subsequent to the deposition, a magma pulse pushed up and fractured the limestone. Fractures enlarged through dissolution by mildly acidic waters formed various surface and underground karst features.

Northwest Arkansas contains numerous surface and underground karst features and subterranean passageways. Surface water enters groundwater systems rapidly through thin layers of permeable soil and fractured bedrock, potentially traveling over a mile per day underground. Surface water contamination does contribute to groundwater contamination and affects habitat supporting sensitive cave animals. The Elm Springs/Tontitown recharge zone is one example of this kind of surface/groundwater interaction. These characteristics of karst landscapes make the environment fragile and highly susceptible to human disturbance.

Many highly specialized and sensitive fish and wildlife species such as bats, salamanders, cavefish, and crustaceans (e.g., cave crayfish, isopods, and amphipods) spend all or part of their life in these unique and sensitive habitats. The Elm Springs/Tontitown recharge zone contains the endangered Benton County Cave Crayfish (*Cambarus aculabrum*). The species was listed as endangered by the U.S. Fish and Wildlife Service (Service) in 1993 with a recovery plan completed in 1996.

A recharge zone study involving the injection of dye into karst features conducted in 2005-2006 determined the area where surface water enters underground conduits and flows to specific springs along Brush creek. The recharge zone as delineated by Tom Aley of the Ozark Underground Laboratory encompasses 2,260 acres and is 3.53 square miles which includes the communities of Tontitown and Elm Springs, Arkansas.

To minimize threats to groundwater quality and endangered species in the Elm Springs/Tontitown recharge zone, the Service and our partners recommend the following Community Growth Best Management Practices (BMPs) for the Conservation of the Elm Springs/Tontitown Recharge Zone.

Erosion and Sediment Control

BMPs should be implemented for all construction projects within karst landscapes. BMPs should include filter fences, straw bales, interceptor dikes and swales, sediment traps, ditch checks, detention basins, mulching, seeding, and/or revegetation as appropriate. Mats or netting should be applied on steep slopes and stream banks. Erosion and sediment control measures should be sized to handle at least the 25 year flood and 24-hour storm event. Erosion and sediment control BMP's should be implemented to prevent sediment and contaminants from entering groundwater.

It is important that construction plans reduce erosion and sedimentation into streams and karst features by:

- Identifying areas with potential for erosion problems prior to construction initiation.

- Avoiding wetlands and low lying areas.

- Restoring steep embankments with seed, mulch, fertilizer, and implementing erosion control measures such as silt fences, straw bales, matting, and sediment traps. Soil stabilization immediately after earth work is complete is critical.

- Restoring steep approaches to stream crossings by seeding, mulching, fertilizing, and implementing erosion control measures such as silt filter fences, ditch checks, straw bales, matting, and sediment traps. It is critical that restoration be implemented immediately after construction.

- On approaches to stream crossings, drainage control structures should be located at the top and base of the slope/bank. Runoff should be routed to stable slopes on either side of the right of way, or routed via temporary conveyance structures to the base of the approach slope where it can infiltrate into the stream bank and eventually seep back to the channel.

1. Silt Fence and Straw Bales

Silt fence or a combination of silt fence and straw bales, should be installed to prevent or minimize sediment from steep slopes and disturbed areas leaving the construction site and entering streams or karst features. Sediment detention structures should be used in areas with moderate to high erosion potential. Silt fence are useful to intercept and retain small amounts of sediment under sheet flow conditions and should be placed along the borders of water bodies wherever disturbance or construction occurs. Silt fences should be installed immediately adjacent to disturbed soils and a minimum of 10 feet from the ordinary high water mark of wetlands, streams, and rivers. Natural vegetation should be retained within the 10 foot buffer zone. Silt fence should be used in areas subject to erosion where the drainage area is one acre or less, but for larger areas a sediment basin should be also used. Silt fences should be used on slopes no greater than 1:1. The maximum flow path to each fence should be no more than 100 feet. Concentrated flows should not be directed toward any fence. Silt fence should be trenched up slope from the barrier and supported by posts spaced a maximum of six feet apart.

Straw bales are one of the most common sediment control methods. Straw bales should be used in areas subject to sheet flow and erosion where the drainage area is no greater than 1/4 acre per 100 foot of barrier length and the maximum slope behind the barrier is 50 percent (2:1). In most cases, bales should be placed in single rows along contours with ends tightly butted together. To discourage underflow, bale barriers should be entrenched. The back side of the bale should be an undisturbed natural area. If the area behind the barrier has been disturbed or is naturally subject to erosion, the barrier should be back filled. All bales should be tied and staked. Silt fence and straw bales should be maintained throughout the construction period and inspected daily during prolonged rainfall and immediately after each rainfall event.

2. Sediment Traps

Sediment traps are small temporary ponds used to detain stormwater runoff and allow sediment deposition, thereby minimizing the quantity of sediment entering water bodies. Sizing considerations for traps include inflow and sediment load, but traps are generally used for small drainage areas less than three acres. Because sediment traps filter out all but the finest sediments, silt fence is necessary at the outfall to retain silt and clay-size particles.

Sediment traps should be located to intercept runoff from disturbed areas and should be located away from stream channels. A sufficient number of traps should be constructed to intercept runoff from disturbed areas and have adequate capacity for potential storm events and accumulated sediment. Sediment traps should be designed for the specific site, for bare soil, and typically for a 75 percent removal efficiency. Sediment traps should consist of check dams located within an enlarged section of the interception ditch on stable ground. Stable ground is identified as areas with well drained soils and/or where vegetation remains in place providing sufficient root strength to prevent sliding. In areas where stable ground is not available, several check dams should be used to prevent buildup of excess water. Traps should have both a low-flow outlet and an emergency overflow. Rock should be placed at the outlet and overflow to prevent erosion where the water enters the downstream drainage way. The outlet pipe, if needed, should be sized to pass runoff from a 25 year flood and/or 24-hour storm event. Traps should not be constructed on fill material.

3. Mulch and Revegetation

Mulch and prompt revegetation should be used to minimize erosion of exposed soils. Vegetation should be re-established as soon as possible on all disturbed ground, including access roads and trench backfill. Vegetation (use native vegetation when possible) should be planted in the same growing season as construction or immediately following construction, or if not possible disturbed areas should be covered with straw, mats, or some other erosion control material in the interim. At most locations, broadcast seeding and the replacement of saplings should be the predominant method of revegetation. Seed should be planted by hydroseed method or by a mulch covering. A grass and forb mixture recommended by the Natural Resource Conservation Service (NRCS) and the Service should be used to reseed slopes and fertilized where suitable (do not over fertilize). Where terrain or other conditions combine to cause a high risk of erosion, the revegetation method should be to drill/plant grasses or hydroseed over steep slopes then cover with straw or mats.

4. Permanent Stabilization

Material pushed aside to make temporary level working areas should be replaced onto disturbed areas. Original contours should be restored as closely as possible. Equipment access crossings should be removed and stabilized. After contours have re-established, topsoil previously segregated should be redistributed across the surface. Water bars should be graded horizontally across the slope to aid in gully and erosion prevention. Areas compacted by construction equipment should be chiseled and disc-plowed to loosen compacted soil. Following final grading, the disturbed area should be stabilized by replanting with non-invasive plant species. Forest and shrub areas impacted by construction not requiring maintenance as part of the right-of-way access road should be replanted with suitable native tree and shrub species. Within floodplains, ground stabilization should include rooted or anchored features, used to slow runoff velocity and erosion until vegetation is re-established. Steep slopes may require the use of mats to help stabilize soil while new vegetation is established. Disturbed stream banks should be stabilized using appropriate vegetation (native if possible). Wetlands should be stabilized by replacing the original subsoil and topsoil, replacing vegetation, and returning the topography and hydrologic characteristics of the wetland as closely as possible to their original form. Disturbed wetland buffers should be stabilized by replanting appropriate vegetation.

Construction in Sensitive Areas

As the true extent of the underground environment is difficult to clearly delineate, undiscovered karst features; such as cave openings, sinkholes, and underground passages may occur on or near a project site, even in previously developed areas. Therefore, the Service recommends the following precautionary measures be taken to avoid impacts to groundwater and sensitive or endangered species which may inhabit karst features not previously surveyed.

1. Survey existing and any new right-of-ways for karst features such as caves, sinkholes, losing streams, and springs.

2. Establish a natural area of 300 feet or greater around any cave, sinkhole, losing stream, or spring found during the survey (or during any aspect of project implementation). The Service should be contacted for further evaluation to determine if caves are used by sensitive or federally listed species.

3. If a cave is used by sensitive or federally listed species, the Service may request that the cave be mapped to determine if additional openings or passages may be affected by the project. The Service may recommend modifications of the proposed project to allow natural areas to be established. Incorporation of natural areas may be necessary to avoid impacts.

4. If caves or other openings are encountered during construction, the Service requests that work efforts cease within 300 feet of the opening. The opening should be adequately marked and protected from work activities, and the Service should be contacted immediately. No fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to inventory the site.

5. The Service should assess caves located prior to or during construction for sensitive/endangered species and provide recommendations before activities proceed.

6. No blasting should be permitted in the vicinity of any known karst feature without previous consultation.

Additional measures may be required for construction near sensitive areas including stream channels and karst features. Care should be taken when working around streams and karst features to prevent unnecessary damage to or removal of vegetation. If a cave or fracture is breeched or surface water is rerouted into a karst feature, all activities should cease and the Service should be contacted to assess the situation and provide further consultation before proceeding.

Staging areas should be at least 300 feet away from streams, wetlands, and karst features. All streams, wetlands, and karst features adjacent to disturbed areas should be protected by the use of silt fence, straw bales, and other BMPs necessary to prevent sediment from entering water bodies. A combination of several measures may be necessary to decrease damage at stream crossings. In streams with enough flow, temporary in-stream settling ponds should be used to catch sediment generated by construction. Sediment should be removed as soon as construction is completed. For smaller streams or where appropriate, water could be bypassed through construction areas by the use of flume pipes, pumps, or coffer dams. Stream can be bypassed using directional drilling techniques, as discussed later.

Streams and karst areas should be restored and stabilized immediately following construction activities. Native plants, mats, netting, and other BMPs should be used to stabilize banks. Instream deflectors and anchored logs should be used in high velocity streams to protect vulnerable banks and allow for reestablishment of vegetation. Riprap revetment should also be used, if necessary, to help stabilize slopes in areas of high velocity stream flows. The use of riprap should, however, be minimized. Rock typical of the local geology should be used if available. Monitoring of BMP performance in critical areas, particularly at sensitive stream crossings and stream approach slopes should be conducted and documented on a routine basis prior to and after storms during construction and operation. Based on monitoring, additional BMPs or other improvements may be necessary to insure minimization of impact.

All efforts should be made to minimize stream alterations which could impact water quality and fish and wildlife resources. Construction along streams should not take place during fish spawning seasons if possible.

Vehicle Maintenance, Petroleum, and Chemicals

To prevent petroleum products from contaminating soils and water bodies, the following BMPs should be implemented:

- Construction equipment and vehicles should be properly maintained to prevent leakage of petroleum products.

- Staging areas for equipment maintenance and chemical storage should be established 300 feet or more away from wetlands, streams, or karst features.

- Drip pans and tarps or other containment systems should be used when changing oil or other vehicle/equipment fluids.

- Any contaminated soils or materials should be disposed of off-site in proper receptacles at an approved disposal facility.

- Vehicle and equipment fueling should be attended at all times by site personnel. Spill cleanup materials should be stored on site and employees should be trained in spill control procedures.

- Vehicle washing should not occur on the project site, but at an area with appropriate wash facilities to manage contaminated wash water. Wash water should never be discharged directly into water bodies or karst features.

- Petroleum products and other chemicals should be properly stored in appropriately labeled containers under sheltered areas. Storage shelters should be designed with an impermeable floor area.

- Materials for cleaning up spills should be kept on site. Spills should be cleaned up immediately in accordance with state and federal regulations.

Solid Wastes

Solid wastes, such as vegetation removed during clearing, sanitary waste, food and food container waste, and metal and wood scraps, should be collected and disposed of according to applicable regulations or recycled/reused. Sanitary facilities should be well maintained and conveniently located. Waste containers should be labeled and located in a sheltered area at least 300 vegetated feet away from water bodies and drainage pathways. Erosion and sediment control structures should be frequently inspected for accumulations of solid waste and any waste removed immediately.

Chemical Controls

Herbicides, fertilizers, vehicle maintenance fluids, petroleum products, and drilling fluids should be discarded, stored, and/or changed in staging areas established at least 300 vegetated feet from streams or karst features. Spill response protocols and kits should be maintained on site to address these concerns.

Areas where discharge material, overburden, fuel, and equipment are stored should be designed and established at least 300 vegetated feet from the edge of streams and karst features. Further distance is recommended, but with proper barrier fences, surface design, and/or maintaining a vegetated buffer, most impacts can be avoided or significantly reduced.

Stream Crossings/Pipelines

Several methods could be used for stream crossings, including open cut channels and directional drilling. The standard BMPs for pipeline construction in trenches, construction near sensitive areas, and construction staging areas should be applicable to each of water crossing methods. Construction at stream crossings should be according to the selected stream crossing method (wet trench, dry trench, or drilling) and specific mitigation concerns associated with the level of disturbance and stream sensitivity. General construction sequences for trenched stream crossings include the following basic steps.

1. Construct a flow by-pass structure (for dry trenching) to create a relatively dry stream bed or backwater condition. Flow by-pass structures should cross the full width of channel (including side channels) in one span or in stages.

2. Once flow is controlled (in the case of wet trenching, step one above is not needed), route flow into the by-pass and trench across the entire channel width to the appropriate depth below maximum scour and install the pipeline.

3. Backfill the trench with native bed material, and stabilize the bed and bank with armoring matched to baseline flow conditions.

4. Re-introduce flow and monitor performance.

Temporary in-stream settling ponds should be constructed without significantly dredging or altering the natural hydrology and channel of a stream. Settling ponds should be constructed using fill rock or screens with disturbance or alteration of the channel kept to a minimum. Natural stream bed alteration necessary for diversions should be minimal and restored upon completion of activities. Riprap and filter screens used to create traps or diversions should be removed upon completion of the activities.

Critical slopes are characterized as steep approaches to stream crossings where the pipeline trench is parallel to the slope angle, areas where bank erosion can destabilize slopes, drainage is concentrated, and areas where sediments can directly enter receiving waters. Stringent erosion and sediment control measures, aggressive slope stabilization measures, and frequent monitoring should be implemented during and after construction.

Use directional drilling methods for proposed pipeline crossings of losing streams, perennial streams, and wetlands. Prior to directional drilling, a geotechnical investigation using the least intrusive means possible (e.g. ground penetrating radar, minimal exploratory bore hole drilling, seismic refraction and reflections, cave radio, resistivity, magnetometry, etc.) should be conducted to determine subsurface/geologic conditions encountered along the drill path to ensure that a directional drill pipeline at the location would be feasible and not result in unnecessary damage to a sensitive area, such as a karst void. All drilling fluids should be captured and accounted for during drilling activities.

If directional drilling is not feasible, it is recommended that stream crossings be conducted during periods of low flow (July-September), and that limited amounts of riparian vegetation be removed during installation.

Stream channel disturbance using directional drilling is greatly reduced compared to trenching. Prevent runoff and contaminants from staging areas on either side of the crossing from entering the stream. This should require construction of secondary containment structures (i.e. berms and filter fences) along with runoff dispersion and sediment traps to prevent any runoff generated in the staging areas from reaching the stream. Additionally, equipment should not be run through stream channels.

Where excavation involves native or established wetland/riparian vegetation, the top 6-12 inches or more of vegetation and topsoil including the vegetation and root mass should be carefully removed and stockpiled separately into a dedicated deposition area. After completion of site disturbance this vegetated material and its associated soils should be placed as the surface material.

Wells located should be evaluated for closure methodology and potential biological inventories. Wells should be documented and evaluated for future monitoring opportunities. If wells are located which require closure, coordination with the USFWS should occur prior to closure.

Natural Area Establishment

Within the delineated Elm Springs/Tontitown recharge zone two primary losing streams convey surface waters underground to springs along Brush Creek. If other karst features occur in the recharge zone such as springs, caves, or sinkholes, they would also convey surface water to the same springs. Contaminants from any source entering these karst features would likely contribute to water quality impairment and reduce site suitability for the cave crayfish. Based on the knowledge and function of hydrogeology within this recharge zone, it’s recommended that identified karst features receive a 300 foot vegetative natural area where development is restricted. This distance is based on the need for a large area of natural infiltration and percolation of climatic events. This also gives a sufficient area to reduce the potential for contaminants to be directly input to the karst features. Otherwise, the entire influx of precipitation would be stormwater runoff from development activities. These are not “no touch” areas, but should be considered as conservation areas where a community trail system might be established or subdivision open space should be maintained. Natural areas may also meet city ordinance for a specific amount of the land to remain open.

While the distance of 300' is difficult to embrace, there are alternatives to reduce the impact to developers, including tax deductions and conservation easements. The Service is willing to discuss this recommendation in order to establish understanding and some level of agreement.

Stormwater

Stormwater concerns occur during construction and after the site is developed and stabilized. Threats to groundwater shift from sediment and fuel/oil/grease, to lawn chemicals, oil and grease from personal vehicles, brake dust, chip seals, roof tar, and other household contaminants. Plans should be made to address post construction stormwater contaminants.

The Arkansas Department of Environmental Quality and the Environmental Protection Agency oversee and permit stormwater runoff. In 2003, the Northwest Arkansas Regional Planning Commission developed the Northwest Arkansas Stormwater Quality Best Management Practices Preliminary Guide Manual for community use. The manual was developed with six control measures including public education and outreach, public participation and involvement, illicit discharge, detection and elimination, construction site runoff control, post-construction runoff control, pollution prevention, and good housekeeping. When open land is developed the hydrology of the site completely changes. Possible contaminants associated with development include sediment, nutrients, microbes, organic matter, toxic contaminants, trash, and debris. Each of these together or separately can pollute groundwater. Once contaminants leave the site and enter drainage within a groundwater recharge zone, whatever the water was carrying is now contributing to groundwater contamination threatens rare and endangered karst animals.

Please contact Jeff Hawkins Director of the Northwest Regional Planning Commission at 406 N. Shiloh, Springdale, Arkansas 72764 or call him at 479-751-7125 for a copy of their stormwater BMPs. BMPs summarized above are presented in greater depth in this publication.

Post Construction Stormwater Management

Stormwater runoff contains sediment, fuel/oil/grease, brake dust, herbicide, pesticide, and other contaminants. In order to reduce potential contaminants contained in stormwater during and after construction activities, the following recommendations apply.

Establish a permanent stormwater detention basin capable of capturing contaminates from the development. This basin can be rough initially, then refined once construction is complete and the site stabilized

Detention basins should be designed and constructed to capture the first ½ inch of a climatic event from the entire site proposed for development. These basins should be fenced and contain a 3:1 slope for safety reasons. The basin should not be constructed in a stream drainage, but may be constructed adjacent to it. A spillway should be established to allow for precipitation events in excess of ½ inch to be discharged based on state permitting. The bottom of the pond should be lined with a textile or bentonite type material to capture the rain and not allow infiltration. This should then be covered by approximately 1-2 feet of gravel, so that during maintenance the impenetrable lining would not be breeched.

Sediment monitoring should occur in the detention basin to document the filling rate and to determine when excess sediment should be removed. At least once a year the pond should be inspected for trash and debris which should be removed. At least every five years, the pond should be drained, sediment deposition monitored, and if necessary the pond dredged to its original depth. Dredged sediment should be removed to an appropriate location due to probable concentrated contaminants.

After capture of the first ½ inch of a precipitation event, additional flow should be directed to a 50-100 foot bioretention treatment area consisting of a vegetated strip, sand bed, organic or mulch layer, planting soil, and hydrophilic plants. This area provides additional filtration prior to proposed outfall. Plants can remove contaminants while a clay layer can absorb hydrocarbons, heavy metals, nutrients and other contaminants. Organic mulch filters contaminants and provides an environment conducive to growth of microorganisms, which degrade petroleum based products and other organic materials. Bioretention areas require maintenance. Due to potential high flows and scouring of the bioretention area, it’s recommended that a foundation of rock be used as a base, with soil and vegetation placed on top.

Another alternative for treatment of stormwater are separation systems. These systems allow for sediment, oil and grease, and floatable debris to be collected. They require periodic maintenance, but may provide a reasonable alternative to detention basins. While these systems do reduce contaminants, outflow from the systems should run through a bioretention filter prior to leaving the site. One example can be found on the internet at baysaver.com

“Rain gardens” that drain internally may be suitable for certain sites. Site specific requirements and developer needs should be considered prior to selecting a preferred option.

A final alternative is to connect into an established community stormwater collection system which transfers and discharges to a permitted location. All regulations established and required by the Arkansas Department of Environmental Quality must be followed. Dependent on the site and its relation to a sensitive area, the development may still be required to implement post construction stormwater management controls prior to release in a stormwater system.

While options are discussed for post construction stormwater management, the Service recognizes we’re not experts and are willing to discuss alternatives presented to us. The premise on which an alternative is founded is that each development be responsible for their stormwater and to reduce the threat to surface and groundwater from unregulated discharge.

Wastewater

Alternatives for managing wastewater are either currently available or possible in the future. These include regional or municipal sewage treatment plants, decentralized wastewater treatment facilities, or septic systems. Tontitown is currently installing a community sewer system, although septic tanks still occur in the recharge zone. Based on the density of large scale development, municipal facilities are the primary option.

Karst landscapes have limited soils which reduce effectiveness of decentralized and septic systems. Generally, shallow soils exist close to karst features limiting wastewater treatment potential. The Arkansas Department of Health (ADH) must be contacted for decentralized wastewater treatment facilities and septic systems in order for to characterize soils as capable of functioning effectively as part of the treatment process. In the case of decentralized wastewater treatment facilities, the ADH and Arkansas Department of Environmental Quality conduct reviews before permits are issued. Septic systems are reviewed and permitted by the ADH.

Where stream channels are located within the Elm Springs/Tontitown recharge zone, a setback of at least 300 feet should be the minimum for driplines or drainfields. Soils should meet more than the minimum criteria for wastewater detention time, given the fact that karst geology lies just beneath that transfers contaminants directly to groundwater.

Decentralized wastewater treatment is generally considered to be an extension of onsite wastewater treatment or conventional wastewater systems that includes some form of voluntary management practices. Decentralized systems employ a combination of technologies and are used to treat and dispose of wastewater from dwellings and businesses close to the source. Decentralized wastewater systems allow for flexibility in wastewater management, and different parts of the system may be combined into "treatment trains," or a series of processes to meet treatment goals, overcome site conditions, and to address environmental protection requirements. Each technology has advantages, as well as limitations, so a treatment technology must be selected specifically to meet local conditions and treatment objectives. Similarly, every community's own financial, physical, and regulatory factors must be evaluated to find the best technology for their circumstances.

Many considerations would determine how close to the source of generation it is practical to place the treatment center. One very important factor is the potential for beneficial reuse of reclaimed water. Other considerations include topography, soil conditions, development density (existing or desired), type of land use, and environmental impacts of the wastewater management function in any given locale.

Management is the key to keeping decentralized treatment systems functioning properly. Management can encompass planning, design, installation, operation, maintenance, and monitoring onsite and cluster systems. Regular inspection and maintenance form the basis of any management program.

Procedures for Subdivisions Using On-site Sewage Disposal

According to the Arkansas Department of Health's RULES AND REGULATIONS PERTAINING TO SEWAGE DISPOSAL SYSTEMS, a subdivision is defined as "land divided or proposed to be divided by a common owner or owners for predominantly residential purposes into three or more lots or parcels, any of which contain less than three acres, or into platted or unplatted units any of which contain less than three acres, as a part of a uniform plan of development."

1. You must contact an authorized Designated Representative to start the process. Designated Representative lists are available at the County Health Department.

2. The Designated Representative will submit the subdivision plans, in triplicate to the County Health Department.

3. The Arkansas Department of Health's Environmental Health Specialist will evaluate the site and write a letter with their findings to the Arkansas Department of Health Engineering Division. Special consideration will be given to sites that may pose a potential problem for ecologically sensitive areas, areas of shallow bedrock, fractured rock formations, and/or other conditions that may adversely affect renovation of wastewater before re-entering the true water table.

4. Following a recommendation from the Environmental Health Specialist, the Engineering Division will write a letter of approval or denial, usually in conjunction with the subdivision's water system, to the property owner. Water supply, treatment, and distribution plans for the subdivision, other than individual wells for each lot, must be prepared by a registered professional engineer and submitted to the Division of Engineering for review and approval. If you have any questions, please contact the County Health Department and speak to an Environmental Health Specialist.

Summary of Septic tanks from EPA website:

> If properly designed, constructed, and maintained, a septic system can provide an effective treatment of household wastewater. Malfunctioning systems can contaminate groundwater that might be a drinking water source or home to rare karst dependent animals. A typical septic system has four main components: a pipe from the home, a septic tank, a drainfield, and the soil. Microbes in the soil digest or remove contaminants from wastewater. A septic tank is buried in a watertight concrete, fiberglass, or polyethylene container. It holds wastewater long enough to allow solids to settle out and oil and grease to float to the surface. It also allows for partial decomposition of solid materials. A T-shaped outlet in the septic tank prevents sludge and scum from leaving the tank and traveling to the drainfield. Screens are also recommended to keep solids from entering the drainfield. Wastewater exits the septic tank and is discharged into the drainfield for further treatment by the soil. Microbes in the soil provide final treatment by removing harmful bacteria, viruses, and excess nutrients.

Procedures for Obtaining an Individual Septic System Permit

The Arkansas Department of Health requires all property owners using individual sewage disposal (septic system) for their property to follow the steps outlined below. You must contact an authorized designated representative to design the individual sewage disposal system or a repair to the individual sewage disposal system. Designated representative lists are available at the county health department. The following steps are in accordance with the Arkansas Department of Health's Rules and Regulations Pertaining to Individual Sewage Disposal Systems:

1. The Designated Representative will submit an application for a PERMIT FOR CONSTRUCTION for the individual sewage disposal system to the Arkansas Department of Health.

2. The Arkansas Department of Health's Environmental Health Specialist will evaluate the design and issue a PERMIT FOR CONSTRUCTION if the submitted application meets all current regulations and is appropriate for the site.

3. If approved, a copy of the permit will be mailed to the property owner at this time.

4. Upon receipt of the PERMIT FOR CONSTRUCTION, the approved individual sewage disposal system may be installed. A list of septic system installers licensed by the Arkansas Department of Health is available at the County Health Department.

5. After installation, and before the system is covered, the property owner and or the licensed installer will contact the Arkansas Department of Health's Environmental Health Specialist to conduct a final evaluation of the system. If the system is approved the Environmental Health Specialist will issue a PERMIT FOR OPERATION.

If you have any questions regarding on-site sewage disposal or septic systems, please contact the County Health Department and speak to an Environmental Health Specialist.

Development of the original BMP's

In December of 2004, a public meeting was held to discuss the Cave Springs Cave recharge zone (16 square miles). One task was developing a set of karst best management practices for establishment of common ground between the steady growth of three communities within the recharge zone and the conservation of groundwater, whereby protecting two endangered and several rare species. The document above is the product of that meeting with many of the agencies and organizations below either reviewing and/or providing comment. Of the 110 participants, over forty provided comment which was incorporated into the final document. This document minus incorporated recent changes was adopted by the community of Cave Springs as part of their planning ordinance. The Service appreciates those who participated in the original meeting and who took time to provide comment. The following is not a comprehensive list of participants, but represents many of the groups involved in developing these "Karst Best Management Practices."

- Private landowners
- Developers
- Attorneys
- Local engineering firms
- U.S. Army Corps of Engineers
- U.S. Geological Survey
- Natural Resources Conservation Service
- Federal Highway Administration
- Arkansas Highway and Transportation Department
- Karst Resources Support Team
- Arkansas Game and Fish Commission
- Arkansas Department of Environmental Quality
- Arkansas Natural Resources Commission

- Arkansas Department of Health
- The Nature Conservancy
- Arkansas Natural Heritage Commission
- Cities of Cave Springs, Rogers, Lowell, and Bentonville
- Northwest Arkansas Regional Airport
- University of Arkansas professors

If you have any questions regarding the Community Growth Best Management Practices for the Conservation of the Elm Springs/Tontitown Recharge Zone and their application, please contact:

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