A Landowner's Guide to Stream Management

Permitting

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Assistance Options

Frequently Asked Questions

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Missouri Geological Survey

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Front Cover: The three pictures on the front page of this guide represent three stages of a successful streambank stabilization project completed by the U.S. Army Corps of Engineers and local officials.

The first picture shows an eroding streambank threatening a county road in Pike County along Haw Creek.

The second picture shows emplacement of stone toe protection and willows during construction.

The final picture shows the stabilized and vegetated streambank three years after construction. This project was performed in one day and monitored over the following years. The result was a healthy and stable streambank benefiting the landowner (the county) as well as the area's fish and wildlife.

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Streambank and Channel Instability in Missouri

The Missouri Department of Natural Resources (MoDNR) and other local, state, and federal agencies recognize the problems landowners encounter with stream stability issues. Eroding banks, property loss, excessive gravel, and flood debris are just some of the challenges farmers, landowners, and land managers face while maintaining their land. Finding affordable ways to protect their land with practical and effective stabilization methods can also be a challenge.

MoDNR developed this guide in coordination with the Missouri Farm Bureau as an informational resource on stream management to assist landowners wanting to work in their streams. This guide is not a definitive resource for regulatory guidance and should not be used as such. Landowners should always read the applicable permits and consider consulting the proper regulatory agency before doing stream work.

This guide is designed to be a quick reference resource for Missouri citizens to find information about:

- Permitting needs for working in streams
- Common practices used to stabilize streams
- Gravel removal and mining options for landowners
- Assistance options available
- FAQs, or Frequently Asked Questions
- Contacts for additional information

Stream Work Permitting Needs and Process

Some counties and cities regulate activities conducted in streams or floodplains due to erosional or flooding potential. This guide does not include information about local permitting guidelines because they may vary by location. **Landowners should check with their local and county governments to determine if there are any restrictions.**

Regulatory Request System

The U.S. Army Corps of Engineers (USACE) has developed an online permitting portal called the Regulatory Request System (RRS). The website contains information about USACE regulatory programs, jurisdictional questions, and other topics. Users can also apply online for permits, but the system requires a login.gov account, so infrequent users may find it more convenient to directly contact a USACE office.
As of August 2024, the system is usable but still in beta.

Nationwide Permit 13

The Nationwide Permit (NWP) 13 for "Bank Stabilization" is a permit administered by USACE and the fastest and easiest way to perform a streambank stabilization project on your property. NWPs are used to ensure projects have no more than minimal impacts to aquatic resources. NWP 13 has already received a Water Quality Certification (WQC) from the State of Missouri.

The Nationwide Permits are "permit-by-rule," which means that much of the work done using the permits can be performed without formally applying for the permit and going through a review process. It is crucial to note that landowners are responsible for understanding all the conditions that apply to NWP 13 projects and verifying their own project will satisfy these conditions. Landowners who perform this work are liable for any violations of the Clean Water Act (CWA) and any subsequent penalties. It is recommended that landowners contact USACE prior to performing any stream work to increase the chances of project success and avoid the risk of violating the CWA.

If done correctly, there is an opportunity to perform projects in compliance with the Section 404 (NWP) and 401 (WQC) of the CWA without Pre-Construction Notification (PCN) to USACE. The information below is intended to assist landowners with ways to quickly navigate the regulatory process. Before conducting any streambank stabilization project, make sure to read and understand NWP 13, the NWP General Conditions, and the Missouri Regional Conditions. It is the landowner's responsibility to understand and comply with the conditions of the permit.

Before starting any project, it is recommended that you contact the appropriate USACE district to verify that your project will fall under NWP 13 – you can find your district at https://www.usace.army.mil/Missions/Locations/. See the contact info section at the end of this document for a more detailed map of the USACE districts in Missouri.

NWP 13 Link: https://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Nationwide-Permits/ (Click on Nationwide Permits, General Conditions and Definitions for the most recent available year). The Nationwide Permits are generally renewed every five years, so be sure to check that you have the most recent version. Please note the general conditions are later in the document and apply to all NWPs.

Missouri Regional Conditions: https://www.nwk.usace.army.mil/Missions/Regulatory-Branch/Nation-Wide-Permits/ (Click on Regional Conditions under State of Missouri). Regional Conditions are additional conditions that apply to all work performed using any NWP in Missouri. They include requirements for stream crossings, seasonal restrictions on activities in spawning areas, suitable material, priority watersheds, and sensitive aquatic species.

Important Requirements for Streambank Stabilization

Nationwide Permit 13 authorizes bank stabilization activities necessary for erosion control or prevention. The following are conditions of NWP 13 and will help you avoid unintended adverse impacts to the stream, as well as help you comply with the CWA:

1) Use the minimum amount of riprap necessary.

2) Keep the project to 500 linear feet or less.

3) Use less than one cubic yard of material per running foot.

4) Do not relocate the stream; maintain the stream's basic pattern, profile, and dimensions.

5) Do not dam the stream or otherwise create a barrier for water, sediment, or aquatic organisms.

6) Only do work on one side of the stream channel, and do not excavate the opposite gravel bar.

7) Be prepared to monitor for erosion and, if necessary, repair after the first couple high water events.

8) Only use clean, authorized fill material.

Utilize the following design tips to reduce risks and increase the chances of success:

1) Utilize clean, self-settling materials, such as appropriately sized and placed rock riprap.

2) Stabilization projects should follow appropriate design guidelines; see the NRCS Stream Restoration Design Manual, Iowa DNR River Restoration Toolbox, or other design resources from reputable sources such as government agencies or academic institutions.

3) It is recommended that plans be produced or approved by a professional engineer with streambank stabilization experience.

You may also reach out to MoDNR with questions about the permitting process.
Email:wpsc401cert@dnr.mo.gov

Important: Streams Requiring Notification

If one or more of the confines within NWP 13, the General Conditions, or the Regional Conditions cannot be met you must contact USACE for authorization. These confines ensure minimal impact and reduce the chances of negative unintended consequences from in-stream work. Projects with bigger impacts may require engineering designs for success. The following is a list of circumstances in which a PCN to USACE is required, **but this list may not be comprehensive and may change over time. It is the responsibility of the landowner performing the stabilization project to verify that all conditions are met.**

- The project will be longer than 500 linear feet (NWP 13).
- The project will use more than 1 cubic yard of material per running foot (NWP 13).
- The project will involve discharges of dredged or fill material into Special Aquatic Sites as designated by the USACE. These include areas principally for the preservation and use of fish and wildlife resources; wetlands; mudflats; vegetated shallows; coral reefs; and riffle and pool complexes. More detail on such sites can be found here. (NWP 13).
- The project will occur in a component of the National Wild and Scenic River System or in a "study river" as designated by Congress (General Condition 16).
- Any species listed in the Endangered Species Act (or species proposed for listing) or designated critical habitat (or critical habitat proposed for such designation) might be affected or is in the vicinity of the project, or if the project is in designated critical habitat or critical habitat proposed for such designation (General Condition 18). Landowners can use the Fish and Wildlife Service's Information for Planning and Consultation (IPaC) tool to determine if there may be endangered species in the project vicinity.
- The project might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties (General Condition 20).
- The project will occur in the designated critical resources waters including wetlands adjacent to those waters (General Condition 22).
- The project will result in the loss of wetland area exceeding 0.1 acres (General Condition 23).
- The project will result in the loss of streambed area exceeding 0.03 acres (General Condition 23).
- The project will alter or temporarily or permanently occupy or use a USACE federally authorized Civil Works project (General Condition 31).
- The project will occur in a stream listed as impaired for sediment related impairments, aquatic habitat alteration, channelization, or unknown impairments listed in the Missouri Integrated Water Quality Report.
- The project will occur in a priority watershed (Regional Condition 4).
- The project will occur in waters that are listed for sensitive aquatic species (Regional Condition 5).
- If project cannot fit within the confines of NWP 13 or any of the General or Regional Conditions for another reason, contact USACE to determine what may be the next steps.

How to Contact the USACE for Project Authorization

1. Contact the appropriate USACE office by phone or email to determine if a PCN is required. If a PCN is required, follow steps 2-4. USACE contact info can be found here, and a detailed map of USACE districts in Missouri can be found at the end of this document.
2. Fill out the Nationwide Permit PCN (application) form.
3. Submit it to the appropriate Missouri USACE regulatory office for review.
4. Call the USACE regulatory office and ensure they received the application and request a conversation with the project manager.

Stabilization Practices for Consideration Under NWP 13

Stabilization Measures

There are a variety of streambank stabilization techniques you can employ that will be effective, efficient, and have a minimal impact on the stream. Some of these techniques require in-stream work, like physically reinforcing a bank with rock or installing a floodplain bench. Some operate mostly out of stream, like establishing a healthy riparian buffer. Below are descriptions and photos of some of these techniques.

The stabilization techniques in the following section may fit within NWP 13 depending on the scope of the project and site-specific conditions. It is the responsibility of the landowner performing streambank stabilization work to understand NWP 13 and all associated conditions, and ensure that any projects satisfy these conditions and comply with the Clean Water Act. Landowners who perform work violating these conditions are fully liable for any violations of the Clean Water Act and any associated penalties. It is recommended that landowners contact USACE prior to performing any stream work to increase the chances of compliance and project success.

USACE regulates the discharge of dredge and fill material into the Waters of the United States, which includes most bank stabilization projects. USACE can help you determine whether a permit is necessary and how to obtain one. Given this, it is recommended that you contact USACE prior to doing any work to determine if a permit is needed. Other agencies that may be able to assist you include your local Soil and Water Conservation District (SWCD), the Natural Resources Conservation Service (NRCS), and MoDNR. The Missouri Department of Conservation (MDC) is another resource that may be able to assist with planning a stream restoration project regarding fish or wildlife habitat, but MDC plays no part in the regulatory process. If you have questions about any of these techniques or need to determine which stabilization measure will work for you, feel free to review some of the linked materials or contact any of the agencies listed at the end of this document.

General Stabilization Guidelines

Rock Sizing Considerations

The size of rock needed for a stabilization project depends on the size and power of the project stream. Streams that contain more water or move faster can generally move larger materials than smaller streams, so larger rock should be used. Materials that are already present in the stream environment (sand, gravel, etc.) should not be used for stabilization, because the stream likely has the power to erode and transport them during high flow events. In addition, neither USACE nor the MoDNR Water Protection Program would authorize the use of instream gravel as a stabilization material. To determine what size of rock is appropriate for a stabilization project, see NRCS Technical Supplement 14C or the Missouri Supplement to the Engineering Field Handbook, Chapter 16. To learn more about using stone as a stabilization material, see NRCS Technical Supplement 14K.

Keying in Structures

Stabilization measures that involve placing rock often need to be "keyed" into the bank at both the upstream and downstream ends. This means that part of the bank is dug out and filled with rock, effectively continuing the structure into the bank. This is done to prevent the stream from eroding the bank behind the structure and causing it to fail. Required key dimensions will depend on the scope of the project. Additionally, stabilization projects should begin and end at stable points of the streambank, or else erosion will likely continue.

Structure Maintenance

Bank stabilization structures need to be monitored for performance after installation. After flood events, landowners should examine their structures to determine if there was any damage and perform maintenance as necessary to restore the structure to its initial condition. Repeated damage to the structure or complete failure may indicate that the design needs to be reconsidered.

Vegetative Reinforcement

Using vegetation in streambank stabilization projects adds stability and longevity to the project. All stabilization projects should incorporate some element of vegetation. When using rock, living plants can be used in tandem with these hard materials to add extra stability in the short and long term. Plant roots hold soil together to stabilize a bank and help water infiltrate into the soil, which can reduce flood volumes.

Some projects may be able to utilize mature willow trees by excavating them from gravel bars, transporting them to the erosion site, and placing them under or behind riprap. These trees would likely not survive if planted into the bank with no reinforcement, so they should be used alongside rock. This activity is not covered under any general or nationwide permit, so it will require authorization by USACE. If you are interested in transplanting willow trees as part of a stabilization project, contact USACE to have your plan reviewed and authorized.

Bendway Weirs

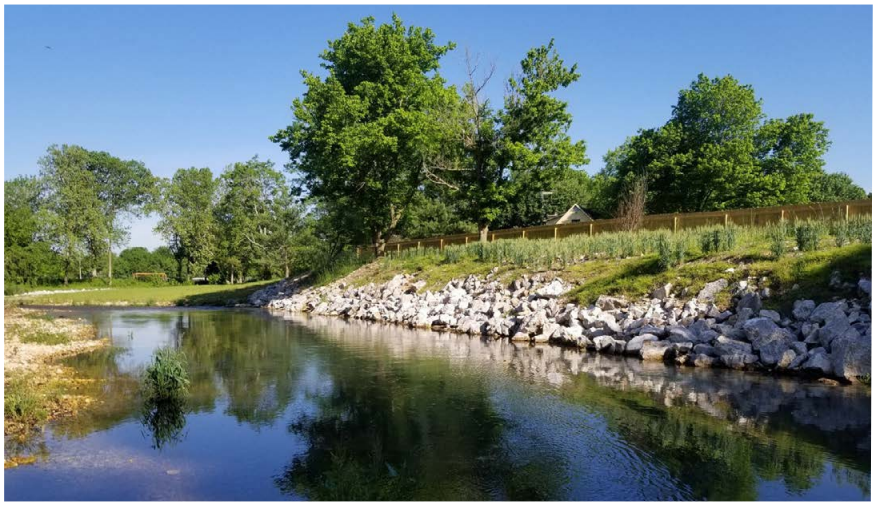
These linear structures are made of piled rock that are installed along eroding streambanks, usually on the outside bend of stream meanders. These structures serve to redirect the flow of water away from the eroding bank. Weirs are installed angled slightly upstream (20-30 degrees), and serve to "capture" flow, which reduces erosion and induces deposition. The sediment deposited adjacent to the weir structures helps vegetation to reestablish itself and secure the banks. Due to their size, these structures may not be applicable in very small ephemeral streams (those that only have running water after rainfall or snowmelt).

The construction of bendway weirs requires stone and heavy machinery. Consultation with an engineer is recommended to increase chances of success.

Bendway weirs.

Rock Revetments

A rock revetment is a streambank stabilization measure that involves armoring the bank using various sizes of rock, which disperses energy and reduces erosion. Riprap is a very common form of revetment. Rock revetments are straightforward, widely applicable, and can be used in a variety of ways. Sometimes, the only rocks required will be large boulders at the base of the bank slope. Other times, it may be necessary to reshape part of a streambank to a gentler slope and place riprap along a portion of that regraded bank. Rock revetments can have a few downsides, namely that it can be expensive to source and transport the amount of rock necessary, and that if rock is not installed correctly, it can increase water velocity and cause erosion problems downstream of the revetment.



Rock revetment protecting a streambank.

The materials required for a rock revetment include specific types and sizes of rock and heavy machinery to move the rock and possibly regrade the streambank. Consultation with an engineer is recommended to increase chances of success.

Stone Toe Protection

Longitudinal peaked stone toe protection (LPSTP) is a comprehensive way of dealing with streambank erosion. It consists of placing a triangular shaped line of rock along the eroding bank, sometimes offset, but often contacting the toe. If the rock is right against the bank, it is often used as toe stabilization in concert with another practice called bank re-sloping. If there is space between the LPSTP and the bank, then over time, as water levels fluctuate, sediment will be deposited on the landward side of the rock. The new deposition will form a "floodplain bench," or stair step below the floodplain and above the typical water line. As sedimentation continues, vegetation can grow which stabilizes the sediment and adds roughness to the channel which can reduce water velocities and curb erosion. This method requires instream work, most likely with heavy equipment, but can be extremely effective in directing scouring flow away from the bank and protecting against erosion. LPSTP often requires tiebacks into the bank which prevent the bank from eroding while the bench is being established and must be "keyed" into the bank at the upstream and downstream ends.

Recently constructed toe protection with bendway weirs.

The construction of LPSTP requires stone and heavy machinery. Consultation with an engineer is recommended to increase chances of success. LPSTP is often used in conjunction with bank re-sloping and re-vegetation.

Bank Re-Sloping

Re-sloping or regrading is a measure that can be used in some instances when bank erosion is extreme. It consists of using heavy machinery to remove sediment and re-shape the bank into a gentler slope. This can reduce undercutting and potential bank collapse, but will leave the bank bare and unprotected, so it is almost always used alongside other techniques. These projects may require the use of anti-erosion materials (large mats that are laid down on top of soil to keep it in place), and the end goal is always a revegetated slope. Re-sloped banks often include some sort of toe protection to limit erosion at the base of the slope. Regrading is not applicable to every stream erosion problem, as some streams will have naturally high banks. If bank re-sloping and vegetation are the only things being done, and the bank is sloped back towards the land and no material (rock, fill material, etc.) is added to the stream, bank re-sloping can be done without a permit. If re-sloping is done with additional bank stabilization, that may require the use of NWP 13 or a site-specific permit from USACE. For technical or funding assistance, you can contact your county Soil & Water Conservation District (SWCD).

Bank re-sloping requires heavy machinery to relocate soil, and erosion control measures like erosion mats to hold soil in place while vegetation establishes. Re-sloping projects will be most successful with an engineered design. A permit may not be necessary if the material is moved landward (not into the stream) and rock is not placed as stabilization material. If rock is placed, that stabilization may be covered by NWP 13.

LPSTP immediately after construction, including tiebacks keyed into the bank and bendway weirs along the stream bend.

The same site after vegetation has established on the floodplain bench.

Grade Control to Prevent Headcutting

Headcutting, often called stream channel incision or streambed degradation, is a certain type of erosion occurring when the slope of a stream bed increases in response to changes such as channelization, straightening, or excavation of the streambed. The stream will naturally try to re-establish a slope similar to the original one. Physically, this means the streambed upstream of the headcut will erode, and the stream will cut down into the ground, resulting in steeper banks that often erode or collapse. The headcut travels upstream as the streambed erodes. Consequently, the eroded material is transported and deposited downstream of the disturbance and can begin to fill in the channel. This process is known as aggradation. If your stream is vertically unstable (the bed is cutting down or degrading), bank stabilization should not be attempted as it will be likely to fail as the banks fall in and the stream widens. In these cases, grade control may be necessary to address the issue.

The purpose of grade control is to halt the progress of a headcut. There are several types of grade control structures, but the most common is the V-weir. This is a V-shaped rock structure spanning the bottom of the channel with the point of the V facing upstream. This creates an artificial riffle, which allows water to pool upstream of the structure. These structures typically have a long, shallow slope on the downstream side to allow for upstream fish migration.

The construction of grade control structures will require heavy machinery and a significant amount of rock. Streams need to be evaluated prior to installation to determine whether grade control is necessary, and structures need to be designed by a professional engineer. Projects will require a site-specific permit from USACE to satisfy CWA Section 404 and a Water Quality Certification from MoDNR to satisfy CWA Section 401.

Rock grade control structure in a small channel.

Tree and Flood Debris Removal

Landowners may remove flood debris including trees that have been deposited in the channel if the trees are not rooted and removal will not involve excavating the stream bed or banks. Trees may be removed whole, or they can be cut up with a chainsaw or other tool and removed piece by piece or left in the channel to wash away. For trees that have fallen in from the streambank but are still rooted, landowners may cut the tree near the base and remove the trunk but should not remove any tree roots from the bank, as this can contribute to streambank instability and erosion. Even dead roots hold soil together, so they should be left in place. Machinery should not be operated in a way that allows fuel, oil, or other contaminants to enter the water. You can contact USACE to determine if any temporary measures like stream crossings or work pads will be allowed.

Aquatic Herbicides

Some landowners may want to apply aquatic herbicides to remove vegetation from within a stream or at the edge of the stream. Aquatic herbicide application over certain thresholds is regulated by MoDNR, but landowners can apply these substances without a permit if certain conditions are met. If the herbicides used are labelled for aquatic use and they are applied to no more than 20 linear miles of stream or 80 acres of surface water in any given year, landowners can apply the pesticides without obtaining a permit. It is recommended that landowners contact MoDNR prior to applying aquatic herbicides to ensure that a permit will not be required, and that chemicals will not be applied to state or national resource waters or impaired streams. Otherwise, landowners should simply follow the directions on herbicide labels to ensure safe and environmentally sound application. Note that vegetation in and around streams is essential for holding soil in place, so herbicides should only be used when necessary, and then sparingly.

Cedar Revetments

One straightforward stabilization method is known as a tree revetment, or cedar revetment, as cedar trees are the most commonly used. This is a more temporary measure that can be installed quickly and can stave off erosion while vegetation grows on the bank for more permanent stabilization. Note that this method will only be effective when used in small or medium streams, typically with banks shorter than 12 feet. Trees with numerous limbs are cabled to the bank and anchored into the ground. They will then provide a buffer between the water and the bank. The many limbs help to disperse energy, so the erosional potential of the stream is reduced. The limbs also provide a surface for sediment deposition, and vegetation can begin to grow on top of the revetment. Trees may be damaged or washed away by floods, or the wood may simply deteriorate over time, meaning they may need to be eventually replaced. It is important to note that trees should be anchored near the toe of the streambank, or where the wall meets the stream bed – this will prevent undercutting of the bank. Additionally, the revetment must start and end at a stable part of the bank. If there an unstable (eroding) section of bank upstream or downstream of the trees, it will continue to erode despite the revetment. Upstream of bridges, water conveyances, or other structures, use of tree revetments may not be advisable because if the trees were to wash away during a flood, they could block off or otherwise damage these structures. Installing a cedar revetment requires cedar trees (you can use trees cut from your property or purchase them from offsite) and steel cables to cinch the trees to the bank.

For further information, see MDC's webpage about tree revetments.

An example of a vertical eroding bank.

The same bank as above after re-sloping and LPSTP.

Live Staking

Live staking is commonly used on banks with little or no vegetation, as it will begin to stabilize the soil immediately while other vegetation is allowed to develop. This method uses live, typically sharpened, tree cuttings that are planted directly into a streambank. As these trees grow, their root systems physically hold the bank soil in place and the vegetation provides roughness to combat erosion. Additionally, the trees will remove excess water from the bank soil which can reduce the risk of bank collapse. Live cuttings typically will not survive and take root when planted in very steep banks, so this method is often used in conjunction with bank re-sloping. Willows are commonly used for this technique, as they grow quickly and thrive in wet environments like streambanks.

An eroding streambank with dormant willow stakes and the same streambank below after vegetation has started to grow.

To do this work, a supply of live stakes is needed. These can be cut from trees growing in nearby sand or gravel bars without needing a permit or can be obtained from a nursery near you. Additionally, you may want a piece of rebar and a hammer/sledge to create pilot holes. Please keep in mind the stakes should be placed at 90 degrees to the bank surface, and their roots must reach down to the water table – if they do not, the stakes will not have enough water to survive and will not grow. Planting live stakes in your streambank typically requires tools to help with planting and willow or sycamore stakes, harvested from gravel bars or purchased from a nursery. Visit MDC's webpage about tree seedlings to learn more or order seedlings from their nursery. No engineering or permits are required to plant live stakes in your streambank.

Riparian Buffers

One of the most important aspects of any stream environment is the riparian zone, or the vegetated area along the stream. A healthy riparian zone provides many benefits to a stream. These benefits include robust root systems that physically stabilize the stream bank and protect against land losses; habitat and food for in-stream and near-stream organisms; shade which cools the water; and a buffer zone which reduces the inputs of many different types of pollutants including sediment, animal waste, and pesticides. Re-establishing a healthy riparian zone is not very difficult and there are sources of technical and financial assistance to help do so (see page 17 for further information about these resources). Establishing or expanding a riparian buffer is often the most effective streambank stabilization technique, but it does require land on which to establish the buffer.

Riparian zone projects should use native trees, bushes, and grasses, as these plants will be the most successful in Missouri's climate and soil types. They will also be more resilient to flooding and drought than non-native species. You can contact MDC to get recommendations on which native plants to use.
Establishing or improving a riparian buffer requires native plant seeds or saplings, tools to assist with planting, and potentially a fence to protect the plants from livestock. Tree plantings require maintenance to establish successfully, such as mowing grass or applying mulch. Visit MDC's webpage about tree seedlings to learn more or order seedlings from their nursery. No engineering or permits are required to plant a buffer on your property.

A Missouri stream showing healthy vegetation in the riparian corridor.

Gravel Removal Information for Landowners

Gravel Removal and Permit Applicability

Streamside sand and gravel are important Missouri resources commonly excavated for personal or commercial uses. This process is often called "instream mining," although sand/gravel excavation activities are not permitted to remove or disturb sand and gravel that is below the water line. This section details which activities are regulated by which agencies, and lists some requirements for compliant sand/gravel mining.

All instream sand/gravel mining activities conducted in Missouri are regulated by USACE under the Clean Water Act Section 404, using Regional General Permit 34M (GP-34M). Individuals or operators excavating sand and/or gravel for personal use; commercial operators gathering material for sale, barter, or trade; political subdivisions gathering material for their official use; and anyone else gathering material for any other purpose are all subject to the same federal regulations and the same permit conditions. Read the subsection "USACE Regulation: GP-34M" to learn about these permit requirements. All operators must notify USACE prior to conducting excavation, excluding the exception below.

Note: Appendix 1(3) of GP-34M provides a notification exception for private property owners who use the material for personal use (not sale, barter, or trade). These property owners can excavate up to 100 cubic yards (CY) of gravel per bar per year on their property without notifying USACE of the excavation, but this activity still must follow all other provisions of GP-34M. For reference, 1 cubic yard of gravel weighs between 1.2-1.4 tons, so the notification requirement is met around 120-140 tons. A tandem axle dump truck carries approximately 15 tons per load. This exemption does not relieve a personal use operator from notifying USACE if the activity may affect a federally threatened or endangered species or its habitat.

If there are any federally threatened or endangered species or their habitat in the vicinity of the permitted activity, landowners must consult with USACE prior to conducting any excavation, regardless of excavation volume. Landowners can use the Fish and Wildlife Service's Information for Planning and Consultation (IPaC) tool to determine if there may be endangered species in the project vicinity. Activities that may impact any threatened or endangered species or their habitat must be specifically authorized by USACE.

Regarding regulation by the MoDNR Land Reclamation Program (LRP):

Private property owners who excavate instream sandgravel on their own property for their own personal use are not required to obtain a mining permit or registration from LRP, pursuant to state statute Section 444.770, RSMo. Excavated material must remain on the private property owner's land.

Political subdivisions (cities, counties, etc.) who excavate instream sand/gravel for their own personal use are not required to obtain a mining permit or registration from LRP, pursuant to state statute Section 444.770, RSMo..

Commercial sand/gravel mining is regulated by the MoDNR LRP and operators are required to register or obtain a permit. If you intend to sell, barter, or trade any amount of material, contact LRP in addition to USACE to determine how to proceed.

Type of Operator	<100 cubic yards per bar per year	>100 cubic yards per bar per year	Notes
Private Property Owner; Personal Use	Proceed	Contact USACE	Excavated material must remain on the landowner's property and be used for non-commercial purposes. Private property owners using material for personal use on their own property can excavate up to 100 cubic yards of gravel per bar per year before contacting USACE, but this activity still must comply with USACE GP-34M, including notifying USACE if there are federally threatened or endangered species or their habitat present.
Political Subdivision; Official Use	Contact USACE	Contact USACE	Political subdivisions (cities, counties, etc.) are not regulated by LRP but must **always** notify USACE prior to excavating. Material must be used for the purposes of the political subdivision.
Anyone; Material is Sold, Bartered, or Traded	Contact USACE and LRP	Contact USACE and LRP	If any amount of material is sold, bartered, or traded, the operator is regulated by both USACE and LRP and must contact both prior to conducting excavation.

All scenarios assume compliance with USACE GP-34M.

USACE Regulation: GP-34M

All instream sand and gravel excavation done in the state of Missouri must comply with USACE's GP-34M. Before conducting any excavation project, operators must fully read and understand GP-34M and all associated conditions to ensure compliance. As stated above, private property owners may excavate up to 100CY per bar per year from their own property for personal use without notifying USACE, but this excavation still must comply with all other conditions of GP-34M. This exemption does not apply to any other entities. All other entities (landowners or operators selling, bartering, or trading any amount of material; political subidvisions; private property owners mining more than 100CY from a bar in one year; etc.) must notify USACE prior to conducting excavation.

Like Nationwide Permit 13 for Bank Stabilization, GP-34M is a general permit and is renewed every five years. Landowners should verify they have the most recent permit and use that document for guidance. Questions should be directed to the appropriate USACE district office; see the map on page 23 to determine who to contact. The main conditions of GP-34M follow:

1. Excavation must be limited to unconsolidated deposits where at least 85% of the material is less than 3 inches in diameter and there is no perennial woody vegetation greater than 1.5 inches in diameter when measured at breast height (4.5 feet off the ground).

2. A 10-foot undisturbed buffer is required between the excavation area and the edge of the water at the time of excavation. A 10-foot undisturbed buffer is also required between the excavation area and the base of the high bank. The high bank is the sloping or near-vertical surface that makes up one of the "walls" of the stream channel – beyond the high bank is the flat or gently sloping, often vegetated floodplain.

3. A 25-foot undisturbed buffer is required landward from the high bank. Clearing or disturbance of the riparian zone is not authorized except to access the site.

4. Sand or gravel must not be pushed against the base of the high bank.

5. For wet streams, excavation must occur above the water elevation at the time of excavation; never excavate below the water line. In dry streams, excavation must occur above the lowest undisturbed elevation of the stream bottom; that is, do not mine below the elevation of the lowest naturally occurring point in the stream channel within the vicinity of the gravel bar.

6. The stream channel cannot be relocated or modified in any way. The stream channel is defined as the area between the high banks where water is flowing, or in a dry stream, where water would flow after a rain event.

7. Materials should not be stockpiled within the stream channel (between the high banks).

8. Gravel washing, screening, and sorting operations must be conducted beyond the high bank.

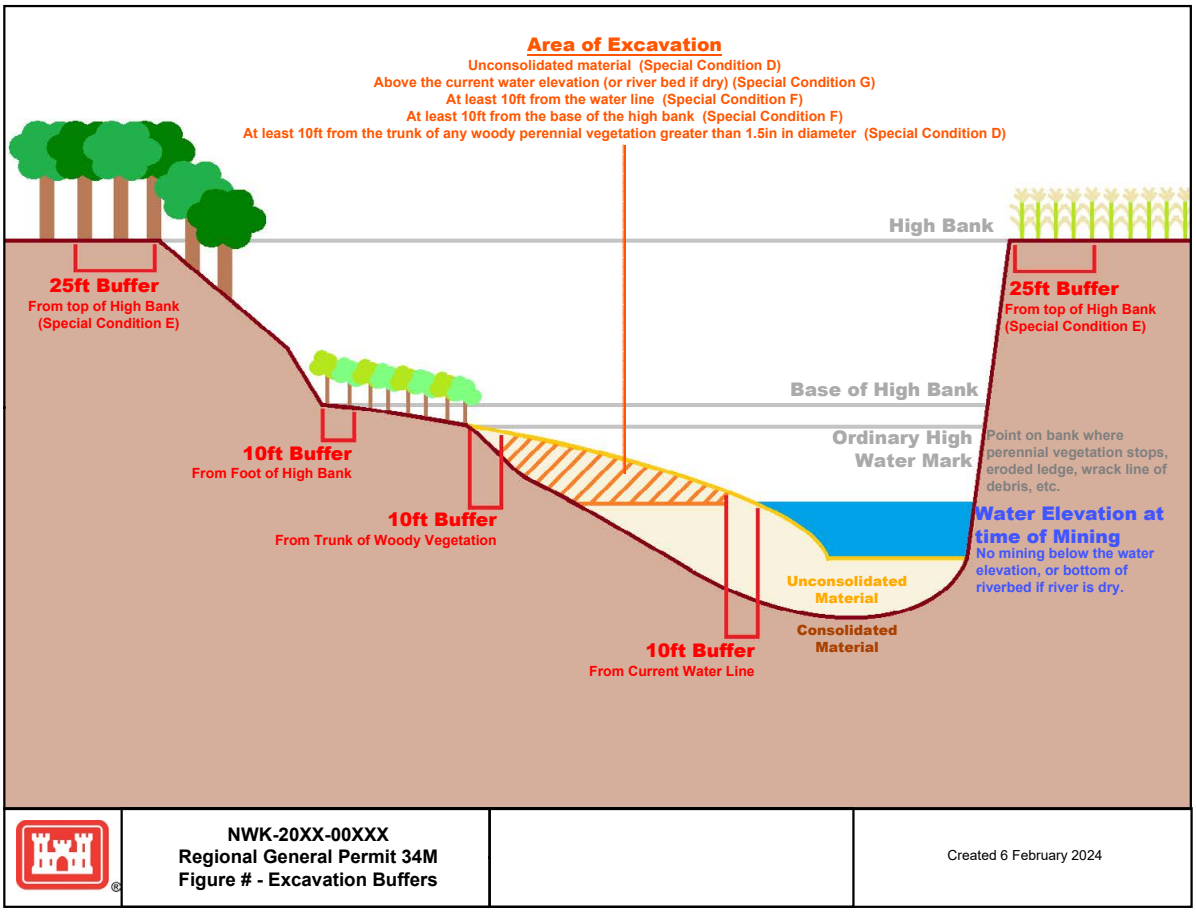
9. Water must be crossed as perpendicular to the direction of the stream flow as possible.

10. No fuel, oil, or waste may be stored within stream high banks to prevent runoff into the stream.

Consult the diagram below to get a visual of what a mining operation should look like.

Personal use gravel mining should be done with a "bucket-to-truck" (one-step) removal method, which can be done two ways. The first method is to scoop gravel directly into a vehicle such as a truck and then drive the vehicle out of the stream channel, beyond the high bank, to unload the gravel. The second method is to pick up the gravel in a loader bucket and then drive the loader directly out of the stream channel, beyond the high bank, to deposit the gravel. Gravel should not be pushed around with a fixed blade or stockpiled within the stream channel.

Private landowners excavating sand/gravel material for personal use on their own property should adhere to the following guidance: if gravel removal is done with a one-step method as described above, the impacted stream has no endangered species concerns, no access road or stream crossing will be constructed, all provisions in GP-34M will be satisfied, and gravel removal will not exceed 100CY per gravel bar per year, you can proceed with the mining activity. Otherwise, you should contact USACE to be certain that mining activities will comply with all relevant regulations. If you are unsure whether your operation will satisfy these conditions, contact USACE prior to beginning gravel excavation.



MoDNR Links

If you have further questions or are uncertain about any of the regulations, please refer to the linked information below or contact the Land Reclamation program at 573-751-4041 or mining@dnr.mo.gov.

https://dnr.mo.gov/land-geology/businesses-landowners-permittees/permits/industrial-mineral/stream-sand-gravel-mining

https://https://dnr.mo.gov/document-search/sand-gravel-mining-pub2813

Technical and Financial Assistance Options

Soil and Water Conservation Program

Every county in Missouri has a Soil and Water Conservation District (SWCD) funded through the State's Parks, Soils and Water Sales Tax. These districts help direct landowners to possible financial assistance through the State Cost-Share Program for areas that qualify for agricultural use. The three cost-share practices below are administered by the Soil and Water Conservation Program, and the state can generally pay for 75% of the project, with each practice having its own maximum payment amount from the state. For more complete descriptions and specifications of the following practices, consult the SWCP's Cost Share Handbook (Chapter V).

- C650 Streambank Stabilization Conservation Practice - The C650 is a streambank stabilization practice used to protect streams from accelerated erosion. It also helps to promote regeneration of natural streambank vegetation and improve water quality. When obtaining a cost-share agreement to receive state funds, the stabilization project must be on agricultural land along streams where significant streambank erosion problems exist.
    - Eligibility is determined by the appropriate technical authority (NRCS or MDC, depending on the project). NRCS can offer technical assistance, and MDC can offer technical assistance within its priority watersheds. A private, Missouri licensed Professional Engineer (PE) with significant streambank stabilization experience may also be used for technical assistance.
    - Finished projects must include a 50-foot vegetated buffer area to protect the stream from disturbances. Engineering plans are required to obtain cost-share approval, but it is recommended that you contact your Soil and Water Conservation District prior to retaining an engineer.
- WQ10 Stream Protection Conservation Practice - The WQ10 is a stream protection practice which applies to areas immediately adjacent to permanent, losing, or intermittent streams that have a defined stream bed where livestock have uncontrolled access for watering purposes. It is an exclusion practice that provides cost-share incentives for producers to install fencing a minimum of 25 feet from the high bank of a qualifying stream, and in return receive cost-share for an alternative watering source.
    - WQ10 is used to reduce excess amounts of sediment, organic material, nutrients, and pesticides in surface runoff; and reduce excess nutrients and other chemicals in shallow groundwater flow, with a secondary benefit of streambank stabilization.
- N391 Riparian Forest Buffer Conservation Practice - The N391 is a Riparian Forest Buffer practice that applies to areas adjacent to permanent or intermittent streams, public drinking water reservoirs and natural wetlands. It is an exclusion practice that provides state cost-share incentives to landowners for establishing trees and preventing livestock access to riparian areas. It is used to reduce excess amounts of sediment, organic material, nutrients, and pesticides in surface runoff; and reduce excess nutrients and other chemicals in shallow ground water flow with a secondary benefit of streambank stabilization.

Additional Governmental Resources

The Natural Resources Conservation Service (NRCS) may have cost-share assistance available through federal programs. To obtain free technical assistance, receive help with planning, and to learn more about financial assistance, contact your local NRCS office. In most counties, the SWCD or NRCS can be reached at the local USDA service center.

In some cases, MDC may also provide assistance via a private land conservationist. These specialists provide technical assistance, information about state and external cost-share programs, and lists of contractors near you to help perform the stabilization work. You can find the nearest private land conservationist at https://mdc.mo.gov/contact-engage/local-mdc-contacts.

FAQs – Frequently Asked Questions

Can I remove trees and woody debris deposited by floods within the channel?

Yes, you can remove flood debris from the stream channel as long as you do not perform any excavation of the bed. Bank excavation should also be avoided, otherwise the streambank may become unstable and start eroding.

Can I remove downed trees from the stream channel?

Yes, you can remove trees that have been deposited in or fallen into the stream channel as long as you do not excavate the bed. These trees can be removed with heavy machinery, or they can be cut up with a chainsaw and the pieces can be left in place or removed from the channel. If a tree falls into the stream but still has roots in the bank, you can cut the tree to sever the trunk from the root system. Rootwads should generally not be removed from the bank, as they provide stability and keep soil in place.

Can I cut vegetation along the banks?

Yes, you can remove vegetation along the banks. However, trees and other plants on streambanks form the riparian zone which is essential for stream stability. Having a robust riparian zone can reduce erosion as well as provide benefits to the stream ecosystem, so it is often wise to maintain a healthy corridor of vegetation next to the stream.

What permits do I need to remove gravel for personal use?

The State of Missouri does not require a permit to mine sand and gravel from personal property if it remains on the property of the operator and is not used for commercial purposes. However, this activity is regulated by USACE and may require Pre-construction Notification to USACE if the project does not meet the confines of General Permit 34M.

Can I do work on the stream channel to straighten it out?

No, landowners are not allowed to straighten or otherwise channelize streams that run through their property. This is because straightening a stream increases the slope of the stream. The slope change can induce headcutting, a process in which erosion and downcutting will travel upstream as the stream adjusts to the new slope. This upstream erosion can transport excess sediment to your property and to those downstream of you. Additionally, the steeper grade causes higher water velocity which can result in higher rates of erosion on your property and more damage during floods.

Should I consult with an engineer?

Several agencies may be able to offer you free technical assistance prior to contacting an engineer, including your Soil and Water Conservation District or the NRCS if you own agricultural land. It is generally a good idea to get in touch with these organizations first to assess your needs and possible solutions. Many bank stabilization projects do not require an engineer but would benefit from using plans produced by one. This is especially true for large or complicated projects.

Can I use gravel from the stream as stabilization material?

No. The presence of gravel in the stream indicates the stream has enough power to transport material of that size at certain flows. When these flows occur, the gravel will likely be washed away. Besides being ineffective, this material would also not be approved for stabilization use by either USACE or MoDNR for bank stabilization projects. In some cases, properly mined gravel may be useful as fill material behind certain structures like LPSTP, but it will not provide any structural support. Proper stabilization structures must be built out of material that is too large or heavy for the stream to transport.

What stream stabilization practices require a site-specific 404 permit?

Stabilization projects that involve placing fill material without excavating the bed or banks, or altering the course or slope of the stream, may use the USACE Nationwide Permit 13 to comply with the Clean Water Act Section 404 if the details of the project satisfy this permit. Many of the stabilization practices listed earlier in the document may satisfy NWP 13 depending on the project, but that is not always the case. If your project cannot be done with NWP, contact USACE to acquire a site-specific permit. It is important to understand NWP 13 and all associated conditions as well as determine whether your project complies with the Clean Water Act. Consultation with USACE is still recommended to increase the chances of compliance. Installing grade control into the stream bed always requires a site-specific 404 permit, as well as a Section 401 Water Quality Certification from MoDNR.

Do I need to apply for a NWP 13 before doing any stabilization work?

If a stabilization project can be completed and satisfy the conditions of NWP 13, the NWP General Conditions, and the Missouri Regional Conditions, the project can be performed without submitting a permit application or notifying USACE. However, it is best practice to contact the USACE if you have project specific questions related to the Nationwide Permit Conditions. For more detail, consult the section of this document regarding NWP 13 on page 15, or contact your local USACE office.

Can I use herbicides for vegetation in and adjacent to my stream?

If the herbicide is labelled for aquatic use and you don't apply it to more than 20 linear miles of stream per year, you can apply it without obtaining a permit. Always abide by the instructions on the label to comply with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

Who should I consult with before doing work on my stream?

There are many organizations that can help you determine what needs to be done to solve your stream problems and direct you to people who can help with recommendations, referrals, and financial assistance. To obtain assistance, you can contact your county's Soil and Water Conservation District, the National Resource Conservation Service, the Missouri Department of Natural Resources, or the Missouri Department of Conservation. These agencies will help you determine if you need permits and direct you to the appropriate permitting authorities. Before performing any stabilization work, you should contact USACE, and your county and city, to determine if there are permitting requirements.

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Contact Information

Missouri Department of Natural Resources

Land Reclamation Program
mining@dnr.mo.gov; 573-751-4041
https://dnr.mo.gov/about-us/missouri-geological-survey/land-reclamation-program

Soil and Water Conservation Program
soil&waterconservationprogram@swcd.mo.gov; 573-751-4932
Find your County Conservation District: https://mosoilandwater.land/
https://dnr.mo.gov/land-geology/soil-water-conservation

Water Protection Program
cleanwater@dnr.mo.gov; 573-751-1300
https://dnr.mo.gov/about-us/division-environmental-quality/water-protection-program

Water Resources Center
mowaters@dnr.mo.gov; 573-751-2867
https://dnr.mo.gov/about-us/missouri-geological-survey/water-resources-center

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United States Army Corps of Engineers

Find a USACE office: https://www.usace.army.mil/Missions/Locations/

Natural Resources Conservation Service

Find a service center: https://www.nrcs.usda.gov/contact/find-a-service-center
Missouri State Office: https://www.nrcs.usda.gov/contact/state-office-contacts/missouri-state-office

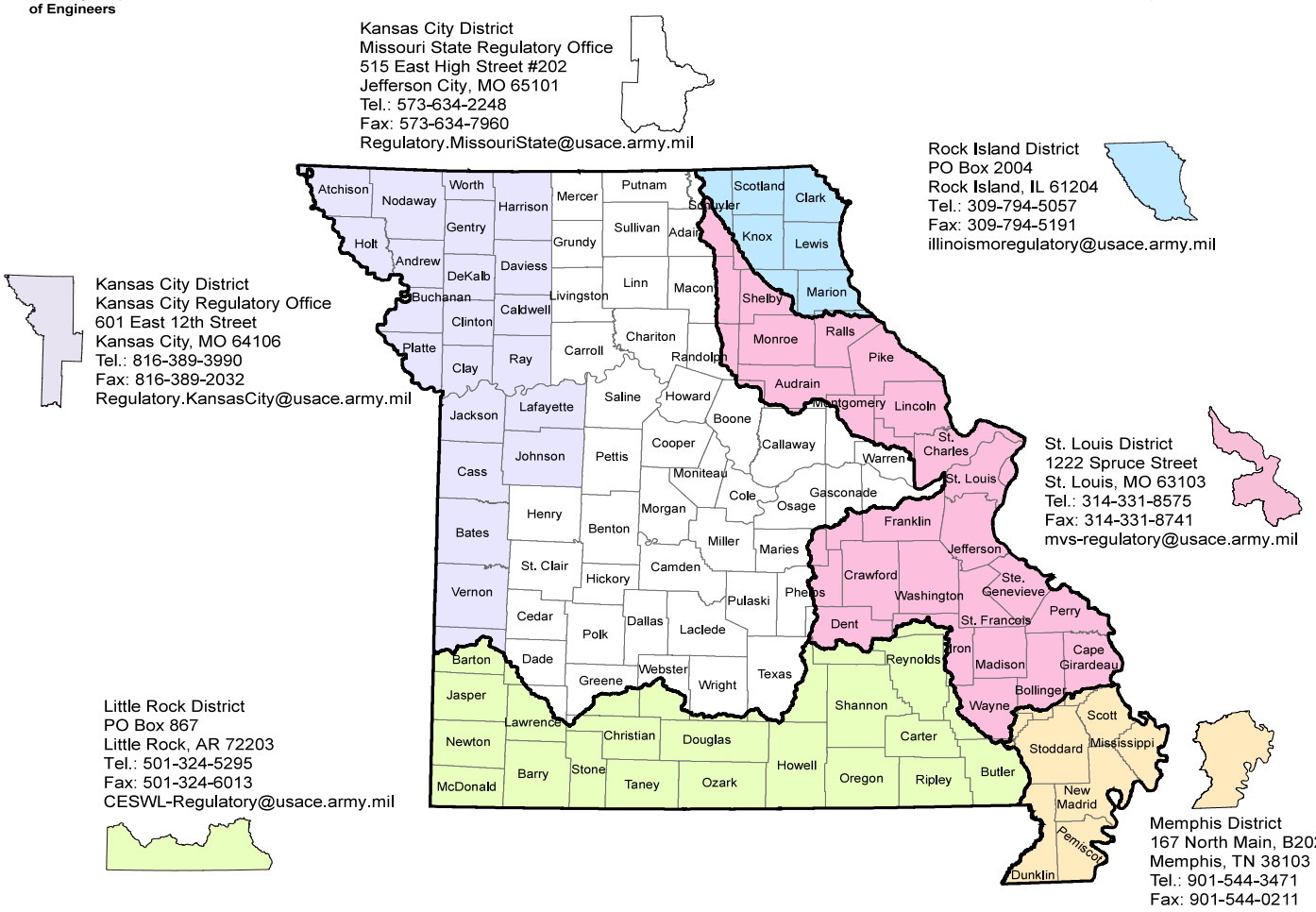
Missouri Department of Conservation

Find a regional office: https://mdc.mo.gov/contact-engage/regional-mdc-offices
Find local contacts: https://mdc.mo.gov/contact-engage/local-mdc-contacts

US Army Corps of Engineers

Regulatory Offices in the State of Missouri

February 2023



In-stream sand and gravel excavation activities most commonly occur within jurisdictional waters of the U.S. Open-pit/quarry activities may also impact jurisdictional waters of the U.S. Contact the appropriate Corps Regulatory Office to determine what Department of the Army permit(s) may be required prior to undertaking any work in waters of the U.S.

Inside Back Cover

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Missouri Geological Survey

Water Resources Center
Missouri Geological Survey
P.O. Box 176
Jefferson City, MO 65102-0176
573-751-2867 • Toll-free 800-361-4827
Fax 573-751-8475
dnr.mo.gov/about-us/missouri-geological-survey/water-resources-center
Email: mowaters@dnr.mo.gov

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