

August 13, 2021

Clerk of the Board

U.S. Environmental Protection Agency Environmental Appeals Board

1200 Pennsylvania Avenue NW (Mail Code 1103M) Washington, DC 20460-0001

Subject: Third-Party Appeal of NPDES Permit TN0070661

Dear Clerk of the Board;

I, Cindy Adkins, "Petitioner", am filing a Third-Party Appeal of NPDES Permit TN0070661 based upon the following information:

1. The permit as issued fails to conform to the Tennessee Water Quality Control Act, in which the Public Hearing section A-8 and A-9 page 6 does not address how the Zone of Aeration can impact the water quality and the aquifer levels in the vicinity of the quarry and Petitioner/landowner of this Appeal. At the Public Hearing, I, the Petitioner, requested a ground water study to determine if mining within ½ mile will damage or permanently drain the ground water being used as drinking water for both human and farm livestock. In section C-3 page 8, two wells and one natural spring was addressed at the Public Hearing.

Issues of Fact:

The area of ground water classified/registered is the ground water within the ½ mile of the proposed quarry. The permit states in Section E. Narrative Discussion, 3.

Groundwater Information: There are no groundwater users within ½ mile of the proposed quarry. See Attachment #1. The applicant/permit holder, Nate Pulley dba Yellow Creek Stone, did not in good faith conduct a water-use survey. The state was contacted and made aware that I am a landowner that has and uses ground water. It was determined that the landowner's well was drilled in 1972 before State requirements to register. See Attachment #2. The well located at 254 Adkins Lane, Cumberland City, TN 37050 is now registered. There is another well and natural spring belonging the Richardson's that is less than ½ mile of the proposed quarry. The Regional Administrator's response to the comment was ("It is not known whether the dewatering process will depress the local water table, but this is not a NPDES regulated impact." was clearly erroneous and warrants review. The Regional Administrator's response to the comment concerning the wells not being registered prior to the application was irrelevant and warrants review. Not only can quarrying within ½ mile of a natural well depress the water table, it can also cause contamination. A U.S. Geological Survey in the USGS Science for a changing world, titled "Potential Environmental Impacts of Quarrying Stone in Karst-A Literature

Review” (Attachment # 3 &4) discuss how rock quarries penetrate the water table and pump out the ground water. Pits and quarries disrupt the existing movement of surface water and groundwater; they interrupt natural water recharge and can lead to reduced quantity and quality of drinking water. Many studies have confirmed that quarrying can substantially modify the routing of ground water and water quality may be degraded. The Hydraulic Impacts of Quarries and Gravel Pits on water level in southeastern Minnesota to Iowa are shown on Attachments #5-8. Other studies regarding the quality and quantity impacted by quarrying are located in (Gunn and Hobbs, 1999) (Kaufmann and Quinif, 1999) (Hobbs and Gunn, 1998; Ekmekci 1993) (Moore and Hughes, 1979) Ground water may become polluted by the removal of vegetation and soil that normally is zone of filtration and water purification.

Resolution:

1. Since a water use survey was not conducted prior to the NPDES permit application, the action of registering the landowner’s wells after the application was filed should not be cause to negate the adverse impact of disturbing the natural ground water. An evaluation of the ecological and environmental impact should the quality and quantity of the groundwater be compromised is highly needed before quarrying begins. After damage is done to the natural springs and ground water, filing a claim will not correct this damage. It is also important to study the underlying structures of an area to understand that these pollutants can travel long distances underground. In karst regions the groundwater can travel many kilometers in underground channels in the limestone before surfacing. The Environmental Appeals Board could require Nate Pulley dba Yellow Creek Stone to be financially liable for the subterranean survey. I respectfully request consideration of this appeal for the sake of the landowners using ground water that could be affected by this proposed quarry operation.

Sincerely,

Cindy Adkins

254 Adkins Lane

Cumberland City, TN 37050

615-430-8475

[Cindyadkins5040@gmail.com](mailto:Cindyadkins5040@gmail.com)

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STATE OF TENNESSEE  
DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
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KNOXVILLE, TENNESSEE 37921-6538  
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July 13, 2021

### NOTICE OF DETERMINATION

Application for a new NPDES permit to discharge treated mine wastewater and storm water into an unnamed tributary to Yellow Creek (Indian Branch) in Houston County, Tennessee.

**Mr. Nate Pulley dba Yellow Creek Stone**  
337 Huff Hollow Lane  
Tennessee Ridge, TN 37178

**Yellow Creek Stone Quarry**  
Ellis Mills Road  
Erin, TN 37061  
NPDES Permit TN0070661 (New)  
Houston County

This NPDES permit will authorize the discharge of treated mine wastewater and storm water resulting from a new 55.3-acre limestone quarry and processing facility. The permittee submitted a complete application on March 10, 2021, which included supporting plans and design calculations for mine wastewater and storm water treatment. The Division of Water Resources (the "Division") made a preliminary determination that the proposed activity would cause de minimis degradation, and thus, no alternatives analysis or social and economic justification was required, per *Chapter 0400-40-03-.06(1)(b)2 of the Rules of TDEC*. The applicant has also submitted calculations which demonstrate that the treatment structure is capable of storing the expected runoff volume from a 10-year/24-hour storm event.

This NPDES permit authorizes discharges to an unnamed tributary to Yellow Creek (Indian Branch) in Houston County, Tennessee. The unnamed tributary to Yellow Creek (Indian Branch) is unassessed. Since the watershed for Indian Branch is less than 1.25 square miles, and the confluence of Indian Branch with Yellow Creek is less than 0.5 miles from the outfall location, the Department has determined that the application of the assessment status of Yellow Creek would be appropriate for the antidegradation review. Yellow Creek is not identified or designated as an Exceptional Tennessee Water (ETW) or Outstanding National Resource Water (ORNW) according to the most recent list of "Known Exceptional Tennessee Waters and Outstanding National Resource Waters."



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According to the information available to the Division, Yellow Creek meets the specifications described at *Chapter 0400-40-03-.06(3)* for the classification of available parameters for the pollutants of concern at this facility (Total Suspended Solids and pH). The Division has made a final determination that the proposed activity will only cause *de minimis* degradation of parameters that are available.

The Division issued a draft NPDES permit for the Yellow Creek Stone Quarry on March 16, 2021, and issued a public notice document concerning the draft permit action on March 24, 2021. Due to the amount of public interest in the project, the Division issued a notice of public hearing on May 18, 2021, which requested comments from other regulatory agencies and members of the public.

A hybrid Public Hearing was held at the Erin City Hall and via a Microsoft Teams video-teleconference on June 23, 2021. The Division of Water Resources – Mining Section held a preliminary technical session with the public from 5:00-6:00 P.M. CDT to provide the opportunity for the public to hear information regarding the proposed project and to ask questions about the project and the decision-making process. Introductory remarks by the hearing officer provided a brief summary of the proposed permitting action, the purpose of the hearing, a brief description of the hearing procedure, and the decision process. Approximately 30 people attended the meeting at Erin City Hall, and approximately 10 people attended the meeting via Microsoft Teams, including Houston County Mayor James Bridges and representatives of the Houston County Commission. Five individuals offered testimony during the hearing and five written comments were received during the Public Comment period. The Public Comment Period expired on July 2, 2021. All comments received by the Division during the comment period are part of the hearing record and were considered by the Division in making a final permit decision.

#### **Comments and Responses**

Please note that several comments are not included in this document because: 1) they were not directly related to the proposed project, 2) state a belief, opinion, or request that did not specifically ask for a response, 3) required a response without a direct relationship to the project, and/or 4) required information or involved matters beyond the regulatory authority of the Division.

Subjects included in the comments and the Division's responses follow: (Several of the public comments representing similar concerns and issues are grouped together under specific categories.)

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**A: Surface and Ground Water Quality Comments:**

*A-1: The proposed quarry activity will cause pollution of surface water in Indian Branch and Yellow Creek and will impact fish, wildlife, and livestock in and around Indian Branch and Yellow Creek.*

The waters of Tennessee are the property of the State and are held in public trust for the use of the people of the State. The waters of Tennessee have many uses in the public interest, such uses can include: sources of water supply for domestic and industrial purposes; propagation and maintenance of fish and other aquatic life; recreation in and on the waters including the safe consumption of fish and shellfish; livestock watering and irrigation; navigation; generation of power; propagation and maintenance of wildlife; and the enjoyment of scenic and aesthetic qualities of waters. The *Rules of TDEC 0400-40-04* list the designated uses for the unnamed tributary to Yellow Creek (Indian Branch) and Yellow Creek as fish and aquatic life, recreation, livestock watering and wildlife, and irrigation.

The *Federal Clean Water Act* and the *Tennessee Water Quality Control Act* recognize the right of a permittee to discharge to waters of the state, as long as the discharge does not impair the designated uses of the receiving stream or violate state water quality standards, causing a condition of pollution. In fact, the primary purpose of any NPDES permit is to ensure that all designated uses of the receiving stream are protected. Any discharge from this facility must be consistent with the terms and conditions of the NPDES permit and shall not impair the downstream designated uses. The Division has determined that this permit is protective of the designated uses of Yellow Creek (Indian Branch): fish and aquatic life, recreation, and livestock watering and wildlife and irrigation.

The proposed discharges from this facility do not have the reasonable potential to cause or contribute to a violation of state water quality standards. If discharges from this facility are identified as causing a condition of pollution, the Division may modify the NPDES permit to include specific monitoring requirements for the pollutant and may also pursue enforcement action.

*A-2: Yellow Creek is listed on the Nationwide Rivers Inventory with the following outstanding resource values: game fishery, recreational opportunities, and scenic value. How can TDEC issue a mining permit that discharges to this river?*

The Nationwide Rivers Inventory (NRI) is a listing of free-flowing rivers in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be at least regionally significant. Under the Wild and Scenic Rivers Act section 5(d)(1) and related guidance, all federal agencies must seek to avoid or mitigate actions that would adversely affect NRI river segments. The Division has made the determination that the NPDES permit for this facility will not adversely affect the water quality nor impair the designated uses of Yellow Creek. Additionally, the US Environmental Protection Agency (EPA), the US Fish and Wildlife



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Service (USFWS), and the Tennessee Wildlife Resources Agency (TWRA) were all notified of the draft NPDES permit and public hearing and provided no comments concerning the proposed permit.

*A-3: Why is Yellow Creek not considered an Exceptional Tennessee Water?*

The criteria for a stream to be categorized as an Exceptional Tennessee Water (ETW) are detailed in the *Rules of TDEC 0400-40-03-.06(4)* and a list of known ETWs can be found at the following web address: [https://tdec.tn.gov:8090/pls/enf\\_reports/f?p=9034:34304:4364479562473527](https://tdec.tn.gov:8090/pls/enf_reports/f?p=9034:34304:4364479562473527). Yellow Creek does not meet the criteria as defined in *Rules of TDEC 0400-40-03-.06(4)* to be considered an ETW and is therefore not categorized as an ETW. However, Yellow Creek was assessed by the Division in 2016 and was found to be fully supporting of its designated uses, and discharges from this facility are not allowed to impair these designated uses. See A-1.

*A-4) Yellow Creek has an outstanding smallmouth bass fishery. Will the discharge from the facility negatively impact the fishery?*

Waters of the State are held in public trust for use by the people of the State (See A-1). The propagation and maintenance of fish and other aquatic life are designated uses for both Indian Branch and Yellow Creek. For each designated use, the state has established water quality criteria that specify the maximum allowable concentration for pollutants of concern. This NPDES permit does not demonstrate the reasonable potential to violate any of the pollutant concentrations for the fish and aquatic life designated use or any of the other designated uses for these streams. Furthermore, if discharges from this facility are identified as causing a condition of pollution or negatively impact a designated use of the receiving stream, the Division may modify the permit to include specific monitoring requirements for the pollutant and may also pursue enforcement action.

*A-5) Yellow Creek is susceptible to streambank erosion. Will the discharge from this facility increase the rates of streambank erosion in Yellow Creek?*

While the NPDES permit regulates the quality of discharges and not the frequency or duration, the permit does not authorize a volume of discharge that could destabilize the channel or banks of the receiving stream. It is unlawful for any person to carry out any activity which may result in the alteration of the physical, chemical, radiological, biological, or bacteriological properties of any waters of the state. See the *Rules of TDEC 0400-40-07* and the "Tennessee Water Quality Control Act of 1977" *T.C.A §69-3-108(b)(1)*.

The facility is designed so that all storm water from disturbed areas and mine process water are retained on site and directed to the water treatment structures. The treatment structures at the facility are designed to the Division's preferred design criteria and are capable of holding all of the storm water runoff from a 10-year/24-hour storm event (4.95 inches of rain in a 24-hour period), and as the quarry pit expands there will be an increase in storm water storage capacity.



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Additionally, many limestone mining facilities retain the storm water on site for their processing activities, which reduces the volume of water discharged from the property after a rain event.

*A-6: At the public hearing the TDEC representative referred to the receiving stream as “an unnamed tributary to Yellow Creek, known locally as Indian Branch” and referred to the stream as intermittent. This stream is clearly labeled as Indian Branch on the 1965 USGS Ellis Mills Quadrangle and it is shown as a solid blue line indicating year-round flow. How does TDEC account for these discrepancies?*

The Division referred to the receiving stream as an unnamed tributary to Yellow Creek because that is how the stream is identified in the Division’s public data viewer and water quality assessment documents. However, the Division recognizes that the stream is referred to as Indian Branch locally and in some publications; therefore, the name Indian Branch was included in the permit and public hearing documents.

The Division did not refer to the receiving stream as intermittent in the permit or public hearing documents, and we concur with the commenter that the receiving stream is likely to flow perennially. During the technical session the presenter specified that the watershed size of the receiving stream was less than two (2.0) square miles, and according to the Division’s standard operating procedures for stream assessments, the watershed of the receiving stream was too small to evaluate using standard biological assessment methods. Therefore, the Division chose to use the stream assessment status of Yellow Creek when conducting the antidegradation review portion of the permit.

*A-7: The Yellow Creek watershed has a long history as an agricultural area with pastureland and row crops as the dominate land use. The conversion of agricultural land to a mine site will increase pollution in the Yellow Creek watershed.*

While the Division understands and appreciates the historical land use of the surrounding area, when determining water quality effluent limits for discharge permits to Waters of the State the Division must look at the potential impact of the land use, current and future. The Division used the revised universal soil loss equation (RUSLE) to determine the pre-mine soil loss at the site in its current condition as forest and pasture-land and determined the soil loss from the site to be 1.1 tons of soil lost per acre per year in its current use. The Division also calculated the post-mine soil loss using the total suspended solids effluent limit, the number of acres permitted and the average annual rainfall at the site and determined the post-mining soil loss to be 0.24 tons of soil lost per acre per year. This is reduction of 0.86 tons of soil per acre per year. This is due to treatment structures being required for the mine site and the requirement to discharge at or below a specific

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discharge limit. Agricultural discharges are non-point source and non-regulated without effluent limits.

Additionally, in the State of Tennessee 1,646 waterbody segments are listed as impaired due to grazing in riparian or shoreland zones or unrestricted cattle access, and another 602 waterbody segments are listed as impaired due to crop production (both irrigated and non-irrigated). Whereas, there are 248 waterbody segments listed as impaired due to mining activities and of those, only 24 waterbody segments are listed as impaired due to sand, gravel, rock or surface mining. The majority of the mining impacts are due to pre-Clean Water Act abandoned coal mines (158 listings).

*A-8: The proposed mining activity is in karst limestone geology and will cause pollution of ground water and damage nearby wells, springs and aquifers.*

One of the primary goals of the *Tennessee Water Quality Control Act* is to protect our valuable ground water resources. This NPDES permit authorizes the discharge to surface water only and does not authorize discharges to ground water. If a distinguishable subsurface discharge is noted on site, the Division will require the permittee to either eliminate the subsurface discharge or permit it through the Underground Injection Control (UIC) permitting program (ground water regulations can be found in the *Rules of TDEC 0400-40-03-.07*). The NPDES permit must also be modified if a UIC permit is issued for a subsurface discharge within the permit area and the public would be notified of the proposed permit modification.

There are currently more than 180 individual NPDES permits for limestone mining facilities within Tennessee, and many of these facilities exist in areas of karst geology underlain with limestone aquifers. The Division's Mining Unit is not aware of any contamination or damage to water wells due to limestone mining facilities within the state.

*A-9: TDEC should conduct a ground water study to understand how the mining activities will impact the aquifer levels in the vicinity of the quarry.*

The study and characterization of ground water is not a requirement for NPDES permits, which regulate surface water discharges. If ground water intrudes into the mining operations, the facility will process the ground water through the proposed water treatment system, and this water would be subject to the same effluent limitations as the mine process water and storm water. It is not known whether the dewatering process will depress the local water table, but this is not a NPDES regulated impact.



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**B: Air Quality and Other Environmental Permit Comments**

*B-1: The facility will create dust which will migrate off-site causing impacts to residents, livestock and wildlife in the area.*

The permittee applied for and received an air quality permit for a portable rock crushing operation from the Tennessee Division of Air Pollution Control (Permit number 978853). The permit was issued to the facility on May 6, 2021. Air quality concerns should be directed to the Tennessee Division of Air Pollution Control, William R. Snodgrass Tennessee Tower, 312 Rosa L. Parks Avenue, 15TH Floor Nashville, TN 37243, or by calling TDEC Nashville Field office at (615) 687-7046.

*B-2: How many other Division of Water Resources permits are there on Yellow Creek?*

There are currently two active Aquatic Resources Alteration Permits (ARAPs) on Yellow Creek. Permit number NRS19.183 is a general ARAP issued to the Tennessee Department of Transportation to perform 300 feet of stream bank stabilization along Highway 46 in Dickson County. Permit number NRS14.314 is a general ARAP issued to the town of Vanleer to withdrawal water from Yellow Creek for public water supply in Dickson County. There is also one active general NPDES permit (permit number TN0074675) at the confluence of Yellow Creek with the Cumberland River. This permit authorizes the discharge of filter backwash and sedimentation basin wash-water from a water treatment plant.

*B-3: Will the proposed discharge impact any municipal water intakes?*

The primary purpose of any NPDES permit is to ensure that all designated uses of the receiving water are protected and that all Water Quality Standards are observed, including drinking water standards. Any discharge from this facility must be consistent with the terms and conditions of the permit and shall not impair the downstream use classifications, including the use for domestic water supply (Lake Barkley). The proposed discharges from this facility do not have the reasonable potential to cause or contribute to a violation of water quality standards.

**C: Blasting, Traffic, Zoning, and Other Non-Environmental Comments**

*C-1: Blasting at the site may cause damage to nearby homes and wells and disturb local wildlife and livestock.*

The Division of Water Resources does not regulate blasting activity. Blasting is regulated by the Tennessee Department of Commerce and Insurance, Division of Fire Prevention – State Fire Marshal’s Office. The State Fire Marshal’s Office can be contacted at 500 James Roberson Parkway, Nashville, TN 37243-0565 or by calling (615) 741-2241.

See Responses to A-1, A-2, and A-8.



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*C-2: The applicant should have published the required public notice in the Stewart County Standard as opposed to the Houston County Herald because residents near the quarry have Cumberland City (Stewart County) addresses not Erin (Houston County) addresses.*

The facility and both Indian Branch (the receiving stream) and Yellow Creek are located in Houston County, and neither stream originates or flows into Stewart County. The Division believes the appropriate newspaper for the publication was the Houston County Herald. Additionally, the applicant posted a large sign at the entrance of the facility for more than 30 days to provide an additional form of public notice for the residents near the facility. Public notices were also placed on both the TDEC public participation webpage and public dataviewer.

*C-3: The application stated that there are no ground water users within ½ mile of the proposed quarry. This is not accurate. There are two registered wells and a spring that are being utilized for human and domestic drinking water.*

At the time the NPDES permit application was determined to be complete, there were no registered wells within ½ mile of the proposed quarry. In fact, TDEC Mining Section staff helped both well owners contact the TDEC Drinking Water Program to facilitate the registering of these wells, and Mining Section staff have made note of both the wells and the spring in the NPDES permitting database. The wells are also now identified on the TDEC water wells database.

*C-4: Several comments were received relating to vehicular safety, road use and damage, proximity of the facility to neighboring properties, impacts to property values and local zoning ordinances.*

While the Division of Water Resources empathizes with the commenters and recognizes their concerns, the Division does not have jurisdiction or authority over these issues. The NPDES permit issued by the Division does not supersede any local or county rules or regulations, nor can the Division enforce any local ordinances. The Division encourages the commenters to contact their county government about these concerns.

## Decision

**The Division has reviewed the permit application, conducted the required antidegradation review, and considered all available stream assessments and data. Our review included in-stream background water quality monitoring, the most recent listing of 303(d) streams, Exceptional Tennessee Waters, and information concerning federal and state listed threatened and endangered species.**

**The Division issued a public notice of the proposed NPDES permit in accordance with 40 CFR 124.10(b) and the *Rules of TDEC 0400-40-05-.06(7)* on March 24, 2021. The Division issued a notice of public hearing on the proposed NPDES permit on May 18, 2021, in**

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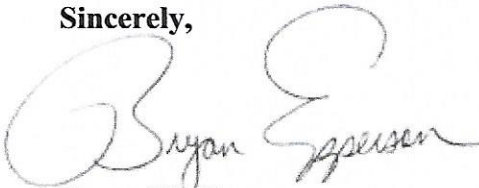
accordance with the *Rules of TDEC 0400-40-05-.06(8)*. Comments were accepted into the official record through July 2, 2021. The Division has responded to all relevant comments contained within the public hearing record.

The public participation process included notifying all applicable state and federal agencies, including the US Fish & Wildlife Service (USFWS), US Environmental Protection Agency (EPA), Tennessee Wildlife Resources Agency (TWRA), TDEC Natural Heritage Program, and TDEC Division of Archaeology. The Division received no comments from these agencies.

Based on its review of all relevant data, the Division has determined that the NPDES permit complies with all applicable statutory and regulatory requirements, is protective of water quality, and can be issued.

The Permit may be appealed to the Board of Water Quality, Oil and Gas pursuant to Tenn. Code Ann. § 69-3-105(i) and *Rules of TDEC 0400-40-05-.12*.

Sincerely,

A handwritten signature in cursive script that reads "Bryan Epperson". The signature is written in black ink and is positioned above the printed name.

**Bryan W. Epperson**  
**NPDES Program Manager**  
**Division of Water Resources – Mining Unit**



*Cindy Atkins  
Appeal  
NPDES Permit  
TN0070661*



**RYE**  
ENGINEERING PLC  
A SYSTEM OPERATORS CONSULTING ENGINEERS  
4210 W MAIN STREET, ERIN TN 37061  
OFFICE (931) 299-2300 FAX (931) 299-2313

**YELLOW CREEK  
STONE**  
Site Plan

HOUSTON COUNTY, TN



11/20/2020

**LEGEND**

- Property Boundary ———
- Permit Boundary ———
- BMPs ———
- Quarry Pit ———
- Stockpiles ———
- Sedimentation Pond 
- Haul Road 
- Future Pond 

SCALE 1" = 500'



*Attachment # 1 Map of Quarry + Well*









Andy Atkins  
 Appeal  
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2 Potential Environmental Impacts of Quarrying Stone in Karst—A Literature Review

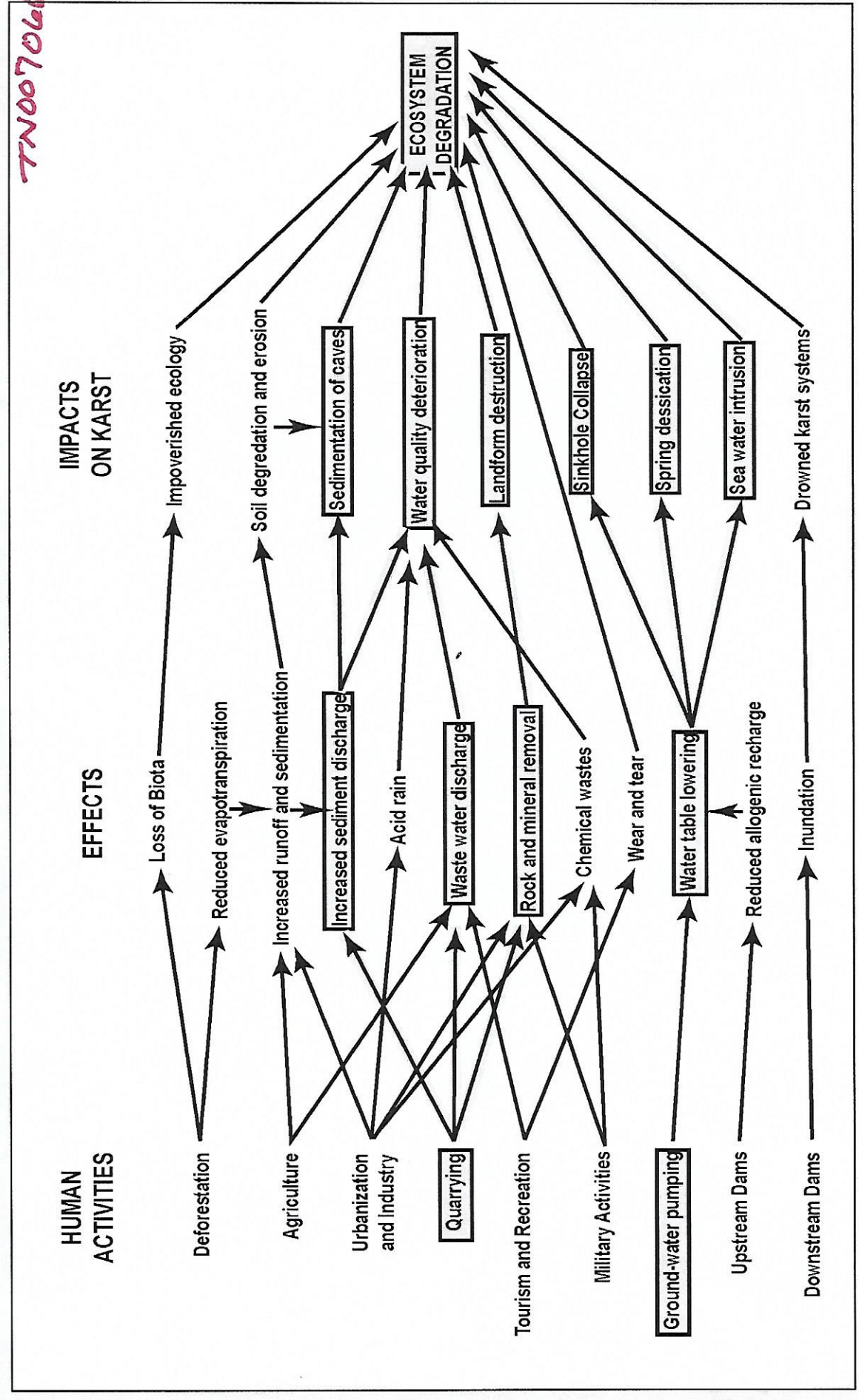
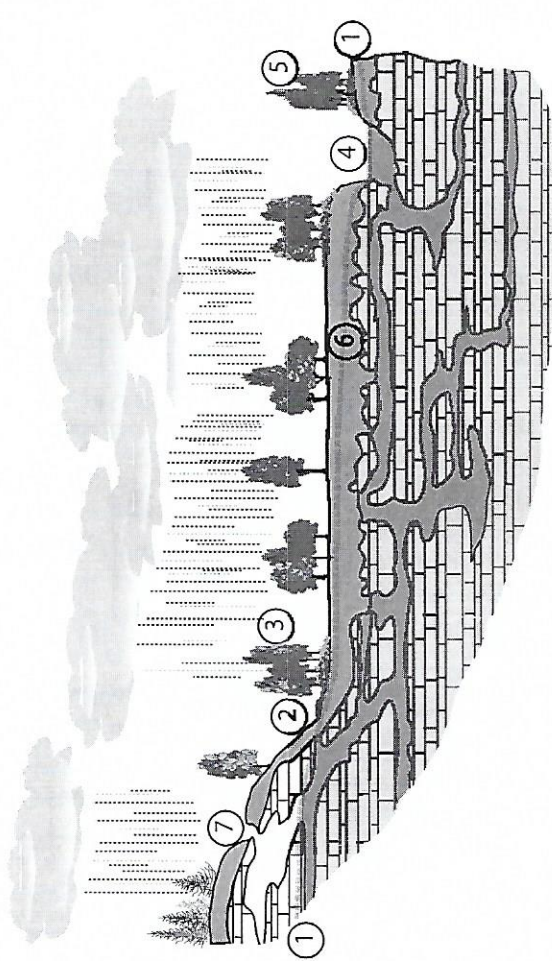


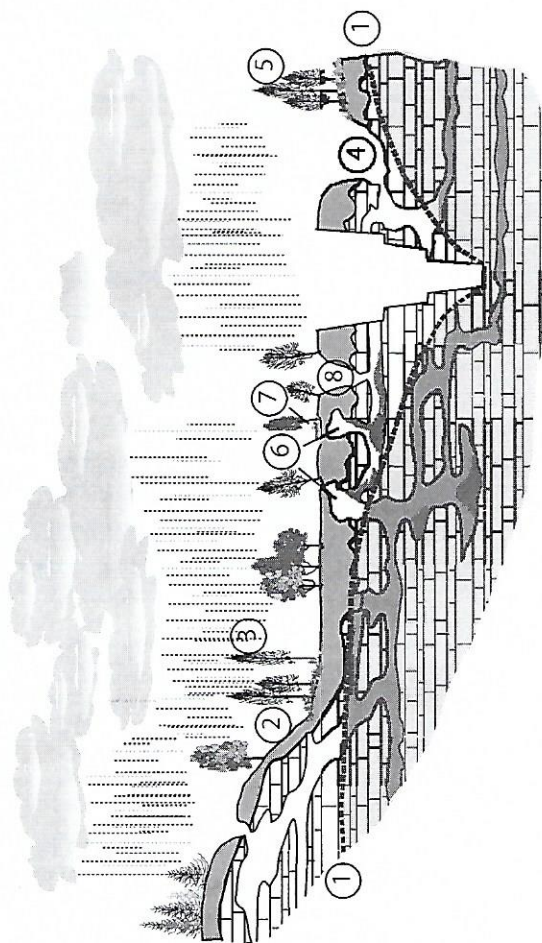
Figure 2. Summary of effects and impacts of various human activities on karst terrains. Effects and impacts from quarrying are highlighted in yellow. (Modified from Williams, 1993a.)

## 18 Potential Environmental Impacts of Quarrying Stone in Karst—A Literature Review

**Figure 20a.** Hypothetical cross section showing karst area under conditions prior to quarry development. The water table (1) is generally above the soil / bedrock contact. Natural ground-water discharges to a spring (2), and a perennial stream (4), which support a wetland (3) and a riparian woodland (5). The surface of the bedrock is highly irregular (6), and is referred to as pinnacled bedrock. A natural sinkhole occurs where the water table is below the soil / bedrock contact (7).



**Figure 20b.** Hypothetical cross section showing karst area under worst-case conditions after quarry development. Under actual conditions, none, some, or all of these conditions may exist. Quarry dewatering has lowered the water table (1) below the soil / bedrock contact. Natural ground-water discharge to a spring (2) and perennial stream (4) has stopped, resulting in destruction of the wetland (3), drying up of the stream (4) and destruction of the riparian woodland (5). Underground cavities formed in the soil in the area of the pinnacled bedrock due to loss of buoyant support and piping (6). The ground above the cavity has subsided, resulting in the formation of a wet area, and the tilting of fence posts or trees (7). Ultimately these cavities could collapse, creating a sinkhole (8).





2005

Minnesota Environment and Natural Resources Trust Fund

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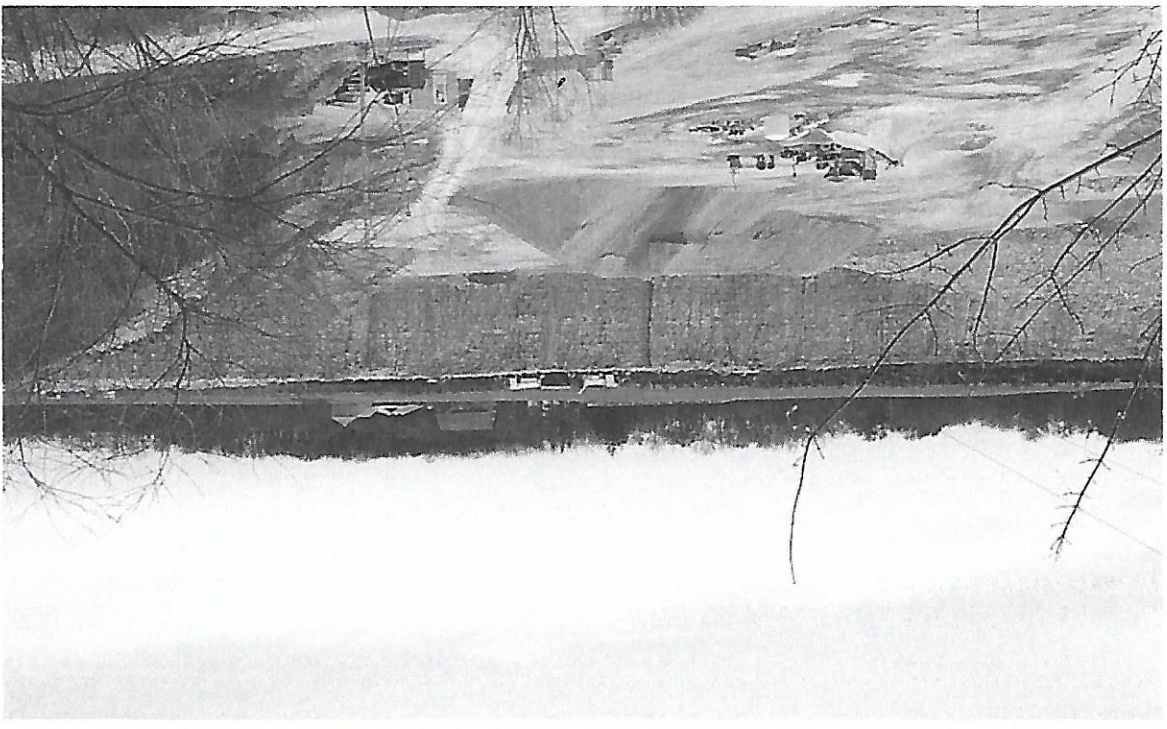
*for the*

Division of Waters

Minnesota Department of Natural Resources,

J.A. Green, J.A. Pavlish, R.G. Merritt, and J.L. Leete

*Prepared by*



# Hydraulic Impacts of Quarries and Gravel Pits

*Cindy Atkins*

*Attachment #5*

## EXECUTIVE SUMMARY

Natural aggregate (crushed stone, sand, and gravel) is a vital part of our economic infrastructure in Minnesota. Aggregate is used for road and bridge construction and in a variety of building materials. In 2003, the value of construction sand and gravel and crushed stone in Minnesota was approximately \$245,000,000. As Minnesota's economy continues to expand, the demand for aggregate will continue to grow. Sand and gravel pits are located in every county in Minnesota. In 1990, the Minnesota Department of Natural Resources, Division of Minerals (DNR Minerals), estimated the number of active and inactive operations at 1500 with the view that this number was likely too low (Dennis Martin, pers. comm.). Quarries for mining limestone, dolomite, sandstone, and hard rock (granite and quartzite) are found in 34 counties. A 1990 DNR Minerals inventory found 165 active operations, 88% of which were limestone quarries (Nelson and others, 1990). That same inventory counted 1,367 inactive operations, 70% of which were limestone quarries.

Aggregate mining is an extractive use of resources: mining alters the landscape and its natural hydrologic system. When a new pit or quarry is proposed or when an existing operation needs to expand, local governments and citizens typically have many questions about the impacts mining might have. Local governments, which are responsible for reviewing these operations, rarely have the budgets to hire experts to evaluate potential impacts of quarry and gravel pit proposals. The Minnesota Legislature's Aggregate Resources Task Force identified that local government units (LGUs) often lack the expertise to assess ground-water models (Southwick and others, 2000).

Quarries and pits can affect ground-water and surface-water systems in various ways. This project focused on the following potential impacts:

- lowering of local ground-water and surface-water levels from mining operations and mine dewatering,
- changes in turbidity levels in ground water due to blasting and quarry operations,
- interruption of ground-water conduit flow paths by rock removal, and
- temperature change (thermal impacts) in springs and surface-water streams.

This report is intended to help local officials, the public, and the mining industry understand the main issues surrounding mine establishment and to provide suggestions for monitoring and mitigation strategies to prevent significant impacts on water resource. The research at these sites (Figure 1) provides the first comprehensive assessment of aggregate mining impacts on ground-water systems in Minnesota. This information can be used for siting of new aggregate mines and for more accurately assessing their impacts on local ground-water resources. It can also be used for planning purposes at the state and local level.



**Results and Conclusions**

Table 1 lists the sites and the impacts that were studied during the project. The text following the table describes the results of the monitoring at the sites.

<b>Summary of Impacts and Study Results</b>		
<b>Site</b>	<b>Impacts studied</b>	<b>Study results</b>
Kraemer Quarry	Water level	Significant decline in aquifer water levels due to quarry dewatering and rock removal.
	Turbidity and well construction	No impacts observed.
Golberg Quarry	Water level	Significant decline in aquifer water levels due to quarry dewatering and rock removal.
	Turbidity and well construction	No impacts observed.
Spinler Quarry	Water level	Hydraulic gradient between the upper and lower aquifers has been reversed; the Straight River has been changed from a gaining to a losing stream.
Fountain Quarry	Turbidity	Blasting caused a slight increase in spring turbidity levels.
Big Spring Quarry	Spring diversion	Ground water that previously discharged directly at the Big Spring now discharges in the quarry. Some of it sinks and emerges at the Big Spring; the rest flows overland to Camp Creek.
	Temperature change	Significant temperature increases were noted in a summer measurement. Monitoring is continuing.
Donovan Pit	Water level	Mining had minimal impact on aquifer water levels.
	Temperature change	Ground-water temperature changes were noted but were not consistent. Monitoring is continuing.
Leitzen-Grabau Pit	Water level	Mining had minimal impact on aquifer water levels.
Felton Pit	Water level	Mining has altered ground-water flow paths affecting the water supply to a calcareous fen.

Table 1. Summary table of sites and impacts studied.

**Limestone Quarries**

Limestone quarries are found in southeastern Minnesota from the Twin Cities south to Iowa and west to Mankato. Some of these operations mine below the water table. In order to do this, the

quarries must be dewatered. Dewatering can locally depress the water table, altering ground-water flow paths and affecting nearby wells, springs, and surface-water bodies. Concerns have also been raised to DNR Waters and local government staff about the impacts of quarry blasting on domestic wells.

To investigate these issues, three sites were studied: the Kraemer quarry in Dakota County, the Golberg quarry at Rochester, and the Spinler quarry in Steele County southwest of Owatonna. Monitoring wells at these sites were equipped with automatic water level and turbidity monitoring devices.

**Water-Level Impacts.** At all three sites, the quarry dewatering has altered the local ground-water hydrology. In essence, the quarries act as huge wells, lowering the water table in the aquifer. The impact of the dewatering at the Kraemer Quarry is shown in Figure 2. This lowering could affect

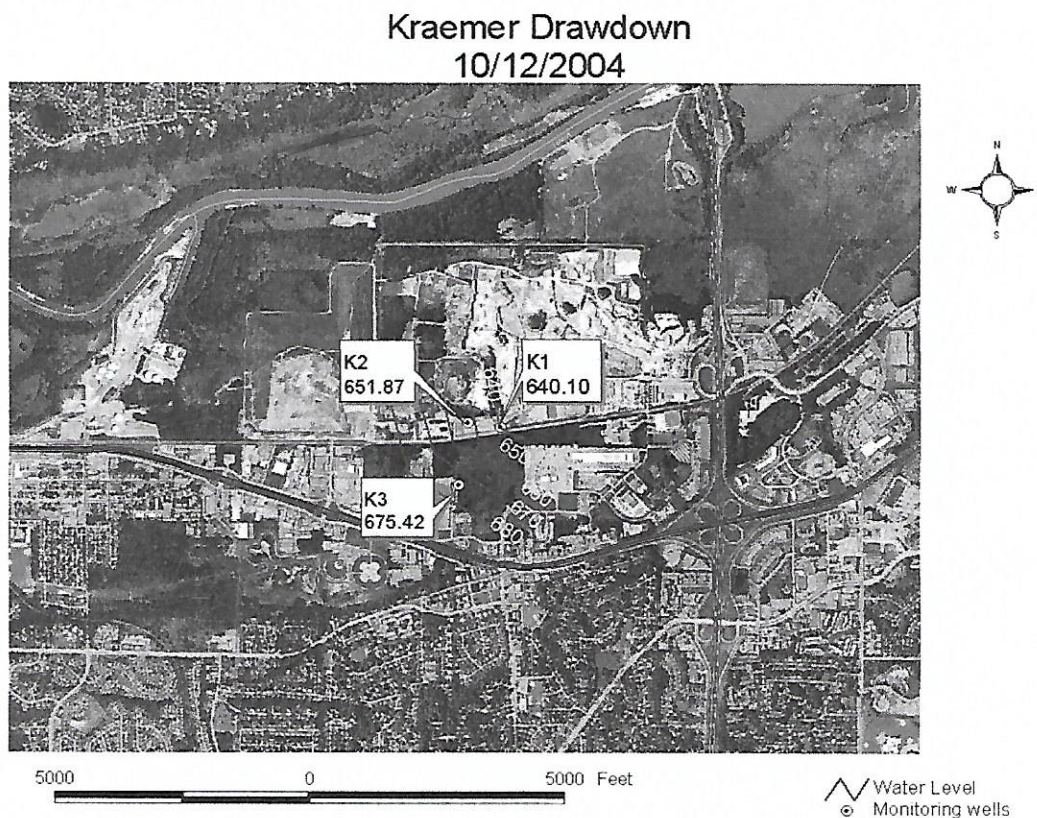


Figure 2. The impacts on ground-water levels of drawdown at Kraemer Quarry.

neighboring wells and testifies to the need for careful evaluation of quarry dewatering proposals and long-term monitoring of the dewatering impacts on the local aquifer. To further evaluate conditions at the Spinler quarry, a three-dimensional model was used. With the quarry being dewatered continuously, the quarry is now draining a confined limestone aquifer and a surficial sand and gravel aquifer. Model results also indicate that the Straight River, adjacent to the property, was probably a gaining stream before quarrying began and is now losing flow to the quarry.

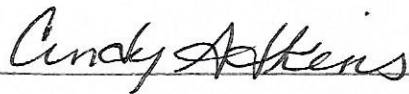


## Statement of Compliance

I, Cindy Adkins of 254 Adkins Lane, Cumberland City, TN 37050 hereby certify that a true and correct copy of the Appeal to NPDES Permit TN0070661 was duly electronically filed this the 13<sup>th</sup> day of August, 2021 within the 30 days of the US Postal postmark date of July 15, 2021 to the following:

Environmental Appeals Board's electronic filing system

[www.epa.gov/aboutepa/about-environmental-appeals-board-eab](http://www.epa.gov/aboutepa/about-environmental-appeals-board-eab)



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