

**FAIRFAX DRAINAGE DISTRICT OF  
WYANDOTTE COUNTY, KANSAS  
1620 Fairfax Trafficway  
Kansas City, Kansas 66115  
(913) 321-2260  
FAX (913) 321-1129**

VIA EMAIL AND U.S. MAIL

April 30, 2020

Matt Shively, Regulatory Project Manager  
U.S. Army Corps of Engineers  
Kansas City Regulatory Office  
601 East 12th Street  
Kansas City, MO 64106

matthew.s.shively@usace.army.mil

RE: Comments on Missouri River Commercial Dredgers Permit Renewal.

Ladies and Gentlemen:

On behalf of the Board of Directors of The Fairfax Drainage District (FDD) of Wyandotte County, Kansas I am writing in response to the Public Notice dated March 18, 2020, concerning the renewal of permits for Missouri River Commercial Dredgers. This letter is to formally request that the U.S. Army Corps of Engineers deny the commercial dredging permit renewal for Holliday Sand & Gravel Company in the Kansas City reach of the River.

In 2009 a Reconnaissance Study was completed by the Kansas City District, Army Corps of Engineers (USACE) that determined through stream-gage and other physical data that there had been a lowering of the riverbed, affecting public infrastructure, such as water intakes and pipeline crossings; bank stability; and the potential to undermine dikes, revetments and levees designed to support navigation and to provide flood protection.

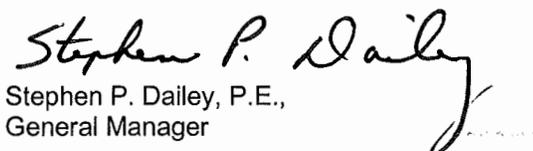
Thereafter local stakeholders contributed \$2.3 Million to the Missouri Riverbed Feasibility Study. The Study resulted in a Technical Report in May of 2017 that concluded commercial sand and gravel mining was the dominant cause of riverbed degradation in Kansas City, dating back to 1994. The economic analysis of the Technical Report also concluded that continued bed degradation in the Kansas City Reach will result in \$269 Million in expenses (2017 dollars for investment and repairs) to adjust for degradation and low water surface levels over 50 years. The average annual estimated cost to public infrastructure is \$5.3 Million.

Considering the findings of the Technical Report the dredging permits should be denied in the Kansas City reach of the River. The cumulative cost to public infrastructure of continued dredging and resulting bed degradation is too significant when there are available alternatives to on river dredging. Holliday Sand & Gravel should move to off river pit mines or other reaches of the River that have not experienced degradation. The dredging industry should not be allowed to operate for free on the river, at the expense of the public in damage to infrastructure.

Balancing the interests on the Missouri River is a difficult task and the work of USACE is appreciated. We are respectfully requesting USACE follow the conclusion of the 2017 Technical Report and deny the permit renewal application of Holliday Sand & Gravel on the Missouri River in the Kansas City Reach.

Thank you for considering our request. Please advise if you have any questions regarding this matter.

Respectfully yours,

  
Stephen P. Dailey, P.E.,  
General Manager



# INDEPENDENCE

★ WATER DEPARTMENT ★

U.S. Army Corps of Engineers  
Kansas City Regulatory Office  
Attn: Mr. Matt Shively  
Regulatory Project Manager  
[Matthew.s.shively@usace.army.mil](mailto:Matthew.s.shively@usace.army.mil)

April 22, 2020

Dear Sirs,

The City of Independence owns and operates 42 drinking water wells that supply water to the City of Independence, Missouri and 12 wholesale entities. The total population served by this water plant is approximately 250,000 people in Eastern Jackson County. One of the City of Independence wells is a horizontal collector well whose laterals collect water from beneath the Missouri River at approximately River Mile 353.5. This well produces in excess of 4,000 gallons per minute of raw water which accounts for a significant percentage of the water we provide to our customers.

Dredging on the Missouri River is of great concern to us for two reasons. The first is the negative infiltration/recharge capability that dredging has on our collector well and the second is the riverbed degradation that is occurring in our reach of the Missouri River.

If sand and gravel are dredged from the riverbed in close proximity to our collector well, this will negatively impact the infiltration/recharge capability of the riverbed in the area that is dredged. Typically, the sand and gravel deposits are dredged, sometimes washed, and the finer materials then fill in the dredged hole. This reduces the permeability of the pit or hole created by the dredge, which will negatively impact recharge. If dredging is allowed to continue, we request a NO Dredge Zone extending 1,000 feet upstream and 1,000 feet downstream from our collector well.

Another area of great concern is the degradation that is occurring in the Missouri River in the Kansas City area. Beginning in 2009, Independence participated with other stakeholders to help fund the US Army Corps of Engineers Missouri River Bed Degradation Feasibility Study, in cooperation with the Mid America Regional Council. This study produced a technical report in May of 2017 that states the following: "Commercial sand and gravel mining was the dominant cause of the bed degradation observed in Kansas City since 1994". It goes on to state: "In the absence of channel



## INDEPENDENCE ★ WATER DEPARTMENT ★

mining, the river bed in Kansas City would have been in a recovery phase following the 1993 flood. Commercial sand and gravel mining is the dominant driver of projected bed degradation over the next 50 years. Restrictions to commercial sand and gravel mining may be an economically viable means to stop bed degradation.”

The wells that Independence uses for all their drinking water are located around Mile Marker 350. There are currently two applications to dredge in this location. Application Number NWK-2011-00361 Capital Sand Company and Application Number NWK-2011-00363 Holliday Sand and Gravel Company. Currently, in 2020, Capital Sand Company is authorized to dredge 700,000 tons of material and Holliday Sand and Gravel Company is authorized to dredge 1,078,000 tons. With this application, Holliday Sand has maintained their request at 1,078,000 tons and Capital Sand Company has requested increases every year with the final 2025 request of 1,112,000 tons.

With the results of the Missouri River Bed Degradation Feasibility Study, conducted by the US Army Corps of Engineers, concluding that commercial sand and gravel mining was the dominant cause of the bed degradation observed in Kansas City, both historically and in the future, we have great concern about continued dredging. We would, in no way, understand the rationale to allow the current levels to be dredged, much less increasing the amounts. Bed degradation negatively impacts navigation structures, levees and floodwalls, bridges, water supply-intakes and other infrastructure. Results from the Feasibility Study estimate expenses (investments and repairs) in the amount of \$269 million (fiscal year 2017 dollars) to adjust for degradation and low-water-surface elevations over a 50 year period. The average annual estimated cost to public infrastructure would be \$5.3 million.

Thank you for the opportunity to comment on this important issue.

Sincerely,

Karen Kelley  
Production Manager  
Independence Water Department



VIA EMAIL AND U.S. MAIL

Matt Shively, Regulatory Project Manager  
matthew.s.shively@usace.army.mil  
U.S. Army Corps of Engineers  
Kansas City Regulatory Office  
601 East 12th Street  
Kansas City, MO 64106

May 1, 2020

**RE: Permit No. Comments on Missouri River Commercial Dredgers  
Permit Renewal**

Dear Mr. Shively:

On behalf of the Kansas City Board of Public Utilities (KCBPU), we are providing the following comments in response to the US Army Corp of Engineers (USACE) Public Notice dated March 18, 2020, concerning the renewal of permits for Missouri River Commercial Dredgers. KCBPU requests two provisions are implemented with respect to the commercial dredging permit renewal for Holliday Sand & Gravel Company in the Kansas City segment of the River.

KCBPU advocates that dredging operations must not be conducted in a zone extending 5,280 feet upstream or downstream from any municipal drinking water intake structure, horizontal collector wells, or other water intake structures located on either bank of the river, unless an exemption to this condition in writing from the Regulatory Branch of the Kansas City District, USACE, is obtained. In accordance with Section 404(b)(1) of the Clean Water Act (CWA), KCBPU's concerns remain with increased sediment and suspended solid loading due to dredging operations; causing reduction of permeability and impacts to structures as well as infiltration and recharge capabilities of intake and horizontal collector well systems.

Along with the above appeal, KCBPU petitions for a reduction in the authorized tonnage for extraction of sand within the Kansas City segment of the River. Holliday Sand is requesting authorization for 507,316 tons in the 2020 permit whereas KCBPU proposes and Adaptive Management approach for the Kansas City River segment. This more conservative approach is consistent with the USACE 2011 Record of Decision to decrease annual tonnage in the Kansas City segment as well as several bathymetric study results performed by KCBPU which acknowledge that dredging and flooding have severe

consequences within the Kansas City segment, specifically, public infrastructure including but not limited to KCBPU's intakes and horizontal collector wells. In addition, the impacts to the Missouri River environmental characteristics are concerning, specifically as it relates to the CWA 40 CFR §230.21.

The Missouri Riverbed Study resulted in a Technical Report in May of 2017 that concluded commercial sand and gravel mining was the dominant cause of riverbed degradation in Kansas City, dating back to 1994. The economic analysis of the Technical Report also concluded that continued bed degradation in the Kansas City segment will result in \$269 Million in expenses (2017 dollars for investment and repairs) to adjust for degradation and low water surface levels over 50 years. The average annual estimated cost to public infrastructure is \$5.3 Million.

Implementation of the aforementioned measures in the Kansas City segment will increase the life of critical public infrastructures and assist in financial offset costs to these infrastructures while still allowing for industry sustainability.

KCBPU appreciates the efforts the USACE has put forth over the years and appreciates the opportunity for comment.

A handwritten signature in black ink, appearing to read 'W. A. Johnson', written over a horizontal line.

William A. Johnson  
General Manger  
Kansas City Board of Public Utilities



## **KC WATER**

### **OFFICE OF THE DIRECTOR**

4800 E. 63rd Street • Kansas City, MO 64130

P: 816-513-0504 • F: 816-513-0185 • [www.kcwaterservices.org](http://www.kcwaterservices.org)

May 1, 2020

VIA EMAIL AND U.S. MAIL

Matt Shively, Regulatory Project Manager  
U.S. Army Corps of Engineers  
Kansas City Regulatory Office  
601 East 12th Street  
Kansas City, MO 64106

[matthew.s.shively@usace.army.mil](mailto:matthew.s.shively@usace.army.mil)

**RE: Comments on Missouri River Commercial Dredgers Permit Renewal.**

Ladies and Gentlemen:

On behalf of City of Kansas City - KC Water Utility I am writing in response to the Public Notice dated March 18, 2020, concerning the renewal of permits for Missouri River Commercial Dredgers. City of Kansas City - KC Water Utility requests the denial of the commercial dredging permit renewal for Holliday Sand & Gravel Company in the Kansas City reach of the River.

In 2009 a Reconnaissance Study was completed by the Kansas City District, Army Corps of Engineers (USACE) that determined through stream-gage and other physical data that there had been a lowering of the riverbed, affecting public infrastructure, such as water intakes and pipeline crossings; bank stability; and the potential to undermine dikes, revetments and levees designed to support navigation and to provide flood protection.

Thereafter local stakeholders contributed \$2.3 Million to the Missouri Riverbed Feasibility Study. The Study resulted in a Technical Report in May of 2017 that concluded commercial sand and gravel mining was the dominant cause of riverbed degradation in Kansas City, dating back to 1994. The economic analysis of the Technical Report also concluded that continued bed degradation in the Kansas City Reach will result in \$269 Million in expenses (2017 dollars for investment and repairs) to adjust for degradation and low water surface levels over 50 years. The average annual estimated cost to public infrastructure is \$5.3 Million.

Considering the findings of the Technical Report the dredging permits should be denied in the Kansas City reach of the River. The cumulative cost to public infrastructure of continued dredging and resulting bed degradation is too significant when there are available alternatives to on river dredging. Holliday Sand & Gravel should move to off river pit mines or other reaches of the River that have not experienced degradation. The dredging industry should not be allowed to operate for free on the river, at the expense of the public in damage to infrastructure.

Balancing the interests on the Missouri River is a difficult task and the work of USACE is appreciated. We are respectfully requesting USACE follow the conclusion of the 2017 Technical Report and deny the permit renewal application of Holliday Sand & Gravel on the Missouri River in the Kansas City Reach.

Sincerely,



Terry Leeds  
KC Water Director

Cc: Charles G. Stevens, Water Utility Officer, C.W.P., WEF Fellow  
Mike Klender, Water Supply & Treatment Officer

**From:** [joriforpv@gmail.com](mailto:joriforpv@gmail.com)  
**To:** [Shively, Matthew S CIV USARMY CENWK \(USA\)](#)  
**Subject:** [Non-DoD Source] Deny dredging permit  
**Date:** Sunday, May 3, 2020 4:33:02 AM

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Ladies and Gentlemen:

I'm writing in response to the Public Notice dated March 18, 2020, concerning the renewal of permits for Missouri River Commercial Dredgers. I'm a Prairie Village City Council Representative and I'm requesting the denial of the commercial dredging permit renewal for Holliday Sand & Gravel Company in the Kansas City reach of the River.

In 2009 a Reconnaissance Study was completed by the Kansas City District, Army Corps of Engineers (USACE) that determined through stream-gage and other physical data that there had been a lowering of the riverbed, affecting public infrastructure, such as water intakes and pipeline crossings; bank stability; and the potential to undermine dikes, revetments and levees designed to support navigation and to provide flood protection.

Thereafter local stakeholders contributed \$2.3 Million to the Missouri Riverbed Feasibility Study. The Study resulted in a Technical Report in May of 2017 that concluded commercial sand and gravel mining was the dominant cause of riverbed degradation in Kansas City, dating back to 1994. The economic analysis of the Technical Report also concluded that continued bed degradation in the Kansas City Reach will result in \$269 Million in expenses (2017 dollars for investment and repairs) to adjust for degradation and low water surface levels over 50 years. The average annual estimated cost to public infrastructure is \$5.3 Million.

Considering the findings of the Technical Report the dredging permits should be denied in the Kansas City reach of the River. The cumulative cost to public infrastructure of continued dredging and resulting bed degradation is too significant when there are available alternatives to on river dredging. Holliday Sand & Gravel should move to off river pit mines or other reaches of the River that have not experienced degradation. The dredging industry should not be allowed to operate for free on the river, at the expense of the public in damage to infrastructure.

Balancing the interests on the Missouri River is a difficult task and the work of USACE is appreciated. We are respectfully requesting USACE follow the conclusion of the 2017 Technical Report and deny the permit renewal application of Holliday Sand & Gravel on the Missouri River in the Kansas City Reach.

Respectfully,  
Jori Nelson  
Prairie Village City Council

Sent from my iPhone

April 30<sup>th</sup>, 2020

VIA EMAIL AND U.S. MAIL

Matt Shively, Regulatory Project Manager  
U.S. Army Corps of Engineers  
Kansas City Regulatory Office  
601 East 12th Street  
Kansas City, MO 64106

matthew.s.shively@usace.army.mil

RE: Comments on Missouri River Commercial Dredgers Permit Renewal.

Ladies and Gentlemen:

On behalf of Water District No. 1 of Johnson County, Kansas, (hereinafter, WaterOne) I am writing in response to the Public Notice dated March 18, 2020, concerning the renewal of permits for Missouri River Commercial Dredgers. Based upon the specific facts described below, WaterOne requests the denial of the commercial dredging permit renewal for Holliday Sand & Gravel Company in the Kansas City reach of the River.

A majority of WaterOne's water supply to serve 450,000 Kansans comes from the Missouri River. WaterOne operates a surface water intake with a pumping capacity of 126 million gallons per day at river mile 379.9. In 2004, because of riverbed degradation, WaterOne lost complete capacity at the intake structure during winter, low-flow conditions. Auxiliary low water pumps had to be installed for \$2.5 Million, which restored operation of the intake at the low flows caused by degradation, but at decreased capacity and additional power expense.

In 2004 WaterOne and other local stakeholders urged the Kansas City District of the U.S. Army Corps of Engineers (USACE) to study and resolve the degradation problem. A reconnaissance study was completed in 2009 to address the degradation on the Missouri River. The study stretched from Rulo, Nebraska, to the mouth of the river in St. Louis, Missouri. It examined existing data to determine the current condition and potential future condition of the riverbed and looked for opportunities to reduce bed degradation and its impacts. USACE determined through stream-gage and other physical data that there had been a lowering of the riverbed, affecting public infrastructure, such as water intakes and pipeline crossings; bank stability; and the potential to undermine dikes, revetments and levees designed to support navigation and to provide flood protection. The reconnaissance phase laid the foundation for the Missouri Riverbed Degradation Feasibility Study, for which Congress authorized and appropriated funds in FY2010.

WaterOne and many other local stakeholders, with the assistance of the Mid-America Regional Council, expended thousands of hours of in-kind work and \$2.3 Million in cash contributions on the Missouri Riverbed Feasibility Study. WaterOne alone contributed \$598,000. The total Study cost was approximately \$4.6 Million. In May of 2017 a Technical Report was issued as a result of the Degradation Feasibility Study that concluded in part:

**“Commercial sand and gravel mining was the dominant cause of the bed degradation observed in Kansas City since 1994. In the absence of channel mining, the riverbed in Kansas City would have been in recovery phase following the 1993 flood. Commercial sand and gravel mining is the dominant driver of projected bed degradation over the next 50 years.”**

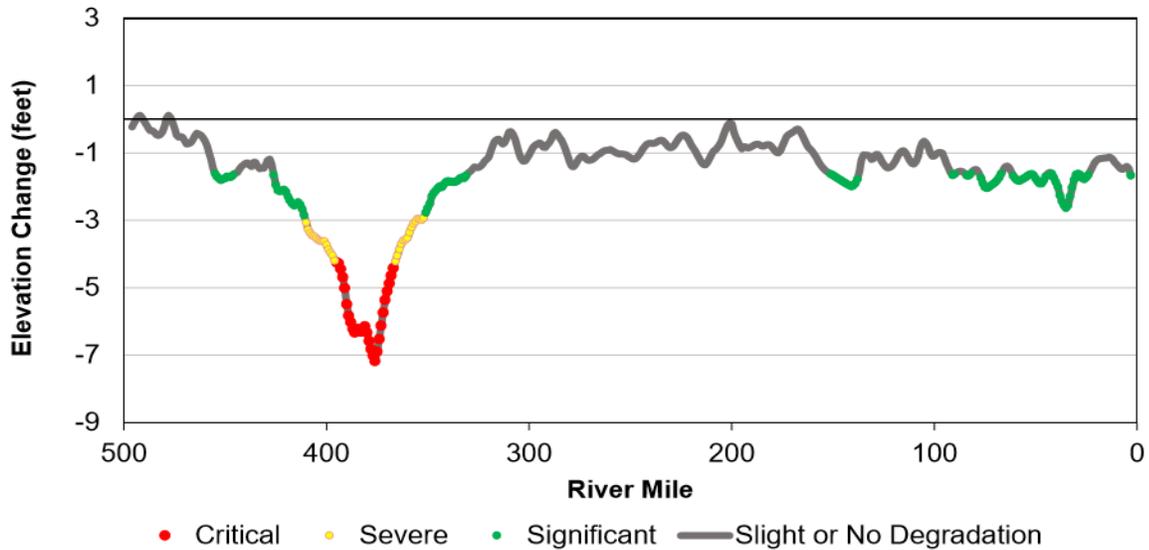
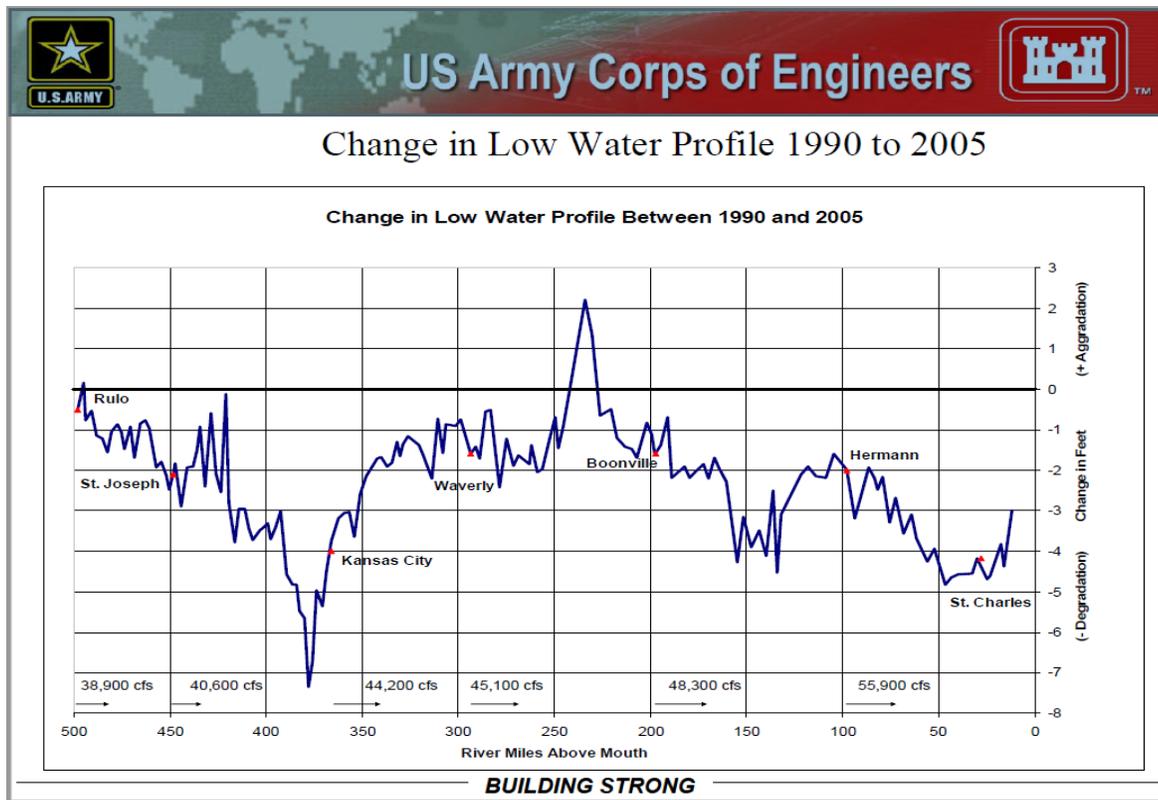
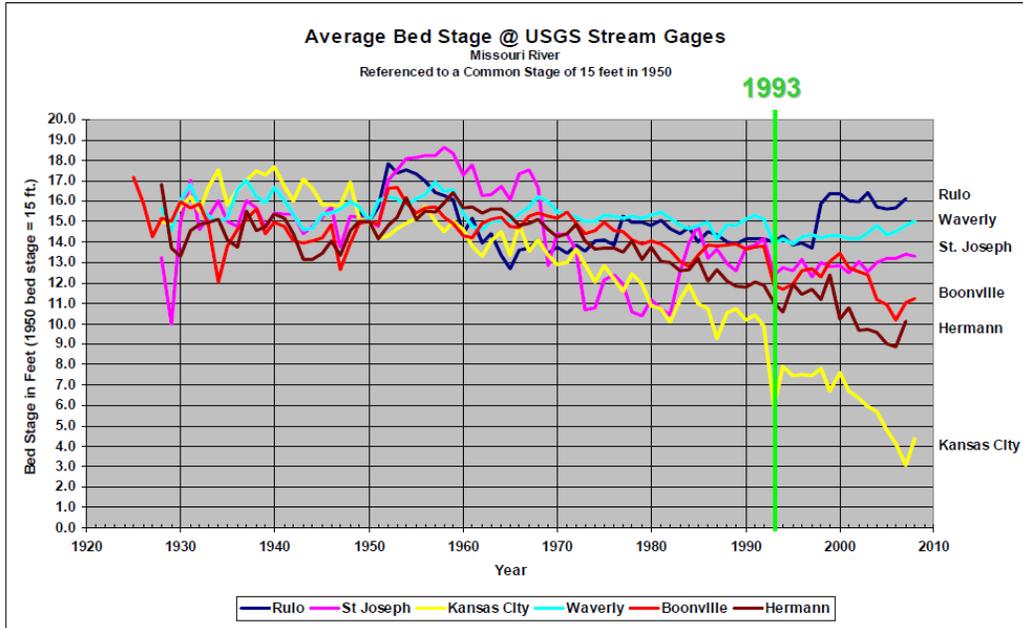


Figure 3-1: Differences in low water profiles from 1990 to 2009 normalized to a common discharge. Technical Report, Page 16.

In *The Missouri Riverbed Degradation Feasibility Study Presentation* presented at the Greater Kansas City Post Industry Day Education and Training Workshop in January of 2009, the decline in the water surface profile was illustrated in slide number 16:

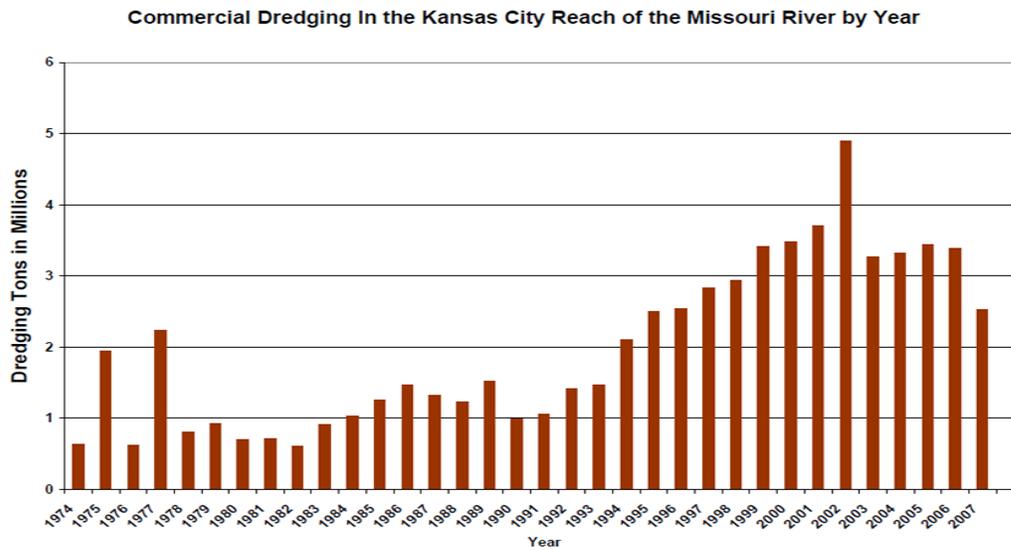


This was about the time problems with bed degradation was identified on the Kansas River and the dredging companies moved their dredging operations to the Missouri River. Slide number 60 shows the decline of the riverbed in this same period:

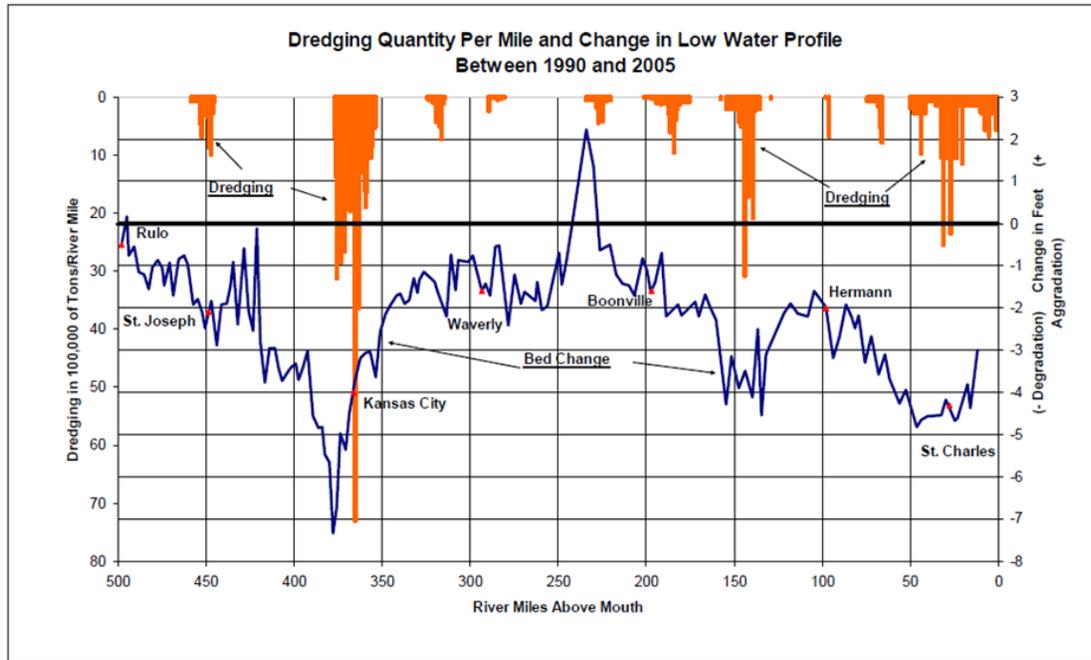


BUILDING STRONG

Additionally, slides number 85 and 87 illustrate the amount of sand that was removed from the Kansas City reach during this period and the correlation between the dredging and bed degradation:



BUILDING STRONG



87

BUILDING STRONG

Based upon this information from USACE's own research demonstrating the correlation between dredging and continued bed degradation, USACE must deny Holliday Sand & Gravel's application to renew dredging permits in the Kansas City reach of the Missouri River.

Furthermore, the Technical Study cites the negative impact of dredging dating back to 1994, yet USACE has chosen to use an arbitrary adaptive management baseline of 2009 to measure degradation. Reliance upon 2009 as the baseline year is a flawed approach. USACE officials have explained the reason for choosing 2009 as the baseline is because it is the first year they have "good" data on the bed levels but slide 87 above clearly documents the relationship of dredging and degradation back to 1990. **1990 should be the baseline to measure the degradation of the riverbed.**

USACE must recognize the cumulative impacts of dredging on public interests, especially water supply. The economic analysis of the Technical Report concluded that continued bed degradation in the Kansas City Reach will result in \$269 Million in expenses (2017 dollars for investment and repairs) to adjust for degradation and low water surface levels over 50 years. The average annual estimated cost to public infrastructure is \$5.3 Million. These costs include maintaining the safety of bridges and levees and the reliability of public water supply infrastructure at the expense of the public to allow the commercial dredging industry to continue to operate at little or no expense on the river. **This cost to the public is unjustified when Holliday Sand and Gravel has alternatives for mining such as off river pit mines or moving to other segments of the river that have not experienced the same level of degradation.**

In the Webinar held on April 21<sup>st</sup>, 2020, USACE referred to the results of the 2019 riverbed survey as being a critical element to the review of the permit applications. However, the 2019 survey has not been made available to the public. **If the survey information is significant to the decision, another public hearing should be held to explain the results to the public and the public should have another opportunity to provide comment in response.**

The March 18<sup>th</sup> Public Notice describes the Section 408 review and authorization as being required "prior to undertaking the activity". The Public Notice goes on to indicate dredging may affect federal structures related to the Missouri River Bank Stabilization and Navigation Project and the Missouri River Recovery Program. In the Webinar on April 21<sup>st</sup>, 2020, USACE Officials stated that any level of degradation in the Kansas City Reach would be considered

to impact federal projects. (Slide 42, April 21<sup>st</sup>, 2020 Webinar). There is ample evidence of degradation in the Kansas City Reach before the arbitrary baseline of 2009, therefore the level of degradation for the 408 analysis should be measured from 1990 bed levels. **The public is being asked to comment on the 408 process without having the key information from the 2019 hydrographic survey but based upon the degradation that has been document by USACE since 1990, it is beyond question that federal projects have been impacted.**

WaterOne understands how difficult USACE's job is to balance the complex interests on the Missouri River. The work and attention USACE has given the degradation issue is very much appreciated. However, we must not let the efforts of USACE and all the public stakeholders go to waste by ignoring the findings of the 2017 Technical Report in the permit renewal process. **WaterOne requests the denial of Holliday Sand & Gravel's application for permit renewal.** The health and sustainability of the Missouri River, a critical resource to our communities, must be weighted more than the ability to purchase cheap sand.

Best Regards,



**Darci Meese**

Manager Legal Services/Govt Affairs

WaterOne | 10747 Renner Blvd. | Lenexa, KS 66219

Office: 913/895-5516

[dmeese@waterone.org](mailto:dmeese@waterone.org)

cc: Col. William Hannan, Jr., USACE, KC District  
Leo Henning, KDHE

**From:** [Whitney Wilson](#)  
**To:** [Shively, Matthew S CIV USARMY CENWK \(USA\)](#)  
**Subject:** [Non-DoD Source] Comments regarding commercial sand dredgers permit renewal  
**Date:** Saturday, May 2, 2020 5:22:18 PM

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Mr. Shively,

I am writing as a taxpayer in Johnson County, Kansas, and as a board member for WaterOne, a utility which represents 430,000 residents. I have responsibility to make sure our community continues to receive, clean, affordable, water. Current dredging activities in Kansas City threaten this.

The commercial sand dredging permits along the Kansas City reach of the Missouri River (RM 357- RM397) need to be denied for the upcoming 5 year period. USACE should allow the river to recover from the degradation outlined in the 2017 technical report.

The 2017 technical report showed commercial sand dredging has been creating significant riverbed degradation since 1994. I have no doubt the USACE 2019 study results will show similar if not worse trends as commercial dredging activities have increased since 2017.

Kansas City sand dredgers pay a mere \$20 (or \$100 for 5 years) to take millions of tons of sand from the river yet it is a \$5.3M annual infrastructure cost to taxpayers.

During winter months, the water intake for WaterOne is compromised which results in water quantity and quality issues and can be an added cost to the water ratepayer.

I respect the general economic benefit commercial sand dredging can offer as well as navigation support it can provide along portions of the Missouri River.

Perhaps in 5 years, new surveys will show it makes sense to commence with sand dredging operations in Kansas City. However, right now, we have a clear imbalance with one stakeholder, Holliday Sand & Gravel, and their request for permit renewal along the Kansas City reach.

Regards,

Whitney Wilson

WaterOne Board Member



28405 East Blue Valley Road  
Independence, Missouri 64058  
Telephone 816-796-4100

SENT VIA EMAIL

April 28, 2020

USACE, Kansas City District  
Regulatory Branch (ODR)  
601 East 12th Street  
Kansas City, Missouri 64106

ATTENTION:  
Matt Shively  
USACE, Kansas City District  
Kansas City Regulatory Office

RE: Public Comments regarding dredging in the Lower Missouri River-Kansas City District

Dear Mr. Shively:

Attached please find a letter from Doug Haney, PE, PG regarding the reissuance of commercial dredging permits near facilities owned by Tri-County Water Authority. Tri-County Water Authority contracted the services of HDR to provide an engineering analysis of the potential impacts dredging would have on our existing potable water production facilities, as well as those being planned for future development.

I believe Mr. Haney's letter adequately addresses our concerns. However, should you need additional information to support our position, please do not hesitate to contact me directly. My direct telephone number is 816-796-4100 ext. 204, and my email address is [j.overstreet@tri-countywaterauthority.com](mailto:j.overstreet@tri-countywaterauthority.com) .

Thank you for your attention in this matter,

John Overstreet  
General Manager



# Memo

Date: Wednesday, April 22, 2020

Project: Tri-County Water Authority Water Supply Support

To: John Overstreet

From: Doug Haney, PE, PG

Subject: Proposed reissuance of commercial dredging permits near TCWA collector well

On March 18, 2020, the U.S. Army Corps of Engineers, Kansas City District (ACOE-KC) issued a public notice concerning the proposed reissuance of commercial dredging permits on the Lower Missouri River, with a comment period to end May 2, 2020. Previously, these permits had been authorized in 2011 and in 2016. Two of the permits allow for dredging adjacent to Tri-County Water Authority (TCWA) wells. TCWA has requested that HDR comment on the potential impact a dredging operation could have on the TCWA wells.

### **Tri-County Water Authority Wells:**

TCWA originally developed its raw water supply in 1993 with the installation of three 1,000 gallon per minute (gpm) alluvial wells (Wells #1, #2, and #3) located on the dry side of the levee adjacent to River Mile 340.5 (RM 340.5) and approximately 1,000 feet back from the river's ordinary high water mark. A fourth alluvial well (Well #4) was installed in 2001 on the wet side of the levee adjacent to RM 340.5 and approximately 800 feet back from the river's ordinary high water mark.

In 2004, TCWA installed its 13 million gallon per day (MGD) horizontal collector well (HCW). This well is located on the wet side of the levee adjacent to RM 340.4 and approximately 100 feet back from the river's ordinary high water mark.

Vertical wells Well #6, #7, and #8 were installed in 2016 on the dry side of the levee adjacent to RM 342.7 and approximately 3,100 to 4,200 feet back from the river's ordinary high water mark.

Preliminary investigation have been made to a second HCW site on the wet side of the levee adjacent to RM 342.9 and approximately 500 feet back from the river's ordinary high water mark. Well locations and River Miles are presented in Exhibit A.

**Dredging Permits with Potential to Impact TCWA Wells:**

Two of the dredging permits up for reissuance have dredging reaches that could potentially impact TCWA’s well fields:

<b>Application Number</b>	<b>Applicant Name</b>	<b>Relevant River Reach Requested</b>	<b>Annual Tons Requested</b>
NWK-2011-00361	Capital Sand Company, Inc.	Waverly Segment – various reaches between RM 250.30 to RM 355.00  Reaches of concern to TWCA: RM 340.00 – RM 340.35 RM 340.85 – RM 347.85  * Requesting addition of RM 347.85 to RM 353.00	782,500 in 2021 increasing to 1,112,000 in 2025.  Previously, this permit authorized increasing amounts from the Waverly Segment of 370,000 in 2016 increasing to 700,000 in 2020
NWK-2011-00363	Holliday Sand and Gravel Co.	Waverly Segment – various reaches between RM 320.00 to RM 356.90  Reach of concern to TWCA: RM 340.85 – RM 347.85	1,078,000  Previously, this permit authorized increasing amounts from the Waverly Segment of 870,000 in 2016 increasing to 1,078,000 in 2019 and 2020

Relevant dredging areas are presented on Exhibit A.

**Concerns:**

Commercial in-stream dredging on the Missouri River poses some potential concerns for water suppliers who rely on riverbank infiltration as source water to their wells. The potential concerns are outlined below:

***Accelerated Clogging of Infiltration Zone by Silt Impingement*** – Riverbank infiltration wells operate by inducing flow through the adjacent river bed and into the aquifer. When the wells are put online, well drawdown underneath the river increases flow velocity into the river bed, and silt particles will impinge into the pore spaces on the river bed surface, partially clogging the river bed. After a “seasoning” period, clogging of the river bed will come to an equilibrium and there will be cycles of a larger area of clogging during low flows (and corresponding reduction in well capacity) and a scouring away of the clogged layer during high flows (and corresponding well capacity recovery).

An increased silt load in the river due to the dredge action or return flow of dredge water upstream of TCWA wells could increase rate of clogging between scouring events. This could detrimentally impact both HCW's and the vertical well field by decreasing the wells production efficiency and increasing well operation pumping costs.

***Shifting of the Thalweg away from the Wells*** – The river thalweg is the line defining the lowest points along the length of a river bed. Riverbank infiltration wells produce best when constructed at a location where the river's thalweg is close to the nearest bank by producing more scouring action over the infiltration area and having a greater hydraulic head above the streambed near the wells. Currently, the river's thalweg near the TCWA wells is somewhat stable due to manmade control structures on the north bank of the river.

There is concern that dredging within the channel and progressive erosion of river bed upstream from dredged areas may shift the thalweg and deeper areas of the channel away from the TCWA wells, which would reduce production capacity.

***Potential Damage to Physical Structures*** - Allowing dredging in close proximity to the collector wells could be detrimental to these physical structures. Collector well laterals are set at a level below the river bed that can be reached by the dredge cutting heads. Laterals are composed of a wire-wrapped continuous slot well screen and would be damaged by a dredge cutting head, should one operate near the screen. There is concern that damage to a lateral would cause a loss in production at TCWA's collector well, damage equipment, and potentially render the lateral useless. The loss of production at HCW #1 would significantly reduce well field production capacity.

***Potential Changes in TCWA Raw Water Quality*** - Disturbance of the river bed material, as well as of the clay, silt, and organic material layers beneath the river bed upstream and adjacent to the TCWA wells could potentially compromise the quality of water being produced at the HCW and the vertical wells. This could require additional water treatment costs.

- ***Total and Dissolved Organic Carbon*** – There is concern that disturbance of river channel layers containing buried trees and highly organic clays and silts could potentially increase organic carbon content in the river water and thus the raw water supply. Increased levels of organics will result in additional requirements for organics removal due to current EPA regulations. This would increase chemical costs as well as potentially require additional unit processes to address organics removal. The increased and/or change in organics will also result in increases in EPA regulated disinfection byproducts which are carcinogenic

compounds. Addressing these compounds can result in additional chemical costs as well as could potentially require additional unit processes.

- *Dissolved Iron & Manganese* – Naturally occurring iron and manganese is oxidized in streams and settles into the river bed sediment as an insoluble form that doesn't readily dissolve into water being withdrawn by the wells. When the oxidized form is removed from the river and placed on the floodplain, particularly when in the presence of decaying organic material, the iron and manganese can be reduced to a soluble form. This soluble form readily infiltrates into the groundwater with precipitation, and can cause elevated dissolved iron and manganese levels in the raw water supply from the portion of production supplied by groundwater.

**Regulatory Considerations:**

The U.S. Army Corps of Engineers (USACE) is the regulatory agency that authorizes in-stream dredging in the Missouri River. In 2011, the USACE went through an Environmental Impact Study (EIS) process prior to renewing existing dredging permits on the Missouri River. Full documentation of the exhaustive process can be found on the USACE website at:

<http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/MissouriRiverCommercialDredging.aspx>.

The following past special conditions were attached to in-stream dredging permits that help mitigate impacts to water suppliers:

***Operational Measures:***

These conditions are necessary to ensure the regulatory action does not negatively interfere with the navigability of the Missouri River or impair its water quality.

- The permittee must implement a Dredge Monitoring Plan (DMP) that records the dredge intake position.
- The permittee must discharge only suitable material that is free from toxic pollutants in other than trace quantities.
- The permittee must investigate for water supply intakes or other activities which may be affected by suspended solids and turbidity increases caused by work in the watercourse and give sufficient notice to the owners of affected activities to allow preparation for any changes in water quality. The permittee must furnish the Regulatory Branch of the Kansas City District, USACE with a copy of any written notification provided in accordance with this condition.

- The permittee must employ measures to prevent or control spilled fuels or lubricants from entering the waters of the United States.
- The permittee may return unwanted dredged material and river water (but not garbage) extracted from the Missouri River back to the Missouri River. The permittee must not dispose of waste materials, water, or garbage below the ordinary high water mark of any other water body, in a wetland area, or at any location where the materials could be introduced into the water body or an adjacent wetland as a result of runoff, flooding, wind, or other natural forces.

***Resource Protection Zones - Water Supply:***

Dredging too close to water intake structures, even at sustainable levels, can harm these structures through direct physical contact; by undermining, exposing, destabilizing, or weakening these structures; and by negatively affecting water quality at the water intake. Dredging over horizontal collector wells can harm these wells by direct physical contact and by modifying the depth and physical characteristics of the river bed over the wells and negatively affecting the volume and quality of water pumped by the wells.

The following special conditions are necessary to avoid adverse impacts to existing municipal drinking water intake structures and provide a mixing zone sufficient to reestablish water quality to background conditions on the Missouri River; to preserve the existing permeable aquifer material and avoid adverse impacts to the horizontal collector wells; and to avoid adverse impacts to water intake structures and water quality of water users other than municipal drinking water providers.

- The permittee must not conduct dredging operations in a zone extending 1,000 feet upstream and 1,000 feet downstream from any municipal drinking water horizontal collector wells located along either bank of the river unless he obtains an exemption to this condition in writing from the Regulatory Branch of the Kansas City District, USACE. *(Of note - the requested dredging reach from RM 340.00 to RM 340.35 extends into this buffer zone on TCWA's HCW #1. The requested dredging reach from RM 340.85 to RM 347.85 will be in the buffer zone of HCW #2, once that well is installed).*

**Conclusions and Recommendations**

The US Army Corps of Engineers issues permits for in-stream dredging on the Missouri River, and have completed a 2011 Environmental Impact Statement which indicates the dredging should not impact collector wells as long as a 1,000 foot exclusion zone upstream and downstream of the

collector well is observed. Review of the dredging permit renewal requests indicates that one reach (RM 340.00 to RM 340.35) extends into the exclusion zone of TCWA's HCW #1. Dredging reach RM 340.85 to RM 347.85 would be in the exclusion zone of HCW #2, once that well is completed.

There is some concern regarding potential water quality impacts to a collector well or the vertical well field from the in-stream dredging and nearby off-stream aggregate processing and storage. Raw water quality from these wells should be monitored for increases in:

- Total and Dissolved Organic Carbon
- Dissolved Iron and Manganese

Increases in these constituents could require increased water treatment costs.

EXHIBIT A

