

CERTIFIED COPY OF ORDER

STATE OF MISSOURI

} ea.

October Session of the October Adjourned

Term. 20 15

County of Boone

In the County Commission of said county, on the

20th

day of October

20 15

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby authorize the Presiding Commissioner to sign the attached Finding of Public Nuisance and Order for Abatement of a public nuisance located at 1608 S. El Chaparral Ave., parcel #17-513-21-01-014.00 01.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

Daniel K. Atwill
Daniel K. Atwill
Presiding Commissioner

Absent
Karen M. Miller
District I Commissioner

Janet M. Thompson
Janet M. Thompson
District II Commissioner

**BEFORE THE COUNTY COMMISSION OF
BOONE COUNTY, MISSOURI**

In Re: Nuisance Abatement)	October Session
1608 S El Chaparral Ave)	October Adjourned
Columbia, MO 65202)	Term 2015
)	Commission Order No. <u>495-2015</u>

FINDING OF PUBLIC NUISANCE AND ORDER FOR ABATEMENT

NOW on this 20th day of October 2015, the County Commission of Boone County, Missouri met in regular session and entered the following findings of fact, conclusions of law and order for abatement of nuisance:

Findings of Fact and Conclusions of Law

The County Commission finds as fact and concludes as a matter of law the following:

1. The Boone County Code of Health Regulations (the "Code") are officially noticed and are made a part of the record in this proceeding.
2. The City of Columbia/Boone County Health Department administrative record is made a part of the record in this proceeding and incorporated herein by reference. In addition, any live testimony of the official(s) of the department and other interested persons are made a part of the record in this proceeding.
3. A public nuisance exists described as follows: abandoned car in driveway
4. The location of the public nuisance is as follows: 1608 S El Chaparral Ave, El Chaparral-Plat 4 Lot 123 (a/k/a parcel # 17-513-21-01-014.00 01) Section 21, Township 48, Range 12 as shown by deed book 0011 page 0029, Boone County
5. The specific violation of the Code is: abandoned vehicle in driveway in violation of sections 6.5 of the Code. The Health Director's designated Health Official made the above determination of the existence of the public nuisance at the above location. Notice of that determination and the requirement for abatement was given in accordance with section 6.10.1 of the Code on the 23 day of March, 2015, to the property owner, occupant, and any other applicable interested persons.
7. The above described public nuisance was not abated. As required by section 6.10.2 of the Code, the property owner, occupant, and any other applicable interested persons were given notice of the hearing conducted this date before the Boone County Commission for an order to abate the above nuisance at government expense with the cost and expense thereof to be charged against the above described property as a special tax bill and added to the real estate taxes for said property for the current year.
8. No credible evidence has been presented at the hearing to demonstrate that no public nuisance exists or that abatement has been performed or is unnecessary; accordingly, in accordance with section 6.10.2 of the Code and section 67.402, RSMo, the County

Commission finds and determines from the credible evidence presented that a public nuisance exists at the above location which requires abatement and that the parties responsible for abating such nuisance have failed to do so as required by the Health Director or Official's original order referred to above.

Order For Abatement Chargeable As a Special Assessment To The Property

Based upon the foregoing, the County Commission hereby orders abatement of the above described public nuisance at public expense and the Health Director is hereby authorized and directed to carry out this order.

It is further ordered and directed that the Health Director submit a bill for the cost and expense of abatement to the County Clerk for attachment to this order and that the County Clerk submit a certified copy of this order and such bill to the County Collector for inclusion as a special assessment on the real property tax bill for the above described property for the current year in accordance with section 67.402, RSMo.


WITNESS the signature of the presiding commissioner on behalf Boone County Commission on the day and year first above written.

Boone County, Missouri
By Boone County Commission



Presiding Commissioner

ATTEST:



Boone County Clerk

Carol Stepney

1608 S El Chaparrel

Timeline

07/30/2015	Complaint received from citizen
08/01/2015	complaint investigated and found abandoned vehicle in driveway
08/01/2015	Notice of violation sent via certified mail
09/04/2015	Certified Letter returned to Health Department
09/25/2015	Nuisance reinspected and violation still present
09/25/2015	Pictures Taken
10/6/2015	Hearing notice sent to Carol Stepney
10/6/2015	Notice ran in the Columbia Tribune for Nuisance violation

Carol L Stepeny

1608 S El Chaparral Ave

17-513-21-01-014.00 01





CITY OF COLUMBIA/BOONE COUNTY, MISSOURI



HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

NOTIFICATION OF DETERMINATION OF PUBLIC HEALTH HAZARD AND/OR NUISANCE AND ORDER FOR ABATEMENT

Stepney Carol L
1608 S El Chaparral Ave
Columbia, MO 65201-9035

An inspection of the property you own located at 1608 S El Chaparral Ave. (parcel # 17-513-21-01-014.00 01) was conducted on August 1, 2015 and revealed an an abandoned vehicle with flat tires on the property.

This condition is hereby declared to be a public nuisance. You are herewith notified that you must begin correcting this condition within 7 days of receipt of this notice and order and that if the above nuisance condition has not been fully corrected within **15 days** after the receipt of this notice, an additional enforcement action will result for violation of Boone County Public Nuisance Ordinance Section 6.3.13 and 6.3.12. A reinspection will be conducted at the end of the 15-day period. If the above nuisance condition has not been fully corrected by that time, a hearing before the Boone County Commission will be called to determine whether a violation exists. If the County Commission determines that a violation exists and the nuisance has not been removed as ordered under this notice, the County Commission may have the nuisance removed with the cost of abatement, plus administrative fees, charged against the property in a special tax bill. In addition, a complaint may be filed against you in Circuit Court. **If the above nuisance condition has been corrected within the 15-day period, no further action is necessary.**

The purpose of these ordinances is to create and maintain a cleaner, healthier community. If you have any questions, please do not hesitate to contact our office. If you are not the owner or the person responsible for the care of this property, please call our office at the number listed at the bottom of this letter. Your cooperation is greatly appreciated.

Sincerely,

Britni Hendren
Environmental Public Health Specialist

This notice deposited in the U.S. Mail certified, return receipt requested on the 3rd day of September 2015 by MD.

1005 W. Worley • P.O. Box 6015 • Columbia, Missouri 65205-6015
Phone: (573) 874-7346 • TTY: (573) 874-7356 • Fax: (573) 817-6407
www.GoColumbiaMo.com



CITY OF COLUMBIA/BOONE COUNTY, MISSOURI



HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

HEARING NOTICE

Stepney Carol L
1608 S El Chaparral Ave
Columbia, MO 65201-9035

An inspection of the property you own located at 1608 S El Chaparral Ave (parcel # 17-513-21-01-014.00 01) was conducted on August 1, 2015 and revealed an abandoned vehicle in the driveway. This condition is declared to be a nuisance and a violation of Boone County Public Nuisance Ordinance Section 6.3.5.

You are herewith notified that a hearing will be held before the County Commission on Tuesday October 20, 2015 at 9:30 am in the County Commission Chambers at the Boone County Government Center, 801 E. Walnut Street, Columbia, Missouri. The purpose of this hearing will be to determine whether a violation exists. If the County Commission determines that a violation exists, it will order the violation to be abated.

If the nuisance is not removed as ordered, the County Commission may have the nuisance removed. All costs of abatement, plus administrative fees, will be assessed against the property in a tax bill. **If the above nuisance condition has been corrected prior to the hearing, you do not have to appear for the hearing.**

The purpose of these ordinances is to create and maintain a cleaner, healthier community. If you have any questions, please do not hesitate to contact our office. If you are not the owner or the person responsible for the care of this property, please call our office at the number listed at the bottom of this letter.

Sincerely,

Britni Hendren
Environmental Public Health Specialist

This notice deposited in the U.S. Mail, first class postage paid on the 6th day of October 2015 by mm

1005 W. Worley ♦ P.O. Box 6015 ♦ Columbia, Missouri 65205-6015
Phone: (573) 874-7346 ♦ TTY: (573) 874-7356 ♦ Fax: (573) 817-6407
www.GoColumbiaMo.com



Boone County Assessor

Boone County Government Center
801 E. Walnut, Room 143
Columbia, MO 65201-7733

Office (573) 886-4270
Fax (573) 886-4254

Parcel 17-513-21-01-014.00 01

Property Location 1608 S EL CHAPARRAL AVE

City **COMMON ROAD DISTRICT (CO)** Road **COMMON ROAD DISTRICT (CO)** School **COLUMBIA (C1)**
Library **BOONE COUNTY (L1)** Fire **BOONE COUNTY (F1)**

Owner **STEPNEY CAROL L**
Address **1608 S EL CHAPARRAL AVE**
City, State Zip **COLUMBIA, MO 65201 - 9035**

Subdivision Plat Book/Page

0011 0029

Section/Township/Range **21 48 12**

Legal Description **EL CHAPARRAL - PLAT 4
LOT 123**

Lot Size **85.00 x 125.00**

Irregular shape **Y**

Deed Book/Page

1916 0373

1197 0808

Current Appraised

Current Assessed

Type	Land	Bldgs	Total	Type	Land	Bldgs	Total
RI	16,300	72,400	88,700	RI	3,097	13,756	16,853
Totals	16,300	72,400	88,700	Totals	3,097	13,756	16,853

Most Recent Tax Bill(s)

Residence Description

Year **1975**
Built
Use **SINGLE FAMILY
(101)**

Basement **FULL (4)**

Attic **NONE
(1)**

Bedrooms **3**

Main Area **1,331**

Full Bath **1**

Finished Basement Area **0**

Half Bath **1**

Total Rooms **6**

Total Square Feet **1,331**

Home > Home > My Account > My Documents

USER:
WMD@WROC@BOOCOLUMBIAMO.COM
Logout

Nora Dietzel
Boone County , Missouri - Recorder of Deeds

[Click Here To View Document](#)

Boone County Recorder of Deeds
801 East Walnut, Rm. 132
Columbia, MO 65201-7728

(573) 886-4345 Office
(573) 886-4359 Fax

Document recording information

Instrument RL - FULL DEED OF
RELEASE
Document No. 2003049982
Book 2413
Page 66
Recording Date 12/22/2003 11:12:19 AM
Dated date 12/12/2003

Referenced By This Document (1)

Book: 1916 Page: 375 DT 05/13/2002

References To This Document (0)

Grantor(s) (2)

FLAGSTAR BANK
FIRST SECURITY SAVINGS BANK

Grantee(s) (1)

STEPNEY, CAROL L

Legal Description(s) (1)

LT 123 EL CHAPARRAL PLAT4 FF EL CHAPARRAL SUB

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Recorded in Boone County, Missouri

Date and Time: 07/15/2003 at 03:21:04 PM

Instrument #: 2003028755 Book: 02281 Page: 0391

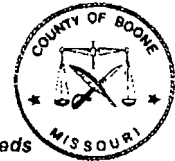
First Grantor STEPNEY, CAROL L

First Grantee PIONEER MORTGAGE INC

Instrument Type DT

Recording Fee \$68.00


Bettie Johnson, Recorder of Deeds



(Space above reserved for Recorder of Deeds certification)

Loan Number 999541587

Title of Document: DEED OF TRUST

Date of Document: JULY 8, 2003

Grantor(s): CAROL L. STEPNEY SINGLE WOMAN

Grantor(s) Mailing Address: 1608 S. EL CHAPARRAL AVENUE, COLUMBIA,
MISSOURI 65201

Grantee(s): PIONEER MORTGAGE INC

Grantee(s) Mailing Address: 800 N. PROVIDENCE ROAD, STE #110,
COLUMBIA, MISSOURI, 65203

Legal Description: LEGAL DESCRIPTION SET FORTH ON PAGE ~~1~~ 15

Reference Book and Page(s):

(If there is not sufficient space on this page for the information required,
state the page reference where it is contained within the document.)

MISSOURI RECORDER'S COVER PAGE

DocMagic  800-649-1362
www.docmagic.com

Nora Dietzel, Recorder of Deeds



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After Recording Return To:

PIONEER MORTGAGE INC
800 N. PROVIDENCE ROAD, STE #110
COLUMBIA, MISSOURI 65203
Loan Number: 999541587

[Space Above This Line For Recording Data]

DEED OF TRUST

MIN: 1000525-9995415875-0

DEFINITIONS

Words used in multiple sections of this document are defined below and other words are defined in Sections 3, 11, 13, 18, 20 and 21. Certain rules regarding the usage of words used in this document are also provided in Section 16.

- (A) "Security Instrument" means this document, which is dated JULY 08, 2003, together with all Riders to this document.
- (B) "Borrower" is CAROL L. STEPNEY SINGLE WOMAN

Borrower is the trustor under this Security Instrument.

- (C) "Lender" is PIONEER MORTGAGE INC

Lender is a A MISSOURI CORPORATION organized
and existing under the laws of MISSOURI
Lender's address is 800 N. PROVIDENCE ROAD, STE #110, COLUMBIA, MISSOURI
65203

- (D) "Trustee" is GUARANTY LAND TITLE
607 E ASH, COLUMBIA, MISSOURI 65201

(E) "MERS" is Mortgage Electronic Registration Systems, Inc. MERS is a separate corporation that is acting solely as a nominee for Lender and Lender's successors and assigns. **MERS is the beneficiary under this Security Instrument.** MERS is organized and existing under the laws of Delaware, and has an address and telephone number of P.O. Box 2026, Flint, MI 48501-2026, tel. (888) 679-MERS.

Legal description of the property is set forth on page 3 of this Security Instrument.



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(F) "Note" means the promissory note signed by Borrower and dated JULY 8, 2003
The Note states that Borrower owes Lender EIGHTY-THREE THOUSAND THREE HUNDRED
AND 00/100 Dollars (U.S. \$ 83,300.00) plus interest.
Borrower has promised to pay this debt in regular Periodic Payments and to pay the debt in full not later than
AUGUST 1, 2018

(G) "Property" means the property that is described below under the heading "Transfer of Rights in the Property."

(H) "Loan" means the debt evidenced by the Note, plus interest, any prepayment charges and late charges due under
the Note, and all sums due under this Security Instrument, plus interest.

(I) "Riders" means all Riders to this Security Instrument that are executed by Borrower. The following Riders are
to be executed by Borrower [check box as applicable]:

- | | | |
|--|---|---|
| <input type="checkbox"/> Adjustable Rate Rider | <input type="checkbox"/> Condominium Rider | <input type="checkbox"/> Second Home Rider |
| <input type="checkbox"/> Balloon Rider | <input type="checkbox"/> Planned Unit Development Rider | <input type="checkbox"/> Other(s) [specify] |
| <input type="checkbox"/> 1-4 Family Rider | <input type="checkbox"/> Biweekly Payment Rider | |

(J) "Applicable Law" means all controlling applicable federal, state and local statutes, regulations, ordinances and
administrative rules and orders (that have the effect of law) as well as all applicable final, non-appealable judicial
opinions.

(K) "Community Association Dues, Fees, and Assessments" means all dues, fees, assessments and other charges
that are imposed on Borrower or the Property by a condominium association, homeowners association or similar
organization.

(L) "Electronic Funds Transfer" means any transfer of funds, other than a transaction originated by check, draft,
or similar paper instrument, which is initiated through an electronic terminal, telephonic instrument, computer, or
magnetic tape so as to order, instruct, or authorize a financial institution to debit or credit an account. Such term
includes, but is not limited to point-of-sale transfers, automated teller machine transactions, transfers initiated by
telephone, wire transfers, and automated clearinghouse transfers.

(M) "Escrow Items" means those items that are described in Section 3.

(N) "Miscellaneous Proceeds" means any compensation, settlement, award of damages, or proceeds paid by any
third party (other than insurance proceeds paid under the coverages described in Section 5) for: (i) damage to, or
destruction of, the Property; (ii) condemnation or other taking of all or any part of the Property; (iii) conveyance in
lieu of condemnation; or (iv) misrepresentations of, or omissions as to, the value and/or condition of the Property.

(O) "Mortgage Insurance" means insurance protecting Lender against the nonpayment of, or default on, the Loan.

(P) "Periodic Payment" means the regularly scheduled amount due for (i) principal and interest under the Note,
plus (ii) any amounts under Section 3 of this Security Instrument.

(Q) "RESPA" means the Real Estate Settlement Procedures Act (12 U.S.C. §2601 et seq.) and its implementing
regulation, Regulation X (24 C.F.R. Part 3500), as they might be amended from time to time, or any additional or
successor legislation or regulation that governs the same subject matter. As used in this Security Instrument,
"RESPA" refers to all requirements and restrictions that are imposed in regard to a "federally related mortgage loan"
even if the Loan does not qualify as a "federally related mortgage loan" under RESPA.

(R) "Successor in Interest of Borrower" means any party that has taken title to the Property, whether or not that
party has assumed Borrower's obligations under the Note and/or this Security Instrument.



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TRANSFER OF RIGHTS IN THE PROPERTY

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The beneficiary of this Security Instrument is MERS (solely as nominee for Lender and Lender's successors and assigns) and the successors and assigns of MERS. This Security Instrument secures to Lender: (i) the repayment of the Loan, and all renewals, extensions and modifications of the Note; and (ii) the performance of Borrower's covenants and agreements under this Security Instrument and the Note. For this purpose, Borrower irrevocably grants, bargains, sells, conveys and confirms to Trustee, in trust, with power of sale, the following described property located in the

COUNTY

of

BOONE

[Type of Recording Jurisdiction]

[Name of Recording Jurisdiction]

SEE LEGAL DESCRIPTION ATTACHED HERETO AND MADE A PART HEREOF AS EXHIBIT "A".
A.P.N. #: 17-513-21-01-014.00

which currently has the address of 1608 S. EL CHAPARRAL AVENUE

COLUMBIA

, Missouri

65201

[Street]

("Property Address"):

[City]

[Zip Code]

TOGETHER WITH all the improvements now or hereafter erected on the property, and all easements, appurtenances, and fixtures now or hereafter a part of the property. All replacements and additions shall also be covered by this Security Instrument. All of the foregoing is referred to in this Security Instrument as the "Property." Borrower understands and agrees that MERS holds only legal title to the interests granted by Borrower in this Security Instrument, but, if necessary to comply with law or custom, MERS (as nominee for Lender and Lender's successors and assigns) has the right: to exercise any or all of those interests, including, but not limited to, the right to foreclose and sell the Property; and to take any action required of Lender including, but not limited to, releasing and canceling this Security Instrument.

BORROWER COVENANTS that Borrower is lawfully seized of the estate hereby conveyed and has the right to grant and convey the Property and that the Property is unencumbered, except for encumbrances of record. Borrower warrants and will defend generally the title to the Property against all claims and demands, subject to any encumbrances of record.

THIS SECURITY INSTRUMENT combines uniform covenants for national use and non-uniform covenants with limited variations by jurisdiction to constitute a uniform security instrument covering real property.

UNIFORM COVENANTS. Borrower and Lender covenant and agree as follows:

1. Payment of Principal, Interest, Escrow Items, Prepayment Charges, and Late Charges. Borrower shall pay when due the principal of, and interest on, the debt evidenced by the Note and any prepayment charges and late charges due under the Note. Borrower shall also pay funds for Escrow Items pursuant to Section 3. Payments due under the Note and this Security Instrument shall be made in U.S. currency. However, if any check or other instrument received by Lender as payment under the Note or this Security Instrument is returned to Lender unpaid, Lender may require that any or all subsequent payments due under the Note and this Security Instrument be made in one or more of the following forms, as selected by Lender: (a) cash; (b) money order; (c) certified check, bank check, treasurer's check or cashier's check, provided any such check is drawn upon an institution whose deposits are insured by a federal agency, instrumentality, or entity; or (d) Electronic Funds Transfer.



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Payments are deemed received by Lender when received at the location designated in the Note or at such other location as may be designated by Lender in accordance with the notice provisions in Section 15. Lender may return any payment or partial payment if the payment or partial payments are insufficient to bring the Loan current. Lender may accept any payment or partial payment insufficient to bring the Loan current, without waiver of any rights hereunder or prejudice to its rights to refuse such payment or partial payments in the future, but Lender is not obligated to apply such payments at the time such payments are accepted. If each Periodic Payment is applied as of its scheduled due date, then Lender need not pay interest on unapplied funds. Lender may hold such unapplied funds until Borrower makes payment to bring the Loan current. If Borrower does not do so within a reasonable period of time, Lender shall either apply such funds or return them to Borrower. If not applied earlier, such funds will be applied to the outstanding principal balance under the Note immediately prior to foreclosure. No offset or claim which Borrower might have now or in the future against Lender shall relieve Borrower from making payments due under the Note and this Security Instrument or performing the covenants and agreements secured by this Security Instrument.

2. Application of Payments or Proceeds. Except as otherwise described in this Section 2, all payments accepted and applied by Lender shall be applied in the following order of priority: (a) interest due under the Note; (b) principal due under the Note; (c) amounts due under Section 3. Such payments shall be applied to each Periodic Payment in the order in which it became due. Any remaining amounts shall be applied first to late charges, second to any other amounts due under this Security Instrument, and then to reduce the principal balance of the Note.

If Lender receives a payment from Borrower for a delinquent Periodic Payment which includes a sufficient amount to pay any late charge due, the payment may be applied to the delinquent payment and the late charge. If more than one Periodic Payment is outstanding, Lender may apply any payment received from Borrower to the repayment of the Periodic Payments if, and to the extent that, each payment can be paid in full. To the extent that any excess exists after the payment is applied to the full payment of one or more Periodic Payments, such excess may be applied to any late charges due. Voluntary prepayments shall be applied first to any prepayment charges and then as described in the Note.

Any application of payments, insurance proceeds, or Miscellaneous Proceeds to principal due under the Note shall not extend or postpone the due date, or change the amount, of the Periodic Payments.

3. Funds for Escrow Items. Borrower shall pay to Lender on the day Periodic Payments are due under the Note, until the Note is paid in full, a sum (the "Funds") to provide for payment of amounts due for: (a) taxes and assessments and other items which can attain priority over this Security Instrument as a lien or encumbrance on the Property; (b) leasehold payments or ground rents on the Property, if any; (c) premiums for any and all insurance required by Lender under Section 5; and (d) Mortgage Insurance premiums, if any, or any sums payable by Borrower to Lender in lieu of the payment of Mortgage Insurance premiums in accordance with the provisions of Section 10. These items are called "Escrow Items." At origination or at any time during the term of the Loan, Lender may require that Community Association Dues, Fees, and Assessments, if any, be escrowed by Borrower, and such dues, fees and assessments shall be an Escrow Item. Borrower shall promptly furnish to Lender all notices of amounts to be paid under this Section. Borrower shall pay Lender the Funds for Escrow Items unless Lender waives Borrower's obligation to pay the Funds for any or all Escrow Items. Lender may waive Borrower's obligation to pay to Lender Funds for any or all Escrow Items at any time. Any such waiver may only be in writing. In the event of such waiver, Borrower shall pay directly, when and where payable, the amounts due for any Escrow Items for which payment of Funds has been waived by Lender and, if Lender requires, shall furnish to Lender receipts evidencing such payment within such time period as Lender may require. Borrower's obligation to make such payments and to provide receipts shall for all purposes be deemed to be a covenant and agreement contained in this Security Instrument, as the phrase "covenant and agreement" is used in Section 9. If Borrower is obligated to pay Escrow Items directly, pursuant to a waiver, and Borrower fails to pay the amount due for an Escrow Item, Lender may exercise its rights under Section 9 and pay such amount and Borrower shall then be obligated under Section 9 to repay to Lender any such amount. Lender may revoke the waiver as to any or all Escrow Items at any time by a notice given in accordance with Section 15 and, upon such revocation, Borrower shall pay to Lender all Funds, and in such amounts, that are then required under this Section 3.

Lender may, at any time, collect and hold Funds in an amount (a) sufficient to permit Lender to apply the Funds at the time specified under RESPA, and (b) not to exceed the maximum amount a lender can require under RESPA.





CITY OF COLUMBIA/BOON

DEPARTMENT OF PUBLIC WORKS



1005 W. WORLEY
P.O. BOX 6015
COLUMBIA, MISSOURI 65205-6015



7014 3490 0002 2759 9549

DTNL
9-4-15

HAZARD AND/OR NUISANCE A...

Stepney Carol L
608 S El Chaparral Ave

NIXIE 631 DC 1 0009/23/15

RETURN TO SENDER
UNCLAIMED
UNABLE TO FORWARD

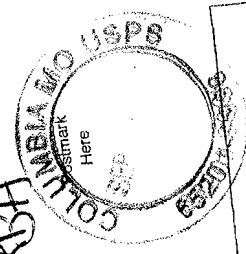
EC: 6520506015 *2864-07937-03-37

6520506015

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OFFICIAL USE

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Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	\$ 6.73



Sent to Carol Stepany Chaparral
Street & Apt. No., 608 S El Chaparral
or P.O. Box No.
City, State, ZIP+4 Columbia MO 65201

PS Form 3800, July 2014

6546 6522 2000 064E 4702
7014 3490 0002 2759 9549

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Lender shall estimate the amount of Funds due on the basis of current data and reasonable estimates of expenditures of future Escrow Items or otherwise in accordance with Applicable Law.

The Funds shall be held in an institution whose deposits are insured by a federal agency, instrumentality, or entity (including Lender, if Lender is an institution whose deposits are so insured) or in any Federal Home Loan Bank. Lender shall apply the Funds to pay the Escrow Items no later than the time specified under RESPA. Lender shall not charge Borrower for holding and applying the Funds, annually analyzing the escrow account, or verifying the Escrow Items, unless Lender pays Borrower interest on the Funds and Applicable Law permits Lender to make such a charge. Unless an agreement is made in writing or Applicable Law requires interest to be paid on the Funds, Lender shall not be required to pay Borrower any interest or earnings on the Funds. Borrower and Lender can agree in writing, however, that interest shall be paid on the Funds. Lender shall give to Borrower, without charge, an annual accounting of the Funds as required by RESPA.

If there is a surplus of Funds held in escrow, as defined under RESPA, Lender shall account to Borrower for the excess funds in accordance with RESPA. If there is a shortage of Funds held in escrow, as defined under RESPA, Lender shall notify Borrower as required by RESPA, and Borrower shall pay to Lender the amount necessary to make up the shortage in accordance with RESPA, but in no more than 12 monthly payments. If there is a deficiency of Funds held in escrow, as defined under RESPA, Lender shall notify Borrower as required by RESPA, and Borrower shall pay to Lender the amount necessary to make up the deficiency in accordance with RESPA, but in no more than 12 monthly payments.

Upon payment in full of all sums secured by this Security Instrument, Lender shall promptly refund to Borrower any Funds held by Lender.

4. Charges; Liens. Borrower shall pay all taxes, assessments, charges, fines, and impositions attributable to the Property which can attain priority over this Security Instrument, leasehold payments or ground rents on the Property, if any, and Community Association Dues, Fees, and Assessments, if any. To the extent that these items are Escrow Items, Borrower shall pay them in the manner provided in Section 3.

Borrower shall promptly discharge any lien which has priority over this Security Instrument unless Borrower: (a) agrees in writing to the payment of the obligation secured by the lien in a manner acceptable to Lender, but only so long as Borrower is performing such agreement; (b) contests the lien in good faith by, or defends against enforcement of the lien in, legal proceedings which in Lender's opinion operate to prevent the enforcement of the lien while those proceedings are pending, but only until such proceedings are concluded; or (c) secures from the holder of the lien an agreement satisfactory to Lender subordinating the lien to this Security Instrument. If Lender determines that any part of the Property is subject to a lien which can attain priority over this Security Instrument, Lender may give Borrower a notice identifying the lien. Within 10 days of the date on which that notice is given, Borrower shall satisfy the lien or take one or more of the actions set forth above in this Section 4.

Lender may require Borrower to pay a one-time charge for a real estate tax verification and/or reporting service used by Lender in connection with this Loan.

5. Property Insurance. Borrower shall keep the improvements now existing or hereafter erected on the Property insured against loss by fire, hazards included within the term "extended coverage," and any other hazards including, but not limited to, earthquakes and floods, for which Lender requires insurance. This insurance shall be maintained in the amounts (including deductible levels) and for the periods that Lender requires. What Lender requires pursuant to the preceding sentences can change during the term of the Loan. The insurance carrier providing the insurance shall be chosen by Borrower subject to Lender's right to disapprove Borrower's choice, which right shall not be exercised unreasonably. Lender may require Borrower to pay, in connection with this Loan, either: (a) a one-time charge for flood zone determination, certification and tracking services; or (b) a one-time charge for flood zone determination and certification services and subsequent charges each time remappings or similar changes occur which reasonably might affect such determination or certification. Borrower shall also be responsible for the payment of any fees imposed by the Federal Emergency Management Agency in connection with the review of any flood zone determination resulting from an objection by Borrower.

If Borrower fails to maintain any of the coverages described above, Lender may obtain insurance coverage, at Lender's option and Borrower's expense. Lender is under no obligation to purchase any particular type or amount of coverage. Therefore, such coverage shall cover Lender, but might or might not protect Borrower, Borrower's equity in the Property, or the contents of the Property, against any risk, hazard or liability and might provide greater



or lesser coverage than was previously in effect. Borrower acknowledges that the cost of the insurance coverage so obtained might significantly exceed the cost of insurance that Borrower could have obtained. Any amounts disbursed by Lender under this Section 5 shall become additional debt of Borrower secured by this Security Instrument. These amounts shall bear interest at the Note rate from the date of disbursement and shall be payable, with such interest, upon notice from Lender to Borrower requesting payment.

All insurance policies required by Lender and renewals of such policies shall be subject to Lender's right to disapprove such policies, shall include a standard mortgage clause, and shall name Lender as mortgagee and/or as an additional loss payee. Lender shall have the right to hold the policies and renewal certificates. If Lender requires, Borrower shall promptly give to Lender all receipts of paid premiums and renewal notices. If Borrower obtains any form of insurance coverage, not otherwise required by Lender, for damage to, or destruction of, the Property, such policy shall include a standard mortgage clause and shall name Lender as mortgagee and/or as an additional loss payee.

In the event of loss, Borrower shall give prompt notice to the insurance carrier and Lender. Lender may make proof of loss if not made promptly by Borrower. Unless Lender and Borrower otherwise agree in writing, any insurance proceeds, whether or not the underlying insurance was required by Lender, shall be applied to restoration or repair of the Property, if the restoration or repair is economically feasible and Lender's security is not lessened. During such repair and restoration period, Lender shall have the right to hold such insurance proceeds until Lender has had an opportunity to inspect such Property to ensure the work has been completed to Lender's satisfaction, provided that such inspection shall be undertaken promptly. Lender may disburse proceeds for the repairs and restoration in a single payment or in a series of progress payments as the work is completed. Unless an agreement is made in writing or Applicable Law requires interest to be paid on such insurance proceeds, Lender shall not be required to pay Borrower any interest or earnings on such proceeds. Fees for public adjusters, or other third parties, retained by Borrower shall not be paid out of the insurance proceeds and shall be the sole obligation of Borrower. If the restoration or repair is not economically feasible or Lender's security would be lessened, the insurance proceeds shall be applied to the sums secured by this Security Instrument, whether or not then due, with the excess, if any, paid to Borrower. Such insurance proceeds shall be applied in the order provided for in Section 2.

If Borrower abandons the Property, Lender may file, negotiate and settle any available insurance claim and related matters. If Borrower does not respond within 30 days to a notice from Lender that the insurance carrier has offered to settle a claim, then Lender may negotiate and settle the claim. The 30-day period will begin when the notice is given. In either event, or if Lender acquires the Property under Section 22 or otherwise, Borrower hereby assigns to Lender (a) Borrower's rights to any insurance proceeds in an amount not to exceed the amounts unpaid under the Note or this Security Instrument, and (b) any other of Borrower's rights (other than the right to any refund of unearned premiums paid by Borrower) under all insurance policies covering the Property, insofar as such rights are applicable to the coverage of the Property. Lender may use the insurance proceeds either to repair or restore the Property or to pay amounts unpaid under the Note or this Security Instrument, whether or not then due.

6. Occupancy. Borrower shall occupy, establish, and use the Property as Borrower's principal residence within 60 days after the execution of this Security Instrument and shall continue to occupy the Property as Borrower's principal residence for at least one year after the date of occupancy, unless Lender otherwise agrees in writing, which consent shall not be unreasonably withheld, or unless extenuating circumstances exist which are beyond Borrower's control.

7. Preservation, Maintenance and Protection of the Property; Inspections. Borrower shall not destroy, damage or impair the Property, allow the Property to deteriorate or commit waste on the Property. Whether or not Borrower is residing in the Property, Borrower shall maintain the Property in order to prevent the Property from deteriorating or decreasing in value due to its condition. Unless it is determined pursuant to Section 5 that repair or restoration is not economically feasible, Borrower shall promptly repair the Property if damaged to avoid further deterioration or damage. If insurance or condemnation proceeds are paid in connection with damage to, or the taking of, the Property, Borrower shall be responsible for repairing or restoring the Property only if Lender has released proceeds for such purposes. Lender may disburse proceeds for the repairs and restoration in a single payment or in a series of progress payments as the work is completed. If the insurance or condemnation proceeds are not sufficient to repair or restore the Property, Borrower is not relieved of Borrower's obligation for the completion of such repair or restoration.



Lender or its agent may make reasonable entries upon and inspections of the Property. If it has reasonable cause, Lender may inspect the interior of the improvements on the Property. Lender shall give Borrower notice at the time of or prior to such an interior inspection specifying such reasonable cause.

8. Borrower's Loan Application. Borrower shall be in default if, during the Loan application process, Borrower or any persons or entities acting at the direction of Borrower or with Borrower's knowledge or consent gave materially false, misleading, or inaccurate information or statements to Lender (or failed to provide Lender with material information) in connection with the Loan. Material representations include, but are not limited to, representations concerning Borrower's occupancy of the Property as Borrower's principal residence.

9. Protection of Lender's Interest in the Property and Rights Under this Security Instrument. If (a) Borrower fails to perform the covenants and agreements contained in this Security Instrument, (b) there is a legal proceeding that might significantly affect Lender's interest in the Property and/or rights under this Security Instrument (such as a proceeding in bankruptcy, probate, for condemnation or forfeiture, for enforcement of a lien which may attain priority over this Security Instrument or to enforce laws or regulations), or (c) Borrower has abandoned the Property, then Lender may do and pay for whatever is reasonable or appropriate to protect Lender's interest in the Property and rights under this Security Instrument, including protecting and/or assessing the value of the Property, and securing and/or repairing the Property. Lender's actions can include, but are not limited to: (a) paying any sums secured by a lien which has priority over this Security Instrument; (b) appearing in court; and (c) paying reasonable attorneys' fees to protect its interest in the Property and/or rights under this Security Instrument, including its secured position in a bankruptcy proceeding. Securing the Property includes, but is not limited to, entering the Property to make repairs, change locks, replace or board up doors and windows, drain water from pipes, eliminate building or other code violations or dangerous conditions, and have utilities turned on or off. Although Lender may take action under this Section 9, Lender does not have to do so and is not under any duty or obligation to do so. It is agreed that Lender incurs no liability for not taking any or all actions authorized under this Section 9.

Any amounts disbursed by Lender under this Section 9 shall become additional debt of Borrower secured by this Security Instrument. These amounts shall bear interest at the Note rate from the date of disbursement and shall be payable, with such interest, upon notice from Lender to Borrower requesting payment.

If this Security Instrument is on a leasehold, Borrower shall comply with all the provisions of the lease. If Borrower acquires fee title to the Property, the leasehold and the fee title shall not merge unless Lender agrees to the merger in writing.

10. Mortgage Insurance. If Lender required Mortgage Insurance as a condition of making the Loan, Borrower shall pay the premiums required to maintain the Mortgage Insurance in effect. If, for any reason, the Mortgage Insurance coverage required by Lender ceases to be available from the mortgage insurer that previously provided such insurance and Borrower was required to make separately designated payments toward the premiums for Mortgage Insurance, Borrower shall pay the premiums required to obtain coverage substantially equivalent to the Mortgage Insurance previously in effect, at a cost substantially equivalent to the cost to Borrower of the Mortgage Insurance previously in effect, from an alternate mortgage insurer selected by Lender. If substantially equivalent Mortgage Insurance coverage is not available, Borrower shall continue to pay to Lender the amount of the separately designated payments that were due when the insurance coverage ceased to be in effect. Lender will accept, use and retain these payments as a non-refundable loss reserve in lieu of Mortgage Insurance. Such loss reserve shall be non-refundable, notwithstanding the fact that the Loan is ultimately paid in full, and Lender shall not be required to pay Borrower any interest or earnings on such loss reserve. Lender can no longer require loss reserve payments if Mortgage Insurance coverage (in the amount and for the period that Lender requires) provided by an insurer selected by Lender again becomes available, is obtained, and Lender requires separately designated payments toward the premiums for Mortgage Insurance. If Lender required Mortgage Insurance as a condition of making the Loan and Borrower was required to make separately designated payments toward the premiums for Mortgage Insurance, Borrower shall pay the premiums required to maintain Mortgage Insurance in effect, or to provide a non-refundable loss reserve, until Lender's requirement for Mortgage Insurance ends in accordance with any written agreement between Borrower and Lender providing for such termination or until termination is required by Applicable Law. Nothing in this Section 10 affects Borrower's obligation to pay interest at the rate provided in the Note.

Mortgage Insurance reimburses Lender (or any entity that purchases the Note) for certain losses it may incur if Borrower does not repay the Loan as agreed. Borrower is not a party to the Mortgage Insurance.



Mortgage insurers evaluate their total risk on all such insurance in force from time to time, and may enter into agreements with other parties that share or modify their risk, or reduce losses. These agreements are on terms and conditions that are satisfactory to the mortgage insurer and the other party (or parties) to these agreements. These agreements may require the mortgage insurer to make payments using any source of funds that the mortgage insurer may have available (which may include funds obtained from Mortgage Insurance premiums).

As a result of these agreements, Lender, any purchaser of the Note, another insurer, any reinsurer, any other entity, or any affiliate of any of the foregoing, may receive (directly or indirectly) amounts that derive from (or might be characterized as) a portion of Borrower's payments for Mortgage Insurance, in exchange for sharing or modifying the mortgage insurer's risk, or reducing losses. If such agreement provides that an affiliate of Lender takes a share of the insurer's risk in exchange for a share of the premiums paid to the insurer, the arrangement is often termed "captive reinsurance." Further:

(a) Any such agreements will not affect the amounts that Borrower has agreed to pay for Mortgage Insurance, or any other terms of the Loan. Such agreements will not increase the amount Borrower will owe for Mortgage Insurance, and they will not entitle Borrower to any refund.

(b) Any such agreements will not affect the rights Borrower has - if any - with respect to the Mortgage Insurance under the Homeowners Protection Act of 1998 or any other law. These rights may include the right to receive certain disclosures, to request and obtain cancellation of the Mortgage Insurance, to have the Mortgage Insurance terminated automatically, and/or to receive a refund of any Mortgage Insurance premiums that were unearned at the time of such cancellation or termination.

11. Assignment of Miscellaneous Proceeds; Forfeiture. All Miscellaneous Proceeds are hereby assigned to and shall be paid to Lender.

If the Property is damaged, such Miscellaneous Proceeds shall be applied to restoration or repair of the Property, if the restoration or repair is economically feasible and Lender's security is not lessened. During such repair and restoration period, Lender shall have the right to hold such Miscellaneous Proceeds until Lender has had an opportunity to inspect such Property to ensure the work has been completed to Lender's satisfaction, provided that such inspection shall be undertaken promptly. Lender may pay for the repairs and restoration in a single disbursement or in a series of progress payments as the work is completed. Unless an agreement is made in writing or Applicable Law requires interest to be paid on such Miscellaneous Proceeds, Lender shall not be required to pay Borrower any interest or earnings on such Miscellaneous Proceeds. If the restoration or repair is not economically feasible or Lender's security would be lessened, the Miscellaneous Proceeds shall be applied to the sums secured by this Security Instrument, whether or not then due, with the excess, if any, paid to Borrower. Such Miscellaneous Proceeds shall be applied in the order provided for in Section 2.

In the event of a total taking, destruction, or loss in value of the Property, the Miscellaneous Proceeds shall be applied to the sums secured by this Security Instrument, whether or not then due, with the excess, if any, paid to Borrower.

In the event of a partial taking, destruction, or loss in value of the Property in which the fair market value of the Property immediately before the partial taking, destruction, or loss in value is equal to or greater than the amount of the sums secured by this Security Instrument immediately before the partial taking, destruction, or loss in value, unless Borrower and Lender otherwise agree in writing, the sums secured by this Security Instrument shall be reduced by the amount of the Miscellaneous Proceeds multiplied by the following fraction: (a) the total amount of the sums secured immediately before the partial taking, destruction, or loss in value divided by (b) the fair market value of the Property immediately before the partial taking, destruction, or loss in value. Any balance shall be paid to Borrower.

In the event of a partial taking, destruction, or loss in value of the Property in which the fair market value of the Property immediately before the partial taking, destruction, or loss in value is less than the amount of the sums secured immediately before the partial taking, destruction, or loss in value, unless Borrower and Lender otherwise agree in writing, the Miscellaneous Proceeds shall be applied to the sums secured by this Security Instrument whether or not the sums are then due.

If the Property is abandoned by Borrower, or if, after notice by Lender to Borrower that the Opposing Party (as defined in the next sentence) offers to make an award to settle a claim for damages, Borrower fails to respond to Lender within 30 days after the date the notice is given, Lender is authorized to collect and apply the Miscellaneous Proceeds either to restoration or repair of the Property or to the sums secured by this Security Instrument, whether



or not then due. "Opposing Party" means the third party that owes Borrower Miscellaneous Proceeds or the party against whom Borrower has a right of action in regard to Miscellaneous Proceeds.

Borrower shall be in default if any action or proceeding, whether civil or criminal, is begun that, in Lender's judgment, could result in forfeiture of the Property or other material impairment of Lender's interest in the Property or rights under this Security Instrument. Borrower can cure such a default and, if acceleration has occurred, reinstate as provided in Section 19, by causing the action or proceeding to be dismissed with a ruling that, in Lender's judgment, precludes forfeiture of the Property or other material impairment of Lender's interest in the Property or rights under this Security Instrument. The proceeds of any award or claim for damages that are attributable to the impairment of Lender's interest in the Property are hereby assigned and shall be paid to Lender.

All Miscellaneous Proceeds that are not applied to restoration or repair of the Property shall be applied in the order provided for in Section 2.

12. Borrower Not Released; Forbearance By Lender Not a Waiver. Extension of the time for payment or modification of amortization of the sums secured by this Security Instrument granted by Lender to Borrower or any Successor in Interest of Borrower shall not operate to release the liability of Borrower or any Successors in Interest of Borrower. Lender shall not be required to commence proceedings against any Successor in Interest of Borrower or to refuse to extend time for payment or otherwise modify amortization of the sums secured by this Security Instrument by reason of any demand made by the original Borrower or any Successors in Interest of Borrower. Any forbearance by Lender in exercising any right or remedy including, without limitation, Lender's acceptance of payments from third persons, entities or Successors in Interest of Borrower or in amounts less than the amount then due, shall not be a waiver of or preclude the exercise of any right or remedy.

13. Joint and Several Liability; Co-signers; Successors and Assigns Bound. Borrower covenants and agrees that Borrower's obligations and liability shall be joint and several. However, any Borrower who co-signs this Security Instrument but does not execute the Note (a "co-signer"): (a) is co-signing this Security Instrument only to mortgage, grant and convey the co-signer's interest in the Property under the terms of this Security Instrument; (b) is not personally obligated to pay the sums secured by this Security Instrument; and (c) agrees that Lender and any other Borrower can agree to extend, modify, forbear or make any accommodations with regard to the terms of this Security Instrument or the Note without the co-signer's consent.

Subject to the provisions of Section 18, any Successor in Interest of Borrower who assumes Borrower's obligations under this Security Instrument in writing, and is approved by Lender, shall obtain all of Borrower's rights and benefits under this Security Instrument. Borrower shall not be released from Borrower's obligations and liability under this Security Instrument unless Lender agrees to such release in writing. The covenants and agreements of this Security Instrument shall bind (except as provided in Section 20) and benefit the successors and assigns of Lender.

14. Loan Charges. Lender may charge Borrower fees for services performed in connection with Borrower's default, for the purpose of protecting Lender's interest in the Property and rights under this Security Instrument, including, but not limited to, attorneys' fees, property inspection and valuation fees. In regard to any other fees, the absence of express authority in this Security Instrument to charge a specific fee to Borrower shall not be construed as a prohibition on the charging of such fee. Lender may not charge fees that are expressly prohibited by this Security Instrument or by Applicable Law.

If the Loan is subject to a law which sets maximum loan charges, and that law is finally interpreted so that the interest or other loan charges collected or to be collected in connection with the Loan exceed the permitted limits, then: (a) any such loan charge shall be reduced by the amount necessary to reduce the charge to the permitted limit; and (b) any sums already collected from Borrower which exceeded permitted limits will be refunded to Borrower. Lender may choose to make this refund by reducing the principal owed under the Note or by making a direct payment to Borrower. If a refund reduces principal, the reduction will be treated as a partial prepayment without any prepayment charge (whether or not a prepayment charge is provided for under the Note). Borrower's acceptance of any such refund made by direct payment to Borrower will constitute a waiver of any right of action Borrower might have arising out of such overcharge.

15. Notices. All notices given by Borrower or Lender in connection with this Security Instrument must be in writing. Any notice to Borrower in connection with this Security Instrument shall be deemed to have been given to Borrower when mailed by first class mail or when actually delivered to Borrower's notice address if sent by other means. Notice to any one Borrower shall constitute notice to all Borrowers unless Applicable Law expressly requires



otherwise. The notice address shall be the Property Address unless Borrower has designated a substitute notice address by notice to Lender. Borrower shall promptly notify Lender of Borrower's change of address. If Lender specifies a procedure for reporting Borrower's change of address, then Borrower shall only report a change of address through that specified procedure. There may be only one designated notice address under this Security Instrument at any one time. Any notice to Lender shall be given by delivering it or by mailing it by first class mail to Lender's address stated herein unless Lender has designated another address by notice to Borrower. Any notice in connection with this Security Instrument shall not be deemed to have been given to Lender until actually received by Lender. If any notice required by this Security Instrument is also required under Applicable Law, the Applicable Law requirement will satisfy the corresponding requirement under this Security Instrument.

16. Governing Law; Severability; Rules of Construction. This Security Instrument shall be governed by federal law and the law of the jurisdiction in which the Property is located. All rights and obligations contained in this Security Instrument are subject to any requirements and limitations of Applicable Law. Applicable Law might explicitly or implicitly allow the parties to agree by contract or it might be silent, but such silence shall not be construed as a prohibition against agreement by contract. In the event that any provision or clause of this Security Instrument or the Note conflicts with Applicable Law, such conflict shall not affect other provisions of this Security Instrument or the Note which can be given effect without the conflicting provision.

As used in this Security Instrument: (a) words of the masculine gender shall mean and include corresponding neuter words or words of the feminine gender; (b) words in the singular shall mean and include the plural and vice versa, and (c) the word "may" gives sole discretion without any obligation to take any action.

17. Borrower's Copy. Borrower shall be given one copy of the Note and of this Security Instrument.

18. Transfer of the Property or a Beneficial Interest in Borrower. As used in this Section 18, "Interest in the Property" means any legal or beneficial interest in the Property, including, but not limited to, those beneficial interests transferred in a bond for deed, contract for deed, installment sales contract or escrow agreement, the intent of which is the transfer of title by Borrower at a future date to a purchaser.

If all or any part of the Property or any Interest in the Property is sold or transferred (or if Borrower is not a natural person and a beneficial interest in Borrower is sold or transferred) without Lender's prior written consent, Lender may require immediate payment in full of all sums secured by this Security Instrument. However, this option shall not be exercised by Lender if such exercise is prohibited by Applicable Law.

If Lender exercises this option, Lender shall give Borrower notice of acceleration. The notice shall provide a period of not less than 30 days from the date the notice is given in accordance with Section 15 within which Borrower must pay all sums secured by this Security Instrument. If Borrower fails to pay these sums prior to the expiration of this period, Lender may invoke any remedies permitted by this Security Instrument without further notice or demand on Borrower.

19. Borrower's Right to Reinstate After Acceleration. If Borrower meets certain conditions, Borrower shall have the right to have enforcement of this Security Instrument discontinued at any time prior to the earliest of: (a) five days before sale of the Property pursuant to any power of sale contained in this Security Instrument; (b) such other period as Applicable Law might specify for the termination of Borrower's right to reinstate; or (c) entry of a judgment enforcing this Security Instrument. Those conditions are that Borrower: (a) pays Lender all sums which then would be due under this Security Instrument and the Note as if no acceleration had occurred; (b) cures any default of any other covenants or agreements; (c) pays all expenses incurred in enforcing this Security Instrument, including, but not limited to, reasonable attorneys' fees, property inspection and valuation fees, and other fees incurred for the purpose of protecting Lender's interest in the Property and rights under this Security Instrument; and (d) takes such action as Lender may reasonably require to assure that Lender's interest in the Property and rights under this Security Instrument, and Borrower's obligation to pay the sums secured by this Security Instrument, shall continue unchanged. Lender may require that Borrower pay such reinstatement sums and expenses in one or more of the following forms, as selected by Lender: (a) cash; (b) money order; (c) certified check, bank check, treasurer's check or cashier's check, provided any such check is drawn upon an institution whose deposits are insured by a federal agency, instrumentality or entity; or (d) Electronic Funds Transfer. Upon reinstatement by Borrower, this Security Instrument and obligations secured hereby shall remain fully effective as if no acceleration had occurred. However, this right to reinstate shall not apply in the case of acceleration under Section 18.



20. Sale of Note; Change of Loan Servicer; Notice of Grievance. The Note or a partial interest in the Note (together with this Security Instrument) can be sold one or more times without prior notice to Borrower. A sale might result in a change in the entity (known as the "Loan Servicer") that collects Periodic Payments due under the Note and this Security Instrument and performs other mortgage loan servicing obligations under the Note, this Security Instrument, and Applicable Law. There also might be one or more changes of the Loan Servicer unrelated to a sale of the Note. If there is a change of the Loan Servicer, Borrower will be given written notice of the change which will state the name and address of the new Loan Servicer, the address to which payments should be made and any other information RESPA requires in connection with a notice of transfer of servicing. If the Note is sold and thereafter the Loan is serviced by a Loan Servicer other than the purchaser of the Note, the mortgage loan servicing obligations to Borrower will remain with the Loan Servicer or be transferred to a successor Loan Servicer and are not assumed by the Note purchaser unless otherwise provided by the Note purchaser.

Neither Borrower nor Lender may commence, join, or be joined to any judicial action (as either an individual litigant or the member of a class) that arises from the other party's actions pursuant to this Security Instrument or that alleges that the other party has breached any provision of, or any duty owed by reason of, this Security Instrument, until such Borrower or Lender has notified the other party (with such notice given in compliance with the requirements of Section 15) of such alleged breach and afforded the other party hereto a reasonable period after the giving of such notice to take corrective action. If Applicable Law provides a time period which must elapse before certain action can be taken, that time period will be deemed to be reasonable for purposes of this paragraph. The notice of acceleration and opportunity to cure given to Borrower pursuant to Section 22 and the notice of acceleration given to Borrower pursuant to Section 18 shall be deemed to satisfy the notice and opportunity to take corrective action provisions of this Section 20.

21. Hazardous Substances. As used in this Section 21: (a) "Hazardous Substances" are those substances defined as toxic or hazardous substances, pollutants, or wastes by Environmental Law and the following substances: gasoline, kerosene, other flammable or toxic petroleum products, toxic pesticides and herbicides, volatile solvents, materials containing asbestos or formaldehyde, and radioactive materials; (b) "Environmental Law" means federal laws and laws of the jurisdiction where the Property is located that relate to health, safety or environmental protection; (c) "Environmental Cleanup" includes any response action, remedial action, or removal action, as defined in Environmental Law; and (d) an "Environmental Condition" means a condition that can cause, contribute to, or otherwise trigger an Environmental Cleanup.

Borrower shall not cause or permit the presence, use, disposal, storage, or release of any Hazardous Substances, or threaten to release any Hazardous Substances, on or in the Property. Borrower shall not do, nor allow anyone else to do, anything affecting the Property (a) that is in violation of any Environmental Law, (b) which creates an Environmental Condition, or (c) which, due to the presence, use, or release of a Hazardous Substance, creates a condition that adversely affects the value of the Property. The preceding two sentences shall not apply to the presence, use, or storage on the Property of small quantities of Hazardous Substances that are generally recognized to be appropriate to normal residential uses and to maintenance of the Property (including, but not limited to, hazardous substances in consumer products).

Borrower shall promptly give Lender written notice of (a) any investigation, claim, demand, lawsuit or other action by any governmental or regulatory agency or private party involving the Property and any Hazardous Substance or Environmental Law of which Borrower has actual knowledge, (b) any Environmental Condition, including but not limited to, any spilling, leaking, discharge, release or threat of release of any Hazardous Substance, and (c) any condition caused by the presence, use or release of a Hazardous Substance which adversely affects the value of the Property. If Borrower learns, or is notified by any governmental or regulatory authority, or any private party, that any removal or other remediation of any Hazardous Substance affecting the Property is necessary, Borrower shall promptly take all necessary remedial actions in accordance with Environmental Law. Nothing herein shall create any obligation on Lender for an Environmental Cleanup.



NON-UNIFORM COVENANTS. Borrower and Lender further covenant and agree as follows:

22. Acceleration; Remedies. Lender shall give notice to Borrower prior to acceleration following Borrower's breach of any covenant or agreement in this Security Instrument (but not prior to acceleration under Section 18 unless Applicable Law provides otherwise). The notice shall specify: (a) the default; (b) the action required to cure the default; (c) a date, not less than 30 days from the date the notice is given to Borrower, by which the default must be cured; and (d) that failure to cure the default on or before the date specified in the notice may result in acceleration of the sums secured by this Security Instrument and sale of the Property. The notice shall further inform Borrower of the right to reinstate after acceleration and the right to bring a court action to assert the non-existence of a default or any other defense of Borrower to acceleration and sale. If the default is not cured on or before the date specified in the notice, Lender at its option may require immediate payment in full of all sums secured by this Security Instrument without further demand and may invoke the power of sale and any other remedies permitted by Applicable Law. Lender shall be entitled to collect all expenses incurred in pursuing the remedies provided in this Section 22, including, but not limited to, reasonable attorneys' fees and costs of title evidence.

If Lender invokes the power of sale, Lender or Trustee shall mail copies of a notice of sale in the manner prescribed by Applicable Law to Borrower and to the other persons prescribed by Applicable Law. Trustee shall give notice of sale by public advertisement for the time and in the manner prescribed by Applicable Law. Trustee, without demand on Borrower, shall sell the Property at public auction to the highest bidder for cash at the time and place and under the terms designated in the notice of sale in one or more parcels and in any order Trustee determines. Trustee may postpone sale of all or any parcel of the Property to any later time on the same date by public announcement at the time and place of any previously scheduled sale. Lender or its designee may purchase the Property at any sale.

Trustee shall deliver to the purchaser Trustee's deed conveying the Property without any covenant or warranty expressed or implied. The recitals in the Trustee's deed shall be prima facie evidence of the truth of the statements made therein. Trustee shall apply the proceeds of the sale in the following order: (a) to all expenses of the sale, including, but not limited to, reasonable Trustee's and attorneys' fees; (b) to all sums secured by this Security Instrument; and (c) any excess to the person or persons legally entitled to it.

23. Release. Upon payment of all sums secured by this Security Instrument, Lender shall release this Security Instrument. Borrower shall pay any recordation costs. Lender may charge Borrower a fee for releasing this Security Instrument, but only if the fee is paid to a third party for services rendered and the charging of the fee is permitted under Applicable Law.

24. Substitute Trustee. Lender, at its option, may from time to time remove Trustee and appoint a successor trustee to any Trustee appointed hereunder by an instrument recorded in the county in which this Security Instrument is recorded. Without conveyance of the Property, the successor trustee shall succeed to all the title, power and duties conferred upon Trustee herein and by Applicable Law.

25. Lease of the Property. Trustee hereby leases the Property to Borrower until this Security Instrument is either satisfied and released or until there is a default under the provisions of this Security Instrument. The Property is leased upon the following terms and conditions: Borrower, and every person claiming an interest in or possessing the Property or any part thereof, shall pay rent during the term of the lease in the amount of one cent per month, payable on demand, and without notice or demand shall and will surrender peaceable possession of the Property to Trustee upon default or to the purchaser of the Property at the foreclosure sale.

26. Homestead Exemption. Borrower hereby waives all homestead exemptions in the Property to which Borrowers would otherwise be entitled under Applicable Law.

27. Notice. Oral agreements or commitments to loan money, extend credit or to forebear from enforcing repayment of debt including promises to extend or renew such debt are not enforceable. To protect you (Borrower(s)) and us (Creditor) from misunderstanding or disappointment, any agreements we reach covering such matters are contained in this writing, which is the complete and exclusive statement of the agreement between us, except as we may later agree in writing to modify it.



Boone County, Missouri
Unofficial Document

404

BY SIGNING BELOW, Borrower accepts and agrees to the terms and covenants contained in this Security Instrument and in any Rider executed by Borrower and recorded with it.


CAROL L. STEPNEY (Seal)
-Borrower

(Seal)
-Borrower

(Seal)
-Borrower

(Seal)
-Borrower

(Seal)
-Borrower

(Seal)
-Borrower

Witness:

Witness:



Boone County, Missouri
Unofficial Document


405

State of Missouri
County (and/or city) of BOONE

On this 8th day of July 2003, before me personally appeared
CAROL L. STEPNEY, ASP

to me known to be the person (or persons) described in and who executed the foregoing instrument, and acknowledged
that he/she/they executed the same as his/her/their free act and deed.

ANITA HALEY
Notary Public - Notary Seal
State of Missouri
County of Boone
My Commission Expires February 28, 2006


ANITA HALEY Notary Public

(Seal)

My commission expires:



EXHIBIT 'A'

**Lot One Hundred Twenty-three (123) of EL CHAPARRAL SUBDIVISION, PLAT NO. FOUR (4)
as shown on plat recorded in Plat Book 11, Page 29, Boone County Records.**

15

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

October Session of the October Adjourned

Term. 20 15

In the County Commission of said county, on the

20th

day of October

20 15

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby authorize the Presiding Commissioner to sign the attached Finding of Public Nuisance and Order for Abatement of a public nuisance located at 6200 E. O'Rear Road, parcel #12-313-11-01-005.00 01.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

Daniel K. Atwill
Daniel K. Atwill
Presiding Commissioner

Absent
Karen M. Miller
District I Commissioner

Janet M. Thompson
Janet M. Thompson
District II Commissioner

**BEFORE THE COUNTY COMMISSION OF
BOONE COUNTY, MISSOURI**

In Re: Nuisance Abatement)	October Session
6200 E Orear Rd)	October Adjourned
Columbia, MO 65202)	Term 2015
)	Commission Order No. <u>496-2015</u>

FINDING OF PUBLIC NUISANCE AND ORDER FOR ABATEMENT

NOW on this 20th day of October 2015, the County Commission of Boone County, Missouri met in regular session and entered the following findings of fact, conclusions of law and order for abatement of nuisance:

Findings of Fact and Conclusions of Law

The County Commission finds as fact and concludes as a matter of law the following:

1. The Boone County Code of Health Regulations (the "Code") are officially noticed and are made a part of the record in this proceeding.
2. The City of Columbia/Boone County Health Department administrative record is made a part of the record in this proceeding and incorporated herein by reference. In addition, any live testimony of the official(s) of the department and other interested persons are made a part of the record in this proceeding.
3. A public nuisance exists described as follows: junk piles in front yard as well as construction materials
4. The location of the public nuisance is as follows: 6200 E Orear Rd, Hillview Acres Blk 1 Lot 22 (a/k/a parcel # 12-313-11-01-005.00 01) Section 11, Township 49, Range 12 as shown by deed book 0010 page 0079, Boone County
5. The specific violation of the Code is: junk piles in front yard as well as construction materials in violation of sections 6.5 of the Code. The Health Director's designated Health Official made the above determination of the existence of the public nuisance at the above location. Notice of that determination and the requirement for abatement was given in accordance with section 6.10.1 of the Code on the 23 day of March, 2015, to the property owner, occupant, and any other applicable interested persons.
7. The above described public nuisance was not abated. As required by section 6.10.2 of the Code, the property owner, occupant, and any other applicable interested persons were given notice of the hearing conducted this date before the Boone County Commission for an order to abate the above nuisance at government expense with the cost and expense thereof to be charged against the above described property as a special tax bill and added to the real estate taxes for said property for the current year.
8. No credible evidence has been presented at the hearing to demonstrate that no public nuisance exists or that abatement has been performed or is unnecessary; accordingly,

in accordance with section 6.10.2 of the Code and section 67.402, RSMo, the County Commission finds and determines from the credible evidence presented that a public nuisance exists at the above location which requires abatement and that the parties responsible for abating such nuisance have failed to do so as required by the Health Director or Official's original order referred to above.

Order For Abatement Chargeable As a Special Assessment To The Property

Based upon the foregoing, the County Commission hereby orders abatement of the above described public nuisance at public expense and the Health Director is hereby authorized and directed to carry out this order.

It is further ordered and directed that the Health Director submit a bill for the cost and expense of abatement to the County Clerk for attachment to this order and that the County Clerk submit a certified copy of this order and such bill to the County Collector for inclusion as a special assessment on the real property tax bill for the above described property for the current year in accordance with section 67.402, RSMo.

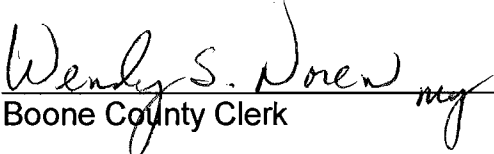
WITNESS the signature of the presiding commissioner on behalf Boone County Commission on the day and year first above written.

Boone County, Missouri
By Boone County Commission



Presiding Commissioner

ATTEST:



Boone County Clerk

6200 O'Rear Rd

Nguyen Ngoc B & Jasmin

ACTIVITY LOG

07/28/2015	citizen complaint received
08/18/2015	complaint investigated – Junk piles in front yard
08/18/2015	notice of violation sent via Certified Mail
08/20/2015	Letter returned to Health Department-no forwarding address
09/15/2015	reinspection conducted – violation still present
09/22/2015	hearing notice sent via First Class Mail
09/22/2015	Posted in Columbia Tribune
09/22/2015	pictures taken
10/20/2015	Hearing Date

Nguyen Ngoc B & Jasmin

6200 O'Rear Rd

12-313-11-01-005.00 01





9/18- sent to newspaper
9/22 ran in newspaper
10/5 Hearing date

Jul 28, 2015 4:15:58 PM CDT
File Edit Commands Help
SUNGUARD PUBLIC SECTOR
NavLine

6328
 Events
 Email log
 Reminders
 Work requests

Call Information
Call ID: 6358 Status: Open Entity: City of Columbia
Description: 6200 O'Rear Rd.
Comments
Broken windows, tall weeds, containers holding water.

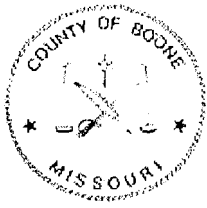
Call Details
Call type: CE-County Nuisance
Entry date/time: 07/27/2015 15:09:36
Entry user ID: Niles, Michelle M Health
Origin:
Work group: Environmental Health

Contact Information
Q Contact ID: 154830
Q Contact name: Undefined
Q From phone: (573) 555-5555
Customer:
Location:
Service:

Call Assignment/Notification
Contact notification: Call back
Notification date:
Email updates: No
Notification user:
Forward to user: Dewrock, Britni M - HL Env. I

Close Information
Close date/time: 00:00:00
Close user:
Elapsed time:
Action taken:

Print
Cancel
Exit
Refresh
Toggle Inform...
Contact Inquiry



Boone County Assessor

Boone County Government Center
801 E. Walnut, Room 143
Columbia, MO 65201-7733

Office (573) 886-4270
Fax (573) 886-4254

Parcel 12-313-11-01-005.00 01

Property Location 6200 E OREAR RD

City **BOONE COUNTY (L1)** Road **COMMON ROAD DISTRICT (CO)** School **HALLSVILLE (R4)**
Library **BOONE COUNTY (L1)** Fire **BOONE COUNTY (F1)**

Owner **NGUYEN NGOC B & JASMIN**
Address **1603 E TOWER DR**
City, State Zip **COLUMBIA, MO 65202**

Subdivision Plat Book/Page

0010 0079

Section/Township/Range **11 49 12**

Legal Description **HILLVIEW ACRES BLK 1
LOT 22**

Lot Size **70.00 x 115.00**

Deed Book/Page

3539 0067

2912 0062

0805 0854

Current Appraised

Type	Land	Bldgs	Total
RI	9,000	16,700	25,700
Totals	9,000	16,700	25,700

Current Assessed

Type	Land	Bldgs	Total
RI	1,710	3,173	4,883
Totals	1,710	3,173	4,883

Most Recent Tax Bill(s)

Residence Description

Year Built **1970 (ESTIMATE)**

Use **SINGLE FAMILY
(101)**

Basement **NONE (1)**

Attic **NONE
(1)**

Bedrooms **4**

Main Area **1,466**

Full Bath **1**

Finished Basement Area **0**

Half Bath **0**

Total Rooms **6**

Total Square Feet **1,466**

Boone County Recorder of Deeds

27462 WILSON ROAD, COLUMBIA, MO 65201

Phone

Nora Dietzel
Boone County , Missouri - Recorder of Deeds

[Click Here To View Document](#)

Boone County Recorder of Deeds
801 East Walnut, Rm. 132
Columbia, MO 65201-7728

(573) 886-4345 Office
(573) 886-4359 Fax

Document recording information

Instrument QTCL - QUIT CLAIM DEED
Document No. 2009022446
Book 3539
Page 67
Recording Date 8/17/2009 4:17:12 PM
Dated date 8/17/2009

Referenced By This Document (0)

References To This Document (0)

Grantor(s) (1)

NEXT MILLENNIUM LTD

Grantee(s) (2)

NGUYEN, NGOC B
NGUYEN, JASMIN

Grantee's Address

3702 MINT JULIP DR
COLUMBIA, MO 65202

Legal Description(s) (1)

LT 22 BL 1 FF HILLVIEW ACRES

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CITY OF COLUMBIA/BOONE COUNTY, MISSOURI

HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

NOTIFICATION OF DETERMINATION OF PUBLIC HEALTH HAZARD AND/OR NUISANCE AND ORDER FOR ABATEMENT

Nguyen Ngoc B & Jasmin
1603 E Tower Drive
Columbia, MO 65202

An inspection of the property you own located at 6200 E Orear Rd. (parcel # 12-313-11-01-005.00 01) was conducted on August 17, 2015 and revealed several piles of trash and junk on the premises.

This condition is hereby declared to be a public nuisance. You are herewith notified that you must begin correcting this condition within 7 days of receipt of this notice and order and that if the above nuisance condition has not been fully corrected within 15 days after the receipt of this notice, an additional enforcement action will result for violation of Boone County Public Nuisance Ordinance Section 6.3.6, 6.3.12. A reinspection will be conducted at the end of the 15-day period. If the above nuisance condition has not been fully corrected by that time, a hearing before the Boone County Commission will be called to determine whether a violation exists. If the County Commission determines that a violation exists and the nuisance has not been removed as ordered under this notice, the County Commission may have the nuisance removed with the cost of abatement, plus administrative fees, charged against the property in a special tax bill. In addition, a complaint may be filed against you in Circuit Court. If the above nuisance condition has been corrected within the 15-day period, no further action is necessary.

The purpose of these ordinances is to create and maintain a cleaner, healthier community. If you have any questions, please do not hesitate to contact our office. If you are not the owner or the person responsible for the care of this property, please call our office at the number listed at the bottom of this letter. Your cooperation is greatly appreciated.

Sincerely,

Britni Hendren

Britni Hendren
Environmental Public Health Specialist

This notice deposited in the U.S. Mail certified, return receipt requested on the 18th day of August 2015 by [signature]

1005 W. Worley • P.O. Box 6015 • Columbia, Missouri 65205-6015
Phone: (573) 874-7346 • TTY: (573) 874-7356 • Fax: (573) 817-6407
www.GoColumbiaMo.com



CITY OF COLUMBIA/BOONE COUNTY, MISSOURI



HEALTH DEPARTMENT
DIVISION OF ENVIRONMENTAL HEALTH

HEARING NOTICE

Nguyen Ngoc B & Jasmin
1603 E Tower Drive
Columbia, MO 65202

An inspection of the property you own located at 6200 Orear Rd (parcel #: 12-313-11-01-005.00 01) was conducted on August 17, 2015 and revealed broken glass, piles of trash. This condition is declared to be a nuisance and a violation of Boone County Public Nuisance Ordinance Section 6.3.5.

You are herewith notified that a hearing will be held before the County Commission on Tuesday October 20, 2015 at 9:30 am in the County Commission Chambers at the Boone County Government Center, 801 E. Walnut Street, Columbia, Missouri. The purpose of this hearing will be to determine whether a violation exists. If the County Commission determines that a violation exists, it will order the violation to be abated.

If the nuisance is not removed as ordered, the County Commission may have the nuisance removed. All costs of abatement, plus administrative fees, will be assessed against the property in a tax bill. **If the above nuisance condition has been corrected prior to the hearing, you do not have to appear for the hearing.**

The purpose of these ordinances is to create and maintain a cleaner, healthier community. If you have any questions, please do not hesitate to contact our office. If you are not the owner or the person responsible for the care of this property, please call our office at the number listed at the bottom of this letter.

Sincerely,

Britni Hendren
Environmental Public Health Specialist

This notice deposited in the U.S. Mail, first class postage paid on the 7th day of October 2015 by MD

1005 W. Worley • P.O. Box 6015 • Columbia, Missouri 65205-6015
Phone: (573) 874-7346 • TTY: (573) 874-7356 • Fax: (573) 817-6407
www.GoColumbiaMo.com



Britni Dewrock <bmdewroc@gocolumbiamo.com>

Quotes

2 messages

Britni Hendren <bmdewroc@gocolumbiamo.com>

Thu, Sep 24, 2015 at 3:42 PM

To: Cliff Hayward <tpmowing@gmail.com>

Doesn't look like its slowing down much yet... Need a few quotes for hearings in October

6200 O'Rear-junk in front yard

5342 N Rocky Fork Dr. tall grass front and back

Land parcel on S Blue Jay Way- it is located at the end of the street on the right. If you are looking at the last house on the right its on the right hand side.

Thanks

—

Britni Hendren

Environmental Health Specialist

City of Columbia/Boone County Public Health and Human Services

Cliff Hayward <tpmowing@gmail.com>

Tue, Oct 6, 2015 at 9:04 PM

To: Britni Hendren <bmdewroc@gocolumbiamo.com>

On Thursday, September 24, 2015, Britni Hendren <bmdewroc@gocolumbiamo.com> wrote:

Doesn't look like its slowing down much yet... Need a few quotes for hearings in October

— 6200 O'Rear-junk in front yard \$110

5342 N Rocky Fork Dr. tall grass front and back.... Haven't been there to bid yet...

Land parcel on S Blue Jay Way- it is located at the end of the street on the right. If you are looking at the last house on the right its on the right hand side. \$110

Thanks

—

Britni Hendren

Environmental Health Specialist

City of Columbia/Boone County Public Health and Human Services

AFFIDAVIT OF PUBLICATION

STATE OF MISSOURI) ss.
County of Boone)

I, Candra Galiley, being duly sworn according to law, state that I am one of the publishers of the Columbia Daily Tribune, a daily newspaper of general circulation in the County of Boone, State of Missouri, where located; which newspaper has been admitted to the Post Office as periodical class matter in the City of Columbia, Missouri, the city of publication; which newspaper has been published regularly and consecutively for a period of three years and has a list of bona fide subscribers, voluntarily engaged as such, who have paid or agreed to pay a stated price for a subscription for a definite period of time, and that such newspaper has complied with the provisions of Section 493.050, Revised Statutes of Missouri 2000, and Section 59.310. Revised Statutes of Missouri 2000. The affixed notice appeared in said newspaper on the following consecutive issues:

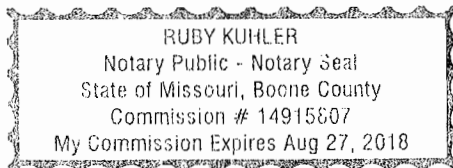
- 1st Insertion _____ September 22, 2015
- 2nd Insertion _____
- 3rd Insertion _____
- 4th Insertion _____
- 5th Insertion _____
- 6th Insertion _____
- 7th Insertion _____
- 8th Insertion _____
- 9th Insertion _____
- 10th Insertion _____
- 11th Insertion _____
- 12th Insertion _____
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- 14th Insertion _____
- 15th Insertion _____
- 16th Insertion _____
- 17th Insertion _____
- 18th Insertion _____
- 19th Insertion _____
- 20th Insertion: _____
- 21st Insertion: _____
- 22nd Insertion: _____

\$62.88
Printer's Fee

By: Candra Galiley
Candra Galiley

Subscribed & sworn to before me this 23 day of September, 2015

[Signature]
Notary Public



**NOTICE OF DECLARATION OF
PUBLIC NUISANCE
AND ORDER OF ABATEMENT**

To: Nguyen Ngoc B & Jasmin
1603 E Tower Drive
Columbia, MO 65202

In accordance with section 67.402 RSMo and section 6.3.9 and 6.3.10, Boone County Code of Health Regulations, the undersigned gives notice to the above named persons or entities that the following described real property is hereby declared to contain the following described public nuisance which is ordered abated within 15 days of the date of this notice, and that if such abatement does not occur, then such nuisance may be ordered abated by action of the Columbia/Boone County Department of Public Health, with the cost thereof to be the subject of a special tax bill against the property subject to abatement.

Property Description: Hillview Acres Blk 1, Lot 22, a/k/a 6200 E Orear Rd., as shown by deed book 0010 page 0079

Type of Nuisance: Junk, trash, rubbish, a derelict and/or inoperable appliance and other items.

The above named persons are further notified that if they fail to abate such nuisance within the time specified in this notice, or fail to appeal this declaration of public nuisance and order of abatement within the time permitted for abatement specified in this notice, then a public hearing shall be conducted before the Boone County Commission, Commission Chambers, 801 E. Walnut, Columbia MO 65201, at a time and date determined by the Commission, and the County Commission will make findings of fact, conclusions of law and a final decision concerning the public nuisance and order of abatement set forth herein. For information concerning these proceedings, contact the Columbia/Boone Department of Public Health, 1005 W. Worley Street, Columbia, MO 65203. Date of Declaration, Order and Publication:
Stephanie Browning, Director,
Columbia/Boone County
Department of Public Health

INSERTION DATE: September 22, 2015.

Boone County, Missouri
Unofficial Document



Recorded In Boone County, Missouri
Date and Time: 08/17/2009 at 04:17:12 PM
Instrument # 2009022446 Book 3539 Page 67

Grantor NEXT MILLENNIUM LTD
Grantee NGUYEN, NGOC B

Instrument Type QTCL
Recording Fee \$27.00 S
No of Pages 2

Bottle Johnson
Bottle Johnson, Recorder of Deeds



QUIT-CLAIM DEED

(INFORMATION PROVIDED ON THIS DOCUMENT MUST BE TYPED OR PRINTED)

THIS INDENTURE, Made and entered into this 17th day of August A.D. Two Thousand and 09 by and between Next Millennium LTD (Grantor), of the County of Boone, in the State of Missouri, party or parties of the First Part, and Ngoc B. Nguyen and Jasmin Nguyen (Grantee), (Grantee's mailings address) 3702 Mint Julep Dr., Columbia, Mo. 65202 of Boone County, State of Missouri party or parties of the Second Part:

WITNESSETH, That the said party or parties of the First Part in consideration of the sum of ten dollars and other valuable considerations paid by the said party or parties of Second Part, the receipt of which is hereby acknowledged, does or do by these presents, Remise, Release and forever Quit Claim, unto the said party or parties of the Second Part, the following described real estate, lying, being and situate in the County of Boone and State of Missouri, to-wit:

Parcel number 12-313-11-01-005.00
6200 O'Rear Rd. Sec. 11 Twp. 49 Rng. 12
Hillview Acres Blk 1 Lot 22
As recorded in Deed Book and Page 0805/0854

TO HAVE AND TO HOLD the same with all the rights and immunities, privileges and appurtenances thereto belonging, unto the said party or parties of the Second Part, and their heirs and assigns, FOREVER; so that neither the said party or parties of the First Part, nor their heirs, nor any other person or persons for them or in their name--or behalf, shall or will hereafter claim or demand any right or title to the aforesaid premises or any part thereof but they and every one of them shall, by these presents, be excluded and forever barred.

IN WITNESS WHEREOF, The said party or parties of the First Part has or have hereunto set their hand or hands the day and year first above written.

Witness *Robert W. Hawkins*
Robert W. Hawkins

James Rausch
JAMES RAUSCH

(ALL SIGNATURES MUST HAVE THE NAME TYPED OR PRINTED UNDERNEATH)

Nora Dietzel, Recorder of Deeds

Boone County, Missouri
Unofficial Document

BOONE COUNTY MO AUG 17 2009

STATE OF MISSOURI)
COUNTY OF BOONE) ss.

On this 17TH day of AUGUST, 20 09 before me personally appeared JAMES RAUSCH /

NEW MILLENNIUM LTD. to me known to be the person or persons described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my

official seal at my office in BOONE COUNTY, the day and year first above written.

My term expires 4/21/12

AARON R. ARMENTROUT
NOTARY PUBLIC - NOTARY SEAL
STATE OF MISSOURI
BOONE COUNTY
MY COMMISSION EXPIRES APRIL 21, 2012
COMMISSION # 08539276

(Seal)

[Signature]
Notary Public

Aaron R. Armentrout



CITY OF COLUMBIA / **BO**
DEPARTMENT

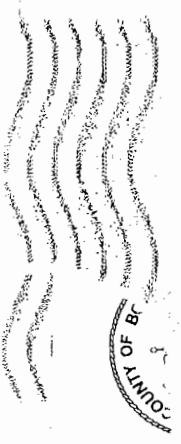


1005 W. WORLEY
P.O. Box 6015
COLUMBIA, MISSOURI 65205-6015

CERTIFIED MAIL



7014 3490 0002 2759 8238



Handwritten signature

AZARD AND/OR NUISANCE AND

NIXIE

DC 1

0009/08/15

guyen Ngoc B & Jasmin
'03 E Tower Drive

RETURN TO SENDER
UNCLAIMED
UNABLE TO FORWARD

EC: 6520506015 *1515-00429-00-28

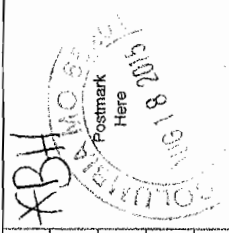
6520506015

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

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OFFICIAL USE

Postage	\$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	\$ 6.73



Sent To
Ngoc & Jasmin Nguyen
Street & Apt. No. 1603 E Tower Dr.
or PO Box No.
City, State, ZIP+4
Columbia, MO 65202

PS Form 3800, July 2014 See Reverse for Instructions

8622 6522 2000 0664 4704

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

October Session of the October Adjourned

Term. 20 15

In the County Commission of said county, on the

20th

day of October

20 15

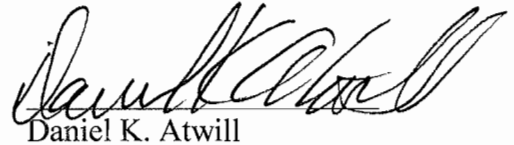
the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby release a Cash Deposit from the Boone County Treasurer in the amount of \$25,410.00. Said deposit was issued on behalf of Alta Vista Properties, LLC for stormwater improvements located at 10140 Alexander Dr., in Columbia, MO. The work has been completed as required. The original Commission Order accepting the Cash Deposit is 211-2014.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission



Daniel K. Atwill
Presiding Commissioner

Absent

Karen M. Miller
District I Commissioner



Janet M. Thompson
District II Commissioner

211 -2014

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

May Session of the April Adjourned

Term. 20 14

In the County Commission of said county, on the 1st day of May 20 14

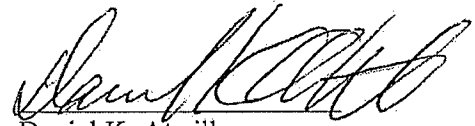
the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the attached Stormwater Erosion and Sediment Control Security Agreement for 10140 Alexander Drive.

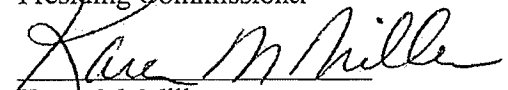
Done this 1st day of May, 2014

ATTEST:

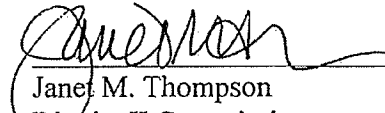
Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission



Daniel K. Atwill
Presiding Commissioner



Karel M. Miller
District I Commissioner



Janet M. Thompson
District II Commissioner

Stormwater Erosion and Sediment Control Security Agreement

Date: April 24, 2014

Developer/Owner Name: Alta Vista Properties LLC
Address: 503 E. Nifong, Ste 249
Columbia, MO 65201

Development: 10140 Alexander Drive

This agreement is made by and between the above named developer (herein "Developer") and Boone County, Missouri, a political subdivision of the State of Missouri, through its Resource Management Department, (herein "County") and shall be effective on the above date when signed and approved by all persons listed below.

In consideration of the performance based by each party of their respective obligations described in this agreement, the parties agree to the following:

1. **Background and Purpose of Agreement** – The Developer is the owner or authorized agent of the owner for the real estate contained within the development described above which is subject to the Boone County Stormwater Regulations. This agreement is made pursuant to Section 8.4 Performance and Guarantee, in the Stormwater Regulations of Boone County, Missouri in order to permit the Developer to disturb land on the development described above, and to assure County of the required erosion and sediment control and stormwater management. By entering into this agreement the developer is agreeing to comply with the erosion and sediment plan described below in accordance with the County Stormwater Regulations and specifications and provide to County financial security in the event the developer fails to comply with the plan, or complete the improvements within the time and manner provided for by this agreement.
2. **Description of Improvements** – The Developer agrees to adhere to the Stormwater Pollution Prevention Plan (SWPPP) and Erosion and Sediment Control (ESC) Plans for Construction activities at 10140 Alexander Drive. The SWPPP and ESC was prepared by Crockett Engineering Consultants on April 2, 2014.
3. **Time for Completion** – The Developer agrees to complete the land disturbance activities and stabilize the site as described in the SWPPP no later than the April 24, 2016, and all such improvements shall pass County inspection as of this date.
4. **Security for Performance** – To secure the Developer's performance of its obligations under this agreement, Developer hereby agrees to provide the County with security in the amount of \$25,410.00, which County may use and apply for completion of the above described improvements in the event the Developer fails to complete the above described improvements within the time or within manner required by County under its regulations.

The Security shall be provided to County as a condition precedent to the effectiveness of this agreement in the following form:

Cash deposit with County Treasurer

5. **Use of Security** – The Developer hereby authorizes County to use, redeem, or otherwise obtain payment as applicable, from the security described above for purposes of completing improvements required of the Developer under this agreement in the event that such improvements are not completed within the time provided for by this agreement, or any extension thereof granted by County in its discretion, or in the event such improvements are not completed in accordance with regulatory requirements or specifications imposed by County. Developer authorizes County to cash the cash deposit contemplated herein upon written instructions from the duly-elected and serving Treasurer of Boone County without further authorization or signature required by Developer. In the event Developer fulfills its obligations in the time and manner required by this agreement and obtains a satisfactory final inspection from the County prior to April 24, 2016, then County shall provide Developer with written proof that the requirements of this Security Agreement are satisfied and the cash deposit can be released to Developer. If no written proof has been provided to the financial institution issuing the cash deposit that Developer has complied with the requirements of this Agreement, however, then the financial institution shall, on April 24, 2016, or such extended period as mutually-agreed by the parties in writing, shall immediately transfer the balance of the cash deposit to the account then-designated by the Boone County Treasurer. If the total sum of the cash deposit is not used for completion of any necessary permit items, then the remaining balance shall be paid to Developer within thirty (30) days of completion and acceptance of any required work, along with an itemization of charges detailing the expenditures made by the County.
6. **Additional Sums Due** – In the event that the security provided herein is insufficient to complete the required improvements as determined by the County, Developer will, upon demand by the County accompanied by a detailed itemization of the requested additional sum, deposit with County such additional monies which, in the opinion of the County, will be required to complete the necessary improvements. In the event that Developer does not deposit the additional monies with the County within ten (10) days, the Developer shall be deemed in default of this Agreement.
7. **Remedies Cumulative** – Exercise or waiver by the County of any enforcement action under this Agreement does not waive or foreclose any other or subsequent enforcement action whatsoever. The County shall be entitled to its costs, including reasonable attorneys' fees, in enforcement of Developer's obligations under this Agreement.
8. **Authority of Representative Signatories** – Signatories to this agreement who execute this agreement in a representative capacity for a corporation, limited liability company or partnership, or other business entity, hereby affirmatively represent that they have obtained all resolutions or orders needed to enter in this agreement and are duly authorized to enter into this agreement and bind the parties which they represent to all terms and conditions herein.

9. **Binding Effect** – This agreement shall be binding upon the parties hereto in their respective heirs, personal representative, administrators, successors and interest in successors in assigned offices. The County and Developer hereby accept this Agreement as a lawful and satisfactory Security Agreement.

In Witness Whereof the Developer and the County have executed this agreement to be effective on the day and year first above written.

ACKNOWLEDGED AND AGREED TO:

Developer/Owner:

By: 

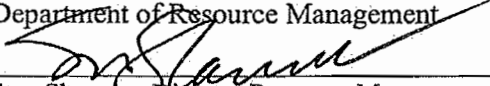
Alta Vista Properties, Inc

Printed Name: Larry Potterfield

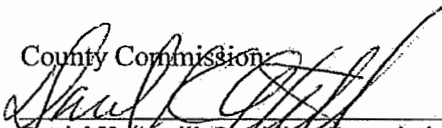
Title: Member

BOONE COUNTY, MISSOURI:

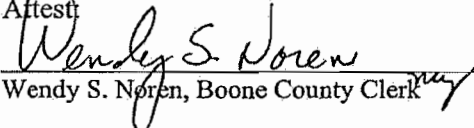
Department of Resource Management


Stan Shawver, Director Resource Management

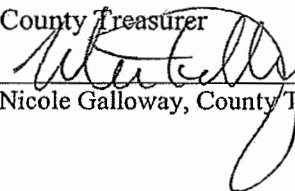
County Commission:


Daniel K. Atwill, Presiding Commissioner

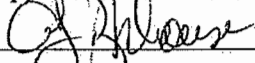
Attest


Wendy S. Noren, Boone County Clerk

County Treasurer


Nicole Galloway, County Treasurer

Approved as to form:



C.J. Dykhouse, County Counselor

BOONE COUNTY TREASURER RECEIPT

Receipt Number: 2014 1381 Receipt Date: 4/25/2014

Employee Initials: TRTANSY

Received From: STORMWTR EROSION/RESOURCE MGMT

Amount: \$*****25,410.00

Remarks: 10140 ALEXANDER DRIVE
ALTA VISTA PROP-SECURITY/DEP



Nicole Galloway, CPA
Boone County Treasurer


Treasurer of Boone County

CERTIFIED COPY OF ORDER

STATE OF MISSOURI

} ea.

October Session of the October Adjourned

Term. 20 15

County of Boone

20th

day of October

20 15

In the County Commission of said county, on the

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the attached Road & Bridge Improvement/Repair Cooperative Agreement between Boone County and the City of Rocheport regarding the distribution of certain road sales tax and property tax revenues.

It is further ordered the Presiding Commissioner is hereby authorized to sign said Road & Bridge Improvement/Repair Cooperative Contract.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

[Signature]

Daniel K. Atwill
Presiding Commissioner

Absent

Karen M. Miller
District I Commissioner

[Signature]
Janet M. Thompson
District II Commissioner

**BOONE COUNTY ROAD & BRIDGE IMPROVEMENT/REPAIR
COOPERATIVE AGREEMENT
APPLICATION ENTITIES¹**

THIS AGREEMENT, dated this 20th day of October, 2015, is made and entered into by and between **Boone County**, a first class non-charter county and political subdivision of the State of Missouri by and through its County Commission, herein "County" and the **City of Rocheport**, a municipal corporation, herein "City".

WHEREAS, County has, in Commission Order 249-2011, adopted updated policies regarding the distribution of certain road sales tax and property tax revenues, the terms and conditions of which are incorporated herein by reference; and

WHEREAS, City is an "Application Entity" as described in the aforementioned Commission Order; and

WHEREAS, City has been classified as an Application Entity that will receive an annual amount as described in Commission Order 609-2012, the terms and conditions of which are incorporated herein by reference; and

WHEREAS, County is willing to enter into a cooperative agreement with the City for the improvement and/or repair of City's road system under certain terms and conditions; and

WHEREAS, the parties are empowered to enter into cooperative agreement(s) for the purposes herein stated pursuant to section 70.220 and section 229.040 RSMo.

NOW, THEREFORE, IN CONSIDERATION of the mutual undertakings and agreements herein contained, the parties agree as follows:

1. **PURPOSE.** The purpose of this Agreement is to effectuate the Application-Based Funding from the County to the City as contemplated in County's policies on distributing road sales tax revenue and road property tax revenues. The terms and conditions of Commission Order 249-2011& 609-2012 are incorporated into this agreement by reference.
2. **COUNTY AGREEMENTS:**
 - a. County will pay to the City the sum of **Fifteen Thousand Five Hundred Sixty Four Dollars and Eighty-Two Cents (\$15,564.82)** as determined by the formula for Year 3 of the 6-year cycle as described in the aforementioned Commission

¹ Application entities are: Harrisburg, Hartsburg, Huntsdale, McBaine, Pierpont, Rocheport and Sturgeon.

4. **PAYMENTS IN EXCESS OF LEGAL OBLIGATIONS.** City represents that the payments from County to City contemplated herein are in excess of any legal obligations imposed on County by virtue of applicable Missouri law, including RSMo §137.556 and the ballot language presented to voters authorizing the current Road & Bridge Sales Tax Levy under RSMo §67.547.
5. **TIMING OF PAYMENTS.** The payments from County to City contemplated herein will occur one time per year, near the beginning of the fourth quarter of the calendar year, and after receipt of the fully executed annual agreement.
6. **REPORTING.** City shall file a written report with County, at least annually, detailing the road and bridge improvement projects funded in whole or in part with the funding received herein, as well as provide a summary of any planned, future projects that are anticipated to be funded with current or future funding from the County. Said reports shall be in sufficient detail so as to allow County to document what specific portions of any City project were funded or are contemplated to be funded with funds received from the County.
7. **ASSIGNMENT.** Neither party may assign or transfer any of its rights or obligations under this Agreement to any other person or entity without the prior, written consent of the other party.
8. **SOLE BENEFIT OF PARTIES.** This Agreement is for the sole benefit of City and County. Nothing in this Agreement is intended to confer any rights or remedies on any third party.
9. **RELATIONSHIP OF PARTIES.** Nothing herein shall be deemed or construed by the parties hereto, nor by any third party, as creating the relationship of principal and agent, or of partnership, or of joint venture, between the parties hereto.
10. **TERM.** This Agreement shall be in effect from its execution until January 1 of the following calendar year.
11. **TERMINATION.** Either party may terminate this Agreement upon thirty (30) days written notice directed to the other party.
12. **NONAPPROPRIATION.** The payments from County contemplated herein are conditioned upon there being a sufficient, unencumbered fund balance budgeted for that purpose. The County's obligations hereunder shall not in anyway be construed to be a

BOONE COUNTY

By:



Presiding Commissioner

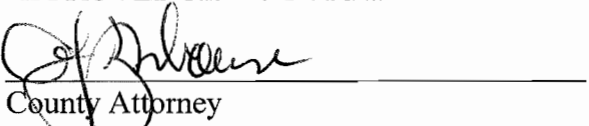
Date: 10-20-15

ATTEST:



County Clerk

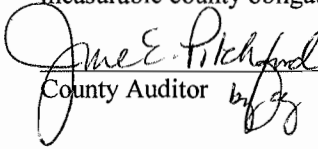
APPROVED AS TO FORM:



County Attorney

Boone County Auditor Certification:


I hereby certify that a sufficient, unencumbered appropriation balance exists and is available to satisfy the obligation arising from this contract. (Note: Certification of this contract is not required if the terms of this contract do not create a measurable county obligation at this time.)



County Auditor *by [initials]* 10/19/15
Date 2049-71452

CITY of ROCHEPORT

By:



Authorized City Representative

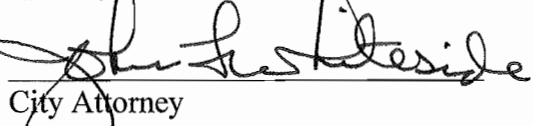
Date: 10-15-15

ATTEST:



City Clerk

APPROVED AS TO FORM:



City Attorney

2015 Road & Bridge Sales Tax Distribution
 Period: March 2014 - February 2015

FY 2014 R&B Sales Tax Revenue:
 Less: Total Property Tax Reduction Due to Voluntary Rollback:
 Net Additional Sales Tax Revenue:

13,754,106.70
 (5,562,095.66)
8,192,011.04

82.25% Retained by County
 1.00% Allocated to Application Entities:
 13.00% Allocated to Formula Entities based on AV%—A
 2.25% Allocated to Formula Entities (excl Columbia)—B
 1.50% Allocated to CSRD
 100.00%

6,737,929.07
 81,920.11
6,819,849.18
 184,320.25
7,004,169.43
 122,880.17
7,127,049.60

Year	R & B Tax Levy Ceiling Rate:	Actual Road & Bridge Tax Levy Rate:
1997	0.27	0.05
1998	0.28	0.05
1999	0.28	0.05
2000	0.28	0.05
2001	0.28	0.05
2002	0.28	0.05
2003	0.28	0.05
2004	0.28	0.05
2005	0.2601	0.0475
2006	0.2601	0.0475
2007	0.2601	0.0475
2008	0.2601	0.0475
2009	0.2632	0.0475
2010	0.2649	0.0475
2011	0.2657	0.0475
2012	0.2677	0.05
2013	0.2677	0.05
2014	0.2677	0.05

A= Distribution Frequency = Annual
 M= Distribution Frequency= Monthly
 C= Distribution Frequency determined by Contractual Terms

Entity	Classify for Formula	Actual AV at 31-Dec	AV% (A)	Actual AV at 31-Dec	AV% (B)	Property Tax Pass Thru to CSRD Fund 700	Statutory Dist. To Cities Actual R&B Prop Tx	Sales Tax Needed to Cover PropTax Roll Back
Cities, Towns, Villages:								
Ashland	Formula	51,803,505	2.7%	51,803,505	44.3%	27,168.99	6,239.86	A
Centralla	Formula	48,995,944	2.5%	48,995,944	41.9%	26,751.40	6,143.93	A
Columbia	Formula	1,813,684,109	93.9%	n/a	n/a	982,483.53	225,645.97	A
Hallsville	Formula	16,172,328	0.8%	16,172,328	13.8%	8,513.20	1,955.18	A
Harrisburg	Application	n/a	n/a	n/a	n/a	1,324.03	304.08	A
Hartsburg	Application	n/a	n/a	n/a	n/a	473.35	108.72	A
Rocheport	Application	n/a	n/a	n/a	n/a	1,503.84	345.38	A
Sturgeon	Application	n/a	n/a	n/a	n/a	3,686.51	846.66	A
Huntsdale	Application Pool	n/a	n/a	n/a	n/a	98.67	22.66	A
McBaine	Application Pool	n/a	n/a	n/a	n/a	25.00	5.74	A
Pierpont	Application Pool	n/a	n/a	n/a	n/a	574.15	131.88	A
Application Pool	Application Pool	n/a	n/a	n/a	n/a	1,052,602.67	241,750.06	C
SubTotal All Cities, Towns, Villages:								
							241,750.06	

Entity	Classify for Formula	Actual AV at 31-Dec	AV% (A)	Actual AV at 31-Dec	AV% (B)	Property Tax Pass Thru to CSRD Fund 700	Statutory Dist. To Cities Actual R&B Prop Tx	Sales Tax Needed to Cover PropTax Roll Back
Road District								
CSRD		64,536,311	n/a	n/a	n/a	26,402.66	114,148.70	M
Grand Total			100.0%		100.0%			

General Ledger Accounts:
 Office Preparing Payment Requisition:

2049-71452	Resource Mngt	2049-71451	Resource Mngt	2049-71453	Resource Mngt
7000-86890	Treasurer	2049-71350	Resource Mngt	2049-71405	Resource Mngt

Entity	Classify for Formula	Sales Tax Distribution To Application Entities	Sales Tax Distribution To Formula Entities (A)	Sales Tax Distribution To Formula Entities (B)	Sales Tax Distribution To CSRD	Total
Cities, Towns, Villages:						
Ashland	Formula	n/a	28,575.13	81,630.25	n/a	143,614.23
Centralla	Formula	n/a	27,026.46	77,206.18	n/a	137,127.97
Columbia	Formula	n/a	1,000,439.10	n/a	n/a	2,208,568.60
Hallsville	Formula	n/a	8,920.75	25,483.82	n/a	44,872.95
Harrisburg	Application	13,107.22	n/a	n/a	n/a	14,735.33
Hartsburg	Application	9,830.41	n/a	n/a	n/a	10,412.48
Rocheport	Application	15,564.82	n/a	n/a	n/a	17,414.04
Sturgeon	Application	39,321.65	n/a	n/a	n/a	43,854.82
Huntsdale	Application Pool	n/a	n/a	n/a	n/a	121.33
McBaine	Application Pool	n/a	n/a	n/a	n/a	30.74
Pierpont	Application Pool	n/a	n/a	n/a	n/a	706.03
Application Pool	Application Pool	4,096.01	n/a	n/a	n/a	4,096.01
SubTotal All Cities, Towns, Villages:		81,920.11	1,064,961.44	184,320.25	n/a	2,625,554.53
		81,920.11	1,064,961.44	184,320.25	n/a	2,625,554.53
Road District						
CSRD		n/a	n/a	n/a	122,880.17	263,481.53
Grand Total		81,920.11	1,064,961.44	184,320.25	122,880.17	2,888,986.06

CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

October Session of the October Adjourned

Term. 20 15

In the County Commission of said county, on the

20th

day of October

20 15

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the attached Intergovernmental Cooperative Agreement between Boone County, the City of Columbia and the Curators of the University of Missouri under the Collaborative Adaptive Management (CAM) process with regard to the Hinkson Creek Physical Habitat Assessment.

It is further ordered the Presiding Commissioner is hereby authorized to sign said Intergovernmental Cooperative Agreement.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

[Signature]
Daniel K. Atwill
Presiding Commissioner

Absent
Karen M. Miller
District I Commissioner

[Signature]
Janet M. Thompson
District II Commissioner

**INTERGOVERNMENTAL COOPERATIVE AGREEMENT PARTIAL
PERFORMANCE ACKNOWLEDGEMENT OF HINKSON CREEK PHYSICAL
HABITAT ASSESSMENT**

The parties hereto are the City of Columbia, Missouri, a Constitutional charter city of the State of Missouri (the "City"), the County of Boone, a first class non-charter county and political subdivision of the State of Missouri by and through its County Commission (the "County"), and The Curators of the University of Missouri (University) and those parties enter this Partial Performance Acknowledgement (Acknowledgement) this ___ day of _____, 2015, by stating as follows:

Whereas, the parties entered an Intergovernmental Cooperation Agreement, attached hereto as Addendum A, on April 2, 2013; and

Whereas, in that Agreement the parties acknowledged their mutual obligations in certain projects initiated under a Collaborative Adaptive Management (CAM) process emanating from a Municipal Separate Storm Sewer System (MS4) permit issued by the Missouri Department of Natural Resources; and,

Whereas, the first two projects initiated in that CAM process have now been completed; and,

Whereas, the parties now wish to acknowledge those projects' completion and affirm and restate their full performance of their respective obligations under these two projects,

Whereas, the parties also wish to agree to the scope and details and costs of a third project known as the "Combined Flow and Suspended Sediment Proposal".

NOW, THEREFORE, in consideration of the mutual covenants in this Acknowledgement, the parties agree that:

1. The University has directed the completion of the Physical Habitat GIS Data Development, as described in the attached Addendum B, and the parties affirm and restate that the scope of the project and the amounts not to be exceeded are acceptable as the University has been fully compensated by the City and the County with each of them contributing \$6,665.59.

2. The University has also directed the completion of the Physical Habitat Data Development, Project 2013MO142B, as described in the attached Addendum C. The parties affirm and restate the scope of the project.

3. The initial proposed cost of the project described in the attached Addendum C to be shared by the parties, \$66,001.00, was to have been reduced to \$44,001.00 by an anticipated federal grant. That grant, however, failed to issue, leaving the final cost to be shared by the parties at \$66,001.00.

4. The City affirms and restates that the project and amount not to be exceeded are acceptable to the parties, and the University agrees it has been fully compensated by the City by the City's payment of the City's proportionate one third share of \$22,000.00.

5.. The County agrees to pay to the University \$22,000.00, upon the execution of this acknowledgement, which the University agrees will constitute the County's full performance of its obligations for the projects described in Addenda B and C, the completed portions of Addendum A, the Intergovernmental Cooperation Agreement and this is acceptable to the parties.

6.. The parties now agree to the scope and details of the next project known as the "Combined Flow and Suspended Sediment Proposal" as described in the attached Addendum D. This project has a total not to exceed amount of \$280,000.00; however the University agrees that it will pay the full cost of the first year of the project without contribution by the City or the County, with a first year estimated cost of \$69,916.50. As set forth in Addendum D the total cost to be shared by the parties in the following three years is \$210, 441.24; with each of the parties proportionate one third costs not to exceed \$23,320.78 in year two; \$23,320.15 in year three; and \$23,506.15 in year four. The proportionate payments shall be subject to the appropriations of the each of the Parties. Subject to appropriation, the City Manager will have the authority make payment on behalf of the City to the University, after receiving an invoice for the proper amounts as set forth herein. Subject to appropriations, the University and County shall take whatever individual actions they deem appropriate to make payment for the proper amounts as set forth herein.

7. The parties also now agree to the scope and details of the next project known as the "Forum Nature Area Level Spreader Monitoring Proposal", as described

in the attached Addendum E. This project has a total not to exceed amount of \$62,250.00, with each of the parties' total proportionate one-third costs not to exceed \$ 20,750.00, or \$7,416.67 in year one and \$3,333.33 for each of years two through five. The proportionate payments shall be subject to the appropriations of the each of the Parties. Subject to appropriation, the City Manager will have the authority make payment on behalf of the City to the University, after receiving an invoice for the proper amounts as set forth herein. Subject to appropriations, the University and County shall take whatever individual actions they deem appropriate to make payment for the proper amounts as set forth herein. Further, Dr. Enos Inniss, will assume Dr. Jason Hubbard's responsibilities as project director.

8. No party may assign or transfer any of its rights or obligations under this Agreement to any other person or entity without the prior, written consent of the other parties.

9. This Agreement is for the sole benefit of parties, and nothing in this Agreement is intended to confer any rights or remedies on any third party.

10. Nothing in this Agreement will be deemed or construed by the parties, nor by any other entity or person, as creating any principal and agent relationship, or partnership, or joint venture, between the parties.

11. This Agreement will be governed by the laws of the State of Missouri, and any action relating to this Agreement will be brought in the Circuit Court of Boone County, Missouri.

12. The covenants, agreements, and obligations in this Agreement will extend to, bind, and inure to the benefit of the parties and their respective successors and approved assigns.

13. Each person signing this Agreement on behalf of any of the parties represents that he or she has been duly authorized and empowered, by order, ordinance, or otherwise, to execute this Agreement and that all necessary action on behalf of that party to effectuate that authorization has been taken and done.

14. The Parties state that this Agreement, together with its attached Addenda A through E, contains the entire agreement between the Parties, and there are no other oral, written, express, or implied promises, agreements, representations, or inducements not specified herein.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed by their duly-authorized officers on day and year indicated by their signature below.

The Curators of the University of Missouri

By: _____

Date: _____

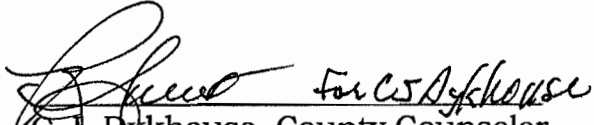
BOONE COUNTY, MISSOURI

BY: _____
Dan Atwill, Presiding Commissioner

ATTEST:

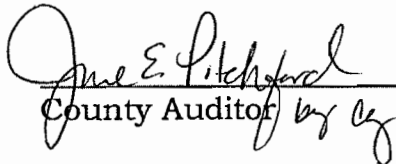
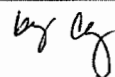
Wendy S. Noren, County Clerk

APPROVED AS TO LEGAL FORM:


C.J. Dykhouse, County Counselor

Boone County Auditor Certification:

I hereby certify that a sufficient, unencumbered appropriation balance exists and is available to satisfy the obligation arising from this contract. (Note: Certification of this contract is not required if the terms of this contract do not create a measurable county obligation at this time.)


County Auditor by  Date 10/9/15 1725- 71100

CITY OF COLUMBIA, MISSOURI

By: _____
Mike Matthes, City Manager

Date

ATTEST:

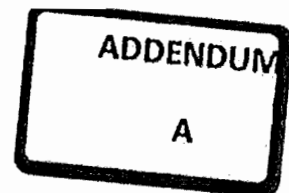
Sheela Amin, City Clerk

APPROVED AS TO FORM:

Nancy Thompson, City Counselor

I hereby certify that this Contract is within the purpose of the appropriation to which it is to be charged, that is, account _____ and that there is an unencumbered balance to the credit of such account sufficient to pay therefore.

John Blattel, Director of Finance



INTERGOVERNMENTAL COOPERATION AGREEMENT

This intergovernmental cooperation agreement (the "Agreement") is entered into on this 2nd day of April, 2013, by and between the City of Columbia, Missouri, a Constitutional charter city of the State of Missouri (hereinafter referred to as the "City"), and the County of Boone in the State of Missouri (hereinafter referred to as "County"), and The Curators of the University of Missouri (hereinafter referred to as "University"); and may collectively be referred to as the "Parties."

WHEREAS, a Total Maximum Daily Load (TMDL) for Hinkson Creek was issued by the Federal Environmental Protection Agency (EPA) in 2011; and

WHEREAS, the City, County, and University are partners in a Municipal Separate Storm Sewer System (MS4) permit issued by the Missouri Department of Natural Resources, which is affected by the TMDL; and

WHEREAS, the City, County, and University entered into an agreement with the EPA and the Missouri Department of Natural Resources (DNR) to address the TMDL with a Collaborative Adaptive Management (CAM) process; and

WHEREAS, the City, County, and University wish to enter into an agreement with regard to how the Parties will contribute to projects that are initiated in the CAM process to address the TMDL.

NOW, THEREFORE, the parties agree as follows:

- 1 **TYPES OF PROJECTS.** The Parties will contribute to projects which are initiated in the CAM process to address the TMDL for research, study, or monitoring-type projects and for construction projects.

For research, study, or monitoring-type projects, the three entities will each be responsible for one-third of the project cost. The University shall coordinate research, study, or monitoring-type projects on behalf of the parties. Before any research, study, or monitoring-type project is started, the Parties shall agree in writing regarding the scope and details of the project, including a not-to-exceed amount for each project.

For construction projects, each entity will exercise discretion and control over projects and be responsible for the costs of projects conducted on its own property unless otherwise agreed between the parties in writing.

2. **APPROPRIATIONS.** All types of projects shall be subject to the appropriations of the Parties who shall pay for the projects. Subject to these appropriations, the Parties shall each delegate in writing a person who shall be responsible for implementing this agreement and any associated documents or contracts to give this agreement effect.



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CAM PROJ HINKSON CREEK

3. **TERM.** The effective date of this Agreement is the date the last party executes the Agreement and provides original executed documents to the other Parties. Any of the Parties may terminate this Agreement at any time by providing the other Parties written notice of their intent to terminate at least thirty (30) days in advance of the intended termination date
4. **ASSIGNMENT.** None of the Parties may assign or transfer any of its rights or obligations under this Agreement to any other person or entity without the prior, written consent of the other Parties.
5. **SOLE BENEFIT OF PARTIES.** This Agreement is for the sole benefit of the City, County and University. Nothing in this Agreement is intended to confer any rights or remedies on any third party.
6. **ENTIRE AGREEMENT.** The Parties state that this Agreement contains the entire agreement between the Parties, and there are no other oral, written, express or implied promises, agreements, representations or inducements not specified herein.
7. **AUTHORITY.** The signatories to this Agreement warrant and certify that they have obtained the necessary authority, by resolution or otherwise, to execute this Agreement on behalf of the named party for whom they are signing.

[SIGNATURES ON THE FOLLOWING PAGES]

IN WITNESS WHEREOF, the Parties hereto have been duly authorized to execute this Agreement as of the day and year first above written.

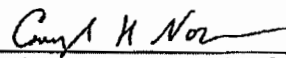
CITY OF COLUMBIA, MISSOURI

By: 
Mike Matthes, City Manager

ATTEST:


Sheela Amin, City Clerk

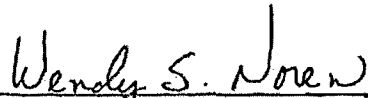
APPROVED AS TO FORM:


Fred Boeckmann, City Counselor
Cavanaugh Nace


BOONE COUNTY, MISSOURI

By: 
Dan Atwill, Presiding Commissioner

ATTEST:

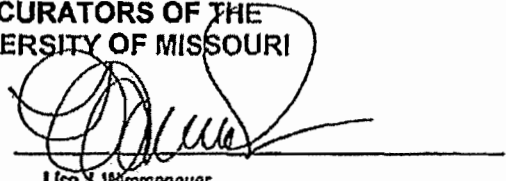

Wendy Noren, County Clerk *my*

APPROVED AS TO FORM:


C.J. Dykhouse, County Attorney

THE CURATORS OF THE
UNIVERSITY OF MISSOURI

By:



Lisa J. Wimmenauer
Assoc. Director, Business Services

ATTEST:

~~Approved By~~

MAR 05 2013

PJH
General Counsel via EMAIL

021646
Permanently Recorded
Filed in Clerk's Office

Introduced by McDavid

First Reading 3-18-13

Second Reading 4-1-13

Ordinance No. 021646

Council Bill No. B 78-13

AN ORDINANCE

authorizing an intergovernmental cooperation agreement with Boone County, Missouri, and The Curators of the University of Missouri as it relates to the collaborative adaptive management implementation (CAM) process to address the total maximum daily load (TMDL) for Hinkson Creek; and fixing the time when this ordinance shall become effective.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF COLUMBIA, MISSOURI, AS FOLLOWS:

SECTION 1. The City Manager is hereby authorized to execute an intergovernmental cooperation agreement with Boone County, Missouri, and The Curators of the University of Missouri as it relates to the collaborative adaptive management implementation (CAM) process to address the total maximum daily load (TMDL) for Hinkson Creek. The form and content of the agreement shall be substantially as set forth in "Exhibit A" attached hereto and made a part hereof as fully as if set forth herein verbatim.

SECTION 2. This ordinance shall be in full force and effect from and after its passage.

PASSED this 1st day of April, 2013.

ATTEST:

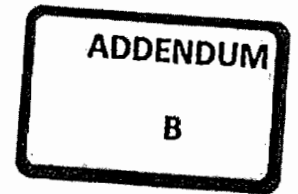
[Signature]
City Clerk

[Signature]
Mayor and Presiding Officer

APPROVED AS TO FORM:

[Signature]
City Counselor

IT



Hinkson Creek Watershed Restoration Project

Collaborative Adaptive Management (CAM)

Physical Habitat GIS Data Development Technical Report

July 31, 2013



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1 Executive Summary

As part of the Hinkson Creek Restoration project, we used GIS and Remote Sensing techniques to create basic information on the geomorphology of Hinkson Creek and the distribution of land cover within the valley and watershed. Basic input data, which included air photos, LiDAR, a stream center line, and fine spatial resolution land cover for about 75% of the watershed, were provided by partners (Boone County and City of Columbia). Staff from our partners, which included members of the Hinkson CAM Science team, viewed progress and provided input on interim products so that modifications could be made at regular intervals. The Hinkson Creek Restoration team partners (Boone County, City of Columbia, and University of Missouri) will use this information for a variety of initiatives, including selection of field data sampling sites and stand-alone analyses, such as the influence of land cover on the geomorphology and biology of the stream. The information is fine-resolution and will serve as input for analyses at multiple scales of resolution.

Data sets developed include: (1) stream centerline update, (2) spatially explicit sample points at 50 m (and multiples of 50 m) intervals on the centerline of the stream, (3) bankfull boundaries on the stream, (4) valley boundaries along the stream, (5) new fine spatial resolution land use/landcover (LULC) for 25% of the study area, (6) attribution of physical data to spatially specific points within the stream at multiple scales (i.e., LULC composition, bankfull width, valley width, slope, sinuosity, and distance to valley wall), (7) sand/gravel bar delineation, and (8) Hinkson Creek road crossings.

2 Data Development

2.1 Introduction

Missouri Resource Assessment Partnership (MoRAP) was contracted to create a number of geospatial datasets, requested by the Hinkson Collaborative Adaptive Management (CAM) Science Team, which would aid in the analysis of the physical, ecological, and geomorphic conditions of Hinkson Creek and its eight main tributaries. The study area extends from the headwaters of Hinkson Creek to its confluence with Perche Creek and includes the following watersheds: County House Branch, Flat Branch, Grindstone Creek, Hinkson Creek, Hominy Branch, Merideth Branch, Mill Creek, Nelson Creek, and Varnon Branch (Figure 1).

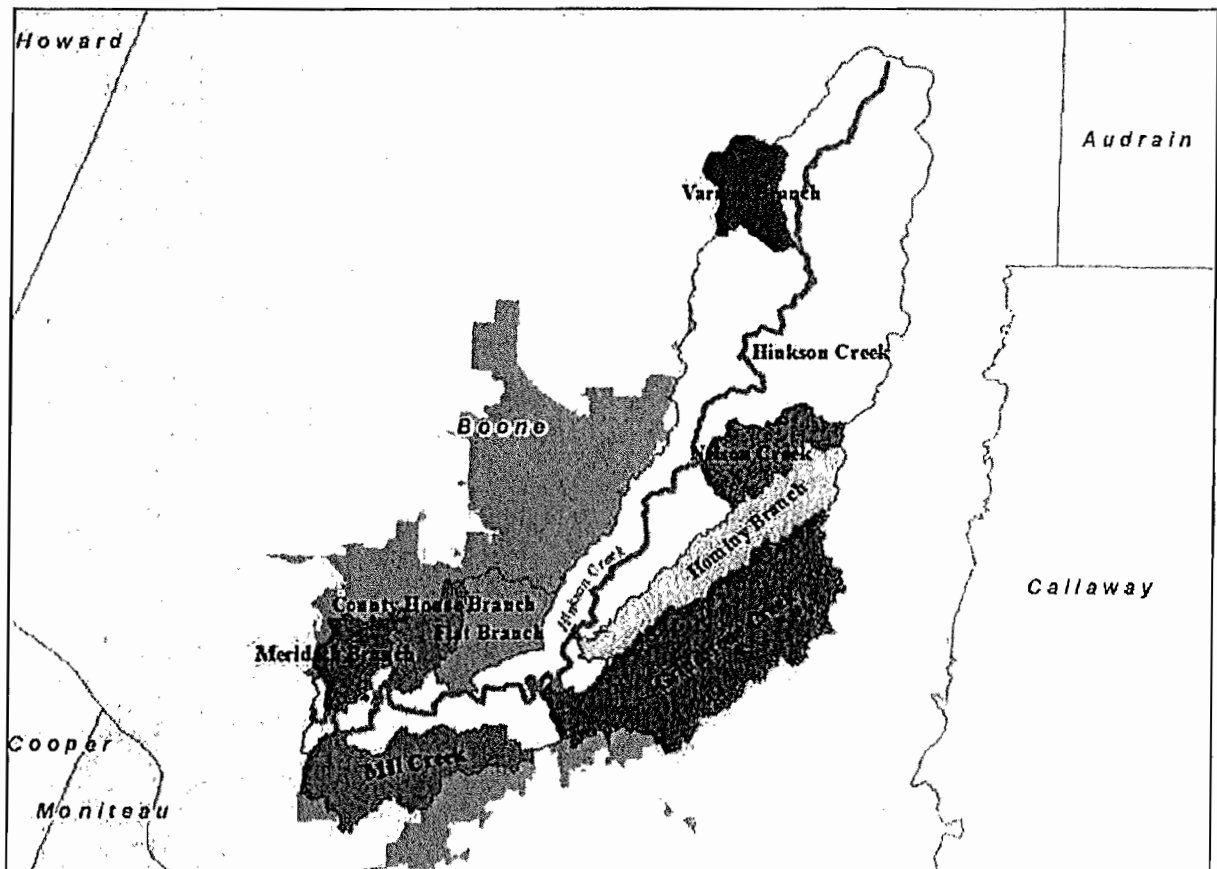


Figure 1. Watersheds that define the study area cover much of the Columbia metro area in central Boone County, Missouri.

2.2 Data Collaboration

Boone County and the City of Columbia shared critical geospatial data with MoRAP (Table 1). The shared data was used only for this project and a GIS data agreement was signed prior to MoRAP receiving data.

2.2.1 Data Used

Table 1. List of GIS data provided by partners to develop physical habitat products.

Data Name	Source	Description	Use
2009 1 foot DEM	Boone County	Digital elevation raster model derived from 2009 LIDAR data	Stream centerline update, bankfull, valley delineation, sand and gravel bar delineation, and % slope
2009 1 foot Hill Shade	Boone County	Hill shade raster derived from 2009 1 foot DEM	Stream centerline update, bankfull, valley delineation, sand and gravel bar delineation, and % slope
Hydro_lines	Boone County	Hydrography lines based on 2007 ortho-imagery	Source for Hinkson Creek centerline, though centerline was updated by MoRAP
2011 6 inch Leaf-off Aerial Photography	Boone County	6 inch, leaf-off, 3-band, true color, aerial photography	Stream centerline update, sand or gravel bar delineation, MoRAP LULC, Hinkson road crossings
2007 Natural Resources Inventory (NRI)	City of Columbia	6 class vector Land Use/Land Cover data set for City of Columbia	Used to determine LULC and impervious surface composition throughout study area and as training data source for MoRAP LULC of study area not covered by NRI
Watersheds	City of Columbia	Watershed vector layer used to define study area	Study area delineation and LULC statistics
2010 1 meter leaf-on NAIP	MSDIS	1 meter, leaf-on, 4-band, CIR, NAIP. Used original, non-compressed, quads	MoRAP LULC

2.3 Subject Matter Expert/Science Team Collaboration

Multiple meetings with subject matter experts Dr. Robb Jacobson - United States Geological Survey, Dr. Paul Blanchard – Missouri Department of Conservation, and Dr. Jason Hubbard – University of Missouri were conducted to identify GIS data products that would be useful to the overall Hinkson Creek restoration effort. Additionally, meetings with a wider audience were held to review GIS data during the data development process to ensure that the data was on track with what was requested and that all parties had similar expectations. By working in a collaborative manner and conducting meetings throughout the data development process, we were able to capitalize on expert information to improve the final products.

2.4 Data Development Methodologies

2.4.1 Study Area Extent

The study area consists of 57,338 acres in central Boone County, Missouri and is centered on Hinkson Creek. The watersheds included are: County House Branch, Flat Branch, Grindstone Creek, Hinkson Creek, Hominy Branch, Merideth Branch, Mill Creek, Nelson Creek, and Varnon Branch (see Figure 1).

2.4.2 Projection

The standard projection used for all datasets was Missouri State Plane Central, NAD 83, FIPS 2402, U.S. Survey feet. Distances in tables are feet unless otherwise noted.

2.4.3 Stream Centerline Update

The Hinkson Creek stream centerline (Hydro_Lines) provided by Boone County was based on 2007 ortho-imagery and upon visual inspection, discrepancies between the centerline and stream channel in the 2009 LiDAR hillshade (provided by Boone County) and the 2011, 6 inch, leaf-off aerial photography (provided by Boone County) were observed. As a result, MoRAP manually edited the Hinkson Creek stream centerline at a 1:1000 scale to reflect its location based on 2009 LiDAR hillshade and the 2011 imagery (Figure 2). Additionally, in some locations the 2009 LiDAR and 2011 imagery did not match due to bank and stream channel geomorphologic changes. In these situations, the stream centerline was modified to more closely correspond with LiDAR, which was used to develop several other datasets.

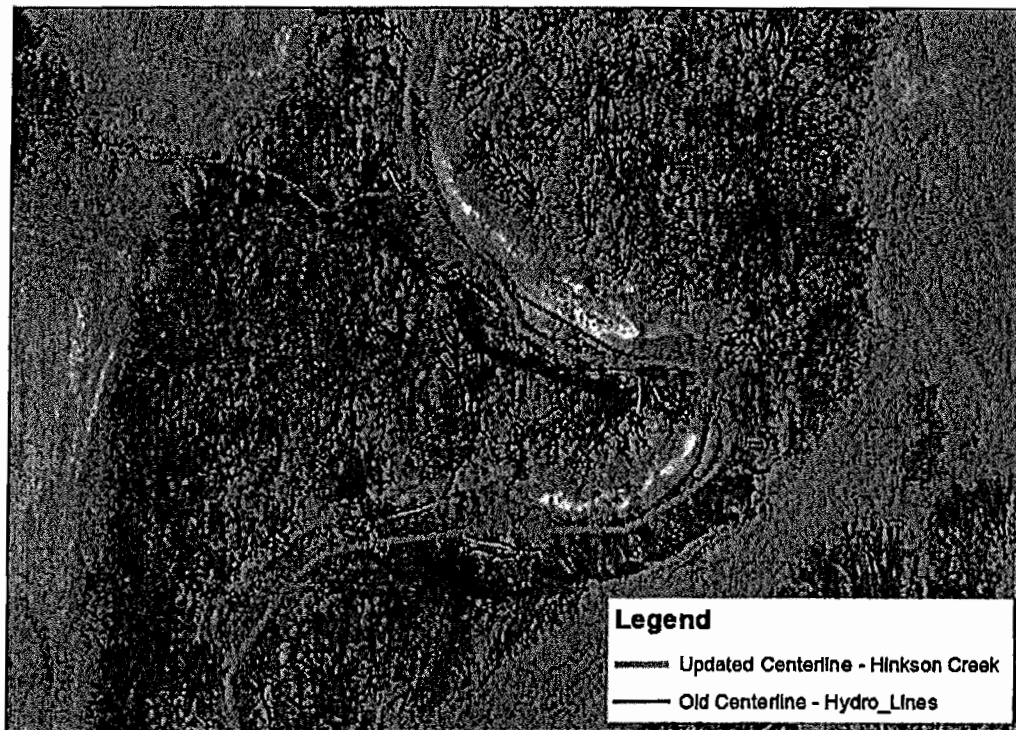


Figure 2. The centerline for Hinkson Creek was updated (blue) in places where 2007 line work (red) did not reflect stream conditions in 2011.

2.4.4 Top of Bank/Bankfull

A bankfull, or top of bank, dataset was created to identify the slope break between the narrower stream channel and the broader floodplain. Theoretically, this is the point at which water will flow over the banks into the surrounding floodplain. It should be noted that top of bank, as determined via GIS data, may not represent modern hydrologic bankfull width because of down cutting of the channel and

limitations of the spatial resolution of the imagery. Hydrologic bankfull width is the channel width at bankfull discharge.

Several methods of delineating bankfull were explored, including the automated River Bathymetry Toolkit (RBT). The data for the study area proved to be too cumbersome for the RBT and the results on sample areas were not satisfactory. MoRAP was able to develop a straightforward and effective method of delineating bankfull. Image objects, or polygons, were created for a buffered extent of the Hinkson Creek centerline based on elevation and slope from the 2009 1 foot LiDAR DEM using Ecognition software. Polygons were generated to encompass textural, tonal, and statistical homogeneity in the data. Due to data file size restrictions, the study area was divided into 22 tiles and image objects were created for each tile. The image object tiles were merged together to create one file encompassing the total study area.

Polygons that delineated top of bank/bankfull were manually selected at a scale of 1:1000. All polygons between steep slope breaks at the top of banks on both sides of the creek were selected (Figure 3). Two foot elevation contours based on the LiDAR DEM were also used to aid in top of bank/bankfull delineation where one bank was higher than the other. This was especially useful in cases where one of the banks was a bluff or high valley wall with a continuous steep slope on one side of the creek. In these instances the elevation break point on the lower bank was used to determine where the bankfull line should be placed on the higher bank.

Image objects were based on raster data, resulting in squared and pixelated-looking polygons. To improve aesthetic appearances, a smoothing technique was applied to the polygons after bankfull delineation was complete (Figure 3 A and B). The polygon shapefile was smoothed in ArcMap using the PAEK smoothing algorithm with a 25 feet tolerance, and all other defaults were retained. This smoothing technique was also applied to valley boundaries and sand/gravel bar boundaries, which were also developed using image objects based on raster data.

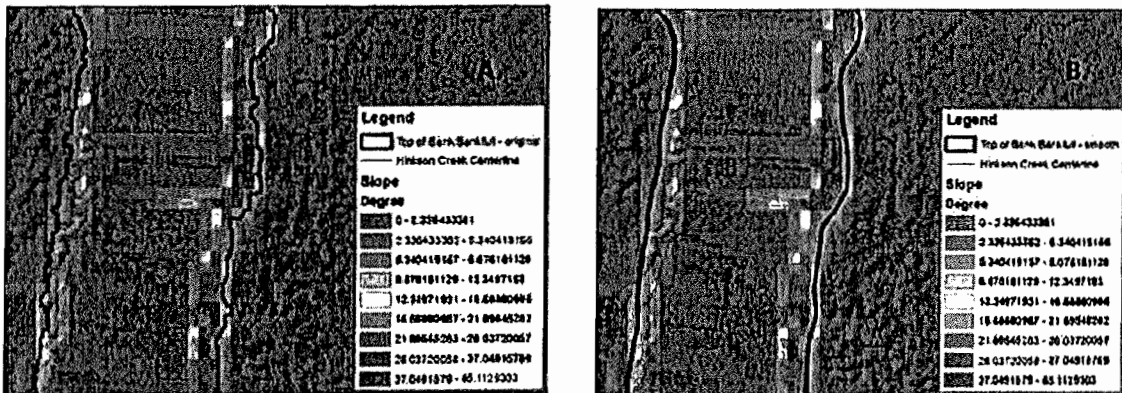


Figure 3. A) The original, pixel based polygon delineation of bankfull where the surrounding valley begins to slope down into stream channel. B) Smoothed bankfull polygon.

2.4.5 Valley Delineation

The initial Hinkson Creek valley delineation concept was designed to define the stream valley from bluff to bluff, including the entire bottomland area and all recent as well as historic floodplain terraces. After initial review by, and advice from, the subject matter experts, a second version of the valley was delineated based on modern constrictions to flow (e.g. levees, roads, etc.; Figure 4).

The constricted modern floodplain concept attempts to limit the delineation to the modern active floodplain and accounts for the impacts of modern structures such as levees, built-up roads, and bridge abutments. This delineation was somewhat subjective, but a single MoRAP staff member did all of the delineation to ensure consistency. Results were viewed and vetted by members of our subject matter expert panel.

The valley boundaries delineated in this project are distinct and different from the FEMA floodplain dataset. The FEMA dataset was developed to identify flood hazards and will be a useful tool in future analyses. The valley bottom datasets created here are not intended for use in flood hazard assessment.

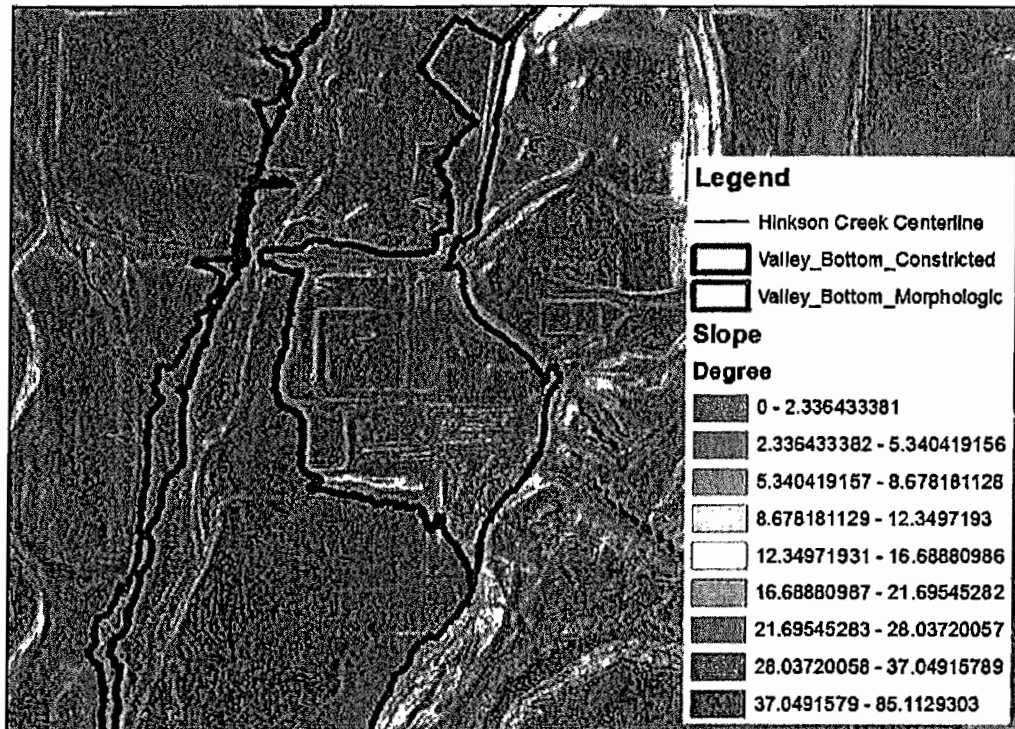


Figure 4. Location within the valley where constricted (black) valley is narrowed due to levees and elevated road beds. Morphological valley (blue) is considerably wider in some areas.

2.4.5.1 Morphological Valley Delineation

The morphological valley boundary broadly circumscribes the bottomland between bluffs (Figure 5). The same image objects created for top of bank/bankfull were used to delineate the morphological valley. Image objects that intersected with alluvial bottomland/valley soils defined by digital county soil

surveys were initially selected. The valley boundary was refined using a subjective manual process, generally at a scale of 1:1000. The image objects were compared against the 2009 1 foot LiDAR hillshade and slope to identify the final boundary of the valley. Valley boundary identification was clear at bluff/bottomland intersections. However, a more subjective approach was often required in areas with more subtle valley slope breaks. In such cases, the valley boundary line was often drawn where incised lateral drainages on slopes intersected with smooth, flat valley bottoms.



Figure 5. Morphological valley delineating bluff to bluff boundary.

2.4.5.2 Constricted Valley Delineation

The constricted valley is often defined by anthropomorphic built-up impedances, such as roads, bridges, trails, levees, and neighborhoods. In some areas without built-up impedances, the constricted valley boundary is drawn at gentle inflections in the landscape that may correspond with the boundary between modern versus older floodplain terrace soils. The same image objects generated for top of bank/bankfull and morphological valley boundary were used to delineate the constricted valley (Figure 6). This process was also a manual and subjective process that was completed at an average scale of 1:1000.

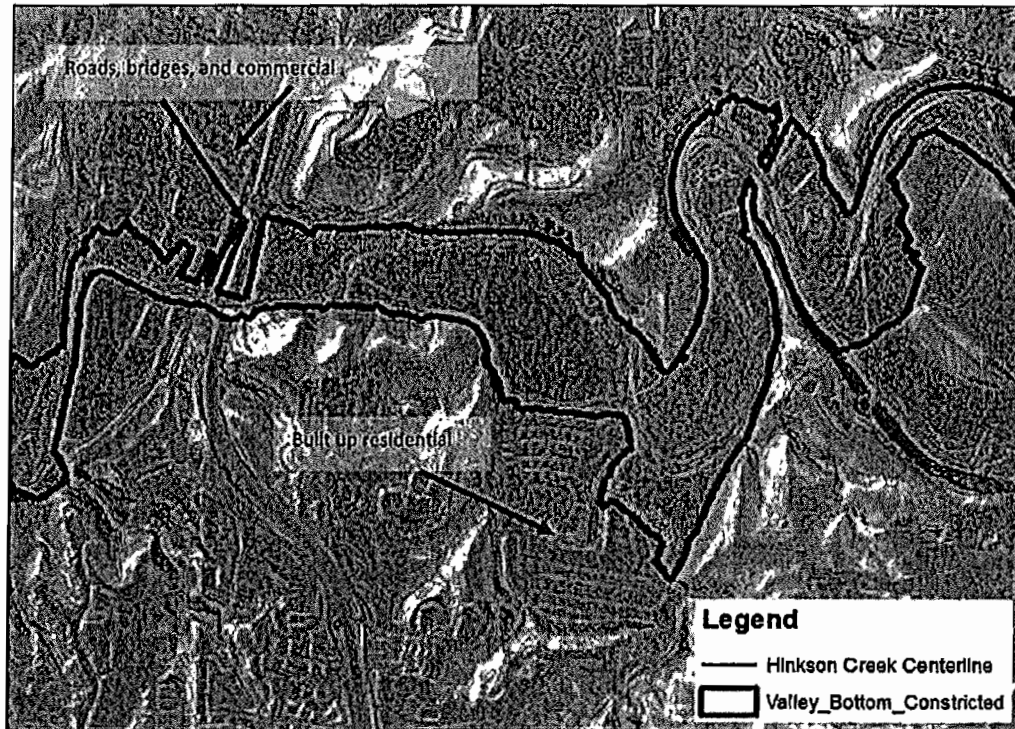


Figure 6. Valley is constricted due to roads, bridges, and built up residential and commercial properties.

2.4.6 Sand or Gravel Bar Delineation

Sand or gravel bars within Hinkson Creek channel were delineated based on 2011 6 inch, 3-band, true color, leaf-off aerial photography provided by Boone County (Figure 7). Image objects were generated based on the 2011 photography using Ecognition software. Due to data file size restrictions, the imagery was divided into seven tiles. Image objects, or polygons, were generated based on the textural and tonal homogeneity of the imagery. The image object tiles were merged into a single file for sand or gravel bar delineation. Polygons that circumscribed sand or gravel bars were manually selected and modified at a scale of 1:1000, as needed, by scanning the entire length of Hinkson Creek from the confluence to the headwaters. No distinction between sand versus gravel bars was possible due to limitations of the imagery. Accordingly, the resultant dataset is a record of sand or gravel bars that existed in the spring of 2011.

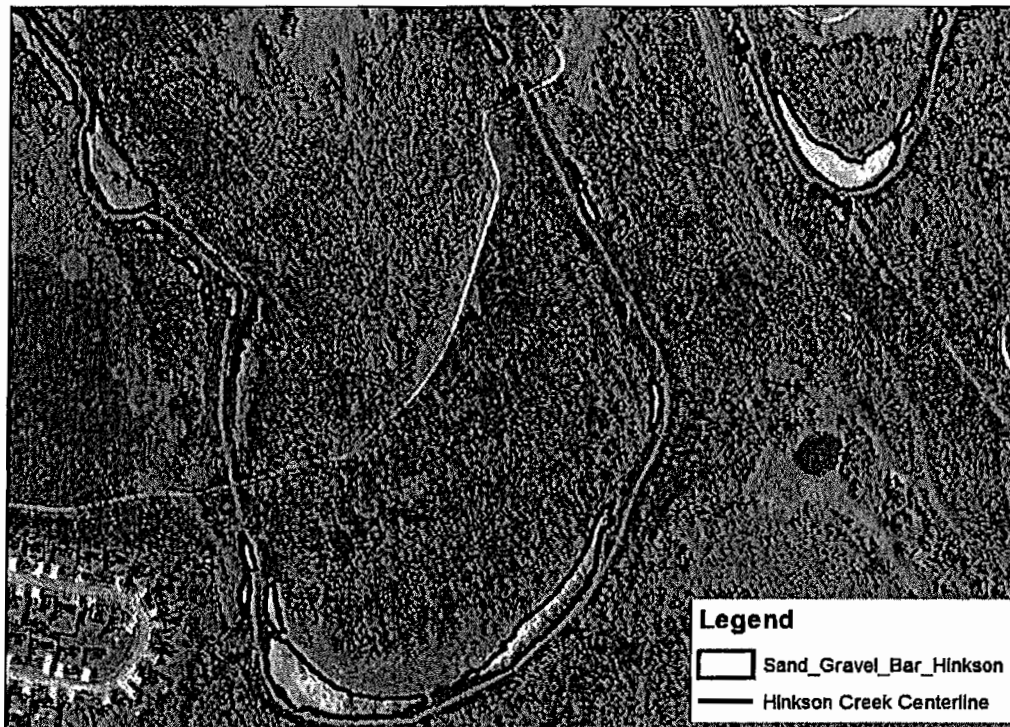


Figure 7. Sand or gravel bars were identified based on 2011 6 inch, 3-band, true color, leaf-off imagery.

2.4.7 Land Use/Landcover - LULC

Land Use/Landcover (LULC) data were used to determine the composition of vegetation and impervious surface within the study area. LULC from the City of Columbia’s 2007 Natural Resources Inventory (NRI), a 6 class vector LULC based on 2007 6 inch, 4-band, leaf-on, aerial photography covered approximately 75% of the study area. The remaining 25%, mainly north of the city of Columbia, was not covered by high spatial resolution LULC. MoRAP developed a NRI-like LULC to fill in the gap (Figure 8).

The MoRAP NRI-like LULC is based on 2011 6 inch, 3-band, leaf-off aerial photography (provided by Boone County), 2010 1 meter, 4-band, leaf-on NAIP imagery, 2009 LiDAR DEM derivatives slope and aspect, and a LiDAR digital surface model (DSM). All datasets used in classification were resampled to 1 meter spatial resolution. A supervised classification approach was employed to map the 6 NRI LULC classes (forest, grass, impervious, sparsely vegetated, crop, and water). A total of 3,000 training samples from the NRI dataset, 500 per class, were used to classify and map LULC in raster format. Image objects were generated using Ecognition software based on the 2011 and 2010 imagery to approximate the shape and size of the NRI polygons. Each polygon was attributed with the majority LULC value based on the raster LULC dataset. The NRI and MoRAP NRI-like LULC vector datasets were merged together to create a seamless, high spatial resolution vector LULC dataset that covers over 99% of the study area (Figure 9). There were approximately 100 acres not covered by LULC due to lack of data at the time of classification.

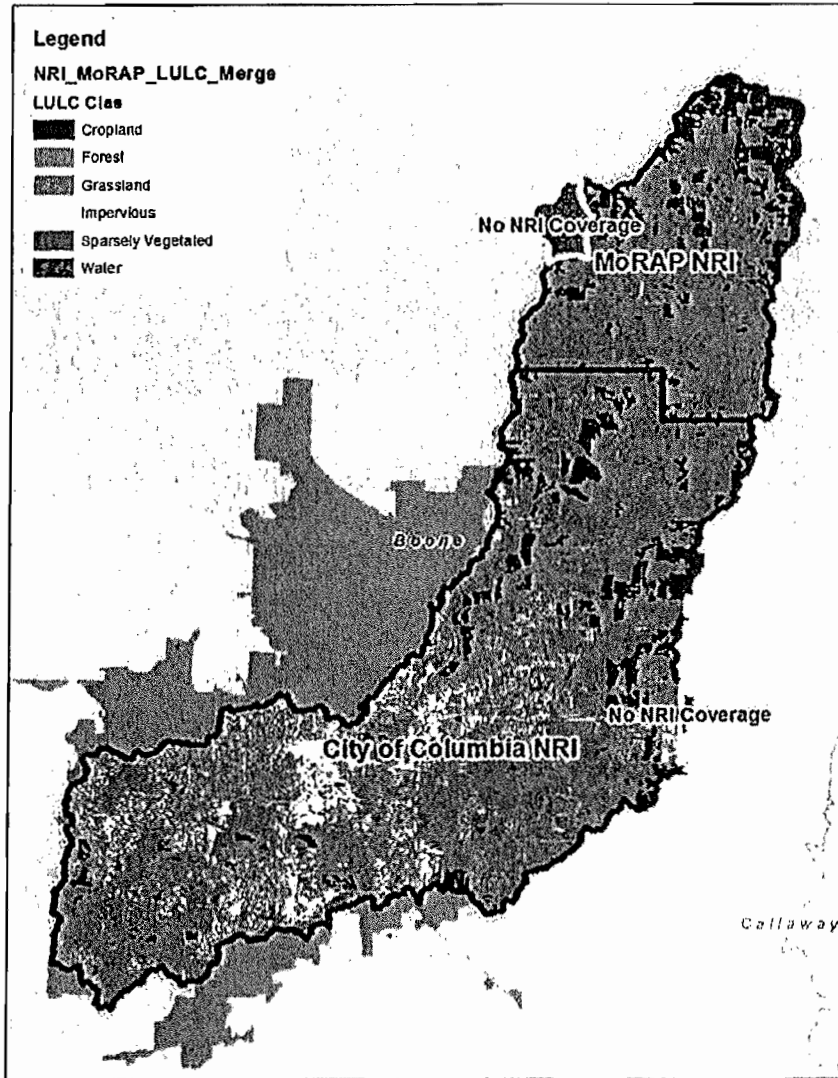


Figure 8. MoRAP created NRI-like LULC for the northern portion of the study area. The areas in red indicate where no LULC exists.

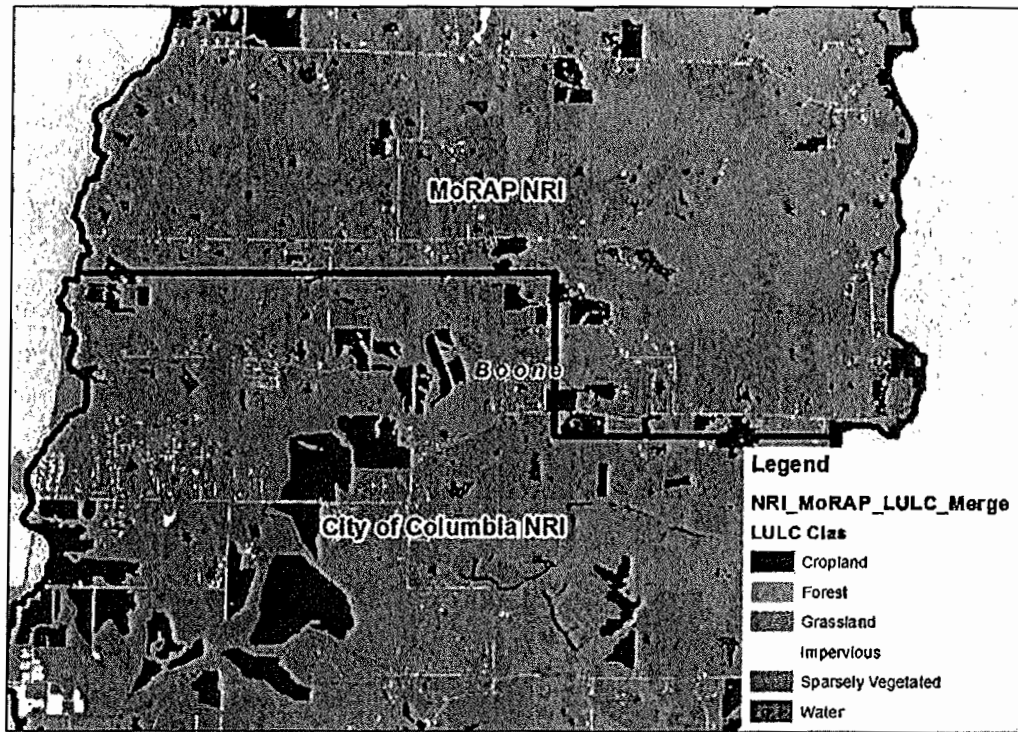


Figure 9. The addition of the MoRAP created LULC provided a virtually seamless LULC for the study area.

2.4.8 Stream Points

Points were generated along the Hinkson Creek centerline at 50 meter intervals to facilitate data summaries and on-the-ground sampling (Figure 10). Ground data will be collected at intervals defined by points generated here, and field data can be compared with GIS-generated data. Attributes applied to the points were percent slope, sinuosity, bankfull width, morphological and constricted valley width, and distance to valley wall. Summaries were provided at intervals of 50, 100, 250, 500, 1000, 2000, and 4000 meters. All points at an interval greater than 50 meters were based on the 50 meter points. Physical stream attributes at multiple scales allow fine- and broad-scale views of the stream. The unique identification number for each set of points begins at 0 at the confluence of Perche and Hinkson Creeks and increases incrementally upstream to the headwaters.

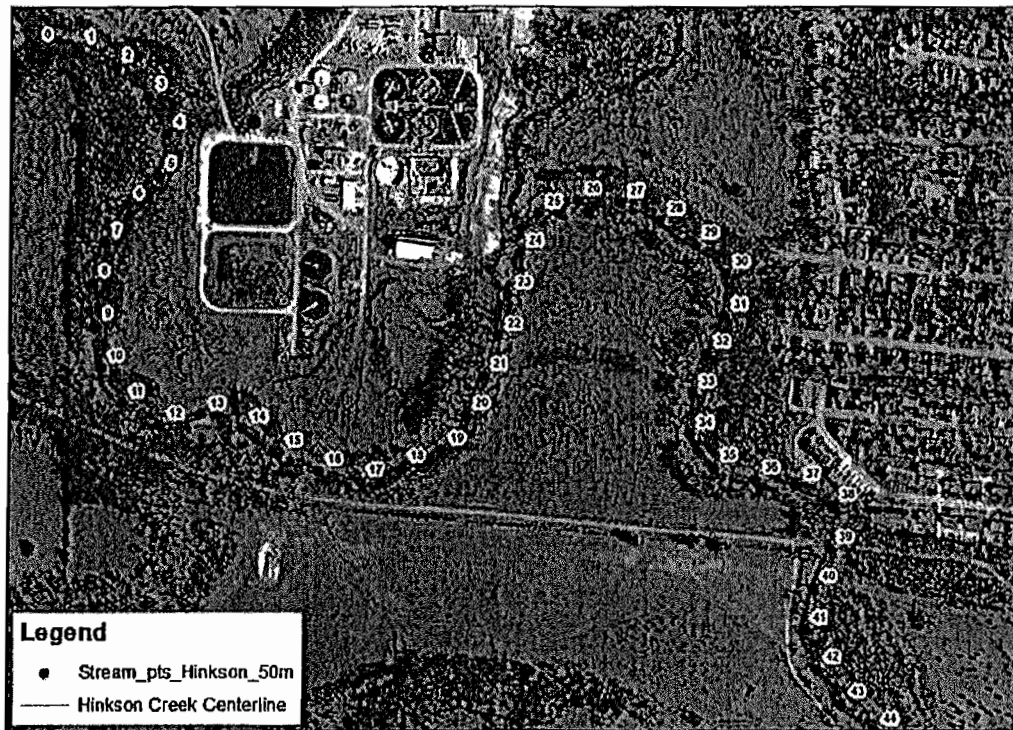


Figure 100. Shown are points at 50 meter intervals along the Hinkson Creek centerline, beginning at the confluence with Perche Creek. Physical attributes were summarized for these points (i.e. slope, sinuosity, bankfull width, valley width, etc.).

2.4.8.1 Percent Slope

Slope is a measure of stream gradient or steepness and was based on the surface water elevation of the stream at the time of LiDAR DEM (provided by Boone County) data acquisition, March 18 and 19, 2009. Average stream discharge during the period of data acquisition was 19 cubic feet per second (waterdata.usgs.gov). Percent slope between stream points along the centerline was calculated at all point intervals. Calculation of slope began at the confluence of Hinkson and Perche Creeks and ended at the headwaters. Slope was calculated by first extracting the elevation for each point from the LiDAR DEM, then calculating the elevation difference between the adjacent points to determine the rise value. The elevation difference was divided by the stream distance to produce a percent slope value.

$$\% \text{ slope} = (\text{elevation difference} / \text{stream line distance}) \times 100$$

2.4.8.2 Sinuosity

Sinuosity is a measure that indicates the degree to which a stream meanders. It is the ratio between the stream distance and Euclidean, or straight-line, distance between two points. A value of 1 indicates a straight stream. As values increase a more sinuous, or meandering, stream is indicated (Figure 11). Sinuosity was calculated between points at all stream point intervals and began at the confluence of Hinkson and Perche Creeks and ended at the headwaters (Figure 12).

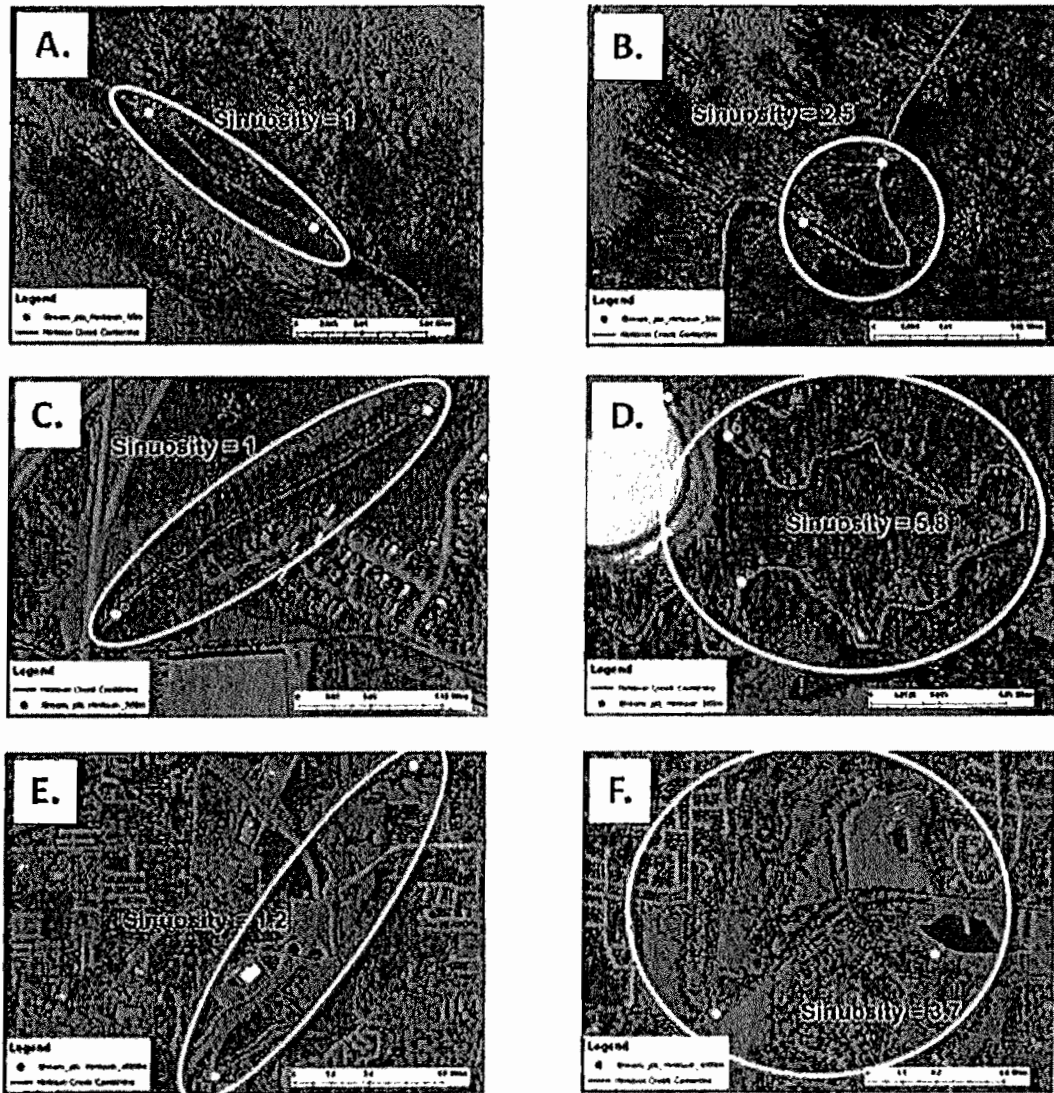


Figure 11. Shown is sinuosity at various scales. A) Sinuosity value of 1 between 50 meter points, indicating a straight section of the creek. B) Maximum sinuosity value of 2.5 within the 50 meter point dataset. C) Sinuosity value of 1 between 500 meter points. D) Maximum sinuosity value of 5.8 within the 500 meter point dataset. E) Sinuosity value of 1.2 between 4000 meter points. F) Maximum sinuosity value of 3.7 within the 4000 meter point dataset.

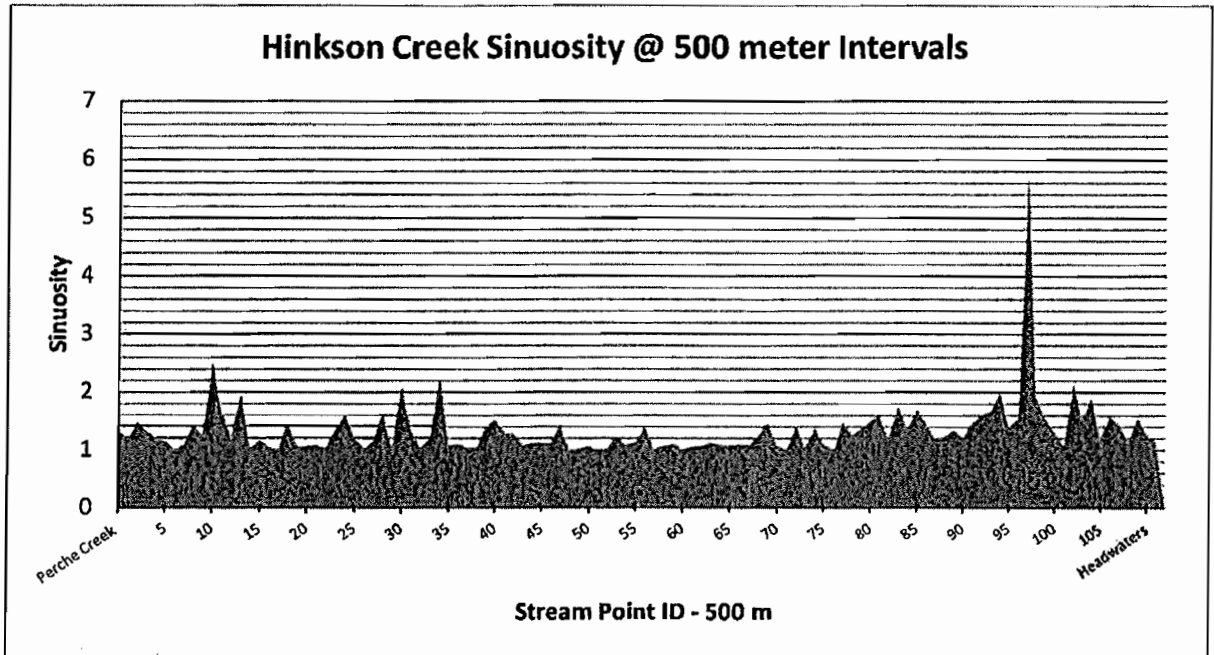


Figure 122. Longitudinal plot of sinuosity measures of Hinkson Creek at 500 meter point intervals. See Figure 23 for locator map of points at 500 meter intervals.

2.4.8.3 Bankfull and Valley Width

Top-of-bank/bankfull and valley widths were measured at each point for all point intervals. A transect perpendicular to the stream centerline was generated for each point and clipped to bankfull, morphological valley, and constricted valley boundaries (Figures 13, 14, 15, and 16). The Geospatial Modeling Environment (GME) "sampleperpointsalonglines" function was used to generate points perpendicular to the stream centerline at 50 meter intervals. Transects were generated at a distance of 300 feet on each side for bankfull width and 10,000 feet for valley widths. A Python script was written to convert the endpoints for transects into polylines. The polylines were clipped to bankfull, morphological valley, and constricted valley boundaries. Extraneous lines remaining as a result of clipping the polylines to boundaries were removed. Line distance, in feet, was calculated for the remaining polylines. A spatial join was performed to apply transect lengths for bankfull and valley widths to each set of stream points.

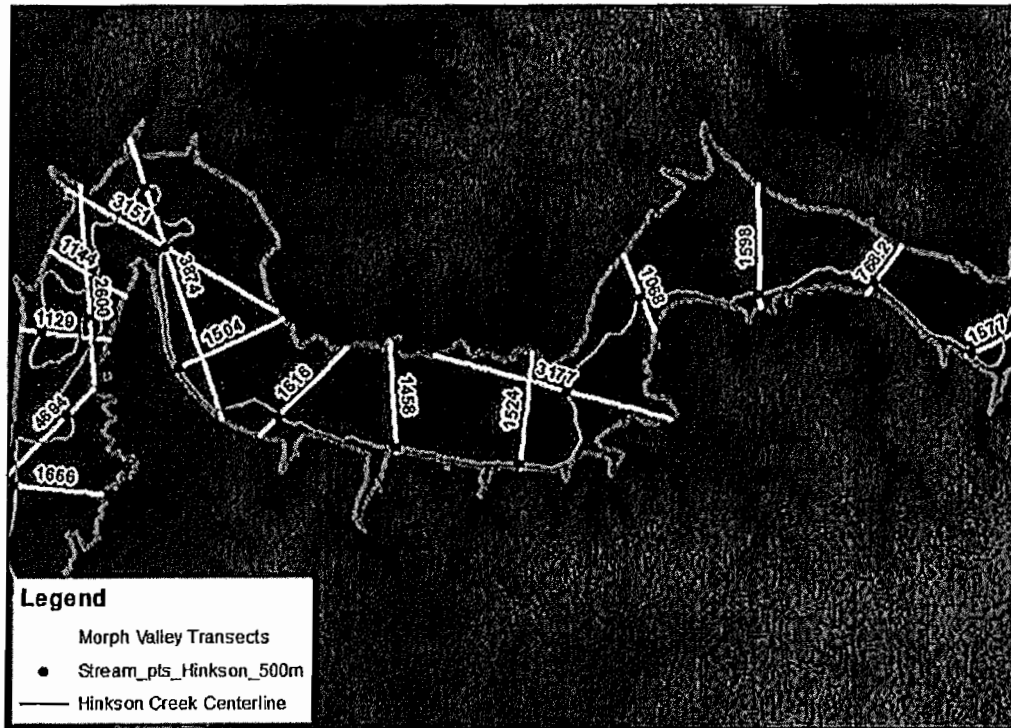


Figure 133. Transects perpendicular to the stream centerline were calculated for each point and clipped to morphologic and constricted valley boundaries and the bankfull boundary to calculate width and then applied to each point. Shown are transects clipped to the morphological valley boundary with width distances in feet on the transect lines. Due to stream sinuosity within the valley, these values may be more or less meaningful.

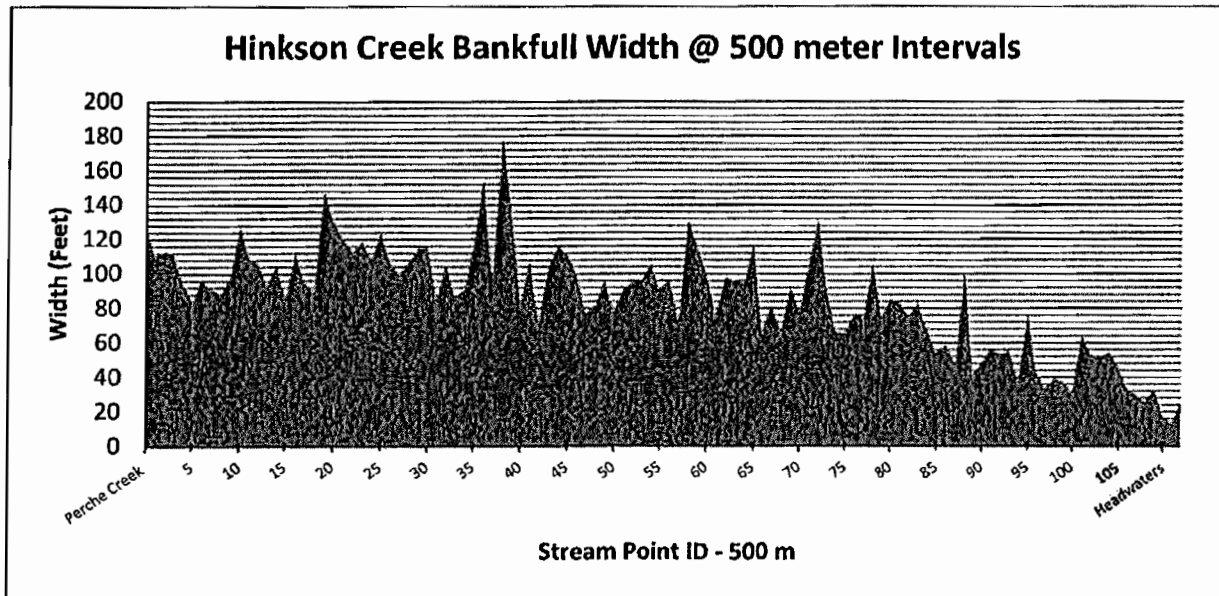


Figure 14. Longitudinal profile of Hinkson Creek bankfull width at 500 meter intervals shows decreasing width from the confluence at Perche Creek upstream to the headwaters. See Figure 23 for locator map of points at 500 meter intervals.

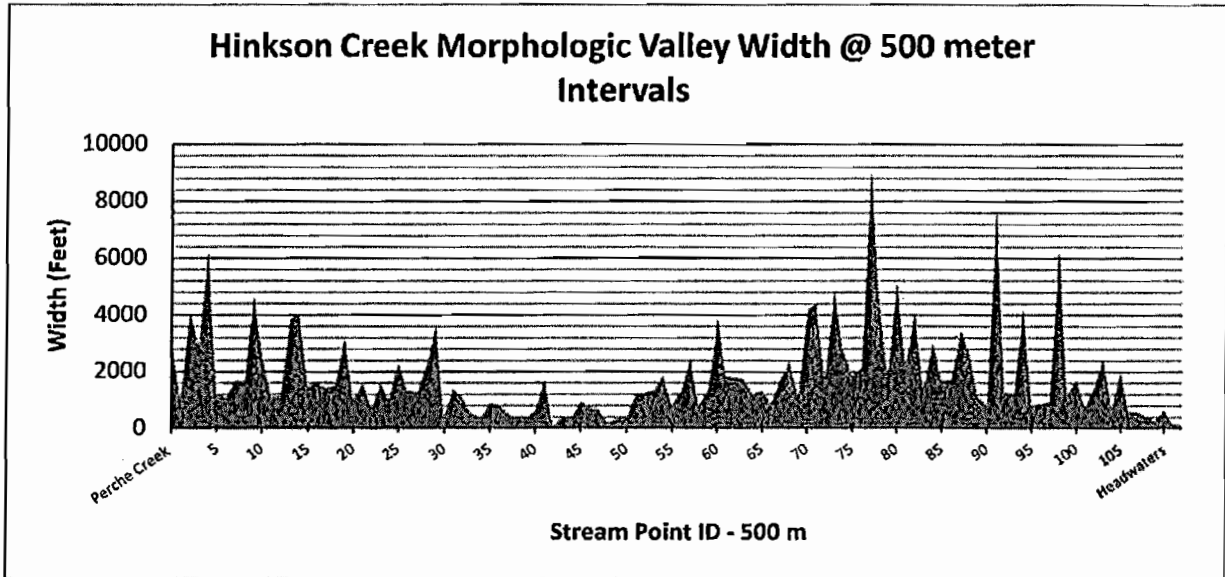


Figure 145. Width of Hinkson Creek morphologic valley at 500 meter intervals. See Figure 23 for locator map of points at 500 meter intervals.

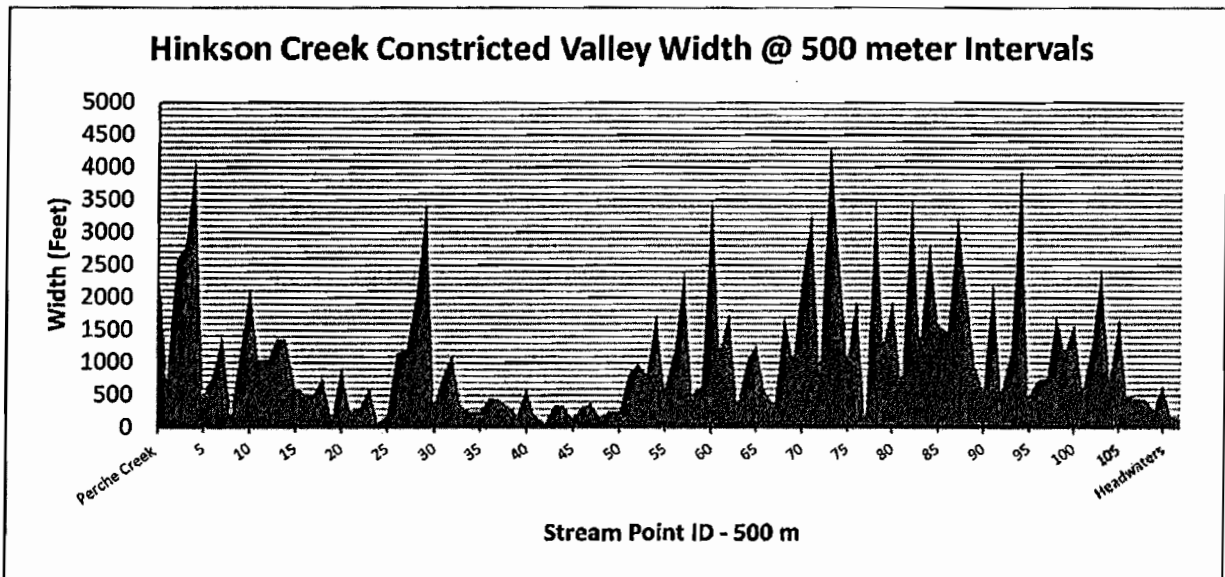


Figure 156: Width of Hinkson Creek constricted valley at 500 meter intervals. See Figure 23 for locator map of points at 500 meter intervals.

2.4.8.4 Distance to Valley Wall

Distance to morphologic and constricted valley walls were calculated and applied to points for all point intervals. Transects used to measure valley width were split at the stream centerline, and the length of the remaining transects for each side of the stream was calculated (Figures 17, 18, and 19). Two distance values were assigned for each point, one for distance to valley wall/boundary edge on one side of the stream, and one for distance on the opposite side. Right and left sides of the stream were assigned as if navigating upstream from the confluence of Hinkson and Perche Creeks.

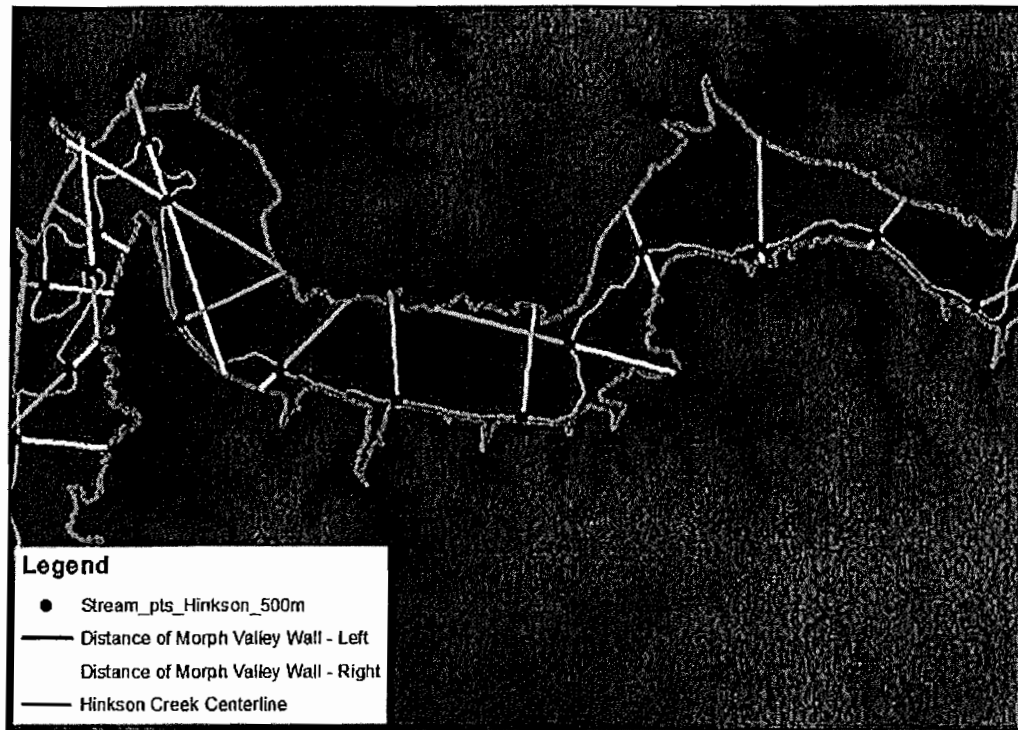


Figure 167. Perpendicular transects used to calculate valley widths were split using the stream centerline. Distance from centerline to right and left side valley boundaries were calculated and applied to each point. Due to sinuosity within the valley, these values may be more or less meaningful.

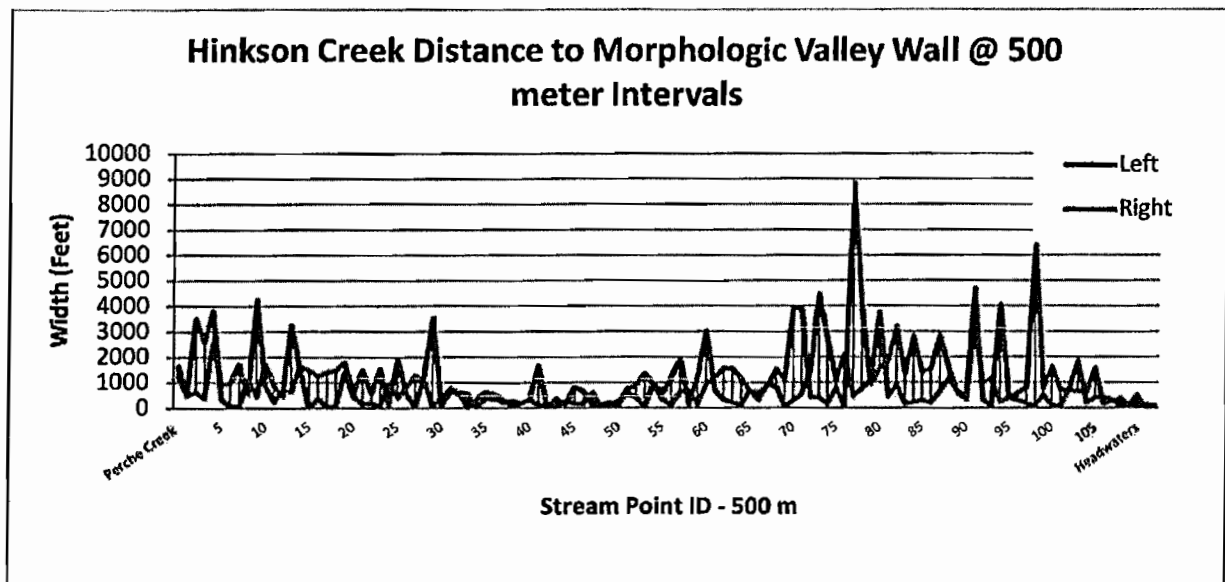


Figure 18. Distance to morphologic valley wall from Hinkson Creek centerline at 500 meter intervals. Red line represents distance from right side of stream to valley boundary and blue line represents distance from left side of stream to valley boundary based on navigation upstream from confluence of Hinkson and Perche Creeks. See Figure 23 for locator map of points at 500 meter intervals.

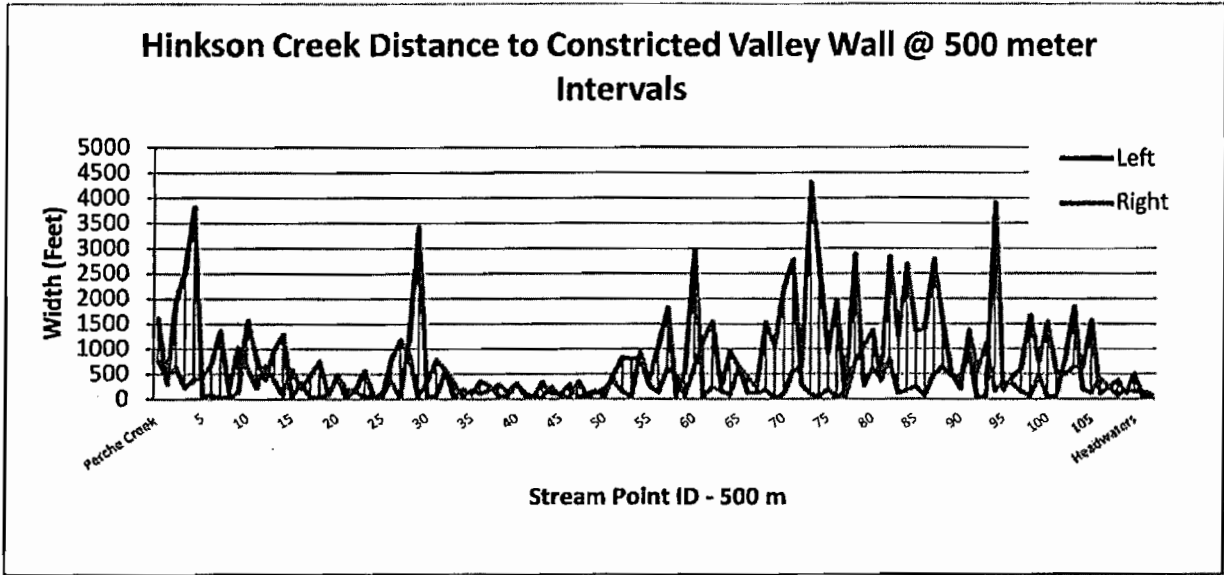


Figure 19. Distance to constricted valley wall from Hinkson Creek centerline at 500 meter Intervals. Red line represents distance from right side of stream to valley boundary and blue line represents distance from left side of stream to valley boundary based on navigation upstream from confluence of Hinkson and Perche Creeks. See Figure 23 for locator map of points at 500 meter intervals.

2.4.8.5 Thiessen Polygon LULC Summary

Thiessen polygons represent areas, or zones, around a set of points where any location associated with a given point is closer to that point than any other point. A set of Thiessen polygons was generated for stream points at all intervals in order to associate the surrounding LULC with a spatially specific location within the stream. The polygons were clipped to both the morphologic and constricted valley boundaries and LULC composition was summarized (total area and % area of each class) for every polygon within each dataset. This resulted in two sets of polygons for each stream interval. A caveat to comparing LULC values for a given point is that the size of the area within polygons associated with any given point can vary greatly. The shorter the stream centerline interval between points, the more varied in size the area within polygons. Polygons based on 50 meter interval stream points have a coefficient of variance (CV) of roughly 0.91 (Figure 20). They become less variable at 500 meters, where CV was 0.49 (Figure 21). The lowest CV of 0.41 occurred at 2000 meters.

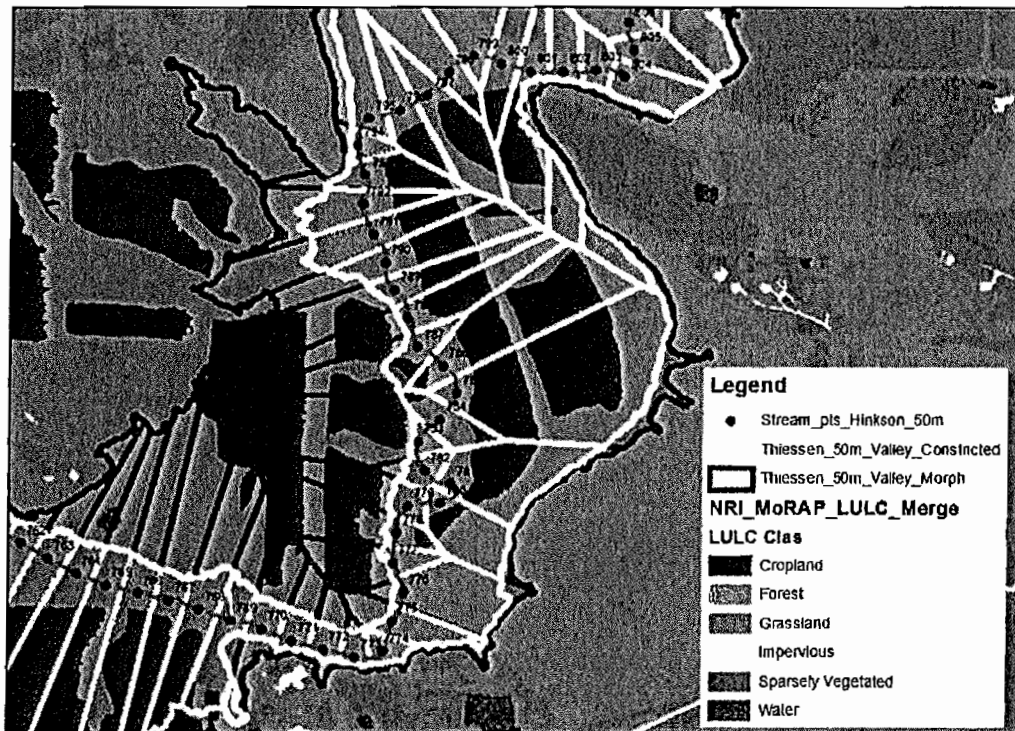


Figure 20. Thiessen polygons based on stream points at 50 meter intervals vary greatly in size. Thiessen polygons were clipped to morphological (black) and constricted (white) valley boundaries.

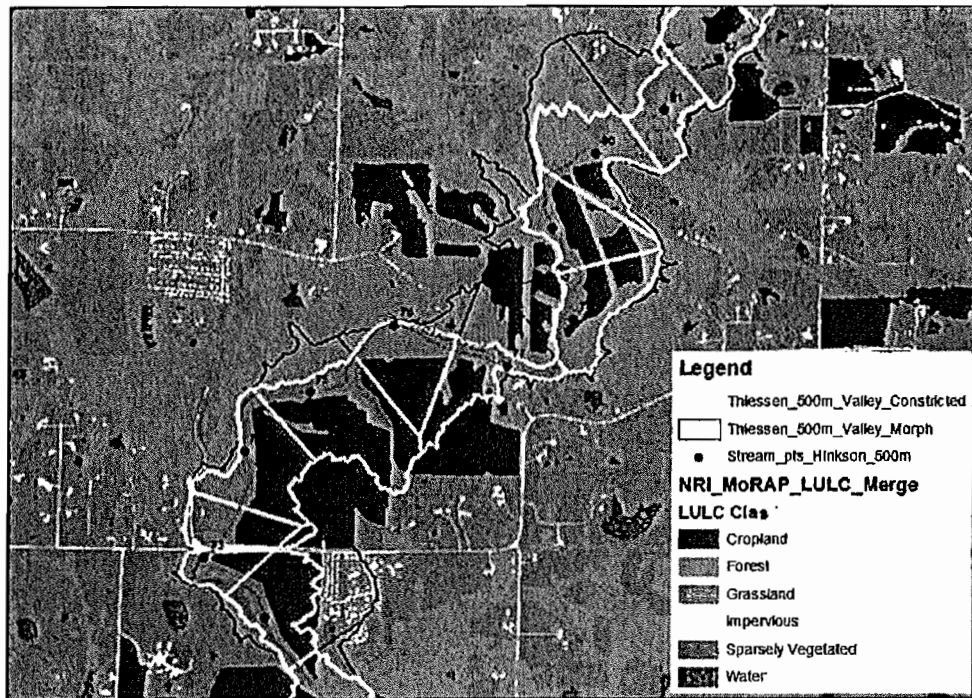


Figure 21. Thiessen polygons based on stream points at 500 meter intervals were much more uniform in size compared to 50 meter intervals (Figure 20). Thiessen polygons were clipped to morphologic (black) and constricted (white) valley boundaries.

2.4.9 Hinkson Road Crossings

A point file was created indicating where roads, bridges, trails, cart paths, etc. cross Hinkson Creek (Figure 22). A point was manually placed on the stream centerline at the location of a stream crossing based on visual inspection of the 2011 6 inch, leaf-off imagery provided by Boone County at a scale of 1:1000. This is a record of stream crossings visible in 2011 aerial photography.



Figure 172. A point file of road crossings was manually created by marking any road, bridge, trail, or low water crossing along the stream centerline visible in Spring 2011.

3 Results

3.1 LULC Analysis

3.1.1 LULC - Thiessen Polygons - Morphologic Valley

Land Use/Landcover (LULC) values can be analyzed in a number of ways to help evaluate contribution to stream conditions at multiple scales. LULC summarized by Thiessen polygons at 500 meter stream intervals, clipped to the morphologic valley extent, show spikes in impervious at the lower reaches of Hinkson Creek (Figures 23 and 24). Forest and grass comprise the majority of LULC throughout much of the valley, except at the lower reach where impervious cover increases and at the upper middle portion of the reach, between points 61 and 72, where crop increases (Figures 23 and 24).

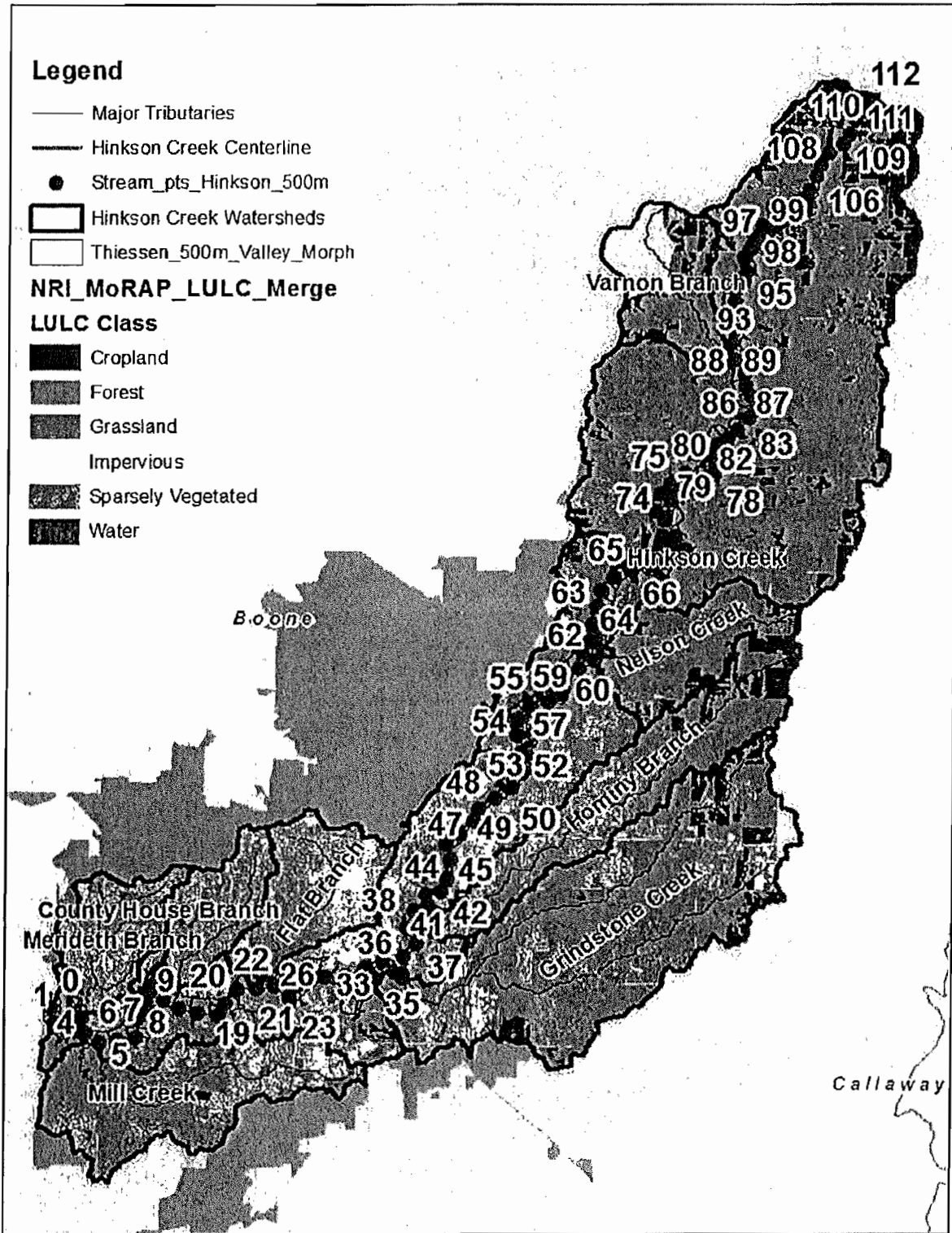


Figure 183. Numbers represent unique ID of stream points and Thiessen polygons at 500 meter intervals along stream centerline.

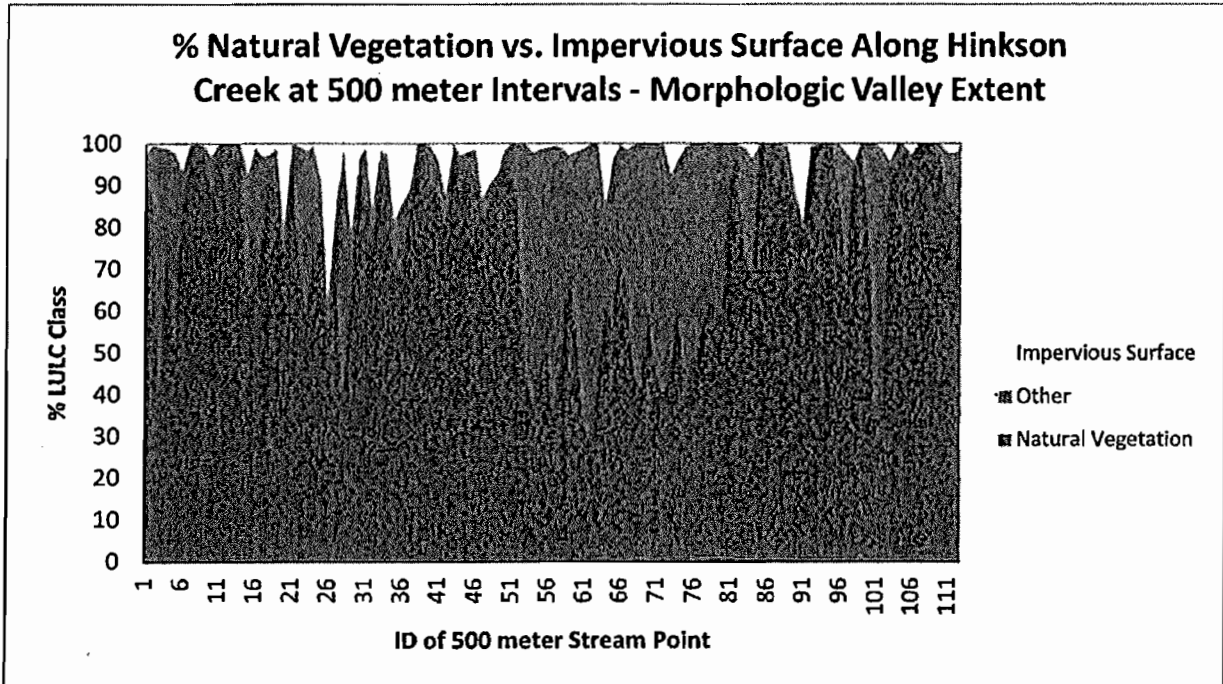


Figure 194. Chart illustrating LULC composition within Thiessen polygons at 500 meter intervals within the morphologic valley. Spikes in impervious surface mostly occur along lower portions of stream, between points 16 and 51. While natural vegetation (grass and forest) drops just below the mid-point of the stream, it typically comprises the majority of LULC within the morphologic valley. Points along the x-axis correspond to spatially explicit points along Hinkson Creek (Figure 25), beginning at the confluence and ending at the headwaters.

3.1.2 LULC – Watershed

At a broader scale, LULC composition within each watershed is illustrated in Figures 25, 26, and 27. Hinkson Creek watershed has the most total area in all cover classes (Figure 26) based on its overall larger size. Forest and grass are the predominant cover types in all watersheds. Flat Branch watershed has the highest percentage of impervious of all watersheds, at 31%, followed by Meredith Branch, at 23%.

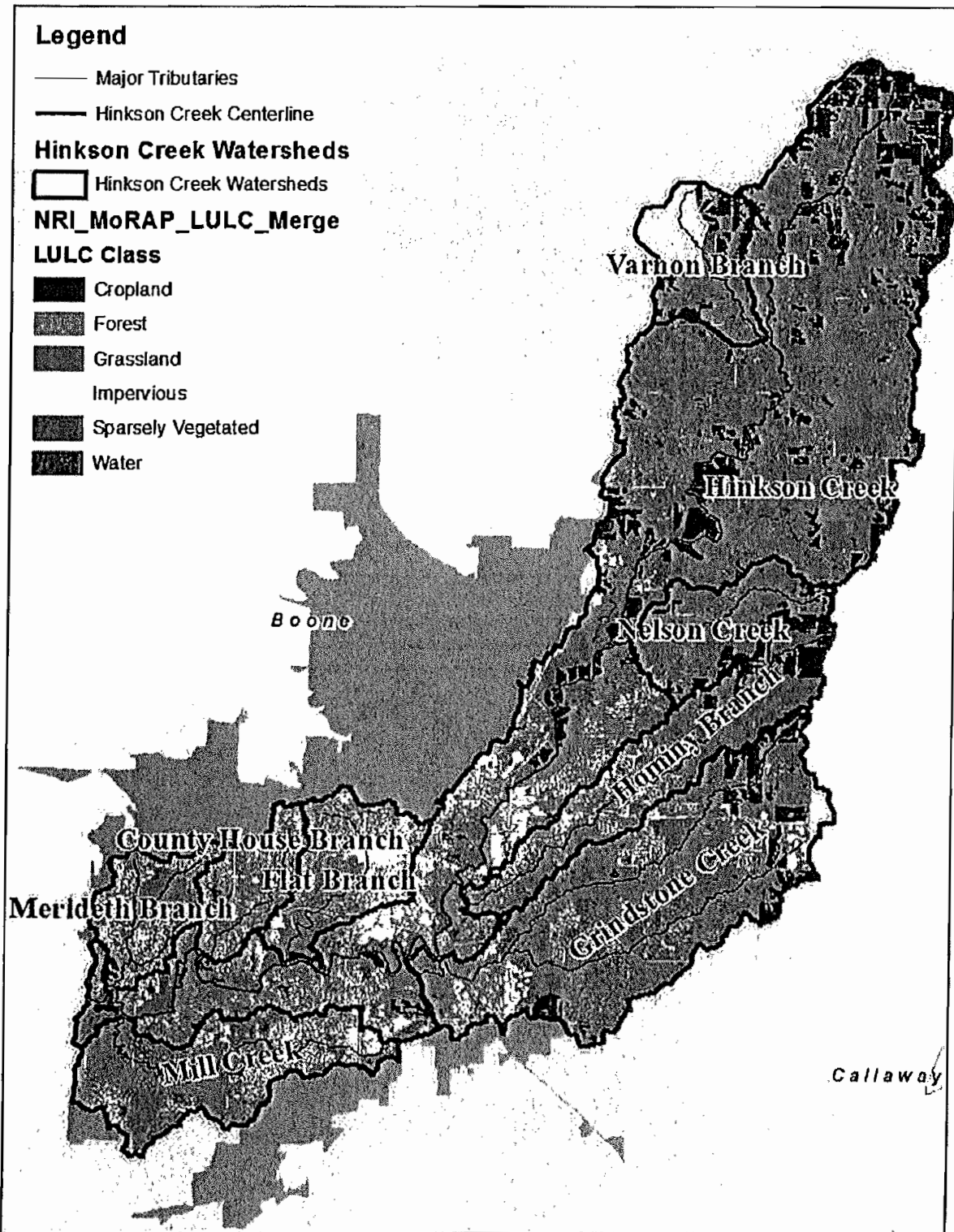


Figure 205. Watersheds and LULC within Hinkson Creek study area.

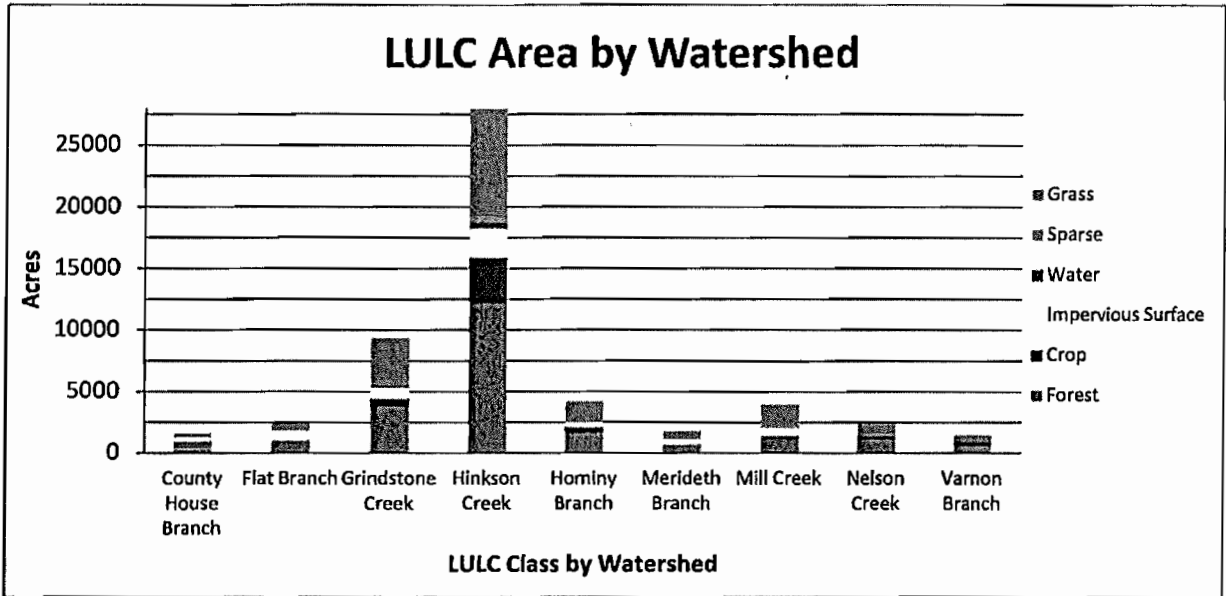


Figure 216. Area of LULC within each watershed in acres.

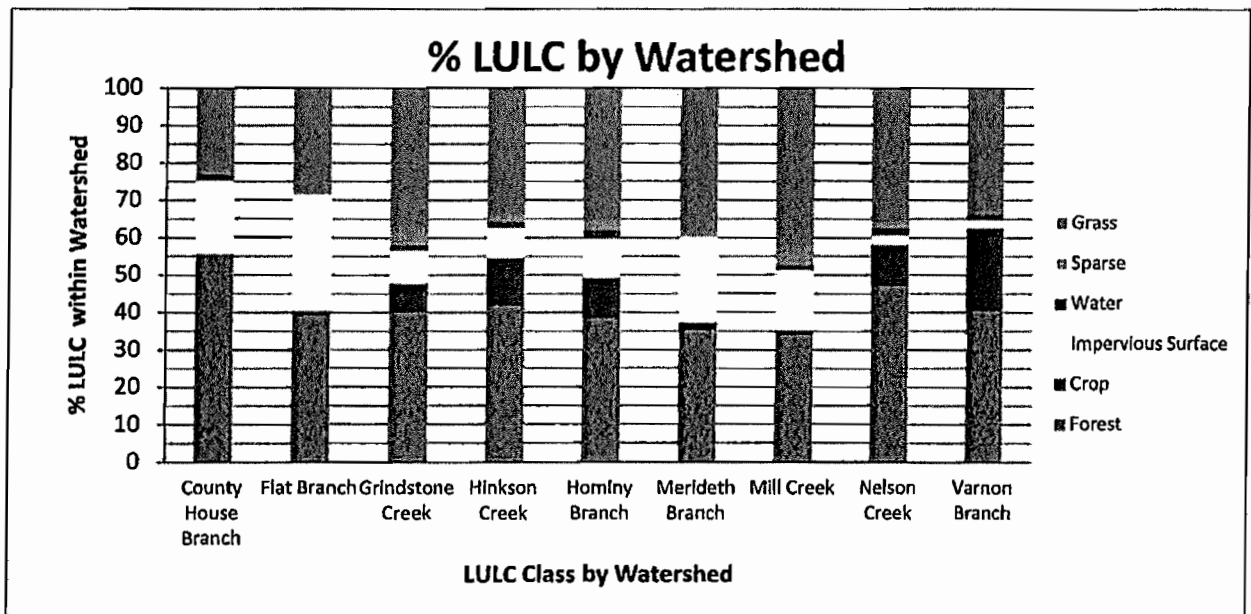


Figure 227. Percent LULC class within each watershed.

3.1.3 LULC - Cumulative Upstream Catchments

To quantify the cumulative upstream composition of LULC at each major tributary, the watershed was divided into hydrologic drainage catchments that roughly correspond with the watershed layer. The Hinkson Creek watershed was subdivided at the confluence of major tributaries. Break lines were drawn based on Hinkson Creek basin hydrologic catchments generated from 30 m DEMs (Figure 28). Catchments were numbered from 1 to 8, starting at the headwaters, with each major tributary resulting in a break point.

Figure 29 shows the percent LULC within each catchment. Forest and grass comprise the majority cover in all catchments, while percent crop decreases and impervious increases downstream. Catchment 5 (Flat Branch) is 28% impervious, which is the highest percentage of all the catchments. Catchment 1 (Varnon Branch) has the highest percentage of crop, at 30%. The highest percentage of forest is found in catchment 6 (County House Branch), at 54% of the catchment. The percent cover by catchment portrays a more accurate longitudinal LULC trend, following the course of Hinkson Creek, than the watersheds. This is due to the subdivision of the Hinkson Creek watershed at major tributaries.

Cumulative upstream LULC depicts the composition of LULC above each major tributary. Forest, grass, and impervious steadily increase downstream, while the percentage of crop levels off at catchment 4, the Grindstone Creek confluence (Figure 30). A spike in impervious occurs between catchments 2 (Nelson Creek) and 3 (Hominy Branch), where the total jumps from 0.8% to 3.3%, and continues to increase up to the confluence with Perche Creek. The second highest spike in impervious occurs between catchments 4 (Grindstone Creek) and 5 (Flat Branch), where the value increases from 5% to 7.3%. Ninety-five percent of all crop occurs between catchments 1 (Varnon Branch) and 4 (Grindstone Creek), and 70% of crop is accounted for in catchments 1 (Varnon Branch) and 2 (Nelson Creek). The most significant jump in forest and grass cover is from catchment 1 (Varnon Branch) to 2 (Nelson Creek), with 13% and 11% increases, respectively.

Percent LULC cover type relative to total area of a given cover type helps to identify the spatial distribution of cover types by catchment. Figure 31 shows that roughly 32% of all forest is within catchment 2 (Nelson Creek), 36% of all crop is within catchment 1 (Varnon Branch), and 60% of impervious surface is within catchments 3 through 5. Catchment 3 (Hominy Branch) has the highest value for impervious at 23%. More than 31% of grass exists in catchment 2 (Nelson Creek). These values are influenced by the size of the catchments, but nonetheless paint a picture of the distribution of land cover within the study area.

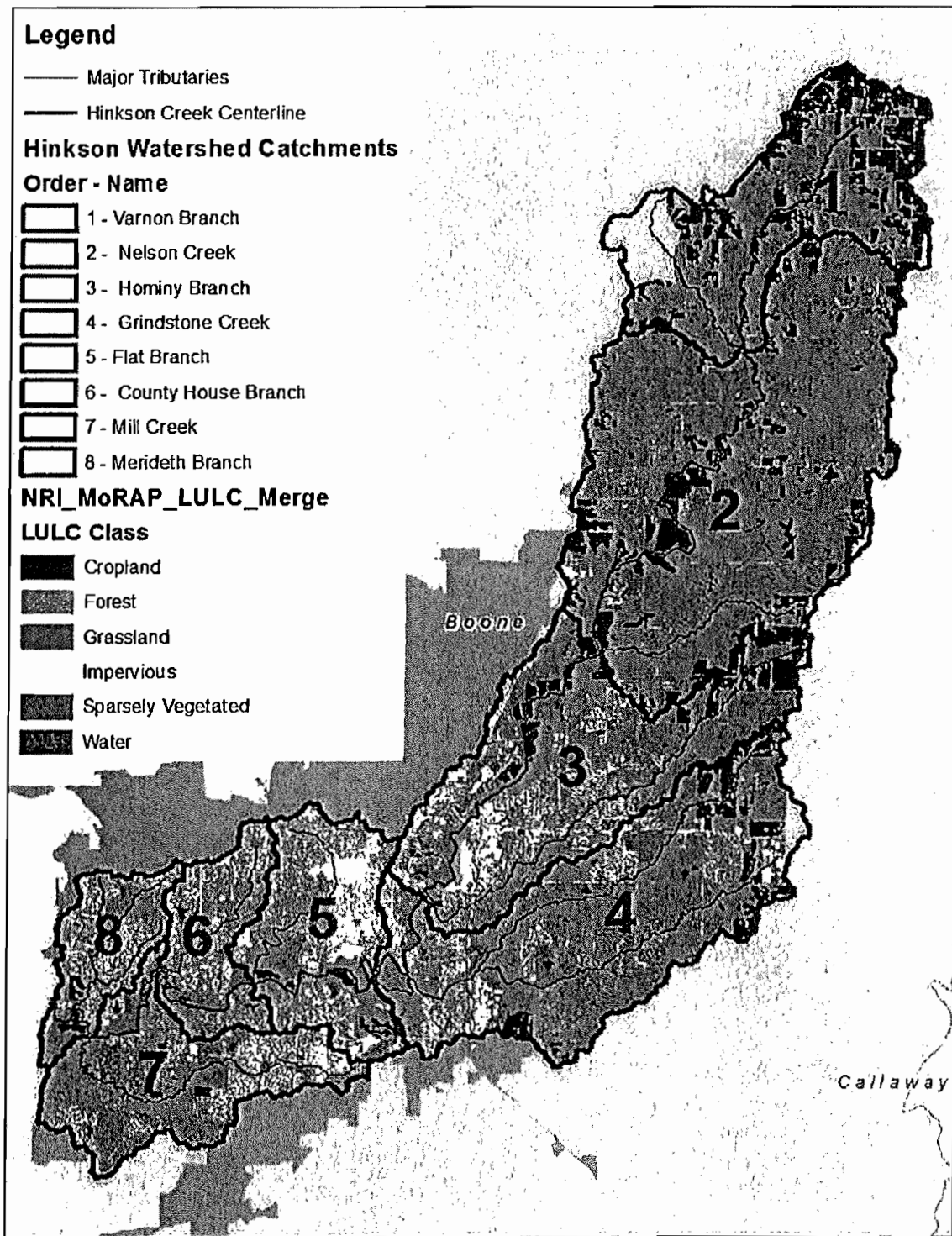


Figure 28. "Catchments" developed to calculate cumulative upstream LULC composition statistics at major tributaries of Hinkson Creek. Watersheds were divided at major tributaries based on fine scale catchments and lumped into broader watershed catchments. Catchments were numbered starting at #1 for the headwaters and increasing downstream.

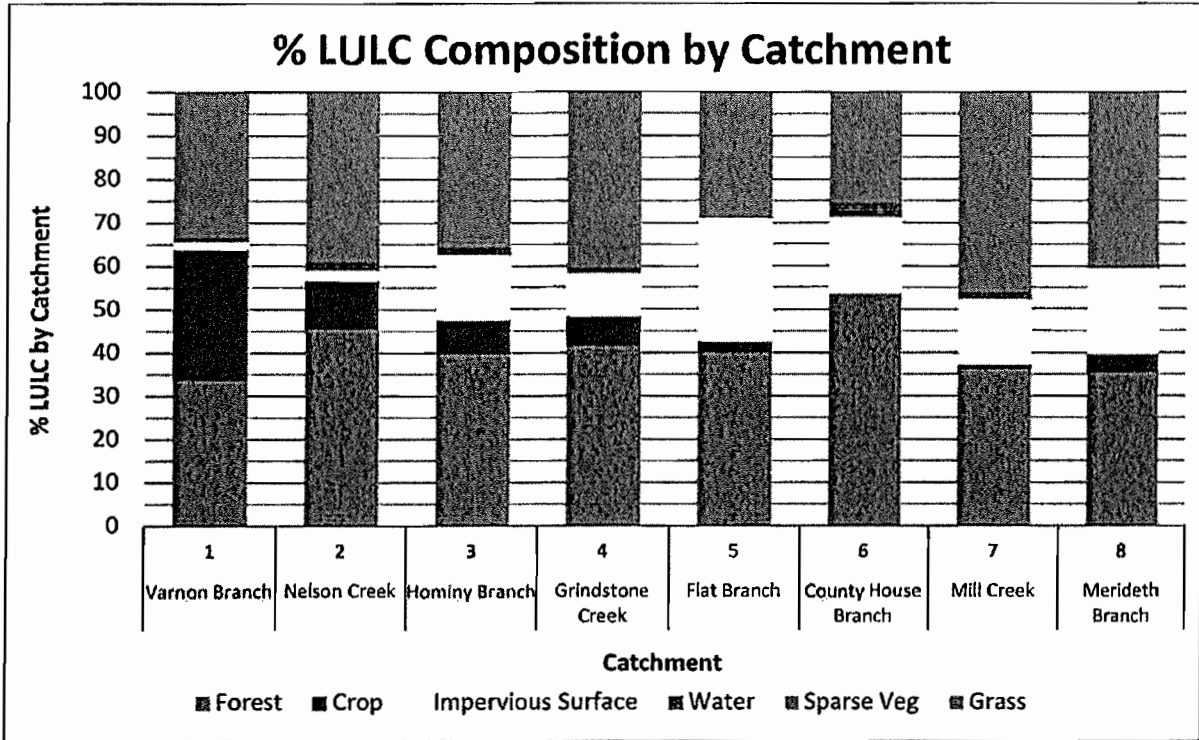


Figure 29. Percent LULC composition within each catchment. Note the dominance of the forest and grass cover types in all catchments, the increase in impervious cover from catchments 3 to 8, and decrease in crop cover type from catchments 1 through 8.

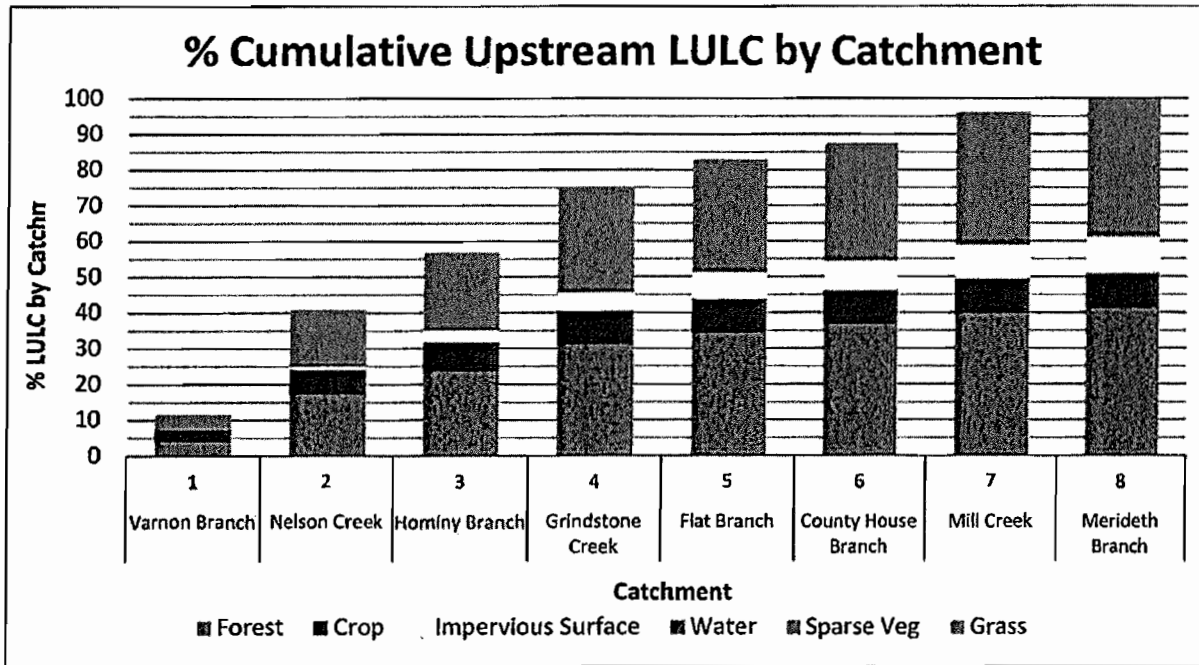


Figure 30. Percent cumulative upstream LULC by catchment shows the contribution of each catchment toward total land cover values for the entire watershed, progressively moving downstream. Note the gradual addition of all forest, grass, and impervious in a downstream direction. Crop, water, and sparse vegetation cover level off before catchment 8.

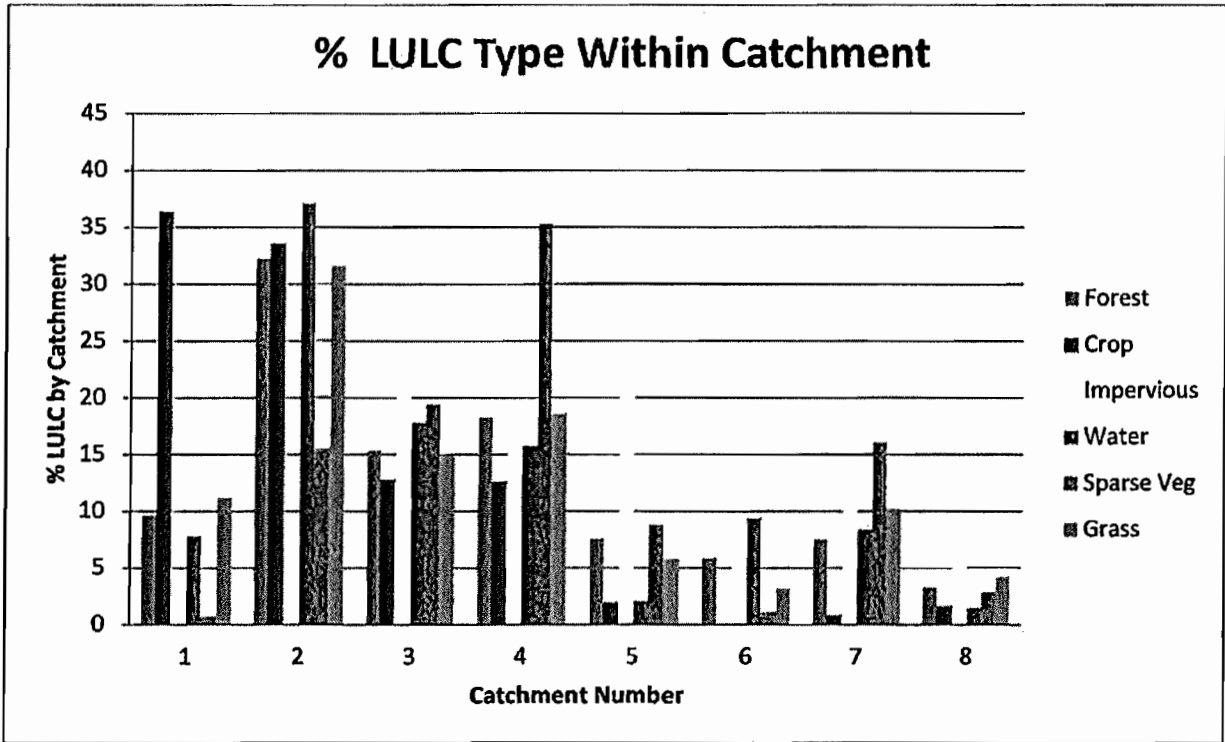
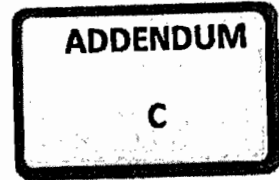


Figure 31. Percent of each LULC type by catchment relative to total area for each LULC type. This chart illustrates the percentage of the total area of a single cover type that exists within each catchment. Note that over 35% of all crop exists in catchment 1 and over 60% of all impervious surface can be found in catchments 3 thru 5.



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Project Number: 2013MO142B
Title: Increase in Water Quality Through the Study of Longitudinal Variations in Physical Habitats
Project Type: Research
Focus Category: Management and Planning, Ecology, Conservation
Keywords: impaired water bodies, habitat characteristics, Collaborative Adaptive Management (CAM), Management and Planning, habitat assessment, channel dimension, floodplain geometry,
Start Date: 3/1/2013
End Date: 2/28/2014
Congressional District: 4
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Abstract

Increase in Water Quality Through the Study of Longitudinal Variations in Physical Habitats Jason A. Hubbart, Ph.D. School of Natural Resources, Department of Forestry, 203-Q ABNR Building, Columbia, MO 65211

ABSTRACT

Many decisions related to restoration, management, monitoring, and evaluation of impaired water bodies require an understanding of longitudinal variation of physical habitat characteristics. Variation in characteristics such as channel morphology, floodplain width, floodplain sediments, and riparian vegetation can affect medium-term channel change and indicate where specific management or restoration actions will be most effective. Hinkson Creek is located in Boone County, central Missouri, USA. The Missouri Department of Natural Resources (MDNR) placed Hinkson Creek on the state's list of impaired streams under section 303(d) of the Clean Water Act (CWA) in 1998. A Collaborative Adaptive Management (CAM) process has been initiated in the watershed that uses a science-based approach guided by local stakeholder committees. Presently, no comprehensive inventory of physical habitat characteristics exists for Hinkson Creek to guide spatial understanding of restoration, management, monitoring, and evaluations. The primary objectives of the current proposal include assessing the entire stream system to supply information that will better inform the CAM process and supply needed information to watershed stakeholders, with the ultimate goal of restoring the biological community to fully supporting and eventual removal of the creek from the 303(d) list of impaired waters. This current effort will be a primarily field-based campaign designed to complement a current geographic information system effort. A student undergraduate team will be assembled, that will be directly supervised by a graduate student assistant (GSA). The entire team and project will be supervised by the PI. The field team will start their field campaign starting in May 2013, and will conduct physical habitat assessment starting in Hinkson Creek headwaters at intervals of approximately every 50 meters. Stream physical habitat data will include observations of erosion and depositional processes, changes in channel and floodplain geometry, and riparian and land-use cover alterations. Data collected will include channel

dimension, pattern, profile and sediments (i.e. bed composition and apparent depth). Data (quantitative and observation) gathered from the proposed work will be of great value as the CAM process and current and ongoing research in the watershed continues. Data from the current work will be distributed to the City of Columbia, Public Works Department, Boone County, the University of Missouri Campus Facilities, the Missouri Department of Natural Resources, the Missouri Department of Conservation and other state, Federal and public entities upon request within four months of project completion (i.e. December 2013).

ABSTRACT

Title:

A Mizzou Undergraduate Team Physical Habitat Assessment for Hinkson Creek

Principle Investigator

Jason A. Hubbart, Ph.D. School of Natural Resources, Department of Forestry, 203-Q ABNR Building, Columbia, MO 65211.

Many decisions related to restoration, management, monitoring, and evaluation of impaired water bodies require an understanding of longitudinal variation of physical habitat characteristics. Variation in characteristics such as channel morphology, floodplain width, floodplain sediments, and riparian vegetation can affect medium-term channel change and indicate where specific management or restoration actions will be most effective. Hinkson Creek is located in Boone County, central Missouri, USA. The Missouri Department of Natural Resources (MDNR) placed Hinkson Creek on the state's list of impaired streams under section 303(d) of the Clean Water Act (CWA) in 1998. A Collaborative Adaptive Management (CAM) process has been initiated in the watershed that uses a science-based approach guided by local stakeholder committees. Presently, no comprehensive inventory of physical habitat characteristics exists for Hinkson Creek to guide spatial understanding of restoration, management, monitoring, and evaluations. The primary objectives of the current proposal include assessing the entire stream system to supply information that will better inform the CAM process and supply needed information to watershed stakeholders, with the ultimate goal of restoring the biological community to *fully supporting* and eventual removal of the creek from the 303(d) list of impaired waters. This current effort will be a primarily field-based campaign designed to complement a current geographic information system effort. A student undergraduate team will be assembled, that will be directly supervised by a graduate student assistant (GSA). The entire team and project will be supervised by the PI. The field team will start their field campaign starting in May 2013, and will conduct physical habitat assessment starting in Hinkson Creek headwaters at intervals of approximately every 50 meters. Stream physical habitat data will include observations of erosion and depositional processes, changes in channel and floodplain geometry, and riparian and land-use cover alterations. Data collected will include channel dimension, pattern, profile and sediments (i.e. bed composition and apparent depth). Data (quantitative and observation) gathered from the proposed work will be of great value as the CAM process and current and ongoing research in the watershed continues. Data from the current work will be distributed to the City of Columbia, Public Works Department, Boone County, the University of Missouri Campus Facilities, the Missouri Department of Natural Resources, the Missouri Department of Conservation and other state, Federal and public entities upon request within four months of project completion (i.e. December 2013).

PRE-PROPOSAL

Title

A Mizzou Undergraduate Team Physical Habitat Assessment for Hinkson Creek

Principle Investigator

Jason A. Hubbart, Ph.D. School of Natural Resources, Department of Forestry, 203-Q ABNR Building, Columbia, MO 65211.

Nature, Scope and Objectives of Research

Introduction and Problem Statement

Land use practices including agriculture, forest harvesting, and urbanization, can have profound impacts on receiving water bodies (Allen 2004). Impacts can include alteration of flow, sediment, thermal regimes, stream geomorphology, aquatic and riparian habitat, the addition of pollutants and nutrients, and a reduction of aquatic species richness and diversity (Allan et al. 2007). For example, agriculture can result in excess nutrient loading that can lead to eutrophication and anoxia (Morgan et al. 2006). In addition, habitat degradation associated with riparian forest clearing, channel straightening and sedimentation, is often present in agricultural streams, and can lead to substantially degraded aquatic faunal assemblages (Heatherly et al. 2007, Reid et al. 2010, Stone et al. 2005). Urbanization can lead to increased sedimentation, increased channel erosion, and consequent habitat degradation (Boothe and Jackson 1997), changes in riparian vegetation (White and Greer 2006), and increases in hydrologic disturbance (Coleman et al. 2011). These effects are often cumulative, resulting in confounding research outcomes, confusing management practices, and misallocations of millions of tax payer dollars.

Many decisions related to restoration, management, monitoring, and evaluation of impaired water bodies require at least a basic understanding of the longitudinal variation of physical habitat characteristics. Longitudinal variation in hard constraints such as bedrock in the bed or banks, hard infrastructure, channel network structure, and sources of coarse sediment will control how much the channel can migrate or adjust to stresses or restoration activities (Piegay and Schumm, 2003; Elliott et al., 2009). Variation in characteristics such as channel morphology, floodplain width, floodplain sediments, and riparian vegetation can affect medium-term channel change and indicate where specific management or restoration actions will be most effective (Jacobson et al., 2010). An additional class of characteristics can be considered short-term physical responses that may also vary substantially along the channel. Examples include (but are not limited to) gravel or sand bar extent, large woody debris, root mats, and sedimentological characteristics of the bed (Jacobson and Gran, 1999). The association of response factors in relation to the first two classes may indicate sources of stress and response in given water body and therefore provide direction for short term physical response investigations.

Hinkson Creek is located in Boone County, central Missouri, USA. The Missouri Department of Natural Resources (MDNR) placed Hinkson Creek on the state's list of impaired streams under section 303(d) of the Clean Water Act (CWA) in 1998. The cause of impairment was listed as unknown (EPA 2011). Subsequent bioassessment studies of Hinkson Creek indicated that sections of the creek were not fully supporting of aquatic life, but water quality analyses and follow-up studies were unable to determine a specific cause of impairment (MDNR 2002, 2004, 2005, 2006). In 2011 a TMDL was proposed, the design of which would reduce runoff from the stream's surrounding area as a surrogate for unidentified pollutants (Hubbart et al., 2010; USEPA, 2011). More recently a Collaborative Adaptive Management (CAM) process has been initiated in the watershed that uses a science-based approach guided by local stakeholder committees. To learn more pertaining to the HCW CAM process the reader is referred to: <http://helpthehinkson.org/CollaborativeAdaptiveManagement.htm>. The primary objectives of the current proposal include assessing the entire stream system, including the creek and terrestrial portions of the watershed, with the goal of restoring the biological community to *fully supporting* and eventual removal of the creek from the 303(d) list of impaired waters.

Presently, no comprehensive inventory of physical habitat characteristics exists for Hinkson Creek to guide spatial understanding of restoration, management, monitoring, and evaluations. A physical habitat assessment of the main stem of Hinkson Creek was identified by several members of the CAM Science Committee and subsequently approved by the CAM Stakeholder Committee as an essential first step towards improved management of Hinkson Creek and its eventual removal from the CWA 303(d) list. Currently, a number of biological and chemical parameters are measured on a regular basis at specific sites. However, those sites have not been placed in the context of the range of physical variability along Hinkson Creek and the physical attributes that influence or provide habitat for macro invertebrates and other aquatic biota throughout the Hinkson Creek drainage have not been thoroughly investigated.

Recent and Ongoing Work in Hinkson Creek

In November of 2008, permanent gauging stations were established at 5 locations along Hinkson Creek using a nested scale experimental watershed study design (Figure 2) (Hubbart et al. 2010). The objectives of studies conducted using the experimental watershed study design included analyses of suspended sediment (Hubbart and Freeman 2010, Hubbart and Gebo 2010, Freeman 2011), monitoring and modeling the flow regime (Scollan 2011) and investigations of nutrient loading (articles in prep). Future anticipated analyses after year seven will include water yield, peak flow and other land-use flow, and pollutant transport analyses. A number of interim studies have been published including Hubbart and Freeman (2010) who collected and analyzed water samples for particle size class distribution during March, 2010. They identified a sharp increase in the concentration of fine particles in urban reaches of Hinkson Creek comparing pre and post-precipitation event conditions and identified a 450% increase in the concentration of the smallest particle size class (2.06 μm). Thus, with a doubling of streamflow (1.4 m^3/s to 2.9 m^3/s), the concentration of fine sediment was more than quadrupled. This relationship can be attributed to a number of natural in-stream or overland processes; however, urban influence was indicated to potentially impact their results. Freeman (2011) showed that suspended sediment concentrations were greater at urban sites relative to rural sites but that the difference was not statistically significant. His results also showed smaller mean particle sizes of the suspended sediment at

urban sites which was attributed to both in-stream weathering processes and land use (Freeman 2011). Kellner et al. (article in submission) followed up on the work of Hubbard and Freeman (2010) and Freeman (2011) by analyzing terrestrial stormwater samples for suspended sediment size class distribution and compared 17 urban stormwater monitoring sites ($n = 272$) and 3rd and 4th order receiving water bodies. Urban stormwater samples had lower total concentration ($205.11 \mu\text{l/l}$) relative to receiving water bodies (3rd order = $318.77 \mu\text{l/l}$, 4th order = $323.26 \mu\text{l/l}$), containing approximately 35% less total suspended sediment. Ultimately, results to date indicate a disproportionate contribution of fine suspended sediment from the urban environment. In other research conducted in the HCW, Huang (2012) conducted a study of streambank erosion and found that bank erosion can contribute as much as 67% of suspended sediment material in the reach of Hinkson Creek that was investigated. These studies show very clearly the effects of land use and implications for hydrogeomorphological alteration, and therefore aquatic habitat. Arguably, alterations to the flow regime including peak flows and base flows may greatly influence in-stream processes. Hubbard and Zell (in submission) used two dissimilar automated baseflow separation algorithms, and Monte Carlo techniques to evaluate urban baseflow and estimation uncertainty using data from the Hinkson Creek USGS gauging station. Three uncertainties affecting trend determinations were assessed including, algorithm structure, precipitation – runoff relationships, and baseflow algorithm parameterization. Results indicated that despite ongoing population growth and development in the HCW, annual streamflow metrics did not significantly increased or decreased ($p \leq 0.05$) from 1967 to 2010. However, several streamflow metrics featured shallow insignificant ($p > 0.05$) slopes in the direction hypothesized for an urbanizing (less pervious) watershed, including a downward slope for baseflow index (BFI) and increases in runoff volume coefficient. Median annual baseflow estimations differed by 29% between techniques (85.3 vs. 118.9 mm yr^{-1}). Obviously, there is a great deal of information still needed in the HCW to better understand current and projected development impacts. Given the work to date, and need for additional physical investigation of the stream channel, the current proposed project will supply a great deal of information inexpensively, while also training future water resources professionals.

Approach and Study Outcomes

Two scales of effort were identified by the CAM Science Committee for the physical habitat assessment. The first scale involves compilation of data that can be readily acquired through photo-interpretation and analysis of existing geographic information system (GIS) data (Elliott and Jacobson, 2006; Elliott and others, 2009). The second scale of effort and the impetus for the current proposed work involves field measurements of characteristics that cannot be measured from remotely sensed data. This second scale of effort could be more open-ended as many potentially relevant characteristics could be measured in the field. Therefore, for the current effort parameters will be selected to maximize utility compared to cost. The Hinkson Creek Science Team members identified relevant parameters for the effort, sampling intervals, and budget needs. The field measurements habitat assessment is anticipated to start as early as spring 2013 and will provide higher spatial coverage of the stream system and more detailed data to support both analyses and future actions within the watershed.

It is anticipated that the scales of habitat assessment proposed here will be followed by more detailed, reach-scale assessments in the future, including measurements of channel morphology, substrate, riparian vegetation characteristics and discharge-determined habitat availability over

distances of 10-20 channel widths or multiple riffle/pool sequences (Fitzpatrick and others, 1998; Panfil and Jacobson, 2001; Jacobson and others, 2004; Kaufmann, 2006). However, as mentioned above the data and other information gathered from the proposed work will be of incalculable value as the CAM process and current and ongoing research in the watershed continues. Data from the current work will be distributed to the City of Columbia, Public Works Department, Boone County, the University of Missouri Campus Facilities, the Missouri Department of Natural Resources, the Missouri Department of Conservation and other state, Federal and public entities upon request within four months of project completion (i.e. December 2013). The project will also result in a interpretive report and student poster presentations of results.

Methods

Hinkson Creek is located in the Lower Missouri-Moreau River basin (HUC 10300102) in central Missouri and is approximately 42 km long. The Hinkson Creek Watershed (HCW) spans approximately 231 km² (MDNR 2006). Soils in the upper reaches of the watershed are Keswick-Hatton-Winnegan Association, characterized as loamy till with a well-developed clay pan. Soils in the lower portion of the watershed are of the Weller-Bardley-Clinkenbeard Association and are characterized as thin cherty clay and silty to sandy clay (USDA 2001). Land use in the upper watershed is mostly agricultural and forested and becomes increasingly urban further downstream.

This will be a primarily field-based effort. A student undergraduate team will be assembled, that will be directly supervised by a graduate student assistant (GSA). The entire team and project will be supervised by the PI (please see Training Potential below). The field team will start their field campaign starting in May 2013, and will conduct physical habitat assessment starting in Hinkson Creek headwaters with repetition approximately every 50 meters. Stream physical habitat data will generally include observations of erosion and depositional processes, changes in channel and floodplain geometry, and riparian and land-use cover alterations. Data collected will include channel dimension, pattern, profile and sediments (i.e. bed composition and apparent depth). Field data sheets will be prepared in advance of the start of the field season by the PI and GSA. All field equipment will be assembled and prepared for field deployment for the undergraduate field team prior to the start of the field season. Field training will be scheduled for two days prior to the field season to train all students (graduate and undergraduate). Other specific information/data collected at each stream cross section will include:

- *Presence of bedrock in banks and bed:* Bedrock can have very strong controls on channel form and process by presenting non-erodible materials, and influencing particle size and bed roughness. Zones where bedrock constrains lateral or vertical movement of the stream channel will be documented by mapping upstream and downstream locations where bedrock is present in the bed and banks.
- *Bank stabilization structures:* Bank stabilization structures consist of rip-rap, gabion baskets, and other engineered structures intended to prevent bank erosion and retreat. Zones where bank stabilization structures constrain lateral movement of the stream channel will be mapped by locating upstream and downstream extents of each structure.

- *Infrastructure* not adequately mapped in GIS resources (including pipes, outfalls, and discharge control structures). Utilities and infrastructure will be incorporated into the habitat assessment because they represent hard structures that can constrain channel movement (for example pipelines in the bed, bridge abutments) as well as potential hazards (for example leaking sewers). Locations of all infrastructure elements intersecting the bank or beds will be determined.
- *Disturbance features*: including erosion gullies, debris fans, slumps, bank failures, debris piles. Relatively small geomorphic features adjacent to the channel can be sources of disturbance or changes in channel morphology or substrate. An example would be a high-gradient gully delivering boulders to the channel or a bank slump that delivers fine sediment directly to the channel. Locations of all relevant geomorphic features affecting the channel will be determined.
- *Bank height and slope*: Stream bank height and angle will be determined at every stream survey site and/or every 50 m using a clinometer (Biedenharn et al., 1997). The vertical height can be determined by knowing one angle and one side of right triangle (Gordon et al., 2004).
- *Photographic journal*: Digital cameras will be used to create a photo journal of each survey site. Photos will be collected in multiple locations including a mandatory set of photos taken from the center of the streambed in the four cardinal directions as well as upwards (canopy cover), directly down (streambed composition), directly upstream, downstream and perpendicularly towards each streambank.
- *GPS*: Coordinates will be collected at each survey site including streambanks, streambeds and major objects (i.e. woody debris, public utilities, engineered structures, erosional gullies, bank failures, debris piles, and other obvious habitat altering features).
- *Canopy cover*: A convex canopy densiometer will be used to quantify forest canopy cover. Canopy cover is defined as the proportion of the forest floor covered by the vertical projection of the tree crowns (Jennings et al. 1999). Canopy cover has been shown to be a multipurpose ecological indicator that is useful for distinguishing different plant and animal habitats, assessing forest floor microclimate and light conditions, and estimating functional variables like the leaf area index (LAI) that quantifies the photosynthesizing leaf area per unit ground area (Jennings et al. 1999).

Data accuracy will be assured through data review and documentation conducted by each undergraduate team member and the GRA. Team members will be responsible for reviewing data daily and evaluating field assessments. Performing daily data inspections will ensure data are not missing, inconsistent with the protocols, or otherwise problematic, and whether there is a need for reevaluation (i.e. revisiting previous sites). Data will be checked in the field by multiple individuals to assure information reliability and replicability as well as to make sure data are properly detailed in data sheets, which will later need to be transcribed to digital formats. Microsoft Excel® databases will be developed to support the collection and storage of data collected at each phase of assessment. Data will be entered by the GRA, and reviewed by both the GRA and PI for completeness and accuracy as it is entered and then again prior to submission to stakeholders at the end of the project. To assist in reviewing data for accuracy and consistency, standard reports and tables will be generated reflecting data at the watershed, reach, segment, and site level (as necessary). Reports and tables will also help with determining where

additional information should be collected and where future phases of assessments may be appropriate.

Related Research

There are currently no related studies in Hinkson Creek as that proposed here. It is however, worth mentioning that the outcomes of the proposed habitat assessment will prove invaluable to land managers (City of Columbia, Boone County, University of Missouri, Campus Facilities, and others) and researchers (Missouri Department of Conservation, Missouri Department of Natural Resources, University of Missouri, and others) engaged and peripheral to the Hinkson Creek Collaborative Adaptive Management process now and for at least the next 10 years at which time the work should have been repeated to document any changes as per the CAM process.

Training Potential

Training is the first step in starting an assessment. Learning how to use the protocols and evaluate the different parameters is necessary for completing an accurate and consistent assessment. Carefully following the protocols is one way of ensuring that repeatable and consistent sets of data are collected. Completing a quality assurance (QA) at the end of each day and/or phase of habitat assessment is also part of the tracking process. Training will be arranged by the PI and other CAM Science Committee members. Training of all members of the field crew (i.e. graduate or undergraduate) will be viewed as mandatory by the PI to assure field work efficiency and data quality. The GSA will receive additional training by supervising the undergraduate field crew, maintaining field protocols and data collection procedures in the field. The GSA will also be responsible for preliminary organization and analysis of the database, a process overseen and reviewed by the PI. All students involved in this project will be expected to present results at the annual Missouri Natural Resources conference in 2014, thereby showcasing the funding agency, MU WRRC and demonstrating the impacts of the project.

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RELEVANCE OF PROJECT

Relevance of research to Missouri needs, as well as regional and national significance, and potential users

The Missouri Department of Natural Resources (MDNR) placed Hinkson Creek on the state's list of impaired streams under section 303(d) of the Clean Water Act (CWA) in 1998. The stream was listed as impaired by unknown pollutants based on analyses of the stream's macroinvertebrate community at eleven sites within the creek. In 2011 a Total Maximum Daily Load (TMDL) was proposed by EPA that used runoff from the stream's surrounding area as a surrogate for the unidentified pollutants (Hubbart et al., 2010; USEPA, 2011). In response to the TMDL, the EPA, Missouri Department of Natural Resources and the three local entities that shared responsibility for the storm water permit, Boone County, the City of Columbia, and the University of Missouri entered into a precedent-setting agreement in 2012 to address the water quality concerns. The agencies agreed to use a Collaborative Adaptive Management (CAM) process in the watershed that uses a science-based approach guided by a local stakeholder committee because of the significant uncertainties inherent in this watershed. This represents the first time such an approach has been formally agreed upon to address water quality issues in a watershed. The stakeholder committee is supported by a group of engineers from the city, county and university who will examine potential actions within the watershed and a team of scientists that will serve to guide the process and provide scientific advice to the stakeholders. The habitat assessment currently proposed was the first priority identified by the science team to help inform future decisions in the watershed because alteration or loss of habitat in response to alterations in hydrologic regime are considered potential causes of impairment. It will serve two major purposes: A) identify areas where suitable habitat for one or more of the species groups used in the macroinvertebrate sampling is missing; and B) direct actions to those reaches of the stream where changes in management practices or restoration activities might best benefit the species and overall water quality. These data and analyses have immediate value as they will be used by the science and action teams as well as stakeholders to guide future decision-making in the Hinkson Creek watershed. Data and an interpretive report from the current work will be distributed to the City of Columbia, Public Works Department, Boone County, the University of Missouri Campus Facilities, the Missouri Department of Natural Resources, the Missouri Department of Conservation, the US Geological Survey and other state, Federal and public entities upon request within four months of project completion (i.e. December 2013). These data will also be incorporated as a project into the County GIS system to promote their availability to all citizens.

Potential of future research and funding following completion

It is anticipated that the proposed work will supply information that will result in a follow up investigation that includes more detailed, reach-scale assessments. Reach-scale assessments typically involve measurements of channel morphology, substrate, riparian vegetation

characteristics and discharge-determined habitat availability over distances of 10-20 channel widths or multiple riffle/pool sequences (Fitzpatrick and others, 1998; Panfil and Jacobson, 2001; Jacobson and others, 2004; Kaufmann, 2006). Possible funding sources for ongoing studies including follow on studies to the current proposed work include the National Science Foundation, US Department of Agriculture National Institute of Food and Agriculture, the Environmental Protection Agency, the Missouri Department of Natural Resources.

Student involvement

In the spring of 2013 a call will go out for undergraduate applications for a four person field team that will work through the summer of 2013 on this project. Applicants will be chosen based on background, interests, course work and grades and their cover letter. This will be a competitive process and a prestigious opportunity for highly qualified undergraduate to obtain field experience, understand the research process and present results at the 2014 Missouri Natural Resources conference by means of poster presentations.

Previous Grant Support from the Water Center

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**HINKSON CREEK COLLABORATIVE ADAPTIVE MANAGEMENT
RESEARCH PROPOSAL: FY2015**

Combined Flow and Suspended Sediment Proposal

**Total Budget (Not to Exceed):
\$280,000.00 (Please see Budget Details)**

Submitted To:

Hinkson Creek Watershed Collaborative Adaptive Management
Stakeholders, Actions and Science Teams

Date:

March 19, 2014

Project Title:

Hinkson Creek: Quantifying Stream Flow and Suspended Sediment Response to Urbanization
using a Scale-Nested Experimental Watershed Study Design

Principle Investigator:

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Background

Hinkson Creeks listing on the Clean Water Act (CWA) 303(d) list as impaired due to unknown pollutants in 1998 (MDNR, 2011; USEPA, 2011) came about due to many problems suspected by State and Federal agencies, and local residents including (but not limited to), (1) larger and more frequent floods, (2) lower base flows; (3) increased soil erosion in construction and development areas with subsequent transport of the soil to streams (i.e. altered suspended sediment regimes); (4) water contamination from urban storm water flows; (5) degradation of habitat for aquatic organisms due to the concerns listed above; and (6) degradation of aquatic habitat due to the physical alteration of stream channels and adjacent streamside (riparian) corridors (MDNR, 2009). In November of 2008, with initial funding (\$634,000) provided by the MDNR 319 program and USDA Ag Experimental Station, the PI began instrumenting Hinkson Creek with a nested-scale experimental watershed study design (Hubbart et al. 2010) to investigate the suspected problems that led to the 1998 listing and improve understanding of contemporary land-use and urbanization effects on hydrologic processes (stream response, water yield), water quality, and biological community health. Nested watershed study designs use a series of sub-basins inside a larger watershed to examine environmental variables. Sub-basins are often determined based on dominant land use and characteristics of the hydrologic system. A nested watershed study design enables quantitative characterization of influencing patterns and processes observed at each location (Hubbart et al., 2010). Each nested monitoring site of Hinkson Creek is designed to monitor water stage and a complete suite of climate variables. Multiple additional water quality variables (e.g. suspended sediment, nitrogen, phosphorus, chloride, pH, and other constituents) have been monitored at the nested sites since shortly after implementation of the study. A United States Geological Survey gauging station (USGS-06910230) has collected stage data intermittently since 1966 and provides flow data for site 4 (Figure 1).

Urbanization can significantly impact stream hydro-ecosystems. In particular by means of stream flow response to precipitation and runoff events. Increased impervious surface areas in urban watersheds, including roadways, rooftops, and parking lots, act to reduce or eliminate soil infiltration and increase the amount of stormwater runoff delivered to stream channels (Bledsoe and Watson 2001, Rose and Peters 2001, Jennings and Jarnagin 2002, Burns et al. 2005, Cianfrani et al. 2006, Xiao et al. 2007). Watershed imperviousness also reduces stormwater transit time, shortening the “lag time” between peak precipitation and peak flow (Galster et al. 2008). Vegetation removal and urban development also increases runoff volumes due to reduced evapotranspiration and canopy interception of precipitation (Hornbeck et al. 1997, Rose and Peters 2001, Im et al. 2003).

Stormwater flow serves as an important transport mechanism for non-point source pollutants, including suspended solids, nutrients, turf fertilizers, bacteria, and trace metals (Tsihrintzis and Hamid 1998, Xiao et al. 2007). Impervious surfaces serve as conduits for flow, replacing soils and vegetation that would otherwise attenuate runoff and transport of pollutants (Tabacchi et al. 2000). Urban peak discharge events also degrade water quality through physical alterations to the stream channel. Channels typically broaden and deepen in response to increased volume, velocity, and frequency of peak discharge in urban environments (Bledsoe and Watson 2001,

Galster et al. 2008), leading to channel instability and accelerated channel erosion (Olsen et al. 1997). Changes in the timing, frequency, and magnitude of stream flow have significant impacts on freshwater ecosystem function (Postel 2000). Channel simplification as a consequence of increased peak discharge frequency also degrades stream habitat diversity and biotic integrity (Cianfrani et al. 2006). In nearly every region, peak discharge magnitude has been shown to increase in response to watershed urbanization. In the southeastern United States, Rose and Peters (2001) documented 30 to 100 percent increases in the magnitude of peak flows in urban watersheds relative to rural watersheds. Despite available information, little is known in urbanizing watersheds of the central U.S. where there is similarly no multi-use (including urban) experimental watershed studies underway from which to draw inference. Thus, the experimental watershed study design implemented in the HCW will provide a great deal of information both locally and regionally in terms of urban land-use effects on peak flow and other stream response characteristics.

A primary transport material of receiving waters is suspended sediment. Suspended sediment is a primary cause of freshwater impairment (USEPA, 2006) affecting the biological, chemical, and physical health of aquatic ecosystems (Uri, 2001). Excess sediment is associated with a host of aquatic ecosystem impacts including reduced transmission of sunlight, which can inhibit photosynthesis and primary productivity (Campbell et al., 2005). Too much suspended sediment can abrade or clog the gills of aquatic organisms, inhibit the feeding efficiency of filter feeders (i.e. mussels), obstruct sight-feeders (i.e. applies to most fish species), and adversely affect macroinvertebrate communities by filling streambed interstitial void spaces (Owens et al., 2005). Suspended sediment also serves as a transport mechanism for many water quality constituents (Keyes and Radcliffe, 2002).

Objectives

The objectives of this project are to improve understanding of the impairment of Hinkson Creek and to assess implications for recovery strategies. Study outcomes will identify land-use related impacts to flow, thus informing the CAM process, respond to original concerns (re: 1998 303(d) listing) in Hinkson Creek related to altered flow processes, and better inform the appropriateness of the formerly proposed volume-based flow reduction TMDL approach. The experimental watershed study design (presented above) in the HCW and associated flow and sediment data collected over the past four years will be used to improve quantitative understanding of stream responses to water –input events (i.e. precipitation) and the transport of sediment and sediment loading in Hinkson Creek. This analysis is a substantial undertaking and investment. For example, flow and precipitation data have been collected at 5-minute intervals during the entire time period (approximately 421,000 data points) and multiple grants have been obtained by the PI to maintain instrumentation and a graduate student labor force (~\$1.5million). Sub-objectives of the current proposed analyses include estimating the interactions of land use type (forested, agriculture, sub-urban, urban) on stream response characteristics such as peak discharge, event flow hydrographs (or effective water input), storm duration, hydrograph rise, response lag, time to peak, response time, time of concentration and other stream responses characteristics (Dingman, 2002) (as appropriate, as analyses progress) will be evaluated at and between each nested monitoring site. These relationships where practicable will be evaluated with observed

suspended sediment concentrations. Observed data and analyses will then be used to calibrate a hydrological model (such as the soil water assessment tool, SWAT), and/or a water resources planning and management analytical tools (e.g. StreamStats, USGS). A calibrated hydrological model will allow us to assess sensitivity of Hinkson Creek streamflow characteristics to a wide range of past and future land-use changes in the watershed.

Study Rationale

1. Quantifying stream response to rainfall events and associated transport of suspended sediment will provide understanding of how these processes vary with stream distance and land-use in Hinkson Creek. Thus, the potential causes of water quality concerns related to physical habitat will become more apparent through this study.
2. This study, coupled to the Physical Habitat Assessment (PHA) results, will help inform decisions on possible actions to improve habitat and water quality in Hinkson Creek by showing where important changes in suspended sediment dynamics occur relative to location (i.e. land-use) in the watershed.

By comparing Hinkson Creek flow data with that from other streams in both urbanized and rural settings, it may be possible to estimate how altered Hinkson Creek has become as a result of land-use practices (e.g. urbanization). This provides a critical measure for determining what might be possible in terms of “restoration” of Hinkson Creek and to better estimate *realistic* extents of action needed to mitigate current and future development impacts.

Methods

Streamflow Metrics

Discharge at gauge sites 1, 2, 3, and 5 will be measured at designated stream cross-sections using the velocity-area method (Rantz 1982, Jones 1997, Dingman 2002, Chen and Chiu 2004). Cross-section discharge estimates will be used to create rating curve equations that will adjust stage measurements (5-minute intervals) from gauge sites. Stream response characteristics will be assessed based on a suite of metrics that may include but are not limited to mean annual flows, 7-day low flows in winter and summer, peak discharges due to rainfall as well as number of flow days with high and extreme flow rates greater than the mean plus one or two standard deviations, respectively (Novotny and Stefan, 2007), or upper confidence limits (CL) to detect significant differences in peak discharge (e.g. 90% CL) as per methods such as Beschta et al. (2000). There may also be some basis for considering precipitation and/or flow return periods in the analysis. Simple regression analysis (Hirsch et al., 1993), and/or statistics such as (but not limited to) Mann-Kendal non-parametric tests will be used to detect significant trends over time and between streamflow monitoring sites. The current work should not be considered all-encompassing or exhaustive, but will be focused on the most meaningful information that will most effectively assist the CAM process.

Suspended Sediment

Suspended sediment concentrations have been quantified using two standardized methods, 1) mass (or gravimetric, mg/l) concentration by wet sieving (ASTM, 1999; Edward and Glysson, 1999; Davis, 2005), and 2) laser diffraction analysis (ul/l). Wet sieving produces Total Suspended Sediment (TSS), or Suspended Sediment Concentration (SSC) information. The main difference between the TSS and SSC method is that TSS generally analyzes an aliquot of a total sample, whereas SSC analyzes the entire sample. Recent advances in suspended sediment monitoring include *in situ* fully automated devices that sense and log suspended sediment and particle size classes (Gray and Gartner, 2009). Laser diffraction instruments often provide volumetric estimates of sediment concentration as opposed to a mass concentration (Agrawal and Pottsmith, 2000) because the optical power distribution is converted to an area distribution. The LISST-Streamside (Sequoia Scientific Inc.), used in the current work utilizes laser diffraction technology to estimate suspended sediment and particle size class concentration metrics (Hubbart and Freeman, 2010). Both methods were used in the current work because each method has its advantages. For example, questions of sediment loading and yield may be most appropriately addressed using mass/gravimetric methods since the studies concern transfers of mass between systems (Walling 1999; Walling and Fang 2003; Wass and Leeks 1999). Conversely, water quality questions, such as the effects of excess sediment concentrations on aquatic biota, may be more aptly addressed via volumetric methods since the method quantifies relative proportions of a given constituent within a water body (Nichols, 2013).

Regardless of the method used, sample collection and laboratory analyses are expensive, and labor intensive (Gray and Gartner, 2009). The collection and labor involved with laboratory analysis will be complete on March 1, 2014. This proposal includes analysis of these data to provide information on how suspended sediment concentrations, loads, and particle-size distributions vary over time in Hinkson Creek.

Study Outcomes: Product(s) and Recommendations for CAM Process

Distinct products are listed as follows for flow and sediment. However, it is worth mentioning that sediment analysis cannot be concluded without flow, so combination of the two studies is a logical course of action.

Flow

Results of data analysis will provide quantitative estimates of stream response characteristics (such as those listed above) in Hinkson Creek. Products will include:

- Annual estimates of stream response metrics at all 5 nested monitoring sites in the HCW.
- Seasonal and event based estimates of stream response metrics at all 5 nested monitoring sites in the HCW.
- Modeled vs. observed stream response metrics (for example, peak flow) processes using a process based model such as (but not limited to) the Soil Water Assessment Tool (SWAT).

Stream response metrics will be compared to land use types in the overall watershed and in each respective sub-catchment (n=5, Figure 1) of the HCW. Modeling results will be very important

for this phase of the work to understand land-use impacts on flow processes. Study results will be synthesized with respect to overall implications for the severity and causes of impairment of Hinkson Creek. Results from Hinkson Creek will be compared with similar studies in other urban areas to provide insight on controlling factors.

The combination of flow dynamics, land use characteristics, and hydroclimatic data will provide detailed, quantitative information that will provide evidence to support, or refute hypotheses about causes for altered stream flow regimes in Hinkson Creek. That information will help guide decision makers in terms of management plans in terrestrial and aquatic environments to mitigate any detected alterations. Study outcomes will identify land-use related impacts to flow dynamics that will inform the CAM process and respond to original concerns in Hinkson Creek related to altered flow processes. Results will also help target most effective locations for BMP implementation projects, and better inform the appropriateness of the formerly proposed volume-based flow reduction TMDL approach.

Suspended Sediment

Results of flow analysis will provide transport relationships to improve quantitative estimates of:

1. Annual suspended sediment loads at all 5 nested monitoring sites in the HCW.
2. Quantitative estimates of fine particle size class concentrations between sites, as an indicator of sediment source or the type of sediment-related stress. For example, urban stormwater runoff may contribute disproportionate quantities of fine sediment to receiving water bodies, while simultaneously starving watercourses of total sediment concentration.
3. Modeled vs. observed suspended sediment loading using the Soil Water Assessment Tool (SWAT).

Total loading and particle size class analysis results will be compared to land use practices in the overall watershed and in each respective sub-catchment (n=5, Figure 1) of the HCW to provide relations between existing land use and suspended sediment. Modeling will be important in this phase of the work to help describe land-use practice impacts to sediment dynamics through 1) providing estimates of background sediment yield under pre-urban conditions and 2) providing a means to assess sensitivity of sediment loading to various land-use scenarios. Study results will be synthesized with respect to overall implications for the severity and causes of impairment of Hinkson Creek. Results from Hinkson Creek will be compared with similar studies in other urban areas to provide insight on controlling factors.

The combination of sediment loads, concentrations, and size distributions, compared with land use characteristics and hydroclimatic data, will provide detailed, quantitative information that will provide evidence to support, or refute hypotheses about causes for altered suspended sediment regimes in Hinkson Creek and thus guide decision makers accordingly in terms of management plans to mitigate any detected alterations in the receiving water body. Thus, study results will inform the CAM process by identifying whether or not suspended sediment is a problem in Hinkson Creek, and if so, where, and by how much.

Products will include annual reports to CAM teams and at least 6 publications in the peer reviewed literature addressing the numbered bullets above.

Not to Exceed Budget

The proposed work will support a post-doctoral research associate (PDA) in the Interdisciplinary Hydrology Laboratory of the PI. The PDA will post-process and analyze data, conduct modeling and report results that will supply improved understanding of land-use impacts on stream response, and management recommendations in Hinkson Creek.

Post-doctoral research associate stipend, benefits and analysis and modeling software, office supplies, consumables: \$70k/yr x 4 yrs = \$280k

Tentative Budget

	Year 1	Year 2	Year 3	Year 4	Total
Salary Post-Doc	\$ 45,000.00	\$47,250.00	\$49,612.50	\$52,093.13	\$ 193,955.63
Benefits	\$ 15,916.50	\$16,712.33	\$17,547.94	\$18,425.34	\$ 68,602.10
Analysis and Modeling Software	\$5,000	\$3,000	\$1,000	\$0	\$ 9,000.00
Travel	4000	3000	1800	0	\$ 8,800.00
Total Direct Costs	\$ 69,916.50	\$69,962.33	\$69,960.44	\$70,518.46	\$ 280,357.73
					Grand Total: \$280,357.73
Funding Source and Amount					
University of Missouri	\$ 69,916.50	\$23,320.78	\$23,320.15	\$23,506.15	\$140,063.58
City of Columbia		\$23,320.78	\$23,320.15	\$23,506.15	\$ 70,147.08
Boone County		\$23,320.78	\$23,320.15	\$23,506.15	\$ 70,147.08
					Grand Total: \$280,357.73

Based on the tentative budget above, each of the three CAM partners are requested to fund approximately \$23,320 for year each year following the first year (2, 3, and 4).

Tentative Schedule

Tasks/Accomplishments	Year 1				Year 2				Year 3				Year 4			
	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su	F	W	Sp	Su
Post-Doc Secured for Project	X	X														
Data post processing		X	X	X	X	X	X	X	X	X	X	X	X	X		
Report #1, Article #1, and 2 Submission				X	X											
Report #2, Article #3, and 4 Submission								X	X							
Report #3, Article #5 and 6 Submission												X	X			
Work Completed															X	X

Reports are distributed to CAM teams.

Timeline assumes post-doc appointment at noted date (could be delayed depending on qualified applicants)

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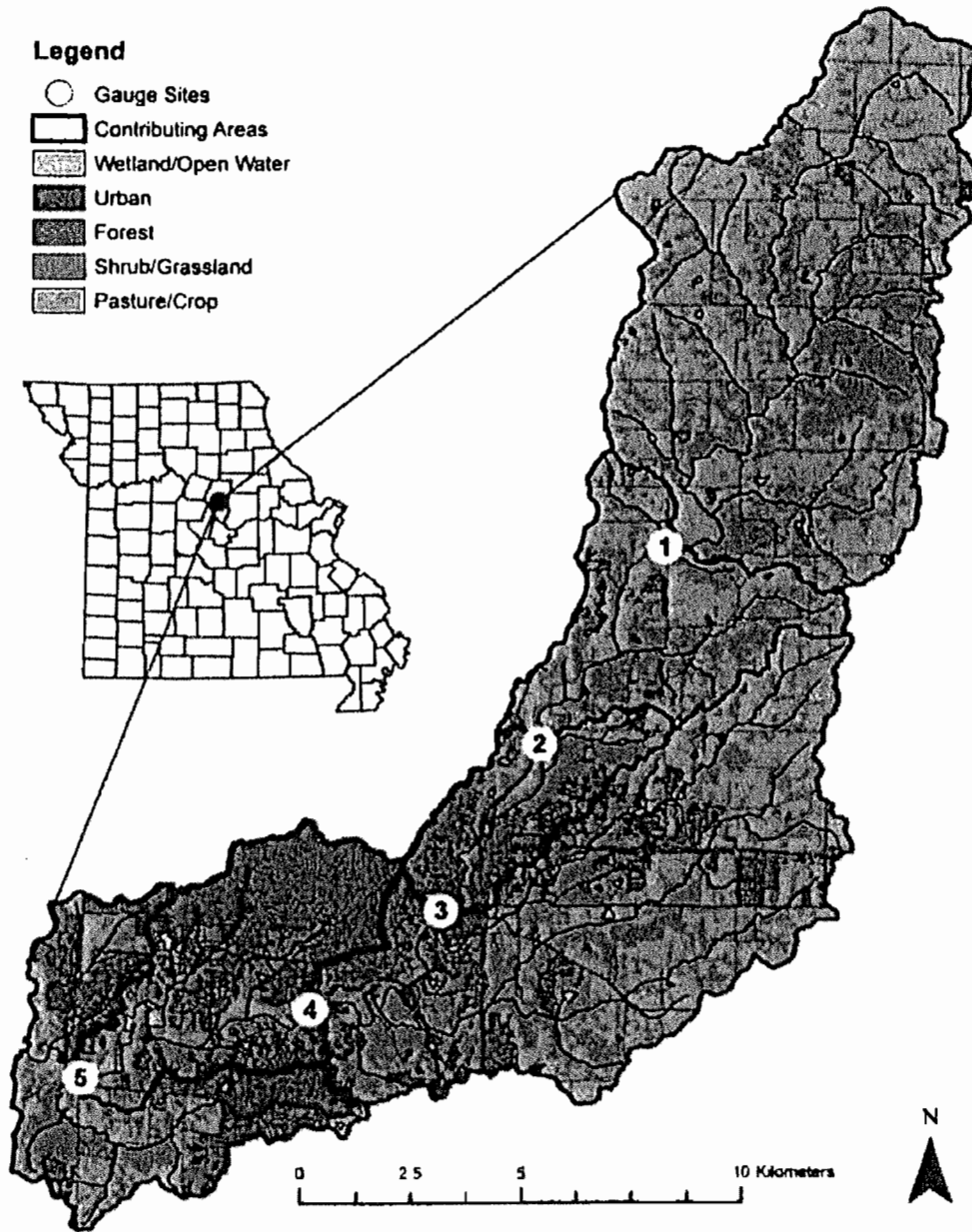


Figure 1. Hinkson Creek Watershed (HCW) nested-scale experimental watershed study design (site 4 is the USGS gauging station).

Forum Nature Area Level Spreader Monitoring Project

Total Budget:
\$62,250.00
(Please see Budget Details)

Submitted To:
Tom Wellman: City of Columbia Public Works

Submission Date:
August 30, 2014

Principle Investigator:
Jason A. Hubbart, Ph.D.
Associate Professor of Forest Hydrology and Water Quality
203-Q ABNR Building, Department of Forestry
University of Missouri
Columbia, MO 65211
573-884-7732
HubbartJ@Missouri.edu

Background

Stormwater flow serves as an important transport mechanism for non-point source pollutants, including suspended solids, nutrients, fertilizers, bacteria, and trace metals (Tsihrintzis and Hamid 1998, Xiao et al. 2007). Impervious surfaces serve as conduits for flow, replacing soils and vegetation that would otherwise attenuate runoff and transport of pollutants (Tabacchi et al. 2000). Urban peak discharge events also degrade water quality through physical alterations to the stream channel. Channels typically broaden and deepen in response to increased volume, velocity, and frequency of peak discharge in urban environments (Bledsoe and Watson 2001, Galster et al. 2008), leading to channel instability and accelerated channel erosion (Olsen et al. 1997). Changes in the timing, frequency, and magnitude of stream flow have significant impacts on freshwater ecosystem function (Postel 2000). Channel simplification as a consequence of increased peak discharge frequency also degrades stream habitat diversity and biotic integrity (Cianfrani et al. 2006).

There is a broadly recognized need to improve the state of knowledge related to Best Management Practices (BMP) efficacy to enhance land managers ability to recommend appropriate and cost effective BMP solutions for slowing, storing, and bioremediation of stormwater in rapidly urbanizing areas. With this in mind, and as part of the ongoing Collaborative Adaptive Management (CAM) process in Hinkson Creek Watershed, a Level Spreader was installed in 2014 to divert water from a small un-named tributary to Hinkson Creek (approximately 115-acre drainage area) and spread the water over an area of Hinkson Creek Floodplain in the Forum Nature Area. The area where the water is spread has been replanted with trees that will improve infiltration and increase transpiration (consumptive water use). The intent of this BMP is to focus on smaller runoff events (i.e. 1-yr storms). It is anticipated that the BMP will a) clean the water, b) reduce immediate runoff to Hinkson Creek, and c) increase localized baseflow to the creek.

Objectives

As per the original CAM Proposal, <http://helpthehinkson.org/documents/ProjectProposal1.pdf>, a monitoring project will be implemented to study the long-term efficacy of the level spreader BMP. The monitoring project will use multiple sensors to determine a) the amount of water flowing through the level spreader, b) the overflow from the level spreader, and c) an array of soil moisture sensors to quantitatively characterize the change in soil infiltration, and soil moisture over time as the small floodplain forest becomes reestablished. While the initial monitoring period is planned for 5 years, a much longer period of time is recommended (i.e. 10 or more years).

Study Outcomes

Study outcomes will provide quantitative information about level spreader efficacy, which will better inform the City and HCW stakeholders the appropriateness of this relatively low cost solution to urban runoff peak flows and water quality.

Not to Exceed Budget

The PI will provide approximately \$2500 worth of instrumentation for the initial installation of the hydroclimate site, including a tri-pod, guy kit, and cross arm and bracket (not included in budget below). The PI will also take his fall 2014 Hydrologic Measurement Techniques course students to the site where they will map the site, create a grid design, and quantify a) infiltration capacity, compaction, and soil water content (and possibly other variables) during the semester. This work may be repeated at interim points and the end of the study to quantify any changes over time. This constitutes a great deal of savings in terms of instrumentation that the PI already possesses, and student labor.

The proposed work will provide support for a field technician, or partial salary for a Graduate Research Assistant, or other research associate in the Interdisciplinary Hydrology Laboratory of the PI. The research associate will help with instrument installations, weekly to bi-weekly site visits and maintenance, data collection, post-processing and data analysis, modeling and / or provide interim reports (upon request up to twice annually).

Budget	Yr1	Yr2	Yr3	Yr4	Yr5	Total
Hydrometeorological Station	\$ 10,000	\$ -	\$ -	\$ -	\$ -	\$ 10,000
Pressure Transducers (flow)	\$ 2,250	\$ -	\$ -	\$ -	\$ -	\$ 2,250
Instrument Maintenance	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 10,000
Student Labor	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 8,000	\$ 40,000
Total	\$ 22,250	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 62,250

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CERTIFIED COPY OF ORDER

STATE OF MISSOURI }
County of Boone } ea.

October Session of the October Adjourned

Term. 20 15

In the County Commission of said county, on the 20th day of October 20 15

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby approve the attached Memorandum of Agreement for Assembling and Compiling Geographic Information System (GIS) Data for the State of Missouri.

It is further ordered the Presiding Commissioner is hereby authorized to sign said Memorandum of Agreement.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission



Daniel K. Atwill
Presiding Commissioner

Absent

Karen M. Miller
District I Commissioner



Janet M. Thompson
District II Commissioner



BOONE COUNTY
Department of Information Technology
GIS Department

ROGER B. WILSON BOONE COUNTY GOVERNMENT CENTER
801 E. Walnut, Room 220
Columbia, MO 65201-4890
573-886-4325

Jason Warzinik

GIS Manager

DATE: 10/13/2015

TO: Boone County Commission

RE: State of Missouri GIS MOU

Commissioners,

The State of Missouri as agreed to a 10% cost-share on the 2015 Mid-Mo six county imagery flight. This marks the first time the State "bought down" and supported a local GIS project with funding! In return for \$15,000 we will be providing the lower resolution 18" imagery to fit into the State-wide imagery layer; Boone County's amount of the cost-share is \$3,085.50.

Attached is a Memorandum of Agreement for Assembling and Compiling Geographic Information System (GIS) Data for the State of Missouri that has been reviewed and approved by the Boone County Legal Department.

Respectfully,

Jason Warzinik, GISP, GIS Manager
Boone County

Jeremiah W. (Jay) Nixon
Governor



Tim Robyn
Chief Information Officer

Kelvin L. Simmons
Commissioner

State of Missouri
OFFICE OF ADMINISTRATION
Information Technology Services Division
301 W. High St., 280 Truman Building
Post Office Box 809
Jefferson City, MO 65102
www.aa.mo.gov/itsd

(573) 751-3290
FAX (573) 526-0132

AOC31956001

Agreement Period 10/12/2015 through 10/11/2016

Memorandum of Agreement for Assembling and Compiling Geographic Information System (GIS) Data for the State of Missouri

I. Purpose

This Memorandum of Agreement ("MOA") is between the Missouri Chief Information Officer ("CIO-MO"), acting on behalf of State of Missouri, and Boone County, Mo signing the agreement below. This MOA defines and establishes the procedures for developing a standardized geospatial datasets for the state. This agreement is effective as of the date on which this agreement has been executed by both CIO-MO and the participating organization signing the agreement below.

WHEREAS, the Director-GIS (DGIS) of Missouri was created to advise the Chief Information Officer and other State Agencies regarding issues pertaining to sharing and coordinating geographic information; and

WHEREAS, one of the primary missions of DGIS is to develop and foster regional and local data partnerships such as the one presented herein; and

WHEREAS, such statewide data sets would also greatly benefit other state planning efforts in the areas of transportation, community development, economic development and the environment; and

WHEREAS, the information technology infrastructure required to house a standardized statewide geospatial dataset is installed and running;

NOW THEREFORE, it is agreed to define and establish statewide data sets, their ownership and the conditions under which they may be used, as follows:

II. Definitions

Participating Organizations – Participating organizations are local governments or private sector companies or groups across the State of Missouri who choose to provide geographic data under

the terms of this agreement. A list of the Participating Organizations at the time this contract is executed is provided in Attachment B.

III. Director-GIS-MO Responsibilities

DGIS staff, under the direction of the Chief Information Officer of the State of Missouri, will:

1. Collect geospatial dataset layers from Participating Organizations, where the data is available. The initial target set of layers is shown in Attachment A.
2. Acknowledge that pursuant to this Agreement it obtains only the right to use the data and that no right, title, or interest, in or to any copyrights, trademarks, or other proprietary rights relating to the data that is transferred or licensed from the Participating Organizations to CIO-MO.
3. Educate users on the availability and restrictions associated with this dataset.
4. Act as data custodian, and, when necessary, through coordination with Chief Information Officer, Missouri GIS Advisory Committee, hire outside assistance for database and IT support.
5. Recommend to Missouri GIS Advisory Committee when it might benefit the State, its residents and/or member local governments to expand the data available. Such an expansion would take place only with the concurrence of the MGISAC as well as the Participating Organizations as specified in Section V below.
8. Deliver quarterly reports at the MGISAC meetings on the status and use of the statewide data sets.

IV. Participant Responsibilities

1. Provide CIO-MO properly documented (to Federal Geographic Data Committee (FGDC) metadata standards) layers identified and marked with a check in Attachment A
2. Designate a point of contact to assist data delivery from the Participating Organization to CIO-MO. (See Attachment A.)
3. Provide updates to datasets provided to CIO-MO on a mutually agreed upon schedule (quarterly, semiannual, annual).

V. Use and Distribution of Data Provided

Each Participating Organization agrees to allow:

1. CIO-MO to use the organization's non-public contributions to the statewide data sets for efforts associated with the State's law enforcement, disaster, and emergency response missions; all data noted as public can be used for other State purposes.
2. CIO-MO to provide its contractors temporary access to portions of the statewide data sets, so long as the contractors sign an agreement that the data is to be used only to satisfy their contract with CIO-MO, that they will itemized the cost savings from the utilization of the data, and that they will destroy the data once the contract is completed or terminated.
3. CIO-MO to provide data from the statewide data sets to State and Federal emergency management agencies during natural and man-made disaster events.

CIO-MO agrees:

1. To not license or distribute the statewide data sets to any organization or persons other than as explicitly provided above.

2. Notify the originating Participating Organization of any requests for their data from the statewide data sets and attempt to refer such requests to the Participating Organization.
3. To make exceptions to the above only if authorized in writing to do so by the originating Participating Organization.
4. To abide by the Missouri Sunshine Law as it pertains to the dissemination of GIS data.

VI. Additions to the Missouri Geospatial Dataset

Each Participating Organization:

1. Understands that the data listed in Appendix A is an initial dataset, and that the statewide data sets may expand through time to include additional data layers.
2. Agrees that any future additions to the statewide data sets will be determined by the Geographic Information Officer, MGISAC, or the Participating Organizations, and will be executed through addendums to Attachment A of this agreement.
3. Agrees that datasets so added to this Agreement fall under the same contractual obligations as the initial data set described above.

CIO-MO agrees to:

1. Update and regenerate the catalog of layers contained within the statewide data sets with each addition to the dataset.
2. Manage the use of and access to the additions to the statewide data sets in exactly the same manner as the initial data set as described above.

VII. Statement of No Liability

The statewide data sets are provided "as is" without warranty of any kind either expressed or implied. CIO-MO and the Participating Organizations do not warrant, guarantee, or make any representations regarding the use of or results from the use of the data in terms of correctness, accuracy, reliability, completeness, fitness for a particular purpose, or otherwise. CIO-MO and the Participating Organizations shall not be liable for any loss or injury arising out of or caused in whole or in part by the acts or omissions of CIO-MO or the Participating Organizations, their personnel, or their sources of information whether negligent or otherwise. In no event shall CIO-MO or the Participating Organizations be liable for any special, indirect, punitive, or consequential damages with respect to this Agreement or the data provided hereunder.

VIII. Period of Agreement, Revision, and Early Termination.

With respect to each Participating Organization, this Memorandum Of Agreement will remain in effect until terminated by CIO-MO or the Participating Organization by providing 30 days prior written notice.

Any party to this MOA may offer amendments to this MOA. All proposed amendments must be in writing and must be approved by both the Participating Organization and the Chief Information Officer before becoming a part of this MOA.

Any Participating Organization may terminate their participation in this MOA by giving CIO-MO thirty (30) days prior written notice. If a Participating Organization terminates their participation, CIO-MO agrees to cease use of the portion of the MERGIS provided by the

terminating organization, and to erase its data from the State Emergency Management Agency Server and any back-up or development servers at the Center for Geospatial Intelligence.

IX. General

Neither party may assign or transfer this MOA without the prior written consent of the other party. This MOA may be amended only upon the parties' mutual written consent.

X. Entire Agreement

This MOA cancels and supersedes all previous discussions, negotiations, understandings, representations, warranties and agreements, written or oral, relating to the subject matter of this Agreement, and contains the entire understanding of the parties hereto.

XI. Counterparts

This MOA may be executed in any number of counterparts, each of which is deemed to be an original and all of which constitute one agreement that is binding upon all of the parties hereto, notwithstanding that all parties are not signatories to the same counterpart.

XII. Reimbursement for Geospatial Datasets provided to the state:

The Office of Geospatial Information (OGI) agrees to reimburse Boone County, Mo for geospatial datasets as described in this agreement and specified in Addendum A of this agreement in the amount of \$3,085.50.

XIII. Legal Authority

WITNESS the following signature of the parties by their duly authorized representative:

The parties represent that they have the authority to enter into this Agreement. This Agreement shall apply to, and be binding upon, the parties hereto, their agents, employees, successors and assignees, all persons acting under, through, or for them, any matter affected by the terms of this Agreement.

This Agreement shall become effective immediately upon the execution by all parties, and shall terminate upon the mutual agreement of the parties.

PARTICIPATING ORGANIZATION:

CIO-MO:

Date: 10-20-15

Date: _____

Name: DANIEL K. ATWILL

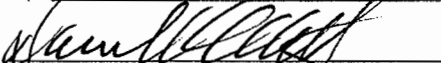
Name: _____

Title: PRESIDING COMMISSIONER

Title: _____

Agency/Group: BOONE COUNTY COMMISSION

Agency/Group: _____

Signature: 

Signature: _____

Utilities

	Public Domain	Not Public Domain
<input type="checkbox"/> Waterlines	n/a	n/a
<input type="checkbox"/> Sewers	n/a	n/a
<input type="checkbox"/> Electric	n/a	n/a
<input type="checkbox"/> Gas	n/a	n/a
<input type="checkbox"/> Power generation plants	n/a	n/a
<input type="checkbox"/> Sewage treatment facilities	n/a	n/a
<input type="checkbox"/> Water treatment facilities	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a

Hydrology \ Flood \ Storm water

	Public Domain	Not Public Domain
<input type="checkbox"/> Streams	n/a	n/a
<input type="checkbox"/> Lakes	n/a	n/a
<input type="checkbox"/> Dams	n/a	n/a
<input type="checkbox"/> Floodplain	n/a	n/a
<input type="checkbox"/> Flash flood areas	n/a	n/a
<input type="checkbox"/> Storm sewers	n/a	n/a
<input type="checkbox"/> Watersheds	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a

Elevation \ Topography

	Public Domain	Not Public Domain
<input type="checkbox"/> DEMs/DTMs	n/a	n/a
<input type="checkbox"/> Contours	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a

Public Domain	Not Public Domain
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Critical facilities

<input type="checkbox"/> Schools	n/a	n/a
<input type="checkbox"/> Hospitals	n/a	n/a
<input type="checkbox"/> Colleges	n/a	n/a
<input type="checkbox"/> Day cares	n/a	n/a
<input type="checkbox"/> Mobile home parks	n/a	n/a
<input type="checkbox"/> Apartments	n/a	n/a
<input type="checkbox"/> Nursing homes	n/a	n/a
<input type="checkbox"/> Shopping malls	n/a	n/a
<input type="checkbox"/> Dormitories	n/a	n/a
<input type="checkbox"/> Houses without basements	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a

Public Domain	Not Public Domain
---------------	-------------------

Miscellaneous layers

<input type="checkbox"/> Jurisdictional boundaries (city bndy)	n/a	n/a
<input type="checkbox"/> Subdivision	n/a	n/a
<input type="checkbox"/> Zoning	n/a	n/a
<input type="checkbox"/> Land use	n/a	n/a
<input type="checkbox"/> Railroads	n/a	n/a
<input type="checkbox"/> Shelters	n/a	n/a
<input type="checkbox"/> Staging/treatment centers	n/a	n/a
<input type="checkbox"/> Special needs populations	n/a	n/a
<input type="checkbox"/> Tier II hazardous materials locations	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a
<input type="checkbox"/> Other	n/a	n/a

Point of Contact for Data:

Name: Jason Warzinik

Title: GIS Manager

Dept: GIS Department

Phone: 573-886-4325

Email: jwarzinik@boonecountymo.org

CERTIFIED COPY OF ORDER

STATE OF MISSOURI

County of Boone

} ea.

October Session of the October Adjourned

Term. 20 15

In the County Commission of said county, on the

20th

day of October

20 15

the following, among other proceedings, were had, viz:

Now on this day the County Commission of the County of Boone does hereby authorize closed meetings on Tuesday, October 27, 2015, at 8:30 a.m. and 2:00 p.m. The meetings will be held in the Conference Room 338 of the Roger B. Wilson Boone County Government Center at 801 E. Walnut, Columbia, Missouri, as authorized by RSMo 610.021(1), to discuss legal actions, causes of action or litigation involving a public governmental body and any confidential or privileged communications between a public governmental body or its representatives and its attorneys.

Done this 20th day of October, 2015.

ATTEST:

Wendy S. Noren
Wendy S. Noren
Clerk of the County Commission

Daniel K. Atwill

Daniel K. Atwill
Presiding Commissioner

Absent

Karen M. Miller
District I Commissioner

Janet M. Thompson

Janet M. Thompson
District II Commissioner