

Please staple check here

Iowa Department of Natural Resources



Construction Permit Application Form Confinement Feeding Operations

INSTRUCTIONS:

Prior to constructing, installing, modifying or expanding a confinement feeding operation structure¹, answer questions 1-8 on Item 3, Section A (page 2), to determine if a construction permit is required. To calculate the animal unit capacity (AUC) of the operation, complete Table 1 (page 4). If a construction permit is required, complete the rest of the form, have the applicant(s) sign it on pages 5 and 6. Mail to the DNR (see address on page 5) this application form, documents and fees requested in Checklist No. 1 or 2 (pages 10-15). See item 5 (page 5), to determine which checklist to use.

If a construction permit is not needed, some pre-construction requirements may still apply prior to the construction of a formed manure storage structure². See page 5 for additional DNR contact information.

THIS APPLICATION IS FOR:

- 1. A new confinement feeding operation
- 2. An existing confinement feeding operation (answer all of the following questions):
 - a) Facility ID No. (5 digit number): _____
 - b) Date when the operation was first constructed: _____
 - c) Date when the last construction, expansion or modification was completed: _____

(Not needed if the confinement operation has previously received a construction permit from DNR.)

- d) Is this also an ownership change? Yes No If yes box is checked additional fees apply. See page 8

ITEM 1 – LOCATION AND CONTACT INFORMATION (See page 17 for instructions and an example):

A) Name of operation: Richland 28

Location:	<u>SW</u>	<u>SW</u>	<u>28</u>	<u>T84N R22W</u>	<u>Richland</u>	<u>Story</u>
	(¼ ¼)	(¼)	(Section)	(Tier & Range)	(Name of Township)	(County)

B) Applicant information:

Name: LongView Pork, LLC Title: _____

Address: 20965 650th Ave Nevada, IA 50201

Telephone: 515-382-1891 Fax: _____ Email: _____

C) Person to contact with questions about this application (if different than applicant):

Name: Brian Ritland Title: _____

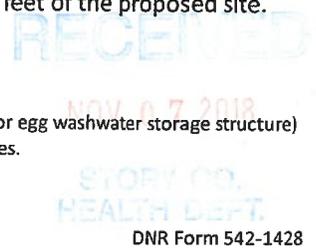
Address: 620 Country Club Rd Iowa Falls, IA 50126

Telephone: 641-648-7300 Fax: 641-648-7310 Email: britland@pinnacleiowa.com

Enclose aerial photo or engineering drawing showing the proposed location of the confinement feeding operation structure¹ and all applicable separation distances, as requested in Attachment 1 (pages 11-12 or 14-15). See example of aerial photo on pages 18 to 19, at the end of this form.

I manage or am the majority owner of another confinement feeding operation located within 2,500 feet of the proposed site. Please contact the DNR AFO Program staff at (712) 262-4177 to verify site adjacency requirements.

¹ Confinement feeding operation structure = animal feeding operation structure (confinement building, manure storage structure or egg washwater storage structure) that is part of a confinement feeding operation. Manure storage structures include formed and unformed manure storage structures.
² Formed manure storage structure = covered or uncovered concrete or steel tanks, and concrete pits below the building.



ITEM 2 – SITING INFORMATION:

A) **Karst Determination:** Go to DNR AFO Siting Atlas at <http://programs.iowadnr.gov/maps/afo/>. Search for your site by either scrolling into your location or entering an address or legal description in the bottom search bar. Left click on the location of your proposed structure. Make sure the karst layer box is checked on the map layers. If you cannot access the map, or if you have questions about this issue, contact the AFO Engineer at (712) 262-4177. Check one of the following:

- The site is not in karst or potential karst. Print and enclose the map with the name and location of the site clearly marked.
- The site is in karst. The upgraded concrete standards of 567 IAC 65.15(14)"c" must be used. Refer to "Applicant's submittal checklist" on page 10 for karst documentation.
- The site is within 1,000 feet of a known sinkhole, Secondary Containment Barrier is required in accordance with 567 IAC 65.15(17).

B) **Alluvial Soils Determination:** Go to the AFO Siting Atlas as described above. Make sure the alluvial layer box is checked on the map legend. If you cannot access the map, or if you have questions about this issue, contact DNR Flood Plain at (866) 849-0321. Check one of the following:

- The site is not in alluvial soils. Print and enclose the map with the name and location of the site clearly marked.
- The site is in alluvial soils. You will need to submit a request for a flood plain determination from DNR Flood Plain (866) 849-0321. After receiving determination submit one of the following:
 - Not in 100-year floodplain or does not require a flood plain permit. Include correspondence from the DNR Flood Plain Section.
 - Requires flood plain permit. Include flood plain permit.
 - Documentation has been submitted to determine site is not in alluvial soils. Refer to "Applicant's Submittal Checklist" on page 10 for alluvial soils documentation.

ITEM 3 – OPERATION INFORMATION:

A) A construction permit is required prior to any of the following:

1. Constructing or modifying any unformed manure storage structure³, constructing or modifying a confinement building that uses an unformed manure storage structure³, or increasing animal units in a confinement building that uses an unformed manure storage structure.
2. Constructing, installing or modifying a confinement building or a formed manure storage structure² at a confinement feeding operation if, after construction, installation or expansion, the AUC of the operation is 1,000 animal units (AU) or more. This also applies to confinement feeding operations that store manure exclusively in a dry form.
3. Initiating a change that would result in an increase in the volume of manure or a modification in the manner in which manure is stored in any unformed manure storage structure³, even if no construction or physical alteration is necessary. Increases in the volume of manure due to an increase in animal capacity, animal weight capacity or AUC up to the limits specified in a previously issued construction permit do not require a new construction permit.
4. Initiating a change, even if no construction or physical alteration is necessary, that would result in an increase in the volume of manure or a modification in the manner in which manure is stored in a formed manure storage structure² if, after the change, the AUC of the operation is 1,000 AU or more. Increases in the volume of manure due to an increase in animal capacity, animal weight capacity or AUC up to the limits specified in a previously issued construction permit do not require a new construction permit.
5. Constructing or modifying any egg washwater storage structure or a confinement building at a confinement feeding operation that includes an egg washwater storage structure.
6. Initiating a change that would result in an increase in the volume of egg washwater or a modification in the manner in which egg washwater is stored, even if no construction or physical alteration is necessary. Increases in the volume of egg washwater due to an increase in animal capacity, animal weight capacity or AUC up to the limits specified in a previously issued construction permit do not require a new construction permit.
7. Repopulating a confinement feeding operation if it was closed for 24 months or more and if any of the following apply:
 1. The confinement feeding operation uses an unformed manure storage structure³ or egg washwater storage structure;
 2. The confinement feeding operation includes only confinement buildings and formed manure storage structures² and has an AUC of 1,000 AU or more.
8. Installing a permanent manure transfer piping system, unless the department determines that a construction permit is not required.

³ Unformed manure storage structure = covered or uncovered anaerobic lagoon, earthen manure storage basin, aerobic earthen structure.

B) In your own words, describe in detail, the proposed construction, expansion, installation, modification or repair being proposed in this project. (Must be completed) Attach additional pages if necessary:

I will be constructing a two building site designed to house 5000 head of hogs.

C) Master Matrix (must check one). If any of boxes 1 to 3 are checked, the operation is required to be evaluated with the master matrix if the county, where the confinement feeding operation structure¹ is or would be located, has adopted a 'Construction Evaluation Resolution' (CER). Select the one that best describes your confinement feeding operation:

1. A new confinement feeding operation proposed in a county that has adopted a CER.
2. An existing operation constructed on or after April 1, 2002, in a county that has adopted a CER.
3. An existing operation constructed prior to April 1, 2002, with a current or proposed AUC of 1,667 AU or more, in a county that has adopted a CER.
4. None of the above. Therefore, the master matrix evaluation is not required.

D) Qualified Operation (must check one). If any of boxes 1 to 4 are checked, the operation is also a 'qualified operation'. A qualified operation is required to use a manure storage structure that employs bacterial action which is maintained by the utilization of air or oxygen, and which shall include aeration equipment. However, this requirement does not apply if box 5 is checked. Select the one that best describes your confinement feeding operation:

1. A swine farrowing and gestating operation with an AUC of 2,500 AU or more. If the replacement breeding swine are raised and used at the operation, the animal units for those replacement animals do not count in the operations total AUC for the purpose of determining a qualified operation.
2. A swine farrow-to-finish operation with an AUC of 5,400 AU or more.
3. A cattle confinement feeding operation (including dairies) with an AUC of 8,500 AU or more.
4. Other confinement feeding operations with an AUC of 5,333 AU or more.
5. This is not a qualified operation because:
 - a. It is below the limits shown on boxes 1 to 4.
 - b. It includes a confinement feeding operation structure¹ constructed prior to May 31, 1995.
 - c. It handles manure exclusively in a dry form (poultry).

ITEM 4 – ANIMAL UNIT CAPACITY (AUC) and, if applicable, ANIMAL WEIGHT CAPACITY (AWC):

A) Calculating AUC – Required for all operations

For each animal species, multiply the maximum number of animals that you would ever confine at one time by the appropriate factor, then add all AU together on Table 1 (page 4). Use the maximum market weight for the appropriate animal species to select the AU factor.

You must complete all applicable columns in Table 1. Use column a) to calculate the existing AUC, before permit for existing operations only. Use column b) to calculate the 'Total proposed AUC' (after a permit is issued) including new operations. The number obtained in column b) is the AUC of the operation and must be used to determine permit requirements. Use column c) to calculate the 'New AU' to be added to an existing operation. To calculate the indemnity fee (see page 7), also use column c), however, if the "Existing AUC" (column a) is 500 AU or less, enter the "Total proposed AUC" (column b) in the "New AU" (column c).

In calculating the AUC of a confinement feeding operation, you must include the AUC of all confinement buildings which are part of the confinement feeding operation, unless a confinement building has been abandoned. A confinement feeding operation structure¹ is abandoned if the confinement feeding operation structure¹ has been razed, removed from the site of a confinement feeding operation, filled in with earth, or converted to uses other than a confinement feeding operation structure¹ so that it cannot be used as a confinement feeding operation structure¹ without significant reconstruction. Therefore, in Table 1, enter the animal unit capacity of all the confinement buildings, including those that are from an "adjacent" operation located within 2,500 feet. For more information, contact the AFO Program at (712) 262-4177.

Table 1. Animal Unit Capacity (AUC): (No. HEAD) x (FACTOR) = AUC

Animal Species	a) Existing AUC (Before permit)			b) Total Proposed AUC (After permit)		
	(No. Head)	x (Factor)	= AUC	(No. Head)	x (Factor)	= AUC
Slaughter or feeder cattle		1.0			1.0	
Immature dairy cattle		1.0			1.0	
Mature dairy cattle		1.4			1.4	
Gestating sows		0.4			0.4	
Farrowing sows & litter		0.4			0.4	
Boars		0.4			0.4	
Gilts		0.4			0.4	
Finished (Market) hogs	0	0.4	0	5000	0.4	2000
Nursery pigs 15 lbs to 55 lbs		0.1			0.1	
Sheep and lambs		0.1			0.1	
Goats		0.1			0.1	
Horses		2.0			2.0	
Turkeys 7 lbs or more		0.018			0.018	
Turkeys less than 7 lbs		0.0085			0.0085	
Broiler/Layer chickens 3 lbs or more		0.01			0.01	
Broiler/Layer chickens less than 3 lbs		0.0025			0.0025	
Ducks		0.04			0.04	
Fish 25 grams or more		0.001			0.001	
Fish less than 25 grams		0.00006			0.00006	
TOTALS:			a) Existing AUC: 0			b) Total proposed AUC: 2000

Note: If the "Existing AUC" (column a) is 500 AU or less, enter the "Total proposed AUC" (column b) in the "New AU" (column c)

c) New AU = b) - a):

2000

(This is the AUC of the operation)

B) Calculating AWC - Only for operations first constructed prior to March 1, 2003

The AWC is needed for an operation that was first constructed prior to March 1, 2003, to determine some of the minimum separation distance requirements for construction or expansion.

The AWC is the product of multiplying the maximum number of animals that you would ever confine at any one time by their average weight (lbs) during the production cycle. Then add the AWC if more than one animal species is present (examples on how to determine the AWC are provided in 567 IAC 65.1(455B).)

If the operation was first constructed prior to March 1, 2003, you must complete all applicable columns in Table 2:

Table 2. Animal Weight Capacity (AWC): (No. head) * (Avg. weight, lbs) = AWC, lbs

Animal Species	a) Existing AWC (Before Permit)			b) Proposed AWC (After permit)		
	(No. head) x	avg weight	= AWC	(No. head) x	avg weight	= AWC
Slaughter or feeder cattle						
Immature dairy cattle						
Mature dairy cattle						
Gestating sows						
Farrowing sows & litter						
Boars						
Gilts						
Finished (Market) hogs						
Nursery pigs 15 lbs to 55 lbs						
Sheep and lambs						
Goats						
Horses						
Turkeys 7lbs or more						
Turkeys less than 7 lbs						
Broiler/Layer chickens 3 lbs or more						
Broiler/Layer chickens less than 3 lbs						
Ducks						
Fish 25 grams or more						
Fish less than 25 grams						
TOTALS:			a) Existing AWC: <input type="text"/>			b) Total proposed AWC: <input type="text"/>

c) New AWC = b) - a):

(This is the AWC of the operation)

ITEM 5 – SUBMITTAL REQUIREMENTS Checklists No. 1 or 2 (pages 10-15) describe the submittal requirements, which are based on the type of confinement feeding operation structure¹ and AUC proposed. To determine which checklist to use, choose the option that best describes your confinement feeding operation:

- 1) **Formed manure storage structures²**: The proposed confinement feeding operation structure¹ will be or will use a formed manure storage structure². Check one of the following boxes:
- A swine farrowing and gestating operation with an AUC of 1,250 AU or more. Use Submittal Checklist No. 2 (page 13).
 - A swine farrow-to-finish operation with an AUC of 2,750 AU or more. Use Submittal Checklist No. 2 (page 13).
 - A cattle confinement feeding operation (including dairies) with an AUC of 4,000 AU or more. Use Submittal Checklist No. 2 (page 13).
 - Other confinement feeding operations with an AUC of 3,000 AU or more. Use Submittal Checklist No. 2 (page 13).
 - None of the above. Use Submittal Checklist No. 1 (page 10).

If any of boxes 1 to 4 are checked, the operation meets the threshold requirements for an engineer⁴ and a Professional Engineer (PE), licensed in Iowa, is required. For these cases, use Submittal Checklist No. 2 (page 13).

If you checked box 5, your operation is below threshold requirements for an engineer⁴ and a Professional Engineer (PE) is not required. Use Submittal Checklist No. 1 (page 10).

- B) **Unformed manure storage structure³**: The proposed confinement feeding operation structure¹, will be or will use an unformed manure storage structure³ or an egg washwater storage structure. A Professional Engineer (PE) licensed in Iowa must design and sign the engineering documents for any size of operation. Use Submittal Checklist No. 2 (page 13) and Addendum "A" (page 16).

ITEM 6- UTILIZING RURAL WATER SYSTEM FOR WATER SUPPLY

- The proposed facility will utilize rural water and the providing rural water system has been notified and is aware of the proposed increase in water use.

ITEM 7 – SIGNATURE:

I hereby certify that the information contained in this application is complete and accurate.

Signature of Applicant(s):

LongView Park, LLC by
Matt R. Henry

Date:

11/5/18

MAILING INSTRUCTIONS:

To expedite the application process, follow the submittal requirements explained in Checklist No. 1 or 2 (pages 10 to 16), whichever applies. Page 1 of this form should be the first page of the package. Mail all documents and fees to:

**Iowa DNR
AFO Program
1900 N Grand Ave
Gateway North, Ste E17
Spencer, IA 51301**

(Note: Incomplete applications will be returned to the sender.)

Questions

Questions about construction permit requirements or regarding this form should be directed to an engineer of the animal feeding operations (AFO) Program at (712) 262-4177. To contact the appropriate DNR Field Office, go to <http://www.iowadnr.gov/fieldoffice>.

⁴ Threshold requirements for an engineer apply to the construction of a formed manure storage structure². Operations that meet or exceed the threshold requirements for an engineer are required to submit engineering documents signed by a professional engineer licensed in the state of Iowa. Please refer to Checklist No. 2 (pages 13-15).

ITEM 8

**Interested Parties Form
Confinement Feeding Operation**

Interest means ownership of a confinement feeding operation as a sole proprietor or a 10 percent or more ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary or other equity interest holder. Ownership interest is an interest when it is held either directly or indirectly through a spouse or dependent child, or both.

INSTRUCTIONS:

Please list all persons (including corporations, partnerships, etc.) who have an interest in any part of the confinement feeding operation covered by this permit application.

Full Name	Address	City/State	Zip
Scott Henry	20965 650 th Ave	Nevada, IA	50201
Kyle Henry	20965 650 th Ave	Nevada, IA	50201
Eric Henry	20965 650 th Ave	Nevada, IA	50201

For each name above, please list below all other confinement feeding operations in Iowa in which that person has an interest. Check box "None", below, if there are no other confinement feeding operations in Iowa in which the above listed person(s) has or have an interest.

Operation Name	Location (¼ ¼, ¼, Section, Tier, Range, Township, County)	City
<input checked="" type="checkbox"/> None	[There are no other confinements in Iowa in which the above listed person(s) has or have an interest].	

I hereby certify that the information provided on this form is complete and accurate.

Signature of Applicant(s): Long View Pork, LLC by Scott R. Henry Date: 11/5/18

ITEM 9

**Manure Storage Indemnity Fee Form
for Construction Permits**

CASHIER'S USE ONLY 0474-542-474A-0431 Facility ID # County
--

Credit fees to: LongView Pork, LLC

Name of operation: Richland 28

INSTRUCTIONS:

- 1) Use the 'Total Proposed AUC' from column b), Table 1 (page 4), to select the appropriate fee line in the table below. The 'Total Proposed AUC' is the AUC of the operation.
- 2) Select the animal specie and row number (see examples). Enter the 'New AU' from column c), Table 1 (page 4). The 'New AU' is the number of AU to be added to an existing operation or being proposed with a new operation. **Note:** If the "Existing AUC" (column a) is 500 AU or less, enter the "Total proposed AUC" (column b) in "New AU" (column c).
- 3) Multiply the 'New AU' by the appropriate 'Fee per AU'. The resulting number is the indemnity fee due.
 - **Example 1:** An existing swine operation is expanding from an 'Existing AUC' of 1,000 AU to a 'Total Proposed AUC' of 1,800 AU, and has previously paid an indemnity fee for the existing 1,000 AU. Calculate the indemnity fee as follows: The 'Total Proposed AUC' is between 1,000 AU and 3,000 AU; the animal specie is other than poultry; enter 800 AU in the 'New AU' column, row 4, and multiply it by \$ 0.15:

$$(800 \text{ AU}) \times (\$ 0.15 \text{ per AU}) = \$ 120.00$$
 - **Example 2:** An existing poultry operation is expanding from an 'Existing AUC' of 250 AU to a 'Total Proposed AUC' of 2,000 AU and has not paid the indemnity fee for animals housed in the existing buildings. Calculate the indemnity fee as follows: The 'Total Proposed AUC' is between 1,000 AU and 3,000 AU; the animal specie is poultry and the indemnity fee has not previously been paid, enter 2,000 AU in the 'New AU' column on row 3, and multiply it by \$0.06:

$$(2,000 \text{ AU}) \times (\$ 0.06 \text{ per AU}) = \$ 120.00$$
 - **Example 3:** If you are proposing a new swine confinement feeding operation with a 'Total Proposed AUC' of 3,500 AU, enter 3,500 AU in the 'New AU' column, row 6 and multiply it by \$ 0.20:

$$(3,500 \text{ AU}) \times (\$ 0.20 \text{ per AU}) = \$ 700.00$$
 - **Example 4:** If you are applying for a construction permit but you are not increasing the AUC of the operation, and has previously paid the applicable indemnity for the animals housed in the existing buildings, there is no indemnity fee due (\$ 0.00). If no indemnity fee is due, do not submit this page.

Indemnity Fee Table:

Total Proposed AUC (After Permit (from column B, Table 1))	Row	Animal species	New AU (from column C Table 1)	x	Fee per AU	Indemnity Fee
Less than 1,000 AU	1	Poultry		x	\$ 0.04 =	
	2	Other		x	\$ 0.10 =	
1,000 AU or more to less than 3,000 AU	3	Poultry		x	\$ 0.06 =	
	4	Other	2000	x	\$ 0.15 =	300
3,000 AU or more	5	Poultry		x	\$ 0.08 =	
	6	Other		x	\$ 0.20 =	

ITEM 9 (Cont.)

Filing Fees Form
for Construction Permits

CASHIER'S USE ONLY
0473-542-473A-0431
0474-542-474A-0431
Facility ID #
County

Credit fees to: LongView Pork, LLC

Name of operation: Richland 28

INSTRUCTIONS:

1. If the operation is applying for a construction permit enclose a payment for the following:
 - Construction application fee \$250.00.
(Note: This fee is non-refundable)
2. A manure management plan must be submitted with a filing fee.
 - Manure management plan filing fee \$250.00
(Note: This fee is non-refundable)
3. If this is a change in ownership then indemnity fees must also be paid on the current (existing) total AUC at the appropriate rate on page 7.
 - Indemnity fee due to ownership change \$ _____
4. Total filing fees: Add the fees paid in items 1, 2 and 3 (above): \$ 500

SUMMARY:	
- Manure Storage Indemnity Fee (see previous page) to be deposited in the Manure Storage Indemnity Fee Fund (474)	\$ <u>300</u>
- Total filing fees (see item 4 on this page) to be deposited in the Animal Agriculture Compliance Fund (473)	\$ <u>500</u>
TOTAL DUE:	\$ <u>800</u>

Make check payable to: Iowa Department of Natural Resources or Iowa DNR; and send it along with the construction application documents (See Submittal Checklist No. 1 or 2, pages 10-15.) Note: Do not send this fee to the county.

ITEM 10

COUNTY VERIFICATION RECEIPT
OF DNR CONSTRUCTION PERMIT APPLICATION

This form provides proof that the County Board of Supervisors has been provided with a complete copy of the construction permit application documents (everything except the fees) for the confinement feeding operation or a complete MMP has been provided to the County because manure will be applied in that county:

Applicant: LongView Pork, LLC Telephone: 515-382-1891

Name of operation: Richland 28

Location: SW SW 28 T84N R22W Richland Story
(¼ ¼) (¼) (Section) (Tier & Range) (Name of Township) (County)

Documents being submitted to the county:

- Construction permit application form: submit items 1 to 9 (see Submittal Checklist No. 1 or 2)
- Attachment 1 - Aerial photos: Must clearly show the location of the proposed confinement feeding operation structure¹ and that all the separation distances are met, including those claimed for points in the master matrix (if applicable).
- Attachment 2 - Statement of design certification, submit any of the following (see Checklist No. 1 or 2):
 - Construction Design Statement form
 - Professional Engineer (PE) Design Certification form
 - Engineering report, construction plans and technical specifications
 - In addition, if proposing an unformed manure storage structure³ or an egg washwater storage structure submit documentation required in Addendum "A" of this construction application form.
- Attachment 3 - Manure management plan (MMP).
- Attachment 4 - Master Matrix (if required). You must include supporting documents (see Checklist No. 1 or 2)

THIS SECTION IS RESERVED FOR THE COUNTY

As soon as DNR receives a construction permit application, the DNR will fax your County Auditor a "Courtesy reminder letter" explaining what actions your County Board of Supervisors must complete and the deadlines.

Public Notice is required for all construction permit applications, including those applications not required to be evaluated with the master matrix and applications in counties not participating in the Master matrix.

Counties participating in the master matrix: the county's master matrix evaluation and county's recommendation is required for the following cases:

- A new confinement feeding operation that is applying for a construction permit
- An existing confinement feeding operation that was first constructed on or after April 1, 2002 that is applying for a construction permit.
- An existing confinement feeding operation that was first constructed prior to April 1, 2002 that is applying for a construction permit with an animal unit capacity (AUC) is 1,667 animal units (AU) or more.

I have read and acknowledge the county's duty with this construction permit application, as specified in 567 IAC 65.10 and Iowa Code 459.304. On behalf of the Board of Supervisors for:

COUNTY: Story

NAME: Margaret Conshelsky

TITLE: Director Environmental Health

(Member of the County Board of Supervisors or its designated official/employee)

ate: 11-7, 20 18

If you do not receive the courtesy reminder letter within a reasonable time, or if you have any questions, please contact the animal feeding operations (AFO) Program at (712) 262-4177 or visit www.iowaDNR.gov



Construction Design Statement (CDS)

Instructions:

1. This form is for new or expanding confinement feeding operations with an AUC¹ of more than 500 AU, not required to have a professional engineer (PE)², that are proposing to construct a formed manure storage structure³.
2. Complete and submit Sections 1, 2 and 3 (pages 1 to 6).
3. Complete and submit Section 4 (page 6) only if you are applying for a construction permit and are constructing three or more confinement feeding operation structures⁴.
4. Mail only pages 1 to 6, as instructed on page 6 and 7. Do not mail the remainder of this form.
5. If the site-specific design is sealed by a PE², do not use this CDS instead use DNR Form 542-8122.

Section 1 - Information about the proposed formed manure storage structure³(s)

A) Information about the operation:

Name of operation: Richland 28 Facility ID No.: N/A

Location: SW SW 28 T84N R22W Richland Story
(¼ ¼) (¼) (Section) (Tier & Range) (Name of Township) (County)

B) Description of the proposed formed manure storage structure³. Include dimensions (length, width, or diameter, depth). Indicate if it is aboveground or belowground; covered or uncovered, made of concrete or steel; address location of pit fans, if applicable, and address water line entry into buildings. If necessary attach more pages:

Two 101' 10" x 200' x 8' deep, below ground, covered, formed concrete manure storage tank will be constructed. No water lines will enter through the concrete manure storage wall or floors and all pit fans will be mounted on top of concrete pump-outs.

C) Utilizing Rural Water System for Water Supply

The proposed facility will utilize rural water and the providing rural water system³ has been notified and is aware of the proposed increase in water use.

D) **Aerial photos:** Aerial photos must be submitted that clearly show the location of all existing and proposed confinement feeding operation structures and show at least a one-mile radius around the structures. The photos must either show roads on the north and south or east and west sides of a section (so that a mile distance is apparent), or include a distance scale.

The photo(s) must show that the proposed structures comply with all statutory minimum required separation distances to the objects listed below:

- Residences (not owned by the permit applicant), churches, businesses, schools, public use areas
- Water wells (depends on type)
- Major water sources, wellhead or cistern of an agricultural drainage well or known sinkholes
- Water sources (other than major water sources) and surface intakes of an agricultural drainage well
- Designated wetlands
- Road right-of-way

The separation distance to each of the above objects must be noted with a straight line between the proposed structure(s) and the object. If any of the above objects is not located within one mile from the proposed structures, note the fact on the photo(s) or use additional pages. (Example: "No agricultural drainage wells within one mile.")

All separation distances that are not clearly in excess of the required minimum separation distance must be measured according to 567 IAC 65.11(9) using standard survey methods. Go to the DNR fact sheet page at <http://www.iowadnr.gov/Environmental-Protection/Land-Quality/Animal-Feeding-Operations/AFO-Resources/AFO-Factsheets> and select DNR fact sheet "Distance Requirements for Construction" to find the required separation distances. Or, go directly to:

<http://www.iowadnr.gov/Portals/idnr/uploads/forms/5421420.pdf>. An example aerial photo can be found on pages 18 to 19 of the AFO Construction Permit Application (DNR Form 542-1428). Or, go directly to:

http://www.iowadnr.gov/Portals/idnr/uploads/afo/fs_iemap.pdf.

¹ To determine the AUC see the 'Manure Storage Indemnity Fee' (Form 542-4021) or the 'Construction Permit Application' (Form 542-1428), or visit <http://www.iowadnr.gov>

² PE is a professional engineer licensed in the state of Iowa or a NRCS-Engineer working for the USDA-Natural Resources Conservation Service (NRCS).

³ Formed manure storage structure means a covered or uncovered concrete or steel tank, including concrete pits below the floor.

⁴ Confinement feeding operation structure = A confinement building, a formed or unformed manure storage structure, or an egg washwater storage structure.

Note: If a master matrix is required, the photos must also show that the additional separation distances required for any points claimed in matrix criteria one through ten will be met for the objects listed above. Note the additional separation distance by drawing a straight line between the proposed structures and the matrix item.

E) Karst Determination: Go to DNR AFO Siting Atlas at <http://programs.iowadnr.gov/maps/af/>. Search for your site by either scrolling into your location or entering an address or legal description in the bottom search bar. Left click on the location of your proposed structure. Make sure the karst layer box is checked on the map layers. If you cannot access the map, or if you have questions about this issue, contact the AFO Engineer at 712-262-4177. Check one of the following:

- The site is not in karst or potential karst. Print and enclose the map with the name and location of the site clearly marked.
- The Siting Atlas has indicated that the site is in karst. The upgraded concrete standards of 567 IAC 65.15(14)"c" must be used. Complete and sign Section 3.H (page 5).

F) Alluvial Soils Determination: Go to the AFO Siting Atlas as described above. Make sure the alluvial box is checked on the map layers. If you cannot access the map, or if you have questions about this issue, contact DNR Flood Plain at 866-849-0321. Check one of the following:

- The site is not in alluvial soils. Print and enclose the map with the name and location of the site clearly marked.
- If the site is in alluvial soils contact DNR Flood Plain at 866-849-0321. You will be required to submit a petition for a declaratory order if less than 1000 AU or request a flood plain determination if 1000 AU or greater. After receiving Flood Plain determination, submit one of the following:
 - Include correspondence from the DNR showing the site is not in 100-year flood plain or does not require a Flood Plain permit.
 - Include copy of the Flood Plain permit if a Flood Plain permit is required.

Section 2 - Manure management plan:

An original manure management plan (MMP) is enclosed with this form, even if a MMP was previously filed.

LongView Pork, LLC
Owner's Name (print)

LongView Pork, LLC by
Scott R. Thayer
Owner's Signature

11/5/18
Date

Section 3 - Construction design standards: The person responsible for constructing the formed manure storage structure(s)³ must complete Section 3.

A) Liquid and semi-liquid manure: The proposed formed manure storage structure³ will be (check one):

- A.1 A non-circular concrete tank, belowground, with walls laterally braced or below the building concrete pit designed according to 567 IAC Chapter 65, Appendix D.
- A.2 A non-circular concrete tank, belowground, walls designed according to MidWest Plan Service (MWPS), publication MWPS-36. Include design calculations.
- A.3 A circular concrete tank, walls designed according to MidWest Plan Service (MWPS), publication MWPS TR-9. Include design calculations.
- A.4 Will be made of steel, constructed aboveground according to the manufacturer's recommendations.

B) Dry manure: The proposed formed manure storage structure³ will be (check one):

- B.1 An aboveground concrete tank, with walls designed according to MWPS-36. Include design calculations.
- B.2 Will be made of steel, constructed aboveground according to the manufacturer's recommendations.
- B.3 Will be a belowground or partially belowground concrete tank, with walls laterally braced designed according to 567 IAC Chapter 65, Appendix D or MWPS-36. Include design calculations.

C) Details of the proposed design: Submit an additional completed copy of this page 3 for each formed manure storage structure³ that have different dimensions. Complete all of the following information:

Number of buildings: two Building name: swine finisher

Dimensions of proposed formed manure storage structure³

	Length	Width	Height or depth	Wall thickness	Diameter (circular tanks only)
Feet	200	101	8	0	N/A
Inches	0	10	0	8	N/A

To determine the appropriate vertical steel in walls, first check one of the following boxes (must check one):

- a. To use Tables D-1 and D-2 (on pages 7-8), backfilling of walls shall be performed with gravel, sand, silt, and clay mixtures (less than 50 percent fines), with coarse sand with silt or clay (less than 50 percent fines), or cleaner granular material (see page 9 for the unified soils classification). You will need to submit a copy of a USDA soil survey map with the proposed location of the formed manure storage structures³ clearly marked showing the unified soil classification; or a statement signed by a qualified organization or NRCS staff.
- b. Use Tables D-3 and D-4 (on pages 8-9) if backfilling of walls will be performed with soils that are unknown or with low plasticity silts and clays with some sand or gravel (50 percent or more fines); or fine sands with silt or clay (less than 50 percent fines); or low to medium plasticity silts and clays with little sand or gravel (50 percent or more fines); or high plasticity silts and clays (see page 9 for unified soils classification). You must use Tables D-3 and D-4 if you do not submit the soils information requested in box "a", above.

Maximum spacing of steel, in inches

Description of reinforcing steel in walls	Proposed vertical steel in walls [see boxes "a" and "b", above]				Proposed horizontal steel in walls (use Table D-5)
	Walls where vehicles are not allowed within 5 feet (use Table D-1) ^a	All walls with pumpout ports and walls where vehicles are allowed within 5 feet (use Table D-2) ^a	Walls where vehicles are not allowed within 5 feet (use Table D-3) ^b	All walls with pumpout ports and walls where vehicles are allowed within 5 feet (use Table D-4) ^b	
Grade 40, No. 4					
Grade 40, No. 5					
Grade 60, No. 4			10	9	12
Grade 60, No. 5					

D) Aboveground tanks or partially aboveground tanks: Liquid and semi-liquid manure (check the following box):

- If the proposed tank is to be constructed **aboveground or partially aboveground** and will have an external outlet or inlet below the liquid level, the tank will also be constructed according to the 567 IAC 65.15(20).

E) Steel Tanks: Certification that the tank will be constructed according to the tank manufacturer's specifications:

Name of tank manufacturer company: _____
 Address: _____
 Telephone: _____ Fax: _____

F) Additional construction design standards:

To determine the additional requirements set forth in 567 IAC 65.15(14) that would apply to the proposed formed manure storage structure³, check any of the following 3 boxes based on the information entered on Sections 3.A or 3.B (page 2):

- If you checked boxes A.1, A.2, A.3 or B.3 (on page 2) **all** of the following 15 additional requirements apply. Complete the numbered items 1 to 15 (below).
- If you checked box B.1 (on page 2), only the requirements of numbered items 1, 3, 4, 5, 6, 8 and 12 apply and need to check those boxes (below).
- If you checked boxes A.4 or B.2 (on page 2) and the steel tank will have a concrete floor, only the requirements of numbered items 1, 2, 3, 4, 5, 8, 9, 12, apply and need to check those boxes (below).

Additional Requirements that will be followed during construction of the formed manure storage structure(s)³:

1. Site preparation (check the following box):
 - The finished subgrade of a formed manure storage structure shall be graded and compacted to provide a uniform and level base and shall be free of vegetation, manure and debris. For the purpose of this subrule, "uniform" means a finished subgrade with similar soils.
2. Groundwater separation requirements (check one of the following boxes):
 - When the groundwater table, as determined in 65.15(7)"c," is above the bottom of the formed structure, a drain tile shall be installed along the footings to artificially lower the groundwater table pursuant to 65.15(7)"b"(2). The drain tile shall be placed within 3 feet of the footings as indicated in Appendix D, Figure D-1, at the end of this chapter and shall be covered with a minimum of 2 inches of gravel, granular material, fabric or a combination of these materials to prevent plugging the drain tile. A device to allow monitoring of the water in the drainage tile lines installed to lower the groundwater table and a device to allow shutoff of the drainage tile lines shall be installed if the drainage tile lines do not have a surface outlet accessible on the property where the formed manure storage structure is located.

- In lieu of the drain tile, a certification signed by a PE², a groundwater professional certified pursuant to 567 Chapter 134, or a qualified staff from NRCS, is being submitted indicating that the groundwater elevation, according to 65.15(7)"c", is below the bottom of the formed structure.
3. Minimum as-placed concrete compressive strength (check the following box):
- All concrete shall have the following minimum as-placed compressive strengths and shall meet American Society for Testing and Materials (ASTM) standard ASTM C 94: 4,000 pounds per square inch (psi) for walls, floors, beams, columns and pumpouts and 3,000 psi for the footings. The average concrete strength by testing shall not be below design strength. No single test result shall be more than 500 psi less than the minimum compressive strength.
4. Cement and aggregates specifications (check the following box):
- Cementitious materials shall consist of Portland cement conforming to ASTM C 150. Aggregates shall conform to ASTM C 33. Blended cements in conformance with ASTM C 595 are allowed only for concrete placed between March 15 and October 15. Portland-pozzolan cement or Portland blast furnace slag blended cements shall contain at least 75 percent, by mass, of Portland cement.
5. Concrete consolidation and vibration requirements (check the following box):
- All concrete placed for walls shall be consolidated or vibrated, by manual or mechanical means, or a combination, in a manner which meets ACI 309.
6. Minimum rebar specifications: (check the following box):
- All rebar used shall be a minimum of grade 40 steel. All rebar, with the exception of rebar dowels connecting the walls to the floor or footings, shall be secured and tied in place prior to the placing of concrete.
7. Wall reinforcement placement specifications (check the following box):
- All wall reinforcement shall be placed so as to have a rebar cover of 2 inches from the inside face of the wall for a belowground manure storage structure. Vertical wall reinforcement should be placed closest to the inside face. Rebar placement shall not exceed tolerances specified in ACI 318.
8. Minimum floor specifications. Complete part a) and b):
- a) Floor thickness requirements (check the following box):
- The floor slab shall be a minimum of 5 inches thick. Nondestructive methods to verify the floor slab thickness may be required by the department. The results shall indicate that at least 95 percent of the floor slab area meets the minimum required thickness. In no case shall the floor slab thickness be less than 4½ inches.
- b) The floor slab reinforcement shall be located in the middle of the thickness of the floor slab (check one of the following boxes):
- Formed manure storage structures with a depth of 4 feet or more shall have primary reinforcement consisting of a minimum of #4 rebar placed a maximum of 18 inches on center in each direction placed in a single mat.
- Formed manure storage structure with a depth less than 4 feet shall have shrinkage reinforcement consisting of a minimum of 6 × 6-W1.4 × W1.4 welded wire fabric.
9. Minimum footing specifications (check the following box):
- The footing or the area where the floor comes in contact with the walls and columns shall have a thickness equal to the wall thickness, but in no case be less than 8 inches, and the width shall be at least twice the thickness of the footing. All exterior walls shall have footings below the frostline. Tolerances shall not exceed ½ inch of the minimum footing dimensions.
10. Requirement to connect walls to footings (check one of the following boxes):
- The vertical steel of all walls shall be extended into the footing, and be bent at 90°, OR
- A separate dowel shall be installed as a #4 rebar that is bent at 90° with at least 20 inches of rebar in the wall and extended into the footing within 3 inches of the bottom of the footing and extended at least 3 inches horizontally, as indicated in Appendix D, Figure D-1 (page 10). Dowel spacing (bend or extended) shall be the same as the spacing for the vertical rebar.
- As an alternative to the 90° bend, the dowel may be extended at least 12 inches into the footing, with a minimum concrete cover of 3 inches at the bottom, as indicated in Appendix D, Figure D-1 (page 10). Dowel spacing (bend or extended) shall be the same as the spacing for the vertical rebar.
- In lieu of dowels, mechanical means or alternate methods may be used as anchorage of interior walls to footings. Please submit structural calculations and details of this proposal.
11. Concrete forms specifications (check the following box):
- All walls shall be formed with rigid forming systems and shall not be earth-formed. Form ties shall be non-removable.

12. Curing of concrete requirements (check the following box):

All concrete shall be cured for at least seven days after placing, in a manner which meets ACI 308, by maintaining adequate moisture or preventing evaporation. Proper curing shall be done by ponding, spraying or fogging water; or by using a curing compound that meets ASTM C 309; or by using wet burlap, plastic sheets or similar materials.

13. Construction joints and waterstops specifications (check the following box):

All construction joints in exterior walls shall be constructed to prevent discontinuity of steel and have properly spliced rebar placed through the joint. Waterstops shall be installed in all areas where fresh concrete will meet hardened concrete as indicated in Appendix D, Figures D-1 and D-2, at the end of this chapter. The waterstops shall be made of plastic, rolled bentonite or similar materials approved by the department.

14. Backfilling of walls specifications (check the following box):

Backfilling of the walls shall not start until the floor slats or permanent bracing have been installed. Backfilling shall be performed with material free of vegetation, large rocks or debris.

15. Additional design requirements (check the following box, if applicable):

A formed manure storage structure with a depth greater than 12 feet shall be designed by a PE or an NRCS engineer.

G) Construction Certification: The person responsible for constructing the formed manure storage structure³ must sign this page. Any change(s) to the specifications of the formed manure storage structure must be first approved by DNR:

"I hereby certify that I have read and understand the minimum design and construction standards of Iowa Code chapter 459, Subchapter III, and the 567 Iowa Administrative Code (IAC) 65.15(14) "Minimum concrete standards" or 567 IAC 65 (if other than concrete)." The proposed formed manure storage structure(s)³ at the operation:

Name of operation: Richland 28 County: Story

Owner's name: Longview Park, LLC

will be constructed in accordance with these minimum requirements. Included with this certification are:

Page 3, for each formed manure storage structure³ that have different dimensions

Pages 4 to 6 (applicable sections)

Other documents (specify): _____

Brent V. Rastetter
(Print name)

[Signature]
(Signature)

(Date)

Quality Ag, Inc.
(Company)

15481 Hwy 220, Aiden, IA 50006
(Address)

515-859-7824, ext. 11
(Phone No.)

(See page 6 for mailing instructions)

H) Upgraded Concrete Standards Certification: If the site is in karst according to Section 1.D (page 2) the person responsible for constructing the formed manure storage structure must also complete this section:

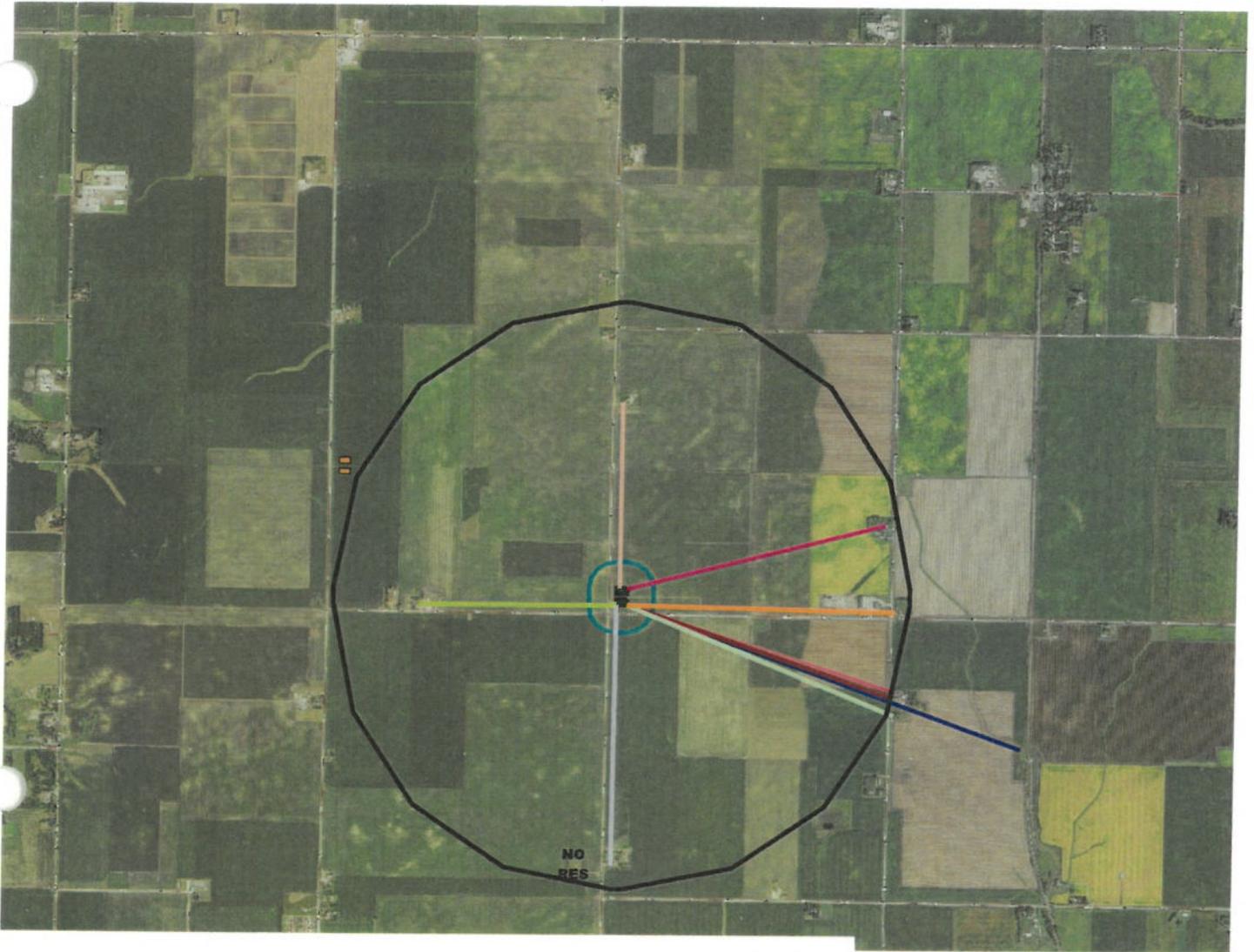
567 IAC 65.15(14)"c". Karst terrain - upgraded standards. If the site of the proposed formed manure storage structure is located in an area that exhibits karst terrain or an area that drains into a known sinkhole, the minimum concrete standards set forth in 65.15(14)"a" or "b" shall apply. In addition, the following requirements apply to all formed manure storage structures that store nondry or dry manure (check all of the following boxes):

(1) A minimum 5-foot vertical separation distance between the bottom of a formed manure storage structure and limestone, dolomite, or other soluble rock is required if the formed manure storage structure is not designed by a PE or an NRCS engineer. (The 5-foot separation must be a continuous profile of low permeability soil directly beneath the bottom of the formed manure storage structure.

(2) If the vertical separation distance between the bottom of the proposed formed manure storage structure and limestone, dolomite, or other soluble rock is less than 5 feet, the structure shall be designed and sealed by a PE or an NRCS engineer who certifies the structural integrity of the structure. A 2-foot-thick layer of compacted clay soil shall be constructed underneath the floor of the formed manure storage structure. However, it is recommended that any formed manure storage structure be constructed aboveground if the vertical separation distance between the bottom of the structure and the limestone, dolomite, or other soluble rock is less than 5 feet.

(3) In addition, in an area that exhibits karst terrain or an area that drains into a known sinkhole, a PE, an NRCS engineer or a qualified organization shall submit a soil exploration study based on the results from soil borings or test pits to determine the vertical separation between the bottom of the formed structure and limestone, dolomite, or other soluble rock. A minimum of two soil borings, equally spaced within each formed structure, or two test pits outside of each formed

Richland 28 West; 18 (0.93 ac.)



- No Public Use within 4001'
- No Educational, Religious, or Commercial Ent within 3376'
- No Well within 101'
- No Ag Drainage Well, Known Sinkhole, or Major Water within 3501'
- No HQ, HQR, or PWA within 2000'

Date: Aug 31, 2018
 Field Name: Richland 28 West; 18
 Location: Story Co., Iowa, U.S.
 Section 28, T84N, R22W
 Farm Name: Scott Henry
 Client Name: P-Index
 Total Acres: 0.93
 Field Boundary Start Location:
 Latitude: 42.04997051
 Longitude: -93.42389401



- 1 Mile
- Res
- 3451.847
- 3677.315
- 4835.021
- 4949.811
- 5003.617
- 5255.993
- 5271.027
- 5388.173
- 500 ft water buffer
- Distance To Water
- 7857.132
- Distance To Fence
- 130.256
- 131.51
- (1.0ac.)Field Boundary
- Richland 29

Richland 28 West; 18 (0.93 ac.)



- No Public Use within 4001'
- No Educational, Religious, or Commercial Ent within 3376'
- No Well within 101'
- No Ag Drainage Well, Known Sinkhole, or Major Water within 3501'
- No HQ, HQR, or PWA within 2000'

Date: Aug 31, 2018
 Field Name: Richland 28 West; 18
 Location: Story Co., Iowa, U.S.
 Section 28, T84N, R22W
 Farm Name: Scott Henry
 Client Name: P-Index
 Total Acres: 0.93
 Field Boundary Start Location:
 Latitude: 42.04997051
 Longitude: -93.42389401



- 500 ft water buffer
- Distance To Fence 130.256
- 131.51
- Distance Between Barns 100.529
- Proposed Well
- Distance To Proposed Well 110.502
- Drive Dimensions 132.227
- 315.666
- Drive
- (1.0ac.) Field Boundary

Map layers Legend

AFO Siting Data

Sinkholes

Ag Drainage Well

Wells

Animal Feeding Operation

- Active, Confined/Open
- Active, Confinement
- Active, Open Feedlot
- Inactive

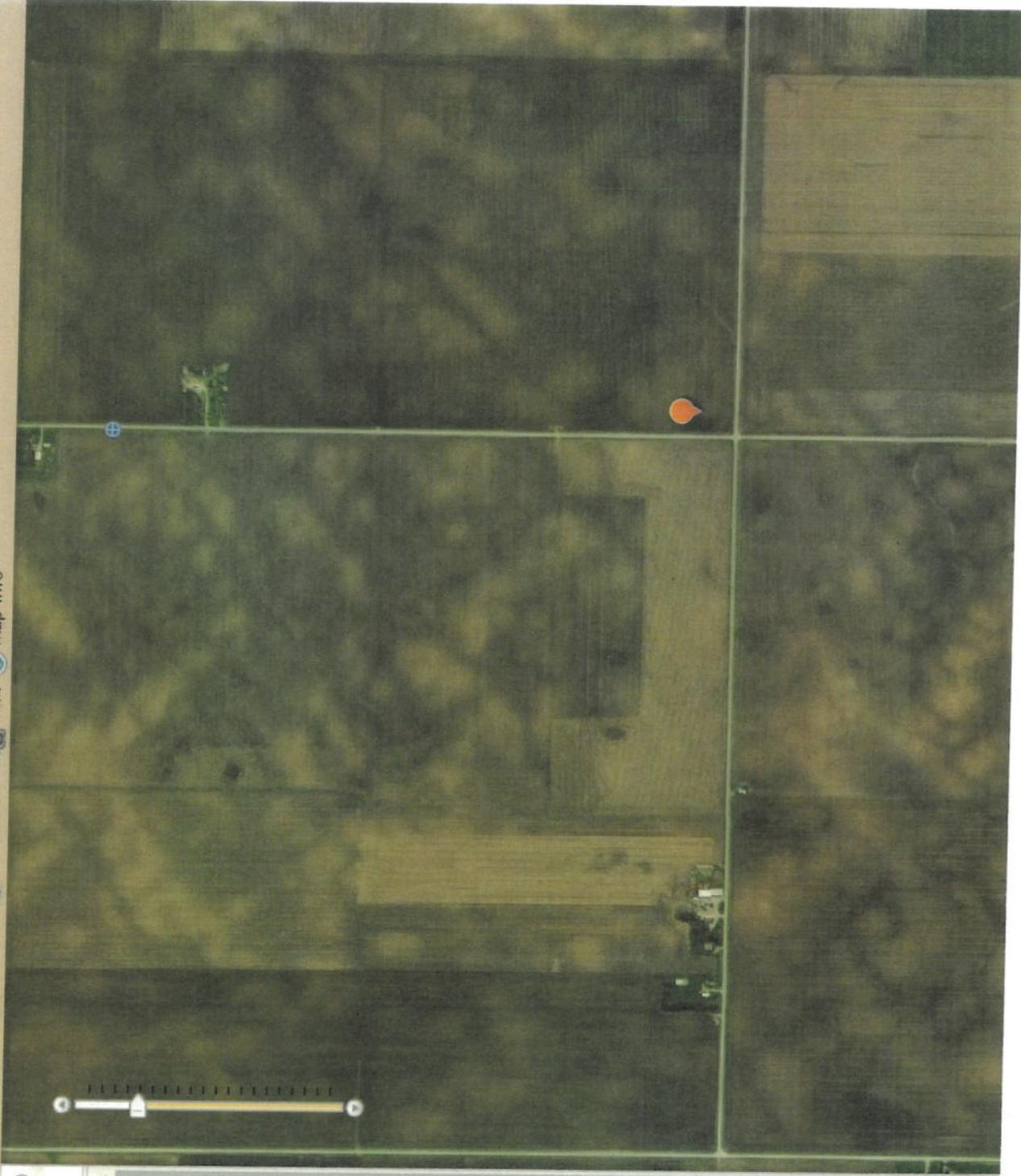
Public Drainage Infrastructure

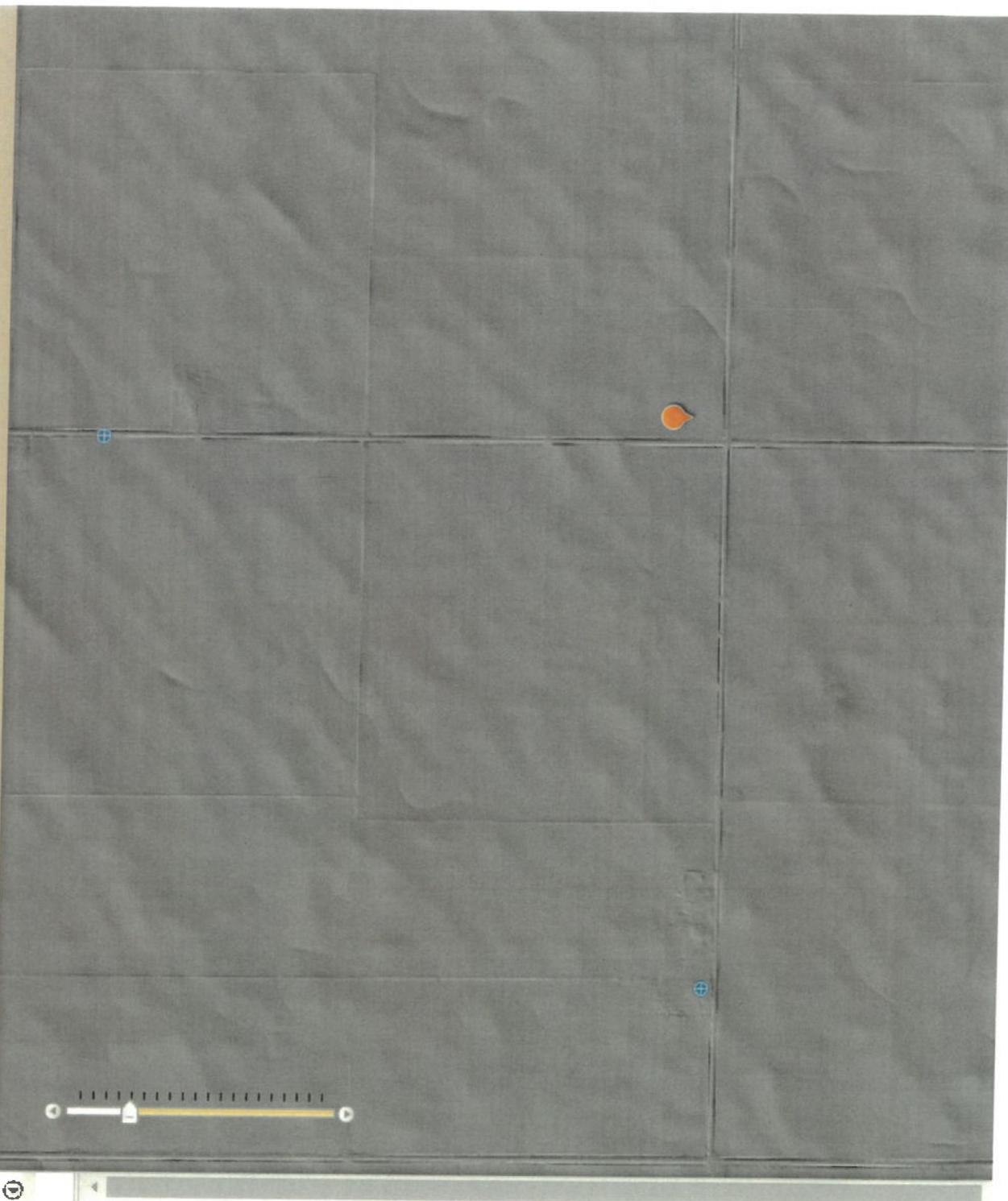
- Ditch
- Tile

High Qty Wtr Resource (Rivers)

High Qty Wtr Resource (Waterbody)

Major Water Source (Rivers)





Map layers Legend

AFO Siting Data

Sinkholes 

Ag Drainage Well 

Wells 

Animal Feeding Operation

-  Active, Confined/Open
-  Active, Confinement
-  Active, Open Feedlot
-  Inactive

Public Drainage Infrastructure

-  Ditch
-  Tile

High Qty Wtr Resource (Rivers) 

High Qty Wtr Resource (Waterbody) 

Major Water Source (Rivers) 



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
- With BFE or Depth
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Flood Risk due to Levee. See Notes.
- Area with Flood Risk due to Levee

OTHER AREAS

- Area of Minimal Flood Hazard
- Effective LOMRS
- Area of Undetermined Flood Hazard

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS

- Digital Data Available
- No Digital Data Available
- Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/31/2018 at 10:35:34 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.





650th Ave

527

2000 ft

640th Ave

Google Earth

© 2018 Google

APPENDIX C MASTER MATRIX

Proposed Site Characteristics

The following scoring criteria apply to the site of the proposed confinement feeding operation. Mark one score under each criterion selected by the applicant. The proposed site must obtain a minimum overall score of 440 and a score of 53.38 in the "air" subcategory, a score of 67.75 in the "water" subcategory and a score of 101.13 in the "community impacts" subcategory.

1. Additional separation distance, above minimum requirements, from proposed confinement structure to the closest:

- * Residence not owned by the owner of the confinement feeding operation,
- * Hospital,
- * Nursing home, or
- * Licensed or registered child care facility.

3951 - 1875 = 1576'

	Score	Air	Water	Community
250 feet to 500 feet	25	16.25		8.75
501 feet to 750 feet	45	29.25		17.50
751 feet to 1,000 feet	65	42.25		22.75
1,001 feet to 1,250 feet	85	55.25		29.75
1,251 feet or more	100	65.00		35.00

- (A) Refer to the construction permit application package to determine the animal unit capacity (or animal weight capacity if an expansion) of the proposed confinement feeding operation. Then refer to Table 6 of 567--Chapter 65 to determine minimum required separation distances.
- (B) The department will award points only for the single building, of the four listed above, closest to the proposed confinement feeding operation.
- (C) "Licensed child care center" - a facility licensed by the department of human services providing child care or preschool services for seven or more children, except when the facility is registered as a child care home.
- (D) "Registered child development homes" - child care providers certify that they comply with rules adopted by the department of human services. This process is voluntary for providers caring for five or fewer children and mandatory for providers caring for six or more children.
- (E) A full listing of licensed and registered child care facilities is available at county offices of the department of human services.

2. Additional separation distance, above minimum requirements, from proposed confinement structure to the closest public use area.

2500 + 1501 = none with H-1 9001'

	Score	Air	Water	Community
250 feet to 500 feet	5	2.00		3.00
501 feet to 750 feet	10	4.00		6.00
751 feet to 1,000 feet	15	6.00		9.00
1,001 feet to 1,250 feet	20	8.00		12.00
1,251 feet to 1,500 feet	25	10.00		15.00
1,501 feet or more	30	12.00		18.00

- (A) Refer to the construction permit application package to determine the animal unit capacity (or animal weight capacity if an expansion) of the proposed confinement feeding operation. Then refer to Table 6 of 567--Chapter 65 to determine minimum required separation distances.
- (B) "Public use area" - a portion of land owned by the United States, the state, or a political subdivision with facilities which attract the public to congregate and remain in the area for significant periods of time. Facilities include, but are not limited to, picnic grounds, campgrounds, cemeteries, lodges, shelter houses, playground equipment, lakes as listed in Table 2 of 567--Chapter 65, and swimming beaches. It does not include a highway, road right-of-way, parking areas, recreational trails or other areas where the public passes through, but does not congregate or remain in the area for significant periods of time.

3. Additional separation distance, above minimum requirements, from proposed confinement structure to the closest:

- * Educational institution,
- * Religious institution, or
- * Commercial enterprise.

1875 + 1501 = none with H-1 3376'

	Score	Air	Water	Community
250 feet to 500 feet	5	2.00		3.00

501 feet to 750 feet	10	4.00		6.00
751 feet to 1,000 feet	15	6.00		9.00
1,001 feet to 1,250 feet	20	8.00		12.00
1,251 feet to 1,500	25	10.00		15.00
1,501 feet or more	30	12.00		18.00

- (A) Refer to the construction permit application package to determine the animal unit capacity (or animal weight capacity if an expansion) of the proposed confinement feeding operation. Then refer to Table 6 of 567--Chapter 65 to determine minimum required separation distances.
- (B) The department will award points only for the single building, of the three listed above, closest to the proposed confinement feeding operation.
- (C) "Educational institution" - a building in which an organized course of study or training is offered to students enrolled in kindergarten through grade 12 and served by local school districts, accredited or approved nonpublic schools, area educational agencies, community colleges, institutions of higher education under the control of the state board of regents, and accredited independent colleges and universities.
- (D) "Religious institution" - a building in which an active congregation is devoted to worship.
- (E) "Commercial enterprise" - a building which is used as a part of a business that manufactures goods, delivers services, or sells goods or services, which is customarily and regularly used by the general public during the entire calendar year and which is connected to electric, water, and sewer systems. A commercial enterprise does not include a farm operation.

4. Additional separation distance, above minimum requirement of 500 feet, from proposed confinement structure to the closest water source.

$7857 - 520 = 7357$

	Score	Air	Water	Community
250 feet to 500 feet	5		5.00	
501 feet to 750 feet	10		10.00	
751 feet to 1,000 feet	15		15.00	
1,001 feet to 1,250 feet	20		20.00	
1,251 feet to 1,500	25		25.00	
1,501 feet or more	30		30.00	

"Water source" - a lake, river, reservoir, creek, stream, ditch, or other body of water or channel having definite banks and a bed with water flow, except lakes or ponds without an outlet to which only one landowner is riparian.

5. Separation distance of 300 feet or more from the proposed confinement structure to the nearest thoroughfare.

	Score	Air	Water	Community
300 feet or more	30	9.00		21.00

- (A) "Thoroughfare" - a road, street, bridge, or highway open to the public and constructed or maintained by the state or a political subdivision.
- (B) The 300-foot distance includes the 100-foot minimum setback plus additional 200 feet.

6. Additional separation distance, above minimum requirements, from proposed confinement structure to the closest critical public area.

$2500 + 500 = \text{NONE WITH IN } 3000'$

	Score	Air	Water	Community
500 feet or more	10	4.00		6.00

- (A) All critical public areas as defined in 567--65.1(455B), are public use areas, and therefore subject to public use area minimum separation distances.
- (B) Refer to the construction permit application package to determine the animal unit capacity (or animal weight capacity if an expansion) of the proposed confinement feeding operation. Then refer to Table 6 of 567--Chapter 65 to determine minimum required separation distances.

7. Proposed confinement structure is at least two times the minimum required separation distance from all private and public water wells.

	Score	Air	Water	Community
Two times the minimum separation distance	30		24.00	6.00

Refer to Table 6 of 567--Chapter 65 for minimum required separation distances to wells.

8. Additional separation distance, above the minimum requirement of 1,000 feet, from proposed confinement structure to the closest:

- * Agricultural drainage well,
- * Known sinkhole, or
- * Major water source.

1000 + 2501 = none within 3501'

	Score	Air	Water	Community
250 feet to 500 feet	5	0.50	2.50	2.00
501 feet to 750 feet	10	1.00	5.00	4.00
751 feet to 1,000 feet	15	1.50	7.50	6.00
1,001 feet to 1,250 feet	20	2.00	10.00	8.00
1,251 feet to 1,500 feet	25	2.50	12.50	10.00
1,501 feet to 1,750 feet	30	3.00	15.00	12.00
1,751 feet to 2,000 feet	35	3.50	17.50	14.00
2,001 feet to 2,250 feet	40	4.00	20.00	16.00
2,251 feet to 2,500 feet	45	4.50	22.50	18.00
2,501 feet or more	50	5.00	25.00	20.00

- (A) The department will award points only for the single item, of the three listed above, that is closest to the proposed confinement feeding operation.
- (B) "Agricultural drainage wells" - include surface intakes, cisterns and wellheads of agricultural drainage wells.
- (C) "Major water source" - a lake, reservoir, river or stream located within the territorial limits of the state, or any marginal river area adjacent to the state which can support a floating vessel capable of carrying one or more persons during a total of a six-month period in one out of ten years, excluding periods of flooding. Major water sources in the state are listed in Tables 1 and 2 in 567--Chapter 65.
9. Distance between the proposed confinement structure and the nearest confinement facility that has a submitted department manure management plan.

	Score	Air	Water	Community
Three-quarter of a mile or more (3,960 feet)	25	7.50	7.50	10.00

Confinement facilities include swine, poultry, and dairy and beef cattle.

10. Separation distance from proposed confinement structure to closest:
- * High quality (HQ) waters,
 - * High quality resource (HQR) waters, or
 - * Protected water areas (PWA)
- is at least two times the minimum required separation distance

1000 x 2 = none within 2000'

	Score	Air	Water	Community
Two times the minimum separation distance	30		22.50	7.50

- (A) The department will award points only for the single item, of the three listed above, closest to the proposed confinement feeding operation.
- (B) HQ waters are identified in 567--Chapter 61.
- (C) HQR waters are identified in 567--Chapter 61.
- (D) A listing of PWAs is available at:
<http://www.iowadnr.gov/Recreation/CanoeingKayaking/StreamCare/ProtectedWaterAreas.aspx>

11. Air quality modeling results demonstrating an annoyance level less than 2 percent of the time for residences within two times the minimum separation distance.

	Score	Air	Water	Community
University of Minnesota OFFSET model results demonstrating an annoyance level less than 2 percent of the time	10	6.00		4.00e

- (A) OFFSET can be found at
<http://www.extension.umn.edu/agriculture/manure-management-and-air-quality/feedlots-and-manure-storage/offset-odor-from-feedlots/>. For more information, contact Dr. Larry Jacobson, University of Minnesota, (612) 625-8288, jacob007@tc.umn.edu.
- (B) A residence that has a signed waiver for the minimum separation distance cannot be included in the model.
- (C) Only the OFFSET model is acceptable until the department recognizes other air quality models.

12. Liquid manure storage structure is covered.

	Score	Air	Water	Community
Covered liquid manure storage	30	27.00		3.00

- (A) "Covered" - organic or inorganic material, placed upon an animal feeding operation structure used to store manure, which significantly reduces the exchange of gases between the stored manure and the outside air.

Organic materials include, but are not limited to, a layer of chopped straw, other crop residue, or a naturally occurring crust on the surface of the stored manure. Inorganic materials include, but are not limited to, wood, steel, aluminum, rubber, plastic, or Styrofoam. The materials shall shield at least 90 percent of the surface area of the stored manure from the outside air. Cover shall include an organic or inorganic material which current scientific research shows reduces detectable odor by at least 75 percent. A formed manure storage structure directly beneath a floor where animals are housed in a confinement feeding operation is deemed to be covered.

- (B) The design, operation and maintenance plan for the manure cover must be in the construction permit application and made a condition in the approved construction permit.

13. Construction permit application contains design, construction, operation and maintenance plan for emergency containment area at manure storage structure pump-out area.

	Score	Air	Water	Community
Emergency containment area	20		18.00	2.00

- (A) The emergency containment area must be able to contain at least 5 percent of the total volume capacity of the manure storage structure.
 (B) The emergency containment area must be constructed on soils that are fine-grained and have low permeability.
 (C) If manure is spilled into the emergency containment area, the spill must be reported to the department within six hours of onset or discovery.
 (D) The design, construction, operation and maintenance plan for the emergency containment area must be in the construction permit application and made a condition in the approved construction permit.

14. Installation of a filter(s) designed to reduce odors from confinement building(s) exhaust fan(s).

	Score	Air	Water	Community
Installation of filter(s)	10	8.00		2.00

The design, operation and maintenance plan for the filter(s) must be in the construction permit application and made a condition in the approved construction permit.

15. Utilization of landscaping around confinement structure.

	Score	Air	Water	Community
Utilization of Landscaping	20	10.00		10.00

The design, operation and maintenance plan for the landscaping must be in the construction permit application and made a condition in the approved construction permit. The design should contain at least three rows of trees and shrubs, of both fast and slow-growing species that are well suited for the site.

16. Enhancement, above minimum requirements, of structures used in stockpiling and composting activities, such as an impermeable pad and a roof or cover.

	Score	Air	Water	Community
Stockpile and compost facility enhancements	30	9.00	18.00	3.00

- (A) The design, operation and maintenance plan for the stockpile or compost structure enhancements must be in the construction permit application and made a condition in the approved construction permit.
 (B) The stockpile or compost structures must be located on land adjacent or contiguous to the confinement building.

17. Proposed manure storage structure is formed

	Score	Air	Water	Community
Formed manure storage structure	30		27.00	3.00

- (A) "Formed manure storage structure" -a covered or uncovered impoundment used to store manure from an animal feeding operation, which has walls and a floor constructed of concrete, concrete block, wood, steel, or similar materials. Similar materials may include, but are not limited to, plastic, rubber, fiberglass, or other synthetic materials. Materials used in a formed manure storage structure shall have the structural integrity to withstand expected internal and external load pressures.
 (B) The design, operation and maintenance plan for the formed manure storage structure must be in the construction permit application and made a condition in the approved construction permit.

18. Manure storage structure is aerated to meet departmental standards as an aerobic structure, if aeration is not already required by the department.

	Score	Air	Water	Community
Aerated manure storage structure	10	8.00		2.00

- (A) Aerobic structure - an animal feeding operation structure other than an egg wash water storage structure which relies on aerobic bacterial action which is maintained by the utilization of air or oxygen and which includes

aeration equipment to digest organic matter. Aeration equipment shall be used and shall be capable of providing oxygen at a rate sufficient to maintain an average of 2 milligrams per liter dissolved oxygen concentration in the upper 30 percent of the depth of manure in the structure at all times.

- (B) The design, operation and maintenance plan for the aeration equipment must be in the construction permit application and made a condition in the approved construction permit.

19. Proposed confinement site has a suitable truck turnaround area so that semitrailers do not have to back into the facility from the road

	Score	Air	Water	Community
Truck turnaround	20			20.00

- (A) The design, operation and maintenance plan for the truck turn around area must be in the construction permit application and made a condition in the approved construction permit.
 (B) The turnaround area should be at least 120 feet in diameter and be adequately surfaced for traffic in inclement weather.

20. Construction permit applicant's animal feeding operation environmental and worker protection violation history for the last five years at all facilities in which the applicant has an interest.

	Score	Air	Water	Community
No history of Administrative Orders in last five years	30			30.00

- (A) "Interest" - means ownership of a confinement feeding operation as a sole proprietor or a 10 percent or more ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary or other equity interest holder. Ownership interest is an interest when it is held either directly, indirectly through a spouse or dependent child, or both.
 (B) An environmental violation is a final Administrative Order (AO) from the department of natural resources or final court ruling against the construction permit applicant for environmental violations related to an animal feeding operation. A Notice of Violation (NOV) does not constitute a violation.

21. Construction permit applicant waives the right to claim a Pollution Control Tax Exemption for the life of the proposed confinement feeding operation structure.

	Score	Air	Water	Community
Permanent waiver of Pollution Control Tax Exemption	5			5.00

- (A) Waiver of Pollution Control Tax Exemption is limited to the proposed structure(s) in the construction permit application.
 (B) The department and county assessor will maintain a record of this waiver, and it must be in the construction permit application and made a condition in the approved construction permit.

22. Construction permit applicant can lawfully claim a Homestead Tax Exemption on the site where the proposed confinement structure is to be constructed

- OR -

the construction permit applicant is the closest resident to the proposed confinement structure.

	Score	Air	Water	Community
Site qualifies for Homestead Tax Exemption or permit applicant is closest resident to proposed structure	25			25.00

- (A) Proof of Homestead Tax Exemption is required as part of the construction permit application.
 (B) Applicant includes persons who have ownership interests. "Interest" - means ownership of a confinement feeding operation as a sole proprietor or a 10 percent or more ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary or other equity interest holder. Ownership interest is an interest when it is held either directly, indirectly through a spouse or dependent child, or both.

23. Construction permit applicant can lawfully claim a Family Farm Tax Credit for agricultural land where the proposed confinement feeding operation is to be located pursuant to Iowa Code chapter 425A.

	Score	Air	Water	Community
Family Farm Tax Credit qualification	25			25.00

Applicant includes persons who have ownership interests. "Interest" - means ownership of a confinement feeding operation as a sole proprietor or a 10 percent or more ownership interest held by a person in a confinement feeding operation as a joint tenant, tenant in common, shareholder, partner, member, beneficiary or other equity interest holder. Ownership interest is an interest when it is held either directly, indirectly through a spouse or dependent child, or both.

24. Facility size.

2000.4 = 2000 AUC

	Score	Air	Water	Community
1 to 2,000 animal unit capacity	20			20.00
2,001 to 3,000 animal unit capacity	10			10.00
3,001 animal unit capacity or more	0			0.00

- (A) Refer to the construction permit application package to determine the animal unit capacity of the proposed confinement structure at the completion of construction.
- (B) If the proposed structure is part of an expansion, animal unit capacity (or animal weight capacity) must include all animals confined in adjacent confinement structures.
- (C) Two or more animal feeding operations under common ownership or management are deemed to be a single animal feeding operation if they are adjacent or utilize a common area or system for manure disposal. In addition, for purposes of determining whether two or more confinement feeding operations are adjacent, all of the following must apply:
 - (a) At least one confinement feeding operation structure must be constructed on and after May 21, 1998.
 - (b) A confinement feeding operation structure which is part of one confinement feeding operation is separated by less than a minimum required distance from a confinement feeding operation structure which is part of the other confinement feeding operation. The minimum required distance shall be as follows:
 - (1) 1,250 feet for confinement feeding operations having a combined animal unit capacity of less than 1,000 animal units.
 - (2) 2,500 feet for confinement feeding operations having a combined animal unit capacity of 1,000 animal units or more.

25. Construction permit application includes livestock feeding and watering systems that significantly reduce manure volume.

	Score	Air	Water	Community
Wet/dry feeders or other feeding and watering systems that significantly reduce manure volume	25		12.50	12.50

The design, operation and maintenance plan for the feeding system must be in the construction permit application and made a condition in the approved construction permit.

Proposed Site Operation and Manure Management Practices

The following scoring criteria apply to the operation and manure management characteristics of the proposed confinement feeding operation. Mark one score under each criterion that best reflects the characteristics of the submitted manure management plan.

26. Liquid or dry manure (choose only one subsection from subsections "a" - "e" and mark one score in that subsection).

		Score	Air	Water	Community
a.	Bulk dry manure is sold under Iowa Code Chapter 200A and surface-applied	15		15.00	
	Bulk dry manure is sold under Iowa Code Chapter 200A and incorporated on the same date it is land-applied	30	12.00	12.00	6.00
b.	Dry manure is composted and land-applied under the requirements of an approved department manure management plan	10	4.00	4.00	2.00
	Dry manure is composted and sold so that no manure is applied under the requirements of an approved department manure management plan	30	12.00	12.00	6.00
c.	Methane digester is used to generate energy from manure and remaining manure is surface-applied under the requirements of an approved department manure management plan	10	3.00	3.00	4.00
	After methane digestion is complete, manure is injected or incorporated on the same date it is land-applied under the requirements of an approved department manure management plan	30	12.00	12.00	6.00
d.	Dry manure is completely burned to generate energy and no	30	9.00	9.00	12.00

	remaining manure is applied under the requirements of an approved department manure management plan				
	Some dry manure is burned to generate energy, but remaining manure is land-applied and incorporated on the same date it is land applied	30	12.00	12.00	6.00

e.	Injection or incorporation of manure on the same date it is land-applied	30	12.00	12.00	6.00
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- (A) Choose only ONE line from subsection "a", "b," "c," "d," or "e" above and mark only one score in that subsection.
- (B) The injection or incorporation of manure must be in the construction permit application and made a condition in the approved construction permit.
- (C) If an emergency arises and injection or incorporation is not feasible, prior to land application of manure the applicant must receive a written approval for an emergency waiver from a department field office to surface-apply manure.
- (D) Requirements pertaining to the sale of bulk dry manure under pursuant to Iowa Code chapter 200A must be incorporated into the construction permit application and made a condition of the approved construction permit.
- (E) The design, operation and maintenance plan for utilization of manure as an energy source must be in the construction permit application and made a condition in the approved construction permit.
- (F) The design, operation and maintenance plan for composting facilities must be in the construction permit application and made a condition in the approved construction permit.

27. Land application of manure is based on a two-year crop rotation phosphorus uptake level.

	Score	Air	Water	Community
Two-year phosphorus crop uptake application rate	10		10.00	

- (A) Land application of manure cannot exceed phosphorus crop usage levels for a two-year crop rotation cycle.
- (B) The phosphorus uptake application rates must be in the construction permit application and made a condition in the approved construction permit.

28. Land application of manure to farmland that has USDA Natural Resources Conservation Service (NRCS) approved buffer strips contiguous to all water sources traversing or adjacent to the fields listed in the manure management plan.

	Score	Air	Water	Community
Manure application on farmland with buffer strips	10		8.00	2.00

- (A) The department may request NRCS maintenance agreements to ensure proper design, installation and maintenance of filter strips. If a filter strip is present but not designed by NRCS, it must meet NRCS standard specifications.
- (B) The application field does not need to be owned by the confinement facility owner to receive points.
- (C) On current and future manure management plans, the requirement for buffer strips on all land application areas must be in the construction permit application and made a condition in the approved construction permit.

29. Land application of manure does not occur on highly erodible land (HEL), as classified by the USDA NRCS.

	Score	Air	Water	Community
No manure application on HEL farmland	10		10.00	

Manure application on non-HEL farmland must be in the construction permit application and made a condition in the approved construction permit.

30. Additional separation distance, above minimum requirements (0 or 750 feet, see below), for the land application of manure to the closest:

- * Residence not owned by the owner of the confinement feeding operation,
- * Hospital,
- * Nursing home, or
- * Licensed or registered child care facility.

	Score	Air	Water	Community
Additional separation distance of 200 feet	5	3.25		1.75
Additional separation distance of 500 feet	10	6.50		3.50

- (A) The department will award points only for the single building, of the four listed above, closest to the proposed confinement feeding operation.
- (B) Minimum separation distance for land application of manure injected or incorporated on the same date as application: 0 feet.

- (C) Minimum separation distance for land application of manure broadcast on soil surface: 750 feet.
- (D) The additional separation distances must be in the construction permit application and made a condition in the approved construction permit.
- (E) "Licensed child care center" – a facility licensed by the department of human services providing child care or preschool services for seven or more children, except when the facility is registered as a child care home.
- (F) "Registered child development homes" - child care providers certify that they comply with rules adopted by the department of human services. This process is voluntary for providers caring for five or fewer children and mandatory for providers caring for six or more children.
- (G) A full listing of licensed and registered child care facilities is available at county offices of the Department of Human Services

31. Additional separation distance, above minimum requirements (0 or 750 feet, see below), for land application of manure to closest public use area.

	Score	Air	Water	Community
Additional separation distance of 200 feet	5	2.00		3.00

- (A) "Public use area" - a portion of land owned by the United States, the state, or a political subdivision with facilities which attract the public to congregate and remain in the area for significant periods of time. Facilities include, but are not limited to, picnic grounds, campgrounds, cemeteries, lodges, shelter houses, playground equipment, lakes as listed in Table 2 in 567--Chapter 65, and swimming beaches. It does not include a highway, road right-of-way, parking areas, recreational trails or other areas where the public passes through, but does not congregate or remain in the area for significant periods of time.
- (B) Minimum separation distance for land application of manure injected or incorporated on the same date as application: 0 feet.
- (C) Minimum separation distance for land application of manure broadcast on soil surface: 750 feet.
- (D) The additional separation distances must be in the construction permit application and made a condition in the approved construction permit.

32. Additional separation distance, above minimum requirements (0 or 750 feet, see below), for the land application of manure to the closest:

- * Educational institution,
- * Religious institution, or
- * Commercial enterprise.

	Score	Air	Water	Community
Additional separation distance of 200 feet	5	2.00		3.00

- (A) Minimum separation distance for land application of manure broadcast on soil surface: 750 feet.
- (B) Minimum separation distance for land application of manure injected or incorporated on same date as application: 0 feet.
- (C) The additional separation distances must be in the construction permit application and made a condition in the approved construction permit.
- (D) "Educational institution" - a building in which an organized course of study or training is offered to students enrolled in kindergarten through grade 12 and served by local school districts, accredited or approved nonpublic schools, area educational agencies, community colleges, institutions of higher education under the control of the state board of regents, and accredited independent colleges and universities.
- (E) "Religious institution" - a building in which an active congregation is devoted to worship.
- (F) "Commercial enterprise" - a building which is used as a part of a business that manufactures goods, delivers services, or sells goods or services, which is customarily and regularly used by the general public during the entire calendar year and which is connected to electric, water, and sewer systems. A commercial enterprise does not include a farm operation.

33. Additional separation distance of 50 feet, above minimum requirements (0 or 200 feet, see below), for the land application of manure to the closest private drinking water well or public drinking water well - OR well is properly closed under supervision of county health officials.

	Score	Air	Water	Community
Additional separation distance of 50 feet or well is properly closed	10		8.00	2.00

- (A) Minimum separation distance for land application of manure injected or incorporated on the same date as application or 50-foot vegetation buffer exists around well and manure is not applied to the buffer: 0 feet.
- (B) Minimum separation distance for land application of manure broadcast on soil surface: 200 feet.
- (C) If applicant chooses to close the well; the well closure must be incorporated into the construction permit application and made a condition in the approved construction permit.

34. Additional separation distance, above minimum requirements, for the land application of manure to the closest:
- * Agricultural drainage well,
 - * Known sinkhole,
 - * Major water source, or
 - * Water source

	Score	Air	Water	Community
Additional separation distance of 200 feet	5	0.50	2.50	2.00
Additional separation distance of 400 feet	10	1.00	5.00	4.00

- (A) "Agricultural drainage wells" - include surface intakes, cisterns and wellheads of agricultural drainage wells.
 (B) "Major water source" - a lake, reservoir, river or stream located within the territorial limits of the state, or any marginal river area adjacent to the state, which can support a floating vessel capable of carrying one or more persons during a total of a six-month period in one out of ten years, excluding periods of flooding. Major water sources in the state are listed in Tables 1 and 2 in 567--Chapter 65.
 (C) "Water source" - a lake, river, reservoir, creek, stream, ditch, or other body of water or channel having definite banks and a bed with water flow, except lakes or ponds without an outlet to which only one landowner is riparian.
 (D) The additional separation distances must be in the construction permit application and made a condition in the approved construction permit.

35. Additional separation distance above minimum requirements, for the land application of manure, to the closest:

- * High quality (HQ) water,
- * High quality resource (HQR) water, or
- * Protected water area (PWA).

	Score	Air	Water	Community
Additional separation distance of 200 feet	5		3.75	1.25
Additional separation distance of 400 feet	10		7.50	2.50

- (A) HQ waters are identified in 567--Chapter 61.
 (B) HQR waters are identified in 567--Chapter 61.
 (C) A listing of PWAs is available at:
<http://www.iowadnr.gov/Recreation/CanoeingKayaking/StreamCare/ProtectedWaterAreas.aspx>.

36. Demonstrated community support.

	Score	Air	Water	Community
Written approval of 100% of the property owners within a one mile radius	20			20.00

37. Worker safety and protection plan is submitted with the construction permit application.

	Score	Air	Water	Community
Submission of worker safety and protection plan	10			10.00

- (A) The worker safety and protection plan must be in the construction permit application and made a condition in the approved construction permit.
 (B) The worker safety and protection plan and subsequent records must be kept on site with the manure management plan records.

38. Applicant signs a waiver of confidentiality allowing public to view confidential manure management plan land application records

	Score	Air	Water	Community
Manure management plan confidentiality waiver	5			5.00

The waiver of confidentiality must be in the construction permit application and made a condition in the approved construction permit. The applicant may limit public inspection to reasonable times and places.

39. Added economic value based on quality job development (number of full time equivalent (FTE) positions), and salary equal to or above Iowa department of workforce development median (45-2093)

-OR-

the proposed structure increases commercial property tax base in the county.

	Score	Air	Water	Community
Economic value to local community	10			10.00

The Iowa Department of Workforce Development regional profiles are available at

<http://www.iowaworkforce.org/centers/regionalsites.htm>. Select the appropriate region and then select "Regional Profile."

40. Construction permit application contains an emergency action plan.

	Score	Air	Water	Community
Emergency action plan	5		2.50	2.50

- (A) Iowa State University Extension publication PM 1859 lists the components of an emergency action plan. The emergency action plan submitted should parallel the components listed in the publication.
- (B) The posting and implementation of an emergency action plan must be in the construction permit application and made a condition in the approved construction permit.
- (C) The emergency action plan and subsequent records must be kept on site with the manure management plan records.

41. Construction permit application contains a closure plan.

	Score	Air	Water	Community
Closure Plan	5		2.50	2.50

- (A) The closure plan must be in the construction permit application and made a condition in the approved construction permit.
- (B) The closure plan must be kept on site with the manure management plan records.

42. Adoption and implementation of an environmental management system (EMS) recognized by the department.

	Score	Air	Water	Community
EMS	15	4.50	4.50	6.00

- (A) The EMS must be in the construction permit application and made a condition in the approved construction permit.
- (B) The EMS must be recognized by the department as an acceptable EMS for use with confinement operations.

43. Adoption and implementation of NRCS approved Comprehensive Nutrient Management Plan (CNMP).

	Score	Air	Water	Community
CNMP	10	3.00	3.00	4.00

The implementation and continuation of a CNMP must be in the construction permit application and made a condition in the approved construction permit.

44. Groundwater monitoring wells installed near manure storage structure, and applicant agrees to provide data to the department.

	Score	Air	Water	Community
Groundwater monitoring	15		10.50	4.50

- (A) Monitoring well location, sampling and data submission must meet department requirements.
- (B) The design, operation and maintenance plan for the groundwater monitoring wells, and data transfer to the department, must be in the construction permit application and made a condition in the approved construction permit.

Score to pass

Total Score	Air	Water	Community
880	213.50	271.00	404.50
440	53.38	67.75	101.13

Site: Richland 28 West

**APPENDIX C
MASTER MATRIX**

<u>Question</u>	<u>Score</u>	<u>Air</u>	<u>Water</u>	<u>Community</u>
1	100	65	0	35
2	30	12	0	18
3	30	12	0	18
4	30	0	30	0
5	0	0	0	0
6	10	4	0	6
7	0	0	0	0
8	50	5	25	20
9	25	7.5	7.5	10
10	30	0	22.5	7.5
11	0	0	0	0
12	30	27	0	3
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	30	0	27	3
18	0	0	0	0
19	20	0	0	20
20	30	0	0	30
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	20	0	0	20
25	25	0	12.5	12.5
26	30	12	12	6
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	5	0	2.5	2.5
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0

Only for: "b,c, or d" Only for: "a & e"

Total **495** **144.5** **139** **211.5**
Total to Pass **440** **53.38** **67.75** **101.13**

Requires: "Design, Operation, and Maintenance Plan"

Requires: "Supporting Documentation"

Richland 28 West; 18 (0.93 ac.)



- No Public Use within 4001'
- No Educational, Religious, or Commercial Ent within 3376'
- No Well within 101'
- No Ag Drainage Well, Known Sinkhole, or Major Water within 3501'
- No HQ, HQR, or PWA within 2000'

Date: Aug 31, 2018
 Field Name: Richland 28 West; 18
 Location: Story Co., Iowa, U.S.
 Section 28, T84N, R22W
 Farm Name: Scott Henry
 Client Name: P-Index
 Total Acres: 0.93
 Field Boundary Start Location:
 Latitude: 42.04997051
 Longitude: -93.42389401



- 500 ft water buffer
- Distance To Fence 130.256
- 131.51
- Distance Between Barns 100.529
- Proposed Well
- Distance To Proposed Well 110.502
- Drive Dimensions 132.227
- 315.666
- Drive
- (1.0ac.)Field Boundary

Design, Operating, & Maintenance Plans & Supporting Documentation

SITE NAME – Richland 28

Master Matrix #1

The swine facility is located an additional **1576 feet**, above the required **1,875 feet**, away from the closest residence not owned by the owner of the confinement feeding operation, Hospital, Nursing Home, and Licensed or registered child care facility. Refer to site map. Credits of **100 pts** have been counted in the Master Matrix for **Item 1**.

Master Matrix #2

The swine facility is located at least an additional **1501 feet**, above the required **2500 feet**, away from the closest Public Use Area; defined as a portion of land owned by the United States, the state, or a political subdivision with facilities which attract the public to congregate and remain in the area for significant periods of time. Refer to site map. Credits of **30 pts** have been counted in the Master Matrix for **Item 2**.

Master Matrix #3

The swine facility is located at least an additional **1501 feet**, above the required **1,875 feet**, away from the closest Educational Institute, Religious Institution, or Commercial Enterprise. Refer to site map. Credits of **30 pts** have been counted in the Master Matrix for **Item 3**.

Master Matrix #4

The swine facility is located an additional **7357 feet**, above the required **500 feet**, away from the closest water source. Refer to site map. Credits of **30 pts** have been counted in the Master Matrix for **Item 4**.

Master Matrix #6

The swine facility is located an additional **500 feet**, above the required **2,500 feet**, away from the closest critical public area. Refer to site map. Credits of **10 pts** have been counted in the Master Matrix for **Item 6**.

Master Matrix #8

The swine facility is located an additional **2501 feet**, above the required **1,000 feet**, away from the closest Agricultural drainage well, known sinkhole, or major water source. Refer to site map. Credits of **50 pts** have been counted in the Master Matrix for **Item 8**.

Master Matrix #9

The swine facility is located at least **three-quarters of a mile** away from the nearest confinement facility that has a submitted department manure management plan. Refer to site map. Credits of **25 pts** have been counted in the Master Matrix for **Item 9**.

Master Matrix #10

The swine facility is located at least two times the minimum separation distance of **1000 feet**, from the closest high quality water, high quality resource water, or protected water areas. Refer to site map.

Credits of **30** pts have been counted in the Master Matrix for **Item 10**.

Master Matrix #12

Points: We are claiming 30 points because this Manure Storage Structure has a cover. Iowa Code states that "a formed manure storage structure directly beneath a floor where animals are housed in a confinement feeding operation is deemed to be covered." On this Site the building roof is the cover.

Design: The site will consist of 2 swine finishing buildings that have manure storage pits directly beneath the roof and floor where the pigs are housed, as required by DNR rules to be considered covered liquid manure storage. The roof has been designed and warranted using ribbed painted, or galvanized steel to withstand appropriate snow and wind loads for Story County, Iowa.

Operation: The roof is part of the Structure and has no moving parts, therefore it does not require an operating plan.

Maintenance: Each building's roof and floor will be maintained to provide coverage of the manure storage structure. Maintenance of this cover will be minimal since it consists of steel. This facility will have a caretaker on site and in the buildings daily, if there is evidence of storm damage, or any holes/water leaks, which would be evidence of a hole; if found, they will be immediately repaired with appropriate materials to achieve as-built condition.

Credits of **30** points have been counted in the Master Matrix for **Item 12**.

Master Matrix # 17

Points: We are claiming 30 points because the manure storage structure is formed. The pit is "cast in place" reinforced concrete.

Design: The site will utilize an 8' deep cast in place reinforced concrete pit. The reinforced cast in place structure meets requirements of Chapter 65 for manure storage, the housing of swine, and the support of roof, slats and walls. Tables for steel grade, size and spacing are reviewed by a DNR engineer through the permitting process. Wall and floor thickness, concrete strength, backfill soil categories, and traffic patterns are also reviewed. There will be a wall poured over an approved footing and floor incorporating a water stop that prevents infiltration/exfiltration. Refer to the Construction Design Statement for specifics. The Construction Design Statement has been completed and signed by the building contractor and contains a Construction Certification stating that it was designed in accordance with DNR rules.

Operation: The Manure Storage Structure is static and has no moving parts. The pit will be cleaned and inspected before animals are placed in building looking for any defects, such as cracks or honeycombing, and if discovered will be repaired to industry standards. The facility will be operated as a below building concrete pit. There will be a Caretaker on site and in the buildings daily, and will visually monitor manure levels. In addition water usage meters are routinely monitored by the caretaker to insure the ample water supply to pigs, and will also be used to identify excessive usage or leaks. The concrete walls of the manure storage pit are designed for heavy equipment to be operated no less

than 5 feet from the walls. The pump-out pits are designed to allow heavy equipment to be operated closer than 5 feet, and are constructed using stronger design specifications. Perimeter Tile are requirement of this CDS and every tile outlet will have a monitoring location consisting of either a monitoring port including a valve in case of leak, or an outlet to the surface.

Maintenance: Due to the concrete design and specifications for the formed structure, maintenance is expected to be minimal for this structure. As a requirement of the CDS all concrete will be cured to minimize shrinking and cracking. Approximately 12" of pit will be exposed above the soil surface. There will be a Caretaker on site and in the buildings daily, and will routinely looking for cracks in the walls. The building contractor will be notified if any cracking is discovered.

The Caretaker will make routine observations of the perimeter footing tile discharge point, or monitoring port for signs of contamination; such as manure odor, visual discoloration, excessive liquid in the tile during dry periods, and dead foliage. If contamination is observed, an immediate investigation will be conducted to locate the source and the problem will immediately be corrected. A groundwater and/or structural expert will direct the investigation, and the investigation will include closing the tile shutoff valve and taking water samples for visual and laboratory analysis.

Initial Settling of soils will be monitored and corrected to eliminate standing water next to the manure storage structure.

Credits of 30 pts have been counted in the Master Matrix for **Item 17**.

Master Matrix # 19

Design: The site will have a truck turnaround area at least 120 feet in diameter and adequately surfaced for traffic in inclement weather. The site will have a truck turnaround area allowing the trucks to pull in to the site completely off of the road and turn around.

Operation: The driveway will be operated to provide for safe entrance and exit to the property for delivery vehicles and not obstruct the public thoroughfare.

Maintenance: The driveway will be maintained to a level that will support regular truck traffic. The driveway will be constructed with a 2-3 inch base. Road rock gravel will be used as a road surface that will be monitored for the purposes of leveling, filling potholes, and adequate snow removal.

Credits of 20 pts have been counted in the Master Matrix for **Item 19**.

Master Matrix #20

The construction permit applicant has no history of Administrative Orders in the last five years at any site in which the applicant has any interest.

Credits of 30 pts have been counted in the Master Matrix for **Item 20**.

Master Matrix #24

The facility has a capacity of **1 to 2000** animal units. Refer to Construction Permit Application, page 3.

Credits of **20** pts have been counted in the Master Matrix for **Item 24**.

Master Matrix #25

Design: The buildings on the site will utilize a wet/dry feeder, dry feeder with watering cups, or swinging nipples. Industry wide accepted data shows significant water savings from any of the three options as compared to a gate mounted watering nipple. Please refer to the attached scientific article illustrating the water savings and benefits any of the three methods mentioned above.

Operation: Feeders, watering cups, or swinging nipples will be adjusted to reduce waste and optimize feed efficiency for the facility. The water savings result in reducing the gallons of water in the pit that later has to be hauled out onto farm fields.

Maintenance: The feeders, watering cups, or swinging nipples will be inspected on a regular basis and adjusted as needed. Water flow will be monitored and adjusted to control waste and excess manure volume.

Credits of **25** pts have been counted in the Master Matrix for **item 25**.

Master Matrix # 26 "e"

All manure will be injected or incorporated on the same date that it is applied.

Credits of **30** pts have been counted in the Master Matrix for **Item 26e**.

Master Matrix #41

THIS CLOSURE PLAN MUST BE KEPT ON SITE WITH ALL OTHER MMP DOCUMENTS. Closure Plan as of 8/14/18. This plan has been written in accordance with NRCS Conservation Practice Standard "Closure of Waste Impoundments". The closure plan is based on NRCS Code #360. This also meets the standards and requirements, which are set forth by the Iowa DNR. The closure shall comply with all federal, State of Iowa, local, and tribal laws, rules and regulations that are in place at the time of the closure. **LongView Pork, LLC** will notify the DNR Filed office of their intent to close the structures on this farm which consists of two 8' deep pit barns, subsequent to six (6) months of the structure being empty of livestock. Applicant will follow any closure rules that may be established at that time that is more stringent than this closure plan. **LongView Pork, LLC** and the DNR will establish a time line of completion for the closure plan.

1. Manure should be well agitated to try to remove as much manure as possible. The effluent, solids and any sludge will have an analysis for both nitrogen and phosphorus. This analysis will be used in determining the amount of material to be applied on a per acre basis according to the Manure Management Plan.
2. Non-concrete construction material should be removed and disposed of following DNR guidelines.
3. Slats should be removed for pit cleaning. Slats can be broken and added back after the pit is clean and walls have been knocked in.
4. All solids left in concrete containment shall be removed and field applied using agronomic rates.

5. After concrete containment is cleaned, applicant shall contact the DNR Field Office for visual inspection if DNR so advises. If DNR determines containment is clean enough to not create environmental impact, applicant may proceed to the next step.
6. Floor of containment shall be broken up so as to not impound water. Sub drain tile may be removed. Containment walls will be broken up and pulled into pit area. Demolished building materials shall be placed on top of concrete if not disposed of in another way.
7. Materials are to be covered with soil to a settled depth of one foot, and the backfill be sufficiently mounded such that runoff will be diverted from the site after the backfill settles.
8. Measures shall be taken during the construction to minimize site erosion and pollution of downstream water resources. This may include such items as silt fences, hag able barriers, temporary vegetation, and mulching.

Credits of 5 pts have been taken for **Item 41**.

Original research

Impact of feeders and drinker devices on pig performance, water use, and manure volume

Michael C. Brumm, MS, PhD; James M. Dahlquist, MS; Jill M. Heemstra, MS

Summary

Objective: To determine the impact of feeder and drinker designs on pig performance, water use, and manure volume.

Methods: Experiment One compared a wet/dry feeder to a dry feeder with wall-mounted nipple drinker. Experiment Two compared a swinging nipple drinker to a gate-mounted nipple, and Experiment Three compared a bowl drinker to the swinging drinker of Experiment Two. In all experiments, pigs were housed in pens of 20–24 pigs per pen in partially slatted, mechanically ventilated facilities.

Results: In Experiment One, water disappearance (L per pig per day) was 4.49 for the wet/dry feeder versus 6.06 for the dry feeder plus nipple drinker. In Experiment Two, water disappearance was 4.90 L per pig per day for the swinging drinker versus 5.50 for the gate-mounted drinker. In Experiment Three, water disappearance was 3.78 for the bowl versus 5.01 for the swinging drinker. Summer manure production in Experiment One was 4.96 L per pig per day for the wet-dry feeder versus 7.02 for the nipple drinker. Winter manure production was 3.96 L per pig per day for the swinging drinker versus 4.59 for the nipple drinker in Experiment Two.

Implications: These results document the wide range in water use and manure volume associated with feeder and drinker devices installed in swine facilities. They also suggest lower amounts of total water use and manure volume than those currently cited in the literature or used by regulatory officials.

For the overall experiment, pigs on wet/dry feeders used 1 kg of water less per kg of feed than did pigs on the conventional system.

The overall W:F ratio was lowest for the wet/dry feeder (1.78; Experiment One) and similar to the bowl drinker (1.89; Experiment Three).

In observations consistent with ours in Experiment One, Maton and Daelemans¹⁴ concluded that all wet feeders included in their experiments reduced water spillage so that water consumption was only 70%–80% of that observed from conventional feeders and nipple drinkers. In addition, slurry (manure) volume was reduced by 20%–30% in their study.

Table 2: Manure production

	Experiment One (summer)		Experiment Two	
	Dry	Wet/dry	Swing	Nipple
Per pig per day				
Volume	7.02 L (1.85 gal)	4.96 L (1.31 gal)	3.96 L (1.05 gal)	4.59 L (1.21 gal)
Mass*	7.0 kg (15.4 lb)	4.9 kg (10.8 lb)	3.9 kg (8.6 lb)	4.5 kg (9.9 lb)
Per 1000 kg bodyweight				
Mass	109 kg (240 lb)	76 kg (167 lb)	61 kg (134 lb)	70 kg (154 lb)

* 990 kg per m³ (61.8 lb per cu. foot); ASAE⁸

References - refereed

1. Thulin AJ, Brumm MC. Water: The forgotten nutrient. In: Miller ER, Ullrey DE, Lewis AJ, Eds. *Swine Nutrition*. Boston, Massachusetts: Butterworth-Heinemann. 1991;315-324.
3. NRC. Nutrient Requirements of Swine (9th Ed.) National Academy Press, Washington, DC. 1988
4. NRC. Nutrient Requirements of Swine (10th Ed.) National Academy Press, Washington, DC. 1998.
5. Brumm MC, Sutton AL, Jones DD. Effect of season and pig size on swine waste production. *Trans ASAE*. 1980;23:165-168.
10. Patterson DC. A comparison of offering meal from a self-feed hopper having built-in watering with some conventional systems of offering meal and pellets to finishing pigs. *Anim Feed Sci Tech*. 1989;26:261-270.
11. Patterson DC. A comparison of offering meal and pellets to finishing pigs from self-feed hoppers with and without built-in watering. *Anim Feed Sci Tech*. 1991;34:29-36.
12. Walker N. A comparison of single- and multispace feeders for growing pigs fed non-pelleted diets ad libitum. *Anim Feed Sci Tech*. 1990;30:169-173.
13. Young RJ, Lawrence AB. Feeding behaviour of pigs in groups monitored by a computerized feeding system. *Anim Prod*. 1994;58:145-152.
14. Maton A, Daelemans J. Third comparative study viz. the circular wet-feeder versus the dry-feed hopper for ad libitum feeding and general conclusions concerning wet feeding versus dry feeding of finishing pigs. *Landbouwtijdschrift-Revue de l'Agriculture* 1992;45(3):531-539.
15. Miyawaki K, Hoshina K, Itoh S. Effects of feed and water mixture for finishing pigs on eating speed and feed intake. *Jpn J Swine Sci*. 1997;34:1-8.
16. Miyawaki K, Itoh S, Hoshina K. Effects of wet/dry feeding for finishing pigs on eating behavior and frequency of trough use. *Jpn J Swine Sci*. 1996;33:88-96.
17. Miyawaki K, Itoh S, Hoshina K. Water requirement and water-saving effect in finishing pigs fed with wet/dry feeders. *Jpn J Swine Sci*. 1994;31:35-42.
18. Crumby TR. Design requirements of liquid feeding systems for pigs: A review. *J Agric Eng Res*. 1986;34:153-172.
19. Mount LE, Holmes CW, Close WH, Morrison SR, Start IB. A note on the consumption of water by the growing pig at several environmental temperatures and levels of feeding. *Anim Prod*. 1971;13:561-563.
21. Brumm MC, Sutton AL, Mayrose VB, Nye JC, Jones HW. Effect of arsenilic acid in swine diets on fresh waste production, composition and anaerobic decomposition. *J Anim Sci*. 1977; 44:521-531.
22. Brumm MC. *The Effect of Dietary Copper Sulfate and Arsonic Acids on Swine Waste Production and Anaerobic Waste Decomposition*. PhD Thesis, West Lafayette, Indiana:Purdue University. 1978.

References - nonrefereed

2. Reese DE, Thaler RC, Brumm MC, Hamilton CR, Lewis AJ, Libal GW, Miller PS. Nebraska and South Dakota Swine Nutrition Guide. Univ. of Nebraska, Lincoln. Nebraska Coop. Ext. 1995;EC95-273
6. Melvin SW, Humenik FJ, White RK. *Swine Waste Management Alternatives*. PIH-67. Coop Ext Service, West Lafayette, Indiana:Purdue University. 1979.
7. MWPS-8 Swine Housing and Equipment Handbook. Midwest Plan Service. Iowa State University, Ames, Iowa. 1983.
8. American Society of Agricultural Engineers (ASAE). ASAE D384.1 DEC 93. Manure production and characteristics. In: *ASAE Standards*. American Society of Agriculture Engineers, St. Joseph, Michigan. 1995;546-548
9. National Pork Producers Council. *Procedures to Evaluate Market Hogs* (3rd Ed.) Des Moines, Iowa: National Pork Producers Council. 1991.
20. Nebraska DEQ. Form WP-42 (6/96), Confined Feeding or Dairy Barn Applications for Permit to Construct and Operate a Livestock Waste Control Facility. Nebraska Dept of Environmental Quality, Lincoln. 1996.

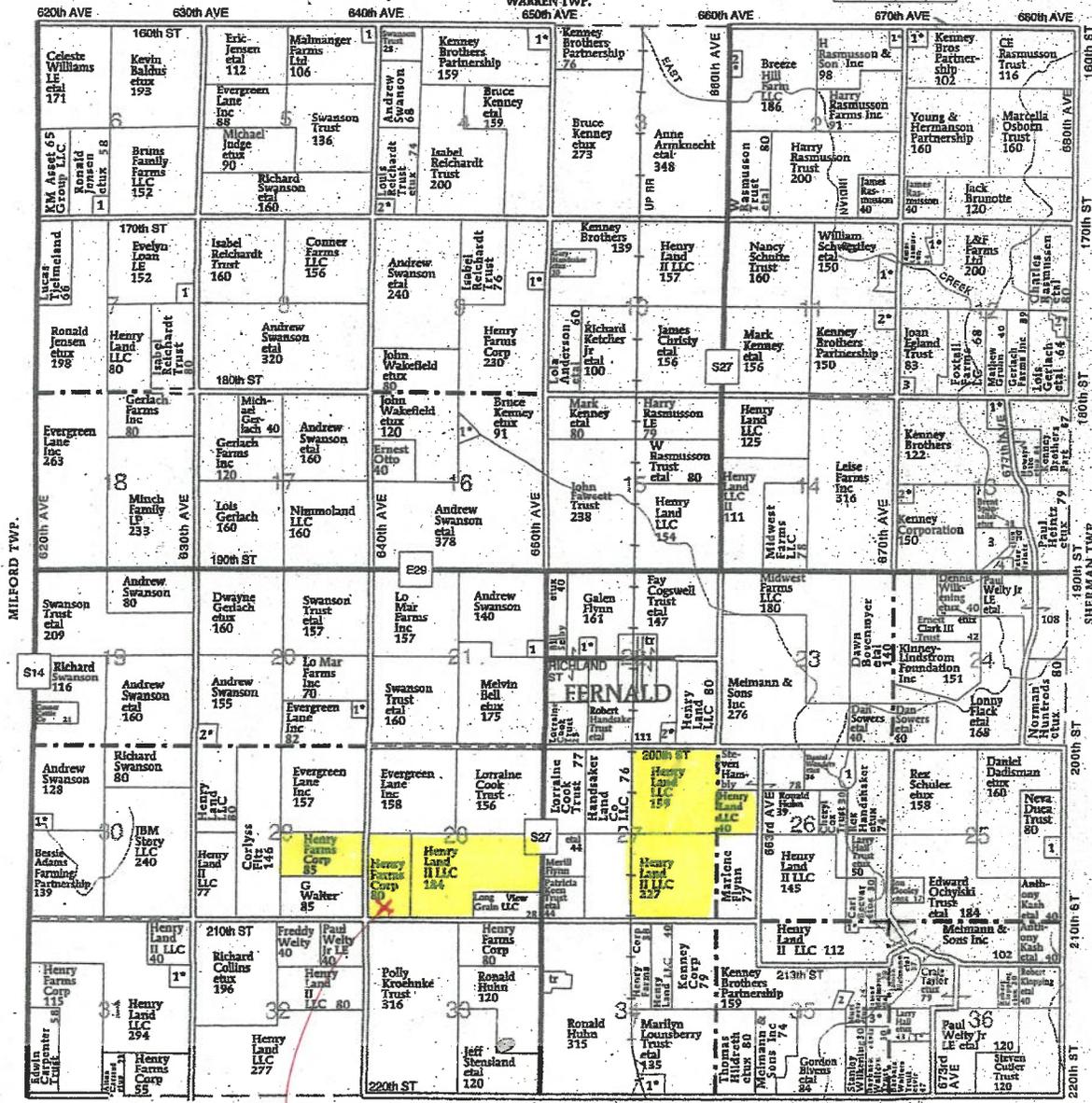
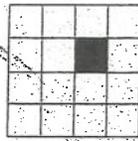
Please turn to the DISTRICT MANAGER Page in this book to see how you can receive your FREE DIGITAL FLIP BOOKS

T-84-N

RICHLAND PLAT

R-22-W

(Landowners)
WARREN TWP.



NEVADA TWP.

RICHLAND TOWNSHIP

- SECTION 1**
1. Campbell, Kirk etux 11
- SECTION 2**
1. Thompson, Kenneth etux 5
2. Uhlenhopp, Darrow etux 6
- SECTION 4**
1. Smith, Brent etux 10
2. Bark, Jonathan etux 6
- SECTION 5**
1. Cox, Michael 6
- SECTION 6**
1. Crawford Premium Pork LLC 7

- SECTION 7**
1. Kruczic, Barbara 8
- SECTION 9**
- SECTION 11**
1. Koudelka, Darryl etux 6
- SECTION 11**
1. Rugg, Diane etal 10
2. Hayes, Mark etux 10
- SECTION 12**
1. Little, John etux 14
2. Schuster, Allan etux 13
3. Bergeson, Mark 6
- SECTION 13**
1. Black, Darrick etal 22
2. Zeisneiss, Clark etux 6
3. Handsaker, Larry 14
4. County of Story 5

- SECTION 16**
1. Swanson, Dale etal 7
- SECTION 20**
1. Dewell, Grant etux 5
2. Griffin, Shane etux 5
- SECTION 21**
1. Sempson, Todd 5
- SECTION 22**
1. Flynn, Todd etux 7
2. Handsaker, Gary etal 9
- SECTION 25**
1. Parcel, Joshua 6
- SECTION 26**
1. Wonders Trust 6
- SECTION 30**
1. Couser, William etux 8

- SECTION 31**
1. Henry, Steve etux 10
- SECTION 34**
1. Mack, Richard etux 14
- SECTION 35**
1. Becvar, Carl etux 8
2. Cline, Douglas 5
3. Hall, Larry etux 10
- SECTION 36**
1. Morris, Melissa etux 8



Manure Management Plan Form

Determining Maximum Allowable Manure Application Rates

Instructions: Complete a worksheet for each unique combination of the following factors (crop rotation, optimum crop yield, manure nutrient concentration, remaining crop N need, method of application) that occurs at this operation. Complete form by filling in blanks, yellow-colored cells, and drop down menus. Gray shaded cells will calculate automatically. Footnotes are given on pages 4, 5 and 6.

Management Identification (Mgt ID)^g

Beans-Corn (A)

(identify this application scenario by letter)

Method to determine optimum crop yield^h Timing of application

Method of application Application loss factor

If spray irrigation is used, identify method

Table 2. Manure nutrient concentration

Manure Nutrient Content (lbs/1000gal or lbs/ton)					
Manure Storage Structure(s) ^k	BBP				
Total N ^l	56		P ₂ O ₅	38	
%TN Available 1st year	90%	2nd year	0%	3rd year	0%
Available N 1st year ^m	49.4	2nd year ⁿ	0.0	3rd year ^o	0.0

Table 3. Crop usage rates^p

lb/bu or lb/ton	N	P ₂ O ₅
Corn	1.2	0.32
Soybean	3.8	0.72
Alfalfa	50	13
Other crop	0	0

*Use blank space above to add crop not listed.

Table 4. Calculations for rate based on nitrogen (always required)

		Corn	Soybean	Corn	Soybean	
1	Applying Manure For (crop to be grown) ^q					
2	Optimum Crop Yield ^h	bu. or ton/acre	200	56	200	56
3	P ₂ O ₅ removed with crop by harvest ^r	lb/acre	64.0	40.3	64.0	40.3
4	Crop N utilization ^s	lb/acre	240	213	240	213
5a	Legume N credit ^t	lb/acre	50.00	0	50	0
5b	Commercial N planned ^u	lb/acre	0	0	0	0
5c	Manure N carryover credit ^v	lb/acre	0	0.0	0.0	0.0
6	Remaining crop N need ^w	lb/acre	190	213	190	213
7	Manure rate to supply remaining N ^x	gal/acre	3847	4308	3847	4308
8	P ₂ O ₅ applied with N-based rate ^y	lb/acre	146	164	146	164

Table 5. Calculations for rate based on phosphorus (fill out only if P-based rates are planned)

9	Commercial P ₂ O ₅ planned ^z	lb/acre	0	0	0	0
10	Manure rate to supply P removal ^{aa}	gal/acre	1684	1061	1684	1061
11	Manure rate for P based plan ^{bb}	gal/acre	2745	0	2745	0
12	Manure N applied with P-based plan ^{cc}	lb/acre	136	0	136	0

Table 6. Application rates that will be carried over to page 3

13	Planned manure application rate ^{dd}	gal/acre	3847	0	3847	0
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When applicable, manure application rates must be based on the P index value as follows:

(0-2) N-based manure management.

(>2-5) N-based manure management but P application rate cannot exceed two times the P removal rate of the crop schedule.

(>5-10) Until December 31, 2008, P-based manure management while adopting practices to reduce P index to 5 or below.

(>10) No manure application until practices are adopted to reduce P index to 5 or below

85842227P6000; 18 (350.99 ac.)

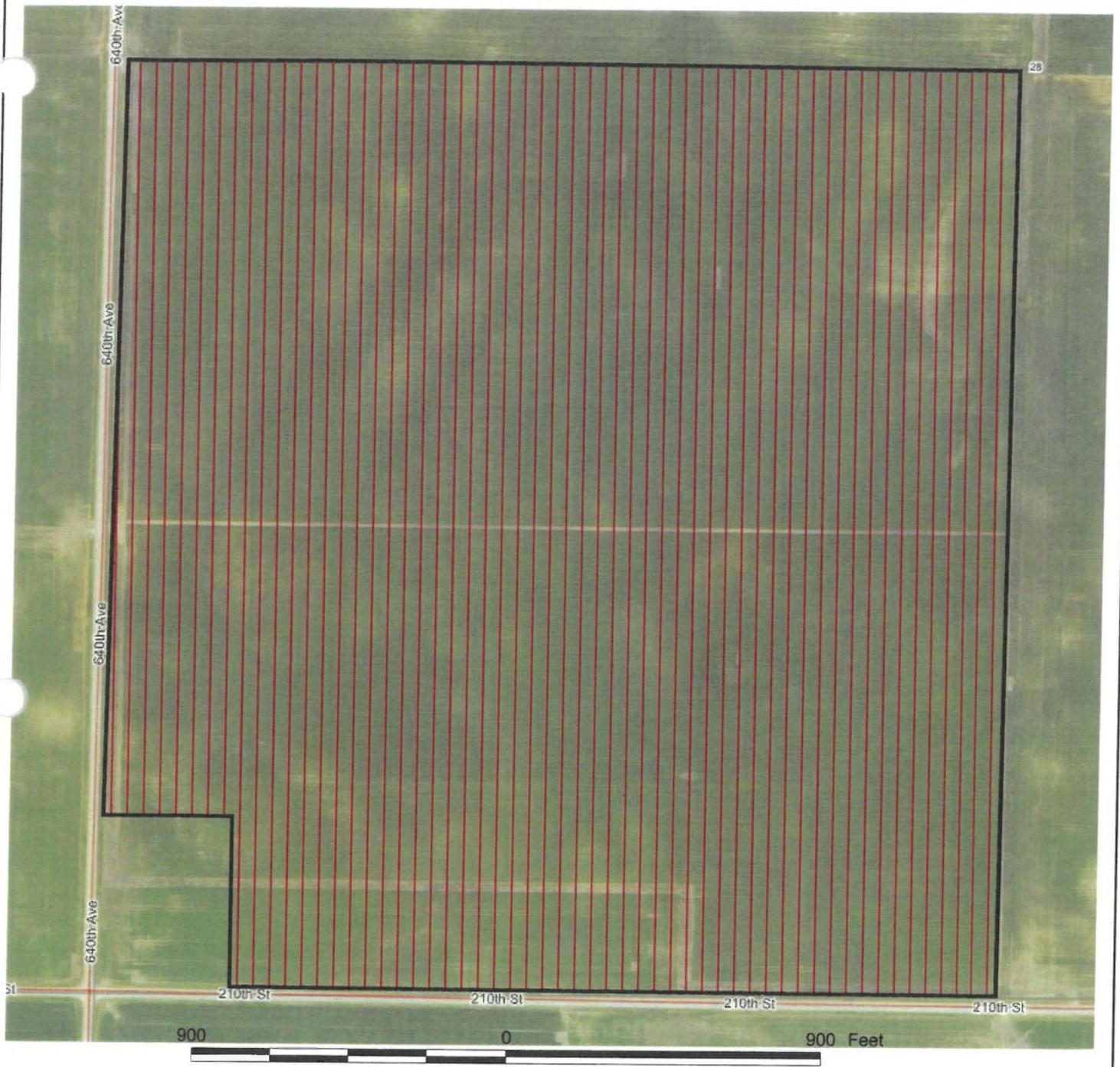


Date: Oct 4, 2018
Field Name: 85842227P6000; 18
Location: Story Co., Iowa, U.S.
Section 27, T84N, R22W
Farm Name: Richland 28
Client Name: P-Index
Total Acres: 350.99
Field Boundary Start Location:
Latitude: 42.06336917
Longitude: -93.39589009



 (351.0ac.) Field Boundary

85842228P3000; 18 (150.47 ac.)



Date: Oct 4, 2018
Field Name: 85842228P3000; 18
Location: Story Co., Iowa, U.S.
Section 28, T84N, R22W
Farm Name: Richland 28
Client Name: P-Index
Total Acres: 150.47
Field Boundary Start Location:
Latitude: 42.05625836
Longitude: -93.42250017



 (150.5ac.) Field Boundary

85842228P4000; 18 (141.08 ac.)



Date: Oct 4, 2018
Field Name: 85842228P4000; 18
Location: Story Co., Iowa, U.S.
Section 28, T84N, R22W
Farm Name: Richland 28
Client Name: P-Index
Total Acres: 141.08
Field Boundary Start Location:
Latitude: 42.05624374
Longitude: -93.41169522



 (141.1ac.) Field Boundary

85842229P4700; 18 (84.12 ac.)



Date: Oct 4, 2018
Field Name: 85842229P4700; 18
Location: Story Co., Iowa, U.S.
Section 29, T84N, R22W
Farm Name: Richland 28
Client Name: P-Index
Total Acres: 84.12
Field Boundary Start Location:
Latitude: 42.05630104
Longitude: -93.43097960



 (84.1ac.) Field Boundary



RUSLE2 Profile Erosion Calculation Record

Info: 85842227P6000

File: profiles\default

Inputs:

Location: USA\Iowa\Story County
 Soil: Story County, Iowa\138B Clarion loam, 2 to 6 percent slopes\Clarion Loam 85%
 Slope length (horiz): 98 ft
 Avg. slope steepness: 3.0 %

Management		Vegetation	Yield units	# yield units, #/ac
managements\CMZ 04\c.Other Local Mgt Records*CB North	vegetations\Corn, grain, high yield	bushels	222.00	
managements\CMZ 04\c.Other Local Mgt Records*CB North	vegetations\Soybean, mw 30 in rows	bu	64.000	

Contouring: a. rows up-and-down hill
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr
 Soil loss erod. portion: 1.3 t/ac/yr
 Detachment on slope: 1.3 t/ac/yr
 Soil loss for cons. plan: 1.3 t/ac/yr
 Sediment delivery: 1.3 t/ac/yr
 Crit. slope length: 98 ft
 Surf. cover after planting: -- %
 Avg. ann. forage harvest: 0 lb/ac

Date	Operation	Vegetation	Surf. res. cov. after op, %
10/25/0	Manure injector, liquid high disturb.30 inch		
4/12/1	Cultivator, field 6-12 in sweeps		75
4/15/1	Planter, double disk opnr w/fluted coultter	Corn, grain, high yield	52
10/30/1	Harvest, killing crop 50pct standing stubble		51
11/2/1	Chisel, st. pt.		88
4/25/2	Cultivator, field 6-12 in sweeps		66
4/28/2	Planter, double disk opnr w/fluted coultter	Soybean, mw 30 in rows	66
			69

10/2

Harvest, killing crop 30pct standing stubble

87

Iowa Phosphorus Index

Credits: Iowa State University
 USDA National Soil Tillage Laboratory
 USDA Natural Resource Conservation Service

Field Number	Gross Erosion				Erosion				Runoff				Tile / Subsurface Recharge				Overall	
	Erosion x	Sediment Trap Factor	SDR x	Buffer Factor	Enrichment Factor x	STP Factor	Erosion PI	RCN Factor x	STP Factor	P App Factor	Runoff PI	Flow Factor x	STP Factor	Tile/Sub PI	Recharge PI	Overall P	Index	
3584227P6000 --	1.30	1.00	0.06	1.00	1.10	0.84	0.08	1.32	0.22	0.09	0.40	1.00	0.07	0.07			0.55	

RUSLE2 Profile Erosion Calculation Record

Info: 85842228P3000

File: profiles\default

Inputs:

Location: USA\Iowa\Story County
 Soil: Story County, Iowa\138B Clarion loam, 2 to 6 percent slopes\Clarion Loam 85%
 Slope length (horiz): 98 ft
 Avg. slope steepness: 3.0 %

Management		Vegetation	Yield units	# yield units, #/ac
managements\CMZ 04c.Other Local Mgt Records*CB North	vegetations\Corn, grain, high yield	bushels		222.00
managements\CMZ 04c.Other Local Mgt Records*CB North	vegetations\Soybean, mw 30 in rows	bu		64.000

Contouring: a. rows up-and-down hill
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr
 Soil loss erod. portion: 1.3 t/ac/yr
 Detachment on slope: 1.3 t/ac/yr
 Soil loss for cons. plan: 1.3 t/ac/yr
 Sediment delivery: 1.3 t/ac/yr
 Crit. slope length: 98 ft
 Surf. cover after planting: -- %
 Avg. ann. forage harvest: 0 lb/ac

Date	Operation	Vegetation	Surf. res. cov. after op, %
10/25/0	Manure injector, liquid high disturb. 30 inch		
4/12/1	Cultivator, field 6-12 in sweeps		75
4/15/1	Planter, double disk opnr w/fluted coulters	Corn, grain, high yield	52
10/30/1	Harvest, killing crop 50pct standing stubble		51
11/2/1	Chisel, st. pt.		88
4/25/2	Cultivator, field 6-12 in sweeps		66
4/28/2	Planter, double disk opnr w/fluted coulters	Soybean, mw 30 in rows	66
			69

10/4

Harvest, killing crop 30pct standing stubble

87

Iowa Phosphorus Index

Credits: Iowa State University
 USDA National Soil Tilth Laboratory
 USDA Natural Resource Conservation Service

Field Number	Gross Erosion			Erosion			Runoff			Tile / Subsurface Recharge			Overall P Index		
	Erosion x	Trap Factor	Sediment	SDR x	Buffer Factor	Enrichment	STP Factor	Erosion PI	RCN Factor	x (STP Factor + P App Factor) =	Runoff PI	Flow Factor		STP Factor	Tile/Sub PI
85842228P3000 ..	1.30	1.00	1.00	0.05	1.00	1.10	0.80	0.06	1.32	0.17	0.09	1.00	0.07	0.07	0.47

RUSLE2 Profile Erosion Calculation Record

Info: 85842228P4000

File: profiles/default

Inputs:

Location: USA\Iowa\Story County
 Soil: Story County, Iowa\138B Clarion loam, 2 to 6 percent slopes\Clarion Loam 85%
 Slope length (horiz): 98 ft
 Avg. slope steepness: 3.0 %

Management		Vegetation	Yield units	# yield units, #/ac
managements\CMZ 04\c.Other Local Mgt Records*CB North	vegetations\Corn, grain, high yield	bushels	222.00	
managements\CMZ 04\c.Other Local Mgt Records*CB North	vegetations\Soybean, mw 30 in rows	bu	64.000	

Contouring: a. rows up-and-down hill
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr
 Soil loss erod. portion: 1.3 t/ac/yr
 Detachment on slope: 1.3 t/ac/yr
 Soil loss for cons. plan: 1.3 t/ac/yr
 Sediment delivery: 1.3 t/ac/yr
 Crit. slope length: 98 ft
 Surf. cover after planting: -- %
 Avg. ann. forage harvest: 0 lb/ac

Date	Operation	Vegetation	Surf. res. cov. after op, %
10/25/0	Manure injector, liquid high disturb. 30 inch		
4/12/1	Cultivator, field 6-12 in sweeps		75
4/15/1	Planter, double disk opnr w/fluted coulter	Corn, grain, high yield	52
10/30/1	Harvest, killing crop 50pct standing stubble		51
11/2/1	Chisel, st. pt.		88
4/25/2	Cultivator, field 6-12 in sweeps		66
4/28/2	Planter, double disk opnr w/fluted coulter	Soybean, mw 30 in rows	66
			69

10/2

Harvest, killing crop 30pct standing stubble

87

RUSLE2 Profile Erosion Calculation Record

Info: 85842229P4700

File: profiles/default

Inputs:

Location: USA\Iowa\Story County
 Soil: Story County, Iowa\107 Webster clay loam, 0 to 2 percent slopes\Webster Clay loam 85%
 Slope length (horiz): 82 ft
 Avg. slope steepness: 1.0 %

Management		Vegetation	Yield units	# yield units, #/ac
managements\CMZ 041c.Other Local Mgt Records*CB North	vegetations\Corn, grain, high yield	bushels		218.00
managements\CMZ 041c.Other Local Mgt Records*CB North	vegetations\Soybean, mw 30 in rows	bu		63.000

Contouring: a. rows up-and-down hill
 Strips/barriers: (none)
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 5.0 t/ac/yr
 Soil loss erod. portion: 0.59 t/ac/yr
 Detachment on slope: 0.59 t/ac/yr
 Soil loss for cons. plan: 0.59 t/ac/yr
 Sediment delivery: 0.59 t/ac/yr
 Crit. slope length: 82 ft
 Surf. cover after planting: -- %
 Avg. ann. forage harvest: 0 lb/ac

Date	Operation	Vegetation	Surf. res. cov. after op, %
10/25/0	Manure injector, liquid high disturb.30 inch		
4/12/1	Cultivator, field 6-12 in sweeps		75
4/15/1	Planter, double disk opnr w/fluted coultter	Corn, grain, high yield	52
10/30/1	Harvest, killing crop 50pct standing stubble		50
1/12/1	Chisel, st. pt.		87
4/25/2	Cultivator, field 6-12 in sweeps		66
4/28/2	Planter, double disk opnr w/fluted coultter	Soybean, mw 30 in rows	65
			68

10%

Harvest, killing crop 30pct standing stubble

87

Manure Application Lease/Fertilizer Consent Form

I Henry Land, LLC (Land Owner) give LongView Pork, LLC (Site Owner)

permission to apply manure from Richland 28 (Site Name) Site,

during calendar year 2018 and any succeeding year until canceled by written notice on

+/- 199 acres in the NE ¼ of Section 27 & SW ¼ of the NW ¼ of Section 26, T84N,

R22W, Richland Township, Story County

Pinnacle Field ID: _____

I as land owner, or operator, agree that I will apply any additional commercial or organic fertilizers according to current DNR Manure Management Plan requirements specified for the site listed above. I plan to apply 0 pounds of Commercial Nitrogen Fertilizer and 0 pounds of Commercial Phosphorus Fertilizer to this field (described above), which is 0 pounds of _____ (type of fertilizer). This application rate will remain in effect for calendar year 2018, and each succeeding year until amended or canceled by written notice.

Steve R. Henry, Mgr
(Land Owner)

LongView Farms by
Scott R. Henry
(Land Tenant/Operator)

Scott R. Henry
(Site Owner)

Manure Application Lease/Fertilizer Consent Form

I Henry Land II, LLC (Land Owner) give LongView Pork, LLC (Site Owner)

permission to apply manure from Richland 28 (Site Name) Site,

during calendar year 2018 and any succeeding year until canceled by written notice on

+/- 160 acres in the SE ¼ of Section 27, T84N, R22W,

Richland Township, Story County

Pinnacle Field ID: _____

I as land owner, or operator, agree that I will apply any additional commercial or organic fertilizers according to current DNR Manure Management Plan requirements specified for the site listed above. I plan to apply 0 pounds of Commercial Nitrogen Fertilizer and 0 pounds of Commercial Phosphorus Fertilizer to this field (described above), which is 0 pounds of _____ (type of fertilizer). This application rate will remain in effect for calendar year 2018, and each succeeding year until amended or canceled by written notice.

Steve R. Henry, Mgr
(Land Owner)

LongView Farms by
Scott R. Henry
(Land Tenant/Operator)

Scott R. Henry
(Site Owner)

Manure Application Lease/Fertilizer Consent Form

I Henry Land II, LLC (Land Owner) give LongView Pork, LLC (Site Owner)

permission to apply manure from Richland 28 (Site Name) Site,

during calendar year 2018 and any succeeding year until canceled by written notice on

+/- 184 acres in the SE ¼ & the E ½ of the SW ¼ of Section 28, T84N, R22W.

Richland Township, Story County

Pinnacle Field ID: _____

I as land owner, or operator, agree that I will apply any additional commercial or organic fertilizers according to current DNR Manure Management Plan requirements specified for the site listed above. I plan to apply 0 pounds of Commercial Nitrogen Fertilizer and 0 pounds of Commercial Phosphorus Fertilizer to this field (described above), which is 0 pounds of _____ (type of fertilizer). This application rate will remain in effect for calendar year 2018, and each succeeding year until amended or canceled by written notice.

Steve R. Henry, Mgr
(Land Owner)

LongView Farms by
Scott R. Henry
(Land Tenant/Operator)

Scott R. Henry
(Site Owner)

Manure Application Lease/Fertilizer Consent Form

I Henry Farms Corp. give LongView Pork, LLC
(Land Owner) (Site Owner)

permission to apply manure from Richland 28 Site,
(Site Name)

during calendar year 2018 and any succeeding year until canceled by written notice on

+/- 80 acres in the W 1/2 of the SW 1/4 of Section 28, T84N, R22W,

Richland Township, Story County

Pinnacle Field ID: _____

I as land owner, or operator, agree that I will apply any additional commercial or organic fertilizers according to current DNR Manure Management Plan requirements specified for the site listed above. I plan to apply 0 pounds of Commercial Nitrogen Fertilizer and 0 pounds of Commercial Phosphorus Fertilizer to this field (described above), which is 0 pounds of _____ (type of fertilizer). This application rate will remain in effect for calendar year 2018, and each succeeding year until amended or canceled by written notice.

Richard A. Henry, President
(Land Owner)

LongView Farms by
Scott R. Henry
(Land Tenant/Operator)

Scott R. Henry
(Site Owner)

Manure Application Lease/Fertilizer Consent Form

I Henry Farms Corp. (Land Owner) give LongView Pork, LLC (Site Owner)

permission to apply manure from Richland 28 (Site Name) Site,

during calendar year 2018 and any succeeding year until canceled by written notice on

+/- 85 acres in the N 1/2 of the SE 1/4 of Section 29, T84N, R22W.

Richland Township, Story County

Pinnacle Field ID: _____

I as land owner, or operator, agree that I will apply any additional commercial or organic fertilizers according to current DNR Manure Management Plan requirements specified for the site listed above. I plan to apply 0 pounds of Commercial Nitrogen Fertilizer and 0 pounds of Commercial Phosphorus Fertilizer to this field (described above), which is 0 pounds of _____ (type of fertilizer). This application rate will remain in effect for calendar year 2018, and each succeeding year until amended or canceled by written notice.

Robert D. Henry, President
(Land Owner)

LongView Farms by
Scott R. Henry
(Land Tenant/Operator)

Scott R. Henry
(Site Owner)

Manure Management Plan Form

Appendix A8: Iowa Ag Statistics County Corn and Soybean Yield Averages, 2013-2017

County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Adair	170	187	178	50	55	54
Adams	171	188	177	50	55	52
Allamakee	182	200	187	53	58	53
Appanoose	158	174	170	46	51	50
Audubon	190	209	198	55	61	58
Benton	190	209	197	55	60	57
Black Hawk	188	207	194	55	60	56
Boone	186	204	194	52	58	55
Bremer	192	211	200	55	61	57
Buchanan	191	210	197	54	60	56
Buena Vista	185	203	191	54	59	56
Butler	192	211	198	54	59	56
Calhoun	184	202	197	52	58	56
Carroll	187	206	200	55	60	58
Cass	184	202	190	54	60	57
Cedar	196	216	203	56	62	58
Cerro Gordo	186	205	192	53	58	56
Cherokee	200	220	205	61	67	62
Chickasaw	187	205	194	51	56	52
Clarke	147	162	152	43	47	45
Clay	187	206	192	54	60	57
Clayton	195	215	200	57	63	58
Clinton	200	220	203	58	63	59
Crawford	195	215	204	57	63	60
Dallas	183	201	192	52	58	55
Davis	154	169	166	45	50	47
Decatur	154	169	160	44	48	47
Delaware	195	215	200	58	63	60
Des Moines	190	209	196	55	60	57
Dickinson	180	198	185	52	57	54
Dubuque	201	221	205	58	63	58
Emmet	189	208	195	52	57	54
Fayette	191	210	196	55	60	56
Floyd	186	204	192	53	58	54
Franklin	191	210	198	54	59	56
Fremont	183	202	189	54	60	56
Greene	183	201	194	52	58	56
Grundy	196	215	200	59	65	60
Guthrie	176	194	188	52	57	55
Hamilton	182	200	194	51	56	55
Hancock	189	208	194	54	60	57
Hardin	189	208	197	54	59	55

Manure Management Plan Form

Appendix A8: Iowa Ag Statistics County Corn and Soybean Yield Averages, 2013-2017

(continued)

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County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Harrison	185	204	191	52	58	53
Henry	186	205	193	55	60	57
Howard	186	204	193	51	57	54
Humboldt	187	206	195	53	58	55
Ida	200	221	206	59	65	61
Iowa	197	217	205	53	59	56
Jackson	191	211	196	57	62	58
Jasper	194	213	202	55	61	58
Jefferson	175	193	183	48	53	50
Johnson	191	210	193	53	58	54
Jones	193	212	196	55	61	56
Keokuk	183	201	190	51	56	54
Kossuth	191	210	196	55	60	58
Lee	172	190	180	51	56	54
Linn	192	212	196	54	59	56
Louisa	189	208	197	54	59	57
Lucas	146	161	153	45	49	48
Lyon	197	217	203	60	66	62
Madison	168	185	175	50	55	52
Mahaska	186	205	191	52	58	54
Marion	178	196	183	51	57	53
Marshall	196	216	205	57	63	60
Mills	180	199	184	53	58	54
Mitchell	191	210	197	53	58	56
Monona	176	194	181	53	58	54
Monroe	162	178	173	47	52	52
Montgomery	177	195	183	52	57	54
Muscatine	187	205	194	56	62	58
O'Brien	201	221	206	60	66	61
Osceola	195	215	201	55	61	57
Page	176	194	182	52	57	54
Palo Alto	184	203	189	52	58	56
Plymouth	196	216	199	59	65	60
Pocahontas	188	207	195	53	58	56
Polk	182	201	192	51	56	54
Pottawattamie	192	211	197	56	61	57
Poweshiek	195	214	204	53	58	55
Ringgold	157	172	165	45	49	47
Wac	187	206	198	56	61	59
Scott	199	219	207	60	66	62
Shelby	197	217	201	56	62	58
Sioux	203	224	207	63	70	64

Manure Management Plan Form

Appendix A8: Iowa Ag Statistics County Corn and Soybean Yield Averages, 2013-2017 (continued)

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County	Corn			Soybeans		
	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)	5-yr. avg. yield (bu/ac)	5-yr. ave. yield + 10% (bu/ac)	Avg. yield of 4 highest (bu/ac)
Story	181	200	193	51	56	53
Tama	192	211	200	56	62	58
Taylor	164	180	170	48	53	51
Union	162	179	169	47	51	49
Van Buren	162	179	171	46	50	48
Wapello	171	188	176	48	53	50
Warren	171	188	177	49	54	51
Washington	195	214	204	55	61	57
Wayne	152	167	159	45	49	47
Webster	185	204	197	52	58	56
Winnebago	187	205	196	54	59	57
Winneshiek	190	209	194	53	59	55
Woodbury	190	209	196	55	61	57
Worth	185	203	193	53	58	55
Wright	189	208	194	52	58	55

The manure nutrient concentration varies considerably between animal species; dietary options; animal genetics; animal performance; production management and facility type; and collection, bedding, storage, handling, and agitation for land application. Use of average or "book" nutrient values can be helpful for designing a new facility and creating manure management plans but is not very helpful in determining specific manure nutrient supply or application rates due to wide variation in nutrient concentrations between production facilities. For example, a recent sampling across swine finishing facilities found a range in total N from 32 to 79 lb N/1,000 gal, P from 17 to 54 lb P₂O₅/1,000 gal, and K from 23 to 48 lb K₂O/1,000 gal. A similar or larger range can be found with other manure types. Nutrient analyses often vary greatly as storage facilities are empty or manure is stockpiled, and also among multiple samples collected from lots during land application. Therefore, collecting multiple manure samples and maintaining a history of analysis results will improve use of manure nutrients.

For determining manure application rates and equating to crop fertilization requirements, it is most helpful if manure analyses give N, P₂O₅, and K₂O based on an as-received or wet basis in lb per ton or lb per 1,000 gal units. It is beyond the scope of this publication to give detailed manure sampling and laboratory analysis

requirements. Those can be found in the extension materials listed on page 7. If manure analyses are provided from the laboratory in other units, they must be converted to these units. See the ISU Extension manure sampling publication for appropriate conversion factors. If manure average nutrient values or methods to estimate manure nutrient concentrations based on excretion are of interest or needed for planning purposes, those can be found in the Midwest Plan Service bulletins listed on page 7.

Manure Nutrient Availability for Crops
Nutrient management guidelines use the words "manure nutrient availability" when suggesting manure applications to supply nutrients needed by crops. However, the meaning of "availability" for manure nutrients often is not clear or is not consistent. Available is defined as present or ready for immediate use, or present in such chemical or physical form as to be usable (as by a plant). The main reasoning for using the term "available" in describing manure nutrients is that some portions are in forms that cannot be used by plants immediately upon application to soil and have to be converted to a form that plants can take up. The term "available" is not typically applied to fertilizers because most include chemical forms that plants can take up or are quickly converted upon application to soil. According to this definition, most inorganic fertilizers contain basically

100 percent crop-available nutrients. For example, anhydrous ammonia dissolves in water and rapidly changes to ammonium, urea hydrolyzes to ammonium within a few days, and nitrate by soil microorganisms. Monoammonium phosphate (MAP) and diammonium phosphate (DAP) are highly soluble in water and dissolve to ammonium and orthophosphate. Potassium chloride (KCl, potash) dissolves in water to potassium (K⁺) and chloride (Cl⁻) ions. Both orthophosphate and K ions are taken up by plants. Because all K contained in manure is in the K⁺ ionic form, manure K is readily crop available in all manure sources.

For manure N and P, there is usually a mix of organic and inorganic materials that varies among manure that is easily mineralized after applica-

sources, production systems, bedding, storage, and handling. This variety in forms of N and P in manure contributes to greater uncertainty in manure nutrient management compared with fertilizers. The ratio of inorganic (mainly ammonium) and organic N varies considerably with the manure source. This was shown, for example, by on-farm research that included manure sampling and analysis from swine and poultry operations. The fraction of total N as ammonium N was almost 100 percent for swine manure from the liquid portion of anaerobic lagoons, 65 to 100 percent (average 84 percent) for liquid swine manure from under-building pits or storage tanks, and 10 to 40 percent (average 20 percent) for solid poultry manure. The large ammonium-N concentration and organic-N fraction that is easily mineralized after applica-

tion varies among manure that is easily mineralized after applica-

tion varies among manure that is easily mineralized after applica-

tion varies among manure that is easily mineralized after applica-



Nutrients in Animal Manure
Manure can supply nutrients required by crops and replenish nutrients removed from soil by crop harvest. Since manure contains multiple nutrients, applications should consider not only what is needed for the crop to be grown but also how the ratio of nutrients in manure could affect soil test levels. This ensures adequate nutrient supply and reduces potential for over- or under-application and subsequent buildup or depletion in the soil. Good manure nutrient management should consider short-term and long-term impacts on crop nutrient supply and soil resources.

Manure has characteristics that make nutrient management different, and sometimes more complicated than fertilizer. These include a mix of organic and inorganic nutrient forms; variation in nutrient concentration and forms; variation in dry matter and resultant handling as a liquid or solid; and relatively low nutrient concentration requiring large application volumes. Since manure nutrient composition can vary significantly, sampling and laboratory analysis are always needed, while with fertilizer nutrient concentrations are provided at a guaranteed analysis.

Using Manure Nutrients for Crop Production

retention by soil mineral constituents for P. Nutrient loss issues are not as pertinent for P and K as for N in Iowa soils as long as there is little soil erosion and surface runoff.

The immediate or long-term fate of plant usable nutrients in soil can be similar for manure and fertilizer. However, variation in manure nutrient concentration, application rate, and application distribution affect nutrient supply and contribute to increased uncertainty with manure management. Application rate and distribution uncertainties affect all applied nutrient sources but are more difficult to manage with manure than with fertilizer. With careful manure sampling, pre-application nutrient analysis, study of nutrient history, and calibration of application equipment, reasonable manure nutrient application rates can be achieved. Due to material characteristics, and sampling and analysis variability, field distribution and application rate variability often is greater for dry manure sources.

These supply issues can be important for N, P, and K, although typically are of greater concern with N. There are several reasons, including manure usually is applied for corn production where N supply is critical, many Iowa soils have optimum or higher P and K test levels where need for and response to P and K is much less than with N, and crop deficiency symptoms and yield loss resulting from nutrient supply problems are more obvious for N.

Manure nutrient loss, application rate, and distribution uncertainties usually are not included in crop nutrient availability estimates. Instead, they are handled by suggested management practices. Not all published guidelines are consistent in this regard and, therefore, suggested crop nutrient availabilities do vary between states and regions. In this publication, use of "availability" refers to manure nutrients potentially available for plant uptake (with no losses) by the first crop after application or beyond, and percent nutrient availability values provided correlate to those for commonly used fertilizers. The guidelines in this publication assume supply issues are handled in the best way possible as is done with fertilizers.

It is important to understand that for successful manure nutrient management, in many instances supply issues are as, or more, critical than estimates of nutrient availability.

Improving crop nutrient supply with manure can be achieved by understanding the issues related to manure nutrient analysis, application rate, nutrient distribution, and the benefits and risks related to management practices such as application timing and placement that influence potential losses. Additionally, use of available tools to determine initial soil nutrient levels and adjust application rates can help provide for adequate season-long nutrient supply when either manure or fertilizer is used. These tools include commonly used pre-plant soil testing for P and K, estimates of N application rate need based on response trial data (such as

the Corn Nitrogen Rate Calculator) and tools to help determine need for additional N after planting, corn such as the late-spring soil nitrate test and in-season crop sensing for N stress.

Manure Nutrient Application Recommendations

To determine manure application rates, the following information is required: needed crop nutrient fertilization rate for N, P, K, or other deficient nutrients; manure type; nutrient analysis; nutrient crop availability; and method of application. Nutrient recommendations for crops are provided in other Iowa State University Extension publications and are not repeated here (see list on page 7).

Using Manure Nutrients for Crop Production

Once the needed nutrient application rate is determined, the manure rate to supply crop available nutrients is calculated based on the specific manure source being used.

An additional consideration is what portion of the needed fertilization will be supplied from manure—to meet the full crop nutrient requirement, or a partial requirement from manure and the remaining from fertilizer. This is an important consideration because manure contains multiple nutrients and a manure rate to supply the most deficient nutrient can over-supply other nutrients. Also, manure application to meet the least deficient, or most environmentally restrictive nutrient application can result in under-supply of other nutrients.

In these cases, use of fertilizers in addition to manure application is necessary to appropriately meet all nutrient application requirements.

Manure Nutrient Availability Values

Many of the manure N, P, and K crop availability estimates listed in Table 1 are derived from research trials conducted in Iowa. However, when local research is lacking, applicable information was taken from research conducted in other states. For manure sources not listed in the table, values based on manure with similar characteristics can provide a reasonable estimate.

First Year Availability Estimates

Table 1. First-year nutrient availability for different animal manure sources.

Manure Source	Percent of Total Nutrient Applied	
	Nitrogen ¹	Potassium ²
Beef cattle (solid or liquid)	30-40	60-100
Dairy (solid or liquid)	30-40	60-100
Liquid swine (macrobi pig)	90-100	90-100
Liquid swine (macrobi hogpen)	90-100 ³	90-100 ³
Poultry (all species)	30-60	90-100

¹The estimates for N availability do not account for potential available N losses during and after land application. Correction factors for volatile acid, bedding type and amount, and both sampling and analysis.

²The ranges in P and K availability are provided to account for variation in sampling and analysis, and for needed P and K supply with different soil test levels. A small portion of manure P may not be available immediately after application but all P is eventually available over time. Use lower P and K availability values for soils testing in the Very Low and Low soil test interpretation categories, where lower yield loss could occur if insufficient P or K is applied and a reasonable building is desirable. Use 100% when manure is applied to maintain soil-test P and K in the optimum soil test category, when the probability of a yield response is small.

³Values apply to the liquid portion of some manure in lagoons; the N and P availability will be less and difficult to estimate with settled solids.

Manure Nutrient Supply

There is a clear difference between crop availability of nutrients in fertilizer or manure and season-long supply of nutrients. Significant amounts of plant usable forms of nutrients in both fertilizer and manure might be lost and become unavailable to crops after application. For example, N can be lost through processes such as leaching, volatilization, or denitrification while P can be lost through erosion and surface runoff. Also, these nutrients can be converted for short or long periods of time into forms not usable by plants through processes such as immobilization to organic materials for N and

Using Manure Nutrients for Crop Production

Second- and Third-Year Availability Estimates

While manure N may become crop available over multiple years for some sources, there should not be an expectation that all of the manure N will eventually become crop available. This happens because some of the N is in difficult to degrade organic forms (recalcitrant) and will become part of the soil organic matter. For some manure sources, such as with bedded systems, not all of the manure N should be accounted for in manure plans over multiple years and the first-, second-, or third-year availability may not add up to 100 percent.

Animal manure that has considerable organic material can have some residual-N availability in the second or third year after application. The second-year N availability estimate for beef cattle and dairy manure is 10 percent

Adjusting for Manure Nitrogen Volatilization

The estimates for manure N availability in Table 1 do not consider potential volatile N losses during or after application. Losses are from various volatile N compounds in manure, such as ammonia, and ammonia that is produced when urea, uric acid, or other compounds convert to ammonium. These are similar losses that can occur from some N fertilizers such as anhydrous ammonia, urea, and urea-ammonium nitrate (UAN) solutions. If manure is left on the soil surface, losses may occur until N is moved into the soil with rainfall or incorporated with tillage. Many factors affect the rate and amount of volatile loss, such as temperature, humidity, rainfall, soil moisture, soil pH, surface residue cover, and days to incorporation.

Volatile losses at or after application often are difficult to predict accurately. However, losses can be significant, and, therefore, it is important to make an adjustment for volatile N losses from applied manure and for manure management planning purposes. Values given in Table 2 provide guidance on potential volatile losses. The correction factors in Table 2 do not account for N losses during storage and handling (time from excretion to sampling for analysis) and assume a reasonable time period from sampling to land application so that the manure analysis represents the manure being applied. To estimate manure N remaining in soil after application, multiply the applied manure N rate by the appropriate correction factor.

Using Manure Nutrients for Crop Production

Table 2. Correction factors to account for N volatilization losses during and after land application of animal manure.

Application Method	Incorporation	Volatilization Correction Factor ¹
Direct injection	—	0.98–1.00
Broadcast (liquid/solid)	Immediate incorporation	0.95–0.99
Broadcast (liquid)	No incorporation	0.75–0.90
Broadcast (solid)	No incorporation	0.70–0.85
Irrigation	No incorporation	0.60–0.75

¹Adapted from *Manure Management Handbook*, MN PS-18. Final Edition. Nitrogen losses during and within 140 days of application.

²Multiply the manure total N rate applied times the volatilization correction factor to determine the portion of total manure N remaining.

Considerations for Time of Application

The time of application influences nutrient availability and potential manure and nutrient loss from soil. Fall applications allow more time for organic N and P portions of manure to mineralize so they are available for plant uptake the next crop season. This is more important for N in manures with high organic matter content, such as bedded systems. Iowa research has shown that fall versus springtime P and K application usually is not an agronomic issue for fertilizers or manure. The increased time for organic N mineralization with fall application also allows for nitrification

of ammonium and therefore more potential nitrate loss through leaching or denitrification with excessively wet spring conditions. This is a more important issue for manure with large ammonium-N concentration, such as liquid swine manure. Coarse-textured soils, with high permeability, are the most likely to have leaching losses. Fine- and moderately fine-textured soils, prone to excess wetness, are most likely to have denitrification losses. Manure applied in the spring has less time for organic N and P mineralization before crop uptake. Delayed mineralization can be an important issue for manure with high organic matter content, especially in cold springs. With manure that

remains a large portion of N as ammonium, spring application allows for better timing of nitrification to nitrate and subsequent crop use, and less chance of N loss.

As a general rule, do not apply manure in the fall unless the soil temperature is 50° F and cooling at the four-inch soil depth. This will slow the mineralization and nitrification processes and is an especially important consideration for manure containing a large portion of N as ammonium.

Broadcasting manure onto frozen, snow-covered, water-saturated soils increases the potential for nutrient losses with rainfall or snowmelt runoff to surface water systems. If manure must be applied in these conditions, it should be applied on relatively flat land, slopes less than 5 percent, and well away from streams and waterways (see Iowa Department of Natural Resources rules on setback distances).



Using Manure Nutrients for Crop Production

Example Calculation of Manure Application Rates

Note: The N, P, and K fertilization requirements in these examples are determined from appropriate extension publications and Web-based tools listed at the right.

Example 1

- Manure source: liquid swine manure finishing under-banding pit

Manure analysis: 40 lb N/1,000 gal, 25 lb P₂O₅/1,000 gal, 35 lb K₂O/1,000 gal

Intended crop: corn in a corn-soybean rotation

Soil tests: 10 ppm Bray P-1 (pphm), 102 ppm Ammonium Acetate K (Low) (pphm)

Crop yield and P and K removal for determining nutrient rates needed to maintain the optimum soil test category: 200 bushels corn yield, 75 lb P₂O₅/acre and 60 lb K₂O/acre

Manure rate based on corn N fertilization requirement at 125 lb N/acre

Manure application: injectable, full

Manure nutrient availability: 100 percent for N, P and K

Manure N volatilization correction factor: 0.98

Manure rate: 125 lb N/acre ÷ 40 lb N/1,000 gal × 0.98 = 3,125 gallons/acre

Manure available P and K nutrients applied: 3,125 gallons × 25 lb P₂O₅/1,000 gal × 1.00 = 781 lb P₂O₅/acre, and 3,125 gallons × 35 lb K₂O/1,000 gal × 1.00 = 1,100 lb K₂O/acre

Phosphorus and K applied with the manure are adequate for P, slightly more than expected corn removal, and will supply more than needed K. The extra P and K can be used by the next crop and should be accounted for. However, additional P and K will need to be applied for the following soybean crop.

Example 2

- Manure source: solid layer manure, P₂O₅/ton, 54 lb K₂O/ton

Intended crop: corn-soybean rotation

Soil tests: 18 ppm Bray P-1 (pphm), 140 ppm Ammonium Acetate K (Low)

Manure rate based on P requirement for the crop: 120 lb P₂O₅/acre

Manure application: far, full, incorporated after four days

Manure nutrient availability: 55 percent for N, 100 percent for P and K

Manure N volatilization correction factor: 0.80

Manure rate: 120 lb P₂O₅/acre ÷ (60 lb P₂O₅/ton × 1.00) = 1.7 tons/acre

Manure available N and K nutrients applied: 1.7 tons/acre × 72 lb N/ton = 122 lb N/acre, and 1.7 tons/acre × 54 lb K₂O/ton = 92 lb K₂O/acre

Corn N fertilization used and K needed for the corn and soybean crops with a low soil test category: 130 lb N/acre, and 172 lb K₂O/acre

Crop available N and K applied with manure is not adequate for N, need additional 70 lb N/acre, and applied K is not adequate for the corn and soybean crops, need additional 80 lb K₂O/acre (172 - 92 lb K₂O/acre) from fertilizer

Using Manure Nutrients for Crop Production

Summary

- Carefully manage the nutrients in animal manure as you would manage fertilizer.
- Have representative manure samples analyzed to determine nutrient concentration. At a minimum, samples should be analyzed for moisture (dry matter) and total N, P, and K. For additional information on N composition, samples can be analyzed for ammonium. Maintain a manure analysis history for production facilities.
- Set the manure application rate according to crop fertilization requirements and for the crop availability of manure N, P, and K.
- Adjust manure rates for estimated N volatilization.

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