Request for Clarification and Justification for DNR Responses to Veysey Written Comments. *Submitted to DNR by Steve Veysey, 05/06/2021*

I appreciate that DNR has collated verbal and written comments submitted with regard to the Supreme Beef NMP application and has in some instances provided partial responses. However, in many cases the DNR response is incomplete, inaccurate, or lacking scientific or technical foundation. I submit this detailed request for clarification, justification, and all work product information pertaining to DNR's response to the 17 specific issues raised in my comments.

03/08/2021 ISSUE 1-4. The applicant is not reporting N&P correctly, etcetera.

As DNR points out, the purpose of public comments is to delve into specific issues pertaining to the NMP and compliance with Iowa Code and Iowa Administrative Code requirements. Neither IC or IAC ever require nutrient mass balance based upon <u>concentration</u>. IAC 65 specifically requires mass balance based upon manure N&P <u>content</u>.

04/02/2021 DNR Response: *"The commenter correctly states that DNR regulations require use of table values for both nutrient concentration and manure production".*

05/05/2021 SV response to DNR: This is totally incorrect. **I state exactly the opposite.** "Concentration" tables are a construct of DNR which for standard situations may help with completing NMP and MMP applications, when used correctly. They are not necessary and do not even exist in the Iowa Administrative Code. IAC tables describe manure N&P <u>content</u>, and excretion <u>amounts</u>. The "concentration" tables DNR include in their MMP appendix are mathematically derived from the IAC content and excretion tables. Use of "concentration" table values for estimating annual N&P production, rather than the use of the IAC Manure Content table values is <u>only scientifically valid when coupled with the precise excretion volume tables from which the concentration tables were derived.</u> That's global. If you use values from other sources, the content and/or concentration and/or volume numbers must all come from the same exact scenario. You cannot mix and match. That is a major point of my ISSUE 1 discussion. Here is what I actually state in ISSUE 1 about the correct use of "content" vs the use of "concentration"

> *IAC 65.17(5) a. [Part 1] To determine the nitrogen available to be applied per year, the factors in Table 3, "Annual Pounds of Nitrogen Per Space of Capacity," multiplied by the number of spaces shall be used. To determine total phosphorus (as P2O5) available to be applied per year, the factors in Table 3a, "Annual Pounds of Phosphorus Per Space of Capacity," multiplied by the number of spaces shall be used.*

This could not be clearer. Annual pounds of N &P per cow per year, multiplied by number of cows, gives the proper value of total N&P content that must be considered in the NMP calculations. Manure N&P "concentrations" (lbs/1000 gal) are NOT to be used in calculating the total amount of N &P. In fact, Chapter 65 does not even include nutrient concentration tables!

I am concerned that DNR staff preparing the response to ISSUE1 may not fully understand the difference between manure nutrient "content" and "concentration". In the responsiveness summary they seem to use the terms interchangeably when they are not at all the same. It is the N&P <u>content</u> of the manure that must be accounted for in the Nutrient Management Plan. Knowing the concentration is only valuable

to the person calibrating the manure spreader in the fall so that the correct amount (pounds of N&P) is applied to each field.

> *If I have 100 jellybeans and put them into a small cup, the content is 100 beans, but the concentration is high; I crammed all those beans into one small cup. If I put the 100 beans into my bathtub, the content is still 100 beans, but the concentration is much lower. For clarity, we must all be careful not to conflate the words "content" and "concentration", and "concentration" can never be used without linkage to the precise total volume scenario under which concentration was determined.*

Another attempt to explain the nutrient mass balance flaws in the SB NMP

Set aside for the moment how the manure will be stored, and whether losses of N&P may be occurring though chemical conversion, adsorption, or denitirification. I'll come back to that.

Cows within a certain size range (i.e., 900 pounds) excrete an average amount of manure (feces plus urine) per day, and that manure has an average content (i.e. moles, pounds, kilograms) of N&P. We must agree on this basic fact in order to have a productive dialogue. The "as-excreted" values are equal to or greater than the values of 95 lbs/yr N and 59 lbs/yr P (as P2O5) listed for basin-stored or deep-pit stored liquid manure. "As-excreted" manure has not been diluted, and there has been no immediate out-gassing, or denitrification. The "deep pit liquid" values can at least be used as the minimum N&P content.

Compare that with the table values of 132 lbs/yr N and 66 lbs/yr P for solid manure. The content is different, but not because water has evaporated. There is no N or P in water. It is because the two constituents of manure, feces and urine, each have different N&P content, and solid manure is mostly feces. You will also note that the volume of manure per cow per day is listed as 6.5 gallons for "deep-pit – liquid, basin formed or earthen". This is also a reasonable estimate of "as-excreted" volumes, but manure volume is not relevant at this point for determining the annual N&P content that must be accounted for. **The tables already provide the value of pounds of N &P per cow per year.** Just multiply by the number of cows! I raise this point because you will see in the IAC tables, values for N&P content that are lower for "liquid, anaerobic lagoon stored". But note that the daily volume is listed as more than double. Clearly cows do not know or care whether their excrement is stored "as-excreted" in a deep pit or diluted with lots of water and stored in a large anaerobic lagoon. Their poop regimen will not change. The "liquid, anaerobic lagoon stored" table values do not purport to represent "as excreted" values. Those anaerobic lagoon table entries may represent "as-applied" values for that type of operation, but as DNR has stated, this is not the case for SB. We will explore that further in a moment.   To work through this, we have to start with reasonable "as-excreted" N&P content numbers. So let's start from there.

95 lbs N /cow/year x 11,600 cows = 1,102,000 pounds of N per year.
59 lbs P(as P2O5) /cow/year x 11,600 cows = 684,400 pounds of P (as P2O5) per year.

IAC 65 cited above clearly requires that the annual N&P content be estimated by multiplying N&P produced per cow per year by the number of cows. That is yearly content multiplied by # of cows.   The applicant's calculations do not use content Table values OR content values from the Upper Iowa Beef test results.   He uses a concentration value from Upper Iowa Beef, which we know is a much-diluted sample since the water content is about 98 %.   One would expect it to be 92% if this were anything approaching a "liquid-deep pit formed or earthen storage" sample representative of "as-excreted" minimums. But to arrive at "content", he then combines those low concentration values with the Table volume value for

"liquid deep pit formed or earthen storage" representative of "as-excreted" minimums. You just cannot do that. It is a scientific non-sequitur.

> *Let's say you have a bathtub full of jellybeans and you need to know the total number of beans you have. You take a sample and determine there are 100 beans per cup. Wonderful. Does that tell you how many jellybeans you have? Unless you know how many cups equals a tub, you still have no idea. But let's say you have a friend who stores jellybeans in a bowl. And he knows that five cups equal one bowl. Does that let you say that your full bathtub contains 5 x 100 = 500 beans? Of course not! That may be how many beans he has, but clearly your bathtub is much bigger than his bowl, so it's NOT how many beans you have.*

The applicant is claiming concentrations (not content) from the Upper Iowa Beef sample, probably taken from a large, dilute lagoon, and combining with near "as-excreted" volume values from the Tables and using the product as if it represents actual <u>content</u> numbers that are necessary to calculate annual N&P production. His calculations equate to:

25.0 lbs N /cow/year x 11,600 cows = 290,000 pounds of N per year.
9.96 lbs P/cow/year x 11,600 cows = 115,536 pounds of P per year.

We KNOW that 11,600 cows excrete about 1,102,000 pounds of N per year and about 684,400 pounds of P per year. The applicant is claiming that when spreading time comes, there will only be 290,000 pounds of N and 115,536 pounds of P in the basin to dispose of.

What happened to the remaining 812,000 pounds of N and 568,864 pounds of P ???

The responsiveness summary does not address this issue correctly, and in several instances presents false flags as possible explanations. Yet this is really the central and critical question. Are there enough acres in the plan to receive the annual N&P nutrients? The DNR response to ISSUES 1-4 contains many confusing and inaccurate statements, some of which I present and address below.

DNR: *However, due to the unique nature of the Supreme Beef operation, the DNR does not have an appropriate table value for N and P concentration of the manure.*

SV: You don't need to know concentration; you need to know content.

DNR: *In the absence of an appropriate table value for nutrient concentration, or available manure nutrient content and production values from a similar operation, the DNR has determined that the values provided by Supreme Beef are reasonable for determining nutrient concentration/manure amount.*

SV.   Respectfully, if you believe there are no relevant Table values and no relevant values from a similar operation, ***upon what basis do you conclude that values provided by Supreme Beef are reasonable?*** You can only reach that conclusion if you definitively account for the missing 812,000 lbs of N and 568,864 lbs of P. Where is it?

DNR: *Likewise, the DNR recognizes that there are few, if any, facilities in the State that are configured like Supreme Beef.*

SV: Exactly what are the configuration issues pertaining to Supreme Beef that are so unique? This has never been clear to me. Supreme Beef is claiming that the content of "as-applied" manure will be similar to the content of clear effluent from a settled lagoon, while claiming that the volume excreted per cow per day and stored in the basin will be similar to that of confinement liquid deep-pit storage. Both cannot be true. It is my understanding, that the manure is initially collected in 10' deep pits and then transferred to the polyethylene-lined, 30 ft deep basin for storage. Correct? The basin is decidedly not designed to operate as an anerobic digester.

Recent email correspondence with DNR supports my understanding that agitation will be used prior to loading the manure transport tanks, with the intent of creating a homogenous slurry that will allow removal of manure for transport and injection as "liquid manure". Because the basin is polyethylene lined, manure may never be completely removed, instead it will be partially removed at different times of the year as the basin fills and as acres become available. Fine. Except that all RUSLE2 documents only include fall injection.

I am assuming that the minimal solids left behind after agitation cannot be scrapped out of the basin and land-applied because of the polyethylene-lined nature of the basin. The NMP deals just with liquid manure that will be injected, therefore there is no plan to allow solids to settle, remove liquids, then somehow remove and land-apply solids. Based upon my current understanding, the ONLY way to account for the missing 1,380,000+ pounds of nutrients is through some loss of N due to bacteria-induced chemical conversion to ammonia or bacteria-induced denitrification releasing N2 gas. There is no leaching into soil, the basin is lined with impenetrable plastic. There is no chemical or physical mechanism by which a significant amount of P can volatilize.

To what extent does ammonia conversion or denitrification releasing N2 gas account for the missing 819,000 pounds of N? The basin has decidedly <u>not</u> been designed or constructed to efficiently function as an anaerobic digestion lagoon. As stated above, NEITHER of these processes can account for the missing 568,864 pounds of P. Volatile forms of P include phosphine (extremely toxic), and some phosphides. I have not read any literature suggesting that phosphorous volatilizes from manure in significant amounts via either chemical pathway. NOTE: The initial forms of N and P in the manure (especially N) can chemically convert to compounds that might be less crop available. But that is already dealt with by claiming only 50% N availability in year 1 and only 65% N availability in total. It has no bearing on calculating the initial manure N and P content, which is where we see the discrepancy of more than 1,380,000 pounds of N&P.

DNR: *DNR believes that the manure handling system for the facility is more similar to a confinement operation. Therefore, the DNR believes that the facility's manure production calculations using the DNR table value of 6.5 gallons/space/day for a beef confinement facility is appropriate.*

SV: Yes. But using the 6.5 gal/space/day "excrement volume" paired with the inexplicably low Upper Iowa Beef "concentration" numbers leads to the discrepancy of 812,000 lbs of N and 568,864 lbs of P per year as explained above. **You state that it all seems reasonable to you, so you must have an explanation for the missing 1,380,000+ pounds of N&P.   Please provide this explanation.   This is the central question.]**

DNR: *Supreme Beef used a manure sample from Upper Iowa Beef as an estimate of the manure nitrogen and phosphorus concentration.*

SV: As has been discussed *ad nauseum.* nutrient concentration numbers without a total-volume number from the same source cannot be used to calculate nutrient content, which is the requirement of IAC 65. Why can't Upper Iowa Beef provide you with the manure volume contained in the deep-pit, basin or lagoon from which the tested manure sample was taken? **Failure to provide that information should have resulted in DNR immediately rejecting the concentration numbers, since they are meaningless without the actual volume numbers pertaining to the sampling site.**

DNR: *DNR researched facilities in the State that would be expected to have a similar nutrient content and found that manure testing conducted at these facilities showed a similar N and P concentration to the estimates provided by Supreme Beef.*

SV: We have seen no evidence of DNR's research efforts in this regard. Not in DNRs responsiveness summary or as addendum or attachments to the responsiveness summary, or as response to any of the three Open Records requests submitted since the initial August 2020 NMP. Please provide all of the details regarding this effort. You correctly refer to "nutrient content" but then refer to "similar N and P concentration" without referencing the final volume of effluent per cow per day in the deep-pit, basin, or lagoon relevant to those concentration numbers. As we have discussed *ad nauseum-squared*, one without the other is meaningless.

DNR: *In addition, the N & P concentration in the storage structure at Supreme Beef will be further decreased by the addition of runoff water from the unroofed production areas.*

SV: False flag. As has been discussed, concentration is not relevant to the calculation of amount of N &P produced per year that must be apportioned to field acres at agronomic rates. That's not what IAC requires. A relevant issue is whether all of the N&P is still present in the deep-pit, basin, or lagoon, at time of removal for spreading, but if the applicant claims it will not be present, where has it gone? Rainwater neither adds or removes N&P from the deep-pit, basin, or lagoon. The addition of rainwater will change the "as-applied" concentration which is relevant only to the person operating the manure spreader. The pounds of N&P to be applied to each field, which is the essence of the agronomic application issue, does not depend on the concentration of those nutrients either as-excreted or as-applied. The correct spreading rate does depend upon an accurate concentration measurement of what is being put into the transport tank at time of application, but that is a different issue, one which I covered in detail in my original written comments.

DNR: *However, it should be noted that Table A4 lists the N and P concentration for cattle manure in a liquid pit but not an earthen basin as is being used by Supreme Beef. The swine finisher manure concentrations in the same table show N and P table values for earthen storage are about 40% less than the concentration for the same manure in pit storage. A similar reduction from the N & P table values is expected for the liquid beef manure stored in the Supreme Beef basin.*

SV: False flag. This statement by DNR is simply incorrect. First, as has been explained *ad nauseum-cubed,* IAC requires the use of Tables A2, and 3 (which are exact copies of IAC 65 Appendix tables 3, 3a) or similar, to establish nutrient **content**. Once expressed in pounds per cow per year, it is multiplied by number-of-cows to arrive at the facility annual production of N&P that must be accounted for. This is how the law states it shall be done. It is incorrect to use Table A4 for this purpose, a table not contained in IAC 65 but simply derived for convenience by DNR from Tables A1, A2, and A3, tables identical to IAC 65 Appendix tables 3, 3a, and 5. Second, DNR Tables A1, A2, and A3 (from which DNR derives Table A4 – not the reverse as claimed by the DNR responder) specifically use exactly the same numbers for "Liquid,

DNR: *…the NMP is based on manure application rates that are significantly below the maximum allowable rates calculated with the assumed N & P values.*

DNR: *…the approved NMP shows over 30% more land than is needed to apply all the manure at agronomic rates, which again makes the acquisition of additional application fields not needed if the manure content is above the assumed values in the NMP.*

03/08/2021 **ISSUE 5. Fields not having "Correct Soils Test for P" must be excluded**

04/02/2021 **DNR Response:** DNR considers this an expansion of an original approved submittal. Fields with single-point P-tests are grandfathered in for one year until correct grid-sampled P-tests are obtained. They rationalize that *"Supreme Beef's submittal is for an expansion in the number of animals at the facility; it is an original NMP submittal."*

05/05/2021 **SV response to DNR:** The owners, either as Walz Energy or Supreme Beef, have been submitting NMP's for this facility since December of 2018. This is either the fourth or fifth submittal. There has been plenty of time for the applicant to obtain correct grid-sampled P-tests for all the fields. As a matter of record, an "original NMP" was approved on October 6 for this facility. DNR is simply ignoring the clear language of IAC 65.17(17) *e*. Furthermore, the owners of Supreme Beef do not consider this NMP to be an "expansion of an existing operation". They state so explicitly in their application, not just in the 02/01/2021 document, but also in two subsequent requested and corrected documents submitted to DNR on 03/22/2021, and 04/02/2021.

This manure management plan is for: (check one)
x existing operation, not expanding ___ existing operation, expanding ___ existing operation, new owner ___ new operation

Construction and Expansion Dates: 2017 ___ date of initial construction
_____ _____ _____ and date(s) of all expansion(s)

     From 02/01/2021 NMP Page 1.

This manure management plan is for: (check one)
x existing operation, not expanding ___ existing operation, expanding ___ existing operation, new owner ___ new operation

Construction and Expansion Dates: 2017 ___ date of initial construction
_____ _____ _____ and date(s) of all expansion(s)

     From 03/22/2021 NMP Page 1.

This manure management plan is for: (check one)
x existing operation, not expanding ___ existing operation, expanding ___ existing operation, new owner ___ new operation

Construction and Expansion Dates: 2017 ___ date of initial construction
_____ _____ _____ and date(s) of all expansion(s)

     From 04/02/2021 NMP Page 1.

03/08/2021   ISSUE 6. RUSLE2 calculations for four fields (PLU's) use incorrect Dominant Critical Area Soil.

04/02/2021   DNR Response: The issue was found to be valid for three of the fields, but not the fourth.

05/05/2021   SV response to DNR: Upon careful inspection of the defining language in NRCS ITN 29, I agree with DNR.

03/08/2021   ISSUE 7. All RUSLE2 management plans are the same and deficient.

04/02/2021   DNR Response: Written affidavits were requested and received from all the landowners that "tillage practices" in the RUSLE2 records were correct and complete.

05/05/2021   SV response to DNR: Respectfully, there are still discrepancies. DNR has confirmed by email that they anticipate that the basin will be partially emptied, and manure will be spread in both fall and spring. However, all management plans only include fall application. In addition, the NMP P.2 calculations all show that commercial N fertilizer in the range of 100 – 155 lbs/acre will be applied annually on every field. But the RUSLE2 management plans DO NOT include a tillage step for the application of commercial fertilizer, even after the landowners have reviewed the management plans with the applicant's agent (Ms. Becky Sexton) and signed affidavits attesting to the RUSLE2 management plans. How does one square this circle? One way would be if the manure as delivered and spread has a much greater N & P content than the applicant claims. Then no additional commercial N would be needed, and the RUSLE2 attestation would be correct. But if that is the case, the amount of P spread would be in HUGE excess.

03/08/2021   ISSUE 7. All P-index calculations ignore ephemeral and classical gully erosion.

04/02/2021   DNR Response: DNR acknowledges the validity of the issue. Ephemeral and classical gully components must be included with rill and interrill erosion determined from RUSLE2, to provide the Total Erosion factor for use in the P-Index calculation. DNR then asserts that:

> *However, inclusion of ephemeral gully erosion in the P index requires an in-field measurement and because ephemeral gullies are not apparent year-round, they are often not apparent at the time of plan submittal and therefore are not included in P index calculations. If the ephemeral gullies are apparent at the time of plan submittal, they must be included in the P index calculation.*

05/05/2021   SV response to DNR: This is pure poppycock. NRCS ITN 25, the IAC rule-referenced document for calculating P-Index, requires the inclusion of ephemeral gully erosion. It states:

> *Ephemeral gullies, and classical gully erosion are determined by the Gully Erosion procedures outlined in section I-C-3 of the FOTG.* [The NRCS eFOTG].

I've read that protocol. I've received training on how to implement that protocol from the same organization that trains DNR staff, NRCS staff, and Technical Service Providers. The protocol provides an annual estimate of ephemeral gully erosion, not a one-time spot check. In the course of my work this past year on the project "Protecting Outstanding Iowa Waters", I have reviewed more than twenty NE Iowa NMPs and MMPs encompassing approximately 200 different fields with individual RUSLE2 and P-Index calculations. In not a single instance has the applicant included ephemeral or classical gully erosion in the Total Erosion factor used in the P-Index calculation. Not once. This is a clear example of DNR refusing to require applicants to just simply follow the law.

03/08/2021   ISSUE 9. The P-Index Sediment Delivery Ratio (SDR) is incorrectly low in numerous cases.

04/02/2021   DNR Response: *DNR reviewed SDR values for all fields and found that Supreme Beef's measurements were accurate.*

05/05/2021   SV response to DNR: Due to a shift in spreadsheet cells during my calculations, some of the distance values listed in Table 8 of my written comments, and therefore SDR values, are correlated with the wrong fields. These corrections have been sent to DNR previously (05/04/21). However, in their 04/02/2021 response DNR states they have verified the applicants SDR values for ALL fields in the NMP, not just the eight fields I listed (with some inaccuracies) in Table 8.

I have spent considerable time rechecking distances based upon what I believe is the scientifically correct and defensible protcol for determining field centers and distances to closest down-slope intermittent or perennial streams. This is the protocol required by NRCS ITN 25, the IAC rule-referenced document to be used for P-Index calculations. In the new "Table 8" presented here, I have included thirteen fields where the distance difference ranges from 114% to 2580%. More importantly, due to the nature of how factors multiply within a specifc term of the P-I calculation, I have included a column "SDR factor effect on Erosive PI term". For the 13 fields listed, these range from 1.18 to 2.20. The actual increase in the erosive PI term from that claimed by the applicant will depend upon the value of the Gross soil loss factor.

Based upon DNR's reponse that <u>all values were checked and are correct</u> and the large differences I list in Table 8, it is clear that someone is NOT using the protocol I consider to be scientificlly correct for determining SDR factor values. **This needs to be clarified.**

Corrected Table 8 - Field to Stream Distances

Designation	Dist_NMP_back_calc_ft	GIS Precise	Distance Difference %	PI_SDR	PI_SDR corrected	SDR factor effect
Carlson - Farmersburg 5	2000	82	2339	0.42	0.92	2.19
Costigan - School House Bottom	400	109	267	0.62	0.86	1.39
East 120	2600	97	2580	0.40	0.88	2.20
Goedken East	1600	583	174	0.44	0.56	1.27
Goedken West	2600	701	271	0.40	0.54	1.35
Home x Scneiders	1600	529	202	0.44	0.58	1.32
June's	1500	700	114	0.45	0.54	1.20
Koether - Giard 34	3200	870	268	0.38	0.51	1.34
Koether - Giard 35	2600	763	241	0.40	0.53	1.33
Meiers	750	96	681	0.53	0.88	1.66
North Harness	2900	1350	115	0.39	0.46	1.18
Schutte South	2600	351	641	0.40	0.64	1.60
Walt and Elmer's	2900	1160	150	0.39	0.48	1.23

ITN 25 states on page 3:

> *Sediment delivery ratio (SDR) is derived from Figure 1 and Figure 2. The data adapt the use of SDR from watersheds to individual fields by transforming area to <u>linear distance from the center of the field to the nearest perennial, or intermittent channeled stream downslope,</u>* (emphasis added).

This requires two determinations. First, the field center must be determined.

Finding field centers

In the NMP, boundaries are clearly presented for each listed field. These are classic "polygon" representations. Mathematically the geometric center is found using the formula (from Wikipedia):

"The **centroid** or **geometric center** of a plane figure is the arithmetic mean position of all the points in the figure. Informally, it is the point at which a cutout of the shape could be perfectly balanced on the tip of a pin."

Of a polygon [edit]

The centroid of a non-self-intersecting closed polygon defined by n vertices (x_0,y_0), (x_1,y_1), ..., (x_{n-1},y_{n-1}) is the point (C_x, C_y),[19] where

$$C_x = \frac{1}{6A} \sum_{i=0}^{n-1}(x_i + x_{i+1})(x_i\,y_{i+1} - x_{i+1}\,y_i), \text{ and}$$

$$C_y = \frac{1}{6A} \sum_{i=0}^{n-1}(y_i + y_{i+1})(x_i\,y_{i+1} - x_{i+1}\,y_i),$$

and where A is the polygon's signed area,[19] as described by the shoelace formula:

$$A = \frac{1}{2} \sum_{i=0}^{n-1}(x_i\,y_{i+1} - x_{i+1}\,y_i).$$

In these formulae, the vertices are assumed to be numbered in order of their occurrence along the polygon's perimeter; furthermore, the vertex (x_n, y_n) is assumed to be the same as (x_0, y_0), meaning $i+1$ on the last case must loop around to $i = 0$. (If the points are numbered in clockwise order, the area A, computed as above, will be negative; however, the centroid coordinates will be correct even in this case.)

Fortunately, ArcGIS mapping software includes the tools to determine the geometric center of polygon features. Unfortunately, "on-line" mapping services like Google Earth or the DNR AFO Siting Atlas, or the Iowa Geographic Map Server (IGMS) do not. Nor does the NRCS on-line Web Soil Survey mapping program. I have a desktop copy of desktop ArcGIS 10.8 which has been used for this project. I previously created a "point feature" layer showing the approximate center locations of all 45 fields listed in the NMP. These were used in my original written comments to measure field-center-to-stream distances using the inherent GIS "measure" tool.

Extending that effort, polygon features have now been created for 20 of the 45 fields where my initial distance measurements were quite different from the applicant (and apparently DNR's) measured distances. The field soil maps and other field images in the NMP were more than adequate for this purpose.

Determining field centers is done within the "attributes table" for the created polygon fields layer. X and Y columns are added to the table. The "calculate geometry" tool is used sequentially in "X coordinates of centroid" and "Y coordinates of centroid" modes to provide UTM coordinates of field geometric centers. NOTE: there is an alternate may to quickly get the center of polygon features, but it is not as accurate if the polygon is L-shaped or U-shaped.

Field-center UTM coordinates were then used to draw linear line features to the nearest intermittent or perennial stream downslope. The measure tool was then used to document the distances.

Using the proper "stream centerlines" coverage

I discussed this necessity in my written comments. Virtually all stream-centerline coverages used in on-line GIS map programs derive from the USGS EPA National Hydrography Dataset (NHD). The full NHD dataset provides the quintessential location, extent, and classification of flowing surface waters as perennial, intermittent, or ephemeral. Within the attribute table for the dataset, the following Fcode values can be found for every stream segment presented:

- Fcode = 46000   feature type only; no attributes
- Fcode = 46003 Hydrographic category – intermittent
- Fcode = 46006 Hydrographic category – perennial

- Fcode = 46007 Hydrographic category –ephemeral

For most regulatory mapping purposes, knowing the boundaries of the <u>perennial</u> stream segment is important, and often debated. Perennail stream segments have aquatic life that must be protected; intermittent and ephemeral streams do not. So, although all stream centerline coverages originate from the USGS EPA NHD files, most are modified in some way to better serve their intended purpose. This often invloves removing some or all of the intermittent stream segments. For example, the excellent stream centerline layer available in IGMS (and discussed in my original written comments) has been modifed for specific purposes:

> *"Small stream centerlines were developed for a dual purpose. The first was to be used to create hydrography for the Iowa DNR's statewide floodplain mapping project in accordance with the Rebuild Iowa Advisory Commission's 120-Day report to the Governor in November of 2008. The second was to be used to conflate data from the National Hydrography Dataset (NHD) to a more accurate resolution stream network in order to be consistent with the already existing NHD framework. For this reason, streams start at 24 acres of flow accumulation where there is a visible channel in the surface of a Digital Elevation Model (DEM) based on the State of Iowa's LiDAR collection. This linework was the basis for creating hydrologically corrected DEMs that were used to determine the one square mile starting point for modeling flood plains, per FEMA standards and specifications. The linework has been collected using the State of Iowa's Statewide LiDAR product as the main determination for flow as this surface was used when carrying out Iowa's Statewide Flood Plain Mapping Project. In cases where LiDAR was insufficient for capture, aerial photography from various years for the State of Iowa was referenced. The NRCSs Eight-Digit Hydrologic Unit boundaries (HUC8) is the Federal Emergency Management Agencies (FEMA) specified unit of study for flood plain mapping designations. Rather than studying by county, FEMA realized that more accurate products resulted from considering an entire HUC8 and gave a more complete look at what contributed/minimized flood damage. Therefore all data was initially compiled into HUC8s, then further compiled into this statewide dataset."*

As another example, the "surface water" layer found in the AFO Siting Atlas is much less complete with respect to intermittent stream segments. A side-by-side comparison example of this was included in my previous written comments.

The ITN 25 P-Index Calculation protocol is different. Distance from the field center to the nearest <u>intermittent</u> stream must be measured and used in the calculation. The rationale is simple. The erosive term of the P-Index calculates the phosphous attached to soil particles that moves with the soil as runoff during significant rain events. During significant rain events intermittent streams will have plenty of flowing water to move the phosphorous to perennial stream segments where aqautic life will be impacted in various manners by high phosphorous concentrations.

The "stream centerlines" coverage I am using in this analysis is the full USGS EPA NHD file for Iowa avaialble through the USGS portal and downloadabe in zip form as NHD_H_Iowa_State_Shape. It's a very large file. The total number of features is such that it presents as three shapefiles. These files were then clipped to the counties in Field Office 1, which includes Clayton County.

Presented below are maps for the 13 fields listed in the revised Table 8. Information for the stream segments are included as well as the distance measurement results. You will note that Fcodes indicate that all stream segments are either intermittent or perennial. The geometric field center is represented by the beginning of the measure line.
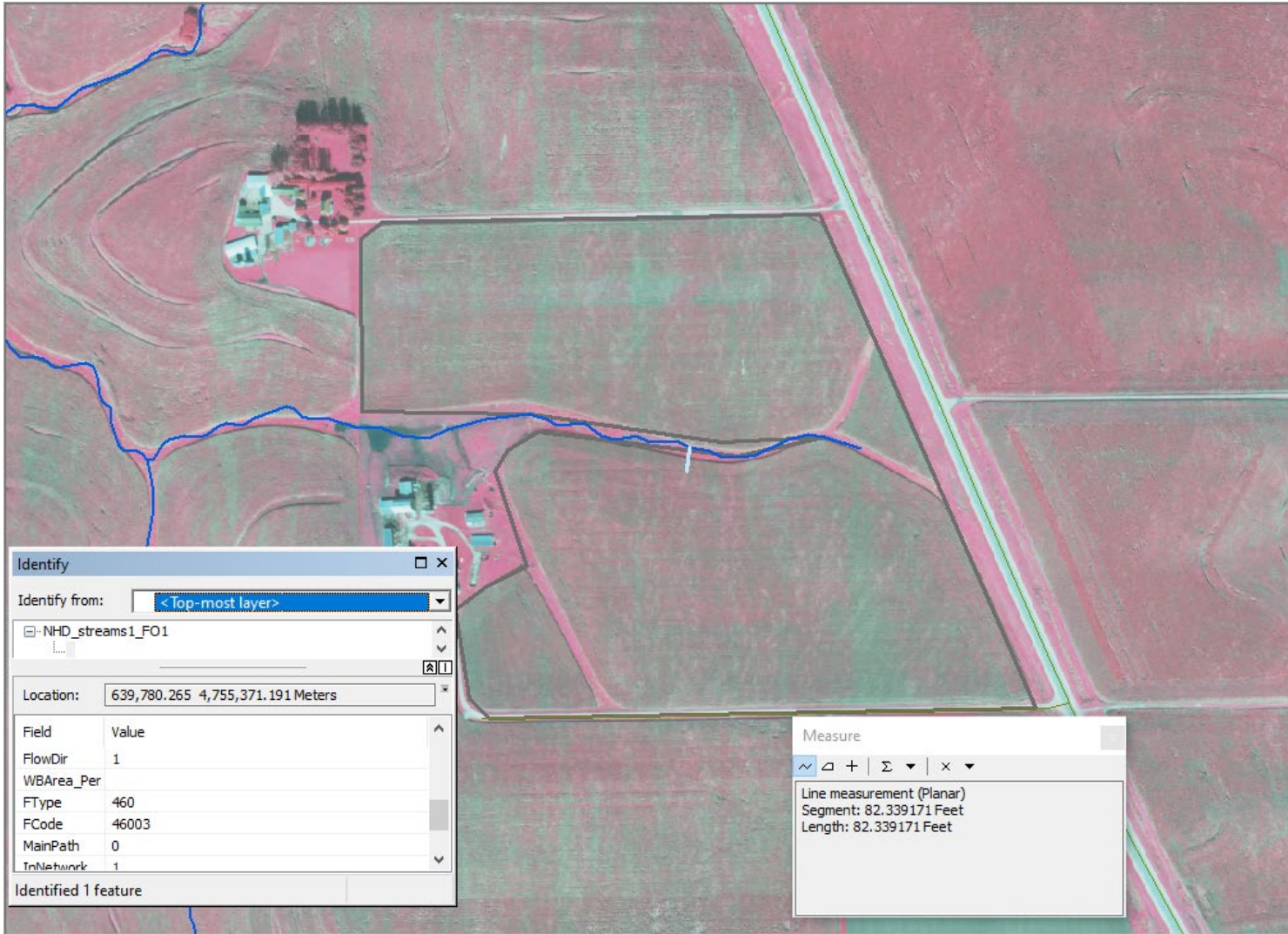
Carlson - Farmersburg 5. Distance from field center to stream is 82 feet. True SDR = 0.92. Applicant claims distance is ~2000 feet with SDR = 0.42.
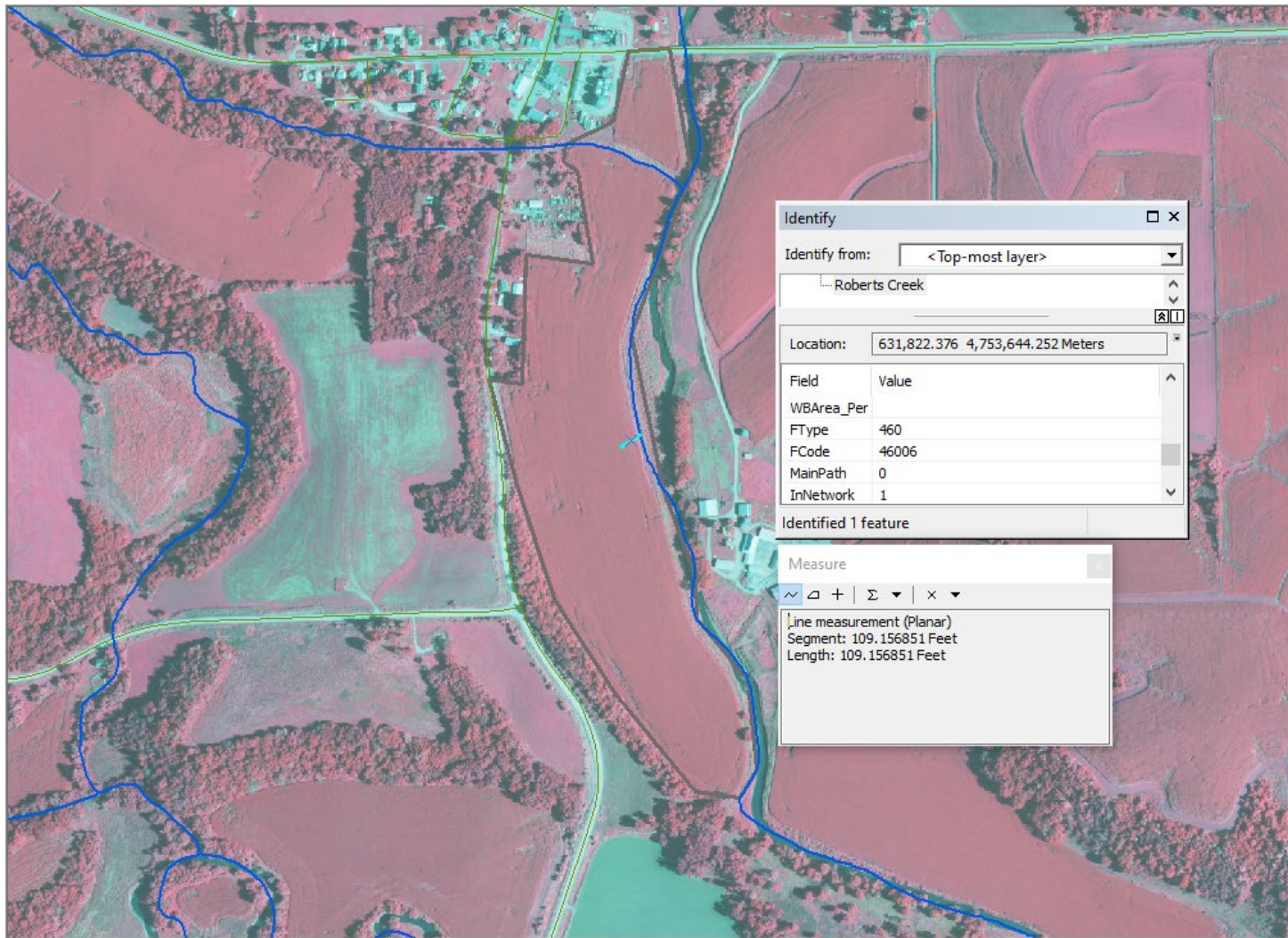
Costigan School House bottom. Distance from field center to Roberts Creek is 109 feet. True SDR = 0.86. Applicant claims distance is ~400 feet with SDR = 0.62.
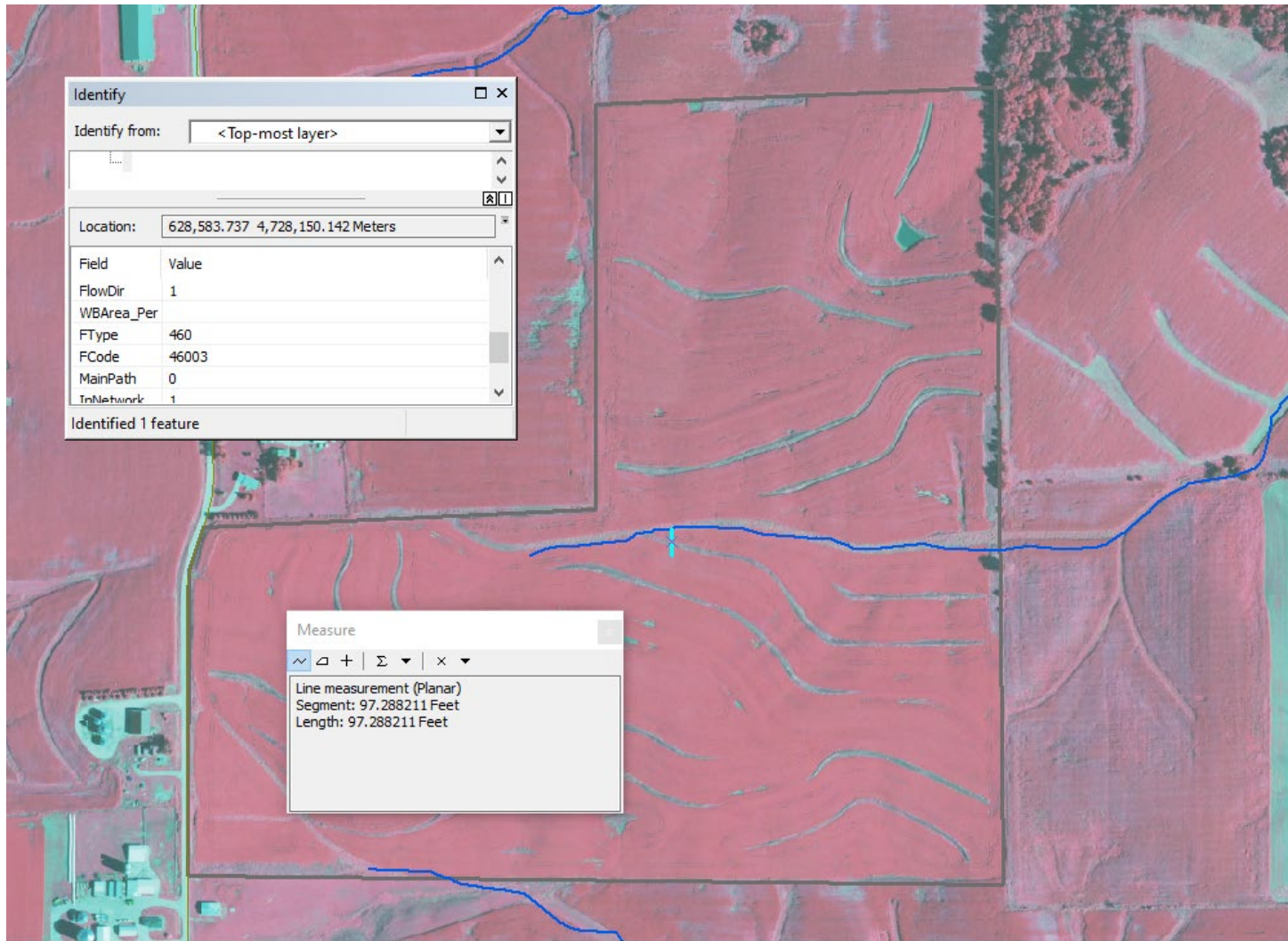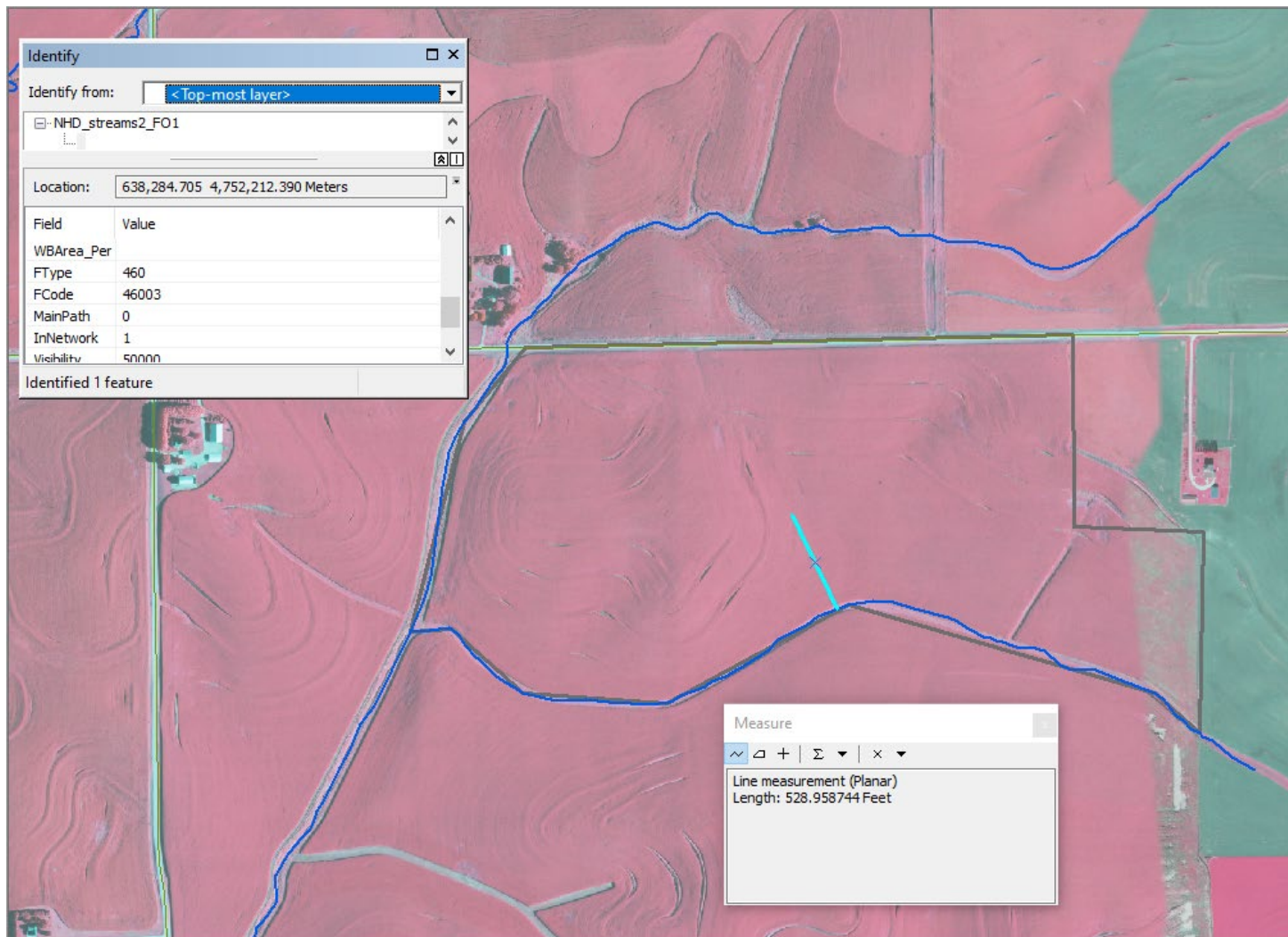
East 120. Distance from field center to stream is 97 feet. True SDR = 0.88. Applicant claims distance is ~2600 feet with SDR = 0.40.
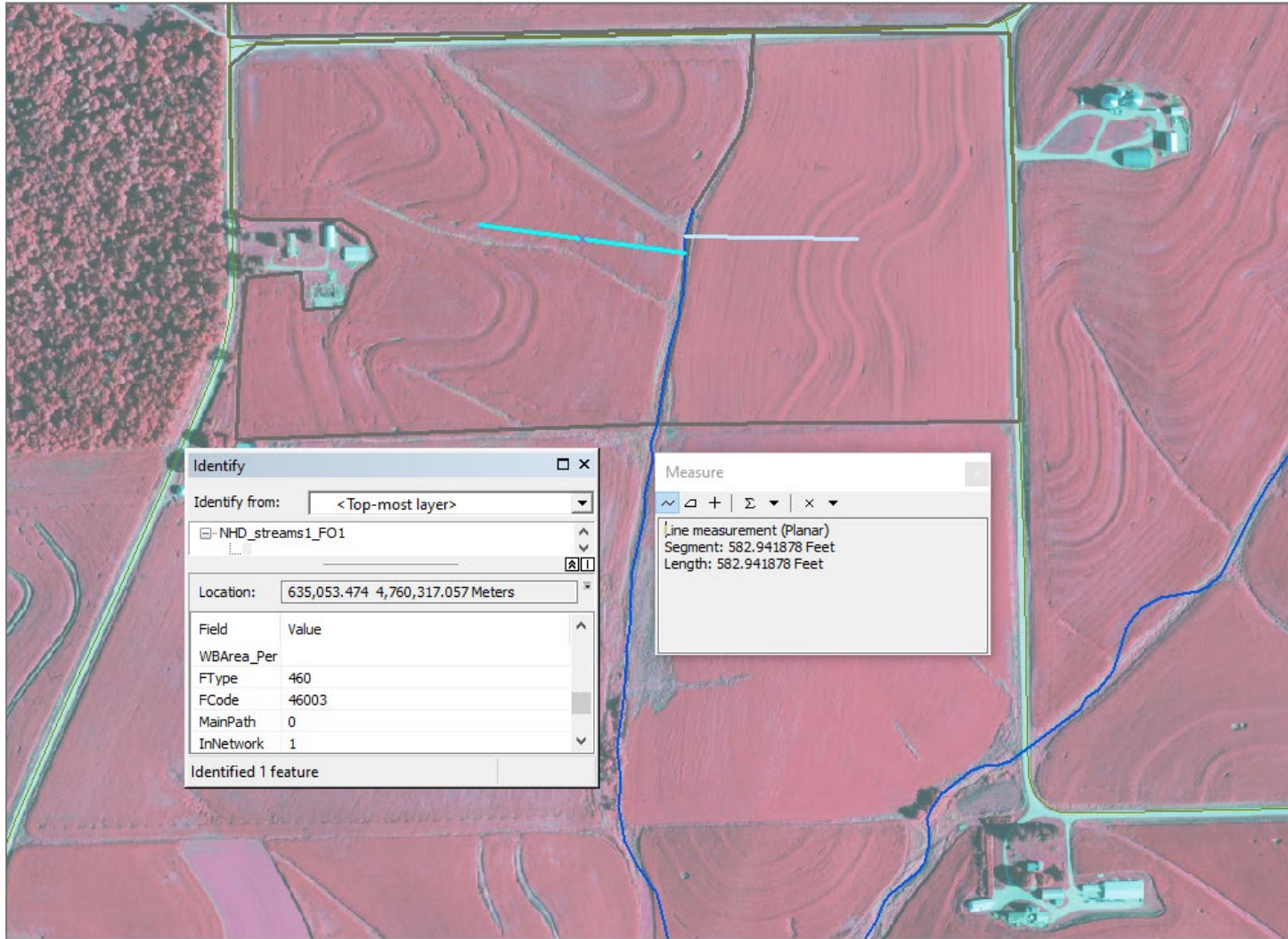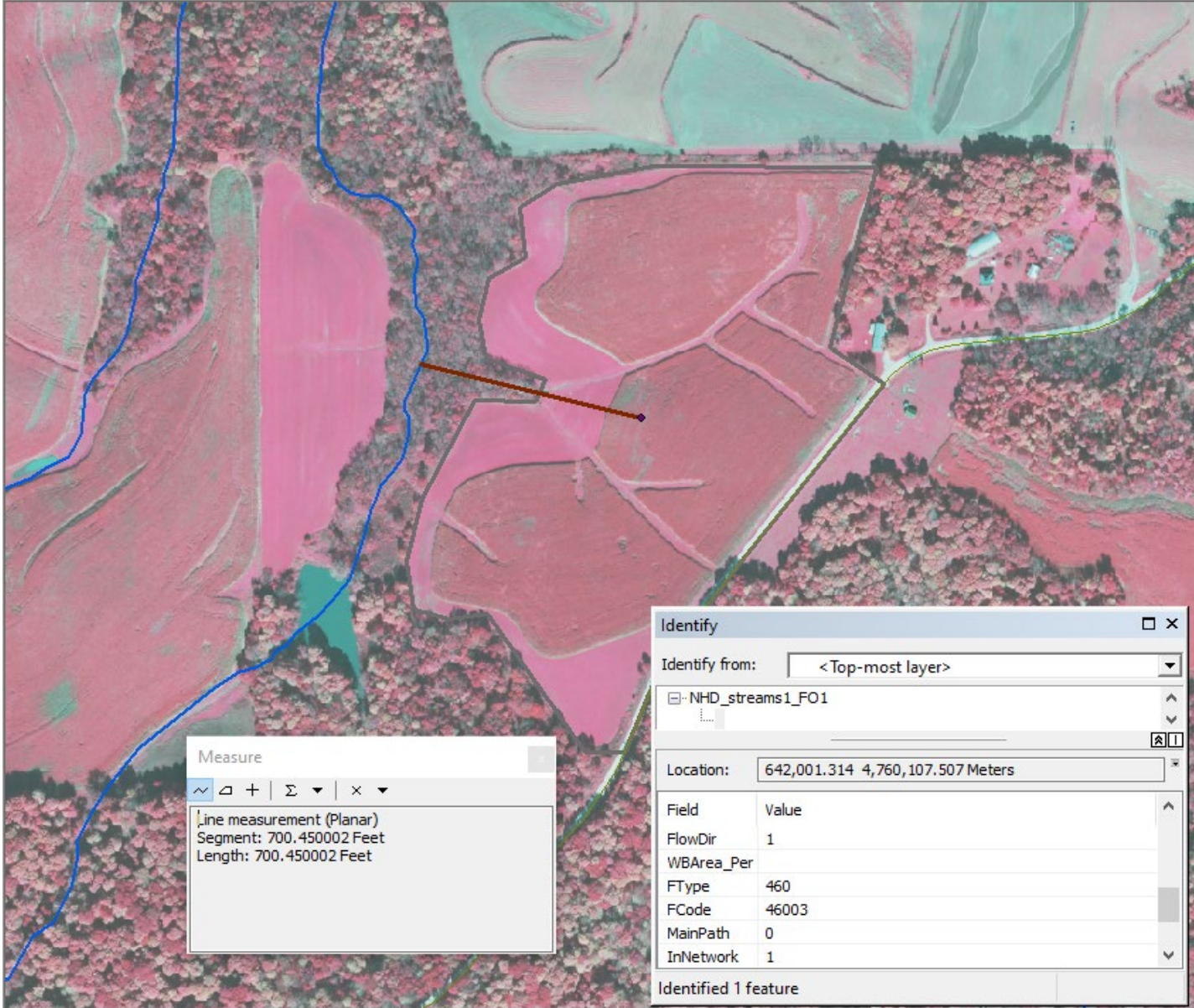
Goedken East. Distance from field center to stream is 583 feet. True SDR = 0.56. Applicant claims distance is ~1600 feet, with SDR = 0.44.
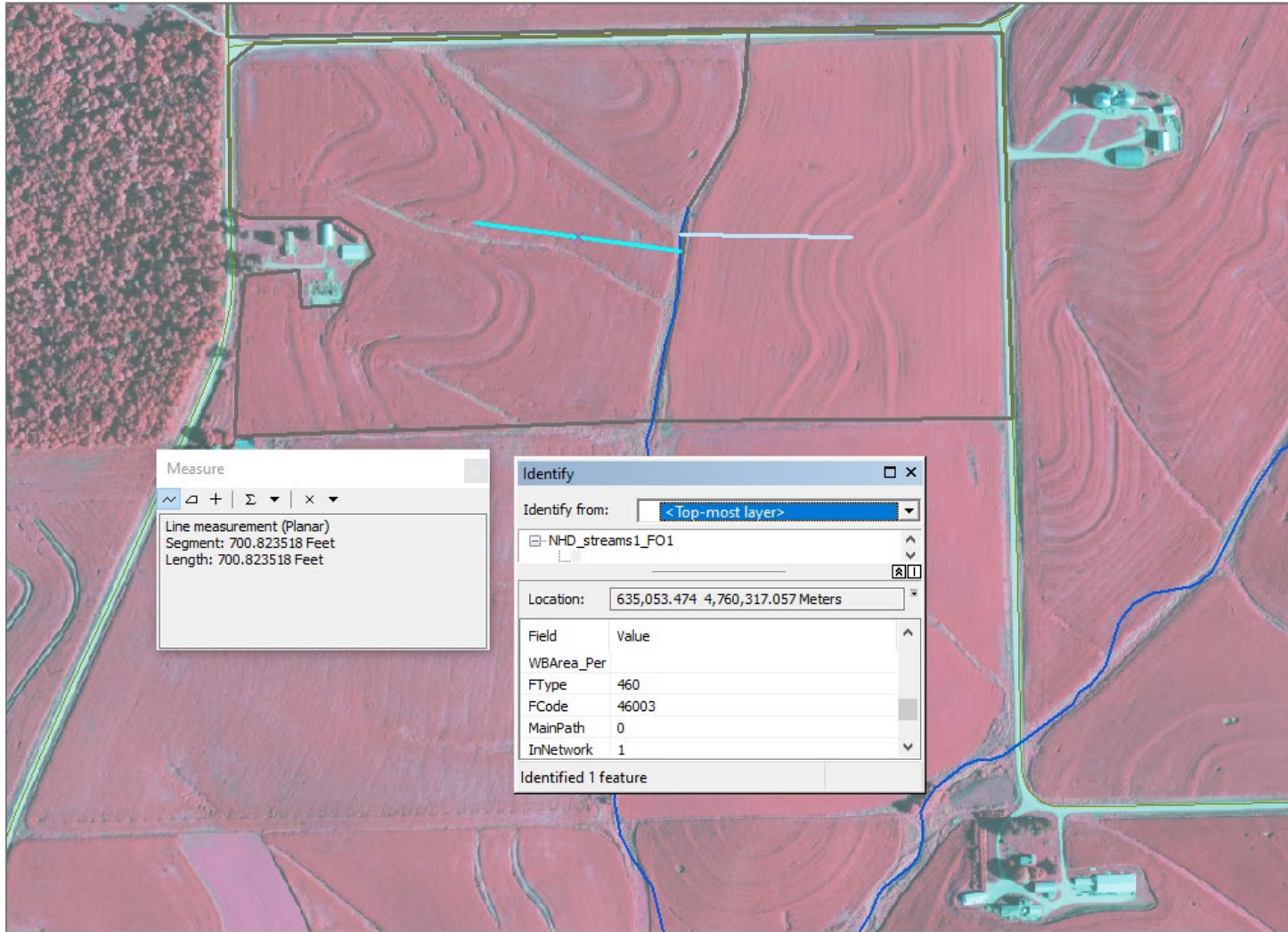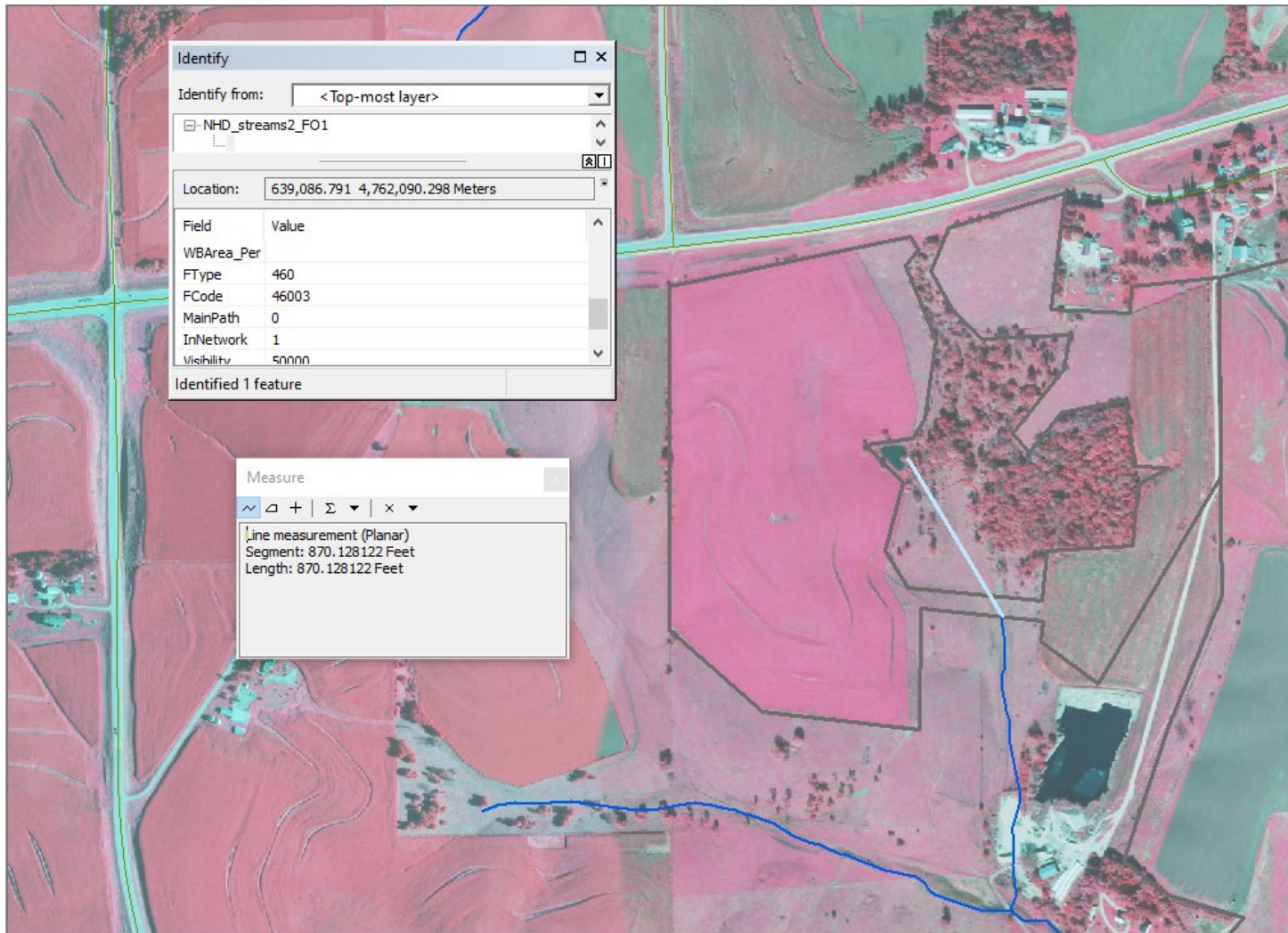
Goedken West. Distance from field center to stream is 701 feet. True SDR = 0.54. Applicant claims distance is ~2600 feet with SDR = 0.40.
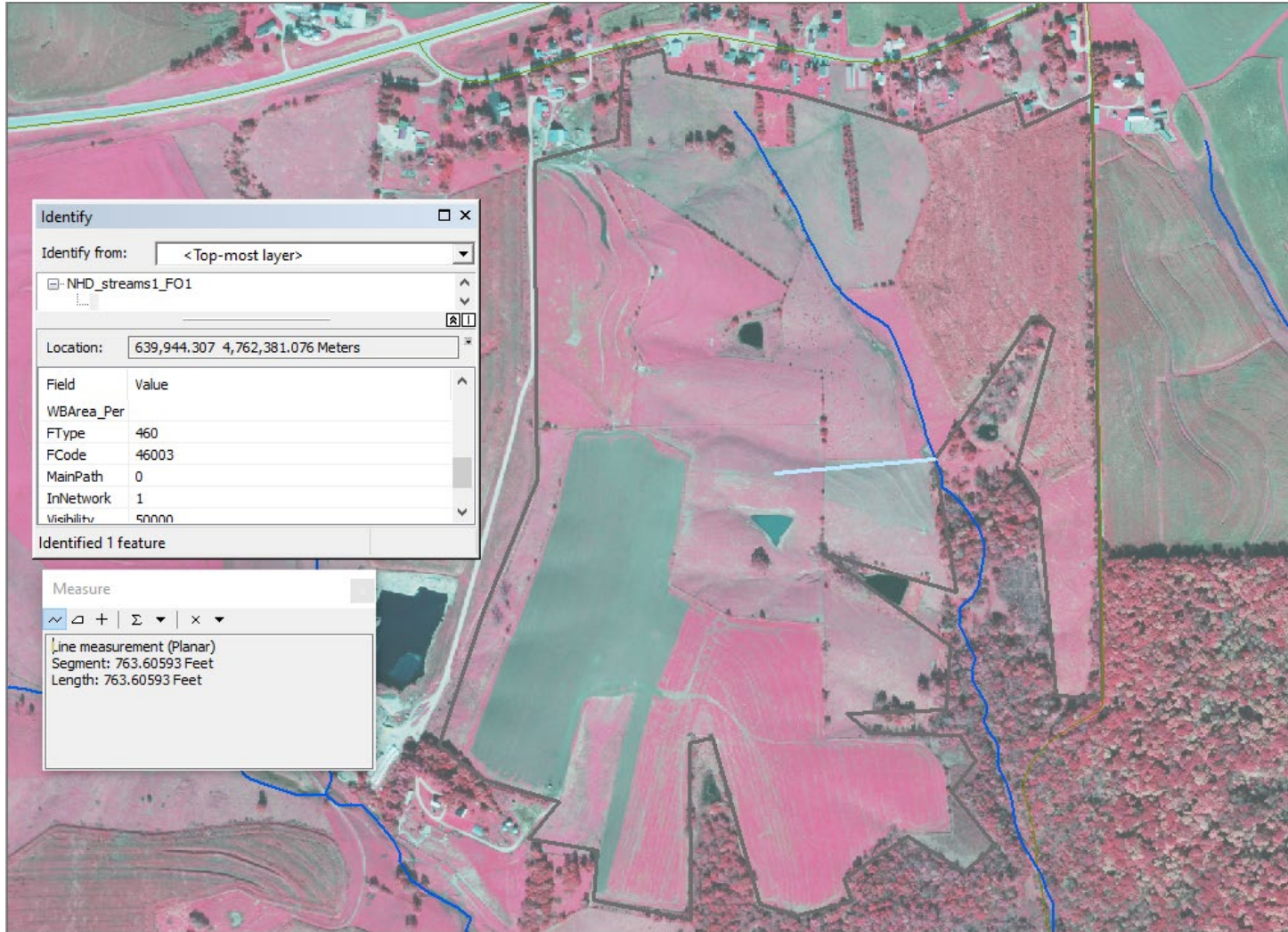
Home x Scneiders. Distance from field center to stream is 529 feet. True SDR = 0.58. Applicant claims distance is ~1600 feet, with SDR = 0.44.
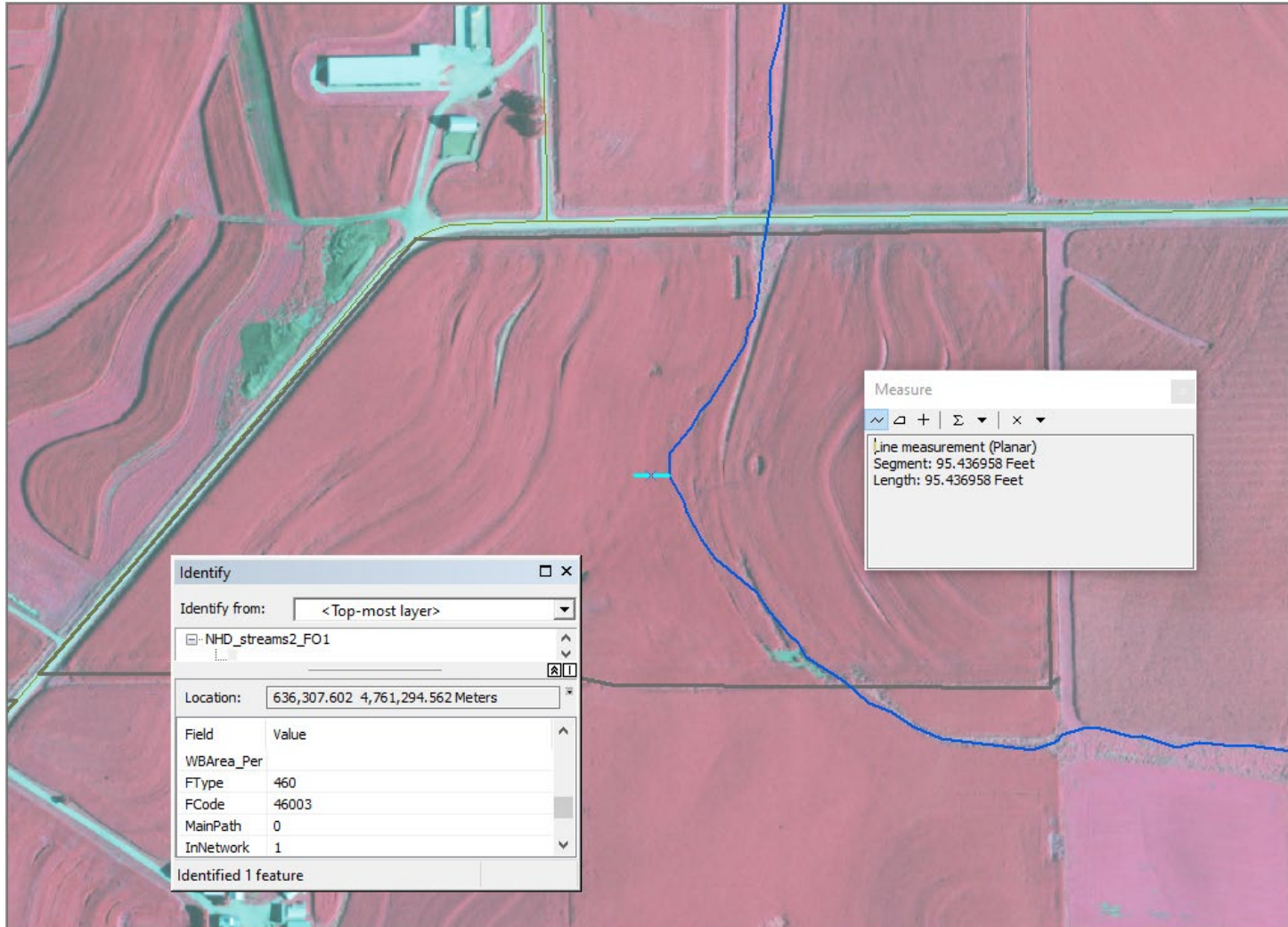
June's. Distance from field center to stream is 701 feet. True SDR = 0.54. Applicant claims distance is ~1500 feet, with SDR = 0.45.

Koether Giard 34. Distance from geometric field center to stream is 870 feet. However, due to the irrational field shape, the geometric center is outside actual field boundaries. This field should be partitioned into two PLU's. When that is done, the distance from the west lobe center to the stream is approximately 1220 feet with true SDR = 0.47. Distance from the east lobe center is approximately 1310 feet with true SDR = 0.46. Applicant treats as just one field and claims distance is ~3200 feet with SDR = 0.38.
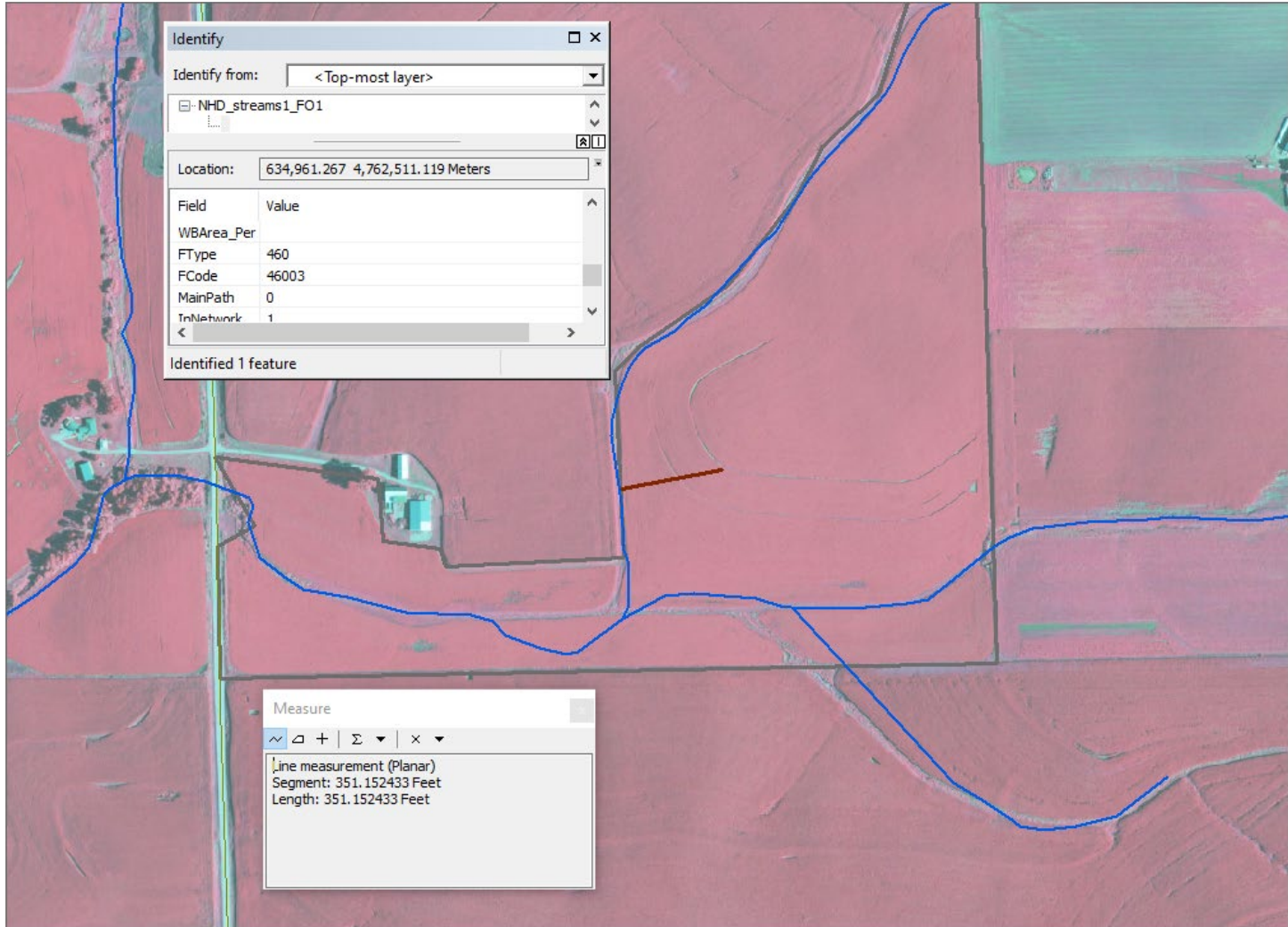
Koether – Giard 35. Distance to field center to stream is 764 feet. True SDR = 0.53. Applicant claims distance is ~2600 feet with SDR = 0.40.

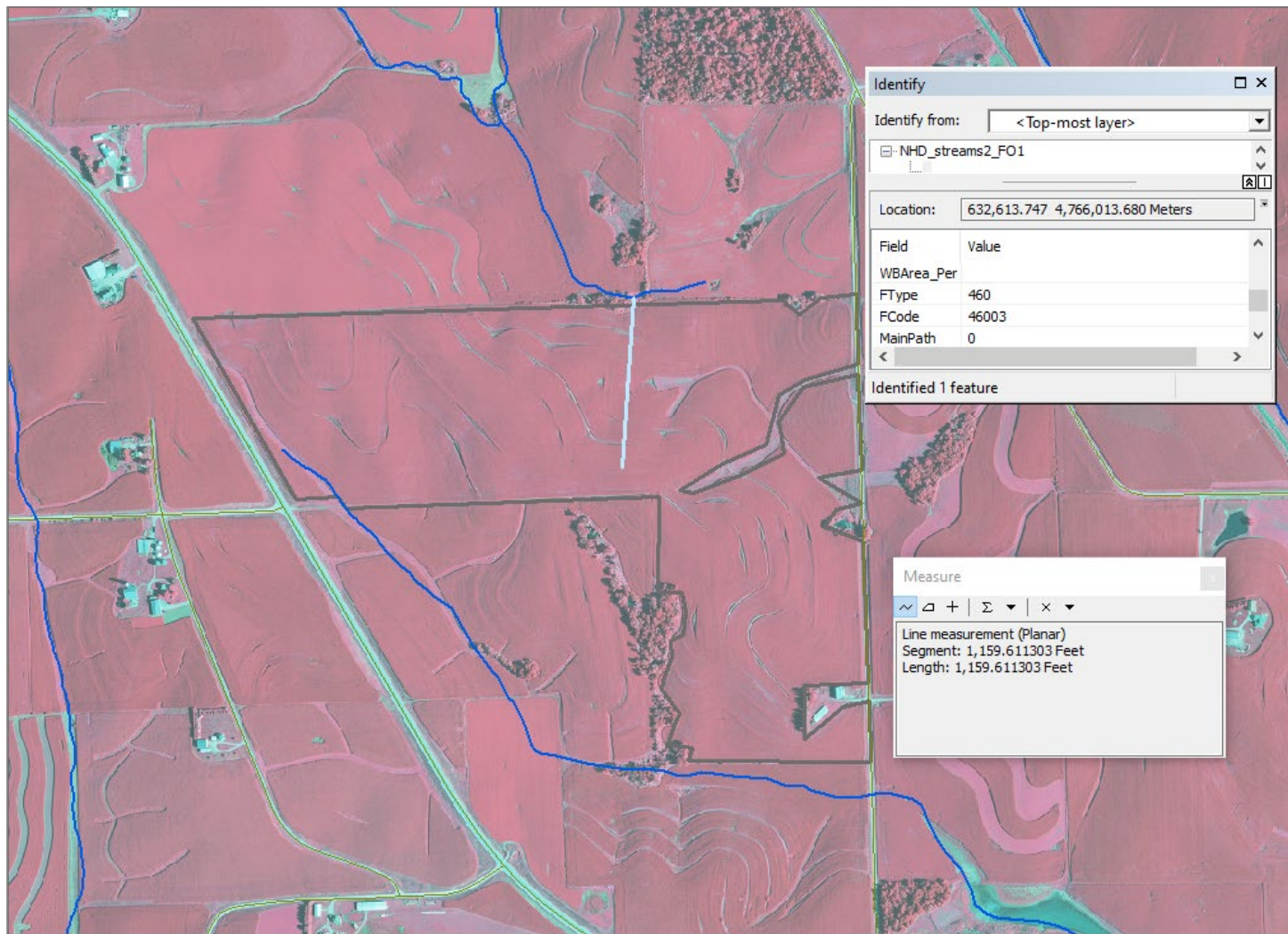**Meirs.** Distance from field center to stream is 96 ft. True SDR = 0.88. Applicant claims distance is ~750 feet, with SDR = 0.53.
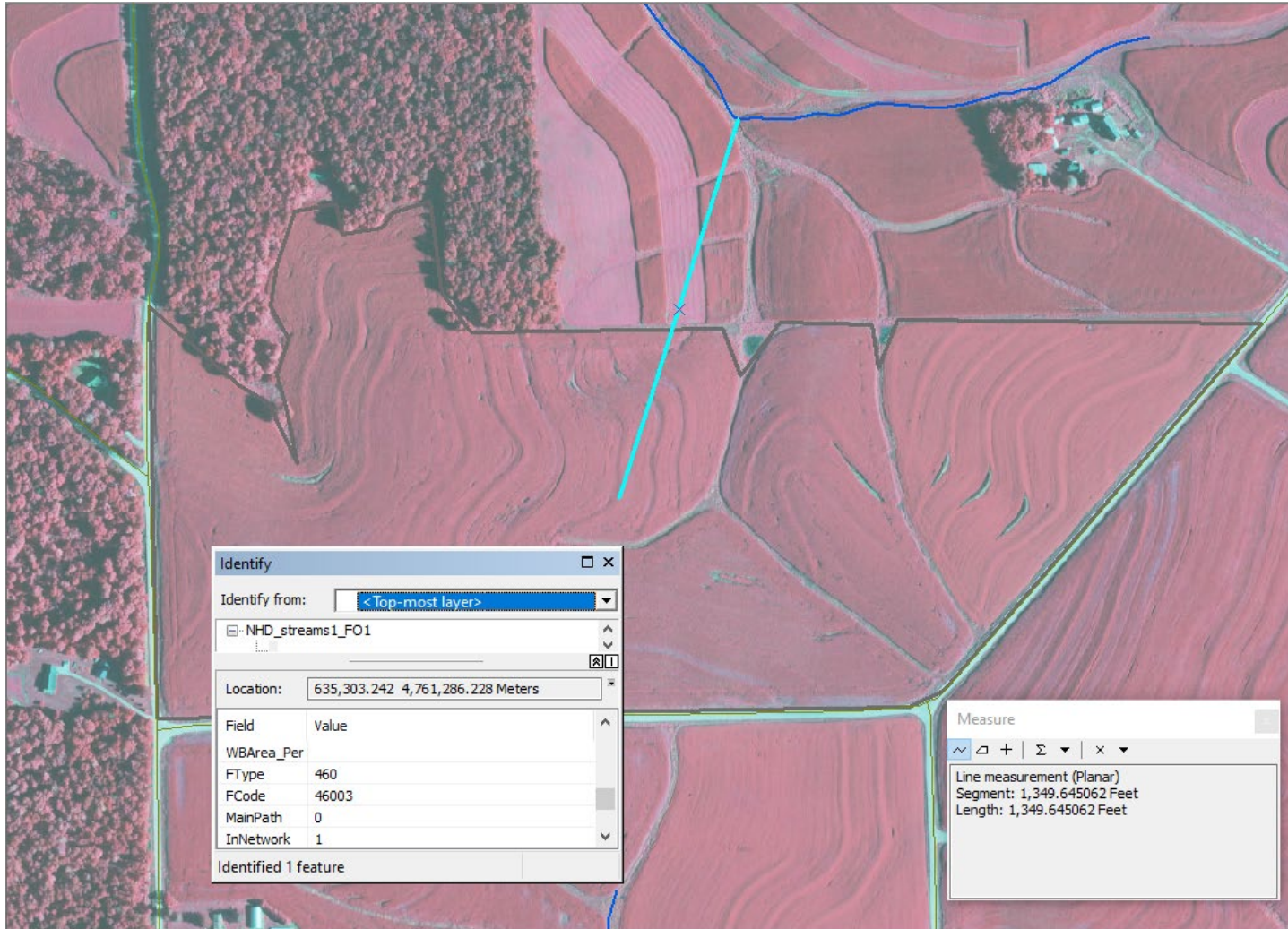
North Harness. Distance from field center to stream is 1350 feet. True SDR = 0.46. Applicant claims distance is ~2900 feet, with SDR = 0.39.

Schutte South. Distance from field center to stream is 351 feet. True SDR = 0.64. Applicant claims distance is ~2600 feet, with SDR = 0.40.

Walt and Elmers. Distance from field center to stream is 1160 feet. True SDR = 0.48. Applicant claims distance is ~2900 feet, with SDR = 0.39.

03/08/2021 **ISSUE 10. Five fields have P-Index values of 5.0 of greater and must be excluded**

04/02/2021 **DNR Response:** Partial agreement. Complicated because of several field misassignments in my original written comments.

05/05/2021 **SV response to DNR:** NOTE: See the document "SV Corrections for the Record" sent to DNR on 05/04/2021. After recalculation, my assessment finds three fields with P-Index greater than 5.0.

03/08/2021 **ISSUE 11. Four additional fields _may_ have PI greater than 5.0**

04/02/2021 **DNR Response:** DNR reviewed these fields and found the P index to be less than 5.0.

05/05/2021 **SV response to DNR:** NOTE: See the document "SV Corrections for the Record" sent to DNR on 05/04/2021. After recalculation, my assessment still finds four additional fields that may have P-

Index greater than 5.0, but the field assignments are different. DNR has dismissed my concern that RUSLE2 management plans do not contain all the tillage steps, including application of the commercial fertilizer listed for each field on NMP P.2. Additional tillage translates to increased rill and interrill erosion as calculated by RUSLE2. They have also dismissed out of hand the additional soil invariably lost from the HEL fields as ephemeral gully erosion. Finally, they are allowing single-point P-Tests for many of the fields instead of requiring the scientifically more accurate grid-sampled P-tests. In combination, these issues could easily push the P-Index of the listed fields above 5.0.

03/08/2021   ISSUE 12-13. Expiring manure easement agreements and hauling distances may limit available acres.

04/02/2021   DNR Response: The manure easement agreements are acceptable as explained under Issue 13. The automatic yearly-renewal language is common and acceptable.

05/05/2021   SV response to DNR: There is simply something fishy here. Every one of the manure easement agreements expires in July, 2021, at least three months BEFORE the first load of manure is scheduled to be applied to those fields. Some of those fields are thirty miles away! Many are more than 10 miles away. Consider the transportation costs which the agreements state will be borne by the recipient, not the supplier. And the listed nutrient content of the manure is literally only a small fraction of the nutrient content of confinement hog manure. Farmers will lose money if they take this manure. So what am I missing? Again, the circle squares if (a) the nutrient content is a lot greater than the applicant lists it to be, and (b) it actually won't be applied to those fields thirty miles away. More manure will be spread on closer fields. NOTE: In the earliest iterations of Walz Energy / Supreme Beef NMPs, the easement agreements were for FIVE years, not one.

03/08/2021   ISSUE 14. HEL fields require special conservation measures.

04/02/2021   DNR Response: It is the DNR's position that by submitting the RUSLE2 and P index calculations for each field in the NMP, the applicant is complying with 567 IAC 65.112(8)"e" (7) and 567 IAC 65.112(8)"e"(9)

05/05/2021   SV response to DNR: As DNR is aware, in the 02/01/2021 NMP none of the RUSLE2 documents for the fields reflect a single conservation practice or measure designed to control runoff to waters of the United States. No conservation tillage, no strips or barriers, no diversions, terraces, or sediment basins. All the fields will be plowed rows up-and-down hill. HEL fields are provided extra protection under the 1985 Food Security Act. Farmers receiving USDA payments (all of them are) may only row-crop HEL fields using approved conservation measures and practices. But the RUSLE2 documents show that even if measures were installed previously, nothing of consequence is left that works to conserve soil and mitigate possible water quality impairments. In fact, the vast majority of RUSLE2 field calculations show predicted soil loss, just from rill and interrill erosion, well above the NRCS developed T-values of acceptable soil loss per acre per year. Finally, DNR did not respond to the requirement to comply with IAC 567.65.3(5)*f.* restricting manure application from fields with slopes greater than 10% unless adequate soil erosion control practices exist.

03/08/2021   ISSUE 15. Fields with H and VH levels of P can only receive phosphorous at agronomic rates.

04/02/2021   **DNR Response:** There is no regulation in Iowa law that prohibits manure application to fields with high or very high levels of soil phosphorus.

05/05/2021   **SV response to DNR:** IAC 567.65.3(5)*b.* sets the standard for acceptable practices when applying phosphorous to fields. This was discussed in response to Issue 1-4. Repeating what was stated earlier:

> *IAC 567.65.3(5) recommends that manure be applied at no more than the agronomic rate if the soil-test for P is in the High or Very High range. <u>This applies to most of the fields listed in the NMP</u>. DNR may be confused about this since IAC 567.65.17(17) establishes three P-Index categories that may allow (but do not require) application at rates above P-removal agronomic rates. Where there are two sections of Code that appear to apply to a particular situation, the interpretation of law that allows <u>both sections of Code</u> to be met is the correct interpretation of the law. Therefore, when the P-test value is high or very high, manure can only be applied at the P-removal rate, regardless of the P-Index value, as per IAC 567.65.3(5). Where the P-test value is very low, low, or optimum, the choices allowed in IAC 567.65.17(17) by the P-Index value are available. This interpretation is consistent with both sections of Code.*

Why would DNR refuse to interpret Iowa Code in the manner than is most protective of our natural resources? That is why DNR exists! If they think there will be blow back from powerful agricultural interests, then so be it. Don't hide from it. Shine the light of day on it.

03/08/2021   **ISSUE 16. "Director's discretion" to modify or deny this NMP**

04/02/2021   **DNR Response:** DNR has reviewed the NMP and it meets the requirements of the regulations.

05/05/2021   **SV response to DNR:** Respectfully, Issue 16 refers to IAC 65.103(5). If the Director has in fact done an assessment based upon all the factors listed in this section, please produce the evidence. Where is the report?   If the Director has decided not to do an assessment based upon the factors listed in IAC 65.103(5), then simply state so. The public has a right to know whether ANY extra consideration has been given towards protecting Bloody Run Creek and the surrounding environmentally exceptional areas.