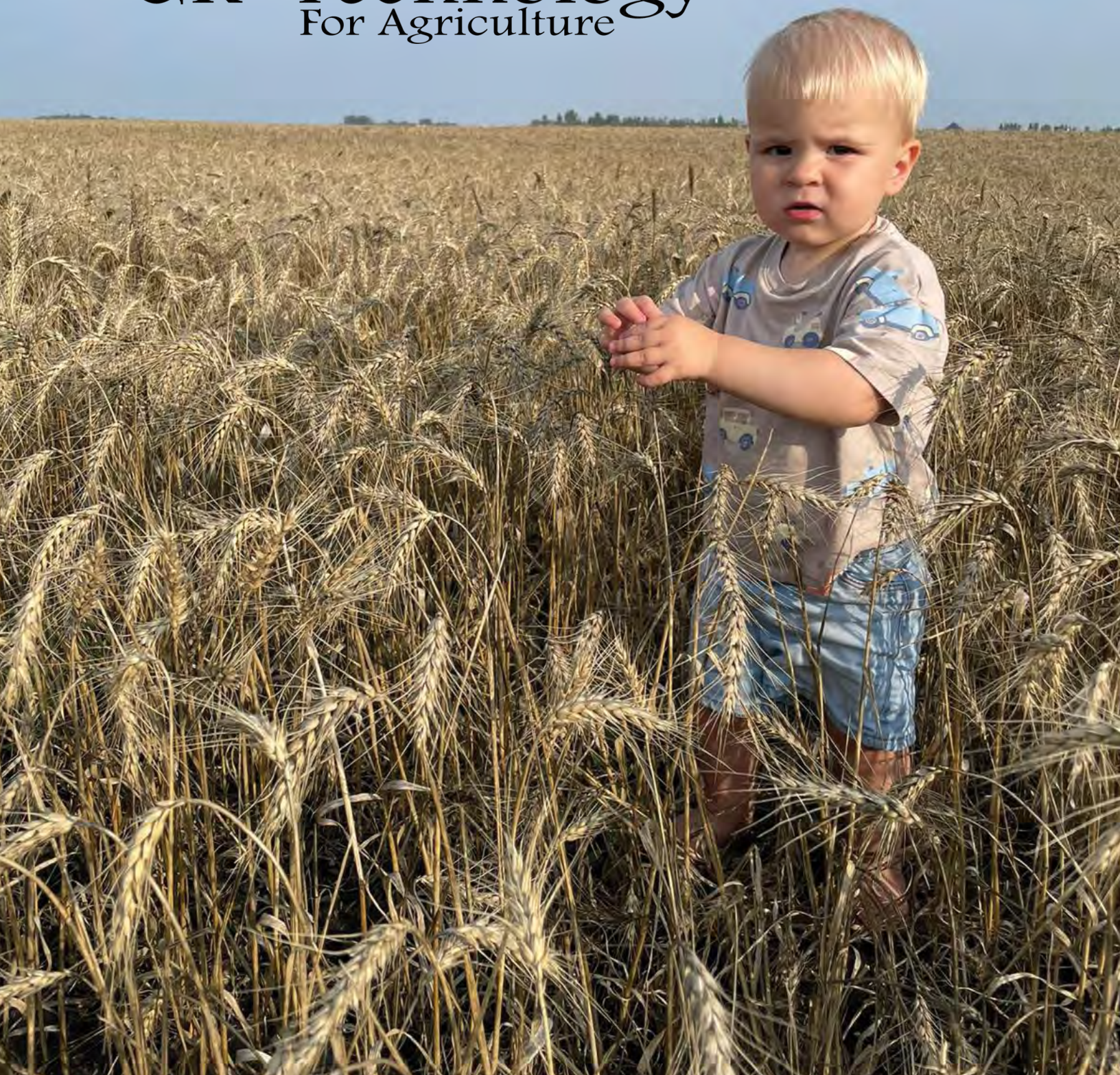


2025 ADMS User Manual

 GK Technology
For Agriculture



Thank you for choosing GK Technology Inc and Ag Data Mapping Solution (ADMS) software. We supply a powerful mapping solution for your agronomic and drainage needs.

Since 2006, GK Technology, Inc. has been offering Ag GIS tools for drainage, fertilizer, seed, and a wide array of other applications. While some of our innovations were thought of ourselves, many have stemmed from customer conversations about their agricultural data needs. By listening closely to our customers, we've developed software and hardware that precisely address those needs. Our commitment to customer feedback has been a cornerstone of our success.

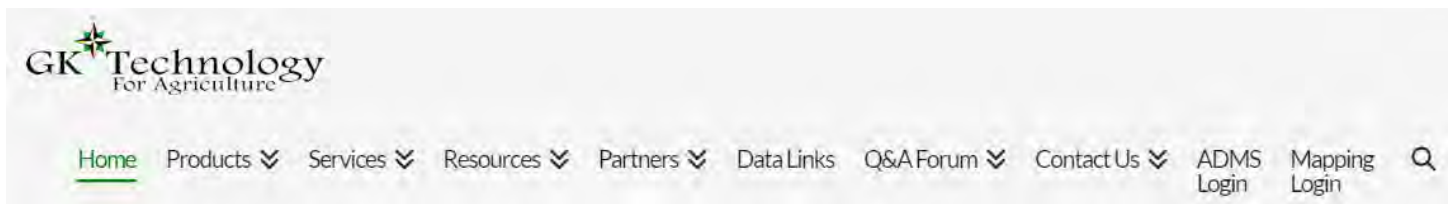
ADMS is one of the most powerful ag mapping software packages available, even if it may not be the simplest to operate. It provides users with extensive capabilities to manipulate, import, and export data freely in various generic formats. The strategic decisions made by Darin Johnson two decades ago ensure that data from ADMS integrates seamlessly throughout the industry; to other software packages and myriad of equipment controllers.

Additionally, GK Technology offers the best support in the industry. Our staff are not just ADMS help staff, they are active users of the software. We offer "Mapping Services," and the same experts who create these maps are available to assist you in navigating any and all parts of the ADMS software. Our team includes specialists in agronomy, soils, imagery, drainage, and more. When you call for support, you will be speaking with professionals who truly understand your needs.

Thank You,

GK Staff

<https://gktechinc.com>



Please visit the website, click the **Contact Us** link to meet the GK Staff.

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PC & System Requirements / File Storage & Structure

PC & System Requirements

Minimum System Requirements

- Operating System: Windows 7 / Windows 8 / Windows 10 / Windows 11
- Processor - 1.5 ghz
- RAM - 4 GB
- Storage - 32 GB
- Video Card - 512 M - 128 bit (Open GL-3d compatible)
- Screen resolution - 1024 x 768

Recommended System Requirements

- Operating System: Windows 11
- Processor - 3.0 ghz base speed—Quad Core (or Higher)
- RAM - 32 GB (or more)
- Storage - 1 TB SSD (or more)
- Video Card - 4 GB - 256 bit (Open GL-3d compatible)
- Screen resolution - 1920 x 1080 (or higher)

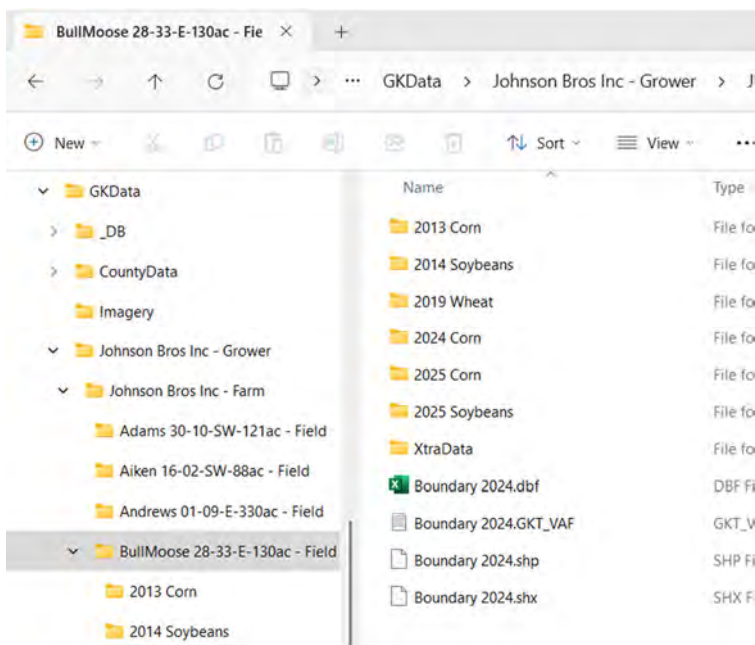
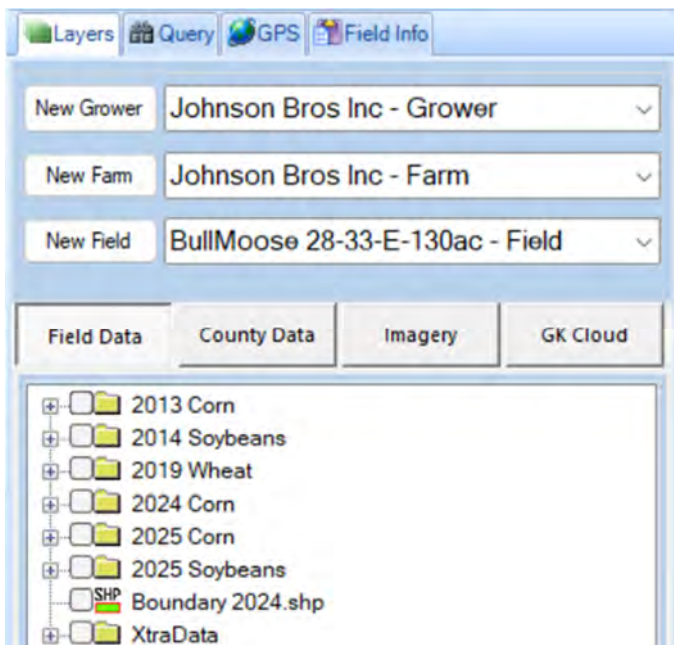
File Storage & Structure Layout

Files are linked, not stored within ADMS, meaning that the files in the ADMS data tree (below, left) directly reflects files located in File Explorer (below, right). Changes made in File Explorer (e.g., renaming) will be reflected within ADMS.

Files are organized in a GFF (Grower-Farm-Field) folder structure. Folders are displayed above the data tree & on most printed maps. Use the "New_" button to create new GFF folders within ADMS.

GK has no data backup of "C:/GKData" folder. If your PC is damaged or lost, so is your data!

Cloud services such as Dropbox, Google Drive or OneDrive are great options for file storage or backup that play well with ADMS Software and Data. While ADMS does contain a tool called the "GK Cloud", this tool is designed for file transfers, not storage or backup.



Getting Started With Ag Data Mapping Solution

To get started with Ag Data Mapping Solution, you need to have some base data in place to work with. You will need some “Properly” geo-referenced pieces of data. Meaning that the data sets are in either Latitude / Longitude or UTM projections system using WGS84 or NAD83.

TO GET STARTED YOU NEED AT LEAST 1 OF THESE ITEMS

County Data set for geography you are working (**County Data**—tab/folder)

NAIP images (USDA-Geospatial)

DRG images & DEM topo (USDA-Geospatial)

Soils Maps (USDA-Web Soil Survey)

Townships & Sections Maps (USDA-Geospatial)

Roads, Railroads & Water ways (TIGER Data)

Data Set to build Maps—need one or more of these (more is usually better)

Satellite / Aerial Imagery (**Imagery**—tab/folder)

Images USGS (Landsat)

Images Copernicus (Sentinel)

Topography from LIDAR (many sources-drop us a line)

Other Imagery sources

Yield data (Raw Data card or .shp files) (**Field Data**—tab)

Veris data (Raw Data card or .shp files) (**Field Data**—tab)

Topography from RTK (Raw Data card or .shp files) (**Field Data**—tab)

Below is a “Rough Outline” of the Process to use this data in the field.

- 1) Create a Grower / Farm / Field structure in ADMS
- 2) Create a Field Boundary by Drawing, Collecting, Extracting, or Importing

For VRT Mapping

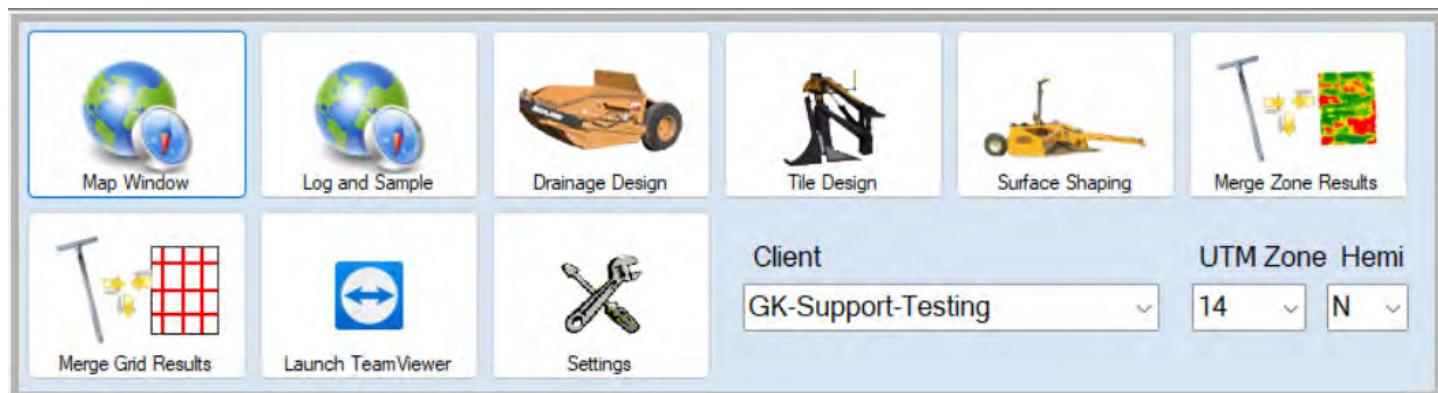
- 3) Create Management Zones or Sample Grids
- 4) Soil Sample
- 5) Set application rates / yield goals
- 6) Enter application values or run a script (create VRT prescriptions)
- 7) Export prescription to controller
- 8) Print “Hard copy” map with total LBS of product and viewing in field

For Topography Mapping

- 3) Import & Process topography data
- 4) Inspect topography accuracy / outlets
- 5) Process watersheds / contours
- 6) Create surface / tile drainage plan
- 7) Create background data sets for controller or infield display
- 8) Print “Hard copy” map for taking notes & taking to the field

Startup Page

Buttons & Unlocks



Button - Unlock - Function

Map Window—All versions—Has different functions with different unlocks. Window most mapping, printing, scripting and processing is done.

Log and Sample—General—For GPS, in field functions, logging data & soil sampling.

Drainage Design—Topography/Watershed—Used for laying out & testing field ditches.

Tile Design—Topography/Watershed—Used for designing Drain Tile plans.

Surface Shaping—Surface Shaping—Tools to create reshaped/graded field design.

Merge Zone Results—Variable Rate Create—Assigns values to zone colors.

Merge Grid Results—Variable Rate Create—Extrapolate Grid point data into Raster.

Launch TeamViewer—All Versions—GK Remote support. (Need Internet connection)

Settings—All Versions—ADMS Settings windows / tabs (see section on “Settings”)

Dropdowns

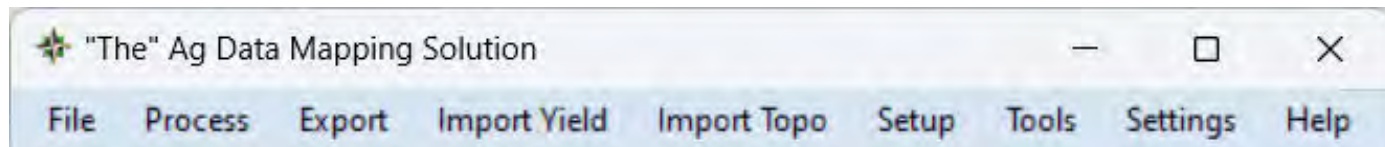
Client —Consultants Package—Adds a “Client” 4th management level. Client/Grower/Farm/Field, vs. standard Grower/Farm/Field structure.

UTM Zone—All Versions—Choose “UTM” zone your field is in. (see Settings for map)

Hemi—All Versions—Assigns which “Hemisphere” of earth you are working in (N or S).

Top Menu Bar

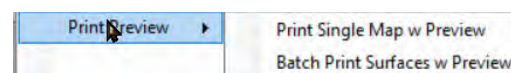
Menu Bar Items & Functions



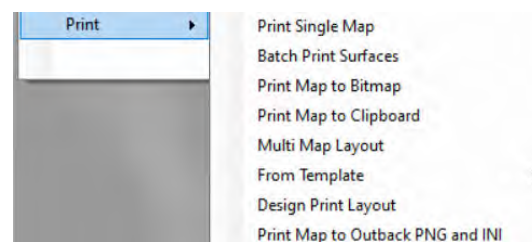
File— New—Opens a New—Map Window or Drainage Planner (Drainage Design) window.



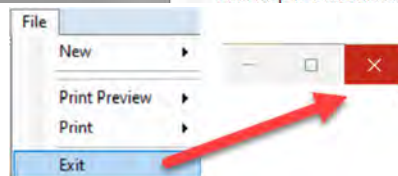
- **Print Preview**—While visualizing maps, users can get preview before printing the map in Single map or Batch print.



- **Print**— Gives all the printing options for use in most windows. There are many options here. See the ADMS Section on Printing.



- **Exit**—Closes ADMS just like the Big Red X.

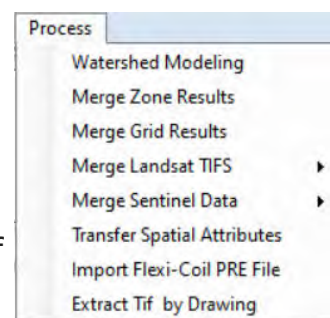


Process— Watershed Modeling—Opens dialog tool Watershed Modeling.

- **Merge Zone Results**—Opens Merge Zone Results window.

- **Merge Grid Results**—Opens Merge Grid Results window.

- **Merge Landsat TIFS**—Tools for merging multiple bands of Raw Landsat—USGS. See GK Website for more info.



- **Merge Sentinel Data**—Tools for merging multiple bands of raw Sentinel data from Copernicus. See GK Website for more info.

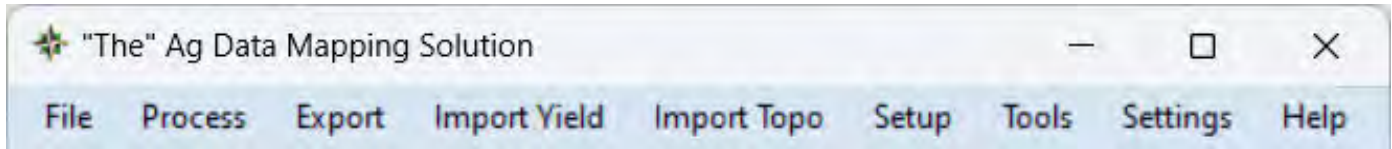
- **Transfer Spatial Attributes**—Move Database column from one file to another.

- **Import Flexi-Coil PRE File**—Opens Flexi-Coil PRE—Rx file in Map Window.

- **Extract Tif by Drawing**—Tool for extracting multiband TIF image to extents Of a SHP file. Primarily—Clipping Landsat to counties. See GK Website.

Top Menu Bar

Menu Bar Items & Functions



Export—Most exports have a section in the manual:

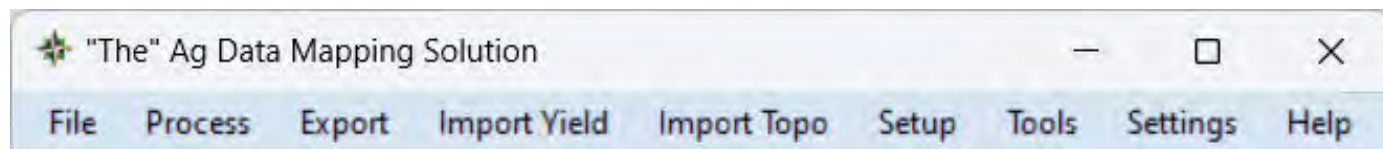
- **FODM Device**—Field Operations Device Manager
converts VR surface to useable format for
infield controllers. (generally for legacy controllers)
- **Shape Grid**—Converts VR Surface to SHP Grid.
- **Topcon X20-Zynx XML**—Converts VR Surfaces to
proprietary Topcon XML format.
- **John Deere GS2-GS3 GRX**— Converts VR Surface to
proprietary John Deere GRX format.
- **Mid Tech ARM File**—Converts VR Surface to proprietary Mid Tech ARM format.
- **Flexi-Coil PRE File**—Converts VR Surface to proprietary Flexi-Coil PRE format.
- **AGPS Setup File**—
- **VRI Prescription**—Converts Variable Rate Irrigation Surface into data for:
 - Valley controller—proprietary format.
 - AgSense controller—proprietary format.

Import Yield—Imports Raw Yield data from select displays:

- **Launch FO Viewer**—Opens Field Operations, a 3rd
party tool from Ted Macy's-MapShots, now Granular.
- **APEX Swath Poly Converter**—Converts multiple
polygon events per second into single polygon.
Legacy issue from John Deere Apex software.
- **John Deere GS2 Data**—Read raw yield & as applied
data from GS2 /2600 (Compact Flash) data.
- **John Deere GS3 Data**—Read raw yield & as applied
data from GS3 / 2630 USB data
- **GK Truck Crop Yield Data**— Reads raw GK Truck Crop Yield data coming in
as a .MDB file format.

Top Menu Bar

Menu Bar Items & Functions



Import Topo—Many of the imports below are for Legacy products.

- **Survey Pro Text**—Legacy format using .TXT file
- **Trimble AGPS 170**—Legacy format using .SHP file
- **AutoFarm Log File**—Legacy format using .LOG file
- **BeeLine Arrow CSV**—Legacy format using .CSV file
- **AGPS NEZ Import**—AGPS / AMW format using .NEZ
See more information in Drainage Section.

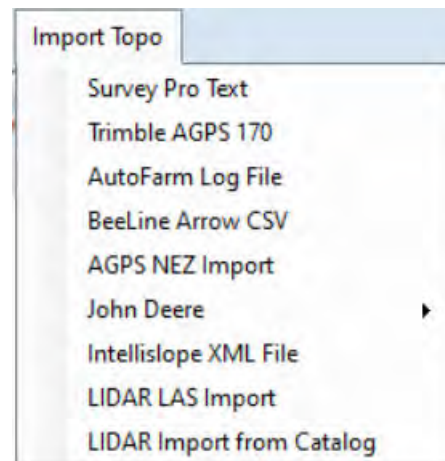
- **John Deere**—

- **GS2 Data**—from 2600 Compact Flash card
- **GS3 Data**—from GS3_2630 USB data folder
- **JD Office**—from Brown Box data card

- **Intellislope XML File**—Legacy format using .TXT file

Does not support the modern Intellislope files, only Legacy “Green Box” data

- **LIDAR LAS Import**—Supports LIDAR LAS & LAZ formats. See Lidar Section for instructions on this tool. Works best with all data in 1 folder and less than 2500 tiles of LAS or LAZ.
- **LIDAR Import from Catalog**—Supports LIDAR LAS & LAZ formats. See Lidar Section for instructions on using this tool. Requires some setup / indexing, designed for use with Multiple folders of LIDAR and many thousand files.

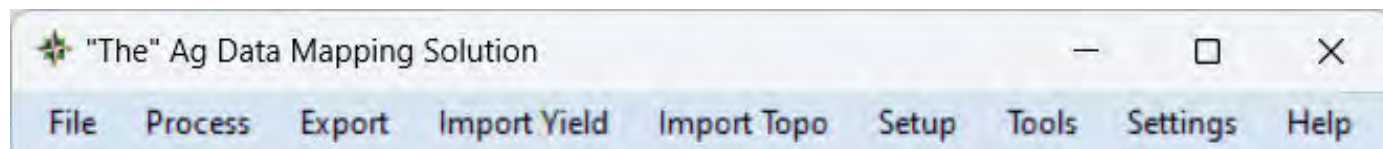


Setup—Most items will be updating the _DB/Data/ADMS90.sqlite, and are used in surface creation and file exporting.

- **Fertilizers**— Items in this list are used in the manual entry of Merge Zone Results, and Exporting functions. Table is shown in Merge Zone Results.
- **Crops**— Used in import and export functions.
- **Blend Groups**— Used in the Merge Zone Results window & shown there.
- **Hybrids**— Used in the exports functions.
- **Add Map Units**— Used in export functions, more importantly used for the “Units” dropdown list in “Creating Grid.grd” & Assign Common Name.

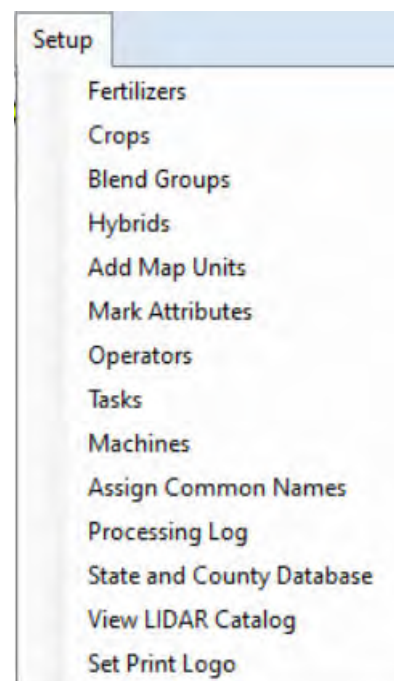
Top Menu Bar

Menu Bar Items & Functions



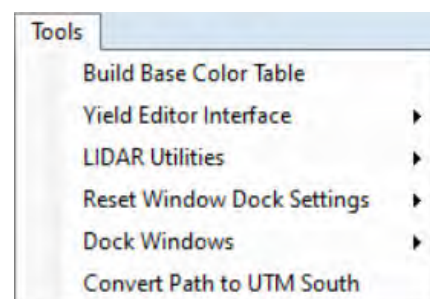
Setup—Continued...

- **Mark Attributes**—These are items that can be added to GPS Logging to track events in the SHP database.
Ex. Variety A & Variety B—See GPS for more info.
- **Operators**— Used in the exports functions.
- **Tasks**— Used in the exports functions.
- **Machines**— Used in the exports functions.
- **Assign Common Name**— Links the names from SHP - DBF & CSV data columns to the "Name.grd" you choose in ADMS. Covered in Merge Grid Result and Merge Zone Results.
- **Processing Log**— This function is running in the Background, documenting all the layers you build. Useful for time tracking and billing.
- **State and County Database**— Has the database GK uses for State (Province) name and County Names (RMs in Canada) and UTM's of County/RM.
This item is used for LIDAR Catalog and other GK Software functions.
- **View LIDAR Catalog**— Will show all the data created in Create LIDAR Catalog. Documented in Create Lidar Catalog section & GK Online Lidar download.
- **Set Print Logo**— Adds your logo to printed page. Covered in Print Section.



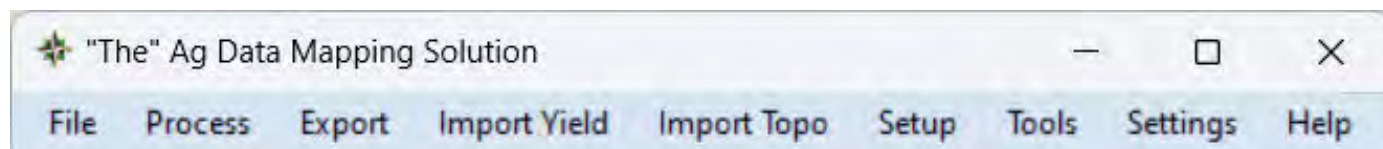
Tools—For creating items needed to do specific tasks or create layers for ADMS.

- **Build Base Color Table**—Allows user to create a Color Table with 3 to 5 color chips of input.
Table created will have 255 color shade breaks.
- **Yield Editor Interface**—Installs / Uninstall GK app & Registry Edit, changing the "Yield Editor Icon" in FODD icon launches GK Zero Catch, removing Zero Area in the .byf file going to Yield Editor.



Top Menu Bar

Menu Bar Items & Functions



Tools—Continued...

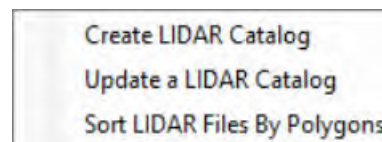
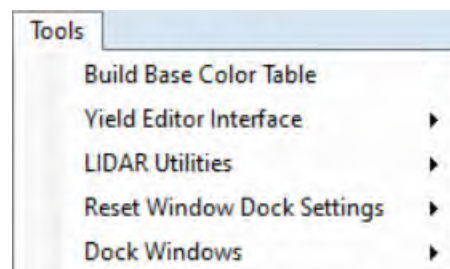
- **LIDAR Utilities—**

- **Create LIDAR Catalog**—Opens a tool to create SHP file and GK Catalog of lidar las & laz files.
- **Update a LIDAR Catalog**—Tool will update GK Catalog with newly added LIDAR las & laz files.
- **Sort LIDAR Files By Polygons**— Creates new Folders based on County Name DBF of SHP then Places a copy of all las or laz files for area in folder.

- **Reset Windows Dock Settings**—Restores / Resets Default GK Docking Tab setting to selected window.
NOTE: This will Close the Window in the process if open.

- **Reset Map Window—**
- **Reset Drainage Window—**
- **Reset Tile Window—**
- **Reset Shaping Window—**

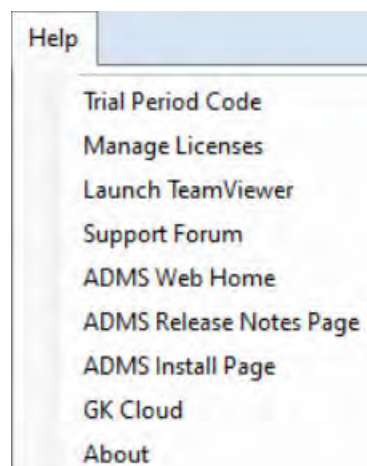
- **Dock Windows— Navigate**—Turns on the Navigate to Points function in the GPS tab in any window.



Settings—Opens the base Settings Windows for ADMS. (see Settings Window)

Help—Items for Trials, Unlocking, Support and General Information on ADMS.

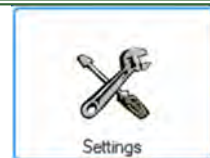
- **Trial Period Code**—Opens window for Trial Code.
- **Manage Licenses**—Opens window for Managing Unlocks.
- **Launch TeamViewer**—Opens GK Remote Support.
- **Support Forum**—Goes to GK Online Support Forum.
- **ADMS Web Home**—Takes you to www.gktechinc.com
- **ADMS Release Notes Page**—Opens release notes history.
- **ADMS Install Page**—Open to the "Latest" ADMS install.
- **GK Cloud**—Connects to GK Cloud storage portal.
- **About**—Information about the Version of ADMS installed



Settings Window

Data Storage

The following pages will walk through base settings for ADMS.



Settings

Data Storage User Interface User Interface 2 GPS Settings GPS Config UTM Zone Veris Settings GK Cloud

These are the default data locations for the different types of data stored.

County Data should be stored in a structured manner in the "CountyData" folder.

Satellite Imagery should be stored in a structured manner in the "Imagery" folder.

See documentation for naming conventions

Client Data Folder C:\GKData\ Browse

County Data Folder C:\GKData\CountyData\ Browse

Imagery Folder C:\GKData\Imagery\ Browse

LIDAR Folder C:\GKData\LIDAR\ Browse

Operator Name Your Name

Use the "Browse" button to set a folder location on your computer where the software will look for different datasets.

Software DEFAULTS are shown above.

Client Data Folder = Grower / Farm / Field datasets and the location of many operating files ("_DB" - color tables, templates, blend groups, scripts and base operating database).

County Data Folder = Location to store data relative to your County or Region. This data may be roads, sections, townships, soils, or county-wide images (e.g. NAIP, DRG, DEM). Likely data downloaded from USDA Geospatial Data Gateway.

Imagery Folder = Location to store satellite and large area imagery data.

Lidar Folder = Location to store large area lidar topography data (no access in data tree).

Operator Name = User's name used for tracking processed data.

NOTE: The name and spaces must be less than 12 characters long.

A handy feature of ADMS is its ability to run and utilize datasets off of USB devices and local disk drives simultaneously.

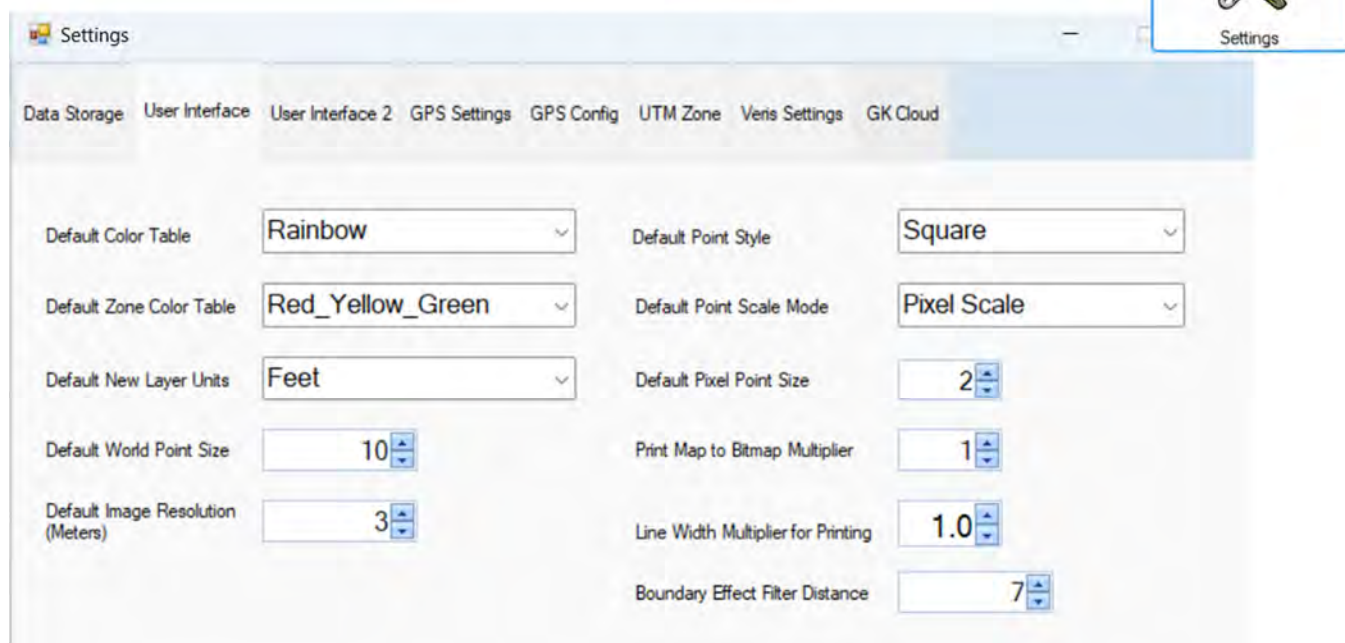
Example: Leaving the Client Data Folder (grower data) on the "C:" drive and running County Data off a USB device "D:" or a "Mapped Network Drive."

NOTE: Read / Write speeds may be GREATLY reduced depending on the speed of device.

We do not suggest running "Client Data Folder" off of USB or drives that may not be there every time your PC starts. Doing this causes PROBLEMS.

Settings Window

User Interface



NOTE: Above are optional settings, not the software defaults.

Default Color Table - Color table used for most functions in the software

Default Zone Color Table - Color table used only in Auto Zone & Extract Image to Zone tools

Default New Layer Units - Default units used when creating "GRD" files

Default World Point Size - Sets data points "10" "Feet" wide on a viewed file

Zoom in = Data point gets larger

Zoom out = Data point gets smaller

Default Image Resolution (Meters) - Resolution of surfaces created using Auto Zone & Extract Image to Zone tools (suggest 3 meters)

Default Point Style - Sets shape of "Data Points" (Circle / Square / Triangle / CrossHair)

Default Point Scale Mode - "Pixel Scale" or "World Scale" (See Display Properties section)

Default Pixel Point Size - Sets data points to 2 "PIXELS" wide no matter how zoomed in or out

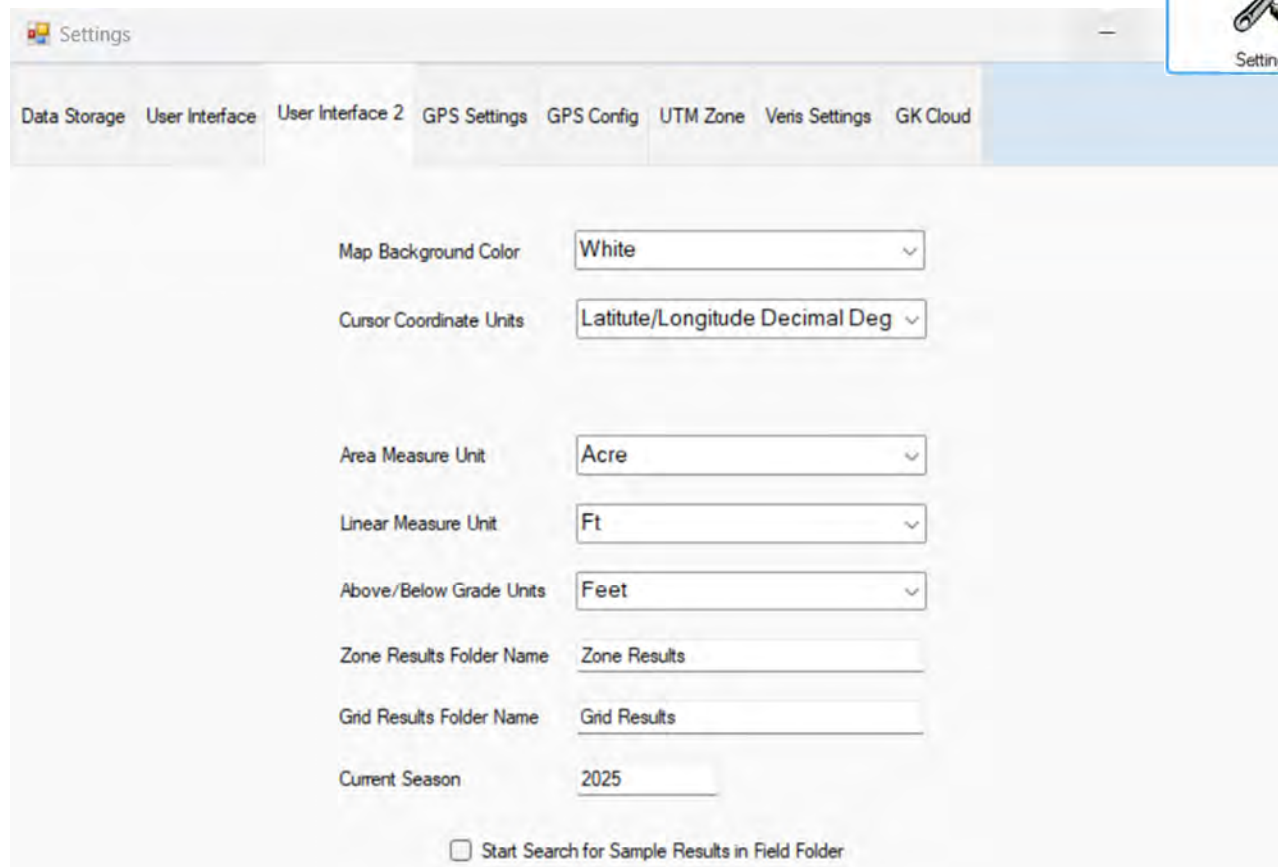
Print Map to Bitmap Multiplier - Value of 1 = 1:1 ratio to the pixels on the PC display screen. 2 will double the resolution making the bmp files 4 times larger (also affects "Printing File Size").

Line Width Multiplier for Printing - As the "Bitmap Multiplier" is adjusted, or while working with High Resolution monitors, you may notice that "Lines and Boundaries" are not showing in printed files. Using a "Multiplier of 1" with line width of "2 pixel" = 2 pixels on print. Bumping "Multiplier to 2" with line width of "2 pixel" = 4 pixels on print.

Boundary Effect Filter Distance - Controls how many "METERS" the "Boundary Effect Filter" in Auto Extract reaches in, perpendicular to the boundary, to grab a value to stretch to the boundary edge

Settings Window

User Interface 2



Settings

Data Storage User Interface User Interface 2 GPS Settings GPS Config UTM Zone Veris Settings GK Cloud

Map Background Color White

Cursor Coordinate Units Latitude/Longitude Decimal Deg

Area Measure Unit Acre

Linear Measure Unit Ft

Above/Below Grade Units Feet

Zone Results Folder Name Zone Results

Grid Results Folder Name Grid Results

Current Season 2025

☐ Start Search for Sample Results in Field Folder

NOTE: Above are optional settings, not the software defaults.

Map Background Color - Allows users to switch map background color (Black/White). Suggest using white for mapping; black is useful for in-field GPS or night soil sampling use.

Cursor Coordinate Units - Changes cursor location units at the bottom of the screen as you move the "mouse cursor" around the screen (has no effect on maps or projections).

Area Measure Unit - Changes calculation method for area of surface and area of polygon drawings.

Linear Measure Unit - Changes method of measuring distance. This will effect the measure tools and how lines in drawing layers are calculated.

Above/Below Grade Units - Changes units in the "Drainage Window" "Profile" area only, giving you option of seeing your cut in "Feet" or "Inches."

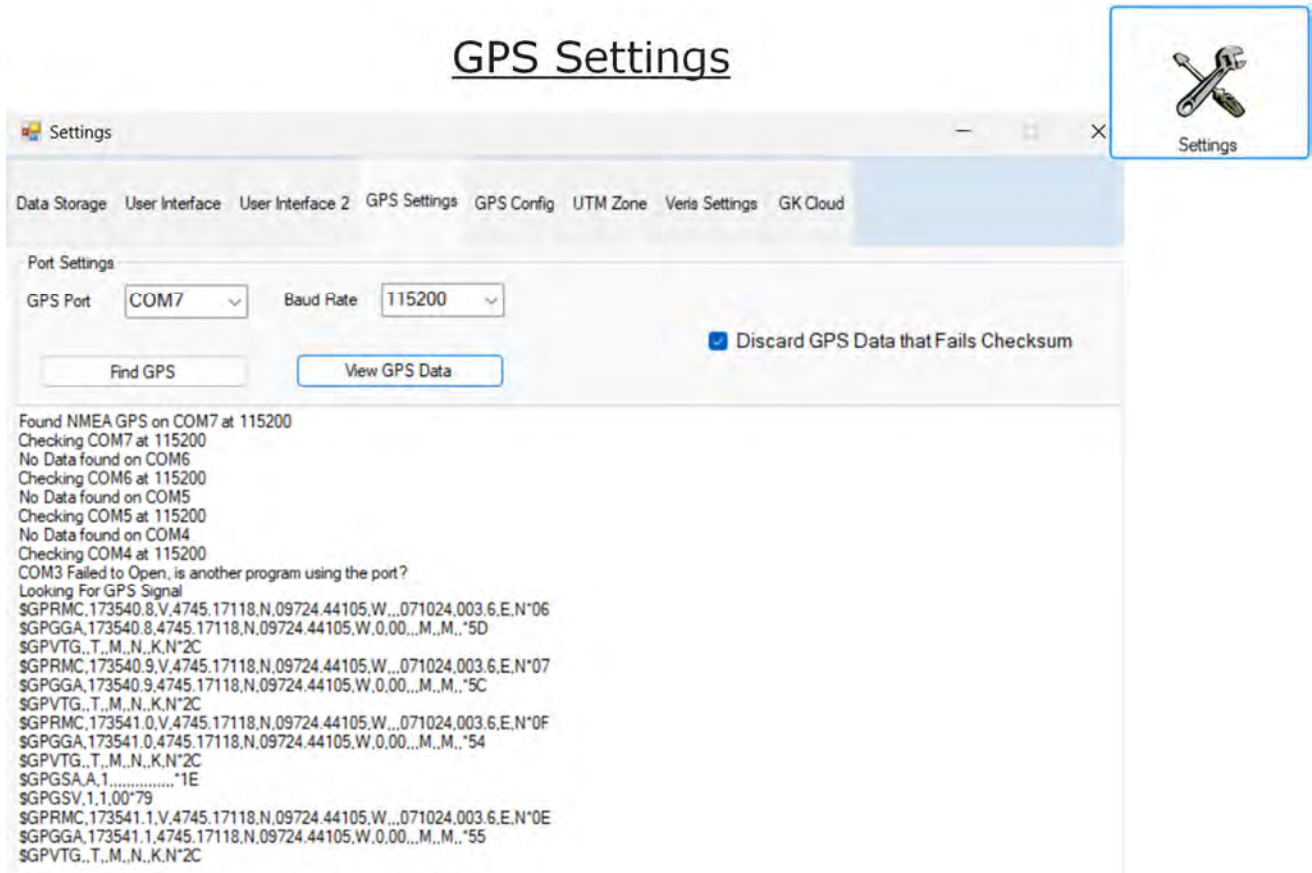
Zone Results Folder Name - The "folder name" created when writing / creating new maps in the "Merge Zone Results" window.

Grid Results Folder Name - The "folder name" created when writing / creating new maps in the "Merge Grid Results" window.

Current Season - The "year" added to the folder name in "Merge Grid Results" & "Merge Zone Results" windows when writing / creating new maps.

Start Search for Sample Results in Field Folder - Check = Starts search in "Field" folder you are working in; No Check = Starts search in last folder browsed to for soil test data (csv /

Settings Window



GPS Port - The "COM" (serial communication port) the GPS is connected to. To find out which COM port your GPS is connecting to, use the "Find GPS" button or open "Device Manager" in Windows Control Panel and look under "Ports (COM & LPT)"

Baud Rate - Set this value to match the GPS receiver output rated

Discard GPS Data that Fails Checksum - If checked "ON," GPS data strings will be checked for all correct data strings, removing "bad" data strings

Find GPS Button - Searches through all COM ports & all BAUD rates looking for a valid GPS signal. Function may not work if indoors and have no GPS signal. Once a GPS signal is found, the "Find GPS" text will turn green.

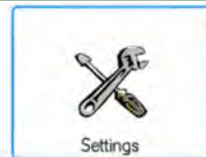
View GPS Data Button - Shows GPS data strings in the window below to confirm you have signal. The "View GPS Data" button will turn to "Stop Test" when pressed. Select "Stop Test" to stop viewing GPS data.

ADMS GPS REQUIREMENTS GPS source must supply the following NEMA strings:

- GGA
- GSA
- RMC (or VTG can be used in its place)
- GST (this data string is OPTIONAL)

Settings Window

GPS Config Warning Criteria



Above are suggested settings for Soil Sampling only, NOT for collecting field boundaries or topography data.

If these Criteria are not met the GPS status bar will flash "RED" and you will hear a "Ding"

GPS Status at Least - Logs data that has a GPS Signal at least this (ex-GPS Only) or greater

HDOP Less Than - Logs data that has an HDOP value less than this number (ex-3.0)

Differential Age Less Than - Logs data that has Differential Age value less than this number (ex-30)

PDOP Less Than - Logs data that has a PDOP value less than this number (ex-3)

VDOP Less Than - Logs data that has a VDOP value less than this number (ex-3)

Horizontal Error Less Than - Logs data with Horizontal Error less than this number (ex-0.10 meters)

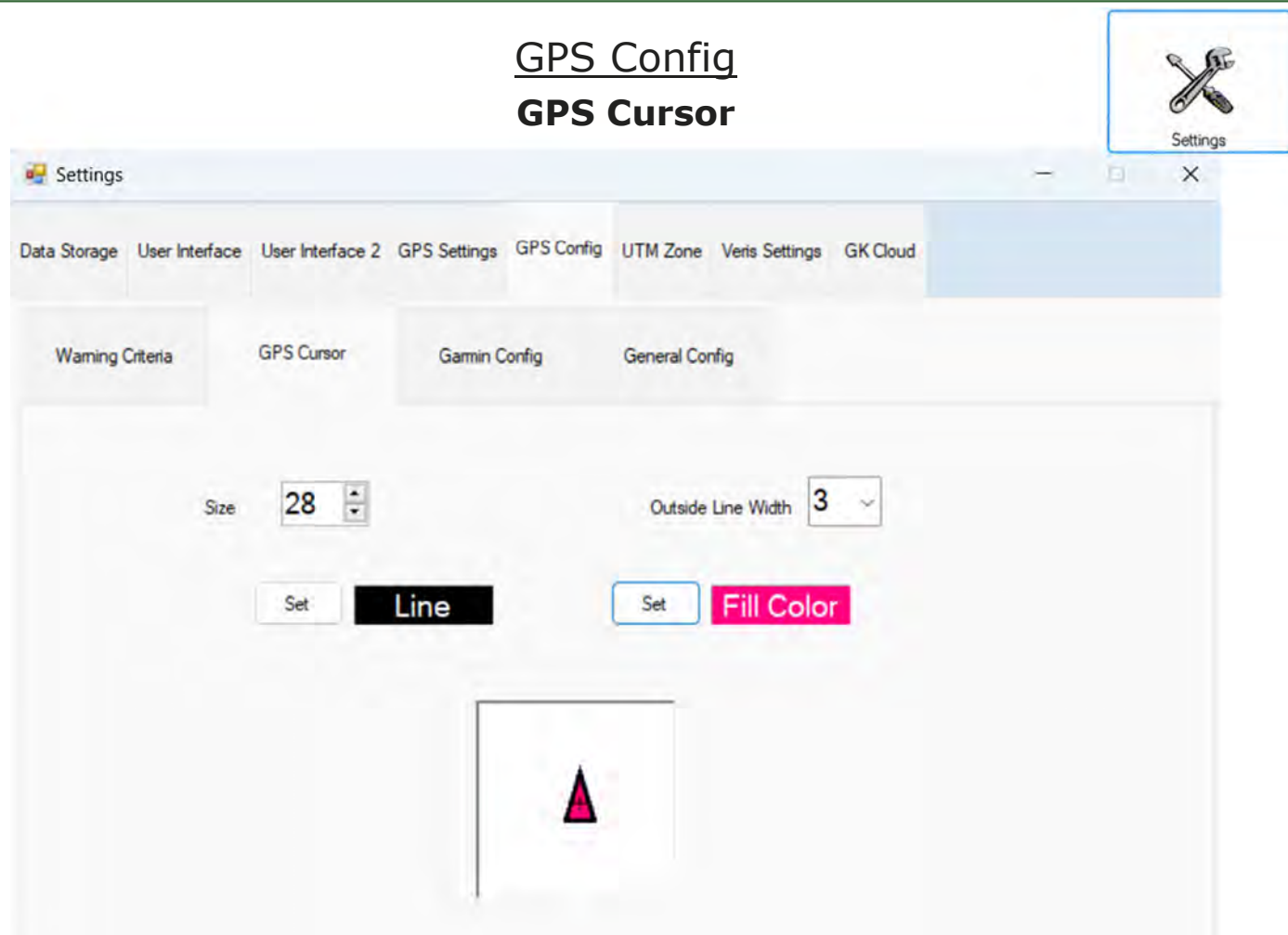
Vertical Error Less Than - Logs data with Vertical Error less than this number (ex-0.10 meters)

Continue Logging and Mark Operations if these criteria are not met.

Checked Allows you to continue logging if there is any valid GPS signal

Not checked the software will stop ALL logging & application functions.

Settings Window



Above are optional setting, not software defaults.

Size - Number of "Pixels" tall (not feet) the GPS Cursor will be. Size preference is relative to your Screen Resolution.

Outside Line Width - Number of "Pixels" wide the GPS Cursor's boundary line will be.

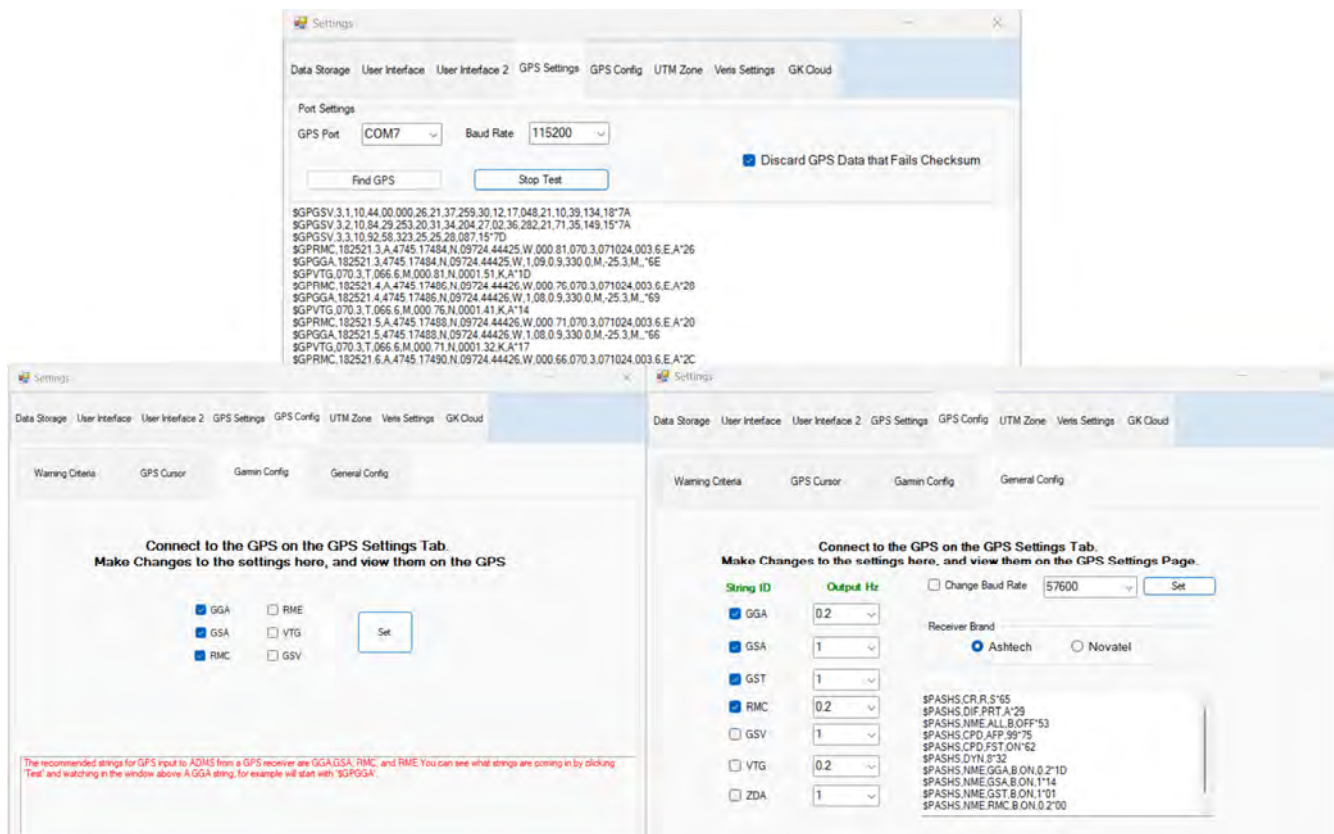
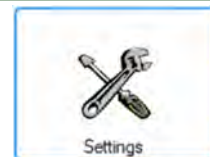
Line Color - Color of GPS Cursor's boundary line. Set to your preference. Think about background map colors; contrast is good.

Fill Color - Color of Cursor fill. Set to your preference. preference. Think about background map colors; contrast is good.

The "Map Window" or "Log & Sample" window must be closed and re-opened if you are trying to adjust these settings with these windows open. Otherwise, these settings will not take effect.

Settings Window

GPS Config Garmin Config & General Config



Above settings recommended if working with one of these three GPS receivers: Garmin, Ashtech, or Novatel.

To use these options you must have the "GPS Settings" tab in the "View GPS Data" mode. This means that GPS data is "STREAMING" across the viewing area of the screen. Then go to the "GPS Config" tab and to either the "Garmin" or "General" Config settings tab.

Check on the data strings you want the device to put out.

Set the Hz rate (Data strings per second)

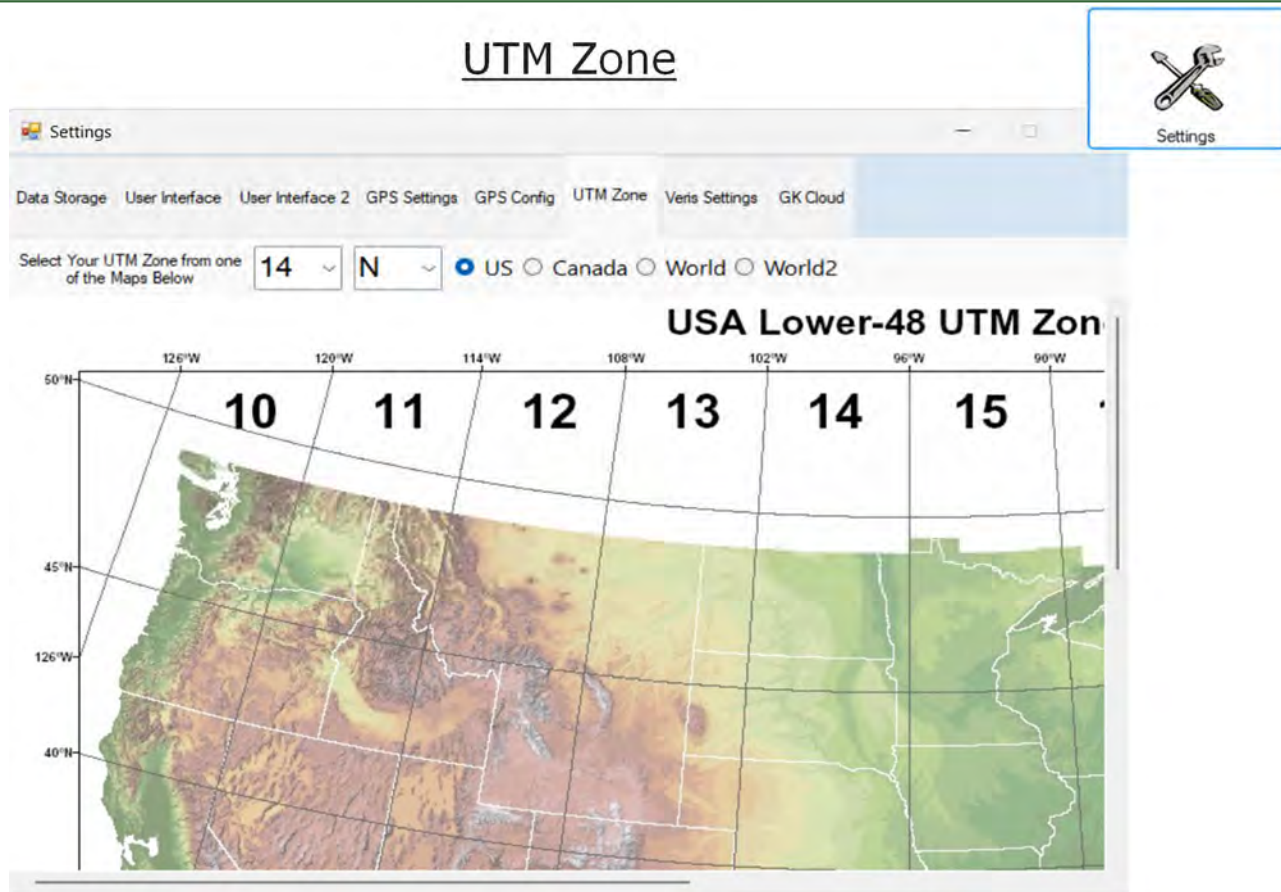
2 = 1 data string every 2 seconds or 1 string every 2 seconds

1 = 1 data string every 1 second or 1 string per 1 second

0.2 = 1 data string every 0.2 seconds or 5 strings per 1 second

If you want to change the baud rate check the box and adjust the rate. Click the "Set" button after the new desired Baud rate is selected.

Settings Window



Use this tab to choose the UTM Zone for the area you are mapping in. One of the major drivers for what UTM you should use is FSA-NAIP imagery. It is suggested to set your UTM Zone to match what UTM Zone is assigned to the FSA-NAIP imagery you are using. If you are in an area with no NAIP imagery, use the UTM Zone of the Landsat data that best fits your area. Contact GK Technology, Inc. support staff if you have questions.

UTM - Universal Transverse Mercator - A projected coordinate system that divides the world into 60 north and south zones, 6 degrees wide. This is what everything is projected in within ADMS. Setting the correct UTM zone is critical to ensure location data is accurate.

N vs S - Beside the UTM number is a N/S dropdown for Northern Hemisphere vs Southern Hemisphere. Choose the correct hemisphere for your mapping needs.

Other Notes on Projection and Units for ADMS:

- Vector data (SHP) files can exist in UTM or LAT/LON coordinate systems and WGS84 or NAD83 spatial reference systems.

NOTE: upon either "Save" or "Save As" all SHP Vector files are converted to LAT/LON-WGS84.

- Raster data or Images coming into ADMS must be in UTM coordinate system and WGS84 or NAD83 spatial reference system. ALL UTM objects must have the units in METERS (for Northing / Easting).

The use of LAT/LON on the Vector-SHP files and UTM on all Raster data is done to confirm your projections on all maps and keep you from using maps in the WRONG projection.

Settings Window

GK Cloud

The GK Cloud enables file transfers from ADMS to the GK Field Mapper app, available on Google Play and the App Store.

You can create a new GK Cloud account in either ADMS or the GK Field Mapper app. The same login credentials work for both.

To set up a GK Cloud account in ADMS:

1. Enter an email and password.
 2. Select a Field Structure:
 - *Consultants Package Users:* Choose "Client - Grower - Farm - Field"
 - *All other users:* Choose "Grower - Farm - Field"
- Note: Field Structure selection is permanent. For changes, contact GK Technology office.*

Once complete, click "New Account."

Download GK Cloud Helper - This app runs in your taskbar tray as "GK Cloud Sync," automatically syncing any file or folder changes to your GK Cloud.

Account Management

- **Change Email/Password:** Click the respective button to update.
- **Delete Account:** Click to delete all data on the GK Cloud.

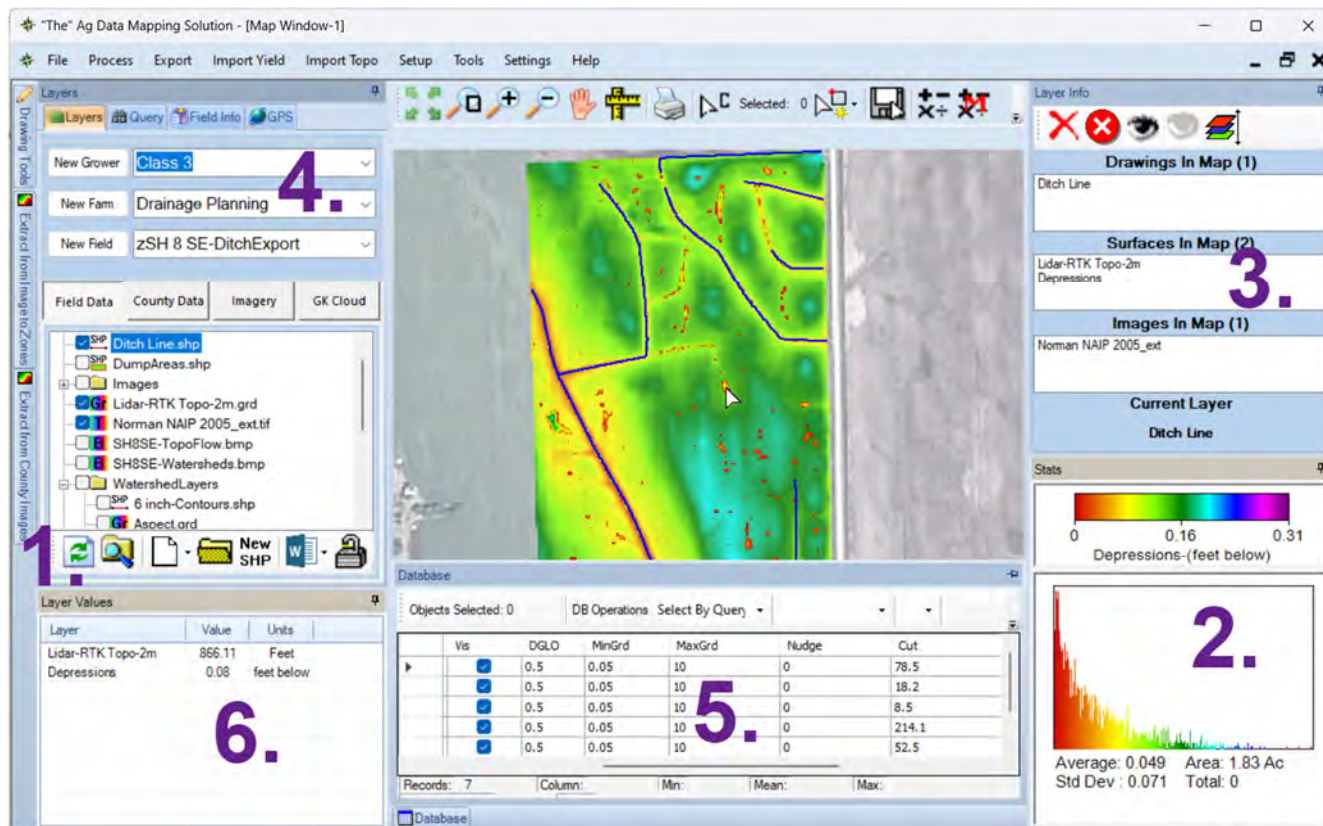
Advanced Settings

- **Use gRPC:** Default setting appropriate for almost all operating systems.
- **Use REST:** Choose if you are running Windows 10.

GK Cloud Website: <https://cloud.gktechinc.com/>

Window Dock Settings

Within ADMS there are many different window configurations. Depending on which unlock you have there may be different panels available to you. At a minimum there will be (1)-Side Bar // (2) Stats// (3) Layer Info // (4) Layers // (5) Database // (6) Layer Values. By default the Layer Selection panel is pinned open when the software first is started.



Drawing Tools— The drawing tools window has tools to merge polygons together to create poly-polygons as interior or exterior polygons, clipping, dissolving, unions, move, copy & more.

Stats—This panel will show layer statistics of the active surface layer.

Layer Info—This breaks apart the layers that are loaded into the software in three different categories: Drawings in Map, Surfaces in Map, and Images in Map. In this panel layers can be cleared, made active, and re-ordered.

Layers—This panel has the data tree in it along with the query tool and GPS.

Database—The database gives the user access to the database (.dbf) in a SHP file, or a attribute table in a CSV. Data can be queried, sorted, added, deleted, and have math operations performed on it.

Layer Values—Show the Surface Values under mouse pointer of all Surfaces checked on.

Docking the Windows

Each of these windows will have a thumbtack icon in the top right corner. If the thumbtack is in the "Pinned" position, the window will be permanently docked open. This can be useful for certain types of data processing and allow for easier access to some of the toolbars. Once pinned open the map window and toolbars will automatically resize.



Unpinned



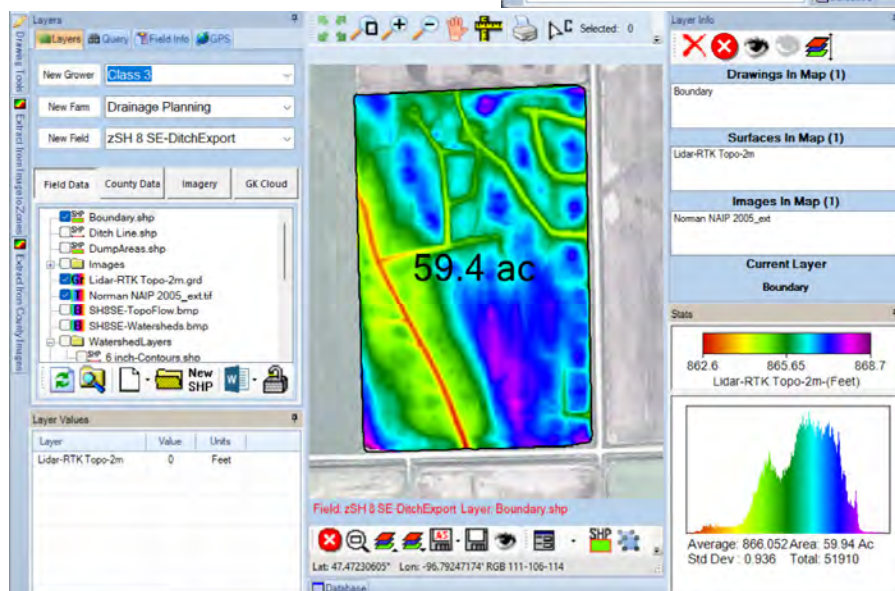
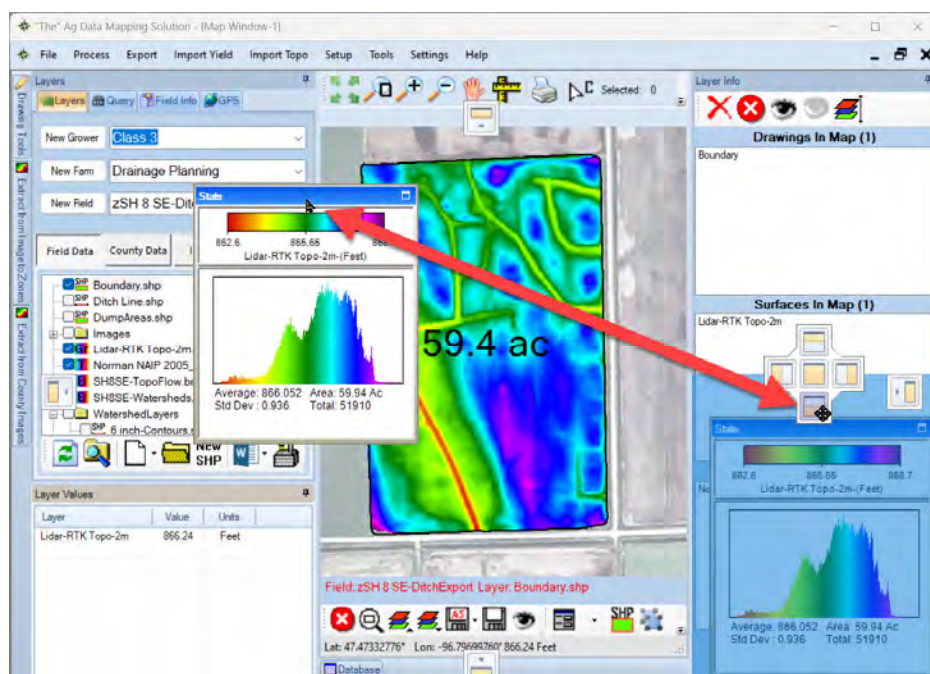
Pinned

Window Dock Settings

These panels can also be docked inside each other or moved to a different location. This gives the software users many options to fit their preferences.

To dock or move a panel first open and pin everything you want open permanently. Next click on the panel you wish to move. For this example the statistics window will be used and get docked under the Layer Info Panel. This allows the user to see all the layers that are loaded and allow for easy visibility to layer statistics.

- Click on Layer Info to open it followed by the thumbtack to dock it open.
- Click on the Statistics to open the window over top of the Layer Info.
- Left click on the window header to make a four way crosshair cursor appear.
- Hold and drag the window out of the side to where you want it. In this example will want to dock it under the Layer Info so drag it to the bottom of layer info. Once there it will show a preview of it snapping in place.
- Once you see it snapping in place let go of the cursor. It will then be docked in place.



After docking now all the layers are visible that are currently turned on within ADMS.

The histogram is easily visible for the surface layer turned on in the map window.

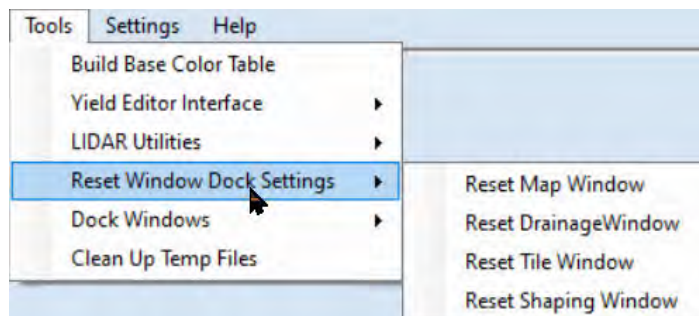
Window Dock Settings

Resetting Window Dock Settings

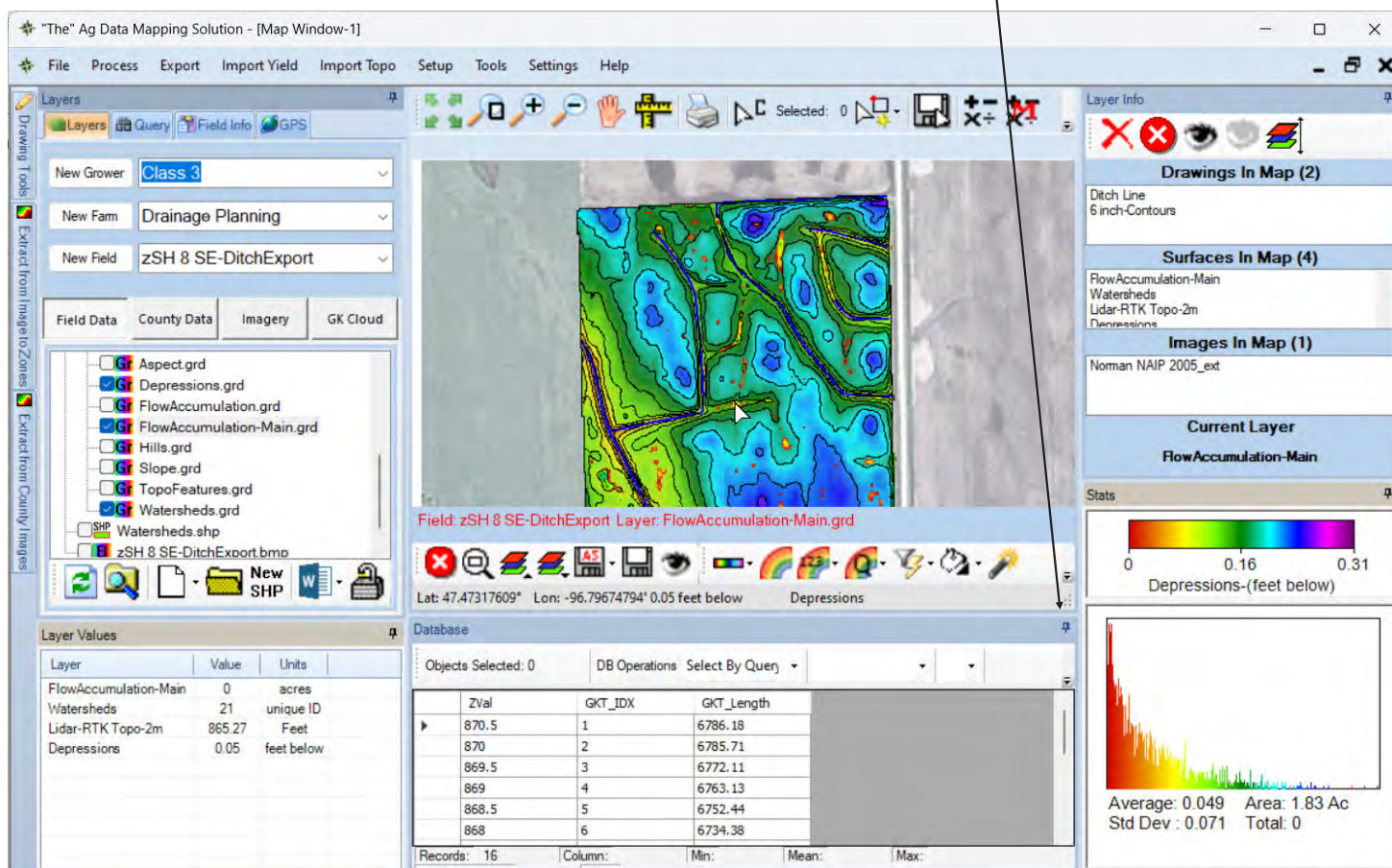
Sometimes when working with different windows one will “disappear.” What actually happens is a panel will get moved behind the main window and it can’t be accessed. Also, if the windows are in a configuration that you aren’t happy with they can be reset.

- Go to the to Menu bar at the top of the window select “Tools” & “Reset Window Dock Settings” & choose —

- Rest Map Window
- Rest Drainage Window
- Rest Tile Window
- Rest Shaping Window



- A window will appear that says “Done.”
- Open the Map Window. All the panels will be docked the same way they were when the software was first installed.
- NOTE: If you want the “Database” hidden, Click on the Thumb Tack in the top right of the “Database” window to Collapse / Hide the “Database”.



Layers Tab - Toolbar

Layers Tab - Lower Toolbar



Refresh Tree - Tell ADMS to look at the File Explorer Folder and see if there is any new data in the folder to show in the ADMS data tree.



Explore This Folder - Whatever folder data is showing in the "Data tree" check box area. Clicking this button will open into Windows File Explorer that contains this data.



Create New Layer From Template - Shows a list of Saved Templates. Click on a template name will create a blank file in the data tree and Check it on.



Create New Folder - Creates a folder in whatever data location you are working. Opening a Naming dialog and saving a blank folder in that location.



Create New SHP File - Opens window to create new & unique SHP file, also can create / save New Templates. See -Create New SHP File section.

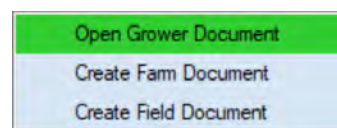


Create/Open GFF WordDoc - Creates a blank Word document to save comments & information. Stored in G/F/F.

Clicking on dropdown-

- If highlighted Gray—Clicking will Create Grower / Farm / Field (G/F/F) "word.docx" at appropriate folder level.

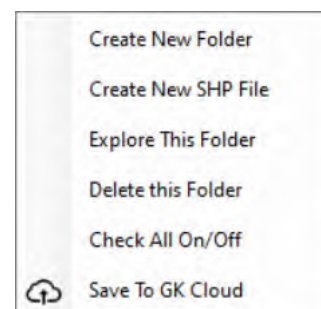
- If highlighted in Green—Clicking will Open the selected G/F/F the "word.docx".



If the tree is greyed out because a layer load failed for some reason, this will unlock it. - Self Explained.

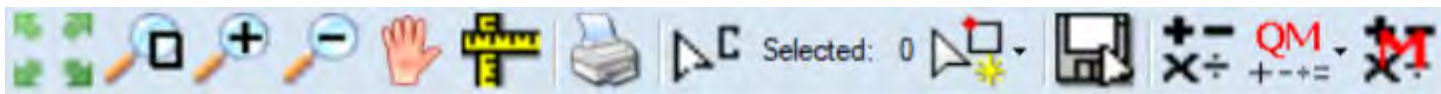
Right Click - Folder Icon

- **Create New Folder / Create New SHP File / Explore This Folder**—Same as above.
- **Delete this Folder**—Deletes folder & contents in ADMS & File Folder Explorer. (Generally going to PC "Recycle Bin")
- **Check All On/Off**—On Folders the "Check Box" does nothing. Choosing this option will turn on/off all the files in a folder.
- **Save To GK Cloud**—Moves all the data in folder over to GK Cloud. Use with caution. See GK Cloud section.



Top Map Toolbar

Map Window Toolbar



Zoom to Project Extents - Zooms out to the full extent of ALL the layers that are open.



Zoom to Rectangle - Zooms to the user drawn rectangle on the map.



Zoom In - Doubles the "ZOOM" extents, zooming IN on the center of the Map Window area.



Zoom Out - Doubles the "ZOOM" extents, zooming OUT on the center of the Map Window area.

Mouse Scroll Wheel - Rolling the Scroll Wheel "ZOOMS" OUT / IN on the location of the mouse. Similar to the "Zoom In" and "Zoom Out" buttons.



Move - Click on the "Move" button and "Left Click", hold down and drag on the map - when you release the "Left Mouse Button", your image will move ("Right Click" to turn off tool).

Right Click/Drag - Right Clicking/holding and dragging your mouse in the Map Window area of the software will Slide or Move map. Similar to the "Move" button.



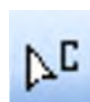
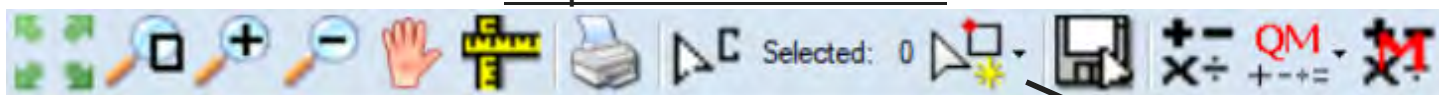
Tape Measure - Allows you to find distances and heading by left clicking around your screen.



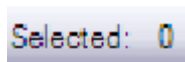
Print - Takes you directly to the "Print Map" function.

Top Map Toolbar

Map Window Toolbar



Clear Selection - Clears all selected items (clears **lime green objects** in the maps window (of **Active-"Drawing Layer"**)



Selected Objects - Shows you how many objects you have "Selected" in your Drawing Layer.



Area Replace - Sets mode of selection to add a single set of selections, hold Ctrl Key to add more selections & Shift Key to subtract selections, using either a click or click hold drag rectangle (of **Active-"Drawing Layer"**) **On by Default.**



Area Add - Sets mode of selection to add multiple selection areas, using either a click or click hold draw rectangle, hold Shift Key to unselect an object (of **Active-"Drawing Layer"**).



Area Remove - Sets mode of selection to remove multiple selections, using either a click or click hold draw rectangle, hold Ctrl Key to add an object (of **Active-"Drawing Layer"**).



Poly Replace - Sets mode of selection to add a single set of selections, hold Ctrl Key to add more selections, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**)



Poly Add - Sets mode of selection to add multiple selection areas, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**).



Poly Remove - Sets mode of selection to remove multiple selections, using left clicks to define object & right click to finish area (of **Active-"Drawing Layer"**).



Save Selected Objects to New Layer - Once you have "selected" your Points, Lines and Polygons from a layer, you can "Save" these items to a newly named layer.



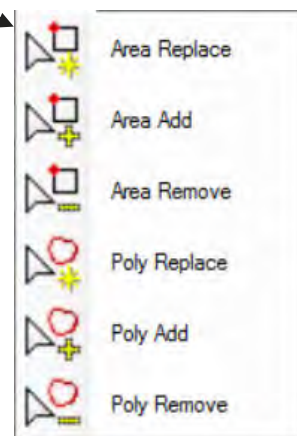
Multi Layer Map Math - Opens a new page in which you can write scripts to perform different functions and apply algorithms on your selected layers.



Multiple Output Map Math - Consultants only option. Opens a new page in which you can write scripts to perform different functions and apply algorithms on you selected layers. This function will allow you to create "Multiple Output maps" in one click from a script.



Quick Math - Consultants only option. Allows scripts to be quickly run from a dropdown menu that have previously been saved as a DLL.



Bottom Layer Toolbar

Bottom Toolbar—Basic Buttons



Remove Layer - Removes the selected layer from the map (does not DELETE layer). The layer can be turned on again later.



Zoom To Layer - Zooms to the extent of the selected layer.



Bring to Front - Moves the selected layer to the front of (or on top) all layers.



Send to Back - Moves the selected layer to the back of (or bottom) all layers.



Save As - Save



Save Changes - Quickly saves any changes made to the selected layer.



Layer Visibility On/Off - Turns the visibility of the layer on and off.

Address Bar and Active Layer

Cursor Coordinates—Values will be in either Latitude / Longitude **OR** UTM—Northing / Easting of the "Cursor" location (adjusted in the settings)

These values only show when drawing a LINE or POLYGON

SegBear: Line Segment Bearing = degrees for your last click to the cursor

Total Len: Total Length = length of line/polygon drawn from first click to cursor

1stPtBear: is First Point Bearing in Degrees

Value on the RIGHT is the distance across the "Map Window" (East to West)

Lat: 47.472229 Lon: -96.79926 LS Len:653 Foot LS Bear:2.3 Tot Len:6,337 Foo FP Bear:2 1.57 Miles
Field: 2006-Wheat Layer: Boundary.shp

The data in RED—is the **ACTIVE LAYER** — VERY IMPORTANT !!!!!

Tells what layer you are actively working on and what layer the buttons will affect or change.

Bottom Layer Toolbar

Drawings Buttons



Layer Display Properties - Opens the properties of SHP file allowing you to do the 5 items below— Style, Thematic, Label, Save As Template and Load Template.



Style - Changes the line & point attributes (color, sizes & fill).



Thematic - Opens a new window which allows the user to change color themes, adjust the number of color ranges, view statistics of the color ranges, and fill and size the points and lines.



Labels - Allows the user to view data from the objects data table in the viewing window as a label. Also allows label size, font, and color adjustment.



Save As Template - Once SHP is colored and labeled correctly. Click button and "Save" all the settings to repeat later.



Load Template - In a click, all "Saved Templates" will show up to be reused or applied to your SHP file. Also on Bottom Toolbar



Load Template - In a click, all "Saved Templates" will show up to be reused or applied to your SHP file. Also in Layer Display Properties.



or



or



Draw New Object - Once selected, you may draw a polygon, line or point (left clicking to draw and right clicking to end lines and polygons).



Decompose a selected PolyPolygon to its Component Polygons -

To use this button "select" a PolyPolygon then click the button. Suggest doing a "Save As" and rename the drawing layer. This will save the Polygon in it's component state.



Move Vertices of Selected Object - Is a TOGGLE on/off button that allows you to move the Vertices of Polygons and Lines. Object must be "selected" before using this button.



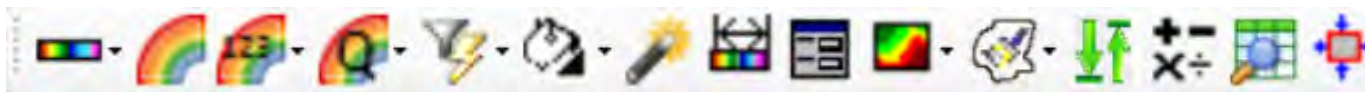
Intra-Layer Math - Allows use of simple mathematical functions on a column of the database.



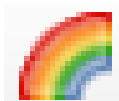
Delete Selected Objects to the Fiery Can of Death - Once an object of this layer is selected, this will delete the selected objects. Changes must be saved to be made permanent.

Bottom Layer Toolbar

Surfaces Toolbar



Change Color Theme - Changes the color pallet used on the selected layer.



Thematic Color - Opens a window to view image statistics, adjust color themes, number of zones, and adjust zone sizes automatically or manually.



Load Fixed Thematic Table - Applies a color theme that has been previously created to active layer.



Quick Zone Set - Applies the "Default Zone Color Table" from "Settings" to using the selected method of color grouping & the selected number of zones.



Smoothing Filter - Averages pixel values using surrounding pixel values making a smoother Raster Surface.



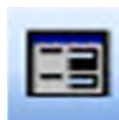
Fill Filter - Fills null values in and around the image by stretching or copying the value of the nearest pixel.



Modify Values Under Selected Polygons - Allows use of simple mathematical functions on selected layers using a combination of Polygons with Raster.



Trim End Values - Allows the change or deletion of values above, or below, a given value (making all the removed values equal to the trim value). Deleted values create a hole that will need to be filled.



Surface Properties - Tools to change "Units" and adjust the Geo Reference and Resolution of the Surface.



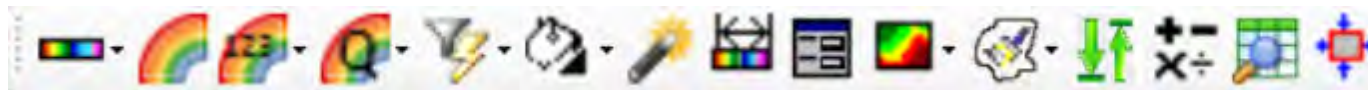
Crop Raster to Selected Polygon - To use this tool, FIRST SELECT A POLYGON. Once the polygon is selected and you have reselected the surface layer you want to cut to, this button will remove all the image outside of the selected polygon. ("Just this Layer" Don't forget to SAVE or SAVE AS!) ("All Visible" cuts all loaded surfaces and AUTO SAVES — BE CAREFUL)



Reduce Boundary Effect - Will go around the field boundary looking in X—Meters and stretch that value out over the selected distance.

Bottom Layer Toolbar

Surfaces Toolbar



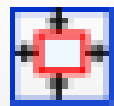
Invert - Inverts the Pixel "Values"



Intra-Layer Math - Allows use of simple mathematical functions on the active layer.

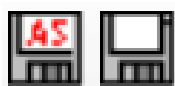
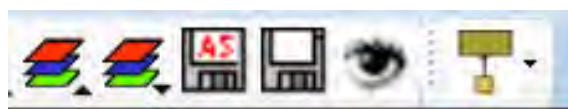


Correlation Matrix - Runs Correlation analysis on all loaded surfaces.

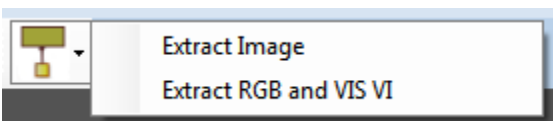


Crop Null Values - After cropping some raster's you may have "Blank Pixels" left in the Surface. Crop Null Values will remove these "Blank Pixels" and "Save" the object.

Web Layers Toolbar

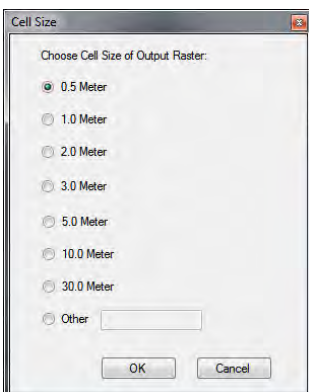


Save/Save As - When working with web layers both buttons do the same thing. They allow the layer to be saved back to "Field Data."



Extract Layer - This button gives two options.

1. Extract the RGB image & save it back to "Field Data"
2. Extract the RBG image as TIF file and extract the VIS VI as a GRD surface. Both of these layers will be saved back to "Field Data."



Choose Cell Size - This option appears after the above save options are used. Different resolutions can be chosen for the final image/extracted surface.

Bottom Layer Toolbar

Multi-Band Image Buttons (TIF & BMP)



Multi-Band Image (SID & JP2)



Image Properties - Allows the geo-referencing of an image to be adjusted.



Multi-Band Layer Display - Select which bands of light and what order they are displayed.



Equalize Image Display - Lighten or equalize the bands of light being displayed.



Reset Color Adjustment - Move the color bands back to their original settings.



Darken - Adjusts the brightness of the displayed image darker.



Brighten - Adjusts the brightness of the displayed image brighter.



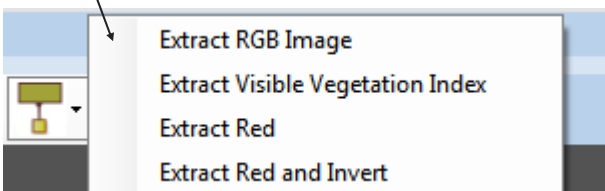
Single Band Extraction - Lets individual bands be extracted from an image. These are the bands that are adjusted in the "Multi-Band Layer Display"



Visual Index - Applies different vegetative indices depending on the type of image and bands available. For RGB images the option will be "RGB VI" (Red, Green, Blue Vegetative Index). If the image is CIR or has an Infrared band there will be a RNDVI and GNDVI option.



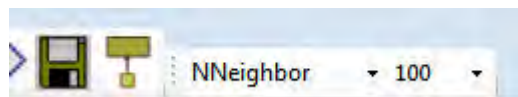
Extract From Image - *This is a consultants package only option. To use this button, must SELECT a boundary first. This button will give a list of different extraction types and after extraction they will be saved back to "Field Data." This button eliminates the need to extract a TIF from SID/JP2 first.



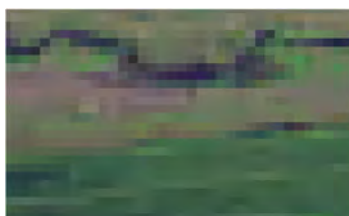
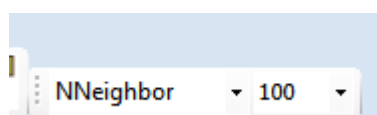
Bottom Layer Toolbar

Images - Re-Sample Display Modes

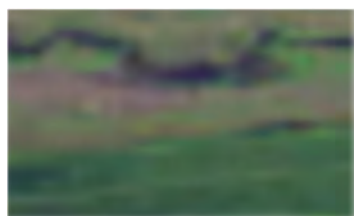
Both images and surfaces can have their appearance adjusted by changing the re-sample modes on the bottom toolbar. This affects only how the data is displayed and does not affect processing. (NNeighbor)



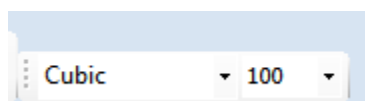
NNeighbor—Selects the value of the nearest point and does not consider the value of neighboring cells - *ADMS Default* -



Bilinear—Linear interpolation is done in one direction and then again in another direction



Cubic—Takes 16 pixels into account and generally has a smoother appearance than Bilinear or NNeighbor interpolation



Transparency Settings

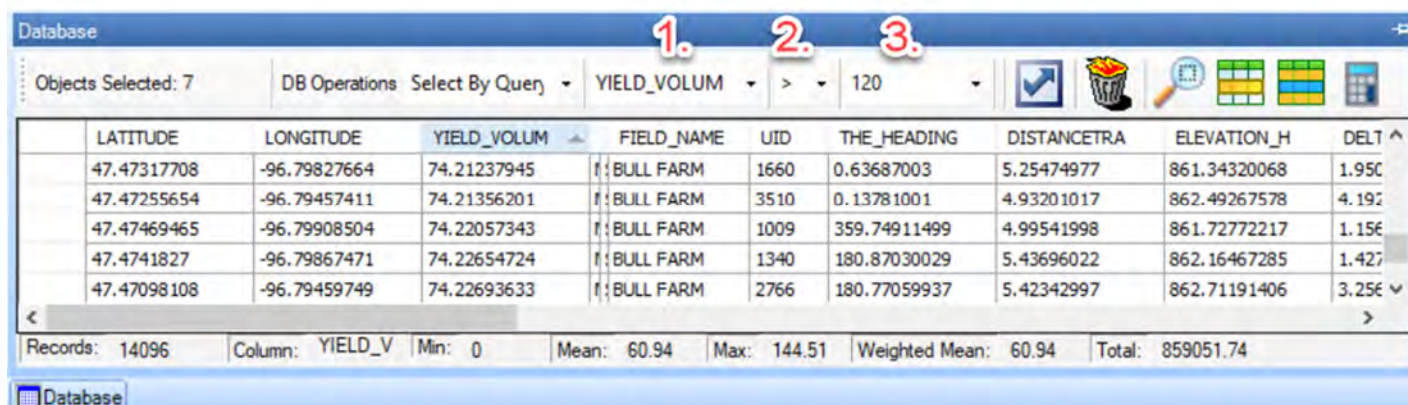
Both Images and surfaces can have their transparency adjusted for visual purposes. The number is in a Percentage (%) (100 = 100% Visible and 0 = fully transparent)



**Note: Windows 7 there are issues with the transparency settings for "Surfaces". Therefore, if layering with an "Image" the "Image" should be brought to the front and it's transparency should be adjusted.*

Database Tab—Tools & Buttons

Database Tab



Left Click on the “Database” tab to Open & Close the Database Window.

Values shown here are for the active SHP/DBF/CSV/BYF/KML (vector) file.

Top Tool Strip

Objects Selected- # of objects selected from query or manual selection

DB Operations- Choose column to Edit and query

Select by Query—set values and selects data/objects in file

Update Selected Values—once selected—set the new values for cells

Math Operations on Selected—once selected—(+ - x /) cell by values

Dropdown 1- Select “Column” by header name to edit

Dropdown 2- Math operation (Option: changes with tools)

Dropdown 3- Select or type the value to use



Run Query- Applies / Runs the function using values set



Firey Can of Death- Deletes Selected “Rows” of Data



Zoom to Selected Objects- Zooms Map window to the Selected Objects.



Show Selected Only- Hides all the “non” selected items.



Invert Selected- Inverts the selection

Database Tab—Tools & Buttons

Database Tab Cont'd

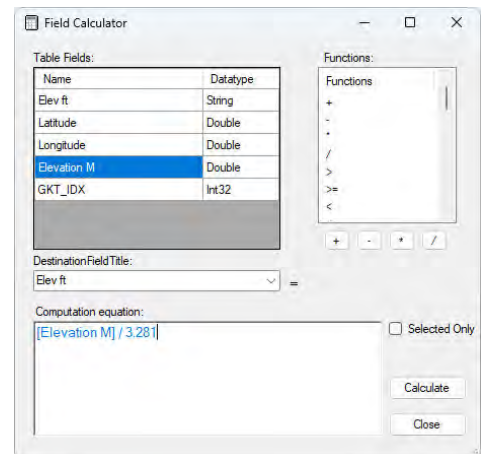


Attribute Editor

The attribute editor is used to calculate between multiple columns and add the results as a new column if desired. In the example below, a shapefile containing elevation data for some soil sample points that happens to be in meters, but it needs to be in feet. To convert it to feet;

	Elev ft	Latitude	Longitude	Elevation M	GKT_IDX
►		47.46723932	-98.1441378	15782	1
		47.46568151	-98.14435224	4723.68	2
		47.46478858	-98.143202	4702.38	3
		47.46663413	-98.13724863	4690.42	4
		47.4648398	-98.13653137	4701.07	5
		47.46745457	-98.13952495	4707.59	6
		47.4659862	-98.14086299	4716.06	7

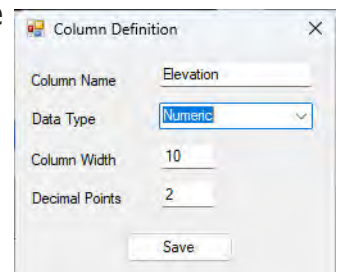
1. Click on the Attribute Editor button 
2. Click on the "Elevation M" column name in the editor to add it to the calculation window at the bottom.
3. In the Functions box you will see many mathematical symbols that can be used. Click on the **Forward Slash** for division and it will be added to the calculation window.
4. Under the Destination Field Title select **Elev ft**. This will cause the resulting values to be placed under the Elev ft column.
5. Click inside the calculation window and enter 3.281
6. Click **Calculate**
7. Click on the Database tab to minimize it and click Save to ensure the new values are saved.



	Elev ft	Latitude	Longitude	Elevation M	GKT_IDX
►	4,810.12	47.46723932	-98.1441378	15782	1
	1,439.71	47.46568151	-98.14435224	4723.68	2
	1,433.22	47.46478858	-98.143202	4702.38	3
	1,429.57	47.46663413	-98.13724863	4690.42	4
	1,432.82	47.4648398	-98.13653137	4701.07	5
	1,434.80	47.46745457	-98.13952495	4707.59	6
	1,437.38	47.4659862	-98.14086299	4716.06	7

If "New Field" is left in the Destination Field box a new field will be created with the calculated values.

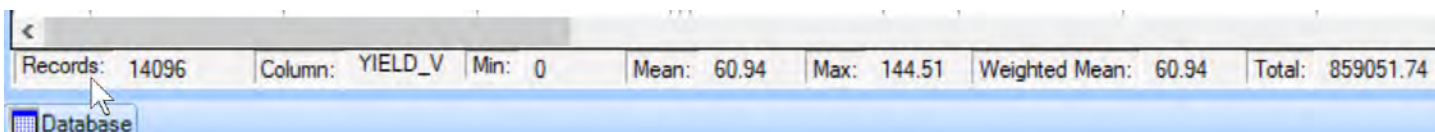
1. Enter a name for the new column
2. Select a Data Type
3. Select a Column Width
4. Select the number of decimal points
5. Click **Save** to finish the process



	Elev ft	Latitude	Longitude	Elevation M	GKT_IDX	Elevation
►	1,429.57	47.46663413	-98.13724863	4690.42	4	1429.57
	1,432.82	47.4648398	-98.13653137	4701.07	5	1432.82
	1,433.22	47.46478858	-98.143202	4702.38	3	1433.22
	1,434.80	47.46745457	-98.13952495	4707.59	6	1434.8
	1,437.38	47.4659862	-98.14086299	4716.06	7	1437.38
	1,439.71	47.46568151	-98.14435224	4723.68	2	1439.71
►	4,810.12	47.46723932	-98.1441378	15782	1	4810.12

Database Tab—Tools & Buttons

Database Tab



Column Summary (Bottom Values)—below the bottom scroll bar (left/right) Gives statistics about the “selected” column header, Values are—Min, Mean, Max, Weighted Mean & Total, also Total Area on polygons.

NOTE 1— Clicking on the Column header will “sort” the column

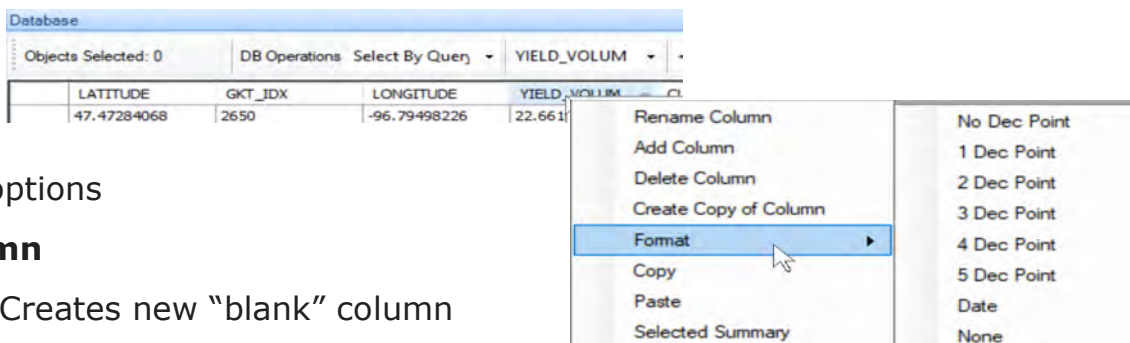
Ascending / Descending—Click again—Descending / Ascending

NOTE 2 – Stats here will NOT update until you click on a new header.

** Even between different SHP files. **

Right Click on Database Column Headers

Use Caution
Setting may be
PERMANENT



Right Click-Header options

Rename Column

Add Column—Creates new “blank” column

- Data Type - Date-Character-True/False-Numeric
- Column Width - # of Character spaces for column
- Decimal Points - If Numeric, how many decimal points are saved

Delete Column

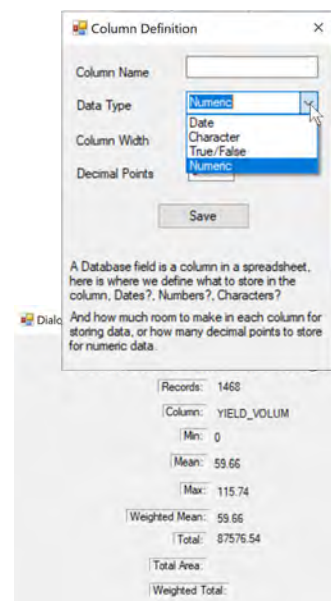
Create Copy of Column

Format - Removes extra decimal points (permanent)

Copy - Selected Columns to “Clipboard”

Paste - Values from other columns or excel

Selected Summary - Opens “DialogStats” of selected column



Database Tab—Tools & Buttons

Database Zooming / Selection Buttons



Zoom to Selected Objects

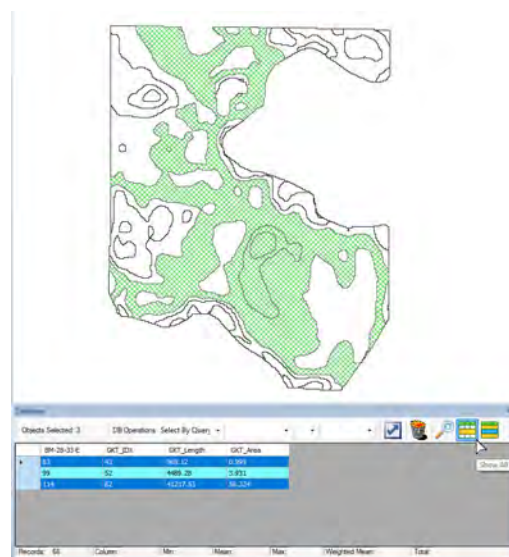


This button allows you to select a feature in the shapefile and zoom to its location on the map. This works well in large datasets where it is difficult to locate the selected object because of its small size or few data points.

Show Selected Only



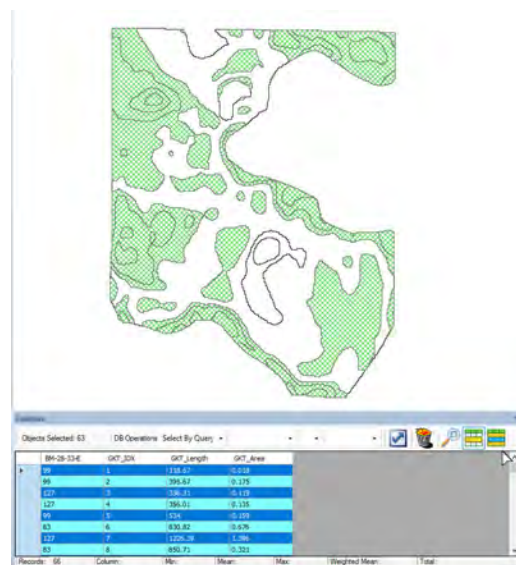
1. Turn on a shapefile.
2. Click inside the shapefile to select polygons to be viewed.
3. Open the "Database" tab below the bottom toolbar and select the "Show All" button.
4. Now only the information for the polygons that were selected will show in the "Database" tab.



Invert Selection



5. With polygons already selected in the previous steps, clicking on the Invert Selection button will make the unselected polygons selected.



Vector Files

Vector Files & ADMS

Vector files simply put are points, lines and polygons. There are many formats of this data, we support (**SHP "Shapefile" / DBF / CSV / BYF / KML**) files directly in ADMS without needing to do special "import / conversions", simply put the file in a "Field Folder", "Refresh Tree" and the files will show in the list to be checked on and used.

Projection: ADMS prefers and will convert data as you "Save / Save As" into EPSG (European Petroleum Survey Group) Code: 4326 (or WGS84-Lat-Lon). Data coming in to ADMS in other Projections will need to be "Reprojected".

ADMS Preferred Format—is SHP file (Shapefile format). Shapefiles need a minimum of .SHP file & .SHX file & .DBF file to be a valid Shapefile (SHP). If you are Editing or amending other Vector File formats. Convert them into a SHP format before editing. Tools may not work with all Vector file formats, SHP is preferred!

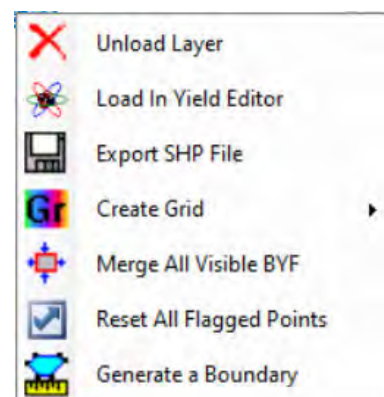
ADMS Manual is generally written using SHP files for the Vector file format!

DBF / CSV files: will give you similar "Right Click" menus as SHP file. (not all work)
- Again, suggest converting to SHP file before Editing.

BYF (Binary Yield File/Format):

BYF is a file created by the USDA—Yield Editor Software. BYF has a unique "Right Click" menu.

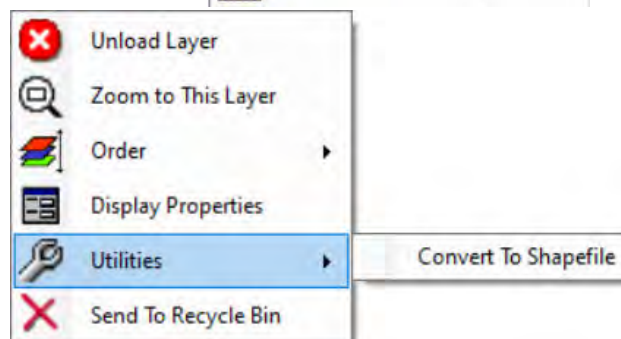
Note some tools on the Vector Toolbar may not work with this format.



KML (Keyhole Markup Language):

KML is a file created by Google and works in Google Earth and Google Maps (and other software). KML has a unique "Right Click" menu.

Note some tools on the Vector Toolbar may not work with this format.



Drawing Layers (Polygons, Lines, & Points)

In Ag Data Mapping Solution, there are 4 ways to create/add Drawing Layer Data. Drawing Layer Data can consist of Boundaries, A-B Lines, Tile Lines, Sample Points, Sample Grids, As Applied Maps, some Application Maps & many more files.

NOTE: All the below examples are using the "Map Window". Other windows in ADMS may not have the same functionality.

- 1. Import from Another Source**
- 2. Extract Drawing Layers from a Mass Collection
(FSA-CLU Field Boundaries/Roads/Yield Data)**
- 3. GK Drawing Tools-Hand Drawing**
- 4. Collect with GPS Using Ag Data Mapping Solution**

- Importing from Another Source

Polygons (boundaries), lines and points that have been collected using another source such as a tractor, pickup, ATV or hand drawn (in other software), all of these coming from a different software packages. Export the files out as Shapefiles (.shp) and save them into the appropriate Grower / Farm / Field (C:/GKData/xxx/xxx/xxx). If you are copying these Shapefiles, make sure you get all the extensions of the shape file (**Min requirement .shp, .shx & .dbf**). Paste them in to the appropriate Grower / Farm / Field (C:/GKData/xxx/xxx/xxx). ADMS does handle "Imports" from certain sources. Generally, you need to have the original data cards from the equipment. Find out by clicking on the "Import" tab while using "Map Window".

Drawing Layers (Polygons, Lines, & Points)

Extracting Drawing Layers from Selected Objects (FSA - CLU Field Boundaries/Roads/Yield Data)

- To use this function "SELECT" the Drawing object to be "SAVED" or "CREATED"
- There are three ways of selecting these objects. To use them first turn on the drawing layer that contains the objects to be saved (CLU-Yield Data-Roads-Topo Data). Key to this process is watching your **"ACTIVE LAYER on the Bottom Toolbar"**

1. Select by Area—Simply left clicking on or in the object or drag a rectangle around the objects to select



2. Selecting by Poly—Basically drawing a boundary around the object.



3. Selecting by Database—Using the "Database" tab (below the map window) and choosing the object out of the dataset.

Database

The next examples will explain these functions.

Selecting by Click—(Example with "POLYGONS")

1. For this example, turn on FSA (CLU) field boundaries (Multiple SHP file Object).

2. Select **"Area Replace"** on the top toolbar.



**** Note:** This is selected by default when software starts ******

3. "Left Click" inside the Polygon (Boundary) you want. *Hold down the "Ctrl" key to select multiple objects.*

4. Note that Polygons have turned **"Lime Green"** showing they have been selected. *Cross hatching may disappear, but the boundary will stay "Lime Green"*

5. Top toolbar -note number of "Selected:" objects

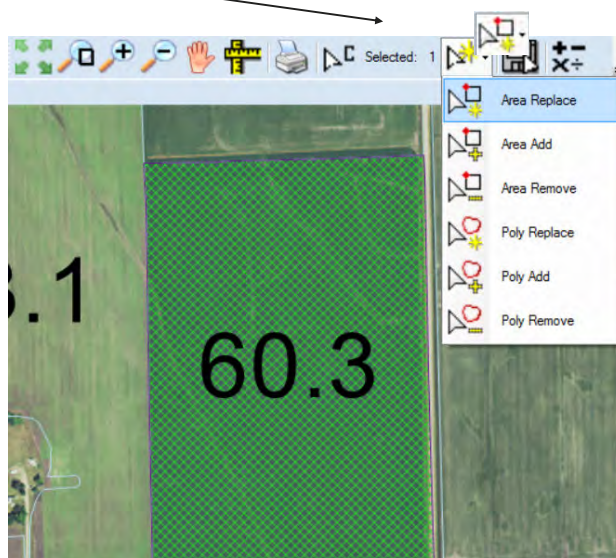
6. On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**.



7. This will open into a "Save" Window so that the selected objects can be saved to a new shapefile.

8. Notice it is saving back into your "Field" level data every time.

9. Name the object & click **"Save"**.



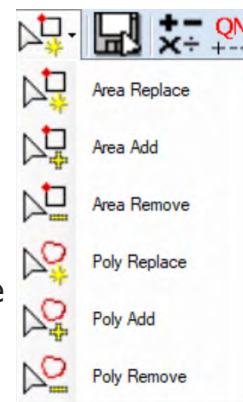
Drawing Layers (Polygons, Lines, & Points)

Extracting Drawing Layers from Selected Objects

(FSA - CLU Field Boundaries/Roads/Yield Data)

Selecting by Area—Example with "POINTS")

1. For this example, turn on Yield Data, Veris Data or Topo Data as "Points" Shape file.
2. Then Click  select either **"Area Add"** or **"Poly Add"**
3. Then follow the directions below the top Toolbar.
4. Note that the objects have turned "Lime Green" showing they have been selected.
5. Top toolbar -note the number of "Selected:" objects.
6. On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**. 
7. This will open into a "Save" window.
8. Notice it is saving back into the "Field" level data every time.
9. Name the object (***you MUST Re-Name the object***) & click **"Save"**.



Selected by "Poly Add"

Left Clicking Polygon

Selected by "Area Add"

Left Click on Point

Dragging a Rectangle



Drawing Layers (Polygons, Lines, & Points)

Extracting Drawing Layers from Selected Objects

(FSA - CLU Field Boundaries/Roads/Yield Data)

Selecting by Database—(Example with "POINTS")

1. For this example, turn on the yield data points.
2. On the bottom left corner of the screen, click on **"Database"** tab.
3. This will open the database of the "Active Drawing Layer" or the last active SHP.

Database

Objects Selected: 5583 DB Operations Select By Query YIELD_VOLUM > 40

	Latitude	Longitude	YIELD_VOLUM	FIELD_NAME	UID	THE_HEADING	DISTANCETRA	ELEVATION_H	DELTA_T
	47.47029769	-96.79503286	28.88093948	N S. BULL FARM	12	285.90750121	4.25584984	863.14892578	0.021
	47.47029692	-96.79504323	34.8067894	N S. BULL FARM	13	280.91751099	4.15743016	863.14892578	0.022
	47.47029698	-96.79505498	43.80432892	N S. BULL FARM	14	278.61749268	4.32146978	863.14892578	0.023
	47.4702984	-96.7950736	43.57194901	N S. BULL FARM	15	278.07751465	4.22305012	863.14892578	0.024

Records: 6017 Column: Min: Mean: Max: Weighted Mean: Total:

4. Selection Methods :

- A. By "Left Clicking" on the gray cell on the left side of the table. (Note the Database Row highlights and the Map Object turned "Lime Green" showing they have been selected).
- B. By holding down the "Shift" key and left clicking a row further down in the database, you can select groups of objects.
- C. By holding down the "Ctrl" key and left clicking a row and another row, you can select multiple individual objects throughout the database.
- D. Using the DB Operations : "Select by Query", you can select a "Column" and Query out objects (>,<,<=,>=,<= (on numeric columns)) and (=,<> (on character columns)), put in your values and click **"Run Query"**.

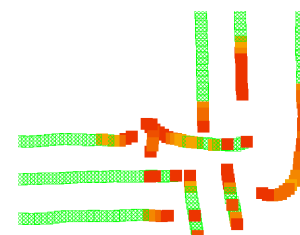
NOTE: The **"Object Selected:"** in the upper left hand corner of the Database window, this will tell you how many objects are selected in the Database.

5. On the TOP TOOLBAR, select **"Save Selected Objects to a New Layer"**.

6. This will open into a "Save" window.

7. Notice it is saving back into the "Field" level data every time.

8. Name the object (**you MUST Re-Name the object**) & click **"Save"**.



Drawing Layers (Polygons, Lines, & Points)

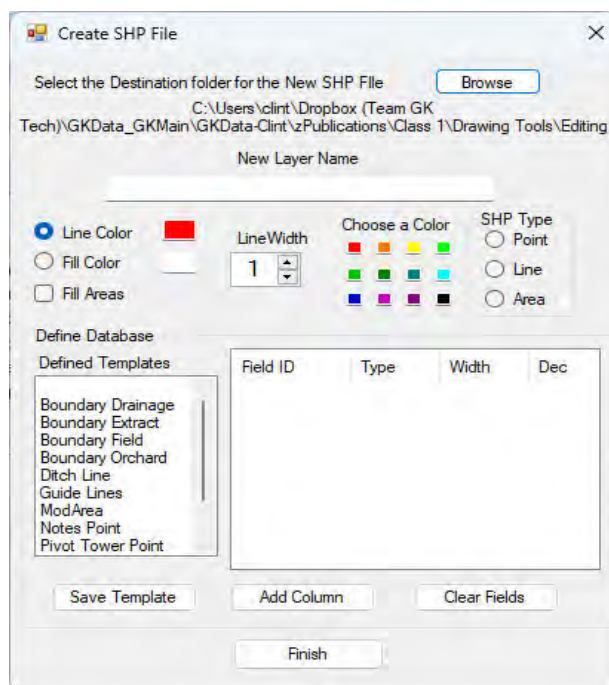
Create New SHP File – SHP Template

Although many shapefile templates are readily available, a specific shapefile may sometimes be needed to display features in a “non-standard” way. In such cases, a custom template or shapefile can be created.

The "New SHP" button, located at the bottom of the “Data Tree,” opens the "Create New SHP File" window, where you can design a new shapefile or template.

**New
SHP**

1. **Initiate the Creation Process:** Click the “New SHP” button located at the bottom of the Data Tree. This will open the “Create SHP File” window.
2. **Specify the File Location:** By default, the new file will be saved in the current Field Folder. To choose a different location, click the “Browse” button and select your desired directory.
3. **Name the Shapefile:** Enter the desired name for your new shapefile in the “New Layer Name” box.
4. **Select the Geometry Type:** Under “SHP Type”, choose the geometry type for your shapefile by selecting one of the radio buttons: Point, Line, or Area.
5. **Line Color:** In the “Choose a Color” section, select a color tile to set the desired color for your Point, Line, or Area features. The selected color will be displayed next to the “Line Color” radio button.
6. **Line Width:** Adjust the “Line Width” to make the features more visible.
7. **Fill Color** (for Area/Polygon type shapefiles): If you've chosen an Area shapefile, you can set a “Fill Color” by selecting a color from the “Choose a Color” section.
8. **Choose to Fill:** To fill the polygons with the selected color, check the “Fill Area” checkbox.



Drawing Layers (Polygons, Lines, & Points)

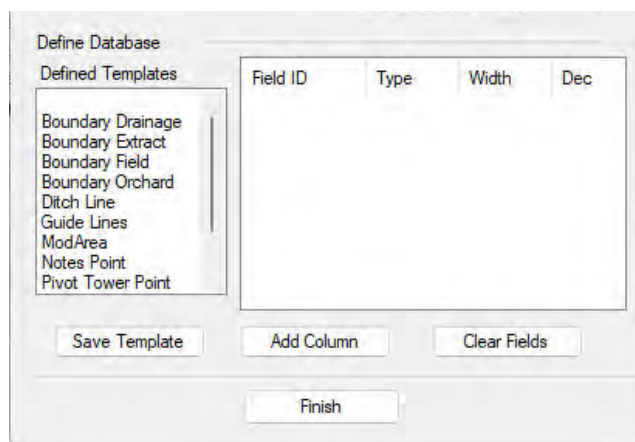
Create New SHP File—SHP Template

Defining Database Columns

The "Define Database" section allows you to design the database table associated with the shapefile.

Using Existing Columns

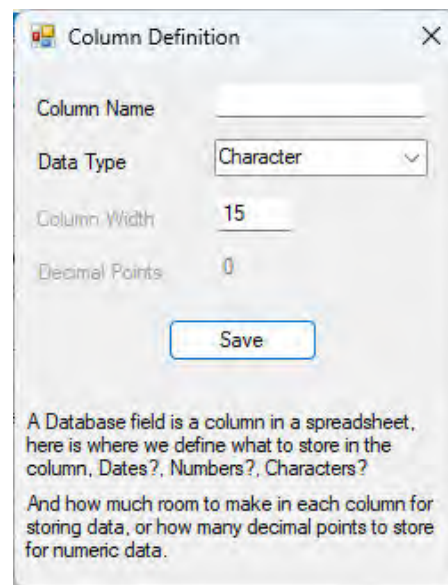
1. **Existing Columns:** Click on a template name in the "Defined Templates" list, the columns are automatically transferred to the window displaying the column information.



Creating Columns

If you prefer to create custom database columns instead of using the existing columns in a "Defined Template", follow these steps:

1. **Add a Column:** Click the "Add Column" button.
2. **Provide a Column Name:** Select a "Data Type" from the following options:
 - **Date:** Stores date values only.
 - **Character:** Requires text as the input. If Character is selected, specify the "Column Width" (maximum text length).
 - **True/False:** Creates a checkbox.
 - **Numeric:** Allows numbers only. If Numeric is selected, specify the number of Decimal Points.
3. **Save Settings:** Click "Save" to finalize the column.
4. **Starting Over:** To clear all database columns and start over, click "Clear Fields".
5. **Save as a Template:** To save the shapefile as a reusable template, check "Save Template" and assign it a name.
6. **Finalizing:** When all fields are set up as desired, click "Finish" to complete the process.



Drawing Layers (Polygons, Lines, & Points)

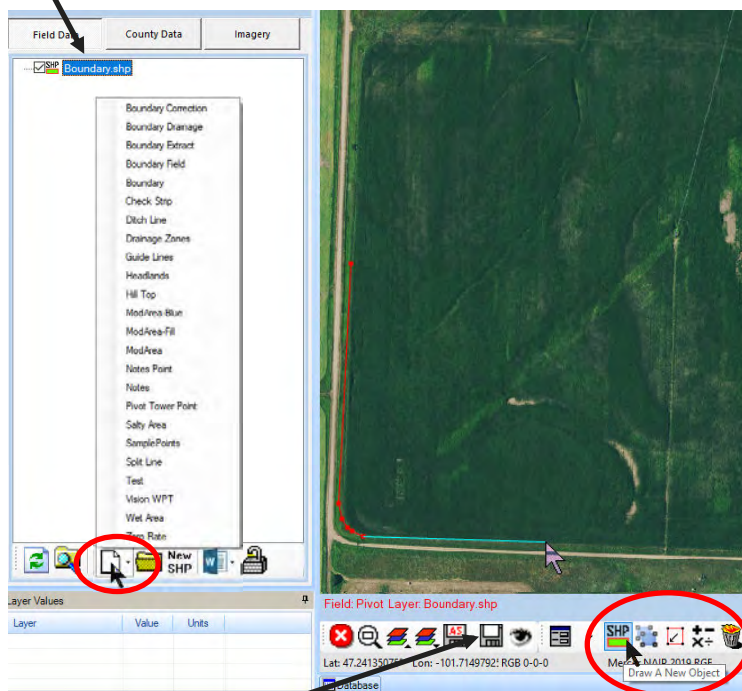
GK Drawing Tools - Hand Drawing Features

Hand drawing spatially accurate shapefiles like a field boundary, ditch line or sample point requires an accurate reference like a high resolution RGB County NAIP image to draw against in the background.

Drawing a feature

In this example, we will be describing how to draw a field boundary.

1. Locate the desired area or feature to be drawn on the background image.
2. Create a "blank" shapefile by clicking the "Create New Layer From Template" button. 
3. Select "Boundary" from the template list to draw a polygon. For a line, select something like "Guide Lines" and for a point select "SamplePoints."
4. In the "Data Tree" check  **Boundary.SHP** the if it isn't already and make sure it is the "Active Layer."
5. On the "Bottom Toolbar" click on the **"Draw New Object"** button. 
6. To start drawing, place cursor in the desired location and Left-Click to place vertices. Note: See HELP instructions below the top toolbar
7. To stop drawing, Right-Click to create the Polygon.
8. For multiple polygons, repeat 6—8. See section to create the "interior—exterior" polygons
9. Once finished drawing the "Boundary", click **"Save"** on the bottom tool bar.



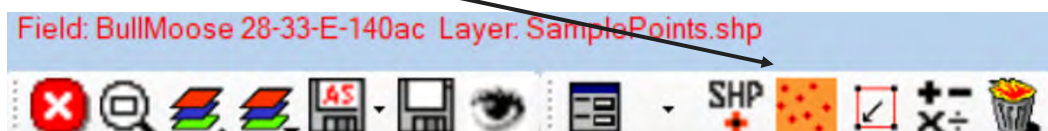
Drawing Layers (Polygons, Lines, & Points)

GK Drawing Tools - Hand Drawing (Multi-Point)

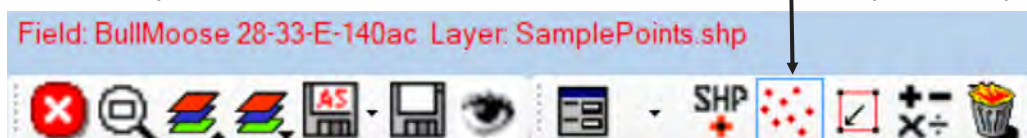
- Points (Draw Multiple points)

There are time you may want to mark many points on a field. In these cases you will NEED to have a "Surface.grd" or "Surface.bmp" built for the field. In this example "Zones ID.grd"

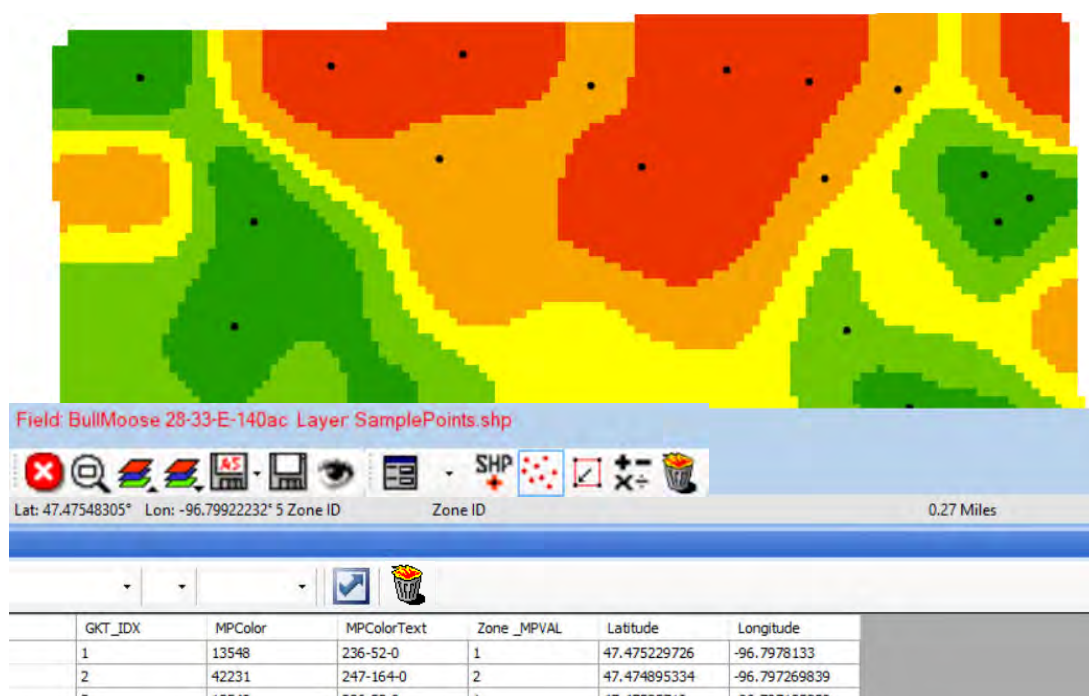
1. Select your Grower / Farm / Field
2. Check on the Surface.grd (ex. Zones ID.grd) (This tool will NOT work without a SURFACE Checked)
3. At the bottom of the "Data Tree" Select "Create New Layer From Template".
4. Select "Sample Points" from the list.
5. Check the "SamplePoints.shp" in the "Data Tree" ☒ SHP SamplePoints.SHP
6. Click "Multi Point Draw Tool" on the bottom toolbar below your map window. (toggle on/off)



7. Click out the points in the order you would want them sampled and in the spot you want sampled.
8. When you are finished deselect the "Multi Point Draw Tool" your new points will automatically save.



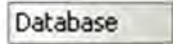
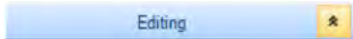
9. You now should have your custom points that look similar to the image below.
10. Once finished click "Save" on the bottom toolbar.

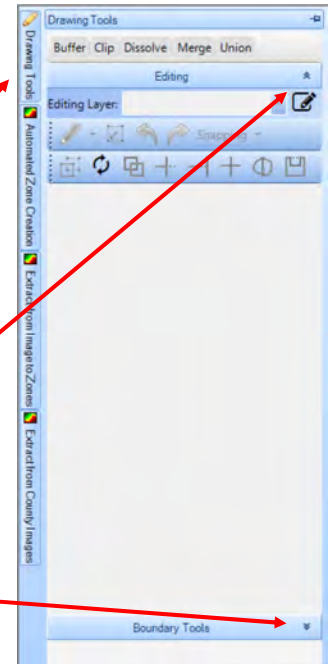


Drawing Layers (Polygons, Lines, & Points)

Drawing Tools Tab - Boundary Tools

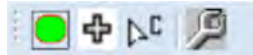
Exterior / Interior Polygons (Creating Poly-Polygon)

1. Turn on your Multiple Polygon Boundary.
2. Open the **"Database"** tab (lower left corner). 
3. Click on the row tabs in the "Database" that contain exterior polygons, this will highlight the whole row and the object will highlight "Lime Green" in the map window.
4. Click on the **"Drawing Tools"** tab on the Right side.
5. Click the Double Arrow on the Editing bar to minimize the Editing Tools 
6. Click the Double Arrow on the Boundary Tools bar to expand it



Multi-Polygon Builder

Exterior



- **Draw New Exterior Polygon** - Select to draw an exterior polygon in the shapefile and add it to the list



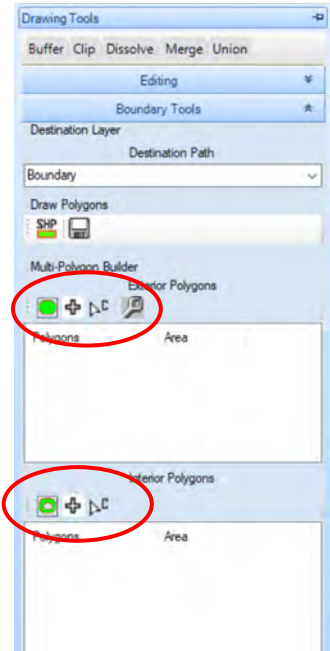
- **Add Selected Polygon as an Exterior Polygon** - Once the proper exterior polygons have been selected, click the Add button to add them to the Exterior Polygons list



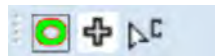
- **Clear Polygon Collections** - Clears any exterior polygon selections in the list



- **Merge Interior and Exterior Polygons to PolyPolygon** - Creates the polypolygon



Interior



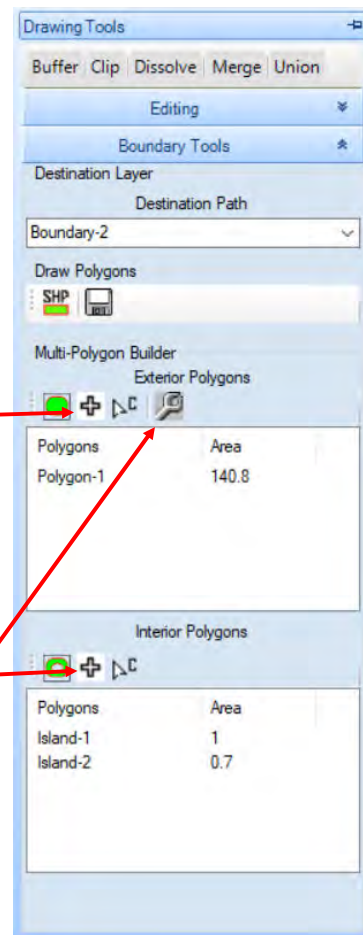
- **Draw New Interior Polygon** - Select to draw an interior polygon in the shapefile and add it to the list

Drawing Layers (Polygons, Lines, & Points)

Drawing Tools Tab - Boundary Tools

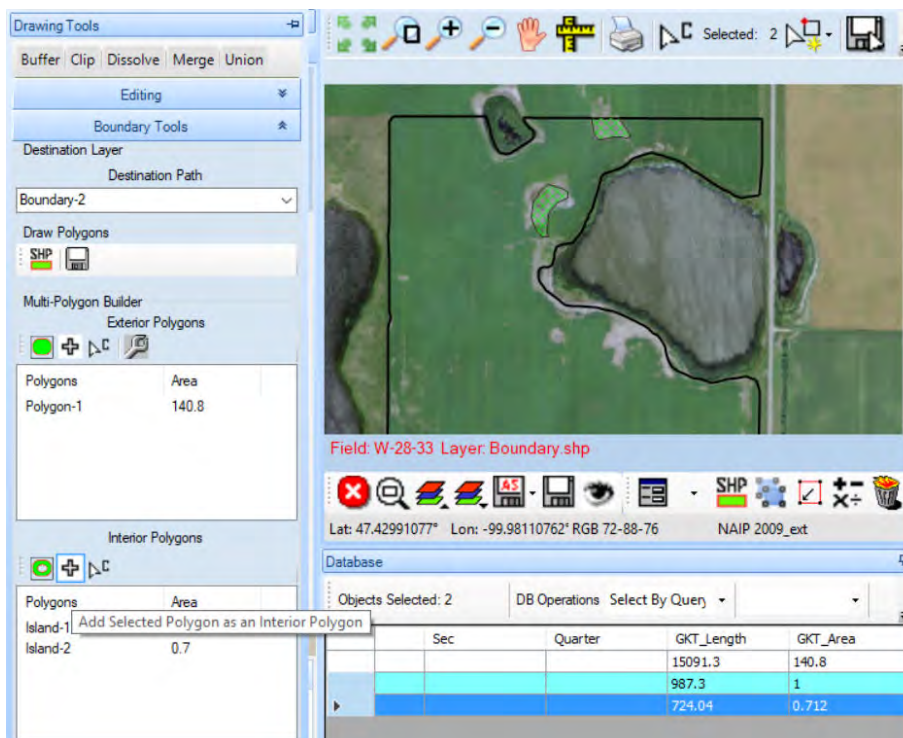
Exterior/Interior Polygons (Creating Poly-Polygon)

1. Suggest starting with a "BLANK Boundary.shp" as "**Destination Path**" (Ex. Boundary-2.shp)
2. Set "**Active Layer**" to Boundary.shp with Exterior Boundary
3. **Select** the Polygons to add in Map Window area
4. Click "**Add Selected Polygon a Exterior Polygon**"
5. Set "**Active Layer**" to Boundary.shp with Interior Boundary. This may be the same boundary.
6. **Select** the Polygons to add in Map Window area
7. Click "**Add Selected Polygon a Interior Polygon**"
8. Confirm the "**Destination Path**"
9. Click "**Merge Interior and Exterior Polygons to PolyPolygon**"
10. Click "**Save File**" and choose "**Save**"



Notes: "**Save File**" is a Save As process.

- If you skip step 1 and have "**Destination Path**" as "original Boundary.shp"
- There's an option to "Re-Name" the Boundary.
- This process may give you extra objects in the database and extra SHP Polygons.
- You can **Select** these objects and send them to the Fiery Can of Death.



Drawing Layers (Polygons, Lines, & Points)

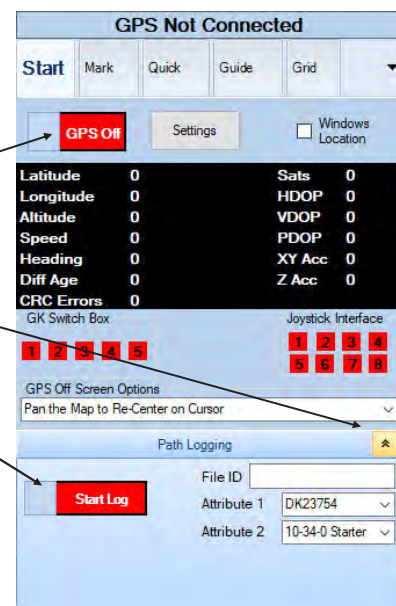
Collect with GPS Using Ag Data Mapping Solution (Map Window)

1. Turn on all layers you want to view for background maps
2. Check on "EXISTING" "Boundary" or "Ditch Line" or "Sample Point" if you want to add to Existing data.

- Connect GPS

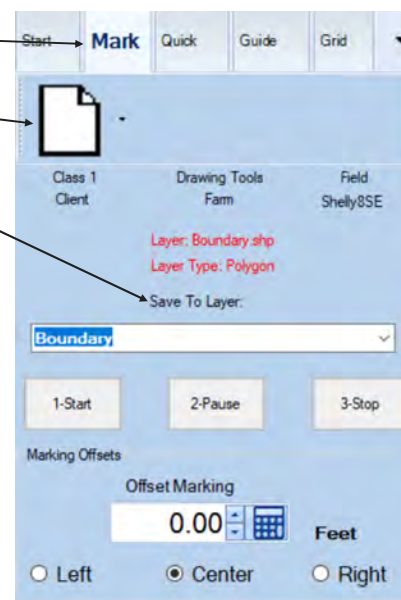
1. Go to the **"GPS"** tab.
2. Go to the **"Start"** tab.
3. Click **"GPS Off"** to change it to **"GPS On"**
4. Click the expand button on the **"Path Logging"** bar.
5. For Topography collection, check **"Start Log"**.

*NOTE: if "Logging" is **"ON"** you **WILL NOT** be able to turn on or off Layers or Data.*



- Marking Data

1. Go to the **"Mark"** tab.
2. For New Shape File **"Create Layer From Template"**.
3. For "Existing SHP" files, Click **"Save To Layer"**
4. Click **"Start"**.
5. **"Pause"** will allow you to go around wet un-drivable areas - click **"Continue"** button on other side of wet area.
6. Click on **"Stop"** once you have reached your finish point.
7. The object will automatically "Save".
8. Repeat steps 1-6 drawing in all the Interior & Exterior Boundaries for this field.
9. To view acres, make sure the object is the **"Active Layer"**.
"Double Click" on the object - or click on the **"Database"** tab for acres.
10. For fields with no interior boundaries, you are finished.
11. For Interior Boundaries, go back two pages **"Exterior/Interior Polygons (Creating PolyPolygon)"** section



**** More GPS information in the "Using GPS Controls" Section of the manual. ****

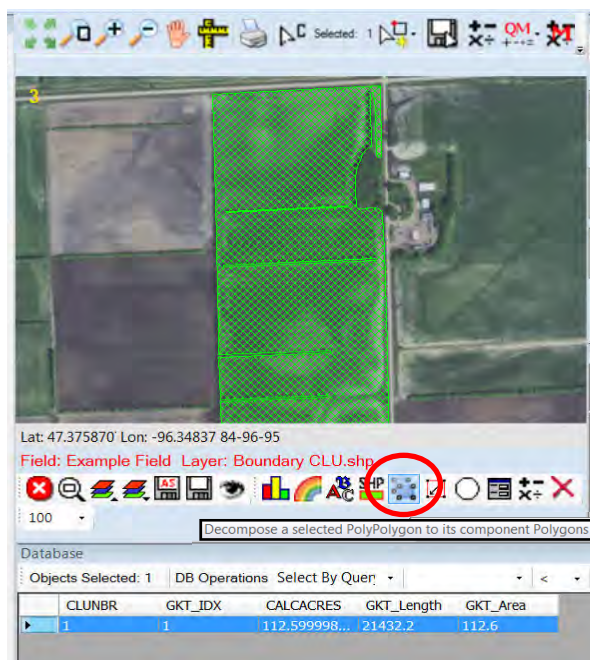
Drawing Layers (Polygons, Lines, & Points)

Decomposing a Poly-Polygon

Some boundaries may come in or have been built as Poly-Polygons. These interior polygon may need to be removed. These instructions will show you how to do this. This example will show how to remove 2 tree rows from a field.

1. Turn on our Poly-polygon boundary (note-turned on NAIP in background for this example)
2. Click inside the Boundary (making it a "Selected Object" - **Lime Green**)
3. On the bottom toolbar click on the "**Decompose a selected PolyPolygon to its component Polygons**" 
4. This is a good time to do a "Save As" & Re-Name (ex. Boundary 2012.shp)
5. Make sure the active layer is Boundary 2012.shp
6. Select the polygons to remove. (either by Clicking in them or using the Database)
7. Click on "Delete Selected Objects" button on bottom toolbar. 
8. Click "Save" on the bottom toolbar. 

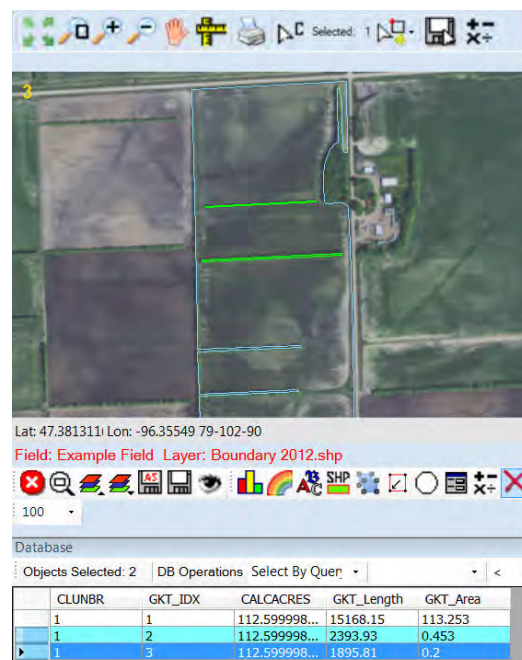
Boundary as Poly-Polygon



Only has 1 Database entry

Note : The Database of each object.

Boundary as Multiple Polygon



Has multiple database entries

Drawing Layers (Polygons, Lines, & Points)

Sometimes it is simpler to modify a point, line, or polygon shapefile rather than redrawing the object. This could include moving, adding, or removing a vertex or point.

Moving Vertices or Points

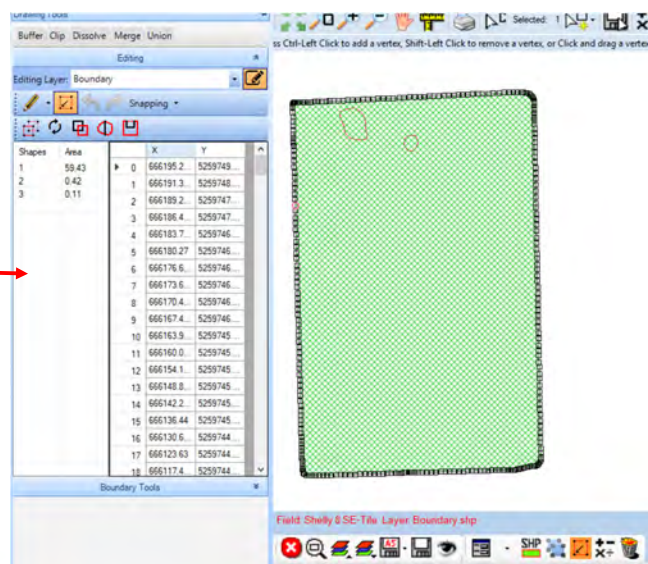
1. Turn on a shapefile
2. Click on a point or line & inside a polygon to select the object (selected object will then become cross-hatched and/or turn green)

3. Click on the **Move Vertices of a Selected Object** button

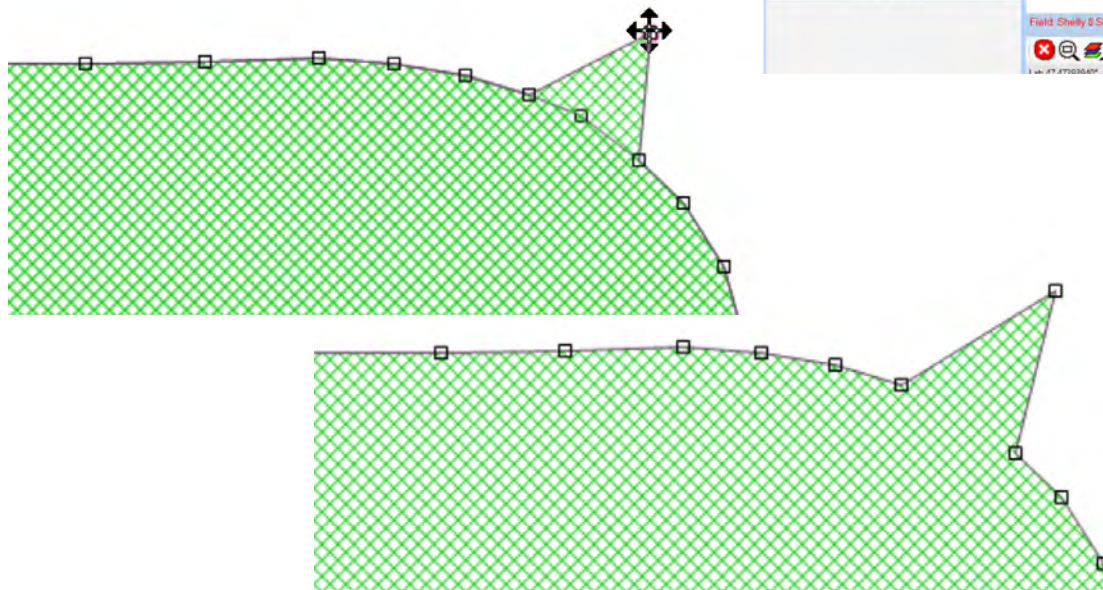


Note: This is a toggle button and must be turned off when finished

4. The Drawing Tools panel should now be open and will show the vertices (on the right) for the selected object. You can also select the various objects in the shapefile, which are shown on the left



5. In the map window, move your cursor over one of the vertices until the cursor arrow becomes a four-way pointer then left-click and hold to move the vertex or point



6. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool

Drawing Layers (Polygons, Lines, & Points)

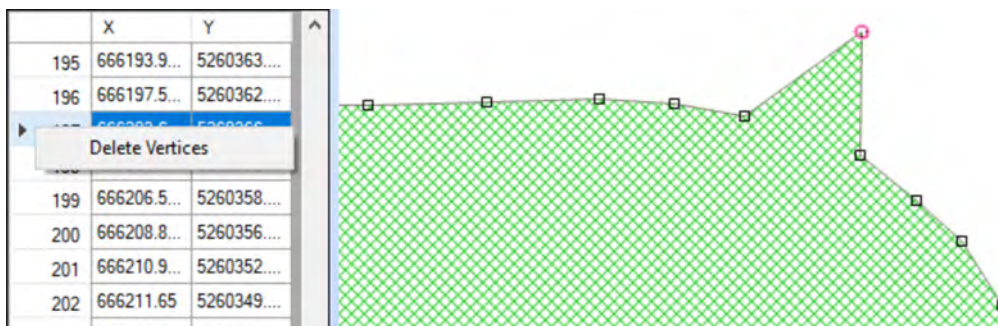
Adding Vertices to a Line or Polygon

1. Turn on a line or polygon shapefile
2. Select the line or polygon that you want to add the modification
3. Click on the **Move Vertices of a Selected Object** button  to activate it
Note: This is a toggle button and must be turned off when finished
4. While holding down the **Control key**, Left-click on the location of the new vertex and one will be added to the line or polygon
5. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool



Removing Vertices from a Line or Polygon

1. Turn on a line or polygon shapefile
2. Select the line or polygon of the active layer that you want to add the modify
3. Click on the **Move Vertices of a Selected Object** button to activate it 
Note: This is a toggle button and must be turned off when finished
4. While holding down the **Shift key**, hover your cursor near the vertex to be removed until it is highlighted by the color pink, then Left-click to remove it
 - It is also possible to select a vertex from the list in the Drawing Tools panel, right-click, & select Delete Vertices to remove the point



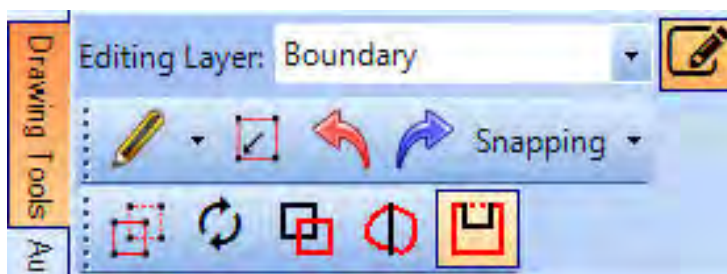
5. Right-click inside the map window or click on the **Move Vertices** button when done to turn off the tool

Drawing Tools Tab

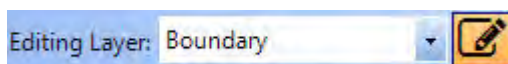
ADMS has many shapefile editing capabilities, this section will cover most of the tools. From something as simple as creating a point on a map to copying polygon features to another shapefile entirely; ADMS now has a much wider range of functions.

Sometimes, it is simpler or faster to modify a point, line, or polygon shapefile rather than redrawing the object, which could include moving, adding, or removing a vertex, point or object.

This section explains the use of the many functions found in the **Drawing Tools** tab located along the left edge of the screen



Selecting the Active Layer to be Modified



Note: To begin and end each shapefile modifying session, you will need to follow these important steps:

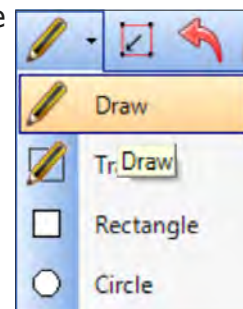
1. Turn on a line or polygon shapefile
2. Select the Editing Start button 
3. Select the layer to be edited from the Dropdown list to make it the active layer
Note: As long as the Edit button is on or active you will be unable to change the active layer unless it is a layer found in the Dropdown list
4. Select the Editing Stop button when finished editing 

Drawing Tools Tab



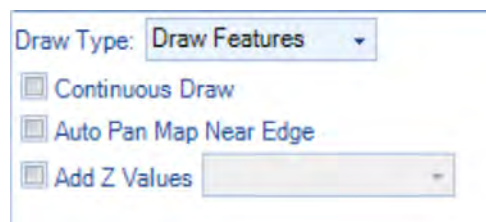
Drawing in a Point, Line, or Polygon Shapefile

1. Turn on a line or polygon shapefile.
2. Select the Editing Start button 
3. Select the layer to be edited from the Dropdown list to make it the active layer.
4. Click on the Drawing dropdown and select Draw.
5. Click to place points or vertices.
6. Select the Editing Stop button when finished editing. 



Drawing Settings for Polygons & Points

- **Draw Type**
 - **Draw Features** is used for drawing individual features, which is shown as a single entry in the database for each feature.
 - **Draw Parts** is used for continuously drawing many features that are polypolygons and can have several features represented by a single entry in the database.
- **Continuous Draw**
 - Used to draw multiple features in succession without having to re-select the Draw function
- **Auto Pan Map Near Edge**
 - Causes the map to automatically pan while drawing when the cursor gets near the edge of the map window
- **Add Z Values**
 - Information from a raster layer can be included as an attribute of the shapefile. One common use is to have an elevation map on in the background and as a point is created the elevation at that point is read and included in the database information for that point



Drawing Stats for Polygons

- As a polygon is being drawn, useful information is displayed in the Drawing Tools panel that can be used to draw a feature with specific lengths, widths, bearings, &/or sizes.

Drawing Stats			
Seg. Length:	1581.32	Total Length:	10809.91
SegBear:	266.872	FpTBear:	82.888
Part Area:	0.71	Total Area:	0.71

Drawing Tools Tab



Drawing Settings for Lines

- **Draw Type**

- **Draw Features** is commonly used for drawing larger features like boundaries
- **Draw Parts** works well for continuously drawing many smaller features

- **Continuous Draw**

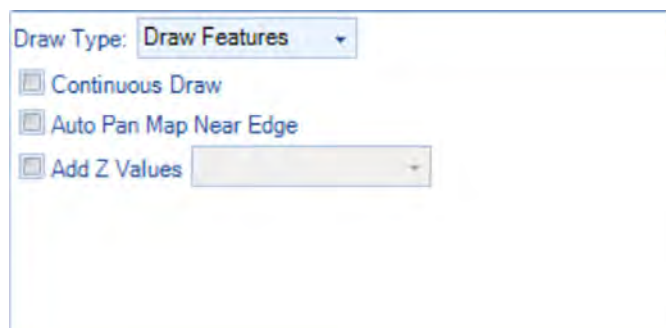
- Used to draw multiple features in succession without having to re-select the Draw function

- **Auto Pan Map Near Edge**

- Causes the map to automatically pan while drawing when the cursor gets near the edge of the map window

- **Add Z Values**

- Information from a raster layer can be included as an attribute of the shapefile. One common use is to have an elevation map on in the background and as a point is created the elevation at that point is read and included in the database information for that point



Drawing Stats

- As a feature is being drawn, useful information is displayed in the Drawing Tools panel that can be used to draw a feature of a specific length & bearing.

Drawing Stats			
Seg. Length:	18435.18	Total Length:	18435.18
SegBear:	227.694	FPtBear:	47.694

Drawing Line Options

- **Max Segment Length**

- Set a specific distance of a line to be drawn in inches

- **Draw Angle**

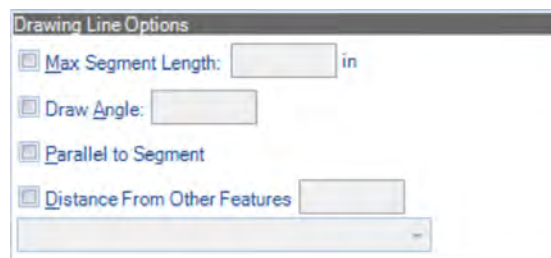
- Set a specific angle to be drawn

- **Parallel to Segment**

- Draw a line that is parallel to another line

- **Distance From Other Feature**

- Set a specific distance from another feature that prevents a line from being drawn any closer than that distance (units in inches). A dropdown box allows another shapefile to be used when selecting which features to measure the setback from



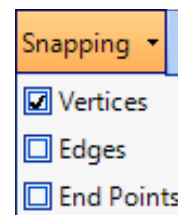
Drawing Tools Tab



Snapping

When using certain functions of the Drawing Tools, it is helpful to use existing vertices to place a new vertex. There are three different features that can be snapped to.

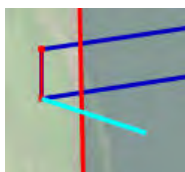
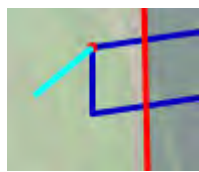
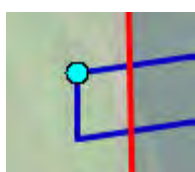
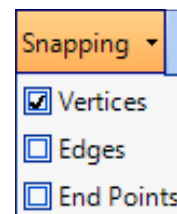
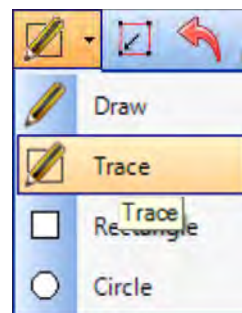
- **Vertices** - When the cursor is moved close to an existing vertex of a shapefile the cursor will “snap” to that point so that a left-click will place a point directly on top of the existing point.
- **Edges** - When the cursor is moved to the edge of a feature it will snap to that edge
- **End Points** - The cursor will only “snap” to the first and last vertices of the feature when it was created.



The three tools can be selected in any combination, depending what is trying to be achieved.

Tracing a Line or Polygon

1. Turn on the line or polygon shapefile that contains the feature to be traced and added to another shapefile.
2. Turn on the line or polygon shapefile that the traced feature will be drawn in and make sure it has been selected in the Editing Layer Dropdown list as the active layer.
3. Select the **Trace Tool** from the Drawing list, then click on the Snapping dropdown list and select **Vertices**.
4. Move the cursor over a vertex until you get a blue dot to show it has snapped to the vertex.
5. Click once to start tracing.
6. Move the cursor along the perimeter, snapping to each Vertex without clicking for the desired distance and right-click to stop tracing. To remove an undesired point hold the ALT key and left-click. It is also possible to free-hand draw while tracing if only certain parts of the feature need to be included.

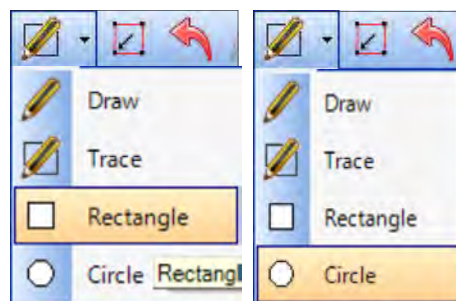


Drawing Tools Tab



Drawing a Rectangle or Circle

1. Turn on a line or polygon shapefile.
2. Select **Rectangle** or **Circle** from the Drawing dropdown list.
3. In the map window, left-click, hold and drag to create a feature of the desired size.
4. Release the mouse button to create the feature.



Notes: The initial click for drawing a rectangle will be the location of the top left corner of the rectangle. The initial click for a circle will be the center of the circle. Snapping to a vertex from another shapefile can be a very useful tool in getting accurate placement.



Additional Tools



Move Vertices of a Selected Object

This tool is a duplicate of the Move Vertices button found on the bottom toolbar and is used to move, add, and delete vertices from a point, line, or polygon.



Undo

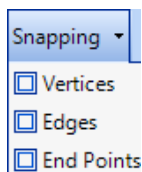
- This tool is used to undo the previous task that was completed.



Redo

- This tool is used to restore the previous undo.

Snapping



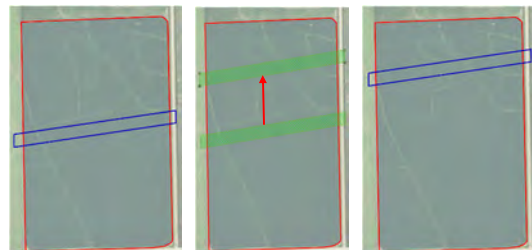
- The snapping tool is useful when trying to draw a feature directly over another by creating common vertices.
- **Vertices** allows snapping to a vertex.
- **Edges** allows snapping to the line without needing a vertex.
- **End Points** allows snapping to only the first and last points created in a line or polygon.

Drawing Tools Tab



Moving a Line or Polygon

1. Turn on a line or polygon shapefile.
2. Select the feature to be moved.
3. Click on the **Move Feature** button  to activate it and cause the cursor to turn into a four-way arrow.
Note: This is a toggle button and must be turned off when finished.
4. Left-click and drag the selected object to the new location.
5. Right-click inside the map window or click on the **Move Feature** button when done to turn off the tool.



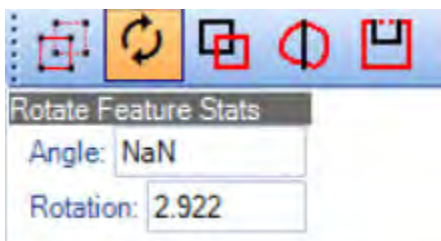
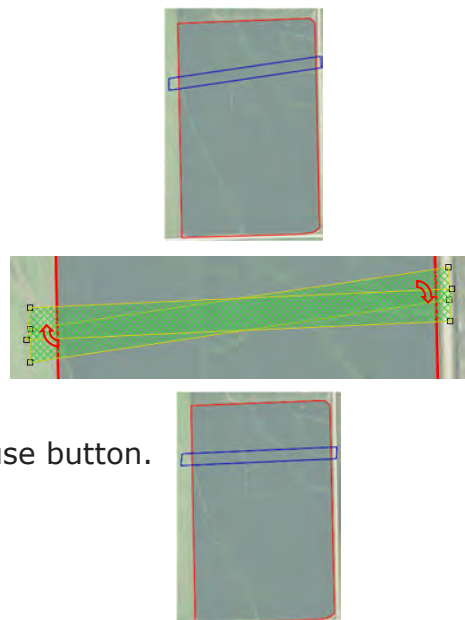
*Note: To move multiple features, select all points, lines or polygons you wish to move before clicking the **Move Feature** button, then continue from step 4.*

Rotate a Feature

1. Turn on a line or polygon shapefile.
2. Select the line or polygon that you want to rotate.
3. Click on the **Rotate Feature** button  to activate it.
4. Left-click and drag somewhere off-center in the feature to cause it to rotate.

*NOTE: Rotation Feature Stats in the Drawing Tools area.
Also, can TYPE #s in "Rotation:" box.*

5. Once the object is in the proper orientation, release the mouse button.
If the object needs adjusting, click and drag again.
6. Once you are satisfied, right click to drop the tool.

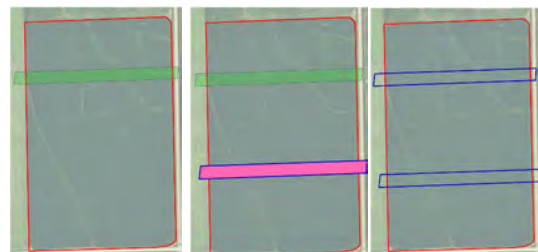


Drawing Tools Tab



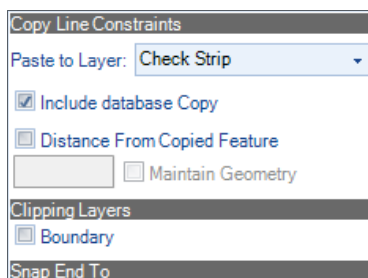
Copy a Line or Polygon

1. Turn on a line or polygon shapefile.
2. Select the feature to be copied.
3. Click on the **Copy Feature** button  to activate it.
Note: This is a toggle button and must be turned off when finished.
4. When you move your cursor back to the mapping window, the selected feature will automatically be attached to your cursor.
5. Place the object in the desired location and right-click to drop the object and the **Copy Feature** tool.



Copy Line Constraints

The Copy Feature tool has additional settings that can be applied to achieve different results.



Paste to Layer

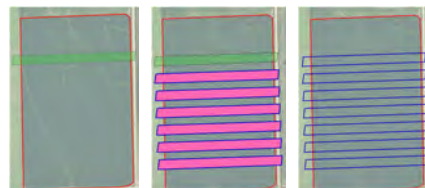
1. Turn on the shapefile that you want to paste into, then turn on the shapefile that contains the feature that you would like to copy.
2. Select the line or polygon that you want to copy.
3. Click on the **Copy Feature** button  to activate it .
4. In the **Paste to Layer** dropdown of the **Copy Line Constraints** window, select the layer that will receive the new feature.
5. In the mapping window, place the copied feature (solid pink) in the desired position and right-click to drop the tool and paste the new feature in the receiving shapefile.
6. Turn off the donor shapefile to see the copied feature.

Drawing Tools Tab



Distance from a Copied Feature

1. Turn on a line or polygon shapefile.
2. Select the object to be copied.
3. Click on the **Move Feature** button  to activate it .
4. Check the box next to **Distance from Copied Feature** and enter the distance you want between features in the box.
Note: This distance is between shared points of each feature. For example, all the top left corners of each polygon will be separated by the distance specified.
5. Move the cursor the desired distance from the original to get the number of copies you want.
6. Right-click to create the copied features and drop the tool.

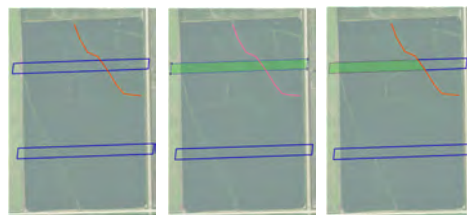


Clipping Layers

1. This area will be populated with the other layers that have been turned on.
2. By checking the box next to one of the layers listed, it will cause the new copied features to be clipped to the specified feature.
Note: This works well with something like a field boundary.

Split Line for Polygons

1. For this tool, in order to split a feature you must use a line shapefile.
2. Turn on a line shapefile and a polygon shapefile.
3. Select the layer to be split in the **Editing Layer** dropdown list.
4. Click on the Split Line button .
5. Select the polygon to be split and hover your cursor over the line that will be used to split the polygon (it should change colors).
6. Right-click to split the polygon and drop the tool.

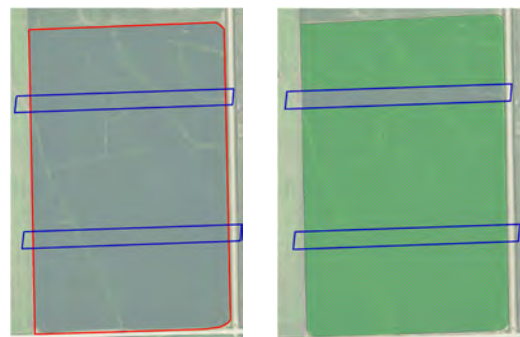


Drawing Tools Tab



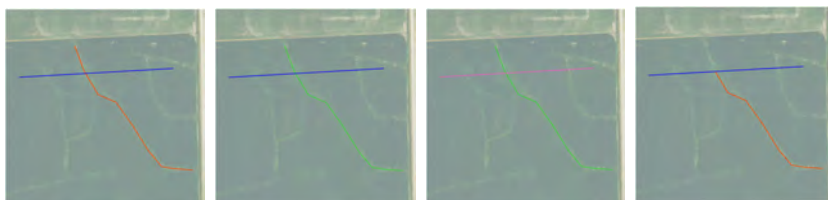
Cut Out Area from Polygon

1. Turn on two polygon shapefiles.
2. Select the layer to be cut as the active layer in the **Edit- ing Layer** dropdown list.
3. Click on the **Cut Out** button  to activate it .
4. Click on the polygon to remove its overlapping area from the other polygon.
5. Right-click to drop the tool.



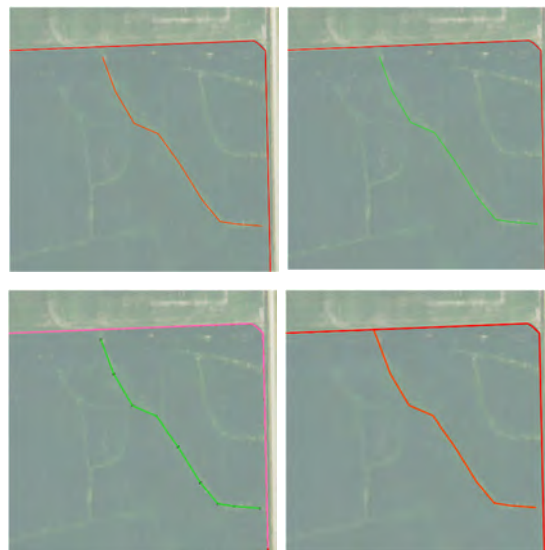
Clipping a Line

1. Turn on at least two line shapefiles.
2. Select the layer to be clipped in the **Editing Layer** dropdown list.
3. Select the line to be clipped. 
4. Click on the **Clip Line** button.
5. Hover your cursor over the line to clip to until it turns pink, then click to clip the other line.



Extend a Line

1. Turn on a line shapefile to be modified and another shapefile.
2. Select the layer to be extended in the **Editing Layer** dropdown list.
3. Select the line to be extended.
4. Click on the **Extend Line** button 
5. Hover your cursor over the feature that the line will be extended to until it turns pink and click to extend the line.

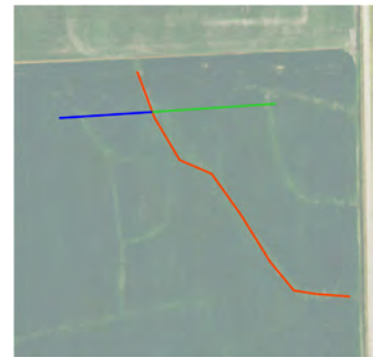


Drawing Tools Tab



Split a Line

1. Turn on the line shapefile to modify and another layer with a feature that intersects the line to be split.
2. Select the layer to be cut as the active layer in the **Editing Layer** dropdown list.
3. Click on the **Split Line** button  to activate it.
4. Click on the line to be split.
5. Hover your cursor over the feature that will be used to split the line until it turns pink, then click to make the split.

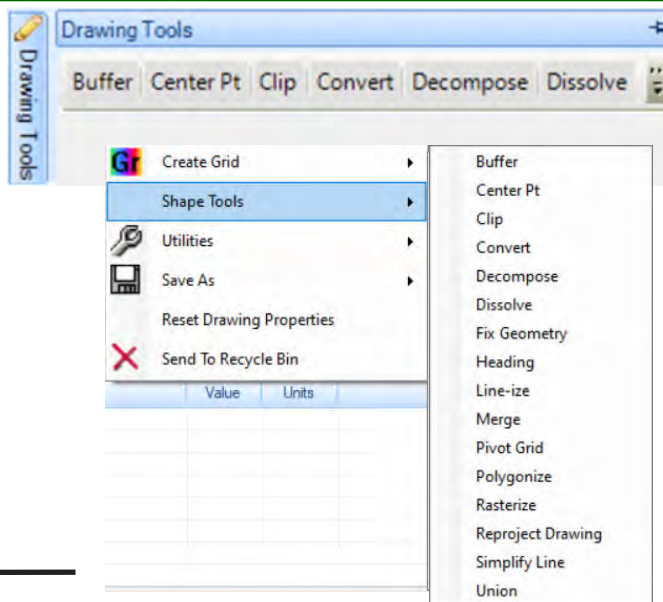


Drawing/Shape Tools

In addition to the other Drawing Tools located under the Drawing Tools Tab, there are "Shape Tools" for modifying shapefiles.

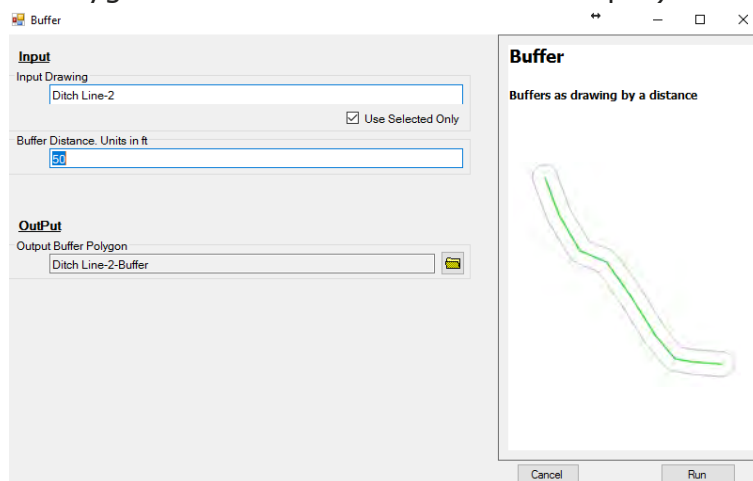
These tools are accessed in one of two places.

1. Top Left Corner "Drawing Tools" panel
NOTE: The "Dropdown Arrow" to Right.
Will give access to more options.
2. Right clicking on a shapefile's name in the Data Tree and choosing "Shape Tools"



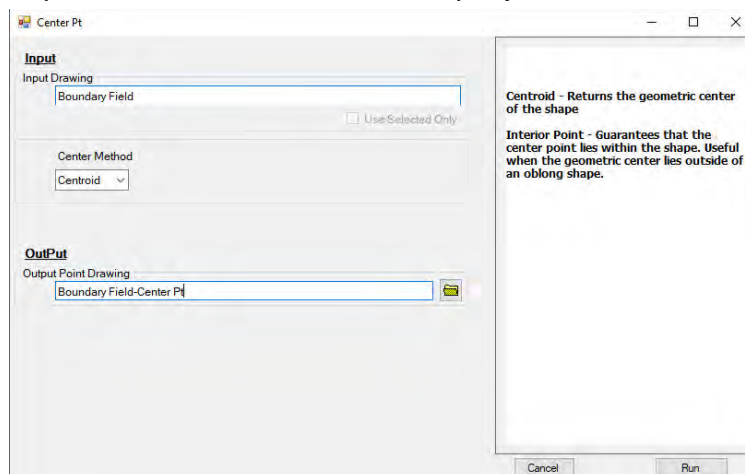
Buffer

1. Turn on a shapefile. (Tool—will create a SHP Polygon buffered in or out from the Input)
2. Select the desired feature to be buffered.
3. Enter a buffer distance. The default is 10 feet (Note: Polygons can use positive or negative numbers)
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Center Point

1. Turn on a shapefile. (Tool—will create a data point at the center of the Input)
2. Select the desired Input Drawing at the top.
3. Choose either Centroid or Interior Point.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.

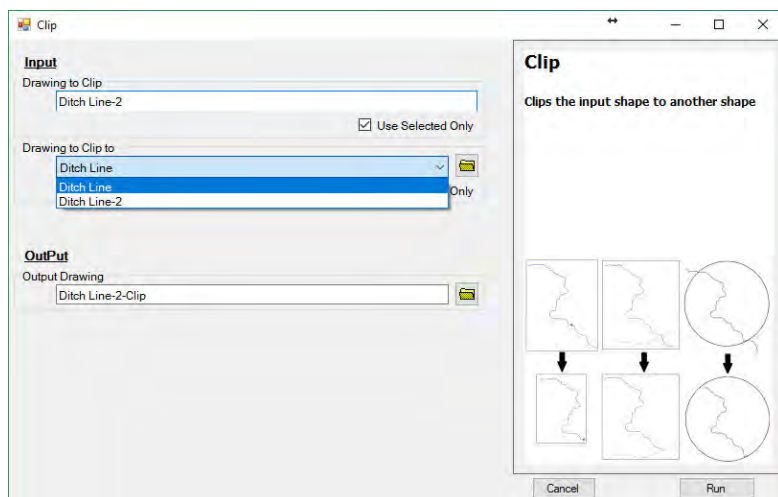


Drawing/Shape Tools

Clip

Tool—will clip a line or polygon SHP to a line.shp. Note: when clipping polygons, the line.shp must touch both sides of the polygon.

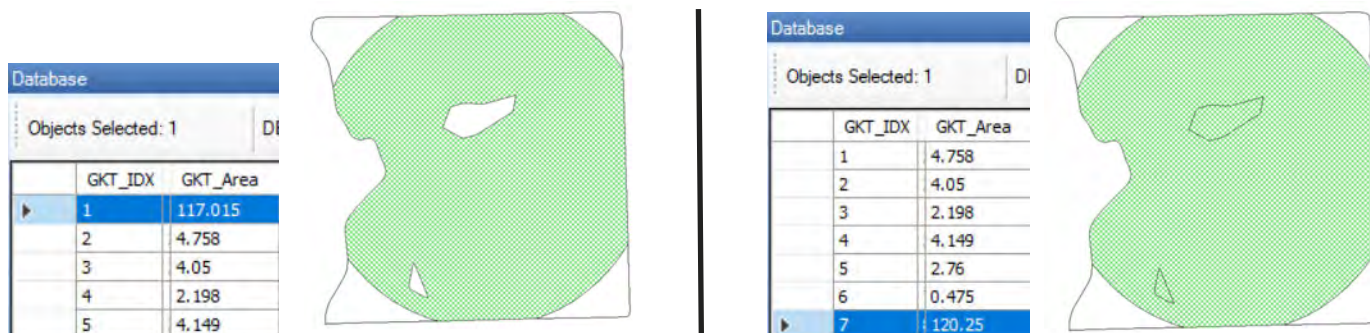
1. Turn on a shapefile.
2. Select the input layer to be clipped.
3. Select the drawing to clip to.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Decompose

Tool—will decompose (point / line / polygon) into it's individual objects. See example below.

1. Turn on a shapefile.
2. Select the input layer. (input on the Bottom Left)
3. Select the object in the map window to Decompose.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you. (output on the Bottom Right)
5. Click **Run**.



Drawing/Shape Tools

Convert

Tool—will convert a given SHP file feature type (ex.Line into a Point).

Turn on XXXX.SHP to edit
Access Drawing / Shape Tools & Convert

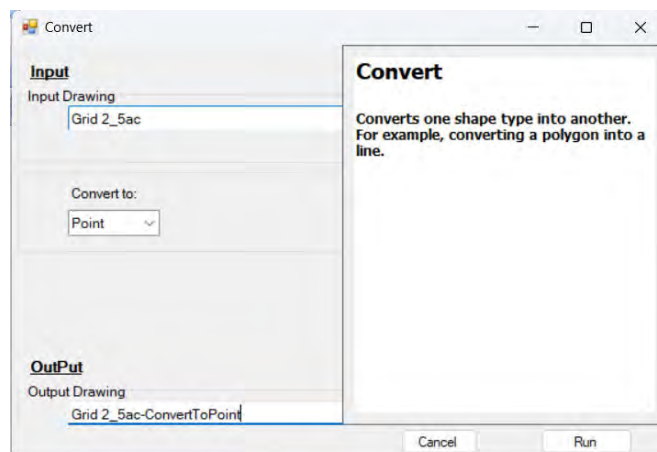
Convert to: Select the Feature Type to convert the Input file to.

Output: Type a meaningful name

Click Run

Examples

Grid Boundary - Convert to Points —Tool creates a SHP-Points file of Vertices in Grid Boundary.



Grid Sample Points - Convert to Lines—Tool will connect the data in order “drawn” and convert Points to Lines.

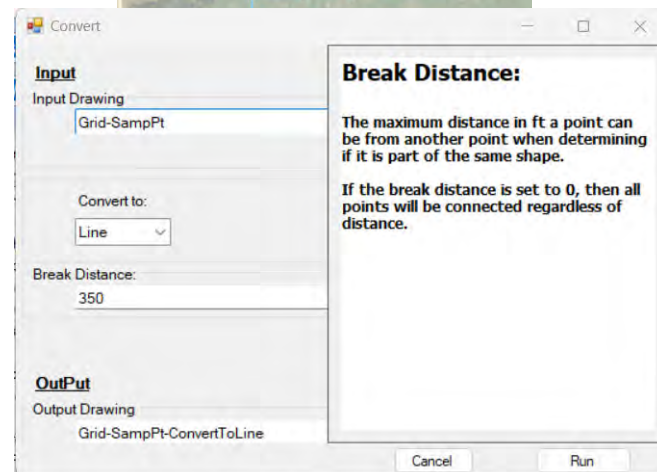
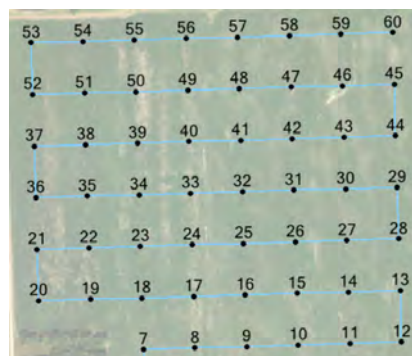
Break Distance: Adjust this value to a number large enough to find the next point in order. (grid points are 330’ apart, set the Distance to 350’)

Setting the distance to 0 will connect regardless of distance.

NOTE:

Points to Lines—Needs at least 2 points

Points to Polygons—Needs at least 3 points

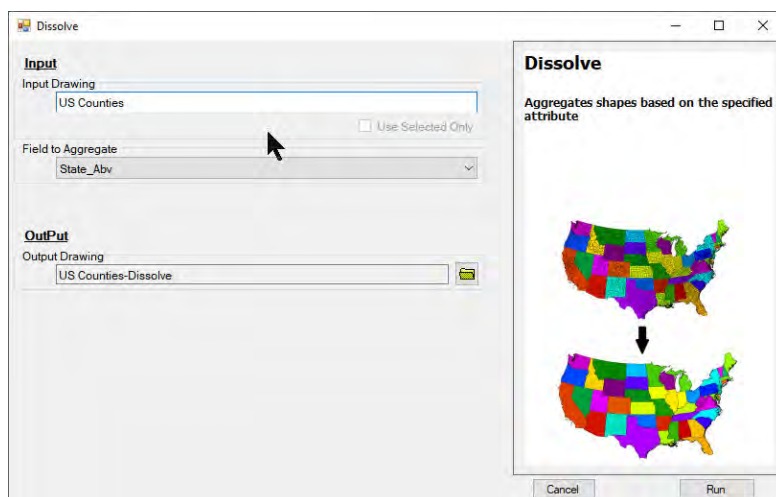


Drawing/Shape Tools

Dissolve

Tool—will dissolve a points, lines or polygons. Merging all SHPs that have the same Database values or names, or dissolving ALL. Reducing the number of DBF objects.

1. Turn on a shapefile.
2. Select the input layer.
3. Select an attribute to dissolve by.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.

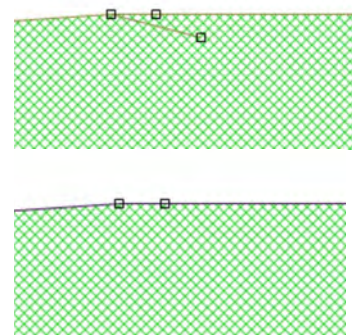


Note: Example in ADMS has the USA by Counties—"Dissolved" by State Name. Giving 48 states as a poly-polygon, meaning the "Database" will only have 48 objects in it.

Fix Geometry

Tool—is designed for "Polygons" that have a "Knot" or "BowTie" errors. Shown on the Right are boundaries that will cause "Vertices Errors" or "Index Errors".

1. Turn on a Polygon layer that has a "Knot" or "BowTie".
2. Right Click on SHP Name— "Shape Tools" & "Fix Geometry"
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.

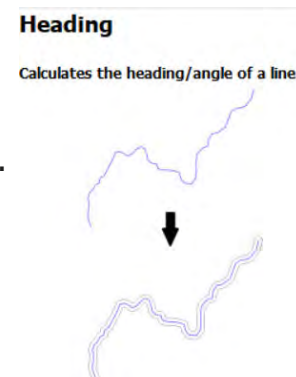


Heading

Tool—designed for "Line" files. Will add a "Heading" value to the Database file for each line of the SHP chosen.

1. Method for Calc.— Longest segment / Average / Start to End Point.
2. Decimal Points—you would like on the heading values in database.
3. Click **Run**.

The Database of SHP layer now has "Heading" column with values.

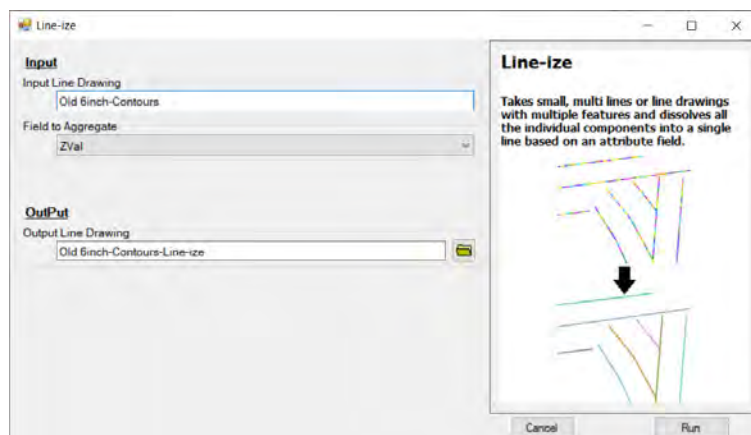


Drawing/Shape Tools

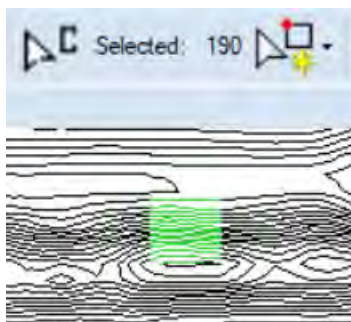
Line-ize

Tool—will take small, multi lines or line drawings with multiple features and dissolves all the individual components into a single line based on an attribute field.

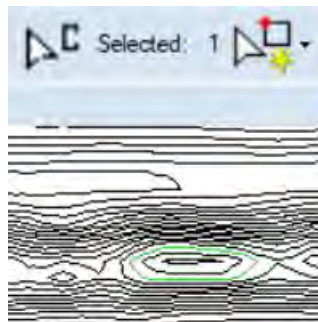
1. Turn on a shapefile.
2. Choose the Fields to Aggregate.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Input Contours many objects



Output of Line-ize



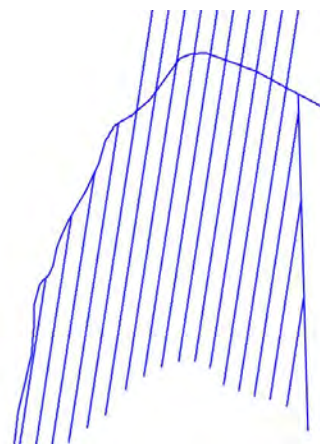
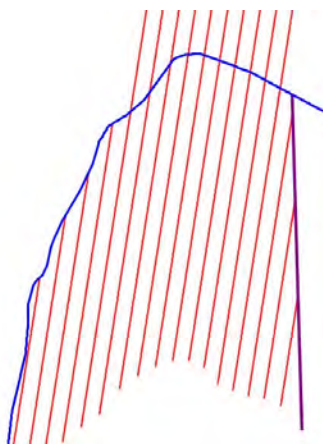
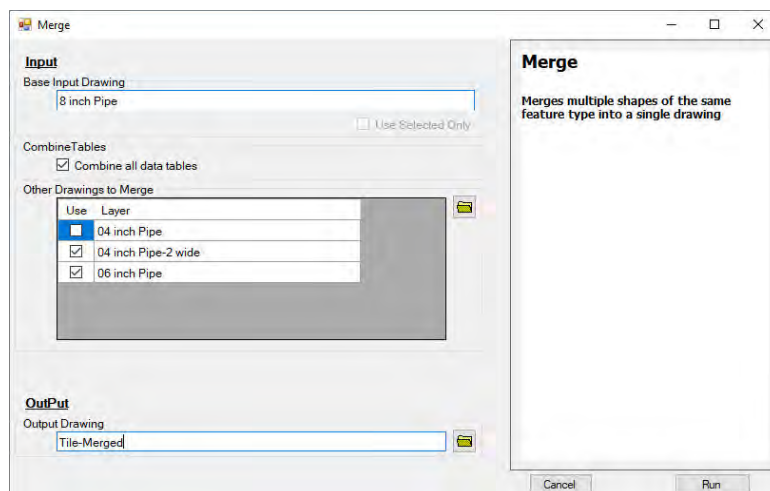
NOTE: the many objects become one elevation for those connected line segments.

Drawing/Shape Tools

Merge

Tool—gives user the ability to merge many SHP files of the same “type” (points to points / lines to lines / polygons to polygons). Below is showing merging multiple tile sizes into 1 TileLine.shp.

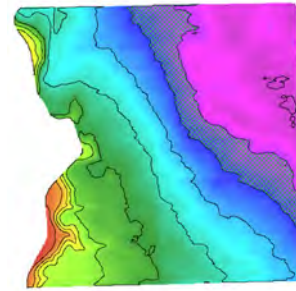
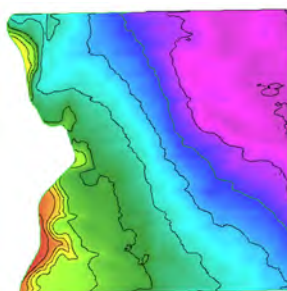
1. Turn on the shapefiles to merge.
2. Select the Base Input Layer.
3. Select Other Drawings to Merge
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Polygonize

Tool—is designed to convert “Contour Lines” into polygons.

1. Turn on the Contour Lines to convert. (image below on Left)
2. Right Click on SHP Name— “Shape Tools” & “Polygonize”
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.
6. Output file (image to far Right)



Drawing/Shape Tools

Pivot Grid

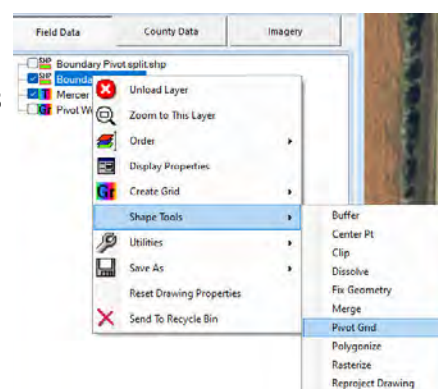
Before using this tool. You may need to know, Field Measurements (length / width), Pivot lengths per application span and total length and the degrees of each pie section.

1. Turn on a boundary or point shapefile representing the pivot's area or center point.
2. Right Click on the name of the shapefile for generating the Grid, go to "Shape Tools" & "Pivot Grid".

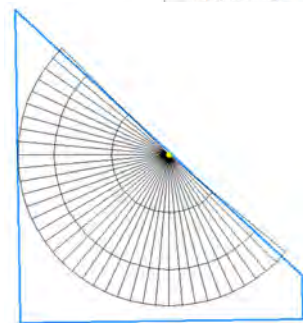
Center Point Method

Checked—uses the point from the point shapefile or calculates the centroid of the polygon

Unchecked— It will use the X & Y values to represent the center point location or by checking the "**From Map**" Check box, the window disappears allowing the center point of the pivot to be clicked on in the Map Window to set the Center Point location.



Start and End Angles—Controls the area of the circle for which grids will be created, since pivots don't always cover a full circle



Pie-Sliced Angles—number that represents how many degrees the width of each wedge covers in circle. Ex. Entering a 10 would result in 36, 10° wide wedges for a full 360° pivot

Radius—enter the distance from the center point to the outside of the pivot (default is 1320 ft), using the Measure tool you can find the radius of the pivot if it is unknown



 A screenshot of the 'Pivot Grid' dialog box. It contains several input fields and checkboxes:

- Center Point Method:** A checkbox labeled 'Center point from the centroid of a shape' is checked.
- Select a drawing for creating the center of the pivot:** A dropdown menu shows 'Center Point'.
- Center Point: Easting/Northing or Longitude/Latitude:** Two input fields show '618094.571561356' and '5207564.45523254'. A 'From Map' checkbox is also present.
- Start and End Angles of the pivot:** Two input fields show '130' and '315'.
- Split the pivot into pie-sliced angles:** An input field shows '5'.
- Radius (Units in ft):** An input field shows '1320'.

Drawing/Shape Tools

Rasterize

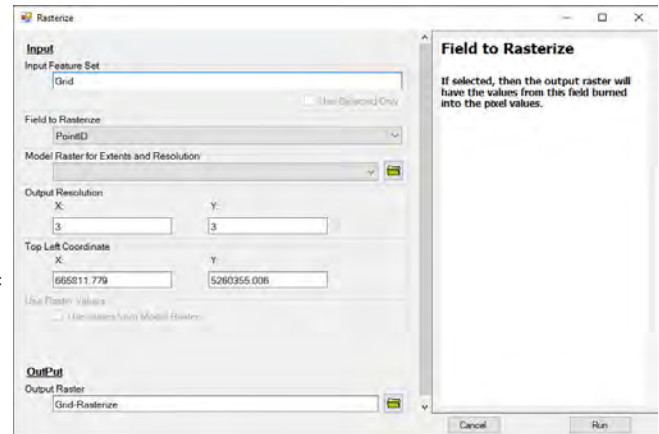
Create a raster from values extracted from another raster or from shapefile values based on a shapefile feature.

For instance, for polygon shapefiles, it is possible to create a raster based on a field in the attribute table (database) of the shapefile. It's also possible to draw a line across the field and create a raster from the elevation values along that line or lines.

It can also be used to extract values from different rasters and the resulting files will have their pixels aligned to one another based on the shapefile for a more exact analysis between datasets.

Rasterize a Polygon

1. Turn on a polygon shapefile.
2. Select the **Input Feature Set**.
3. Select the **Field to Rasterize** (do not use GKT_* fields)
4. Adjust the output resolution if desired.
5. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
6. Click **Run**.

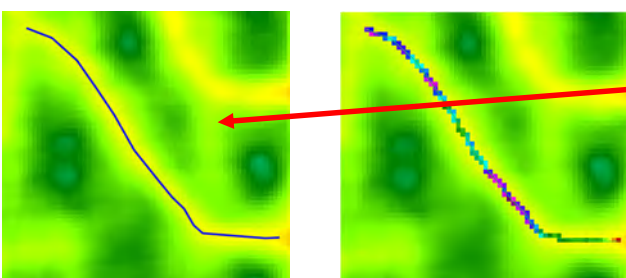
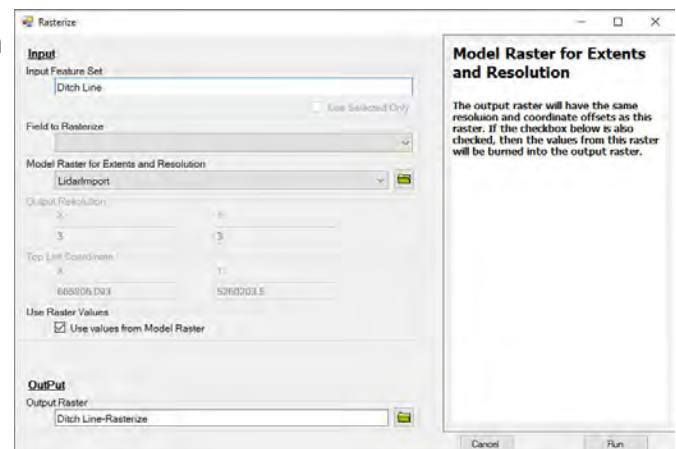


5	6	7	8
1	2	3	4



Rasterize a Line

1. Turn on a line shapefile. Designed for Lines with XY&Z attributes. (Created in Ditch / Tile / Surface Windows)
2. Select the **Input Feature Set**
3. Select the **Model Raster**
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Layer	Value	Units
Lidar Topo	869.7	Feet
Ditch Line-Rasterize	869.69	

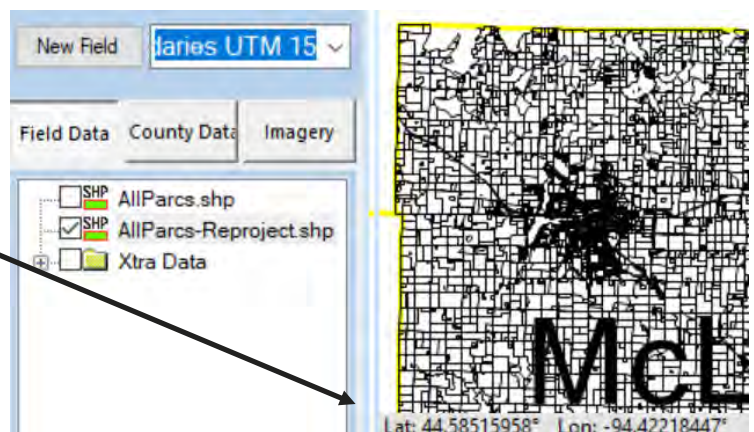
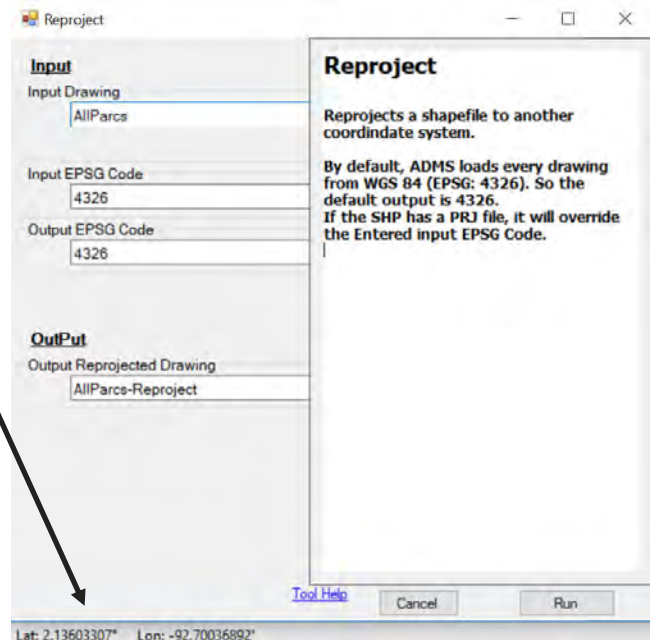
Drawing/Shape Tools

Reproject

From time to time you may run into SHP files that are not in "Lat-Lon-WGS84" or "UTM-WGS84" projections. These are "Projection" methods that are used in GIS software. There are 100's if not 1,000's of projections out there. The two that I have mentioned will have the data turning on in the right spot in ADMS. Please note to check this, I like to have my "Cursor Coordinate Units" set to Lat-Lon-Decimal Degrees (Settings & User Interface 2).

If you have a file that is turning on in the wrong part of the world, it may be a "projection" problem. All "Shape" files need SHP / SHX / DBF, it is suggested that they also have a PRJ file. The PRJ file has the "projection" info for the file that makes this work. If the data does not have the PRJ file, this is a guessing game.

1. Check you are in the correct UTM in ADMS
2. Turn on data that is in the correct spot (State-County Boundaries work well).
3. Note the Lat—Lon values for this area.
4. Turn on your ?data? file and "Zoom to this Layer" on bottom tool bar.
5. Scroll over the data and note the Lat—Lon
6. Right click on file to re-project
7. Choose "Shape Tools" and "Re-Project"
8. "Reproject" window opens
9. Don't change any values in the top 3 boxes.
10. "Output" - Rename if you want.
11. Click "Run"
12. Refresh tree and your new layer is in the tree.
13. Turn on the "Reproject.shp"
14. Zoom to layer and notice it lines up with county boundary and Lat—Lon.

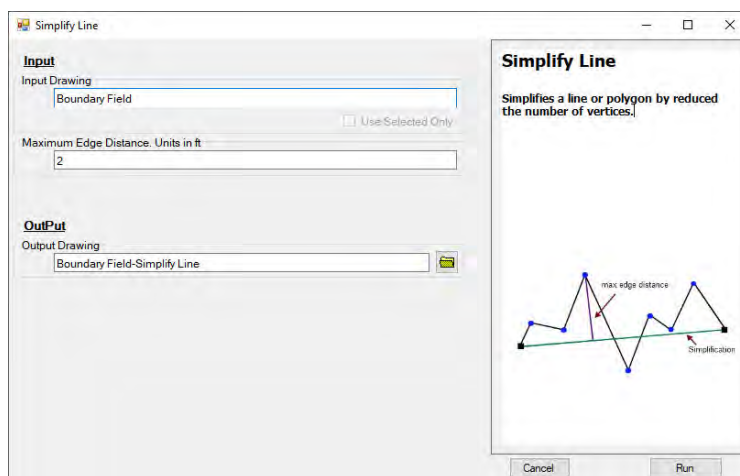


Drawing/Shape Tools

Simplify Line (works on Polygons also)

Tool—Reduces Vertices at the “Distance” set below, straightening out the line or polygon.

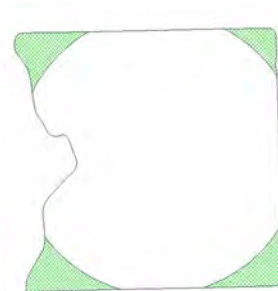
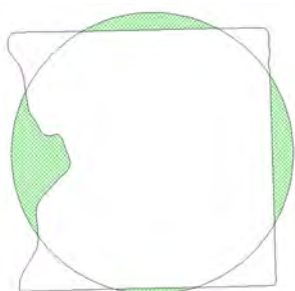
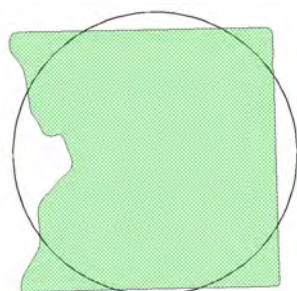
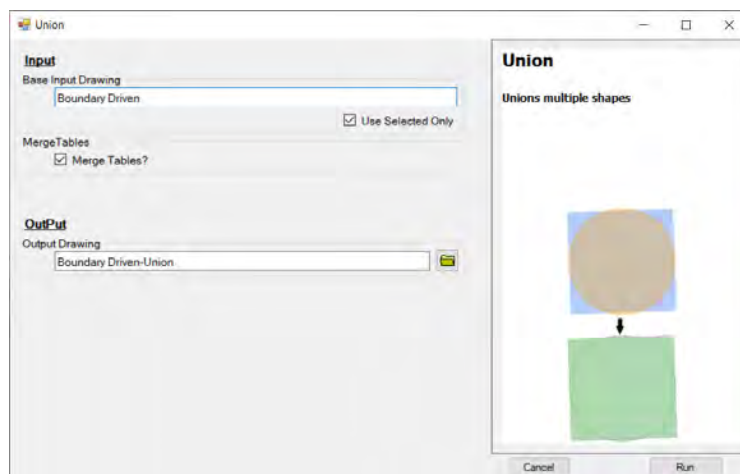
1. Turn on a line or polygon shapefile.
2. Select the Input Layer.
3. Adjust the Max Edge Distance if needed
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**.



Union (Pivot Boundaries)

Tool—Used to build “Pivot” boundaries. Input layers can come from single SHP or multiple SHP.

1. Turn on the shapefiles to merge.
2. Select the feature, master boundary.
3. Check “Merge Table” if you want any of the database info to be in finished item.
4. Select the browse button if you want to change the output file name; otherwise it will be automatically named for you.
5. Click **Run**. (Middle Pic below deleting)



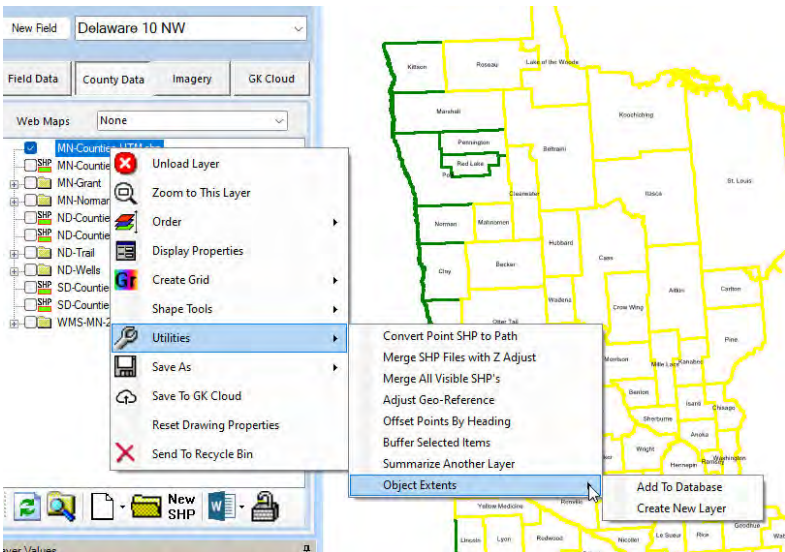
Utilities/Object Extents

Object Extents

This tool is mostly an in-house tool. Not a lot of uses for most agronomic needs.

Tool will go through the SHP file and find all the vertices of every object & generates a Rectangle 1,000 meters beyond the outer most vertices. This function allows GK to look data up quickly.

Right click .SHP name
- Utilities / Object Extents

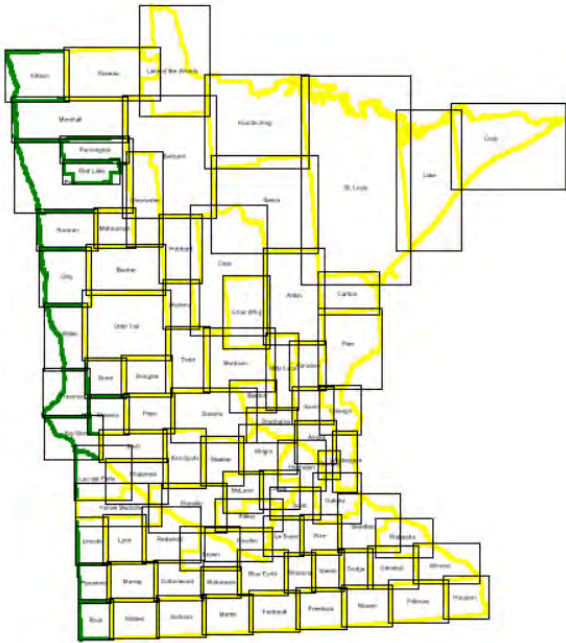


Two Options:

Add to Database—simply adds the bottom / top / left / right (lat-lon) to the existing database.

Create New Layer—which creates Rectangle polygons at the extent of each object. Pulling forward the info that was in the original Database and adding Extents information.

Example
Input name: MN-Counties.shp
Output name: MN-Counties-Extents.shp



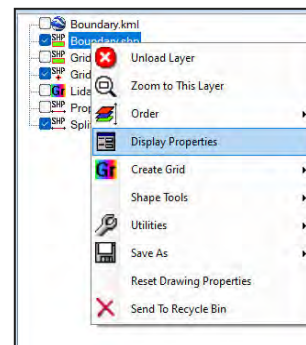
Database						
Objects Selected: 0		DB Operations		Select By Query		
	BOTTOM	TOP_	LEFT_	RIGHT_	UTMZ	GKT_IDX
▶	47.15047073	47.49967957	-96.8718338	-96.06655121	14	1
	43.84682846	44.19314957	-92.07959747	-91.28414154	15	2
	44.80482101	45.30168152	-96.4540863	-95.73700714	14	3
	47.15108871	48.0206604	-95.58289337	-95.16905975	15	4
	44.88734055	45.12446976	-93.22792053	-92.98381042	15	5

Drawing Display Properties

When multiple shapefiles are visible simultaneously, it can be difficult to distinguish them, especially when objects appear too small due to the zoom level. To address this, you can modify the **Display Properties** of a shapefile to adjust the object's size, color, or label, making them easier to identify.

There are two ways to access the Display Properties:

1. Right-click on the shapefile's name in the Data Tree and select Display Properties or;
2. Click on the Display Properties Icon in the Bottom Mapping Toolbar for the shapefile that is the **Active Layer**.



Style Tab for Points

Solid Style

All points in the shapefile will look identical when the "Solid Style" radio button is selected.

Point Scaling

- Fixed - keeps points the same number of pixels no matter the level of zoom so it is always visible.
- World - will get larger or smaller on the screen as zoom changes.

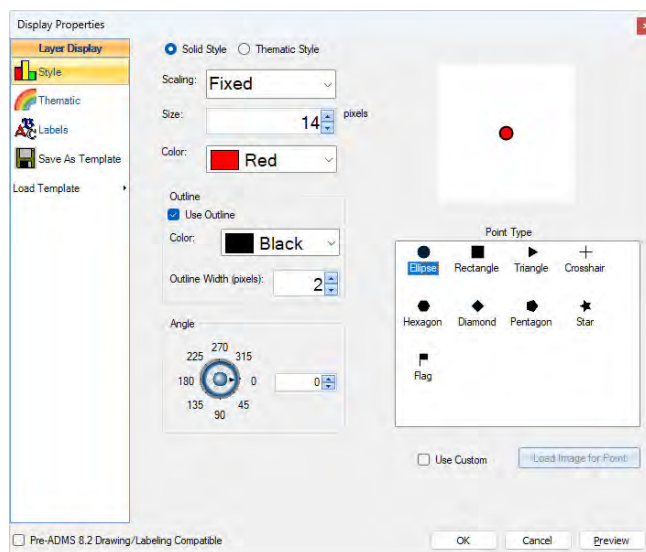
Point Size - Select point size

Point Color - Select point color

Outline - Select color and width

Point Type - Custom points may be loaded from an image file, such as BMP or JPG

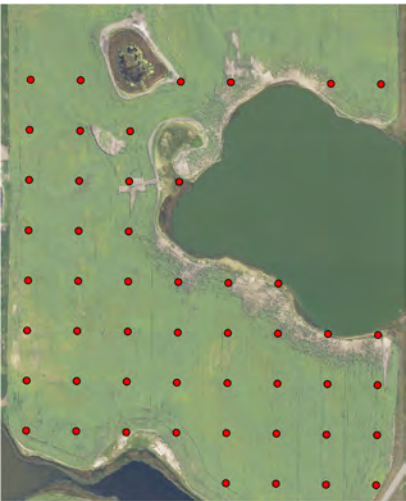
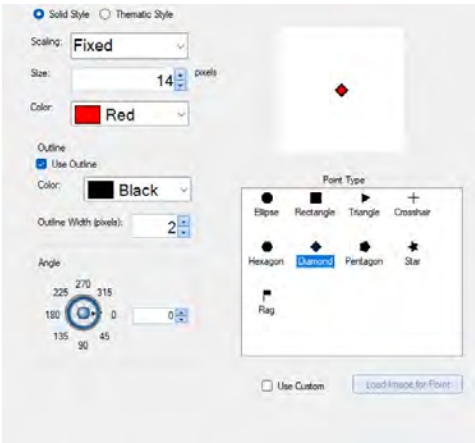
Angle - rotates the orientation of the point.



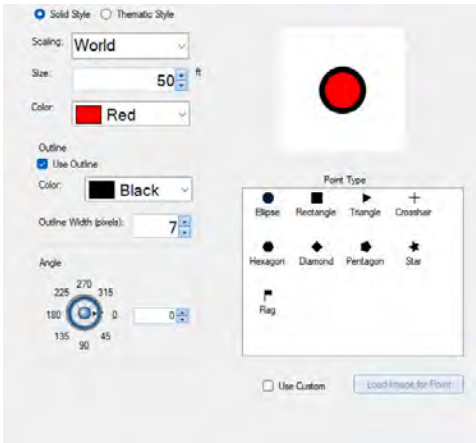
Drawing Display Properties

Style Tab for Points

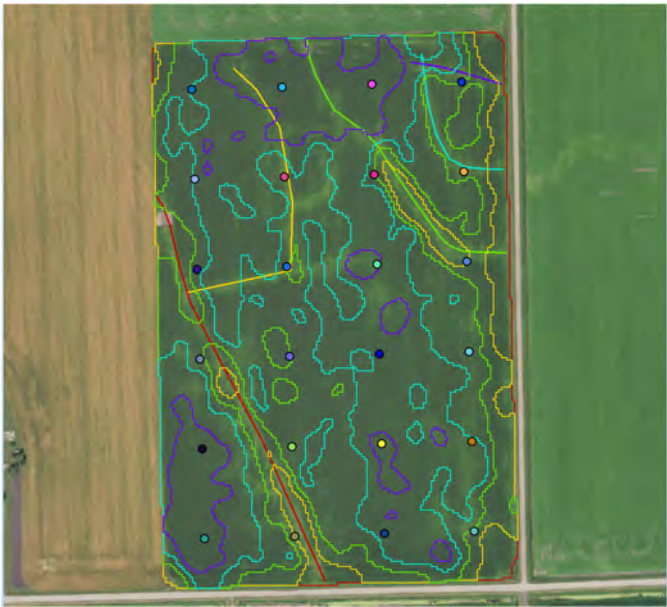
Fixed



World



At the zoom level above, the points are the same size, but as you zoom in the Fixed size point stays the same size and the World sized point gets bigger. Notice the difference in settings used between the two scales.



Drawing Display Properties

Style Tab for Lines

Solid Style

All lines in the same shapefile will look identical when the "Solid Style" radio button is selected.

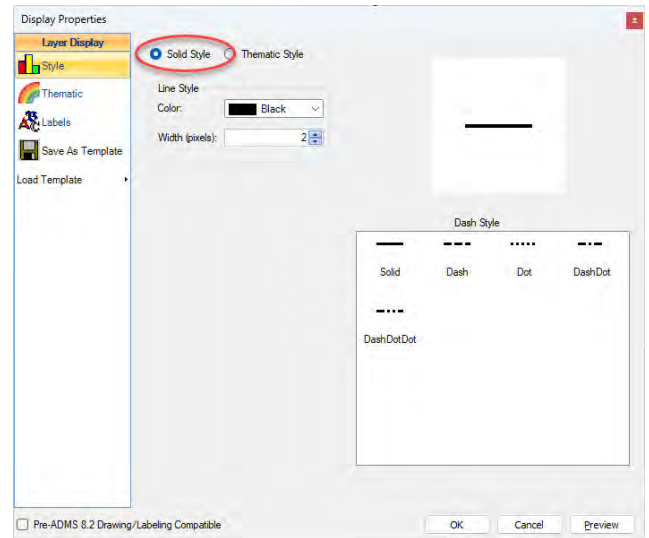
Color: Choose a line color



Width: Choose a line width in pixels



Dash Style: Choose different line styles



Style Tab for Polygons

Solid Style

All polygons will look identical when the "Solid Style" radio button is selected.

Outline Color: Choose a color



Outline Width: Choose a width



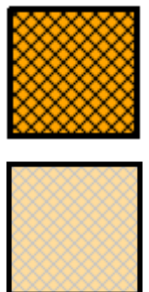
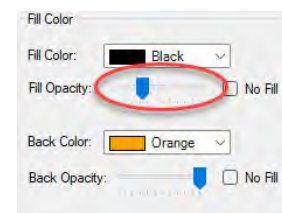
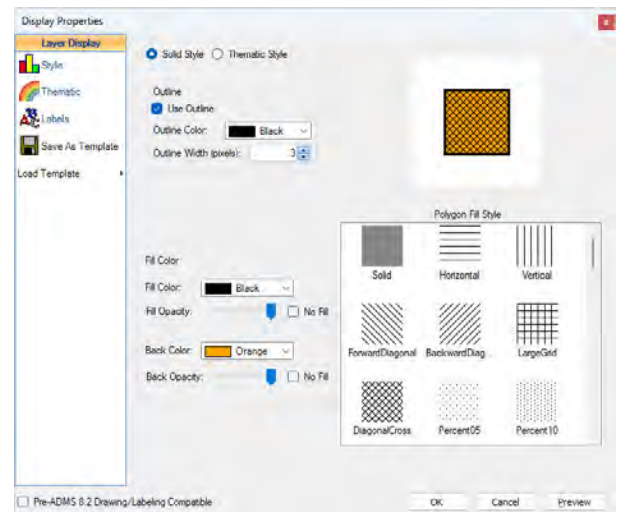
Polygon Fill Style: Choose different fill colors, opacity (transparency), and patterns.

Fill Color: The color creating the design (Black).

Back Color: The dominant color in the background (Orange).

Opacity: Controls the "Back" color, which becomes more transparent as the slider is moved left.

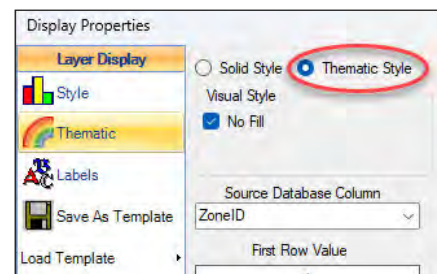
No Fill: Check the associated box to not fill an object.



Drawing Display Properties

Thematic Tab

The "Thematic Tab" allows objects within the same shapefile to be colored distinctly, making them easy to differentiate. To apply thematic changes, ensure the "Thematic" tab is selected and the "Thematic Style" radio button is selected. This will enable the following functions.



No Fill

Applies only to polygon shapefiles. Default is for all polygons to be filled. Checking this box will cause only the outlines to be colored.

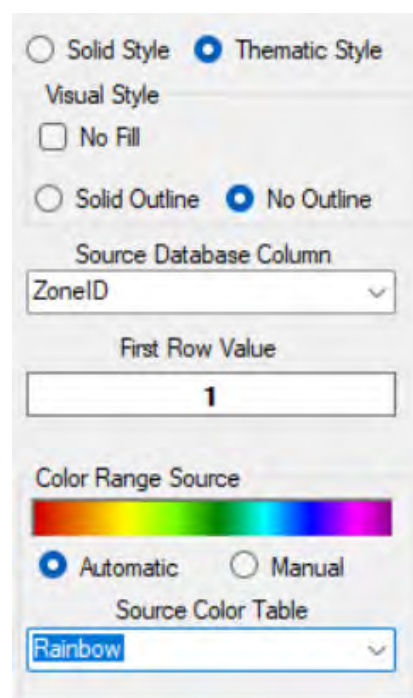
Outline

Only visible if "No Fill" is **not** checked. Outline options are "Solid" or "No Outline". Color is based on the "Outline Color" under the "Style" tab.

Source Database Column

Select the column containing the data to be displayed uniquely. This method works best with data that includes a range of unique attributes, such as objects numbered 1–10, to generate multiple colors.

You can also group objects with the same value to assign them a shared color, making visually distinct groups easier to identify.



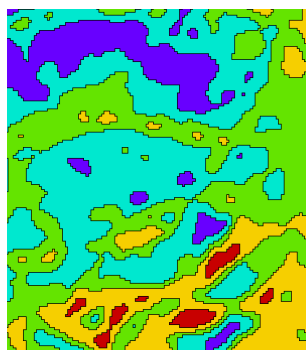
First Row Value

Displays the value of the first row in the selected "Source Database Column".

Source Color Table

Select the desired color table

- **Automatic** - Uses colors in the selected "Source Color Table"
- **Manual** - Manually assign colors to each database value



Example, a Zone Vectorized shapefile was created from a five zone raster.grd. This causes the number of ranges to be 5 based on the ZoneID column and the min & max values to be 1 & 5 respectively.

Drawing Display Properties

Thematic Tab

Source Color Table

Select the Color Table containing the desired colors and order

Ranges: Corresponds to the data you are working with. Min/Max Values will populate from the Source Database Column selected.

Range Type

A data classification method that determines how the ranges are grouped.

Equal Interval: Divides up the range into equal sized intervals

Two Standard Deviation: A statistical range that utilizes data within two standard deviations of the mean.

Stretch 98 Percent: Used to enhance contrast, it removes the top and bottom 1% of values, then stretches the remaining values out to cover the same range

K Means: Divides data points into clusters of similar values, then divides the by the number of zones chosen.

Equal Frequency: Creates groups based on the number of zones and makes each group contain the same number of data points

Natural Breaks: Groups values into classes and identifies "natural" groupings based on differences and inherent patterns.

Note- Thematic styles do not save in a template.

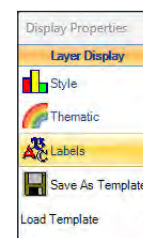
Drawing Display Properties

Labels Tab

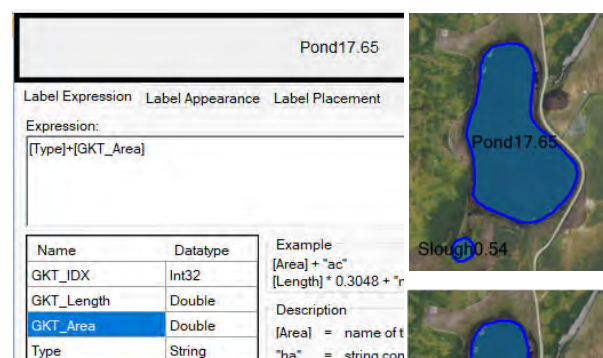
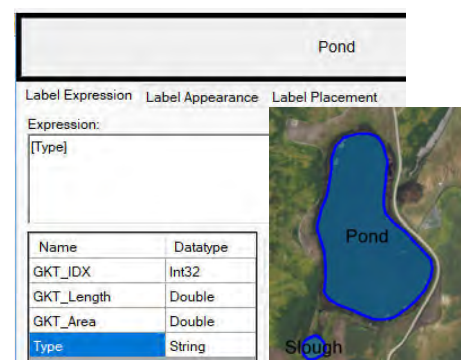
Adding labels to features within a shapefile allows for displaying important information to your maps and most importantly to PDFs to communicate details making viewers aware of important items.

Label Expression

- Select column for labeling:** Choose the column "Name" (Type) that contains the features to be labeled.
- Preview results:** The chosen column will appear the "Expression" box, while a preview of the label (e.g., "Pond") will be displayed in the "Font Preview" box at the top.
- Preview Labels:** At the bottom, click "Preview" to see how the labels will appear in the "Map Window."
- Add additional attributes:** Add a "+" between each entry, and then select "GKT_Area" to include the area in the label.
[Type]+[GKT_Area]
- Adding text:** Additional text can be added by placing it in quotation marks.
[Type]+[GKT_Area]+"ac"
- Adding spaces:** Add spaces for separation by placing a space inside quotation marks (" ").
[Type]+" "+[GKT_Area]+" "+ "ac"
- Perform calculations:** You can also include mathematical operations in the labels, such as converting acres to hectares or feet to meters. If using a number starting with a decimal (see below), make sure there is a zero proceeding the decimal.
[Type]+[GKT_Area]*0.404686
- Multi-line labels:** Labels can also be displayed on multiple levels by entering column names on separate lines in the "Expression" box. Simply use the "Return" button on your keyboard to make a new line.



GKT_IDX	GKT_Length	GKT_Area	Type
1	3718.7	17.65	Pond
2	1123.4	0.538	Slough



Drawing Display Properties

Labels Tab

Label Appearance Tab

Adjusting label appearance can improve visibility at different zoom levels, accommodate maps with high variability, and add a personal touch through font customization.

Font

Family: Changes the text font style

Scale: Choose the scale for the text

Pixel Scale - Ensures the label remains the same number of pixels, regardless of the zoom level, to maintain visibility at all times.

World Scale - the label will get larger or smaller on screen as you zoom in or out. The height will vary depending on the Linear Measure Unit setting.

Style: Choose from Regular, **Bold**, *Italic*, Underline, or a combination of these.

Color: Choose a color for the text

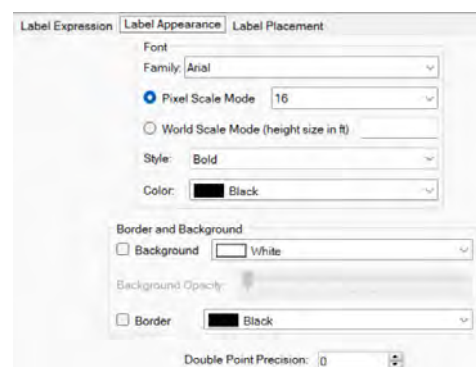
Background and Border

Adds a solid and/or outlined box around your label for better visibility.

Background Opacity: Can make the line visible through the background.

Border Color: Select the desired outline color for the box.

Double Point Precision: Select how many digits display beyond the decimal point.



Label Placement Tab

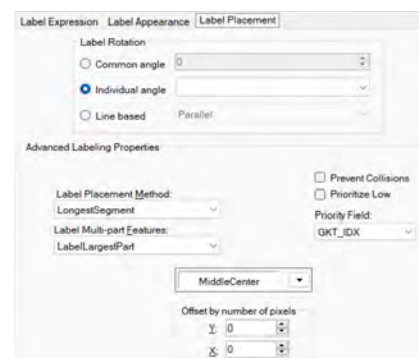
On occasion, labels will be placed over the top of other important features or conflict with other labels. These settings are used to eliminate those conflicts.

Label Rotation

Common Angle: Zero being horizontal, enter a value to cause clockwise rotation

Individual Angle: Different angles can be applied to each individual feature using a column in the database containing angle values and then selecting that column.

Line Based - Positions label perpendicular or parallel to a segment of a line shapefile.



Drawing Display Properties

Labels Tab

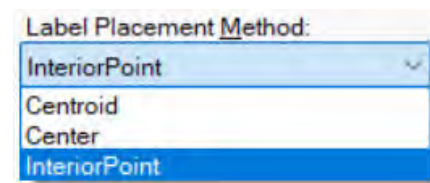
Advanced Labeling Properties

Label Placement (Points & Polygons)

Centroid: Places the label in the center of the polygon based on the distance

Center: Places the label in the center of the extents of the shapefile

Interior Point: Will always place the label inside a polygon



Label Placement (Lines)

Longest Segment: Labels the longest segment of a line shapefile

First Segment: Labels the first segment of a line shapefile

Middle Segment: Labels the middle segment of a line shapefile

Last Segment: Labels the last segment of a line shapefile

Label Multi-part Features (Lines)

Label All Parts: Places the same label on each segment of a line & all polygons that share the same value in the database

Label Largest Part: Places the label on the longest segment of a line or largest area of a polygon that shares values with other polygons in the database

Other Settings

Prevent Collisions: Prevents labels from overlapping or covering each other

Prioritize Low: Turns off the highest value of two overlapping labels

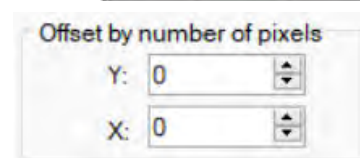
Priority Field: Turns off the lowest value labels that overlap based on the selected column

Placement Dropdown: Select preset locations for label location

Offset By Number of Pixels

Y Offset: Change position of labels up(+) or down(-) based on the entered value

X Offset: Change position of labels right(+) or left(-) based on entered value



Drawing Display Properties

Labels Tab

Save As Template

Saving display settings as a template allows you to quickly apply a specific combination of display properties to a shapefile. This is especially useful when working with multiple shapefiles from different data sources such as Soil Sampling Points and standardizing their appearance.

Rules

Type specific: Templates are not shapefile type specific, but it is recommended to use a point template with a point shapefile to get the best results.

Column used for labeling: The column name used for labeling in the template, must exist in the shapefile the template is being applied to.

Changes are Set: Once a template has been applied to a shapefile it can not be undone, unless you manually make the desired changes.

1. **Save a Template:** Selecting "Save As Template" will open the "SymbTemplates" folder within your GKData/_DB folder that contains all saved shapefile display templates.
2. Create a Folder: Optional
3. **Name the Template:** Give the template a descriptive name, such as "SamplePoints -75FtGK-IDX," to indicate properties like shapefile type, label size, or database column used.
4. **Reset to Default Settings:** Right Click on the shapefile name in the data tree then, "Reset Drawing Properties" to reset the shapefile to the default settings.

Load Template

1. **View Template List:** Click on the  dropdown arrow next to the "Display Properties" icon on the bottom toolbar.
2. **Select a Template:** Choose a template to be applied to the "Active Layer" shapefile.
3. Within the SymbTemplate folder, subfolders can be added to help organize your templates.

Drawing Display Properties

Pre-ADMS 8.2 Drawing/Labeling Compatible

Style Tab-

Line or Point Color-

Fill color for Polygons-

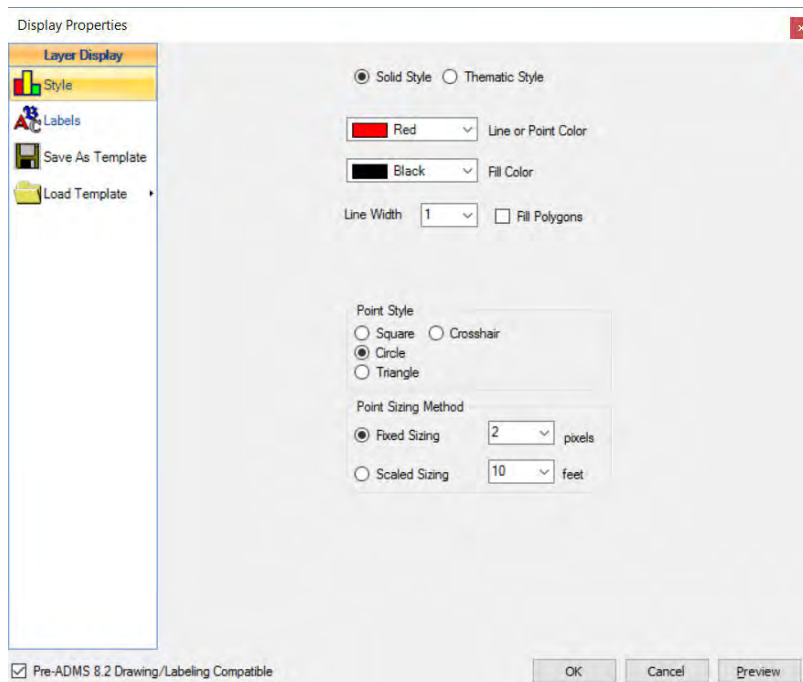
Line Width & Option to Fill Polygons-

Point Style-

Point Sizing Method-

Fixed sizing in Pixels. Object will stay the same number of pixels no matter the level of zoom in or out so it will always be visible.

Scaled Sizing will get larger or smaller on screen as you zoom in or out.



Label Tab-

Check "Labels Visible" to display in the Map Window.

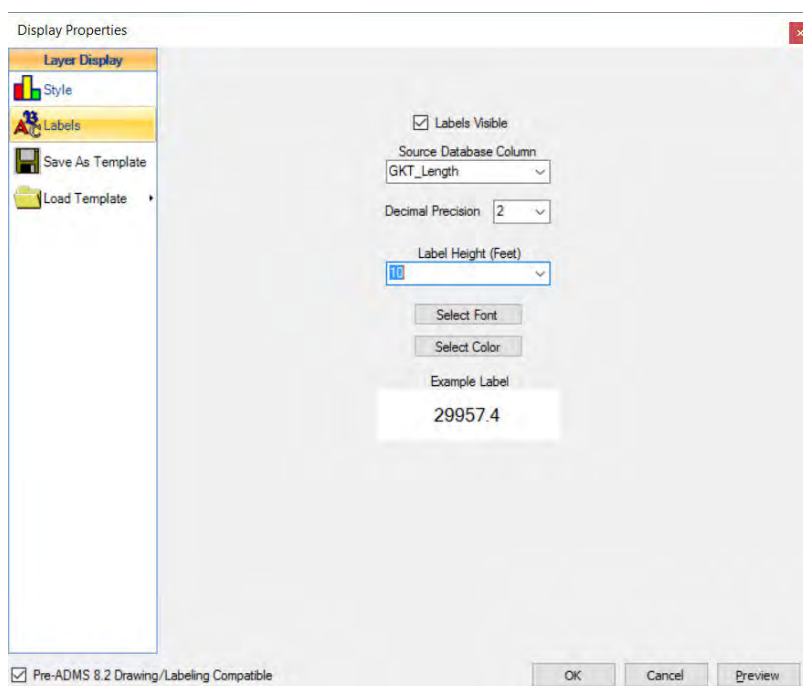
Select Source Database Column for data to be displayed. Color by Name does not function in Pre-ADMS 8.2

Select "Decimal Precision" to fit the data.

Choose Label Height-

Select Font-

Select Font Color-



Quick Notes For Satellite Imagery

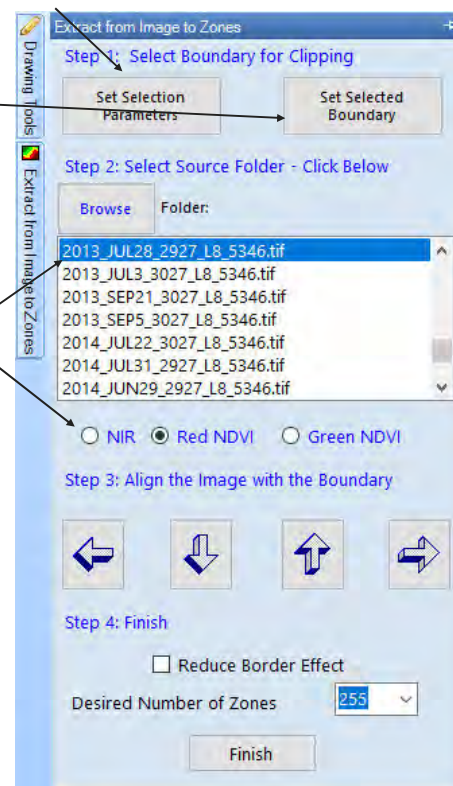
Creating Boundaries and Guidelines



1. Draw a field boundary or save it from a CLU file. Refer to creating boundaries section.
2. Turn on a NAIP image (County Data)
3. Create a new layer from Template— Guidelines 

Selecting Polygon - Boundary

1. A Boundary is needed for this process. Refer to the creating boundaries section to create a Boundary.
2. Turn on Boundary.shp and make sure it is the **active layer**.
3. Go to the **(EIZ)** "Extract from Image to Zones" Tab—Click "Set Selection Parameters"
4. Click inside the Boundary.shp polygon in the "Map Window"
5. The object will appear "Lime Green".
6. Go to "EIZ" tab—Click "Set Selected Boundary"
7. Go to the "EIZ" Tab

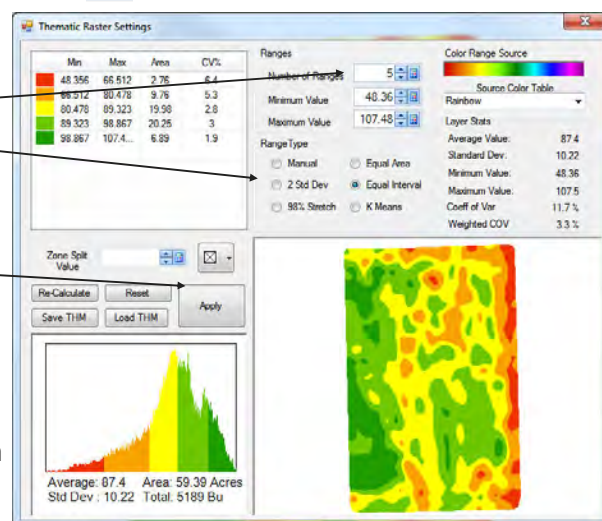


Cutting the Raster

1. "Step 2:" - "Browse" to the folder that contains "Landsat.tif" files
2. Turn on the Guidelines.shp that were created.
3. Choose the Extraction Type - NDVI=Vegetation/NIR=Bare Soils
4. "EIZ" Tab and "Click" on the LandSat Image Date.tif to extract
Note : Image will shows up in map window
5. Use the Alignment Arrows to move Image (if needed) according to guidelines
6. Choose "Desired Number of Zones" (suggest 255)
7. Click "Finish" (Repeat 3-7 for all the Images desired)

Coloring & Zoning Raster

1. Make sure your zone.grd is the **active layer**.
2. Useful tools at this time (if needed)
 - "Reduce Border Effect" 
 - "Trim End Values" 
 - "Invert" 
3. Click on "Smooth Filter" 5x5 - two times 
4. Turn all images to be merged. Open **Multi Output Map Math** 
5. Open "Average Of All Layers" script => Compile => Run
6. "Save As" Zones.grd 
7. Click on "Thematic Color" 
8. Adjust "Number of Ranges" to desired # of Zones
9. Adjust the settings like the window to the right
10. Normally use "2 Std Dev" or "K Means".
11. Mouse over the "Color Chips" to adjust and use the "Scroll Wheel" on the mouse for custom coloring.
12. When finished, click "Apply".
13. In "Map Window" do a "Save As"
-Name "Field Name-Zones-CropYear.grd"



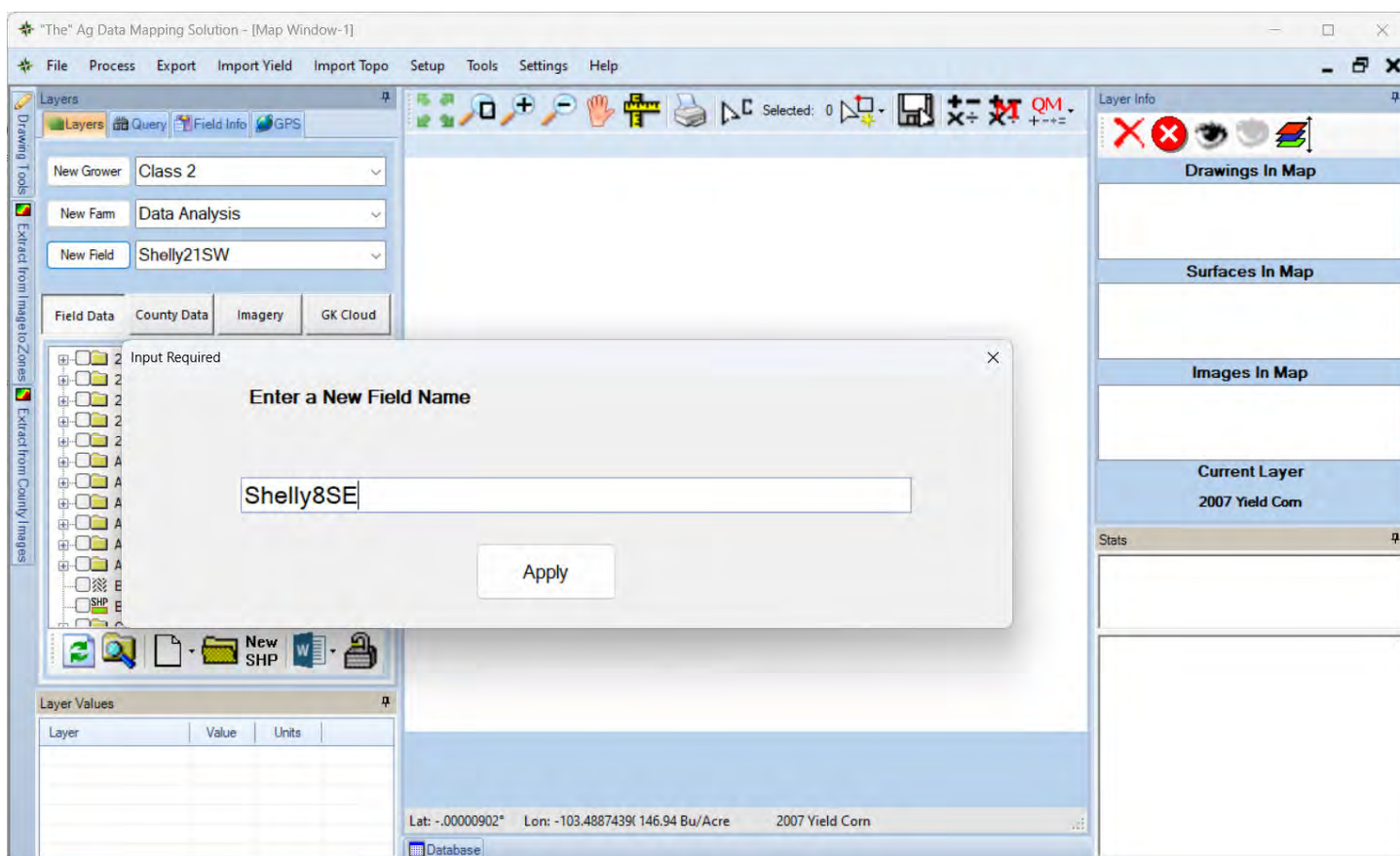
Saving for—Soil Sampling

1. Right click on the file name.grd in the data tree and select save as BMP (most soil samplers) /// save as Google Earth KMZ /// Or go to "File" & "Print Map" & "Print Map to Bitmap". Many options here.

Extracting Surface from Imagery

For this section of the help guide, we will be looking at Extracting and Handling Imagery. In the reference to "Handling" Imagery, we refer to colorization and zone creation. We will be working in the New Map Window, but many of these tools will carry across into other windows in Ag Data Mapping Solution.

1. Start up Ag Data Mapping Solution and select the **"Map Window"** button.
2. When the **"Map Window"** opens, select the desired "Grower", "Farm" and "Field". If they do not exist, click on the "New" buttons to the left of the name. An **"Input Required"** window will open up in the middle of the screen to enter the new name, do so, and click "Apply". Now the field is selected.



Extracting Surface from Imagery

Creating Boundaries

1. Select the "County Data" tab in the "Layer Control" area on the left side of the window. Open up the "County" folder, turn on a "NAIP" file, a "Township" file, a "Section" file and a "CLU" file if there is one.

2. If you already have a boundary created or have a "CLU" and do NOT want to create an individual field boundary, skip to the Automated Zone Creation or the Manual Zone Extraction section.

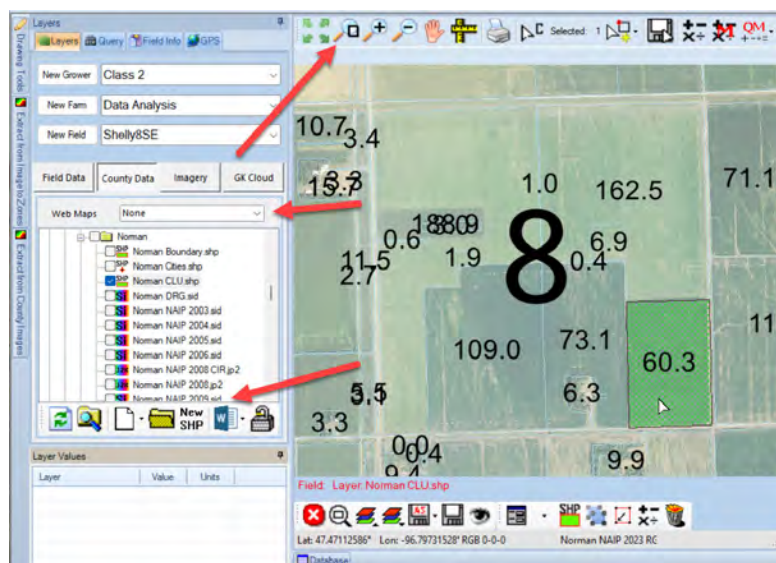
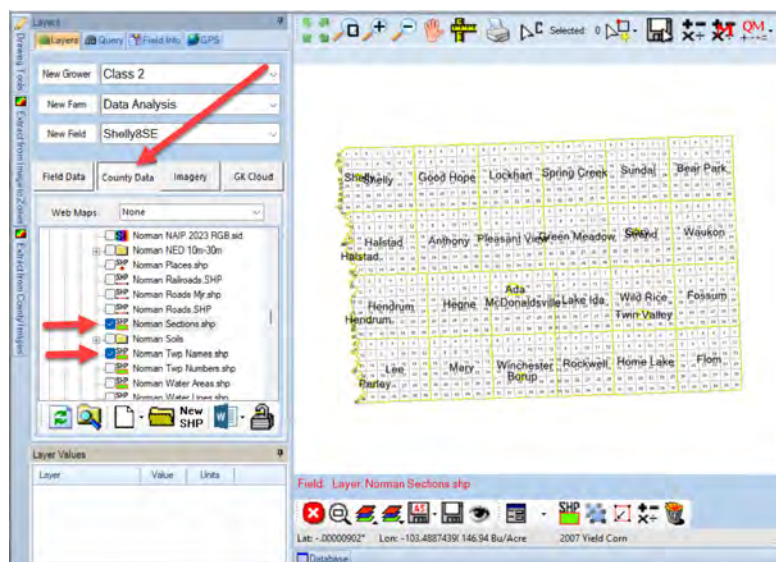
3. Using the Township and Section data, use the zoom tools on the top tool bar to find the desired field.

4. Once zoomed to the desired field, boundaries can be created two different ways in the office:

- **Draw a Field Boundary**
- **Save Boundary from a CLU**
- **Mass Data Collection**
(harvest/application data)

5. Turn on background image (either)

- Web Maps (not shown here)
- Check on "NAIP"

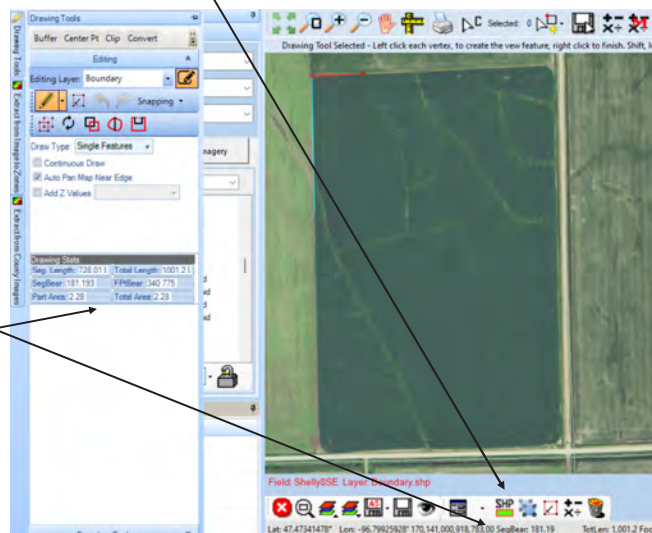
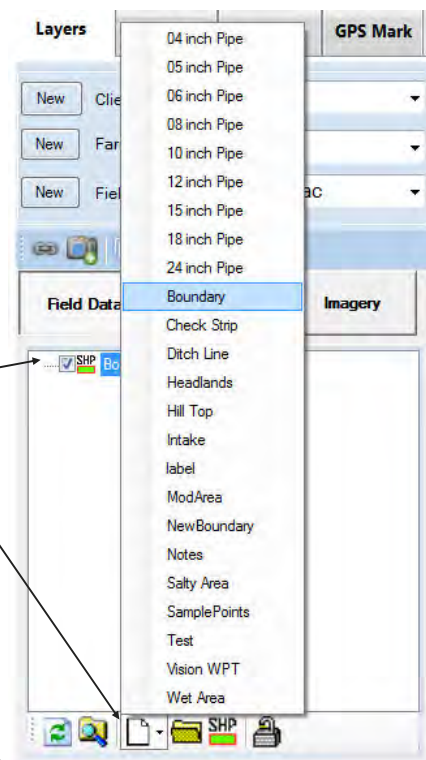


Extracting Surface from Imagery

Creating Boundaries

Hand Draw a Field Boundary

1. Make sure all the correct Grower, Farm, Field data is selected and go to the bottom of the "Data Tree" window and click on **"Create New Layer from Template"** and select "Boundary".
2. You will see the "Boundary" file you created under the "Field Data" tab. Check the box in front of the file name **"Boundary.shp"**, this will make it the **Active Layer**.
3. Go down to the bottom tool bar and select the **"Draw New Object"** button.
4. Once this is selected, "Left Click" on the field edge. Notice the blue line dragging behind the cursor. The line will not draw until you "Left Click" again at the next location (*If you mark a point at an incorrect position, hold down the "ALT" key and left click to undo the last point marked*). Once finished going around the field, "Right Click" to complete the drawing. When you "Right Click", the software will close the boundary by snapping the line back to the first point marked.
 - a) Take note as the line is drawn, there is a tool at the bottom – center of the screen to help. Giving the line lengths and headings to help guide.
5. Once finished creating your boundary, save the boundary by selecting **"Save"** on the bottom toolbar. This will open a save window - click on "Save".



Extracting Surface from Imagery

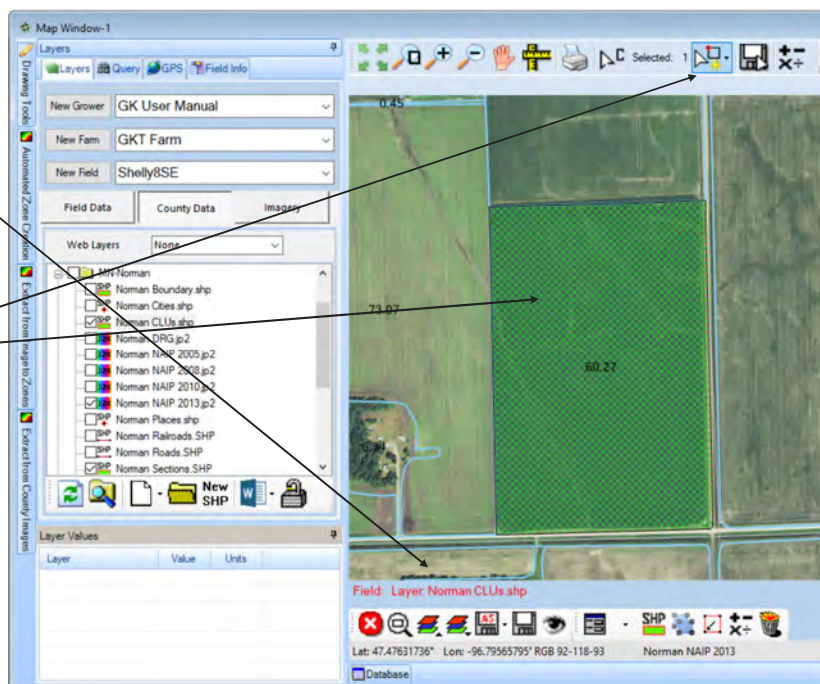
Creating Boundaries

- Save Boundary from a CLU

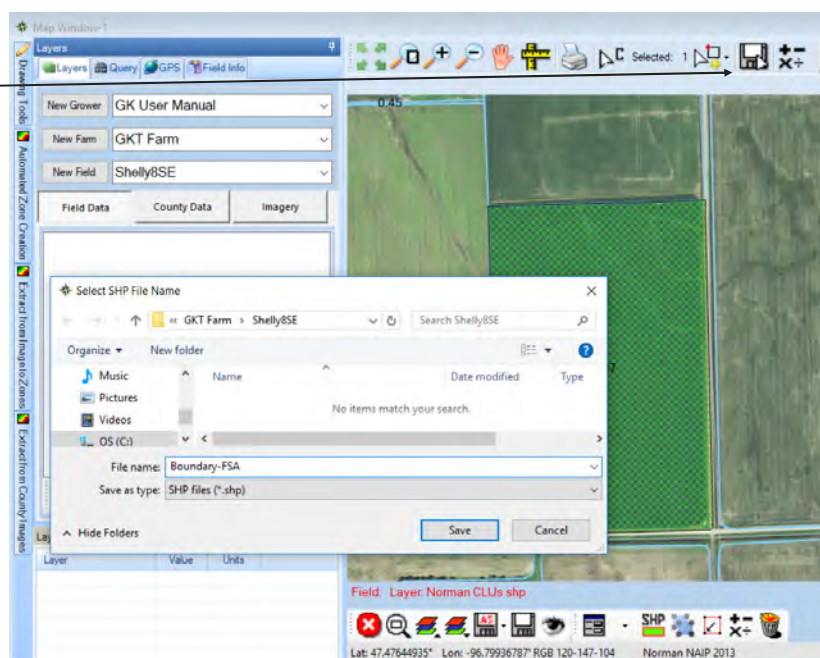
1. Make sure the bottom active layers has the address of the CLU.
Example- **Layer: Norman CLU.shp**
2. Select the polygon of the field to be saved. Do this by clicking on the **"Area Replace"** on the top tool bar and click inside of the polygon; it will appear **Light Green** to show it's selected (Hold down the "Ctrl" key to select multiple objects & the Shift Key to subtract selected objects).

- Note: "Area Replace" is on by default when ADMS starts.

- Note: the **"Selected"** counter on the top toolbar gives the # of objects selected.



3. Select the **"Save Selected Objects to New Layer"** on the upper toolbar. Make sure to save in the correct location. "Name" the object (Example-Boundary FSA.shp) and Click "Save".



Extracting Surface from Imagery

Creating Boundaries—From Application/Yield Points

With some tools within ADMS boundaries can automatically be generated.

To automatically generate a boundary a point data collection is needed. This can be anything as long as it's point data. A few good sources are:

- Yield Data
- Elevation Survey Data
- As-Applied Data

Make sure there are no outlier points in the collection otherwise this process will take much longer to run.

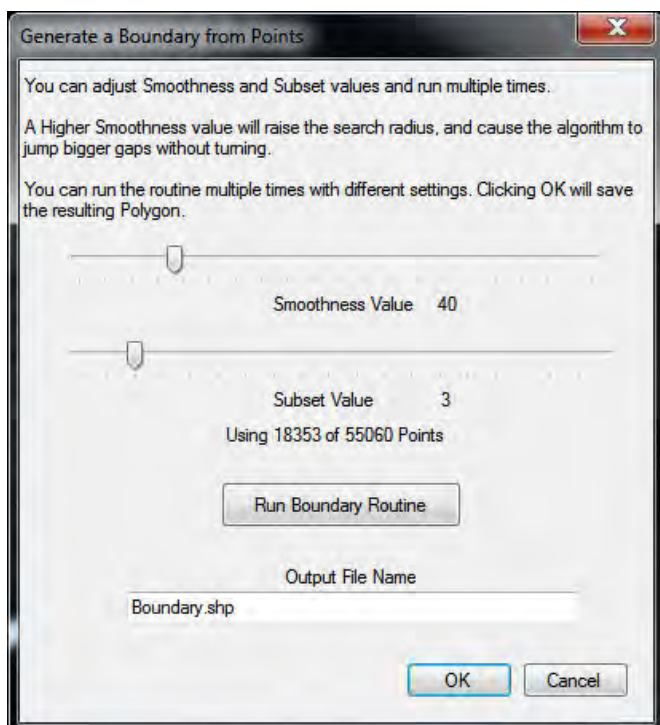
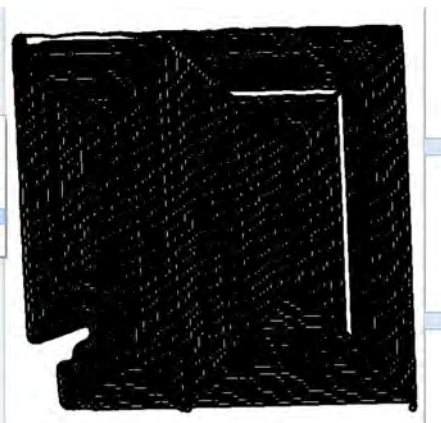
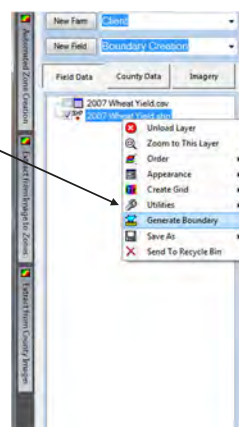
**Note: If yield is being used and has been cleaned up some of the data around the edge of the field may be missing and the boundary will be inaccurate. In this situation consider exporting the raw data for the purpose of boundary creation.*

1. Turn on a data points file (SHP or CSV).
2. Right Click on the field in the data tree and select **"Generate Boundary."**



Generate Boundary

3. After that is selected the "Generate a Boundary from Points" window will appear. This window gives instructions along with different options of how the new boundary will be created.



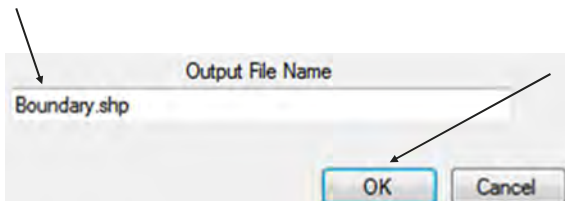
The two options on this window are the "Smoothness" and "Subset" values.

- **Smoothness Value:** How close the boundary follows the original points. The lower the value the smaller the search radius will be.
- **Subset Value:** How many points are used out of the whole collection. (e.g. If the subset value is set at 3, every 3rd point will be used during the calculation. Likewise, if it's set at 20 it will use every 20th point.)
- The boundary routine can be run multiple times before saving the final boundary. This allows you to adjust the smoothness and subset values.
- It is recommended to keep the subset value so it uses less than or equal to 10,000 points.

Extracting Surface from Imagery

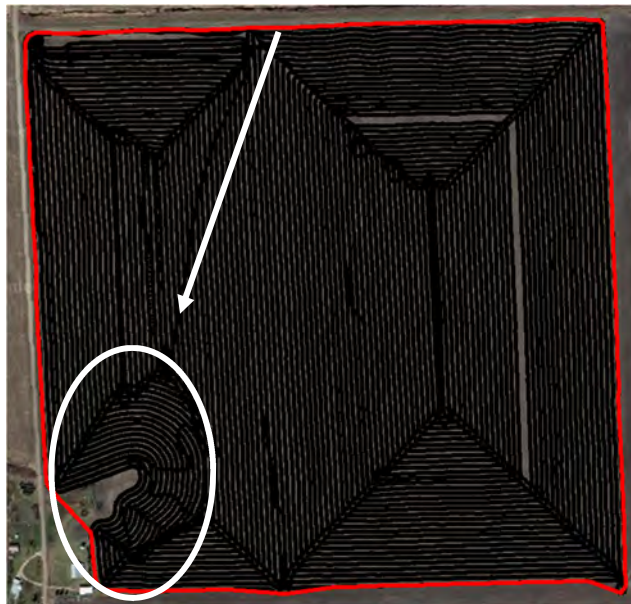
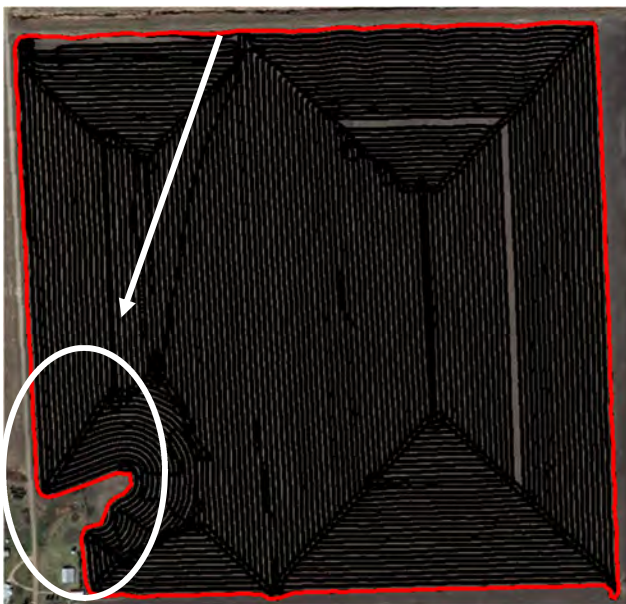
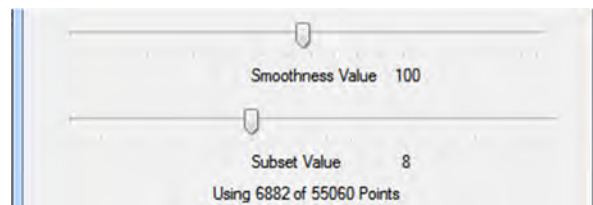
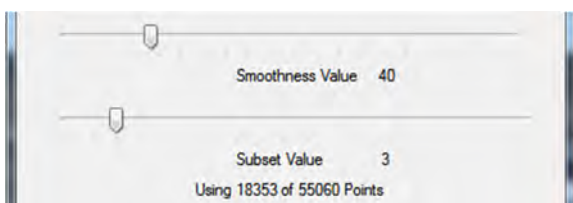
Creating Boundaries—From Application/Yield Points

4. The smoothness and subset values will automatically be set by the software, but can be adjusted to change how the boundary follows the points.
5. Click "Run Boundary Routine" 
6. Adjust the "Output File Name" if needed. If the name is changed make sure the *.shp extension stays on. Otherwise the boundary will not be recognized in the software.



7. Click "OK"

8. The polygon will be saved back to the data tree with the entered file name.



Final adjustments can be made to the boundary using the "Move Vertices" tool on the bottom toolbar.

- Select inside the boundary to turn it green.
- Select "Move Vertices of Selected Object."
- Hover over the vertices and left click and hold to move them.
- After all vertices are moved click the "Move Vertices of Selected Object" button again to turn it off.
- Save changes.

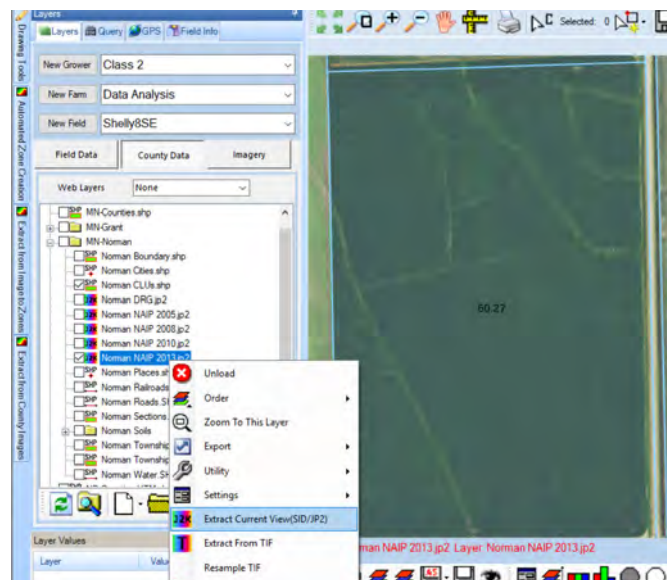


Extracting Images From NAIP

FSA—National Ag Imagery Program (NAIP) supplies high resolution .sid & .jp2 images. Typically 1 & 2 meter resolution. These instructions walk you through converting a small area into a .tif format to create a surface for making “Zones”. Keep in mind there is not a “NIR” channel in most of this data. So we are working with the “Red / Green / Blue” spectrum of visible light.

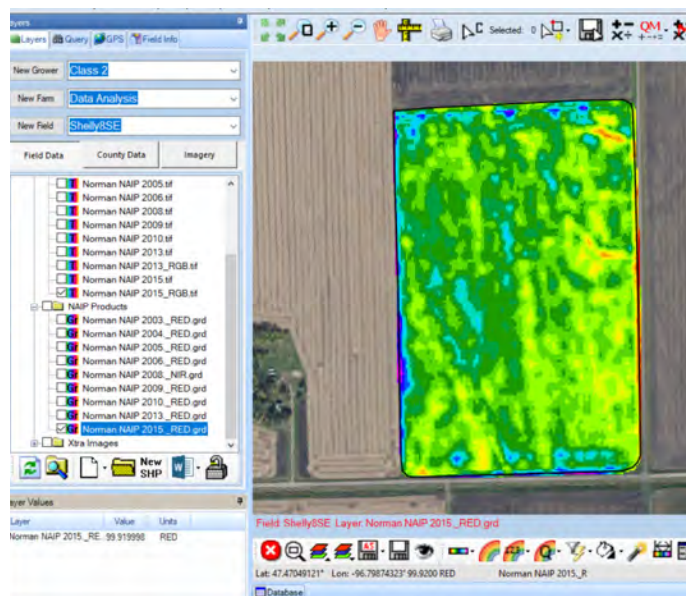
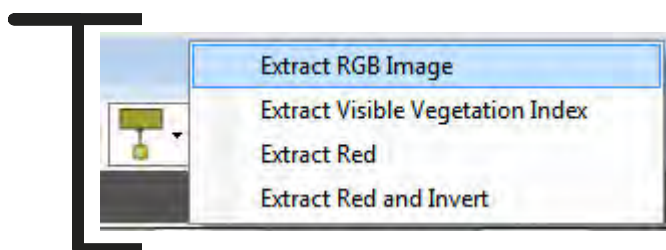


1. Turn on the “Boundary.shp”
 - Note: you must be zoomed to the “Field”
2. Go to the “County Data” Tab
3. Turn on a NAIP Image.sid (or .jp2)
4. Right click on the “NAIP Image.sid” name
5. Select “Extract Current View”
6. Go to the “Field Data” Tab
 - Refresh the data tree
 - Open “Images/NAIP” Folder
7. Check on the new “County NAIP.tif”
make it the **active layer (in RED)**
8. Follow the image extraction instructions
Using - “Manual Extractions”



Consultant Users:

1. Turn on “Boundary.shp”
 - Note: Must be zoomed to the “Field”
2. Go to the “County Data” Tab
3. Turn on a NAIP Image.sid (or .jp2)
4. Click the extract from SID/JP2 icon
5. Several different options will appear in a list.



6. Choose the appropriate extraction method
7. Go to the “Field Data” tab
 - Refresh the data tree
 - Open “Images/NAIP” Folder
8. The extracted file will have an extension on it to define the extraction type
(ex: _Red, _RGB_VisVI)

Extracting Images From Web Layers



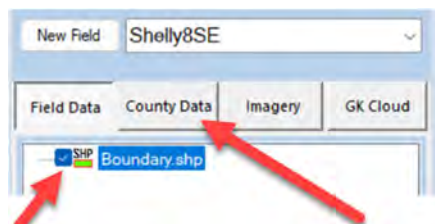
ADMS has functionality to give users access to web based background imagery. In order to use these options, the computer must have an active internet connection. This allows the software to connect to a WMS (Web Map Service) server. Once the connection is made a geo-referenced background is returned to be viewed in the Map Window.

There are two main types of WMS layers that are handled in ADMS.

1. Built in ADMS WMS links
 - These links will be standard within the software. The user has no ability to change, add, or remove them. Examples would be ESRI & Bing Maps and cover a bigger geography including the United States and Canada.
2. Local/Specialty WMS links
 - WMS links that the software user can change, or may have special access to. These may be limited to a specific state or region. The links will be stored in the county data folder and visible in the data tree.

Using ADMS Web Layers

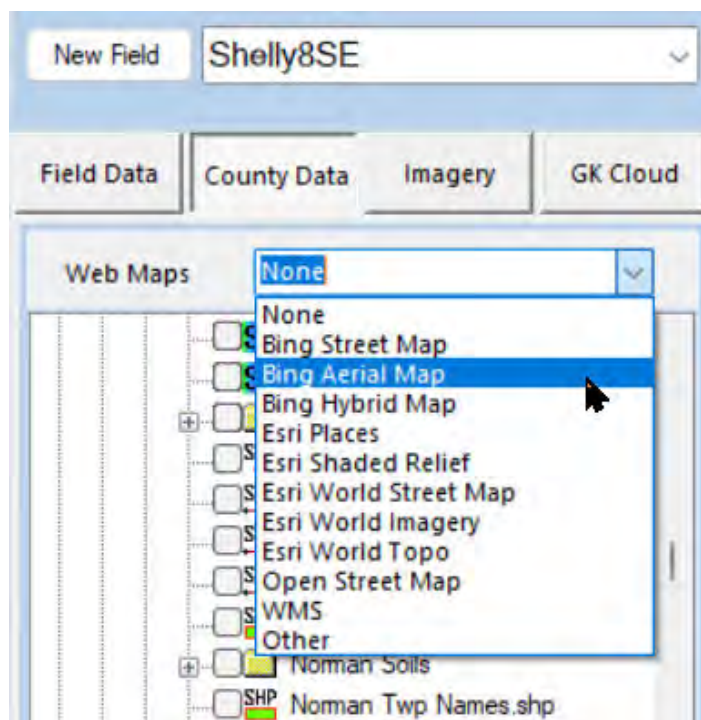
1. Turn on a layer to be used as reference layer. This will bring ADMS to the field level instead of loading the entire country. (e.g., boundary or surface of the field)



2. Select the **"County Data"** tab.

3. From the **"Web Layers"** drop down menu there will be a list of available layers to select.
4. Select the layer to use as the background image. After the desired layer is selected from the list it will load on the back of all layers that are currently loaded in ADMS.

**Note: If another image is currently loaded in the software the web layer may not be visible since by default it is loaded behind all other layers.*



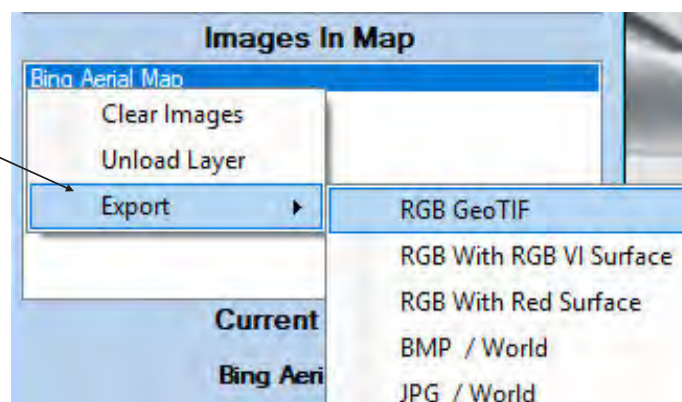
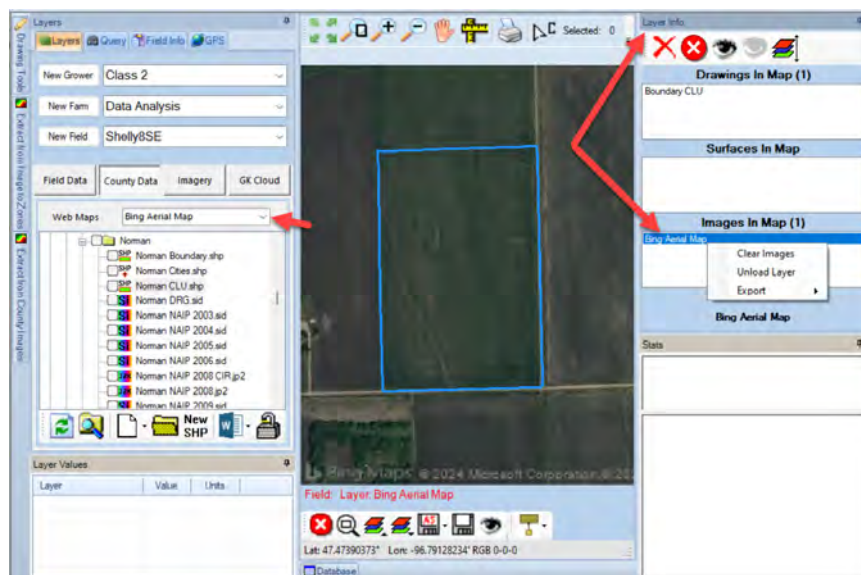
Extracting Images From Web Layers



Using ADMS Web Layers—Saving & Extracting Images

5. Go to "**Layer Info**" down to "**Images In Map**" the Web Maps Image Name is there.
6. To save Web Layer as a Local Copy or for Zone Creation **Right Click** on the layer name (e.g. Bing Aerial Map).
7. Choose "**Export.**" A menu will appear with several different extraction methods.

*To use the surface extractions the boundary **MUST BE SELECTED** first.



- * **RGB (Red, Green, Blue) GeoTIF**—Extracts true color image as a TIF file. Very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **RGB With RGB VI Surface**—Extracts the true color TIF file and it extracts and saves the RGB VI (Red, Green, Blue Visual Index) as a GRD map to the "Field Data."
- * **RGB With Red Surface**—Extracts the true color TIF file and the Red band is extracted and saved as a GRD file.
- * **NRG (Near Infrared, Red, Green) GeoTIF**—Use this option if there is an infrared band in the image. Usually you can tell if the image has a reddish color to it. This will save it as a color infrared GeoTIF in "Field Data." It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **NRG With NDVI**—Extracts the NRG GeoTIF and a NDVI GRD is created and saved in "Field Data."
- * **NRG With NIR Surface**—Extracts the NRG GeoTIF and the NIR band is extracted and saved as a GRD in "Field Data."
- * **BMP / World**—Saves the file as a geo-referenced BMP file.
- * **JPG / World**—Saves the file as a geo-referenced JPG file.

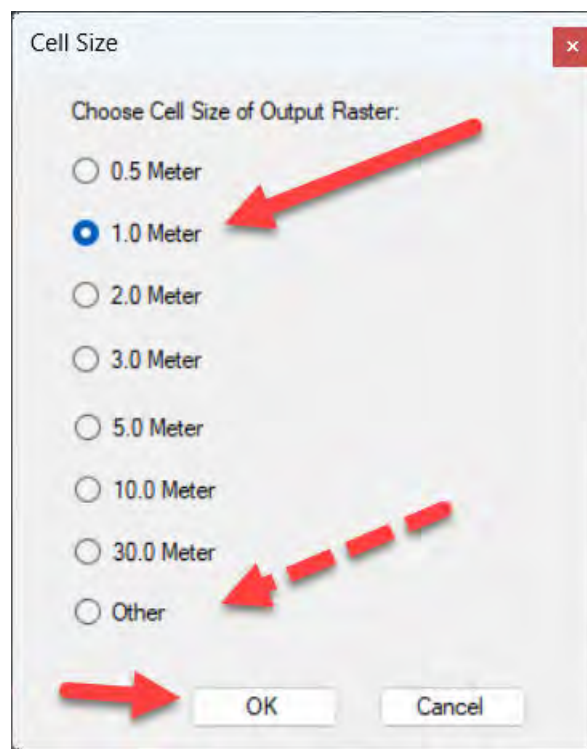
Extracting Images From Web Layers



Using ADMS Web Layers—Saving & Extracting Images

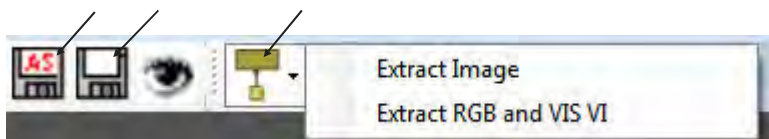
8. After choosing the extraction option a box will appear asking which resolution to export it as. The higher the resolution the less detailed the image will be. For most field situations 1-3 meters is adequate. By choosing "Other" a custom size can also be entered.

Click **"OK"**

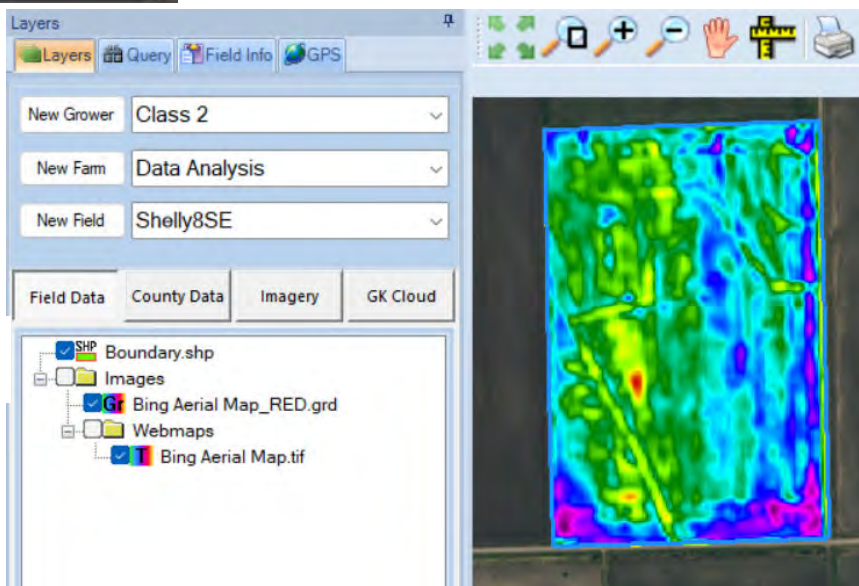
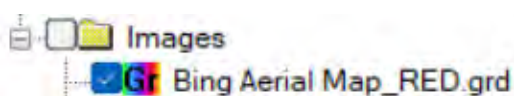


9. File will, by default, be saved back to the "Field Data" & "Field"

The image can also be saved by using the buttons on the bottom toolbar.



If a surface was extracted it will have the extraction type as an extension on the file name. Such as _RED.



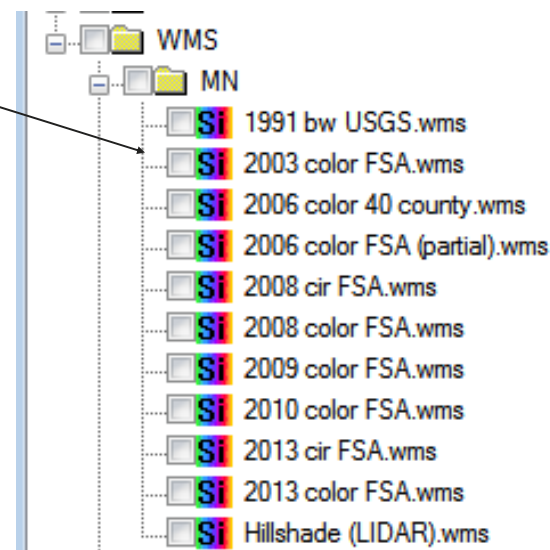
Extracting Images From Web Layers



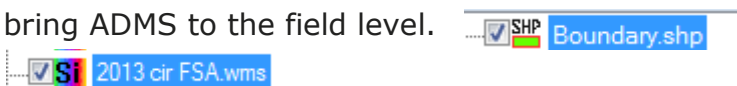
Using Custom WMS (Web Map Service) Layers—Saving & Extracting Images

There are many different WMS layers that may be added into ADMS as an additional layer and be utilized within the software. Often these layers are state or region specific and require some setup before they can be used. To set up WMS layers refer to that section in the book.

- Once the WMS layers have been properly set up they will show up as an additional layer in the data tree just like a SID or TIF file.
- Example on the right shows an example of different layers that are available through the Minnesota WMS server.
- These layers can be placed in folder structures, emailed, and are treated like other layers that ADMS automatically recognizes.

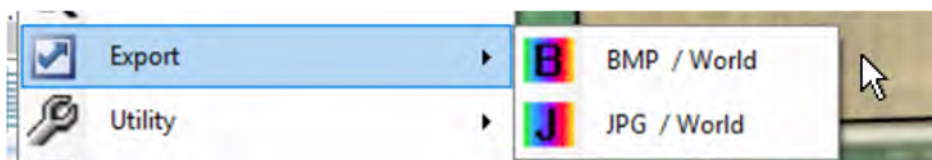


- Turn on a boundary or reference layer to bring ADMS to the field level.
- Turn on the WMS layer to be extracted.



There are several different ways that the layer can now be extracted.

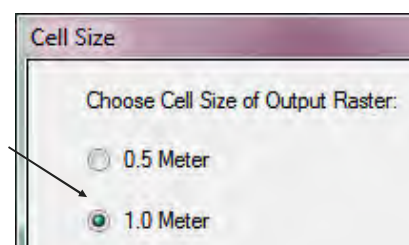
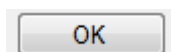
1) Right clicking on the layer in "Layer Selection."



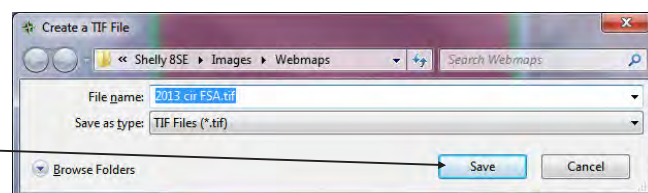
This brings up 3 different extraction options:

- TIF/World—Saves the image as a TIF file. This is recommend for image processing and zone creation.
- BMP/World—Saves the image as a geo-referenced BMP file.
- JPG/World—Saves the image as a geo-referenced JPG file.

- Choose the output resolution. For most field situations 1-2 meters is adequate.
- Click "OK."



- The file will automatically be named and saved back to the "Field Data" file structure.
- Click "Save."

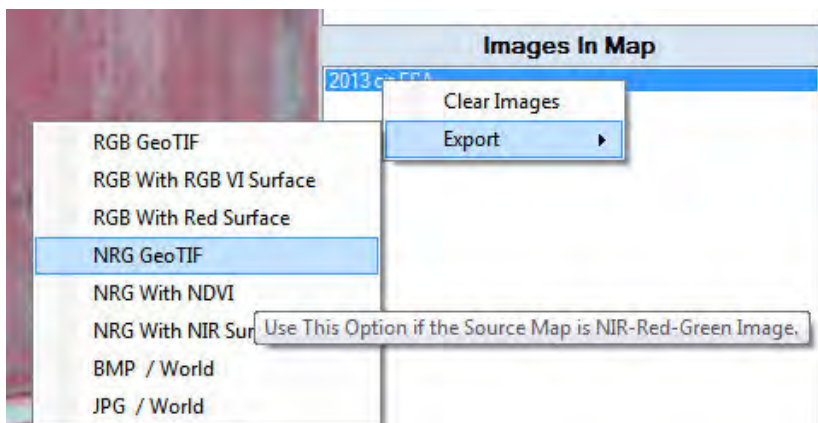


Extracting Images From Web Layers

Using Custom WMS (Web Map Service) Layers—Saving & Extracting Images



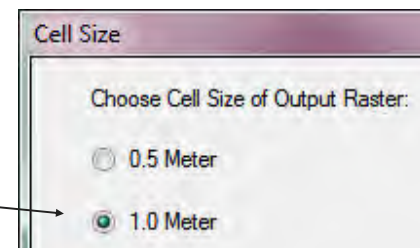
2) Right clicking on the layer in "Layer Info."



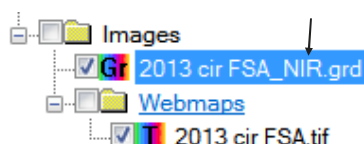
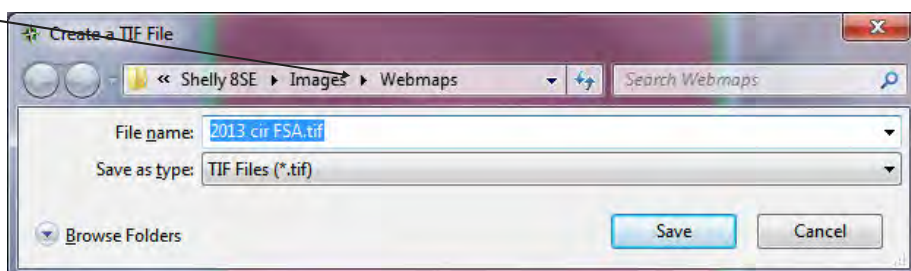
- This gives you several different extraction options. If the RGB VI, Red Surface, NDVI, or NIR Surface is used the boundary **MUST BE SELECTED** first.

- * **RBG (Red, Green, Blue) GeoTIF**—Extracts the true color image as a TIF file. It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **RGB With RGB VI Surface**—Extracts the true color TIF file and it extracts and saves the RGB VI (Red, Green, Blue Visual Index) as a GRD map to the "Field Data."
- * **RGB With Red Surface**—Extracts the true color TIF file and the Red band is extracted and saved as a GRD file.
- * **NRG (Near Infrared, Red, Green) GeoTIF**—Use this option if there is an Infrared band in the image. Usually you can tell if the image has a reddish color to it. This will save it as a color Infrared GeoTIF in "Field Data." It is very important that this is chosen correctly otherwise certain extractions (NDVI, NIR, RGB VI) may not work correctly
- * **NRG With NDVI**—Extracts the NRG GeoTIF and a NDVI GRD is created and saved in "Field Data."
- * **NRG With NIR Surface**—Extracts the NRG GeoTIF and the NIR band is extracted and saved as a GRD in "Field Data."
- * **BMP / World**—Saves the file as a geo-referenced BMP file.
- * **JPG / World**—Saves the file as a geo-referenced JPG file.

- Choose the output resolution of the extracted image. 1-2 meters is adequate for most fields.
- Click "OK."
- The file will automatically be named and saved back to "Field Data" in a "Images/Webmaps."
- Click "Save."
- If a surface was extracted it will have the extension of the extraction type on the end of the file name. (_NIR, _NDVI)



OK



Creating WMS Links



Using WMS Servers

WMS servers are a web based map server that can be accessed through ADMS with an active internet connection. Most of them are state or region specific and are not available in all areas.

Finding WMS Links:

The easiest way to find new WMS links is by simply searching the web for them.

Here are some examples of WMS links:

MN: <http://geoint.lmic.state.mn.us/cgi-bin/wmsll?>

USA:

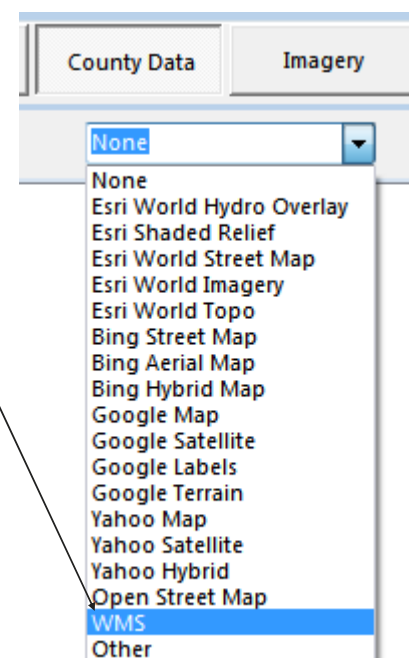
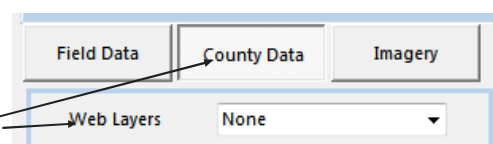
Adding WMS Links:

Select "County Data" so the "Web Layers" dropdown is visible.

From the "Web Layers" dropdown menu select "WMS."

The "WMS Server Parameters" window will appear.

This window allows different links to be saved to the data tree and utilized within ADMS.



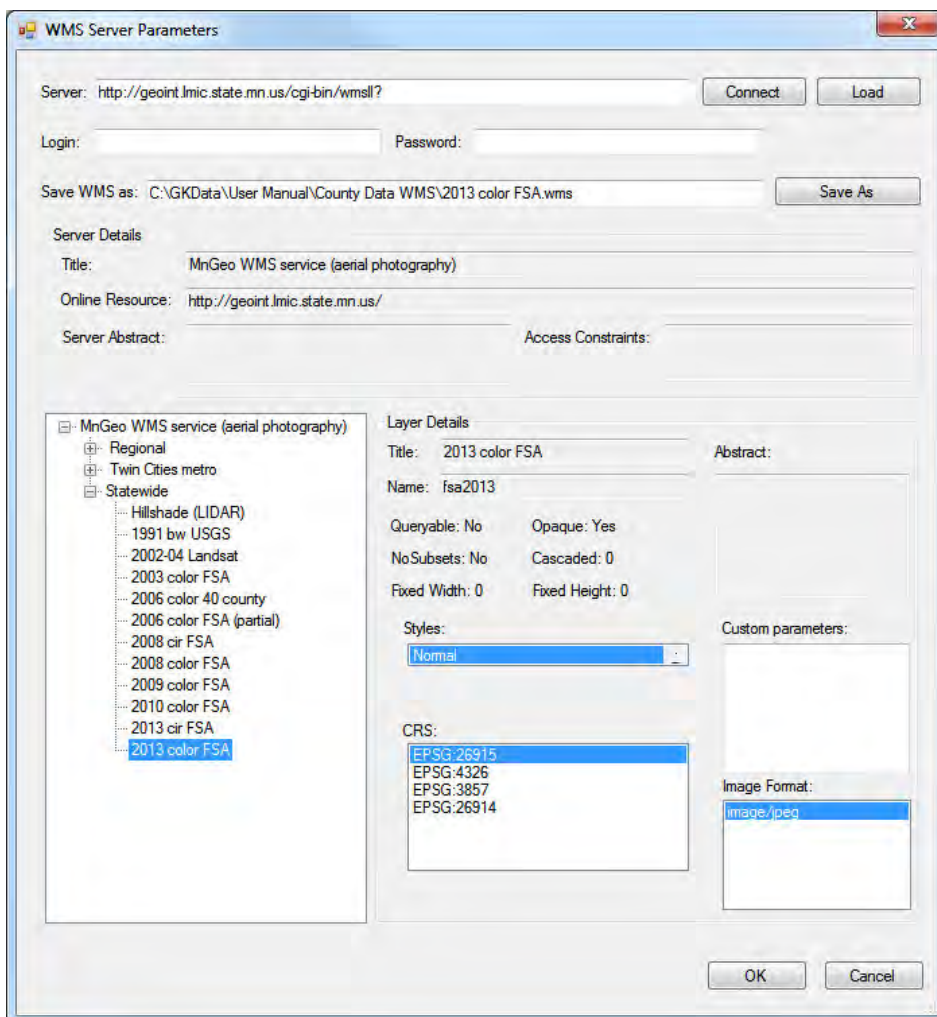
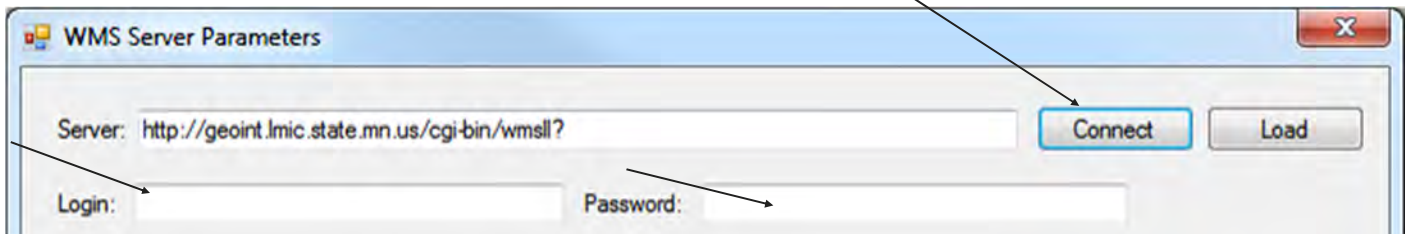
The 'WMS Server Parameters' dialog box contains the following fields and sections:

- Server:** Text input field with 'Connect' and 'Load' buttons.
- Login:** Text input field.
- Password:** Text input field.
- Save WMS as:** Text input field with 'C:\GKData\User Manual\County Data WMS\' and a 'Save As' button.
- Server Details:**
 - Title:** Text input field.
 - Online Resource:** Text input field.
 - Server Abstract:** Text input field.
 - Access Constraints:** Text input field.
- Layer Details:**
 - Title:** Text input field.
 - Name:** Text input field.
 - Queryable:** No
 - Opaque:** No
 - NoSubsets:** No
 - Cascaded:** 0
 - Fixed Width:** 0
 - Fixed Height:** 0
 - Styles:** Text input field.
 - Custom parameters:** Text input field.
 - CRS:** Text input field.
 - Image Format:** Text input field.
- Buttons:** 'OK' and 'Cancel' at the bottom.

Creating WMS Links

The following example will use the MN WMS server link.

1. Enter the WMS server link where it says "Server."
2. Click "Connect."
 - * Some servers need special authentication which may require a login name and password. If this is the case enter it before connecting.



3. After successful connection to the server the window will populate with different options the layers are viewed and saved.
4. Different options may be available or lacking depending on which server is being accessed.

Creating WMS Links

On the left side of the window the different layers that are available on this server will populate. Depending on the server they may range from one to many.

In this MN example there are different categories that break the images up into categories: Regional, Statewide, and Twin Cities metro.

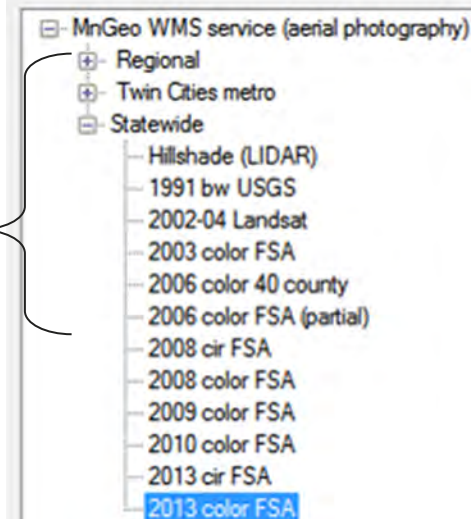
Common acronyms that are used with these layers are:

CIR: Color Infrared—this layer contains a NIR, RED, & GREEN band.

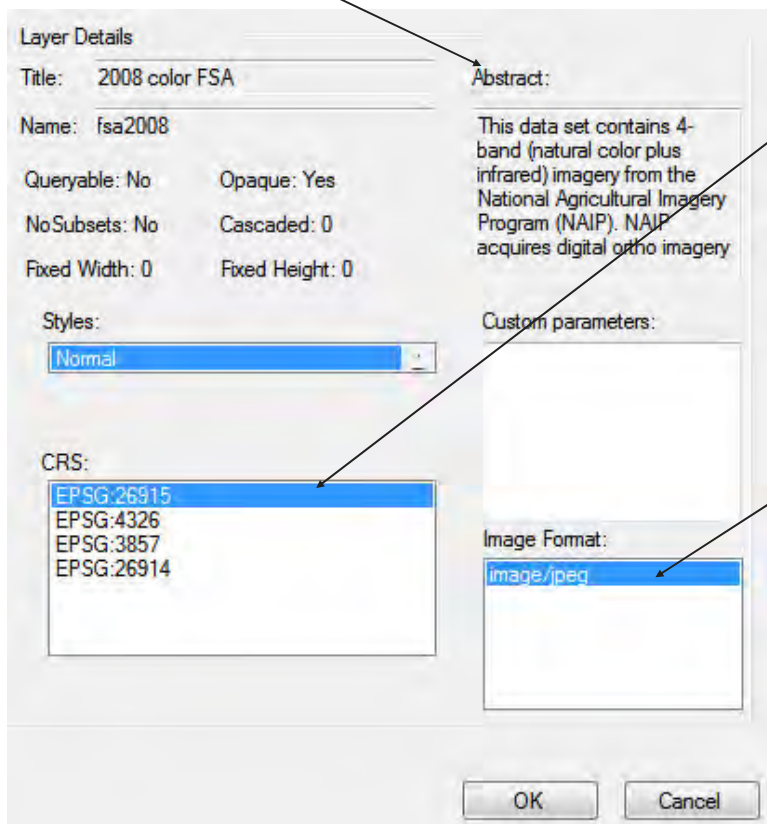
Hillshade: This is a elevation derived shaded relief map.

Color (RGB): These will have layers with the RED, GREEN, & BLUE bands.

BW: Black & White layers.



A description of the layer may be available in the Abstract like this 2008 layer.

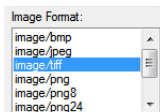


CRS (Coordinate Reference System)

is how the image is projected. By default the WMS layer will be projected in the UTM zone that is active. If the layer is not visible and should be it could be in an uncommon projection system and a different CRS can be selected.

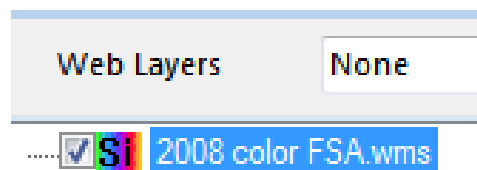
EPSG:26915 (NAD83 UTM15N)
 EPSG:26914 (NAD83 UTM14N)
 EPSG:32615 (WGS84 UTM15N)
 EPSG:4326 (WGS84)
 EPSG:3857 (Web Mercator)

Image Format: Some WMS servers will have options to select different image formats. Some are better quality than others. By default if image/tiff is available it will automatically be selected (because of quality this format is always recommended, but not always available as an option)



Example of different image formats from ND WMS server

5. Click "OK."
6. The image will be saved back to the County Data folder that is set as the root in settings with the title shown in Layer Details above.
7. This server is now ready to be used within ADMS.



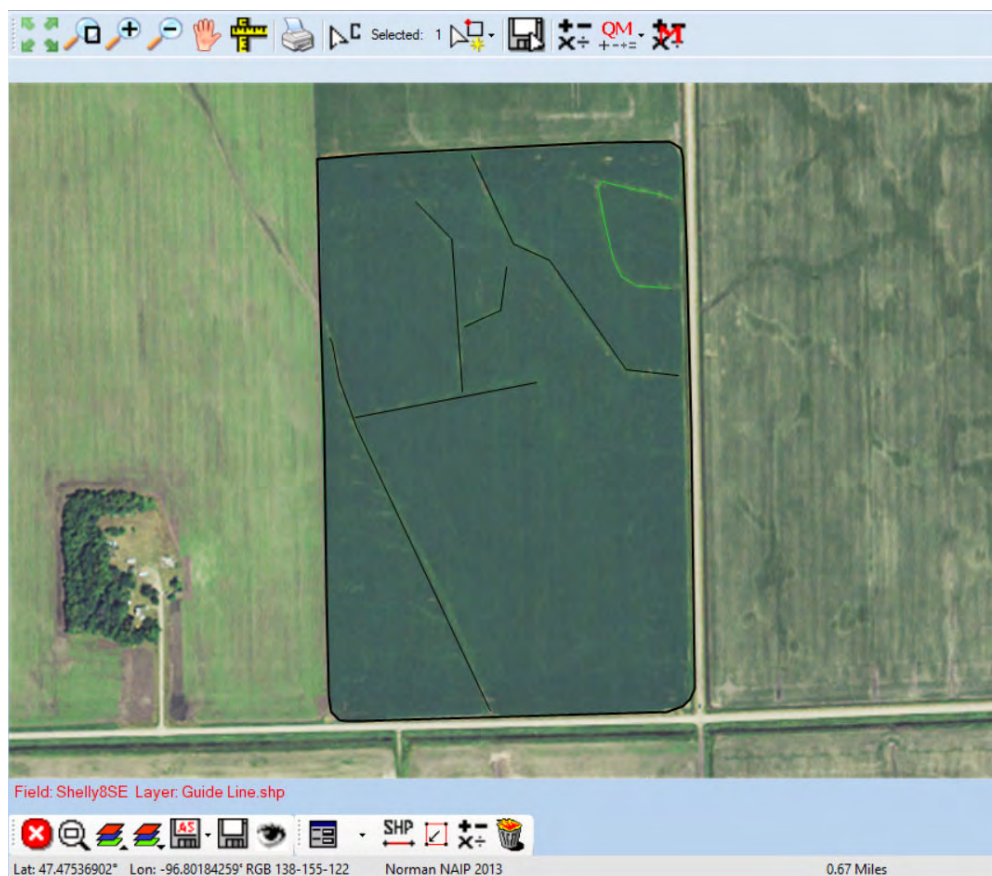
Creating Guide Lines for Extracting Imagery (Landsat)

As you may know if you have ever worked with Landsat data it is low resolution (30 meter raw data). The geo-referencing is ok at best. So you must use the tools in the software to "align" the data. Clicking between images can be time consuming, but it is very accurate. If you are going to be extracting many images on a field using Landsat data. Suggest looking at using "Guide Lines".

1. Turn on Field Boundary
2. Turn on a NAIP image that has all the "details" to be highlighted.
Prefer to use extracted NAIP.tif files (see previous page).

Details Like: ditches / sandy knob & veins / salty spots / clay knobs

3. Click on the "Create Layer from Templates" below the data tree.
4. Choose "Guide Lines"
5. Check the "Guide Lines.shp" file
6. Click on the SHP button on the bottom toolbar
7. Draw in all these areas, reminder ADMS is drawing LINES not Polygons
8. Repeat 6 & 7 as needed to highlight all events
9. Click the "Save" button
10. Leave the "Guide Lines" on while extracting Landsat Images.
Very helpful..

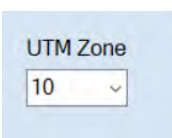


Extracting Surface from Imagery—Re-Projecting Imagery

Re-Projecting Imagery

From time to time you encounter an image whose projection is not in the UTM Zone of the current project. These instructions will work with most TIF images. These instructions will not re-project SID / JP2 / or other compressed images.

This utility shows the projection of the original image. (this example is UTM11)



Make sure the UTM on the ADMS Start Screen to the correct output UTM Zone for this project. It may just be that the UTM zone of the data in this project needs to be displayed in a different UTM Zone.

This is where you want all the data to be when finished. (this example—UTM 10), make sure no other ADMS windows are open.

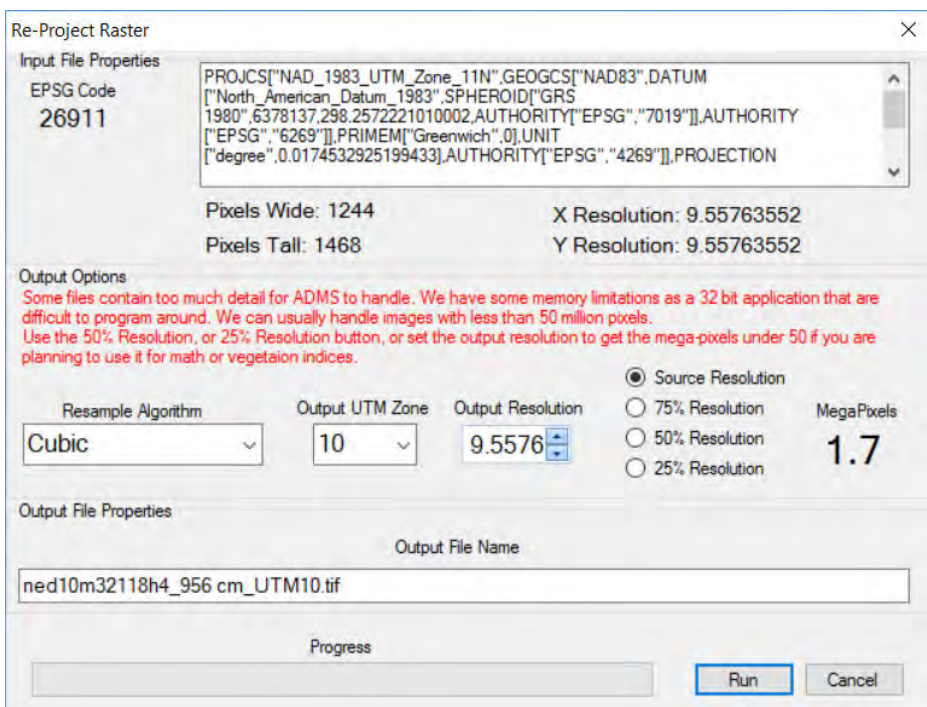
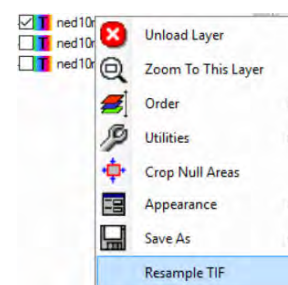
Open **"Map Window"**



Turn on "check" the image you want to re-project.

In most cases the software will see that the image needs to be re-projected. And will open the **"Re-Project Raster"** window.

If the "Re-Project Raster" window does not come up, Right click on the "image name" xxx.tif and choose **"Resample TIF"**



Re-Project Raster Window

If, the image file has projection information in the file it will show up at the top **"Input File Properties"**

Read through the **"Output Options"**

Suggest using

- Cubic
- UTM should be correct
- Output Resolution will change with the selection of the "Resolution %"

If working with aerial imagery suggest using 1 meter for "output resolution"

The Name will "auto populate" adding the new UTM zone # to the name. Suggest leaving this, but you can adjust or edit this name.

Click **"Run"**. You now have a re-projected image in the data tree at the same location as the original.

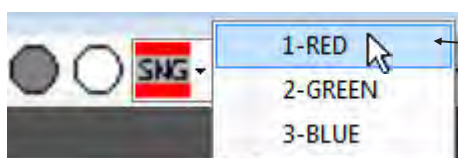
Extracting Surface from Imagery—Manual Zone Extraction



Individual Band Extraction

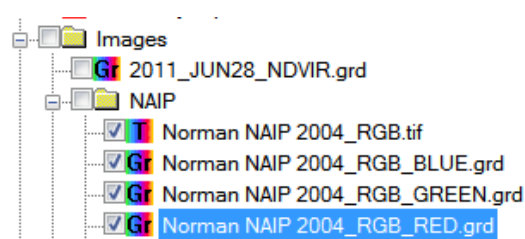
All multi band images can have each band extracted out individually. Commonly, the red, green, blue, and NIR bands will be used. By using the following process each band can be analyzed by itself.

1. Turn on the field boundary and select inside it.
2. Turn on the image to be extracted and make the active layer.
3. On the bottom toolbar select the single band extraction icon.



4. Select the band to extract.

The extracted surface will be saved under "Field Data" in the "Images" folder. The extracted surface will have an extension of the extracted band (_NIR,_GREEN,_RED) that was chosen.

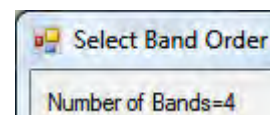


Individual Band Extraction—Changing Band Order

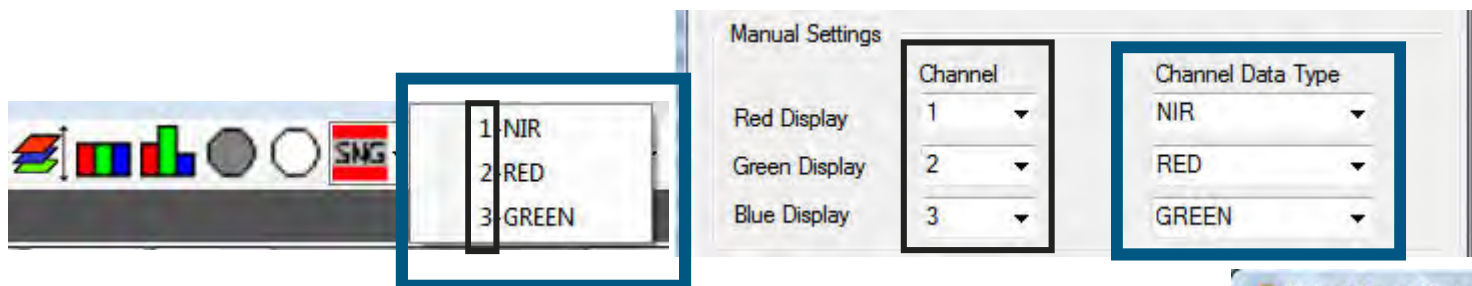
ADMS gives different options to change band orders of images. This can be useful for choosing how the images are extracted and which bands are available for extraction. When the band orders are changed the options in the single band extraction icon on the bottom toolbar dynamically change with it.

To access these options:

1. Make sure the desired image is the active layer.
2. Select the multi-band layer display icon on the bottom toolbar.
3. The "Select Band Order" window will appear.

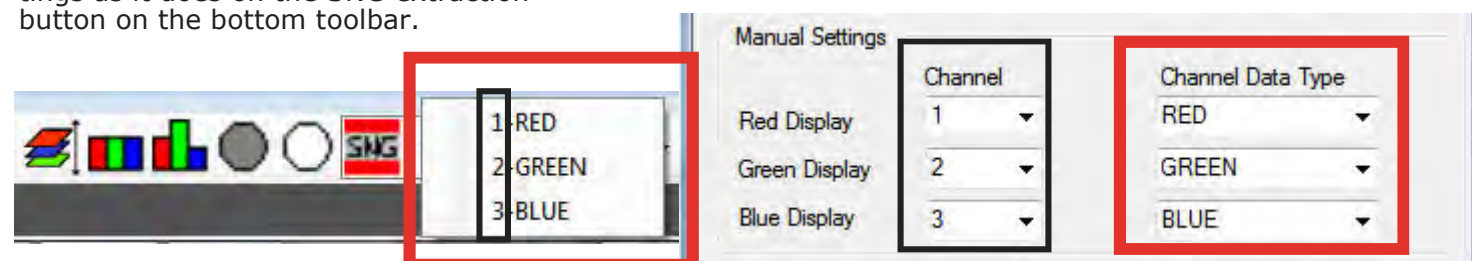


4 Band Image



4. The Channel and Channel Data Type will appear the same in the Manual Settings as it does on the SNG extraction button on the bottom toolbar.

3 Band Image



Extracting Surface from Imagery—Manual Zone Extraction



Introduction

Images used for zone creation will have multiple bands of data that can be utilized to create management zones for precision applications. With the tools available in ADMS, different types of images can be extracted in different ways. Extracting individual bands, or by using several vegetative indices. These tools use the native resolution of the image, and default color table.

Geo-referencing an Image

Often images; especially Landsat will not be perfectly geo-referenced. To update the position of an image a known reference layer such as a boundary is needed.

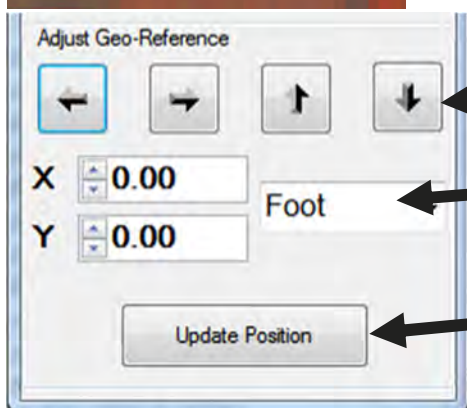


- Turn on the boundary.
- Turn on the image that needs to be aligned (It needs to be the **Active Layer** in red at the bottom of the Map Window).

Notice the road (light red) is on the wrong side of the field boundary.

The image needs to be the Active Layer.

On the bottom toolbar select the "Image Properties" button.



Use the arrows to adjust the image position.

From the dropdown menu different units can be selected. Each click will be equal to one unit. Additionally numbers can be entered manually into the boxes.

Once satisfied with the position of the image click "Update Position."



Extracting Surface from Imagery—Manual Zone Extraction

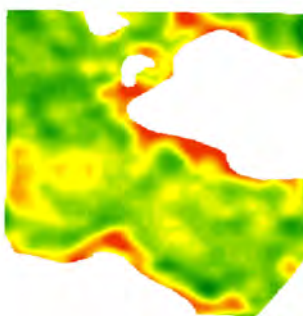
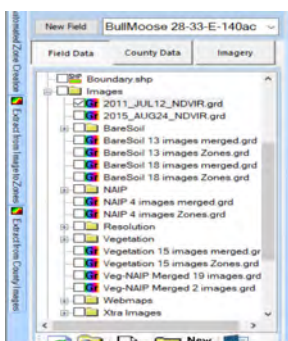


4 Band Images

Four band images (Landsat) usually have the Red, Green, Blue, and an Infrared band in the image. Bands can be extracted out individually, or a vegetative index like NDVI or NDVIG can be used.

Using NDVI

1. Turn on a field boundary.
2. Select inside the boundary so it turns **green**.
3. Turn on the image to be extracted.
- *Make sure it is the **active layer***
4. On the bottom toolbar select the Vegetative Index icon.
5. Choose either the Red NDVI or Green NDVI option.
6. Go to "Field Data."
7. Refresh the data tree.
8. The extracted surface will be automatically saved in a folder called "Images."

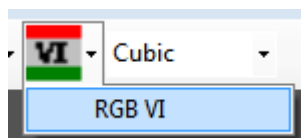


3 Band Images

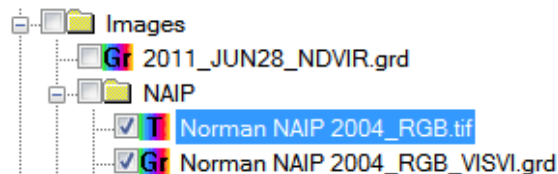
Three band images most commonly have the Red, Green, and Blue (RGB) bands in the image. Each of the bands can be extracted out individually, or the RGB vegetative index (RGB VI) can be used. The visible vegetation index will enhance the vegetation the field.

Using Visible VI

1. Turn on a field boundary.
2. Select inside the boundary so it turns **green**.
3. Turn on the image to be extracted.
- *Make sure it is the active layer*
4. On the bottom toolbar select the Vegetative Index icon.
5. Click "**RGB VI**"



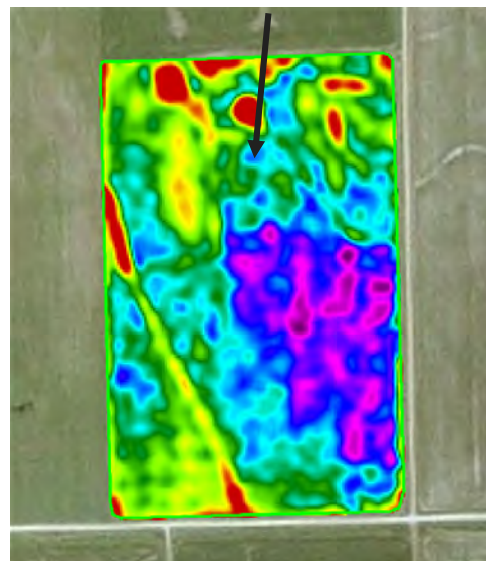
6. The extracted image will be saved in the "Field Data" tab under the folder "Images/NAIP" with the extension "**_VISVI**"



RGB NAIP Image



Visible VI Extraction



Extracting Surface from Imagery—Manual Zone Extraction

Extracting .grd from Sentinel .tif

Sentinel data is in formats and file sizes are very large and need to be Processed ADMS 64bit. Extracting may or may not work in 32bit ADMS. If it does not work see the User Manual section on Sentinel Processing and ADMS 32bit vs 64bit.



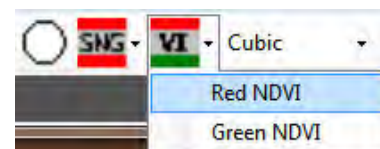
Sentinel Images are Four band images and have Red, Green, Blue, and Near-Infrared band in the image. The bands can be extracted out individually, or a vegetative index like NDVIR or NDVIG can be used.

Using NDVI

1. Turn on a field boundary & **"Select" the boundary polygon area.**
3. Turn on the image to be extracted.

- Make sure it is the **"active layer"**

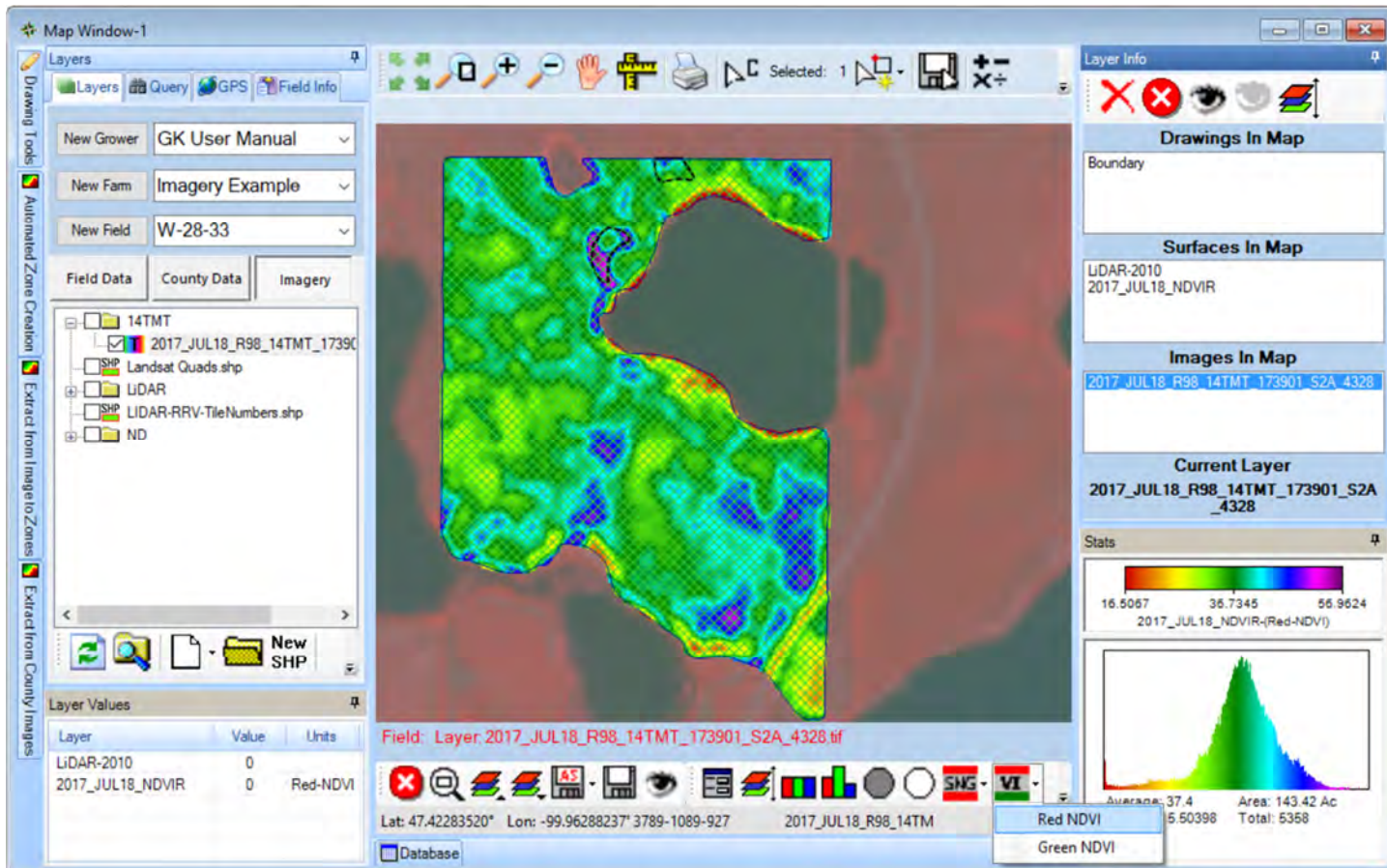
4. On the bottom toolbar select the **"VI"** Vegetative Index icon.
5. Choose either the **Red NDVI** or **Green NDVI** option.



6. Go to **"Field Data"** Tab
7. Click **"Refresh Tree"**.



8. The extracted surface will be automatically saved in a folder called "**Images.**"



Extract from Image to Zones (EI2)

Step-by-Step Procedure: (Landsat, NAIP & Sentinel (tif))

Step 1:

Click on the "Browse" button to browse imagery files. Select file folder containing the desired imagery (tif files).

Step 2 & 3:

Turn the field boundary on and highlight the interior area of the boundary.

Step 4:

Click the "Set Selected Boundary" button.

Step 5:

Select desired image.

Step 6:

Select desired format. (See "Image Extraction Suggestions" below)

Step 7:

If necessary, adjust image to align with border or other know landmark.

Step 8:

Select desired number of zones. (Recommend 255)

Step 9:

Click the "Finish" button.

Step 10:

Click the "Refresh Tree" button in the Layer Selection window.

Step 11:

An "Images" file folder will magically appear in the File Tree containing the newly zoned image.

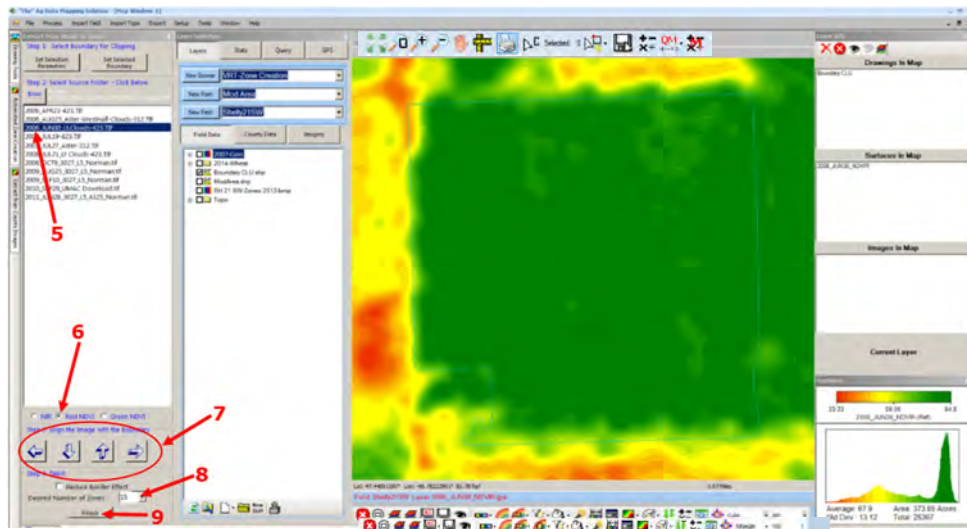
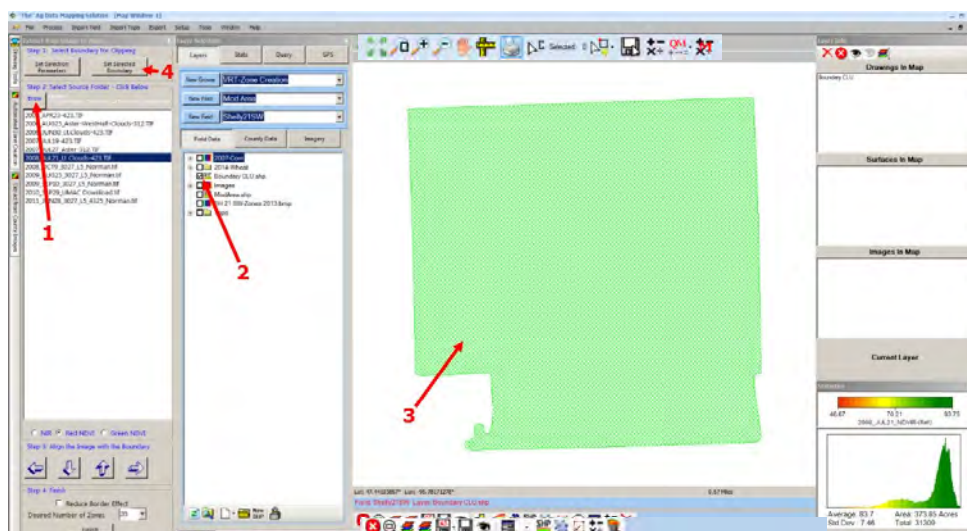
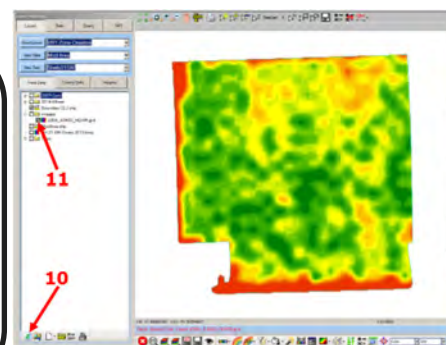


Image Extraction Suggestions

NIR - Best for bare soils or no vegetation

Red or Green NDVI - Best for moderate to heavy vegetation.

NDVI Values - higher than "35" shows full ground cover.



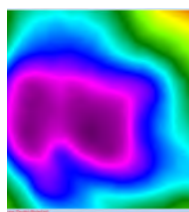
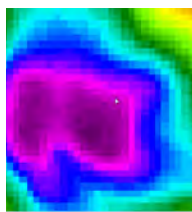
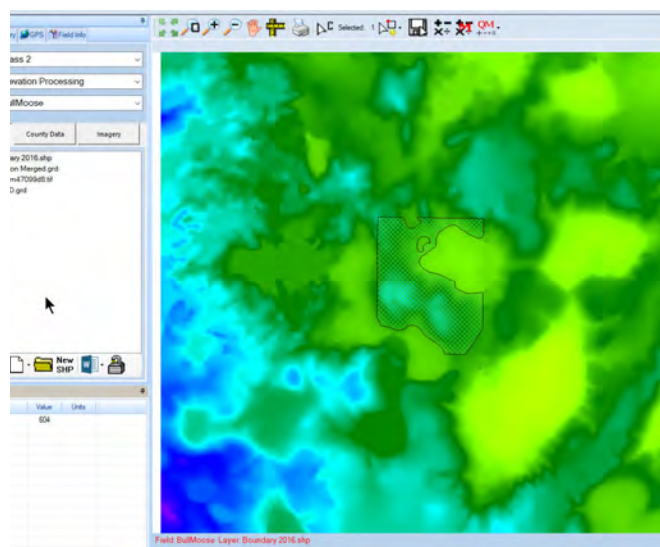
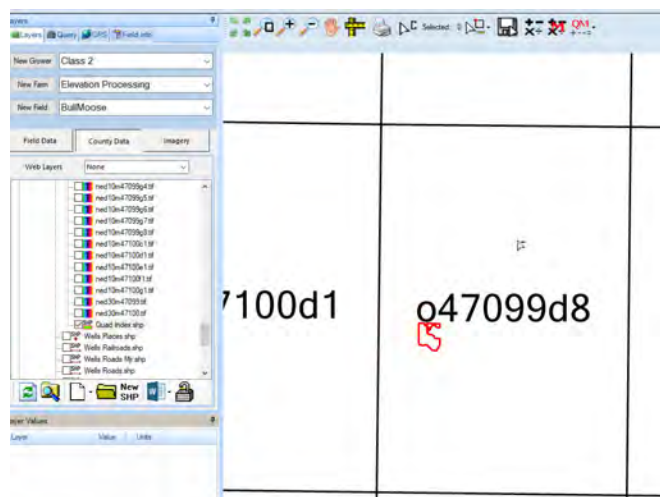
Notes

✓ After extraction of first image, continue to extract multiple images in a single session. Each time you click the "Finish" button (Step 9) the image in the main window will stay till you click the next image date. Select the next image to extract (Step 5) and repeat steps 6, 7, and 9. All images will be saved automatically into the "Images" folder in the data tree.

Processing NED Elevation Data

An **NED** is a low resolution elevation data that is available for most areas and can be downloaded for free as 3, 10, & 30 meter resolution. The higher the resolution the more sparse the coverage is, with 30 meter being the most widespread.

1. Turn on a field boundary file.
2. Under the County Data tab open the County folder, and check on the "Quad Index*.shp" to find the tile that covers the field.
3. Open "Explore this Folder", copy the identified NED tile(s) (tif file).
4. Click on the Field Data tab, open "Explore this Folder" and paste the NED tile(s).
5. Turn on the copied NED file(s) in the Field Data tree
6. Open "Map Math"  scripting window, select "Merge Topo NED Meter-Ft" & "Compile" & "Run" the script.
7. Save the new file as "Merged NED."
8. Make the field boundary the **Active Layer** make it the selected object
9. Make "Elevation NED" the **Active Layer**, then select the "Crop Raster to Selected Polygon" button, choose "Just This Layer" and save when complete. 
10. Check on the "Elevation NED" and select the "Smoothing Filters" button, and run two "5x5 Smooths"



11. Save any changes that were made.

Note: Would not use NED data for drainage purposes, but works well for 3d functions.

- **Suggest** - "Right Click" on the NED.grd file name & choose "Open In 3D Window".

Create Topo Features

Create Topo Features

Tool is designed to work with high resolution large area topography. Best results will come from using 1 or 2 meter resolution LIDAR data (do not smooth LIDAR). If you are using NED data suggest using the 10 meter data processed down to 2 or 3 meter data and smoothed. In both processes we want to have topo data out beyond the field boundary by roughly 200 feet minimum.

"Clear Map"

Turn on your large area Topo.grd file & Right Click on the Topo.grd name.

Choose "**Utilities**" and "**Create Topo Features**"

Set Generalized Topography

Ratio— window will open. Type in a value.

Suggest 1m— use 100

2m— use 50

3m— use 25

NOTE: You will find that rolling hills and flat ground may use different values. (ex. is flat ground)

Click "**Apply**"

ADMS will create a Topography Features.grd

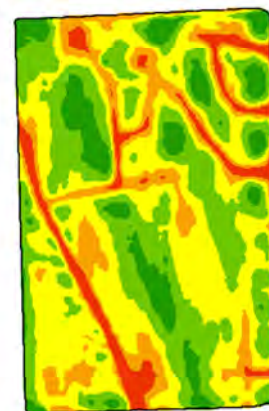
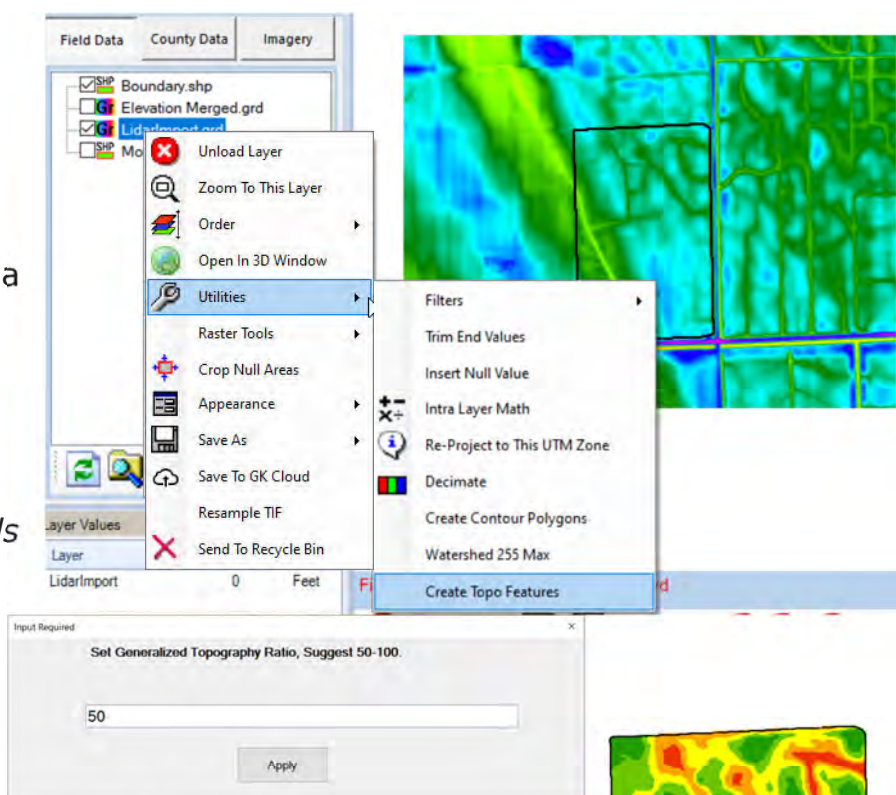
Final Steps:

Select Boundary and "**Crop all Visible**" Topo.grd and Topography Features.grd

NOTE: this function will crop and save all visible layers.

On the Topography Features.grd after the crop you may have to rest the colors.

- Suggest using "**Quick Zone**" button and choose 5 zones.



Surface Editing Tools

Invert Surface Values



At times you will find "Surfaces" that may have values that are inverted from other data sets.

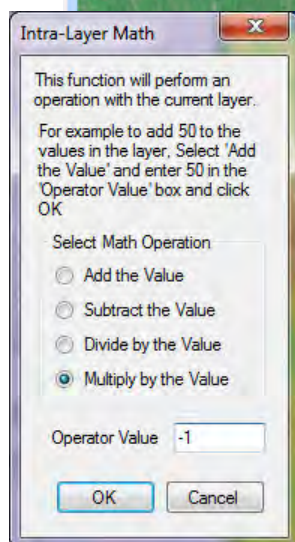
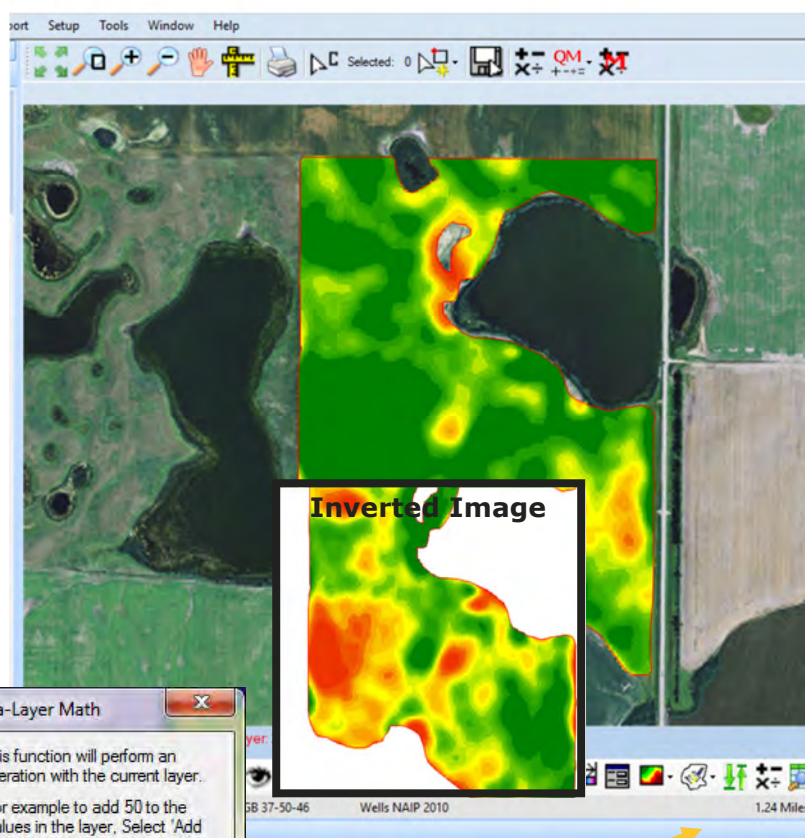
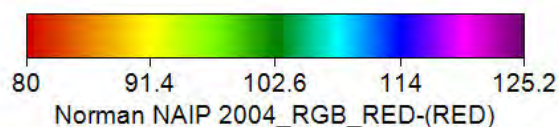
Generally you want to have "Low" values in poor producing areas and "High" values in better producing areas. You can use inverted "Color Tables" to give the surface the proper appearance.

Inverting the "Values" will allow you to merge this surface with Yield and other images.

To invert the surface click the  "Invert" button and you are done.

The process of "Invert" surface values does the following
—Below is the Manual Process of Inverting—

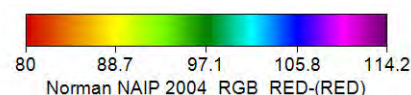
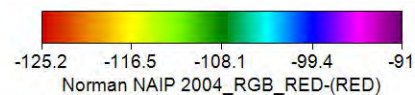
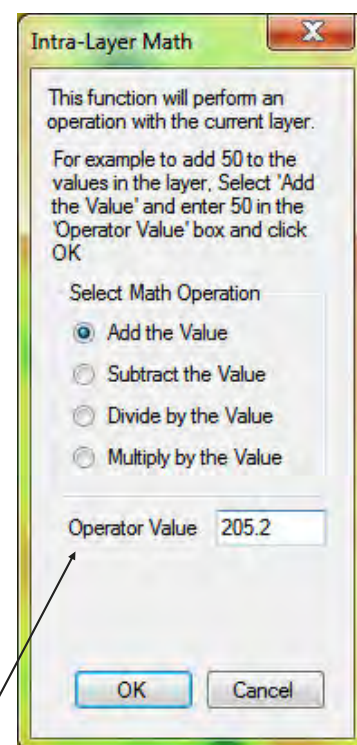
1. Look at your "Color Bar"
2. Add your Min Value + Max Value = New Value
 $80 + 125.2 = 205.2$



3. Using "Intra Layer Math" button, Multiply by a -1
 -Looks "Correct" go to step 4
 -Looks "Incorrect", don't save changes & go to next map or a new map

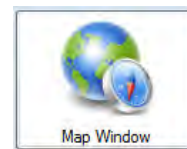
4. Using "Intra Layer Math" button, Add the surface by the "New Value"

5. Select "Save As" and give the new surface a name
 Example—"Norman NAIP 2004 Inverted.grd"

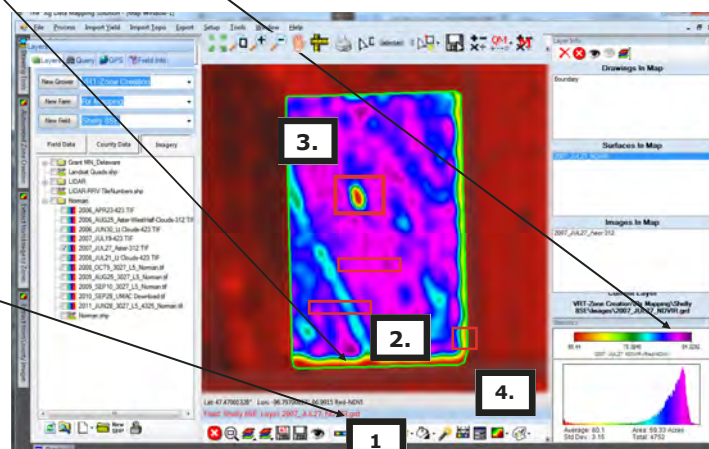
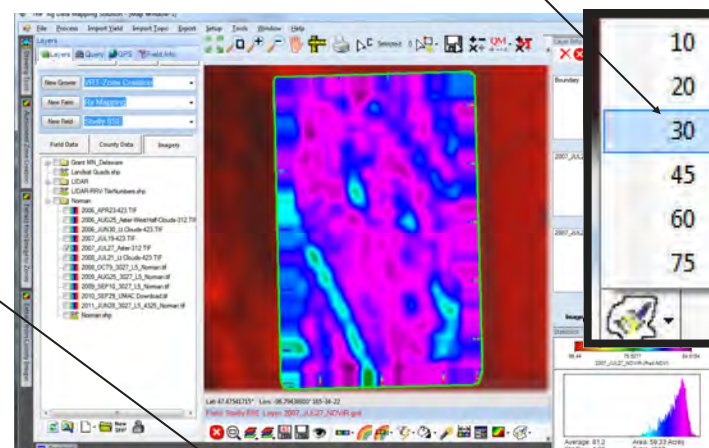
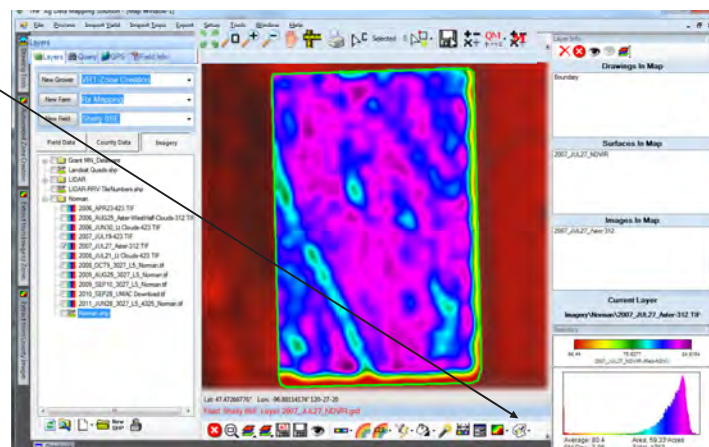


Surface Editing Tools

Reduce Border Effect & Trim End Values



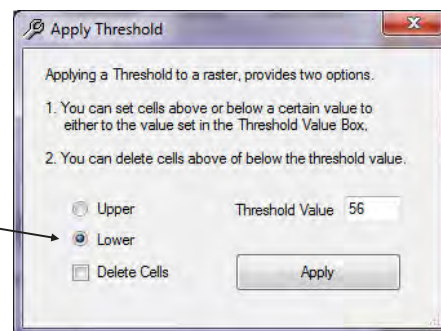
1. There is a very distinctive Red Border along the south side of the field. This is not representative of the field. This is called a Border Effect. There is a tool **"Reduce Border Effect"**  that will help clean up these edges. Knowledge of the field is the factor that will tell you if you need to use this tool or not.
2. This field has some obvious "Border Effects" so, select the **"Reduce Border Effect"** button. Take note this will not work if the Boundary is not selected.
3. Click on the **"Reduce Border Effect"** button, the software will reach in x-meters perpendicular to the Border and pull that value out to the border.
4. Once the new colored image shows up, move the mouse over the image. Notice there is a number at the bottom center of the screen (labeled #1) that is changing as the mouse moves. That value is the pixel value of that location on the map (note the "Color Bar" on the right side of the screen). The higher the value of the pixel, the greater the vegetation.
5. Notice the box around the area labeled #2. That little bit of red on the edge is most likely bleeding of non-crop influence from the original satellite image. The pixel values in this area are 43 to 50 in this red area.
6. Looking at the area labeled #3. Moving the cursor around over this area, we find out the lowest values in the reddish area is 56. These are all "Actual" or true field values.
7. Once the image is inspected, decide if there is anything that needs to be cleaned up or "Trimmed". On this image, it is fairly clear that this value does not represent what is happening in the field. So we are going to "Trim" the image. On the bottom tool bar click on the **"Trim End Values"** button (labeled #4).



Surface Editing Tools

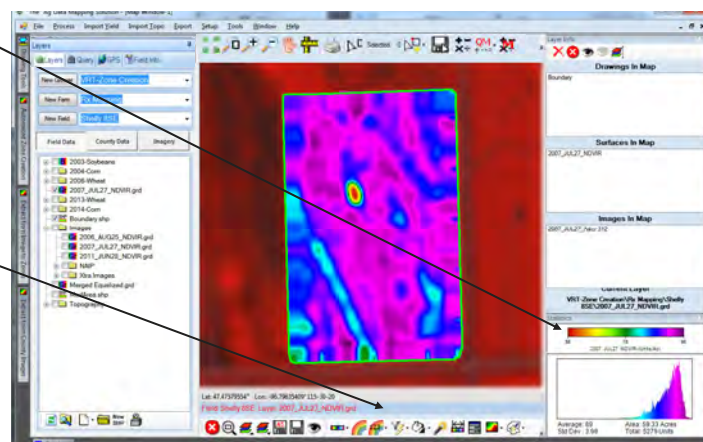
Trim End Values & Smoothing Filters

8. The **"Apply Threshold"** window will open. For doing Imagery, select "Lower" check box. Make sure the "Delete Cells" is **not** selected. Inspecting the image in the prior few steps, we found that 56 was the lowest "real" value in the field. So type in 56 in the "Threshold Value" box, and click **"Apply"**.



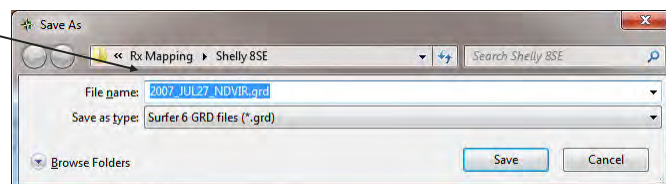
9. Notice that the **"Color Bar"** on the right side of the screen now reads from 56 to 96, confirming that the "Trimming" did work.

8. Looking at the image that has been created, you will notice the image looks a little rough. Use the **"Smoothing Filters"** button by selecting the drop down on the right side. In most cases, the "5x5 Low Pass" will smooth out the rough edges.



11. Select **"Save Changes"** button on the lower tool bar.

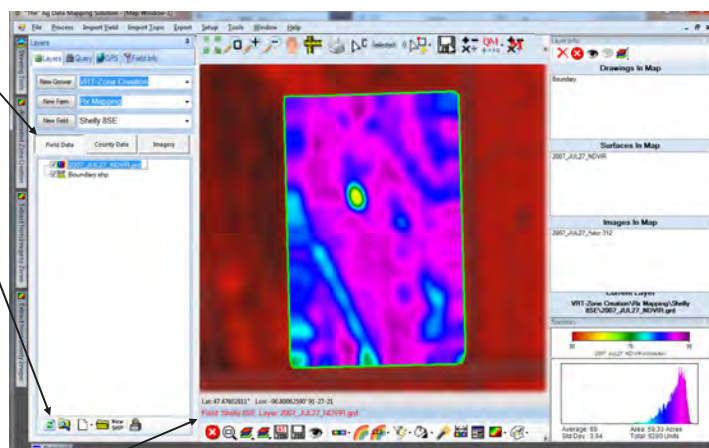
12. The **"Save As"** window will open up. Make sure the file is being saved into the correct folder under the GKData folder (this should be the same location as the field boundary, if you created one).



13. Make sure that in the **"File name:"** box to use the Image date as part of the name of the file. This is the only way to identify the year and date of the image. When finished, click on the **"Save"** button.

14. Now back to the Ag Data Mapping Solution window direct yourself to the **"Field Data"** tab on the left side of the window and make sure to be set to the proper "Grower", "Farm" and "Field". Click on the **"Refresh Tree"** button on the bottom of this window.

15. Notice that the new field image (*.grd) is not showing up in the **Active Layer** below the viewing window. If not, select the field from under the "Field Data" tab by simply clicking on the file name one time.



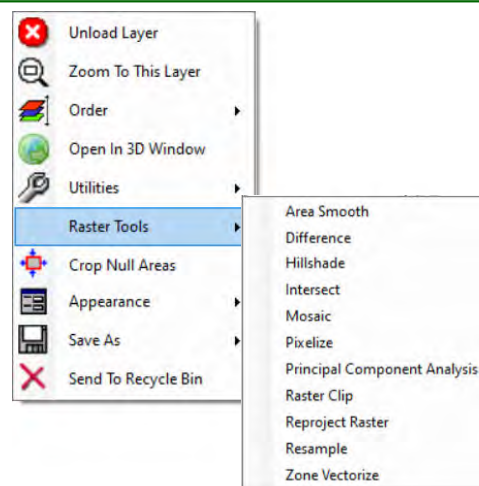
Field: Shelly 8SE Layer: 2007_JUL27_NDVIR.grd

Raster Tools

Raster is a "Surface" or an "Image" layer in ADMS. Basically these are pretty pictures. Majority of them will be .grd or .bmp or .tif files. There are specialized tools for modifying raster layers values and visual attributes.

Tools can be accessed by right clicking on the xxxx.grd name in the **layer tree on the left hand side of the screen** & selecting the Raster Tools list .

These tools will be used primarily for xxxx.grd layers.



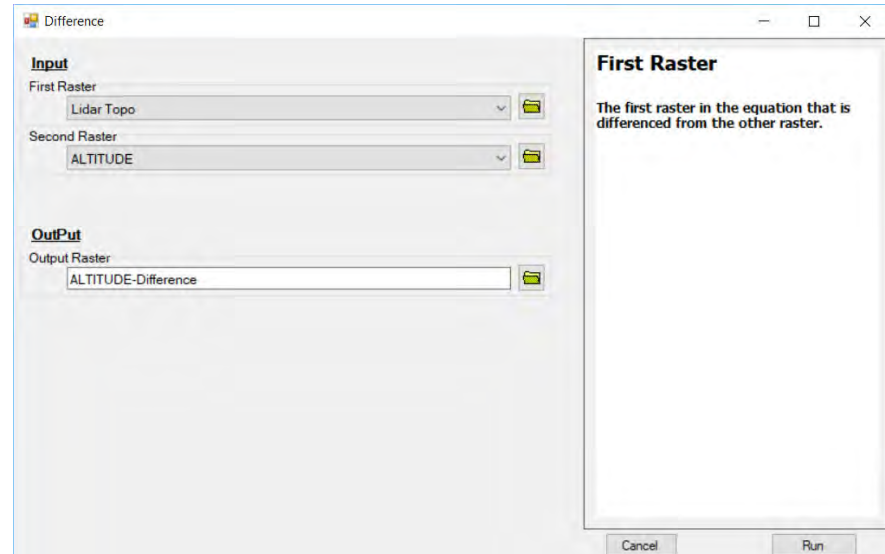
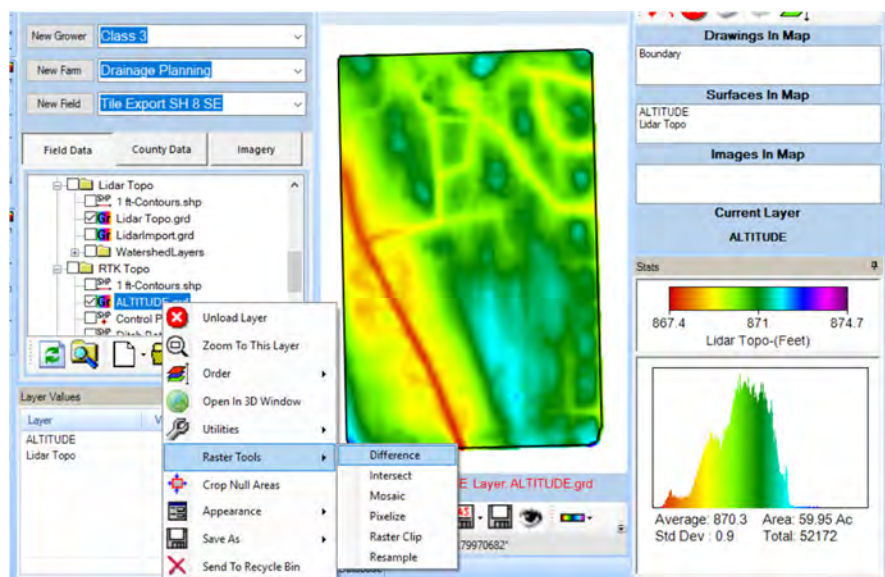
Difference

Difference runs the difference between two "surface" raster's, such as two elevation layers or two yield data layers as a couple examples.

Note: Tool not for "Images".

1. Turn on the First Raster layer (Lidar Topo.grd)
2. Turn on the Second Raster layer (ALTITUDE.grd)
3. Right click on either xxx.grd and select raster tools and difference.
4. Select the Raster layer names in the drop down menu that are going to be used.
5. Name the Output Raster.
6. Click Run.

Note: The new surface raster is in the field data tree, the values of the data are listed in the layers "Stats" window.



Raster Tools

7. In this example the "Difference" is off by a factor of 8.3' due to the relative difference in the "Non-Benchmarked Data". We are going to find the "Relative Difference", Zeroing out the Difference map.

8. Make "ALTITUDE-Difference.grd" the active layer in Red

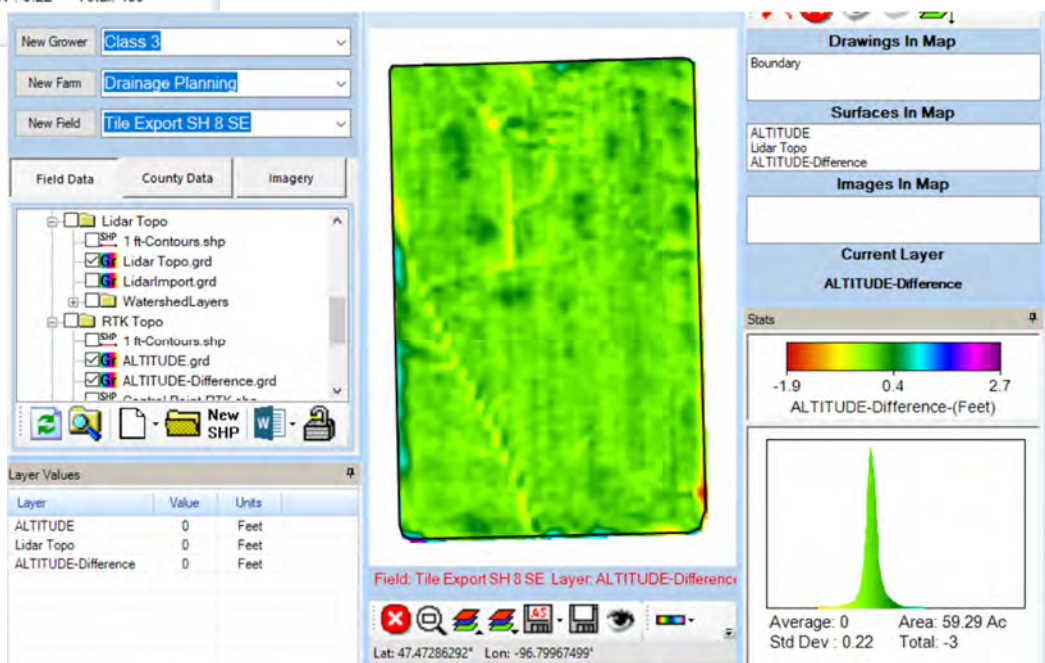
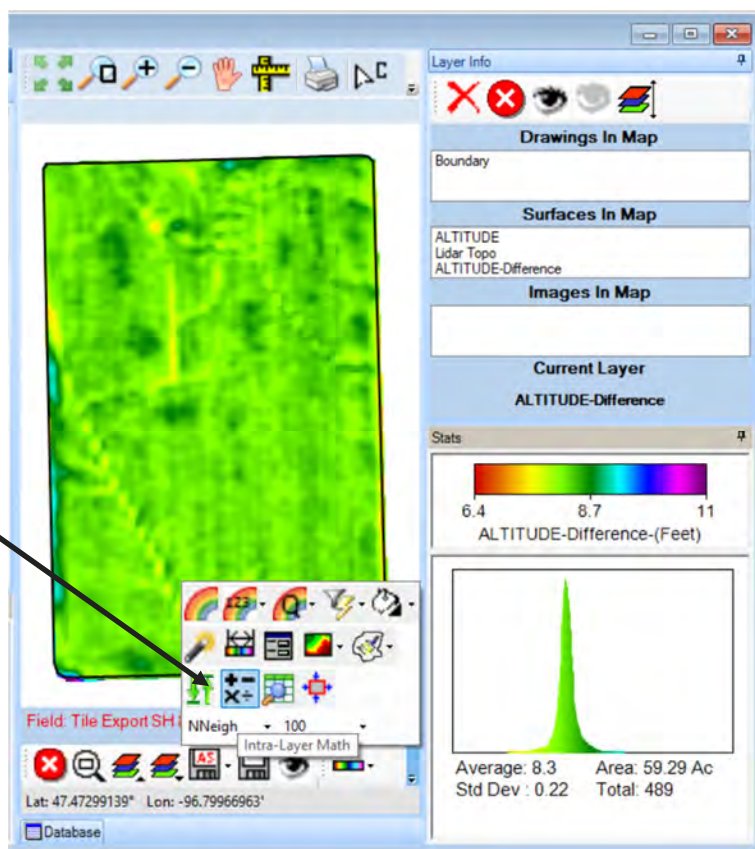
9. Click on the "Interlayer Math" button to correct.

10. Subtract by 8.3

11. Click OK

12. Suggest clicking "Save"

The difference between LIDAR and Altitude = Altitude-Difference.grd with the average of "0" and a range of -1.9 to 2.7 feet of change.



Raster Tools

Area Smooth

This tool will allow user to do intensive smoothing to whole field or to selected areas of fields. Turn on the xxx.grd to be Smoothed, user may also use a polygon to limit smooth area.

Input Raster— xxx.grd to be smoothed.

Input Polygon (Optional) - Drawn polygon.shp to limit smoothing area.

Note: option to use selected object from larger collection.

Smooth Count— How many times to run the smoothing filter.

Neighborhood—the smoothing process
3= 3x3 pixel area (smaller change/smooth)
5 =5x5 pixel area (larger change/smooth)

Lock Edge—tries to maintain original values of the edge of the modified area of pixels, leaving minimal seem on area smooths.

Mosaic over original—only works when using an Input Polygon. If checked, will merge / mosaic the smoothed polygon area with the whole image. If not checked, will only return the area of the Input Polygon.

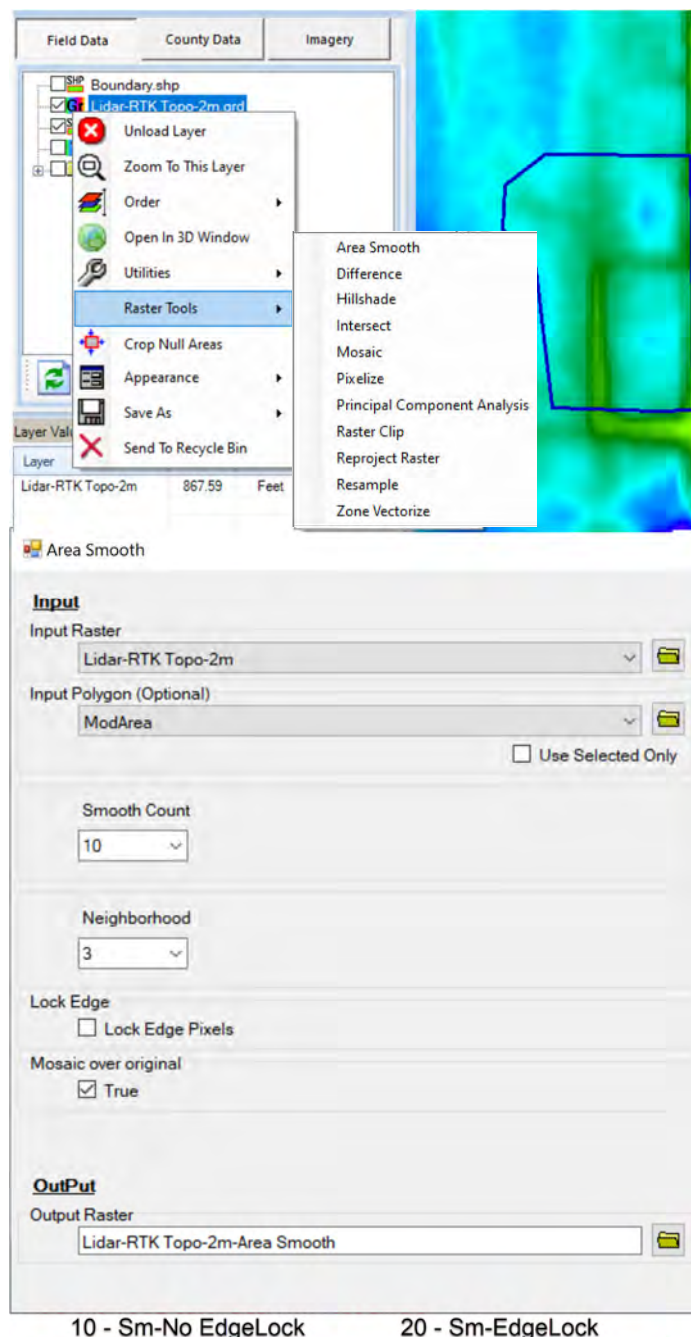
Output—choose the output name of the new layer.grd

Click RUN.

Example 10-3x3 smooth no edge lock

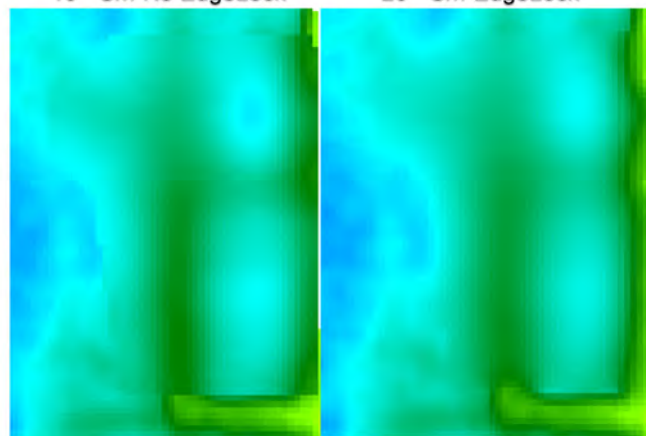
Vs

20-3x3 smooth with edge lock



10 - Sm-No EdgeLock

20 - Sm-EdgeLock



Raster Tools

Hillshade

This tool is designed to show areas of fields that are getting more or less direct sunlight. The output Value Range is -255 to +255. The Values are equated to the angle of reflectance of the sun or absence of the sun. (color table is defaulted to Grayscale)

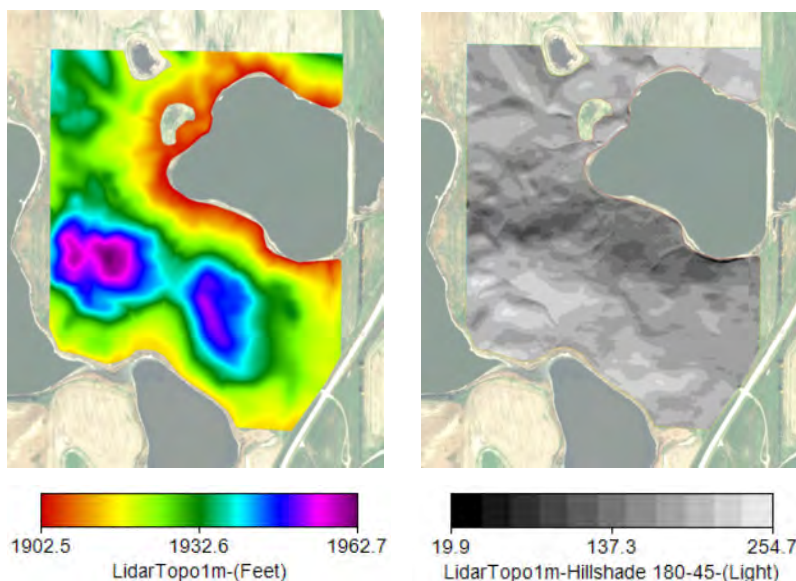
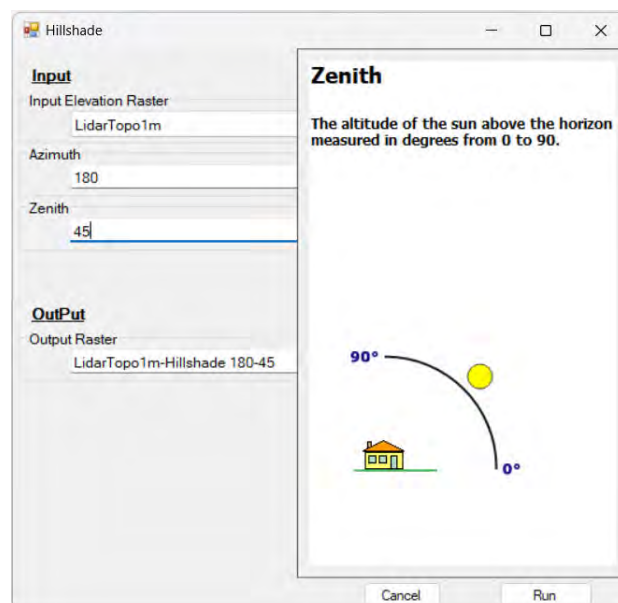
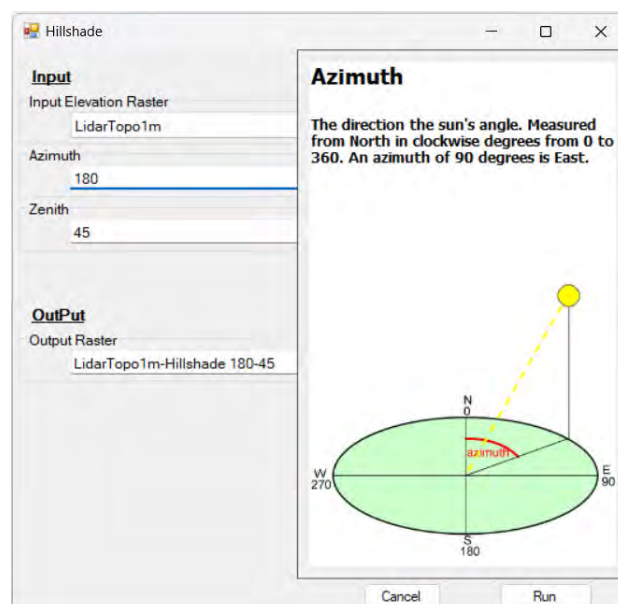
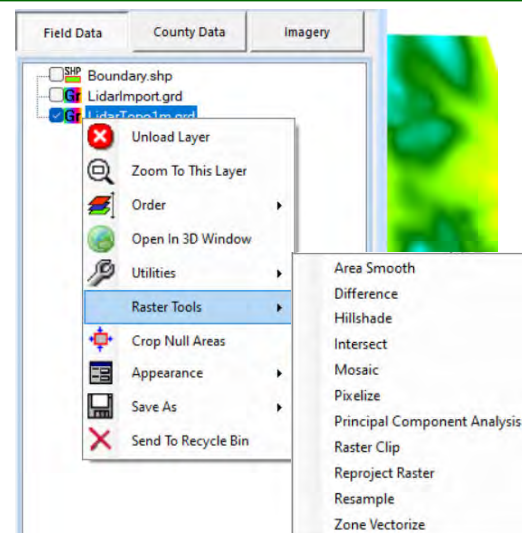
Values less than 0 or (negative) are in full shade and depths of shade and a value of 255 is direct 100% (180 degree) return of light.

Right click on Raster "LidarTopo1m.grd"/ Raster Tools / Hillshade

Azimuth—Adjust to the direction you feel the sun shining from with it's most intensity. (0-360) Where 180 shows the sun light projecting from the south to the north.

Zenith—is the angle of the sun with 0 being the horizon and 90 being straight over head.

Output—Assign new .grd name & Click Run



Raster Tools

Intersect

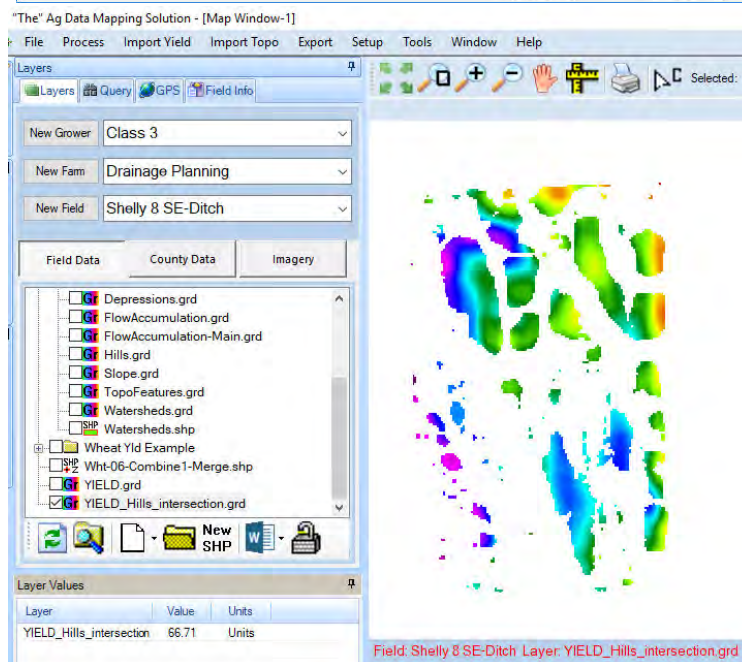
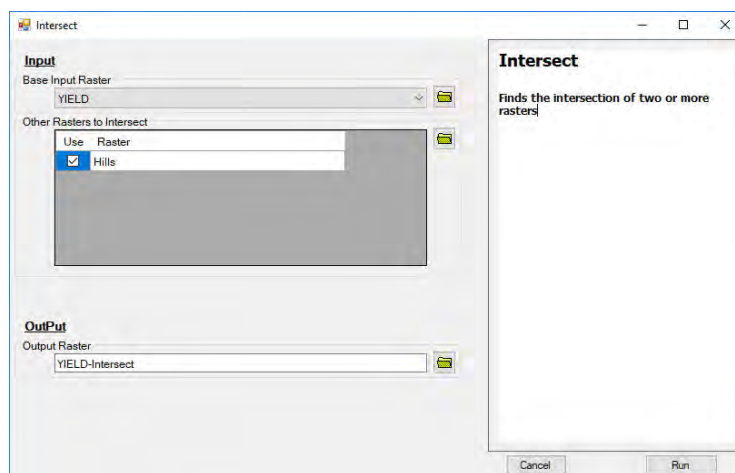
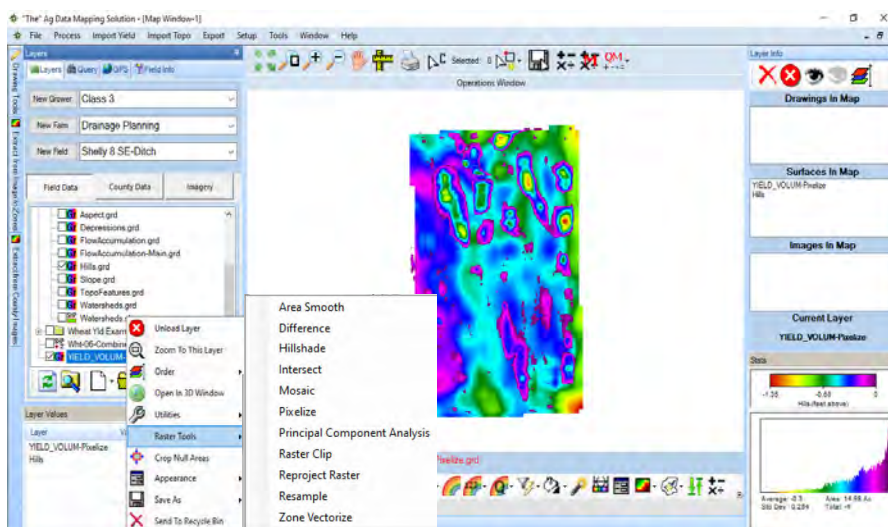
Intersect finds the intersection between two or more raster's and displays the values.

Tool is similar to Query Raster tab.

1. Turn on the first raster (Hills.grd).
2. Turn on the second raster (Yield.grd).
3. Right click raster (Yield.grd) & select Raster Tools / Intersect.
4. **Base Input Raster**—choose the layer you want the Statistics for or from (Yield.grd).
5. **Other Rasters to Intersect**—Assign the raster layers that will define the area to pull data from "Base Input Raster".
6. **Output**—type in a new name that will clearly define the Intersect process.
7. Click Run.

The intersect between the hill.grd and yield.grd is Yield_Hills_intersection.grd.

The new raster will be in the field data window and the intersected values of the new raster can now be viewed.



Raster Tools

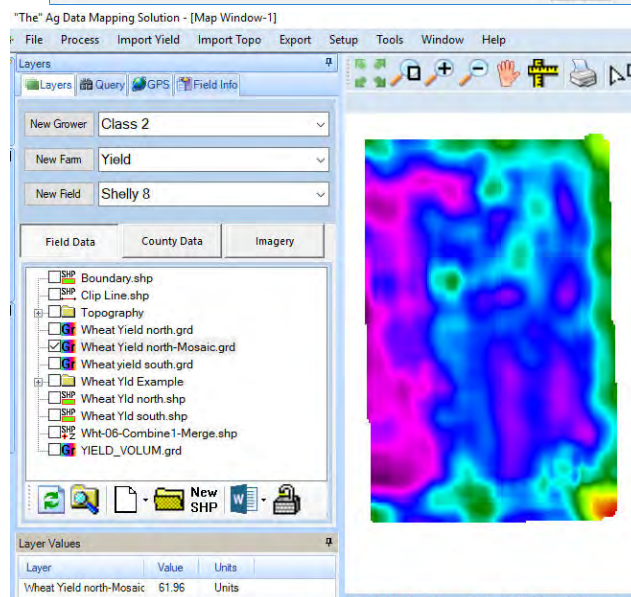
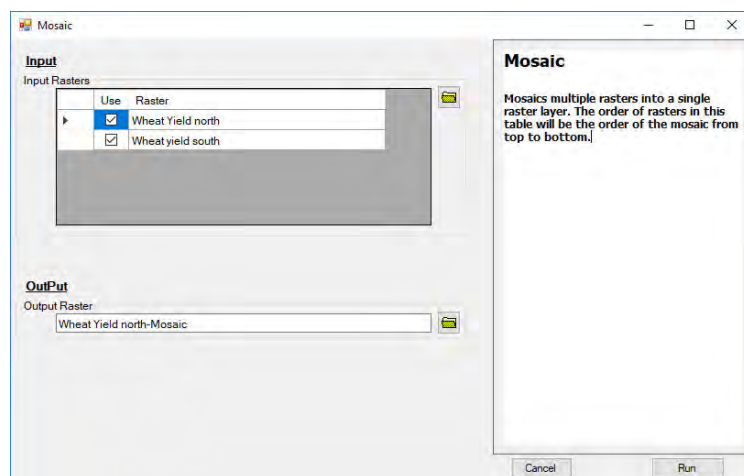
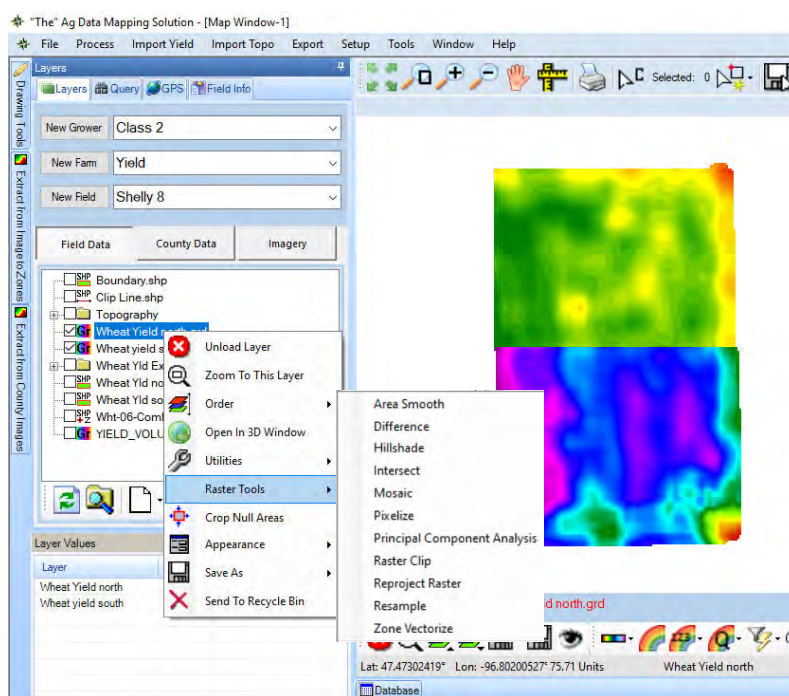
Mosaic

Mosaic is used to stitch together images or surfaces. Ex: merging two yield maps that are side by side.

NOTE: grd. names must be different.

1. Turn on the first raster. (Wheat Yield north.grd)
2. Turn on the second raster. (Wheat Yield south.grd)
3. Right click on either raster.grd, click Raster Tools / Mosaic.
4. **Input**—In the “Use” box—Check on all rasters to merge. Order in the list matters, if there was any overlap the layer “on top” in list will be on top in the newly merged image. (Left Click Hold & Slide—change order of rasters)
5. **Output**—Name the output raster.
6. Click Run.

The wheat yield north has been stitched with the wheat yield south creating the new “Wheat Yield north-Mosaic.grd” as one surface.grd.



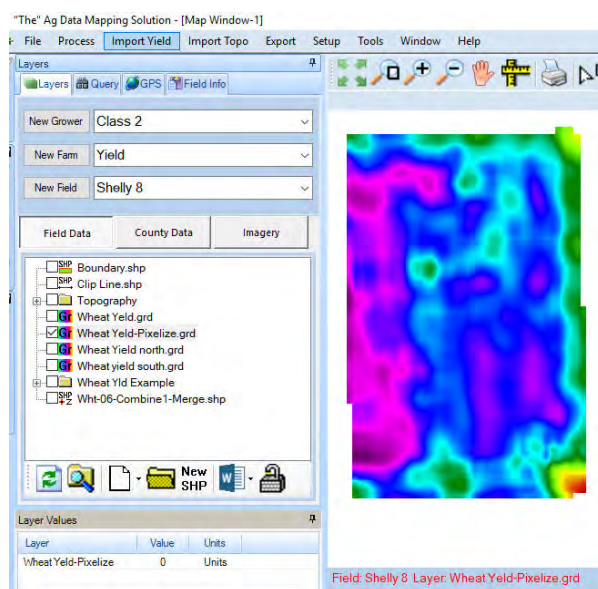
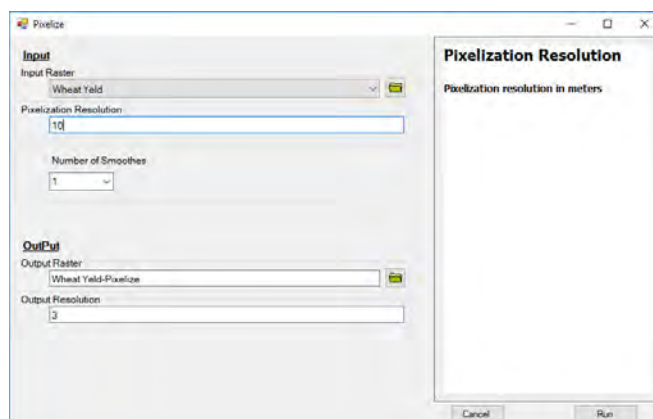
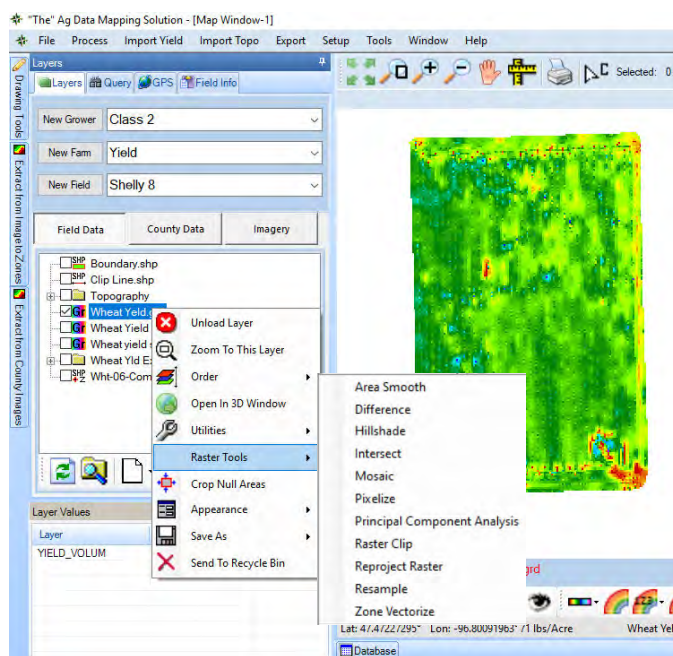
Raster Tools

Pixelize

Pixelize smooths a raster by going to lower resolution (10m as example), running 5x5 smooth on it and then back standard resolution (3m is ADMS default).

1. Turn on the raster. (Wheat Yield.grd)
2. Right click on the raster and select "Raster Tools", select "Pixelize".
3. Select the "Pixelization Resolution" for the raster. Set the resolution for the size of the event that is going to be smoothed. (Event example = header width in meters)
4. Select the "Number of Smooths" (5x5) that are going to be run on the raster when it is at the "Pixelization Resolution". (suggest using 1 smooth)
5. Make sure the "Output Raster" name and folder location are correct.
6. Select the "Output Resolution". (suggest using 3 meter)
7. Click "Run".

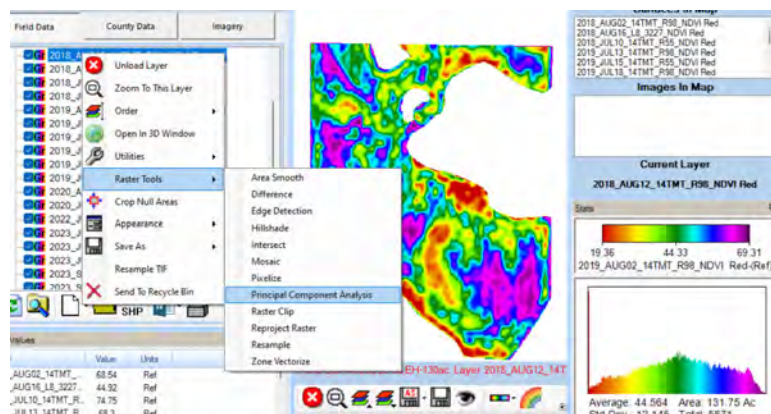
Your new "Pixelized" raster will now be in the field Data Tree.



Raster Tools

Principal Component Analysis (PCA)

PCA is a tool for merging multiple rasters (of the same acres) on a field, mostly used for generating zones, but also great for analyzing Yield & Imagery. For more info.—Google Principal Component Analysis



This web link does a good explanation of PCA:

<https://builtin.com/data-science/step-step-explanation-principal-component-analysis>

To use PCA—

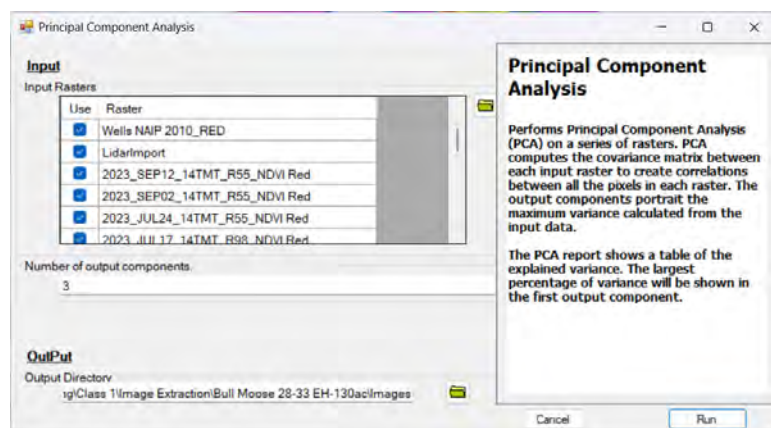
Clear Map & Turn on only .grd files to merge or analyze (no other raster's)

Right Click on any .grd name that is checked on. Choose Raster Tools / Principal Component Analysis

Input—confirm all the .grd files are checked

Number of output components—Number of Principal Component.grd (PC.grd) maps created. Suggest leaving at 3.

Output—Create the folder Name where the PC.grd maps & PC.xml will be generated.



Raster Tools

Principal Component Analysis (PCA)

Output Files

PCA Report.xml will show up first. At the top is the list of maps used. Data is sorted by “Explained Variance” & “PC” numbers them 1 being Highest going to lowest.

“PC” column is the identifier for p_component_PC#.grd. (choosing more “outputs” will make more .grd files of list)

Principal Component Analysis Report				
Input Rasters				
2018_AUG12_14TMT_R98_NDVI Red 2018_AUG09_14TMT_R55_NDVI Red 2017_JUL05_14TMT_R55_NDVI Red 2018_AUG02_14TMT_R98_NDVI Red 2023_JUL24_14TMT_R55_NDVI Red 2020_JUL29_14TMT_R55_NDVI Red 2020_AUG01_14TMT_R98_NDVI Red 2019_JUL30_14TMT_R55_NDVI Red 2018_JUL10_14TMT_R55_NDVI Red 2018_AUG16_L8_3227_NDVI Red				
PC	Explained Variance	Cum. Variance	Eigenvalue	Eigenvector
1	80.0857142466767%	80.0857142466767%	8.00857142466768	[0.339179277836507, 0.341173556471152, 0.245075668870964, 0.344968858890325, 0.317558026046637, 0.316408379085461, 0.322230755376254, 0.265757013344565, 0.329448152466541, 0.324868477228204]
2	10.3406803138726%	90.4263945605493%	1.03406803138726	[-0.0344402105206988, 0.0375273741899096, -0.65111367082753, 0.0778155289168147, 0.0590882980197394, 0.336525353822374, 0.317633832145526, -0.556575091389014, 0.196131664916766, -0.0390620636588602]
3	3.58119173276625%	93.9875862933155%	0.358119173276626	[0.382215158284239, 0.334642838358324, -0.0302744026133525, 0.257893890114648, -0.48947085921022, -0.386992009045791, -0.2913790242465, -0.345417665311238, 0.129512695431815, 0.277552892689281]
4	1.9155658512589%	95.9031521445744%	0.191556585125891	[-0.0201596127478421, 0.0336416200996484, 0.518927700727488, 0.139181841157681, -0.095774051134051, 0.0681154448238651, 0.0737767772617291, -0.341156875877692, 0.000000000000000, 0.000000000000000]

Explained Variance—tries to find similarities in variance between each map.

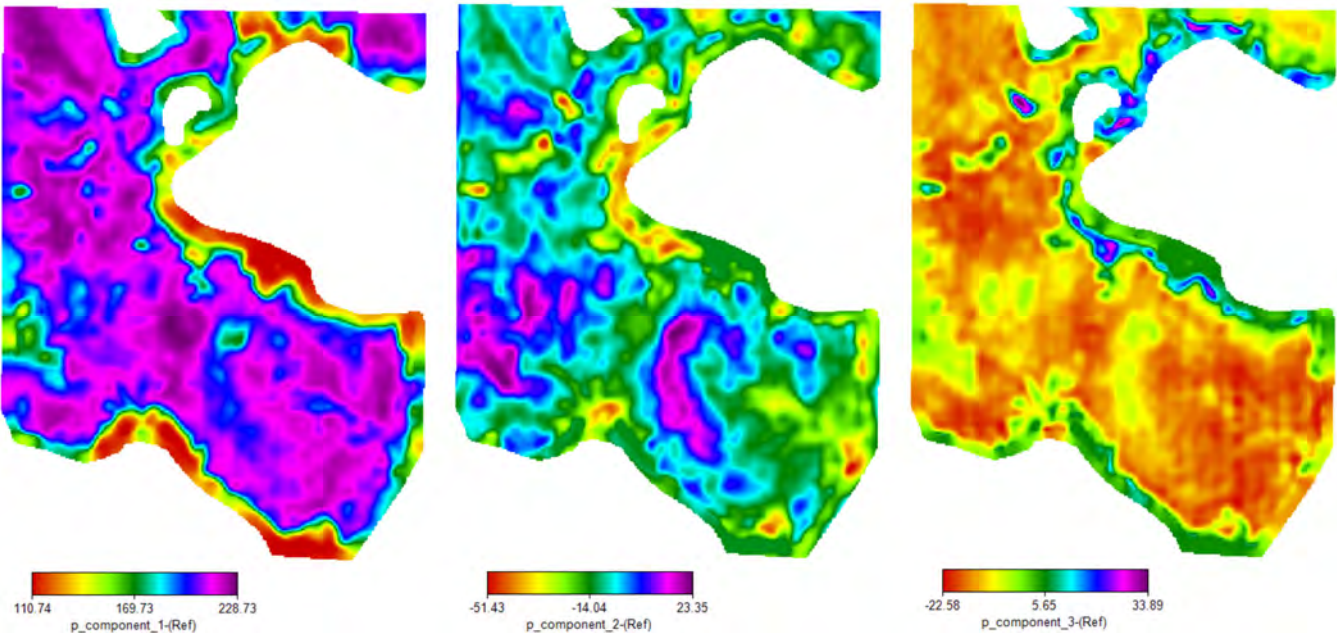
Cum.Variance—is the cumulated total of PC 1 ExpVar + PC 2 ExpVar ...

Output.grd—Below shows—p_component_1.grd & p_comp_2.grd & p_comp_3.grd.

P_comp_1—generally be the “Zone” map or most Stable / Similar data relationship

P_comp_2&3—usually used for “ZoneMods” shows areas of other variance.

NOTE: p_comp_2&3 groups hills, valleys and salty events for “Mods” very well.



Raster Tools

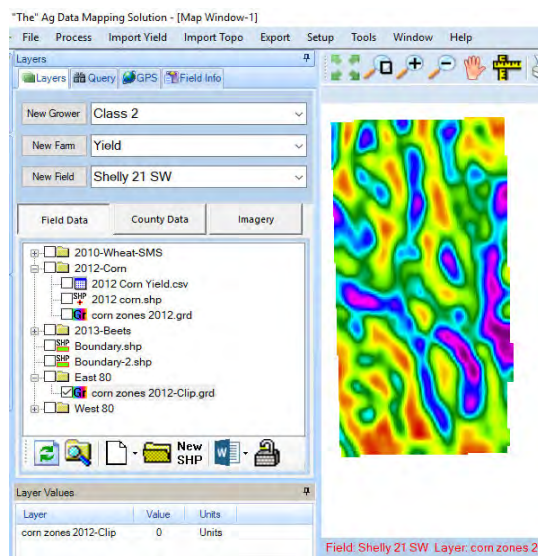
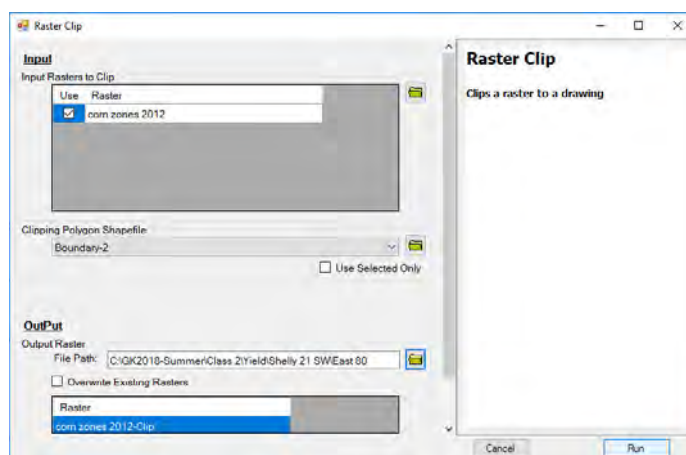
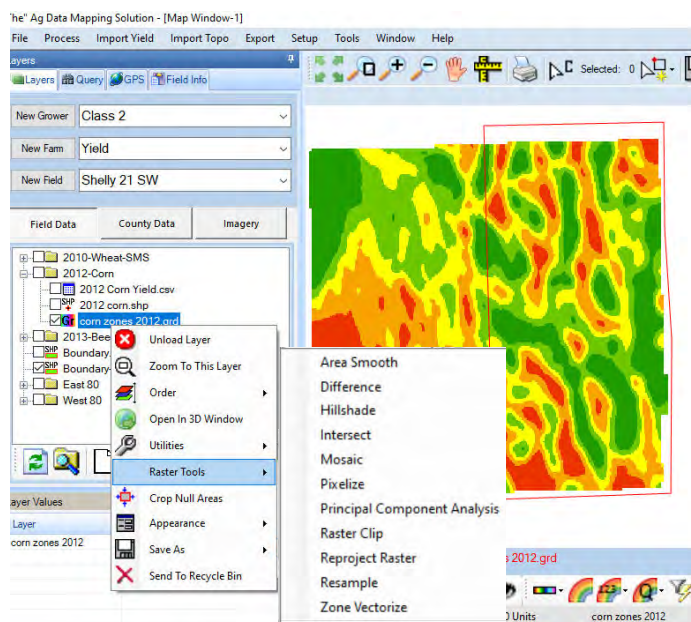
Raster Clip

Raster Clip—clips images and surfaces to boundaries, allows multiple files to be clipped, and saves them to a different folder.

1. Turn on the raster to be Clipped. Corn Zones 2012.grd
2. Turn on the Boundary.shp file to define the area to be clipped.
3. "Right Click" on one of the raster, select "Raster Tools", left click on "Raster Clip".
4. Make sure the raster or rasters are checked on in the "Input Raster's to Clip" window
5. Under "Clipping Polygon Shapefile", confirm the correct SHP and also if you are "Use Selected Only" if the boundary has multiple Polygons / Boundaries.
6. Check "Output Raster" window to make sure the file path. NOTE: the option to create and put data in a "New Folder" and "Overwrite Existing Rasters" - (Overwriting is permanent)

7. Click "Run".

The "corn zones 2012-clip.grd" is now in the "East 80" folder we designated in the Data tree. The original raster has not been changed.



Raster Tools

Reproject Raster

Reproject Raster—Will re-project Raster (surface or image). Taking images from Lat/Lon, StatePlane, UTM and many other projections and projects it into UTM of Map Window.

After opening ADMS.

1. Set to the correct output UTM Zone
2. Open Map Window.
3. Turn on "Surface" or "Image" to Reproject.

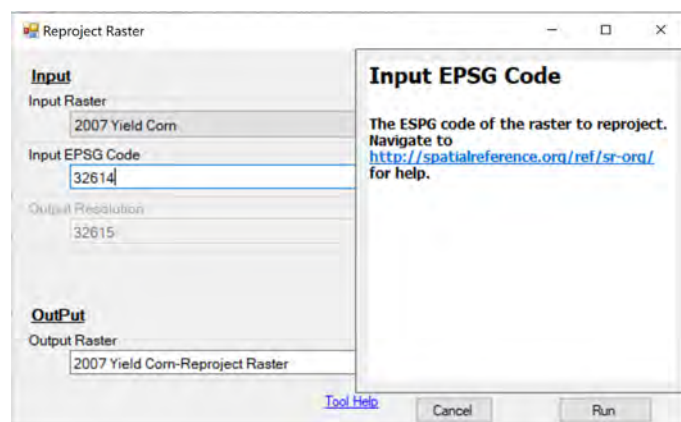
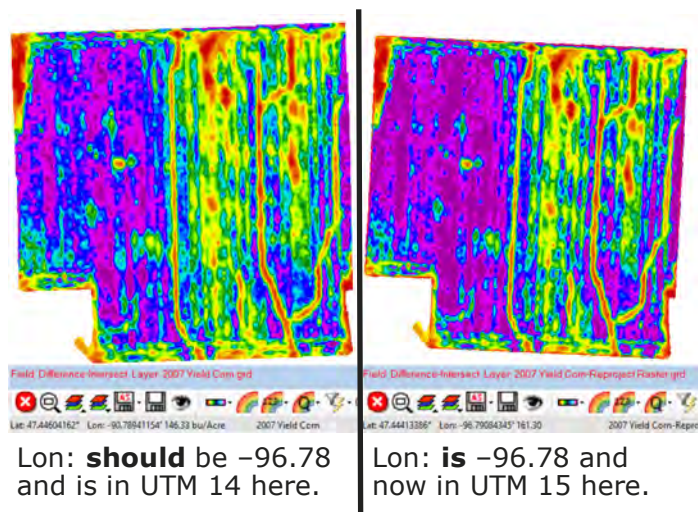
This tool will not Reproject SID or JP2.

4. Right Click on the "image" name.
5. Go to "Raster Tools" & "Reproject Raster".
6. Type in the "Input EPSG Code" for raster.
7. "Output EPSG" is automatically set by ADMS.
8. Assign your "Output Raster" name.
9. Click "Run"

NOTE: Most Raster layers don't have "Projection" text files.

A list of common EPSG Numbers >>

Web link may be helpful.



Coordinate Ref System		EPSG Number
WGS 84	Lat/Lon	4326
WGS 84	UTM 11	32611
WGS 84	UTM 12	32612
WGS 84	UTM 13	32613
WGS 84	UTM 14	32614
WGS 84	UTM 15	32615
WGS 84	UTM 16	32616
WGS 84	UTM 17	32617

<https://source.opennews.org/articles/choosing-right-map-projection/>

Raster Tools

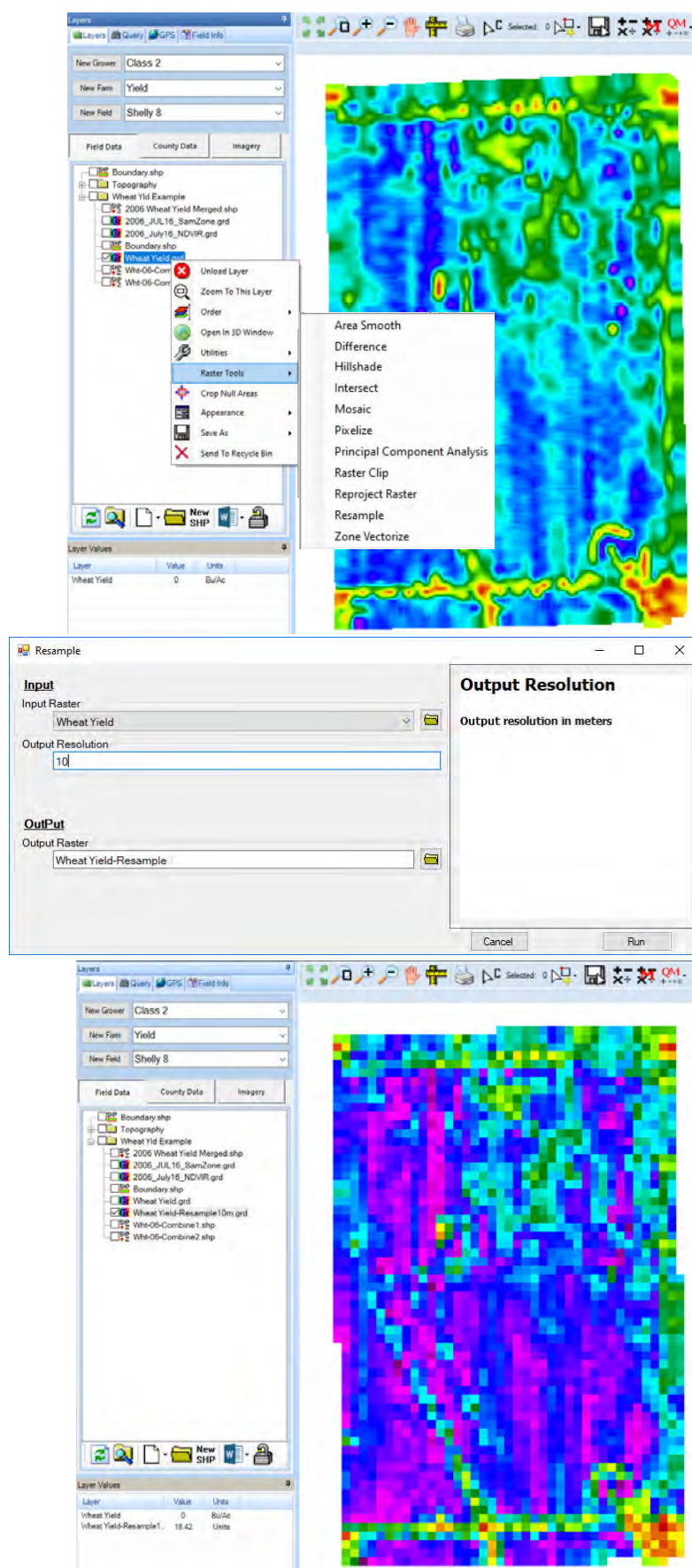
Resample

Resample— Tool changes the output resolution of a raster. Example shows 2m being resampled to 10m.

1. Turn on the raster or surface.grd.
"Wheat Yield.grd" (2 meter data)
2. Right click on the raster, select
"Raster Tools", and click on
"Resample"
3. Select the "Output Resolution" in
meters.
4. Under "Output Raster" select the
name and destination of the new
object or layer.
5. Click "Run".

The "Wheat Yield-Resample10m.grd" is now in the data tree and is resampled to 10 meter. Please note 1—5x5 Smoothing Filter will do wonders here!

The new resampled raster will now be in the field data tree, and can now be smoothed out use as you see fit.

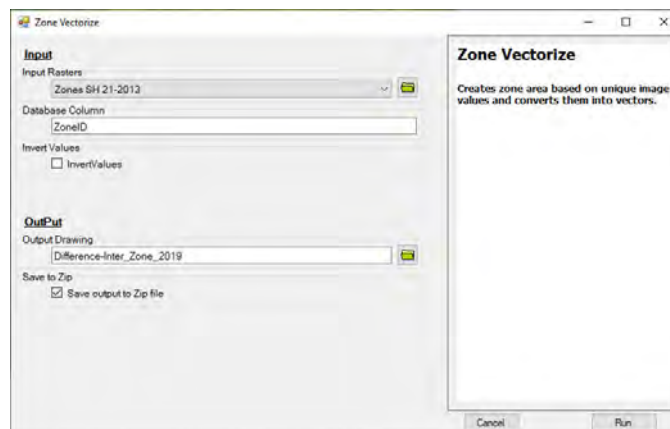
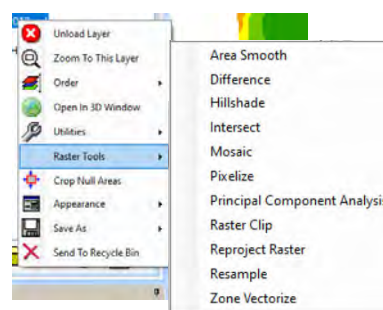
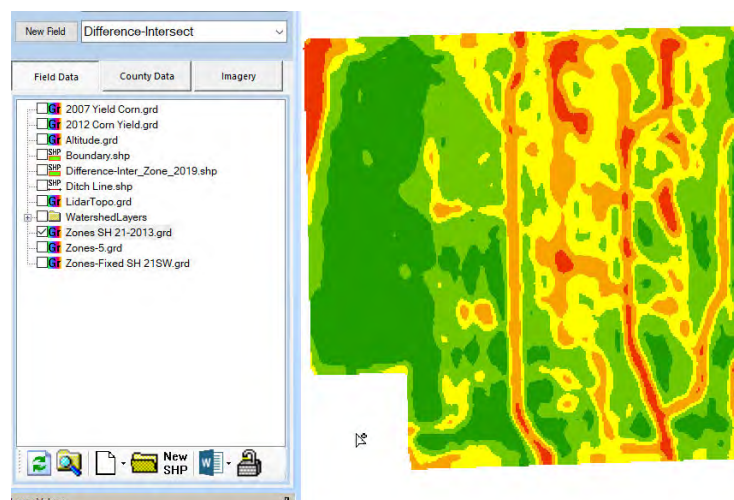


Zone Vectorize

Zone Vectorize

Zone Vectorize uses a .grd zone map to create a .shp file of the zone map that is dissolved.

1. Check on the zone map.
2. Right click on the Zone.grd map, Select "Raster Tools", down to "Zone Vectorize".
3. **Input Raster**, selected raster
4. **Database Column**, Database column to be used to create .shp.
5. **Invert Values** will invert zones.
6. **OutPut Drawing**, Select name and Location where to save file.
7. Check on or off to save to a Zip file.
Note: File works well with most Websites.
8. Click "Run"



ZoneID	Zones SH 2	GKT_IDX	GKT_Length	GKT_Area
1	82.083	1	14232.28	6.287
2	94.704002	2	52795.28	21.677
3	103.532997	3	85078.74	36.548
4	110.651001	4	73917.32	45.284
5	120.069	5	29094.49	40.311



Correlation Matrix

The Correlation Matrix is a useful tool for measuring similarities and differences between multiple layers. It can be used on any surface including imagery, yield, and prescription maps and can also be utilized in blending nutrients. The correlation matrix uses the Pearson correlation coefficient and measures the linear correlation between two variables. The output value will be between -1 & +1. The closer the value is to +1 the stronger the correlation.

http://www.ezanalyze.com/help/res_corr.htm

Using the Correlation Matrix

1. Start with a clear Map Window. 

2. Turn on all surfaces to be correlated.

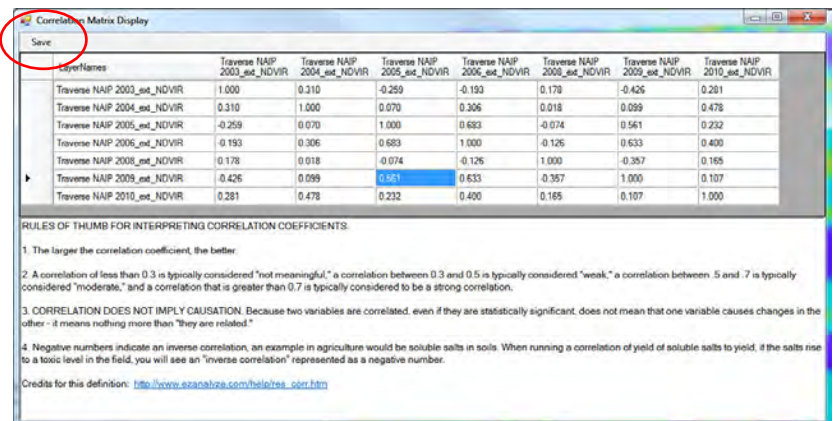
Note: All surfaces turned on will be included in the matrix. The more surfaces to be correlated, the longer it takes to calculate.



3. On the bottom toolbar, select "Calculate Correlation Matrix."

4. A table will appear displaying correlation values between two surfaces at each row and column intersection.

5. If desired, save the spreadsheet as a *.CSV file by clicking Save in the top left corner.



Correlation Value

Meaning

Less than 0.3

Not Meaningful

0.3—0.5

Weak Correlation

0.5 –0.7

Moderate Correlation

0.7—1.0

Strong Correlation

- Correlation does not imply causation. Just because two values are similar or show a strong correlation does not mean that they are related to each.
- Negative numbers indicate an inverse correlation. An example would be a correlation between an elevation map and a yield map, where on a hill top the elevation is high, but the yield is low.

Correlation Matrix

This example was done on 3 years of corn yield and an image from each year.

- The yield maps are 2008, 2009, and 2010
- The image maps are NDVIR from July in 2008, 2009, and June in 2010.
- The table can be read top to bottom, or left to right.
- From the values it can be seen that the same map correlates perfectly with itself each time (1 or 100%).

LayerNames	Corn Yield 2008	Corn Yield 2009	Corn Yield 2010	2008_JUL14_NDVIR	2009_JUL01_NDVIR	2010_JUN18_NDVIR
Corn Yield 2008	1	0.107	0.607	0.641	0.262	0.383
Corn Yield 2009	0.116	1	0.225	0.061	0.324	0.089
Corn Yield 2010	0.614	0.214	1	0.71	0.396	0.685
2008_JUL14_NDVIR	0.636	0.06	0.706	1	0.457	0.591
2009_JUL01_NDVIR	0.264	0.319	0.398	0.457	1	0.279
2010_JUN18_NDVIR	0.376	0.09	0.682	0.591	0.279	1

Correlation Value	Meaning
Less than 0.3	Not Meaningful
0.3—0.5	Weak Correlation
0.5—0.7	Moderate Correlation
0.7—1.0	Strong Correlation
1	Perfect Correlation

- Looking on the table, you can see Corn Yield 2010 and 2010_JUN18_NDVIR have a 0.685 correlation value meaning it is MODERATE.
- Other similarities can be measured also, such as how similar yield maps are from one year to the other.

Using the Correlation Matrix for Determining Blends

The correlation matrix can also be used for determining which products could potentially go together in a product blend depending on spreader limitations like the number of bins.

In this example, we used 46-0-0, 11-52-0, and 0-0-60 maps in the Correlation Matrix calculation with the intention of applying them with a two bin spreader.

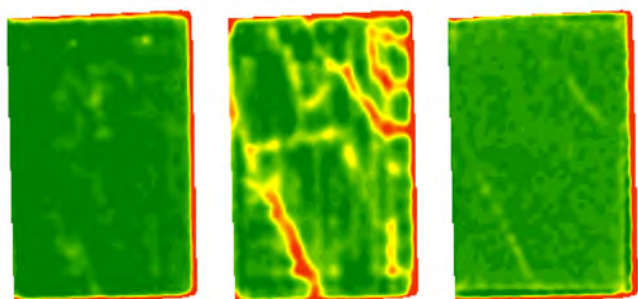
The resulting table shows a strong correlation between the 46-0-0 and the 0-0-60 application maps (.88 correlation), indicating that these two products would blend well and still maintain similar rates to the original maps. At the same time, there are negative correlations between 11-52-0 and the other two products, which if blended with one of them would cause one product of the blend to be spread with rates that are very dissimilar to the original map. This would make the 11-52-0 a good candidate to go in the second bin by itself.

LayerNames	0-0-60	11-52-0	46-0-0
0-0-60	1	-0.017	0.88
11-52-0	-0.017	1	-0.489
46-0-0	0.88	-0.489	1

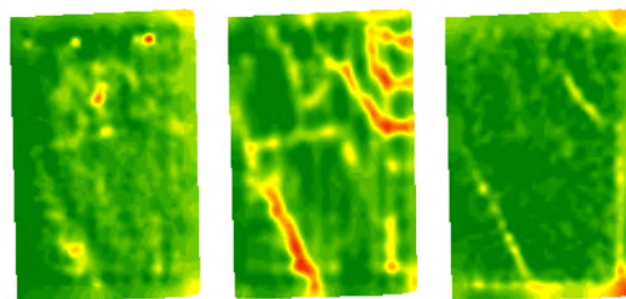
Correlation Matrix

Correlation Matrix - A Decision Making Tool

The correlation calculations are done on a pixel by pixel basis as it compares two images at a time. If two pixels, in the same location of each image, have the roughly the same value the correlation will be high between those pixels. It is because of this methodology that it is important to know how it can affect the results. For instance, on the left there are three images that have some Border/Edge Effect issues and on the right are the same images with the Border/Edge Effect corrected. Notice that in the correlations, the images without the Border Effect corrected have higher correlations than the correlations of the corrected images.



	LayerNames	2016_JUN20_14TF Red	2017_SEP03_14TF Red	2018_JUL30_14TF Red
▶	2016_JUN20_14...	1.000	0.663	0.889
	2017_SEP03_14...	0.663	1.000	0.596
	2018_JUL30_14...	0.889	0.596	1.000



	LayerNames	2016_JUN20_14TF Bord	2017_SEP03_14TF Red Bord	2018_JUL30_14TF Red Bord
▶	2016_JUN20_14...	1.000	0.500	0.397
	2017_SEP03_14...	0.500	1.000	0.344
	2018_JUL30_14...	0.397	0.344	1.000

Notice that in the corrected images on the left that they all show similar trends of production in several areas of the field, but their correlation is low. Keep in mind that images will show the same trends in a field, but at different "intensities" depending on the year or time of year of the image. The point is, a low correlation number doesn't always mean the images don't relate to each other. This reinforces the idea that the Correlation Matrix is a decision making tool, not a hard and fast gauge of good or bad. The user still needs to use their judgement.

Quick Sort Extracted Images

Since it is often hard to tell whether or not an image is going to be used in the final merge while extracting images, the Correlation Matrix is great for making a quick decision on what images to keep and which ones can be ignored. One strategy is to turn all the images on in the Map Window and run a **Average All Layers -Equalized** script to create a merged image of all the extracted images. Once it has finished, run the Correlation Matrix and look for images that don't correlate well with the recently merged image. Once you have eliminated the low valued images, then go through and visually sort the remaining images to find which will be merged in the final merge that will ultimately be used as the Management Zones.

Data Tree Organization

Data Management Tips

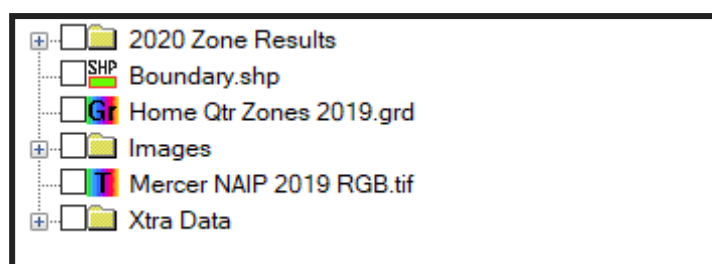
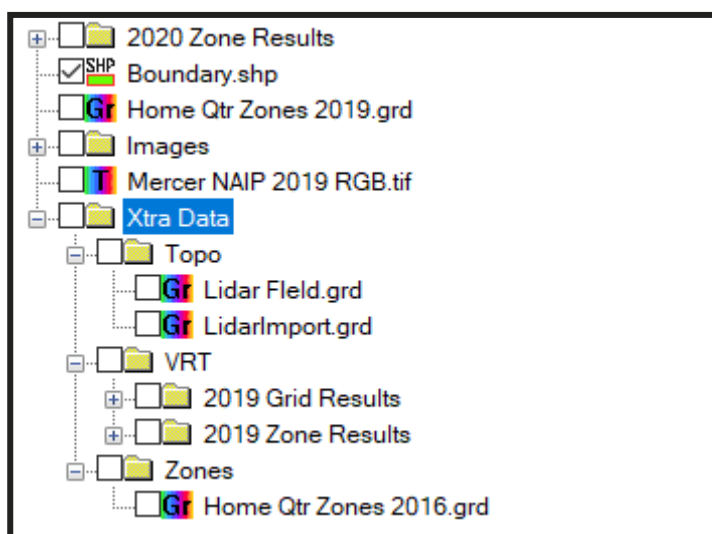
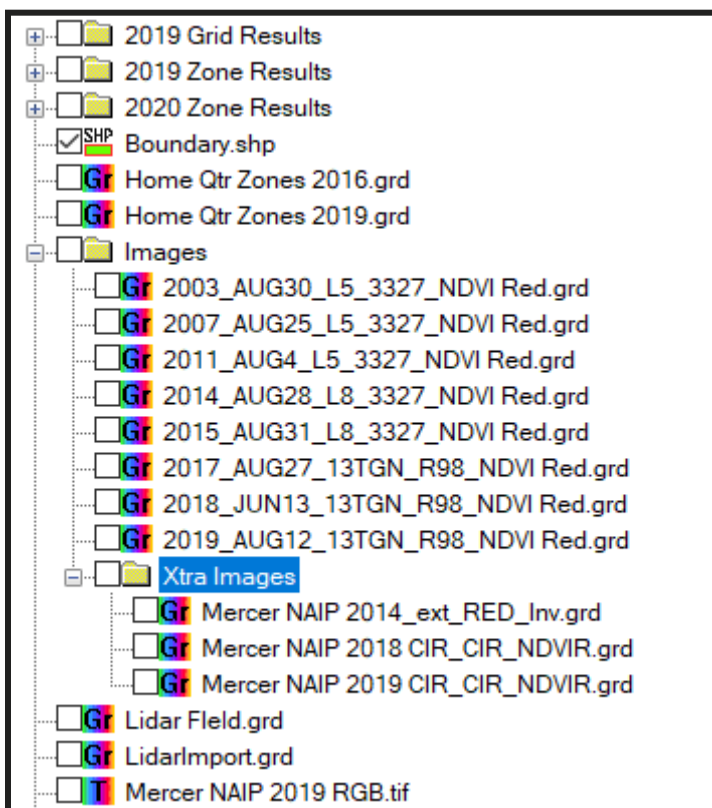
Field folders in the data tree can quickly become disorganized after a few seasons of creating zones, prescriptions, and collecting other data. Over time, there becomes a process just to sort through the old data and find what you need. Our philosophy is to keep everything and not delete any old files, so it comes down to doing a little “house keeping.”

Having an **Xtra Images** folder inside the Images folder works well for placing any unused images into so that when you look back it is easy to see which images were used in the current Management Zone Map.

Creating an **Xtra Data** folder works well for organizing any previously used Zones, VRT, Topo, Veris, etc... when you are done using them for the current season, don't use them often or no longer find them valid.

Once things are organized, the only files that remain visible when initially opening a Field Folder in ADMS are simply the items that you use the most. For most of us, that would be the current season's Prescription Map, a Field Boundary, the current Management Zones, and a background image.

Depending on your own organizational style or needs and preferences, you may find that you like to organize things slightly different from this example, which is fine. The important thing is that the data is organized.



Creating Zones

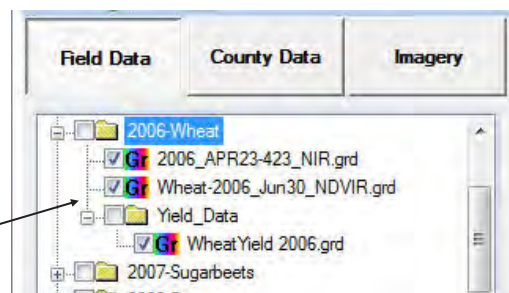


Average All Layers Script (Images / Yield / Topo / Veris)

If multiple .grd files exist for one "Field", these surfaces can be merged to combine traits.

1. Click "**Layer Info**" and "**CLEAR MAP**" 

2. Turn on JUST THE .grd maps you want to "Merge" (2—200 surface rasters from Imagery / Yield / Topo / Veris)

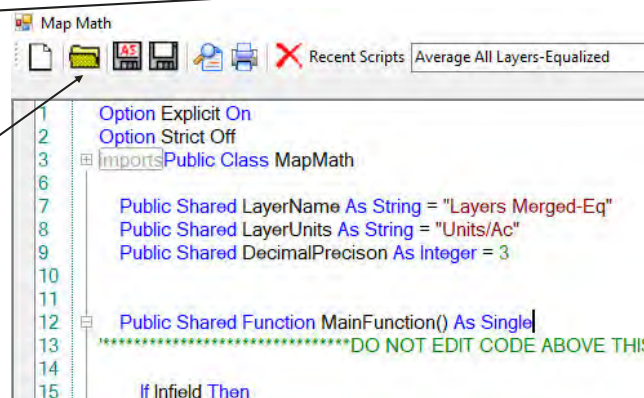


3. Now, click the "**Multi Layer Map Math**" button located in the top map toolbar.



4. The "**Map Math**" window opens.

5. Click the "Open Existing Scripts" Button.



6. Find the "**Average All Layers-Equlaized.txt**" file and click open.

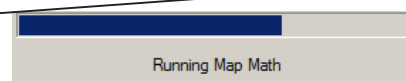
7. Note the "Code Window" should populate with some data looking like this.

8. Click "**Compile Script**".

(If all is correct you should see this)

The Script Compiled without errors! :-)

9. Click "**Run Script**".

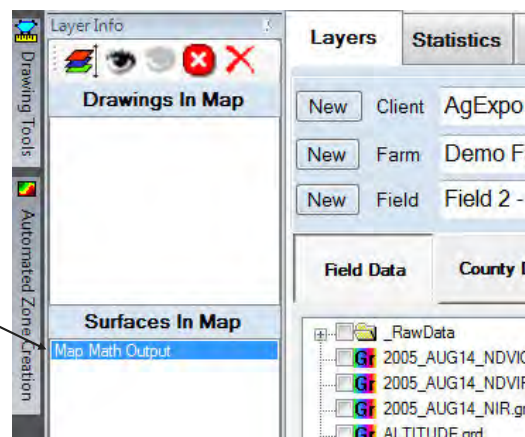


10. Close the "**Map Math**" window.

11. Go to the "Layer Info" tab on the left side of the screen

12. Select the "Layers Merged-Eq" from the "Surfaces In Map" list

13. Click on the "Save As"  button on the bottom toolbar and call this "3 surface merged.grd" (or whatever name represents the new object created).



* More detailed information on Map Math Controls under the Advanced Scripting section .

Creating Zones

Quick Zones—Thematic Raster Settings

Quick Zones

The function of coloring "Zone" maps gets to be a lot of clicks going into the "Thematic" window every time. Also, changing "Default Color Tables" in setting when you are making Zones vs Rx or Topo Mapping. So we added a function called "Quick Zones". Quick Zones uses the "Default Color Tables (Zones)" for the Settings window.

With the "Settings" set like this. >



After "Merging Images" I have a ZONE.GRD that is in Rainbow colors.

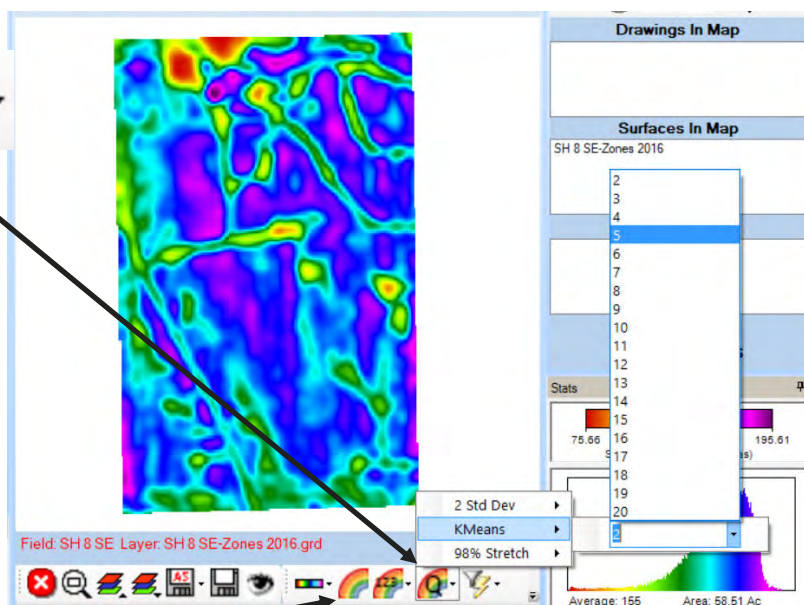
Click on the "QuickZoneSet"

Suggest "KMeans" & 5-7 Zones

Note: Scroll of mouse wheel on the Zone # dropdown.

Click back in the "Map Window" the list will disappear & apply settings using the "Default Color Table (Zones)"

If you are happy with the Zones, your done.



If you want to "Tweak" a Zone

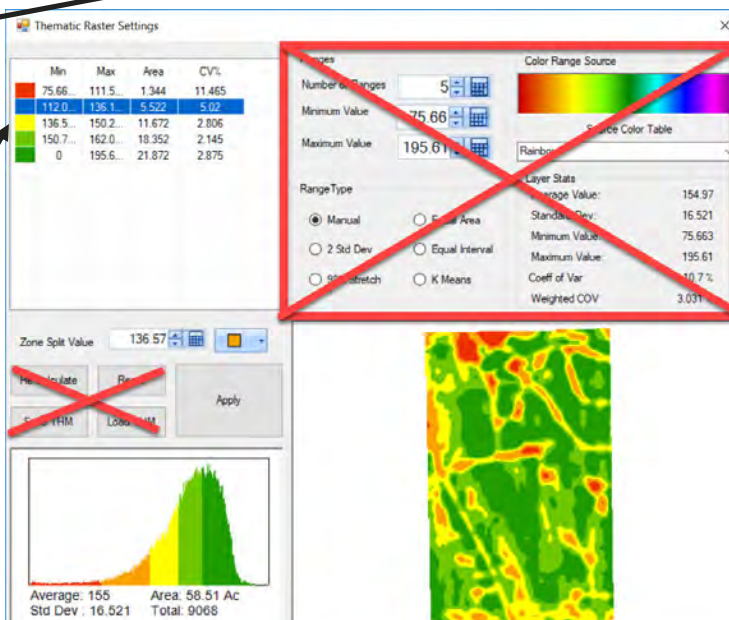
Click on "Thematic Color"

Note: Color Table on the Left is in Red Yellow Green!

Do NOT Click on or in the Red Areas! If you do the color table will go to Rainbow.

Put mouse pointer over "Color Chip" and scroll the mouse wheel to "Tweak" the zone color changing the "Max Value of the "Color Chip"

When Finished Click "Apply"



Creating Zones

Manual Zone Creation/Thematic Raster Settings



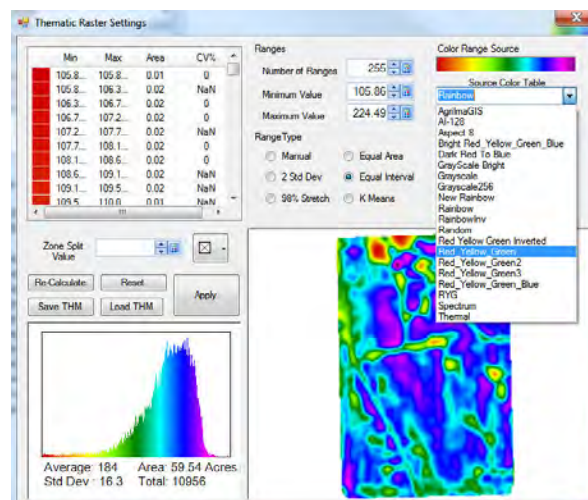
1. In the zoning process, the values of the image do NOT change (unless end values are changed), only changing the colors associated with the values. These colors are used to isolate areas of the field that perform differently.

2. Select the **"Thematic Color"** button on the lower toolbar.



3. The **"Thematic Raster Settings"** window will open up.

4. Select the **"Source Color Table"** to use.



5. Adjust number of zones by changing value in the **"Number of Ranges"**. If creating sample zones in your field, important to keep in mind the number of samples to pull.

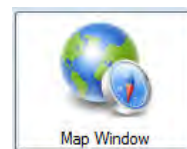
6. Next, select the **"Range Type"** to use. These are mathematical ranges based on the inputs and number of ranges selected. Typically for satellite imagery, use "2 Std Dev" or "K Means".

Range Types—Allow for automatic statistical grouping of the colors by values on the map.

- K Means—Recommended for imagery and zone creation.
 - ⇒ Clusters the data in a way so each zone has the lowest coefficient of variation possible. This minimizes the variation between data groups.
- 2 Std Dev—Recommended for imagery and zone creation.
 - ⇒ Multiplies the Standard Deviation by 2. Then it adds and subtracts that value from the mean. These are the new high and low values.
- 98% Stretch—Recommended for imagery and zone creation.
 - ⇒ 1% of the values are taken from the top and 1% of the values are taken from the bottom end.
- Equal Interval—Recommended for topography or prescriptions when creating contour polygons.
 - ⇒ Makes each color have an equal range of values.
- Equal Area—Not commonly used.
 - ⇒ Each zone has equal area

Creating Zones

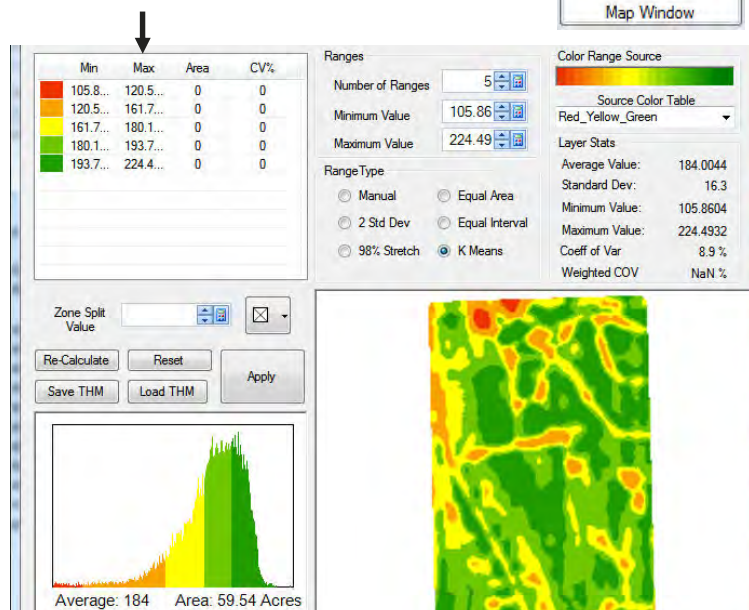
Manual Zone Creation/Thematic Raster Settings



7. The statistical methods may not give the exact zones you are looking for. You may want to adjust the zones manually.

8. To manually adjust a zone, place the mouse over a color chip and "Scroll" the mouse wheel. This will adjust the "Max" value of the range.

9. Repeat this process to adjust all the zones to be changed. Note: adjusting the highest value does nothing, you are moving the top value of the color chip.



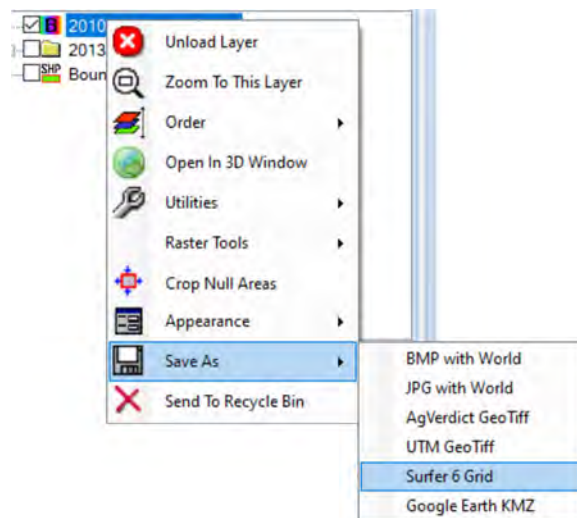
10. If the map in the preview window is acceptable, click on the **"Apply"** button. This will automatically save these settings to a .grd. Must click **"Save"** on lower toolbar if working with .bmp/tif.

11. If using Ag Data Mapping Solution to find the zones for sampling, you are done. If using a PDA or exporting to another program, save this image in another format.

12. To save this image in a new format, "Right Click" on the file name to save, select **"Save As"**.

13. Select the new file type you need.
Note: Surfer 6 Grid (default format)

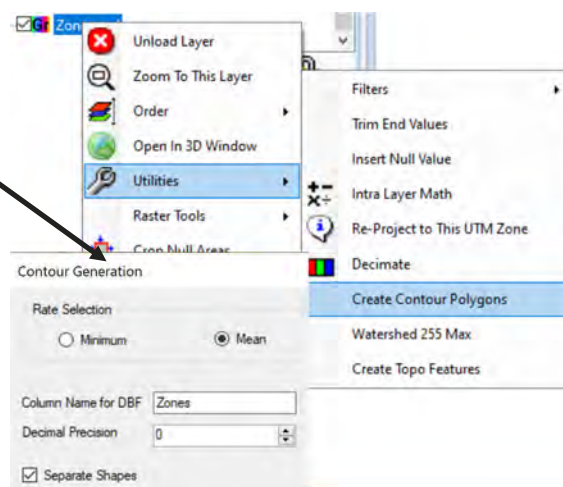
14. End of manual zone creation.



Creating Zones

Create Contour Polygons to "Mod" Management Zones

1. Get Zone Colors the way you want them.
2. Right Click on Zones.grd and go to "Utilities" and "Create Contour Polygons" and click "OK"
3. Change "Active Layer" Zones.shp and select all the polygons you want to "Modify"
4. Go to the top toolbar and "Save Selected Objects to New Layer" and name the output. Example—SaltyArea.shp
5. "Clear Drawings" and turn on just SaltyArea.shp and select all the polygons.
6. Change "Active Layer" Zones.grd
7. Go to "Thematic Color" button, and take a picture or a Screen shot of the Value breaks and close.
8. Bottom tool bar - click on "Modify values under selected polygon". 
9. Two options here.



Thematic Raster Settings

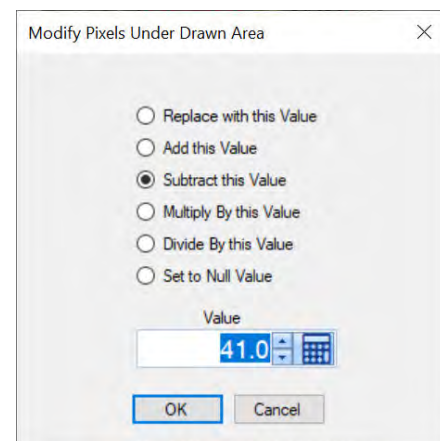
	Min	Max	Area	CV%
	101.2...	125.9...	7.59	5.5
	125.9...	140.2...	15.71	3
	140.2...	154.9...	32.38	2.8
	154.9...	166.0...	33.75	1.9
	166.0...	192.1...	43.1	3.3

A. **Flat Mod Option**—Choose "Repalce with this Value" & "Value" = 99 (most cases using Avg All-Equalized maps), Click "OK"

B. **Curved Mod Option**—Choose "Subtract this Value"

Must calculate this value— Find the "Max" value from highest Zone that was selected (Orange max—140.2). Next find the "Min" value of this surface (Red min—101.2). Choose a "GAP" value, usually (2), this is enough gap that colors don't overlap and get nice color breaks.

(Max (140.2) - Min (101.2))+ GAP (2) = Subtract Value (41.0) & Click "OK"

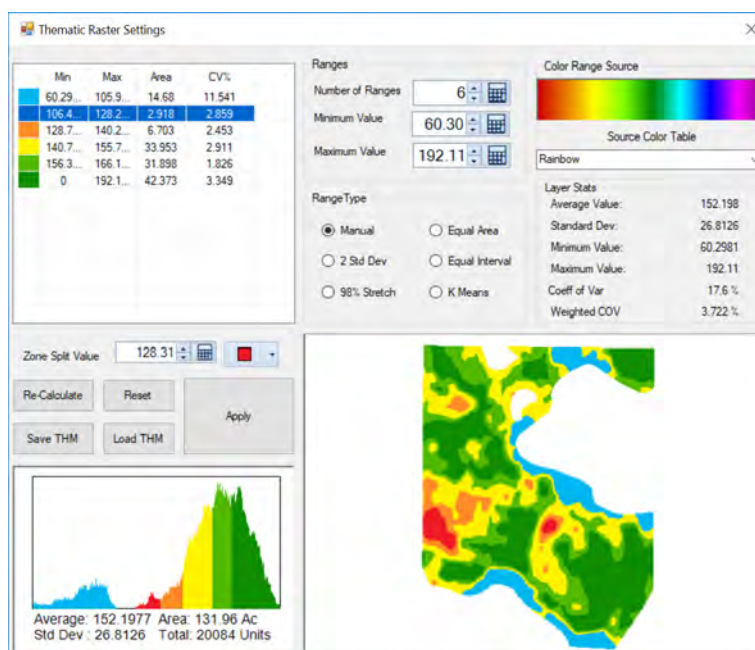


10. Suggest doing a "Save As" - Zones Updated.grd
11. Good time to "Clear Map"

Creating Zones

Create Contour Polygons to "Mod" Management Zones Adjusting Colors

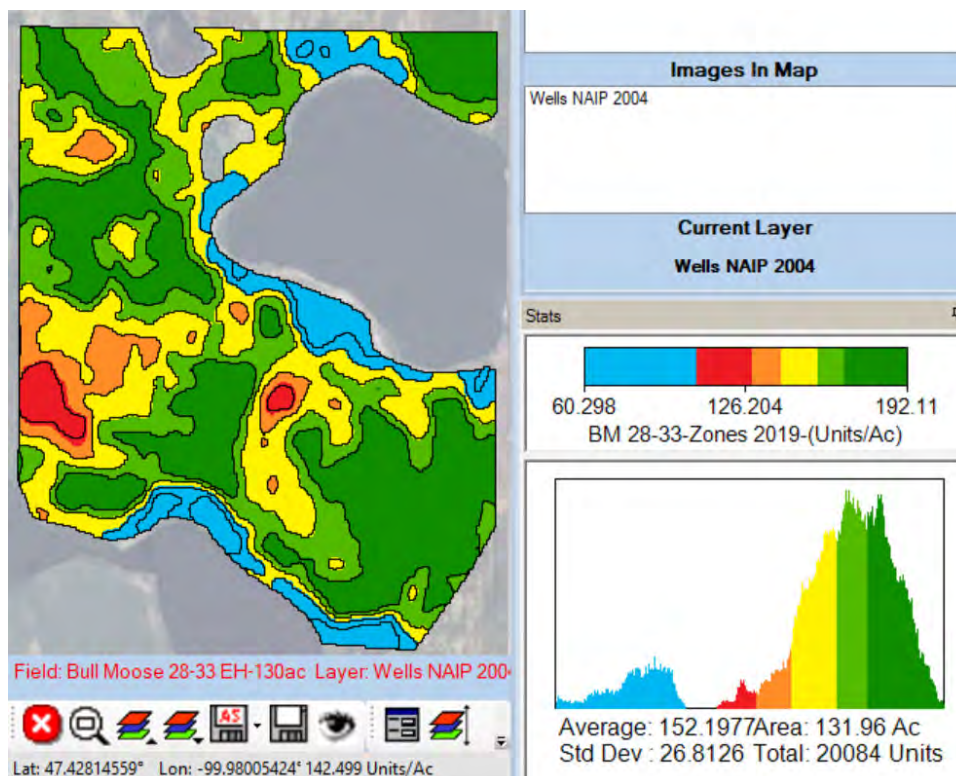
1. Turn on Zones.shp & Zones-Updated.grd
2. With .grd as active layer Click on "Load Fixed Thematic Table" button - "6Zone-Blue-Red-Yellow-Green"
3. Click on "Thematic Color" button
4. Place your Cursor over the Lite Green "Color Chip" & Scroll. Adjust it to match your "Screen Shot or Picture".
5. Repeat for all the zones, suggest leaving "Mod" for last.
6. Click "Apply"
7. If things don't line up with the contour polygons. Go into "Thematic Color" and tweak to fit.



Notes....

The "6Zone-b-r-y-g" fixed theme was saved using the "Save THM" see the ADMS User manual section on "Fixed Color Themes".

This function can be done on the "Top" value Zones also. Suggest making the Mod Zone "Purple" and "Adding" the value.



Nutrient Layers

Creating Fertilizer Products

Before getting started with writing Prescription maps it is suggested that you confirm that you have all the "Products" you would want to use.

1. On the top toolbar, select **"Setup"** and **"Fertilizers"**.
2. At the **"Edit Fertilizer Products"** window, select **"Add New"**.
3. Enter all the values for the product (custom PK)
 Keep names less than 12 characters
 "N Conc" is the % by weight analysis
 If you enter all the "Conc" values on the right,
 the product will be available for "Blend Groups"
 Seed products do not enter "Conc" values
4. When finished, select **"Save"**.
5. Create as many Fertilizer Products as needed by starting at step # 1
6. When finished "Close" this window



Product ID: PKBlend2 N Conc: 9

Product Name: PKBlend2 P Conc: 44

Product Form: Dry K Conc: 48

Product Type: Fertilizer S Conc: 0

Density: 66 Zn Conc: 0

Default Rate: 150 Fe Conc: 0

Market Unit: ton

Transfer Unit: ton

App Unit: lb

Minimum App Rate: 0

Maximum App Rate: 500

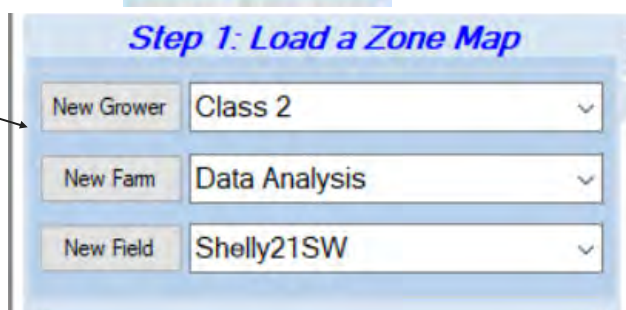
Price/Unit:

Nutrient Layers

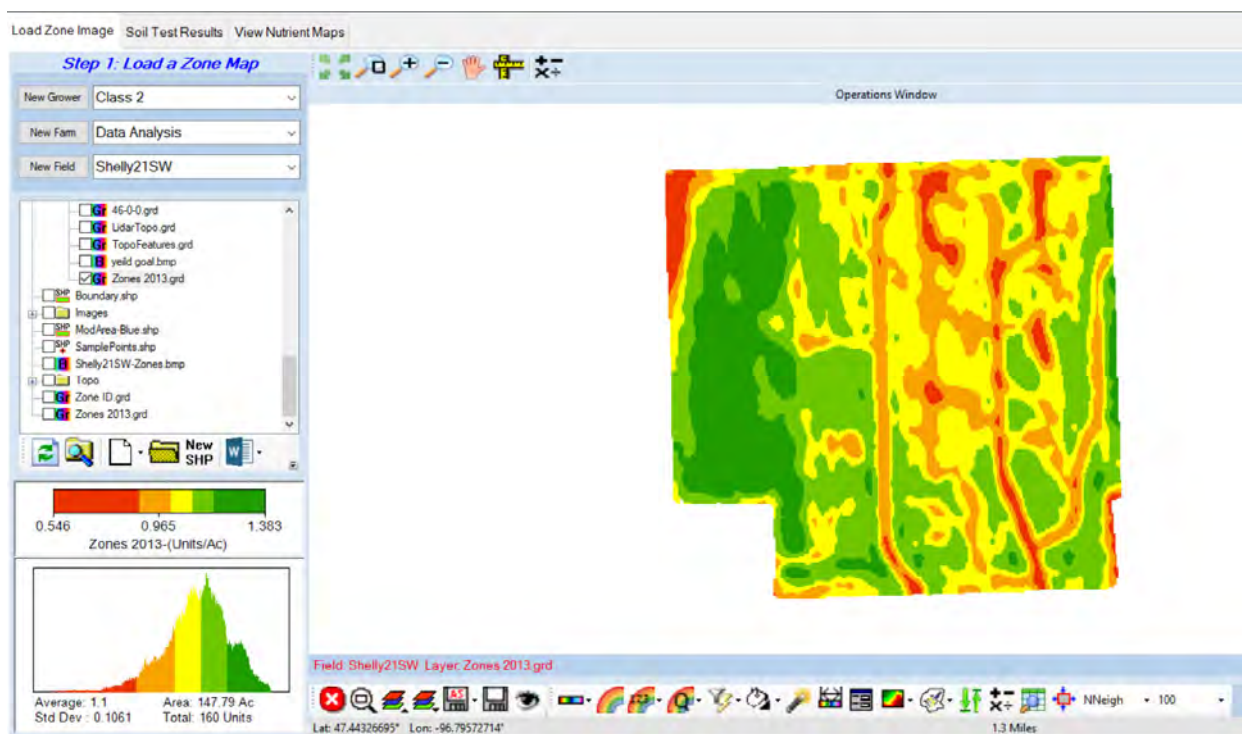
Creating Rx Maps—Load Zone Image

For this section, we will be combining your soil test / application rates to your zone map for the purpose of creating an application map for single or multiple products. It is your responsibility to understand the output maps and what the values on the maps mean.

1. Start up Ag Data Mapping Solution and Select the **"Merge Zone Results"** Icon, or go to the top tool bar and select the **"Process"** button and **"Merge Zone Results"**.
2. Select the Correct "Grower", "Farm" and "Field" where you created the zone maps.
3. Select the **"Zone Map"** for this field.
(Zones 2013.grd)



*NOTE: Suggest having Zones.grd in "Field Folder". **NOT** inside a sub-folder Ex.Images*



Use one of the following sections:

"CSV Soil Test Results"

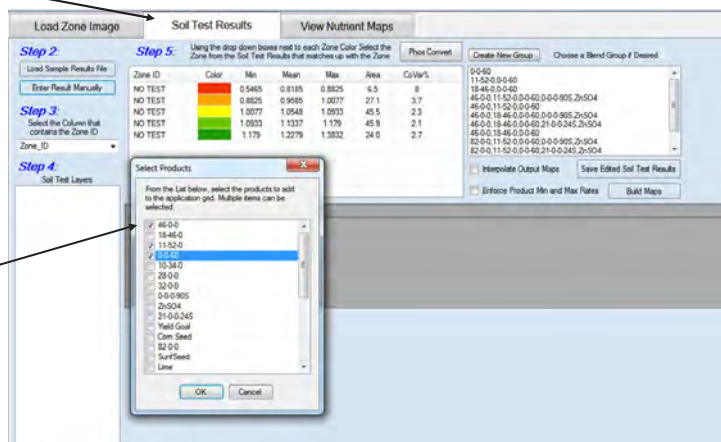
"Creating Prescription Maps—Manually"

"Using Blend Groups"

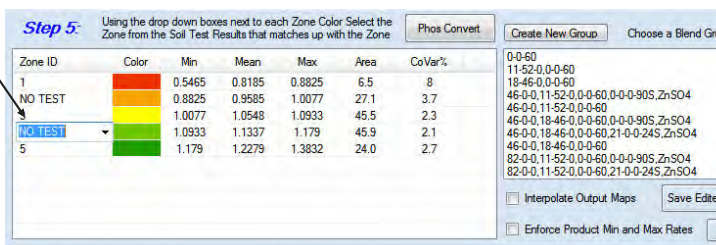
Nutrient Layers

Creating Rx Maps—Manually

1. Select the **"Soil Test Results"** tab on the top of the Nutrient Layers window.
2. To Enter soil test results from a printed / paper soil test, click **"Enter Result Manually"**.
3. From **"Select Products"** window, select which products you will be using for the application. One or more products may be selected.
4. If you do not see the product you would like to use, Cancel and go to the **"Creating Fertilizer Products"** section of the guide.
5. The "Zone_ID" is already selected as **"Column that contains the Zone ID"**.
6. Select the Test Result to be associated with the appropriate color from the Zone map. **If there is no test for a color in the map you must select "No Test" next to that color.**
7. Now enter the product totals from the soil test results to their appropriate Zone ID and Product. **These values are the actual units of product that will be applied by the controller (100 lbs N should be entered as 217 for Urea (46-0-0)).**

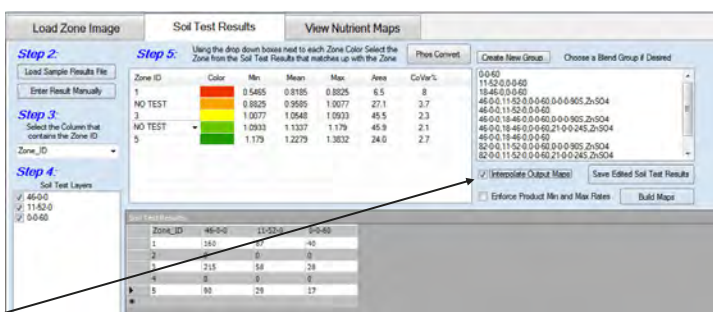


Soil Test Results				
	Zone_ID	46-0-0	11-52-0	0-0-60
	1	160	87	40
	2	0	0	0
	3	215	58	28
	4	0	0	0
	5	90	29	17



You can use values as LBS of Nutrient and convert later using steps 10 - 13, or change the values in the **"Soil Test Results"** table.

8. With all these items selected and values filled in, check **"Interpolate Output Maps"** and click **"Build Maps"**. (By NOT checking the "Interpolate" box you will get a 5 rate zone application map "consider" for seeding maps).

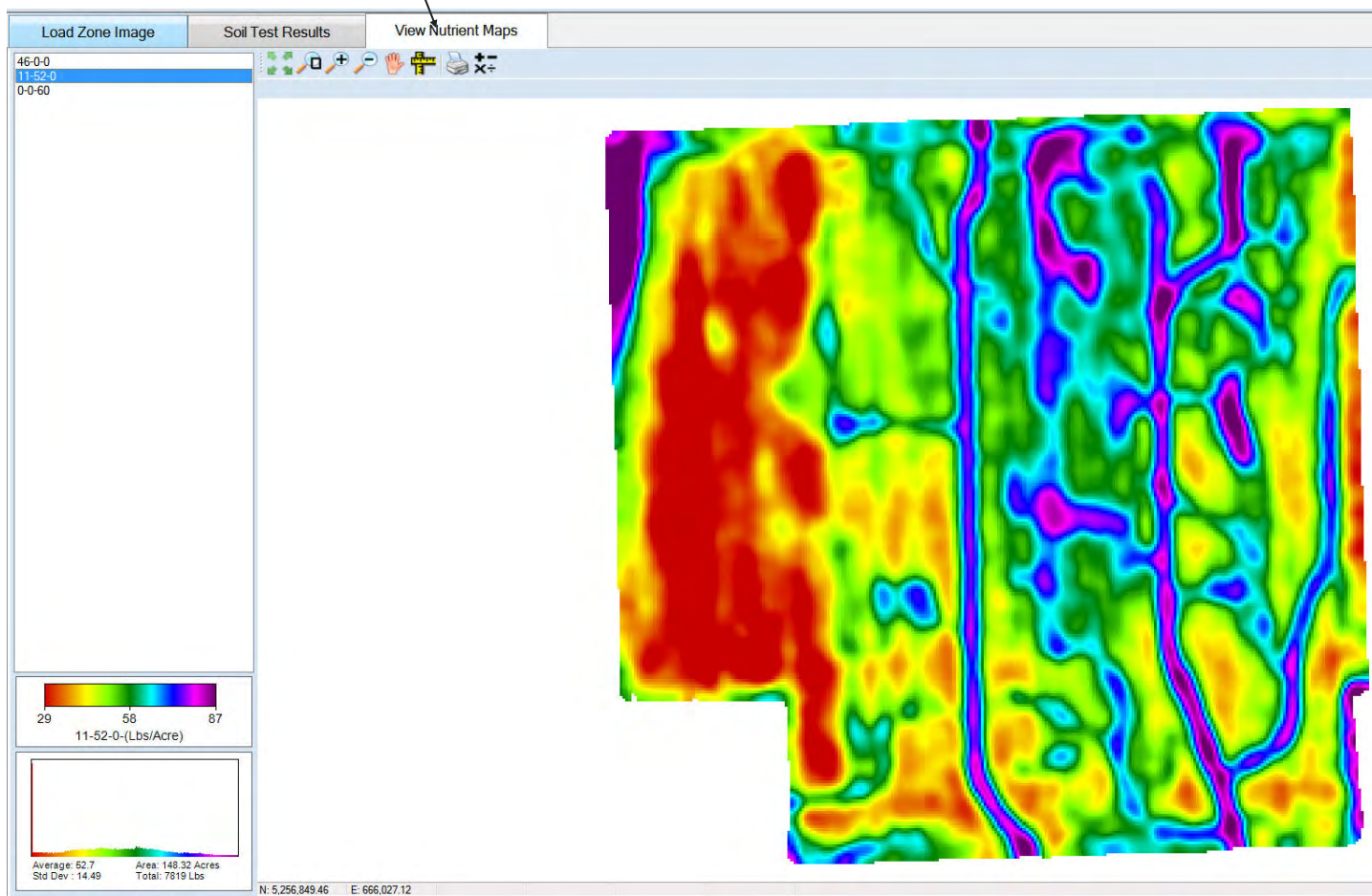


NOTE: "Enter Results Manually" does NOT use the "Select By Named Group" option.

Nutrient Layers

Creating Rx Maps—Manually

9. Select the **“View Nutrient Maps”** tab. You now have Nutrient Maps for each product you desire.



As you click on the “11-52-0” on the Left side of the window you will get a preview of the 11-52-0.grd map.

Click through the maps to assure your rates are all assigned correctly. What you see is what is applied (Example 29 lbs to 87 lbs of 11-52-0 & average of 52.7 lbs/ac)

If rates are not correct, return to the “Soil Test Results” tab and correct the rates.

NOTE: Go to “Map Window” for printing maps & exporting to controller.

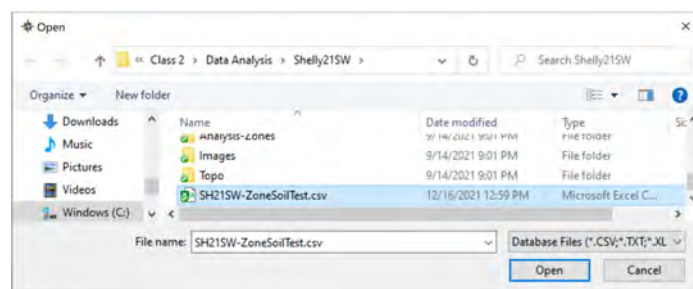
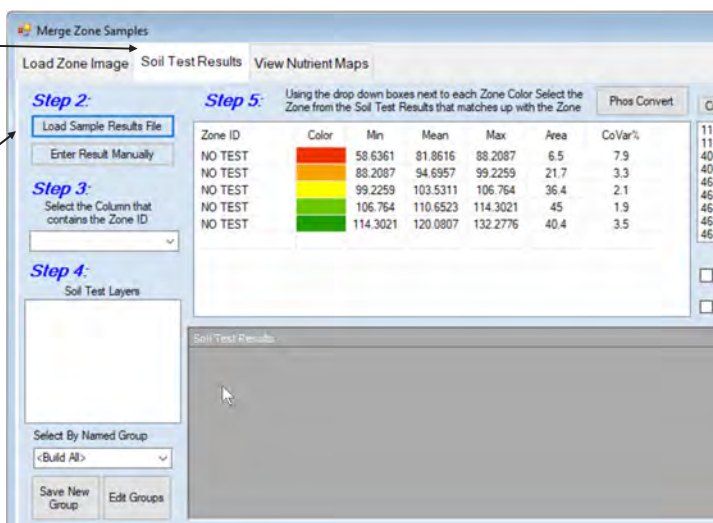
Nutrient Layers

Creating Rx Map & Soil Test Results—Using CSV / XLSX

1. Select the **Soil Test Results** tab on the top of your Nutrient Layers window.
2. Select the **Load Sample Results File** button.

A. Soil tests are normally exported from Agvise website as "GK Technology" as CSV (Comma Separated Value). ADMS can accept files from other sources as long as they are in a supported format (shown below).

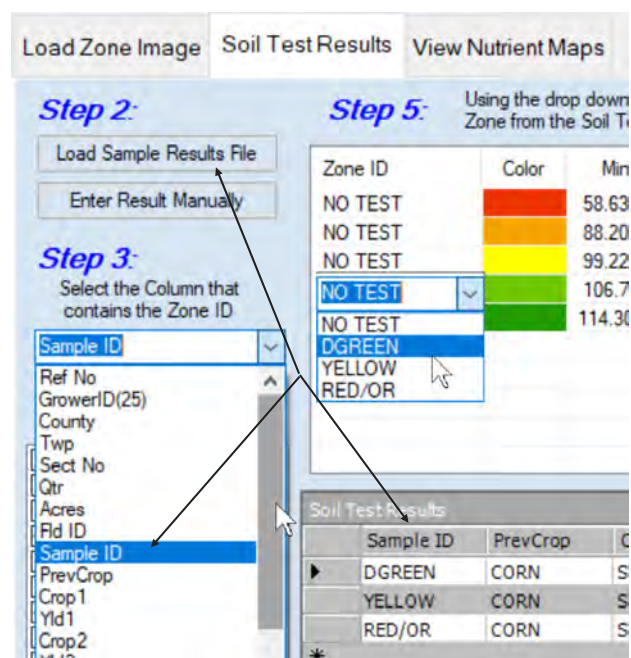
3. Locate the .CSV file and open it. (Note: Settings & User Interface2 - has setting to browse to you import results faster).



**Note: There is an option where to start browsing for soil sample results. Go to Tools > Settings > User Interface 2. At the bottom of the window there is the option to "Start Search Results in Field Folder." If this is checked windows explorer will open up to field location. If it is unchecked it will open to the last location.*

4. Step 3: **"Select the Column that contains the Zone ID"**, select the appropriate column to reflect the Zone ID - Color (usually "Sample ID").

NOTE: ADMS supports CSV / DBF / MDB / TXT / XLS / XLSX files for this process.



Nutrient Layers

Creating Rx Map & Soil Test Results—Using CSV / XLSX

5. In "Step 4: Soil Test Layers" Check the boxes by items you wish to create a Soil Test map or Rx map for. This can be one layer for a single product application, or many layers for soil tests, seed and multi-product application.

NOTE: Once a box is checked, built and added to "Common Name Mapping". This Product name will "auto check" the next time you load a soil test with that Product name.

"Right Click" gives option to

- Uncheck All
- Check All

- 6a. Select By Named Group—will allow you to save "Groups" of what you want checked on to build.

- Save New Group—name the group and click "Apply"

- Edit Groups—Allow user to:
- Rename, Delete Groups.
 - Rename, Delete, Add Nutrients.

- 6b. Next time through you can choose your "Name Group" from the dropdown.

The screenshot shows the 'Soil Test Layers' window with tabs for 'Load Zone Image', 'Soil Test Results', and 'View Nutrients'. It includes sections for Step 2 (Load Sample Results File), Step 3 (Select the Column that contains the Zone ID), and Step 4 (Soil Test Layers). A right-click context menu is open over the 'Soil Test Layers' section, showing 'Uncheck All' and 'Check All' options. The 'Select By Named Group' dropdown is set to '<Build All>'. The 'Save New Group' button is visible.

The screenshot shows the 'Enter Name for New Nutrient Group' dialog box. The text 'GK SoilTest-Normal' is entered in the input field. The 'Apply' button is visible at the bottom right.

The screenshot shows the 'Nutrient Groups Editor' window. It has two main panes: '1. Select a Group to Edit' and '2. Select the Nutrient to Edit'. The first pane lists groups like 'test 6 inch', 'All-less S-ZN', 'NPK-YG', '2 foot tests', and 'GK SoilTest-Normal'. The second pane lists nutrients like 'Yld1', 'pH', 'OM', 'N-(N1+N2)', 'P-O ppm', 'K ppm', 'S1 lb', 'Salt1', and 'Zn ppm'. Buttons for 'Rename Selected Group', 'Delete Selected Group', 'Rename Selected Nutrient', 'Delete Selected Nutrient', and 'Add New Nutrient' are present. A 'Save Changes to Groups' button is at the bottom.

The screenshot shows the 'Select By Named Group' dropdown menu. The dropdown is open, showing options: '<Build All>', 'test 6 inch', 'All-less S-ZN', 'NPK-YG', '2 foot tests', and 'GK SoilTest-Normal'. A mouse cursor is pointing at the dropdown arrow.

Nutrient Layers

Creating Rx Map & Soil Test Results—Using CSV / XLSX

7. **Step 5:** Choose which Product names should be associated with which Zone Color, using the Pull-down menus under Zone ID.

- NOTE: If using a 3 zone soil tests and 5 zone map, **the remaining zones need to read "No Test"**.

8. If there are Column in the database to be used with "**Blend Groups**" this is the time to check them on. (note Checking On - "**Enforce Max Min**" may effect this process)

- NOTE: Blend Groups are discussed on the next page.

9. With all these items selected, check "**Interpolate Output Maps**" if you want maps interpolated—suggest for most fertilizer & seed.

10. Check—"Enforce Product Max/Min Rates" - If Product layers or Rx Maps may have controller limitations.

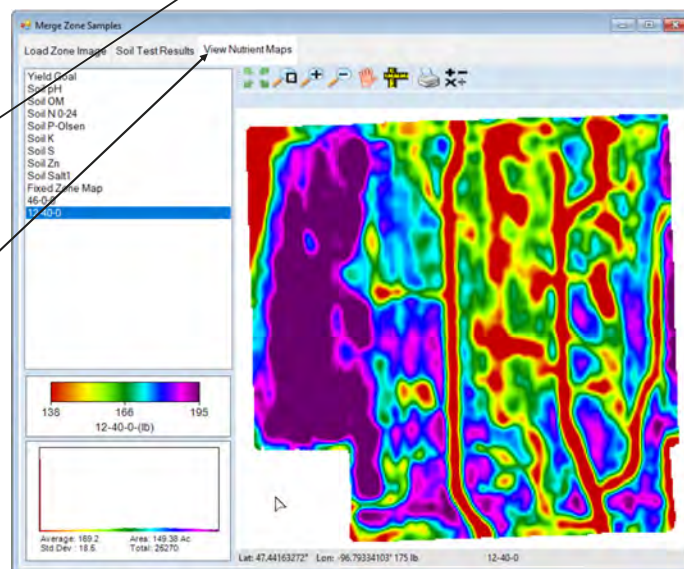
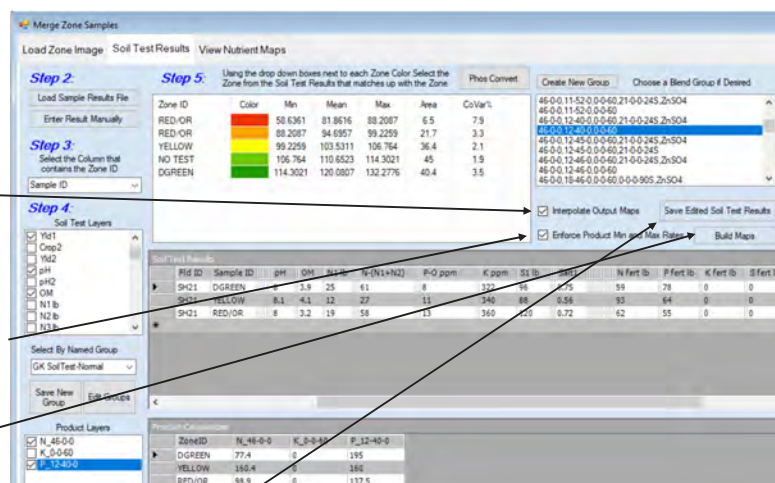
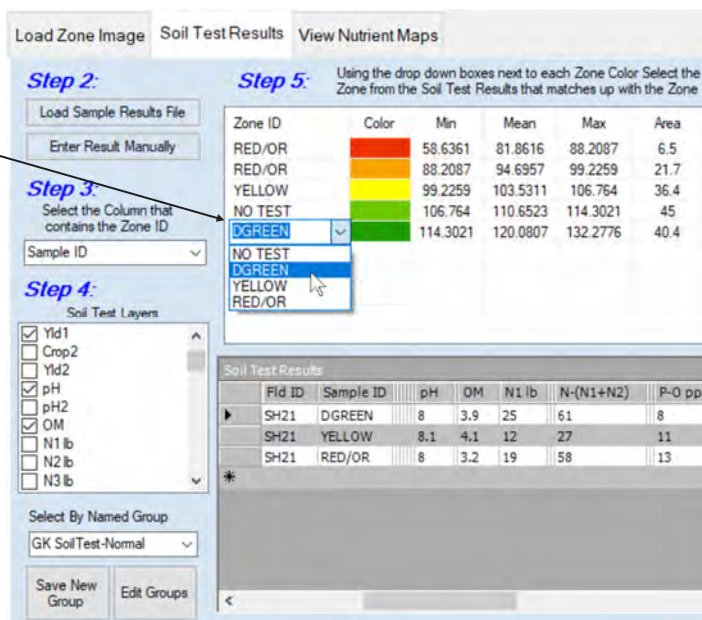
11. Click "**Build Maps**" To create Soil Test Results and Rx Maps.

12. If soil test results have been edited then they should be saved by clicking "**Save Edited Soil Test Results**".

13. Choose the "**View Nutrient Maps**" tab. Click through all the maps.

Confirm Maps & Rates are Correct!

14. Return to "Map Window" for Scripting / Exporting to controller / Printing



Nutrient Layers

CSV / XLSX Soil Test Results—Phosphorous Conversion

Soil phosphorous values may be tested and reported in several different ways such as Olsen, Bray, and Mehlich 2 & 3. Due to variables like pH differences, some samples may be tested as one type and other samples tested as another. For example a high pH test may have an Olsen result where a lower pH may have a Bray result. ADMS cannot distinguish these differences. So there are some conversion tools to update columns that may have zeros in them, or create a new column if the phosphorous result needs to be a certain type for recommendations or scripts.

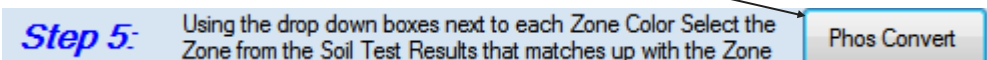
Updating Existing Columns

If there is a column that has only some values reported in it. It can be updated using the other Soil P column. For example these results have three zones reported as Olsen Values and only one zone reported as a Bray value.

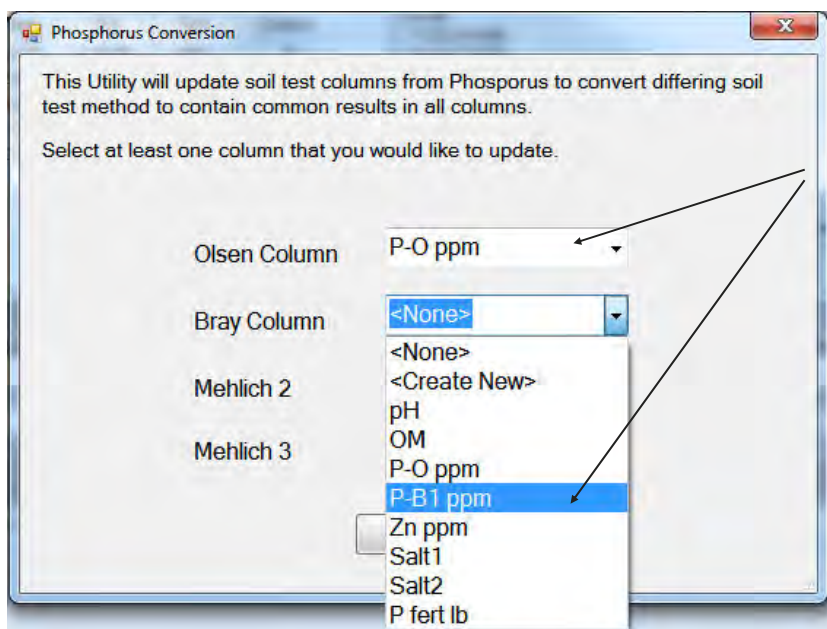
P-O ppm	P-B1 ppm
9	0
7	13.3
6	0

To report everything in P-B1 a conversion must be ran before the maps are created.

1. Click on the "Phos Convert" button.

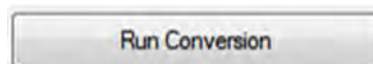


The "Phosphorous Conversion" window will appear.



If the columns have values in them they will show up as a dropdown option.

2. Choose the corresponding columns.
3. To update values two columns must be filled in. ADMS will use the values in one column to convert to the other value. In this example the Olsen values will be converted to Bray (P-B1).
4. After the dropdowns are filled in click "Run Conversion."



5. After clicking "Run Conversion" the missing values will be updated.

P-O ppm	P-B1 ppm
9	14
7	13
6	9

Nutrient Layers

CSV / XLSX Soil Test Results—Phosphorous Conversion

Creating New Columns

If soil test results are reported as one value, but they need to be converted for use in recommendations or scripts it can be done using the same tool. Instead of updating an existing column it will create a new one based on existing values.

1. Click on the "Phos Convert" button.

Step 5: Using the drop down boxes next to each Zone Color Select the Zone from the Soil Test Results that matches up with the Zone

Phos Convert

2. The "Phosphorous Conversion" window will open.
3. Select the existing Soil Phosphorous column from the dropdown.
4. Select "<Create New>" for the soil test value that needs to be converted.
5. Click "Run Conversion."

After the phosphorous conversion has run it will create a new column of the converted soil test values.

☐	Zone2 Salt
☒	PBray1Conv

PBray1Conv
14
10
9

Nutrient layers can be built off of these the same as any other column.

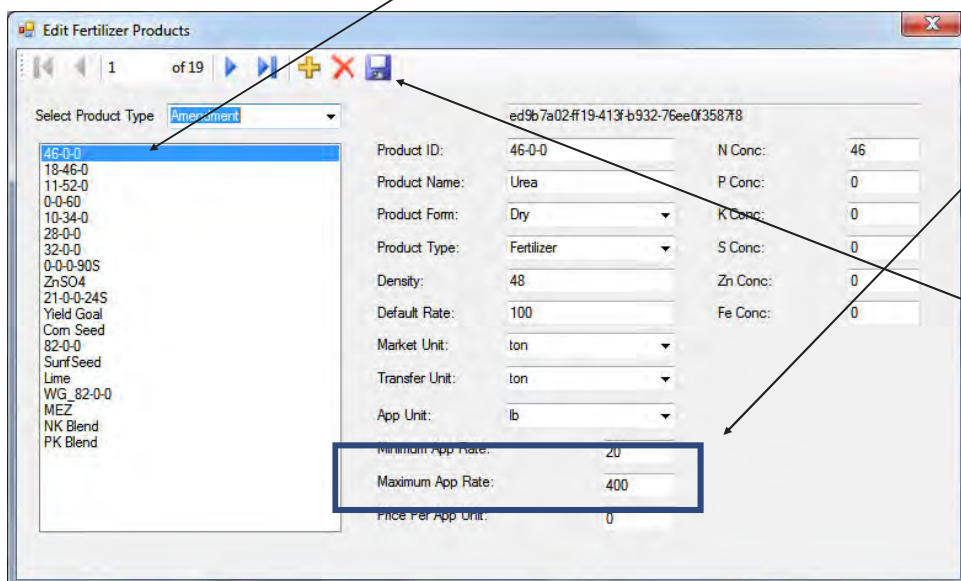
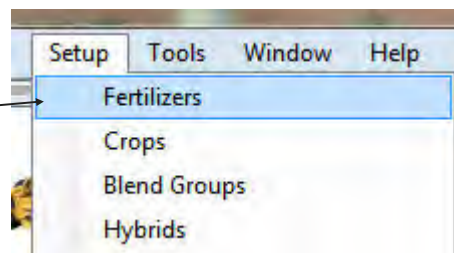
Nutrient Layers

Enforcing Min and Max Rates

There are times when product application maps may need an minimum or maximum rate enforced. This is easily accomplished through the "Merge Zone Results" window when the application maps are created. To utilize this tool there the values have to be assigned in the fertilizer product database.

Setting Up Min & Max Rates

1. Go to Setup > Fertilizers
2. This opens the database where fertilizer products can be added, removed, or edited.
3. On the left select the fertilizer product.



4. After the product is selected enter the Minimum and Maximum App Rate on the bottom of the window. These values will be enforced when the product maps are created.
5. When desired rates are entered "Save Data" before moving on to next product.

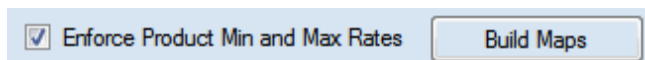


Applying Min & Max Rates

The min and max rates will be applied to maps created by entering results manually or using a blend group to create products.

Entering Results Manually

1. Click "Enter Results Manually" (**Step 2**) and enter the product rates.
2. Before building maps put a check mark in front of "**Enforce Product Min and Max Rates.**"
3. Click "**Build Maps**" the values that were entered in the database will be applied to the product map.



Using a Blend Group

1. Follow the steps on creating nutrient maps from a blend group.
2. **BEFORE** clicking the blend group to create products put a check in front of "**Enforce Product Min and Max Rates.**" If it is selected after the blend group the rates will not be applied to the products and the blend group will have to be reselected.
3. Click "**Build Maps.**"

Product Calculations			
ZoneID	N_46-0-0	P_11-52-0	K_0-0-60
GREEN	231.9	57.7	53.3
YELLOW	276.3	80.8	20
RED	301.8	92.3	20

Minimum App Rate:

Nutrient Layers

Creating Rx Map

Adjusting Rates—using—Map Math (Bottom Tool Bar)

1. Go to **"Load Zone Image"** tab, and turn on the map you would like to use for the application (for example, we will convert N Fert Lb to 46-0-0).

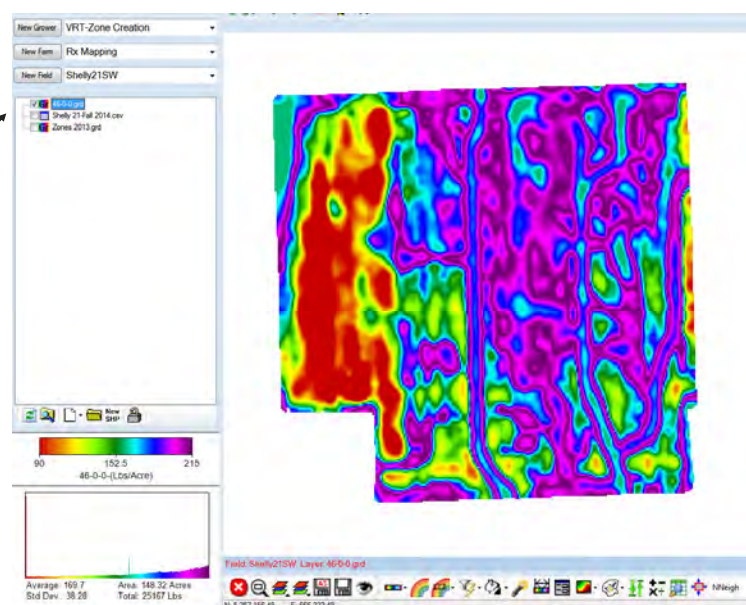
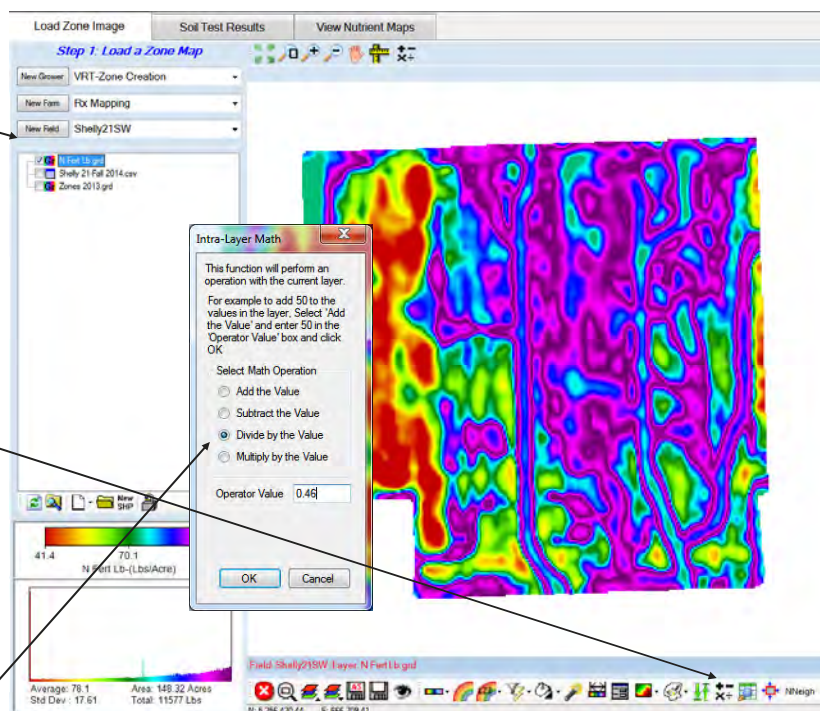
NOTE: Can use "Map Window" or "Merge Zone Results" or "Merge Grid Results"

2. Select the **"Intra-Layer Math"** button. This will run the selected mathematical function over every pixel in the surface.

3. For this math, we will select **"Divide by the Value"** and **"Operator Value 0.46"**, click "OK".

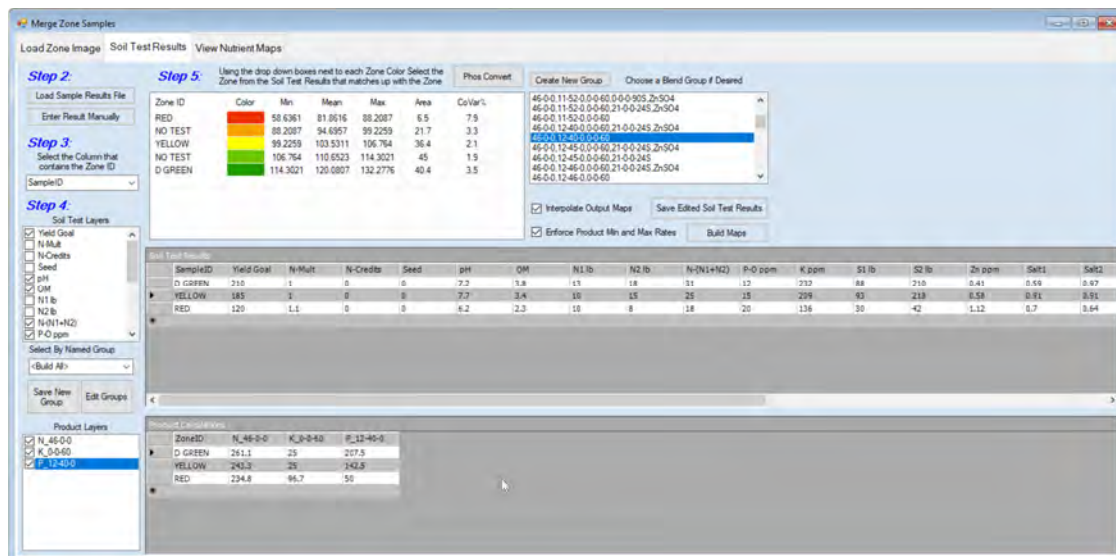
4. The map is now converted to LBS of Urea (46-0-0). Rename or "Save As" to 46-0-0.grd as shown to the right and delete the "N Fert Lb."

5. Confirm the Correct Rates!



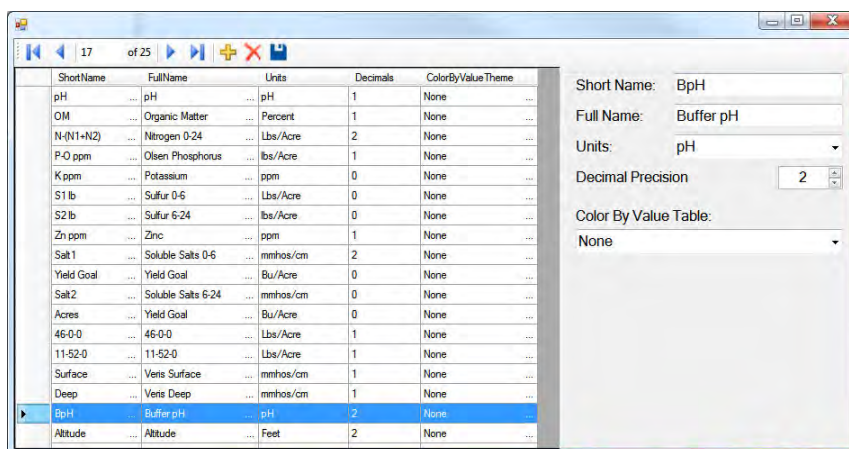
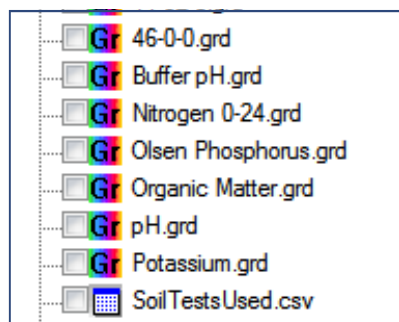
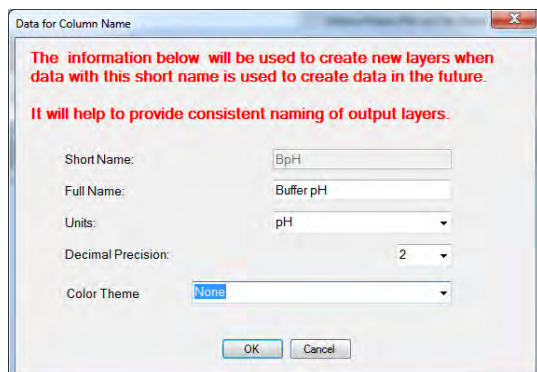
Nutrient Layers

Common Name Mapping Database



Above is a standard Zone Nutrient mapping box.

1. When building a map for a Soil Test Layer or Product the first time, it will ask for information about that column (Fill in all the blanks).
2. This information is stored in a database and used to create the maps from that column from then on. This is the name it will always use.
3. For example a column named BpH in an Agvise Export, if used to create a layer, will create a layer named "Buffer pH" and the units will be set to pH, and set to display 2 decimal points.
4. To Edit the names. Go to the Top Toolbar, Setup, Common Name Mapping.



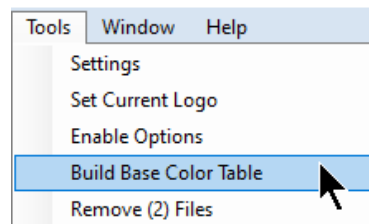
Nutrient Layers

Build Base Color Table

Build Base Color Table– Is a way to set up a custom color table. Example: a custom prescription color table that has meaning for a specific client.

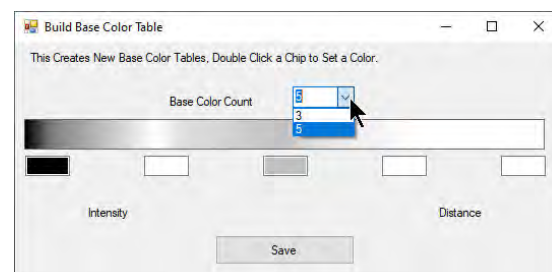
Suggest opening “Map Window”.

1. On the top tool bar left click on the **Tools** tab and go down to “Build Base Color Table”.



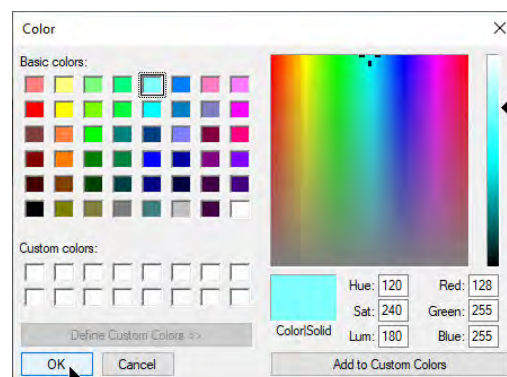
2. The Color Table box will open, Select the number of color chips, 3 or 5.

**NOTE: Left color chip is lowest value & Right color chip is highest value.*



3. Left click twice in the color chip to bring up the color change box to select the new color chip.

4. Select the new color by left clicking on the color chip, or use the slide arrow on the right side, or enter the numbers in the box. When the new color is selected left click on “OK”.

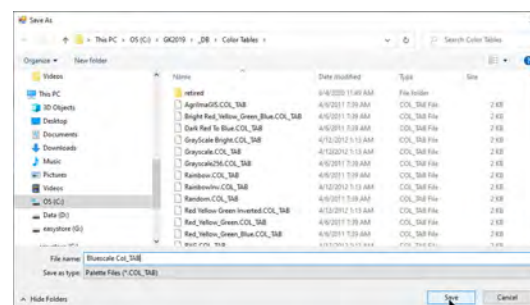


5. When all the color chips have been selected left click on the “Save” button. Enter the name of the new color table and Click “Save”

The new color table can now be used by going into the map window and clicking in the bottom tool bar on the “Change Color Theme” button and selecting the new color them from the pop up menu.



**Note: all created color themes will be 8 bit color tables with 255 colors in the range.*



If trying to recreate a color table from another source, create an image file that can be opened into Microsoft “PAINT”. Once open in paint, we can “look up” the exact VALUE to use in that color chip. Small changes make a big difference!



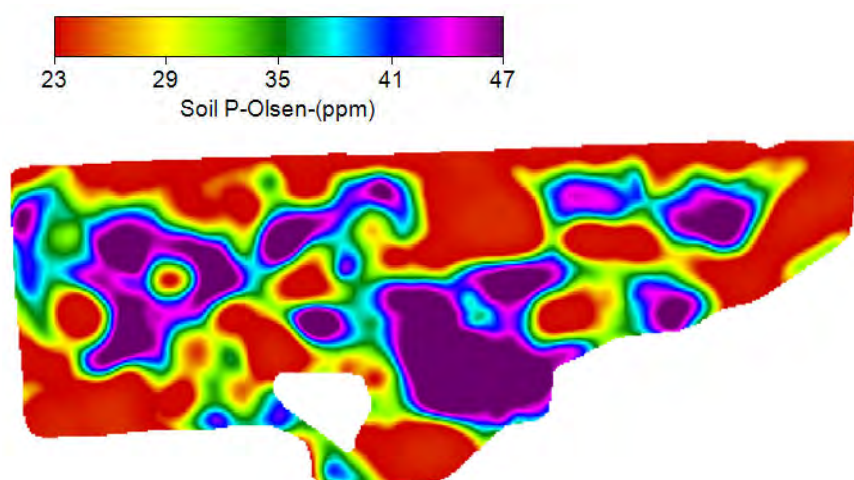
Nutrient Layers



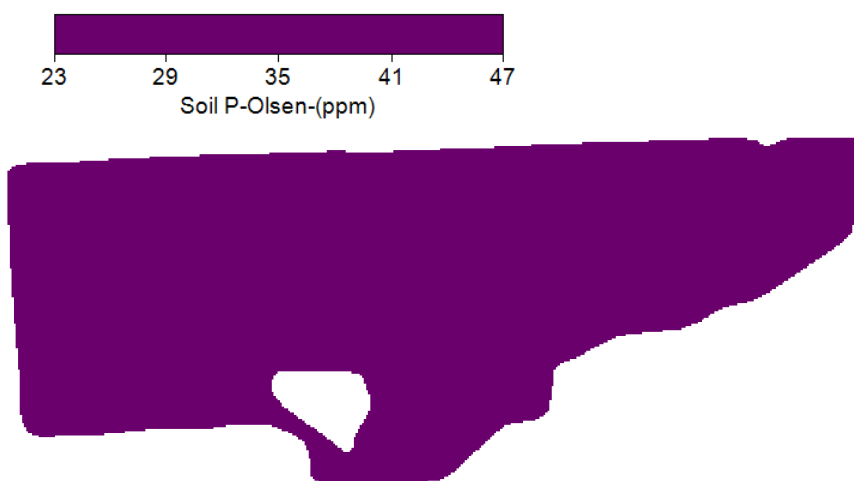
Fixed Color Themes

In ADMS there are some tools that allow raster layers to be colored by certain values or color themes. The benefit of having color themes is that it gives visual consistency when looking at certain types of maps such as nutrient layers. Traditionally when a map gets created a color table gets applied which ranges from the low end color to the high end color despite the values. For example a rainbow color table would always have all the colors no matter what the values are. When dealing with nutrient maps you may want certain colors to always represent certain values. For example red will equal low nutrient levels while purple will equal adequate or excess nutrient levels.

See the phosphorous Olsen map below as an example.



By looking at the map by itself it would appear that a majority of the area is lacking in phosphorous. However, after looking at the color bar it is clear that the Phosphorus values are adequate for this field.



A color theme is applied to this map that tells the software any values 3 or below are bad (red) and 20 and above are good (purple) it is easy to visually see that the Soil P Olsen values are adequate in this field since it is all purple.

Nutrient Layers

Fixed Color Theme

Creating a Fixed Color Themes

Before color themes can be used they first must be created. In order to create color themes to be used in ADMS you'll need a map to use as a template. For the following examples nutrient maps will be used.

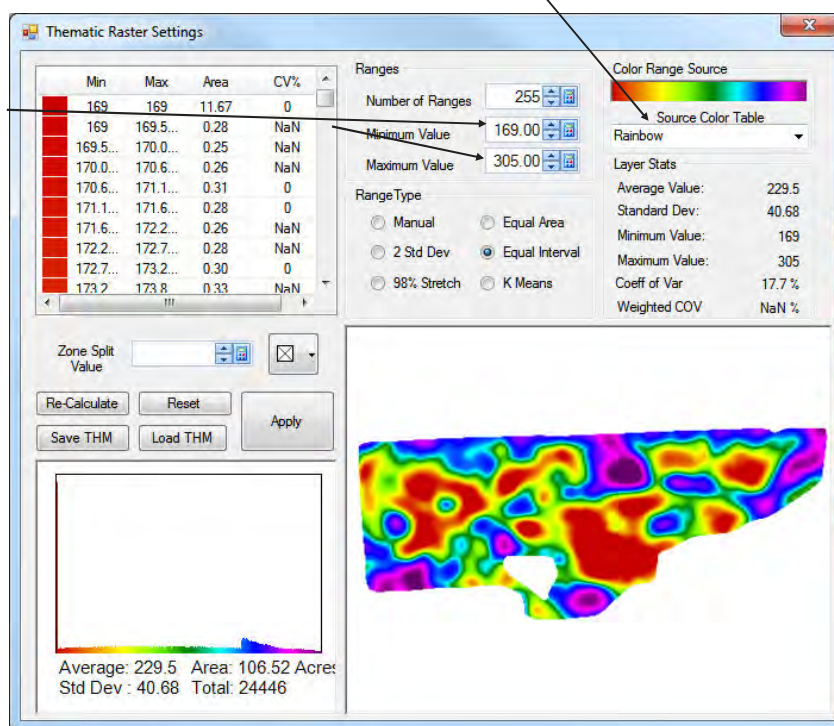
1. Turn on the map that will be used for a template.
2. Open the Thematic Coloring on the bottom toolbar.



3. Once the "Thematic Raster Settings" window is open choose the color table that will be used as the base for the color theme from the "Source Color Table" dropdown menu.

4. Next look at the Minimum and Maximum Values. They will by default be the Min and Max values that exist on the map. To set the range for the color theme these values can be manually adjusted to skew the color table in one direction or another.

This example will use Soil K. We will say that anything 40 ppm or below will be lacking in nutrients and represented by the low end of the color table (Red). Likewise, anything 300 ppm or above will be represented by the high end value of the color table (Purple). Any values between 40-300 ppm will be scaled accordingly.



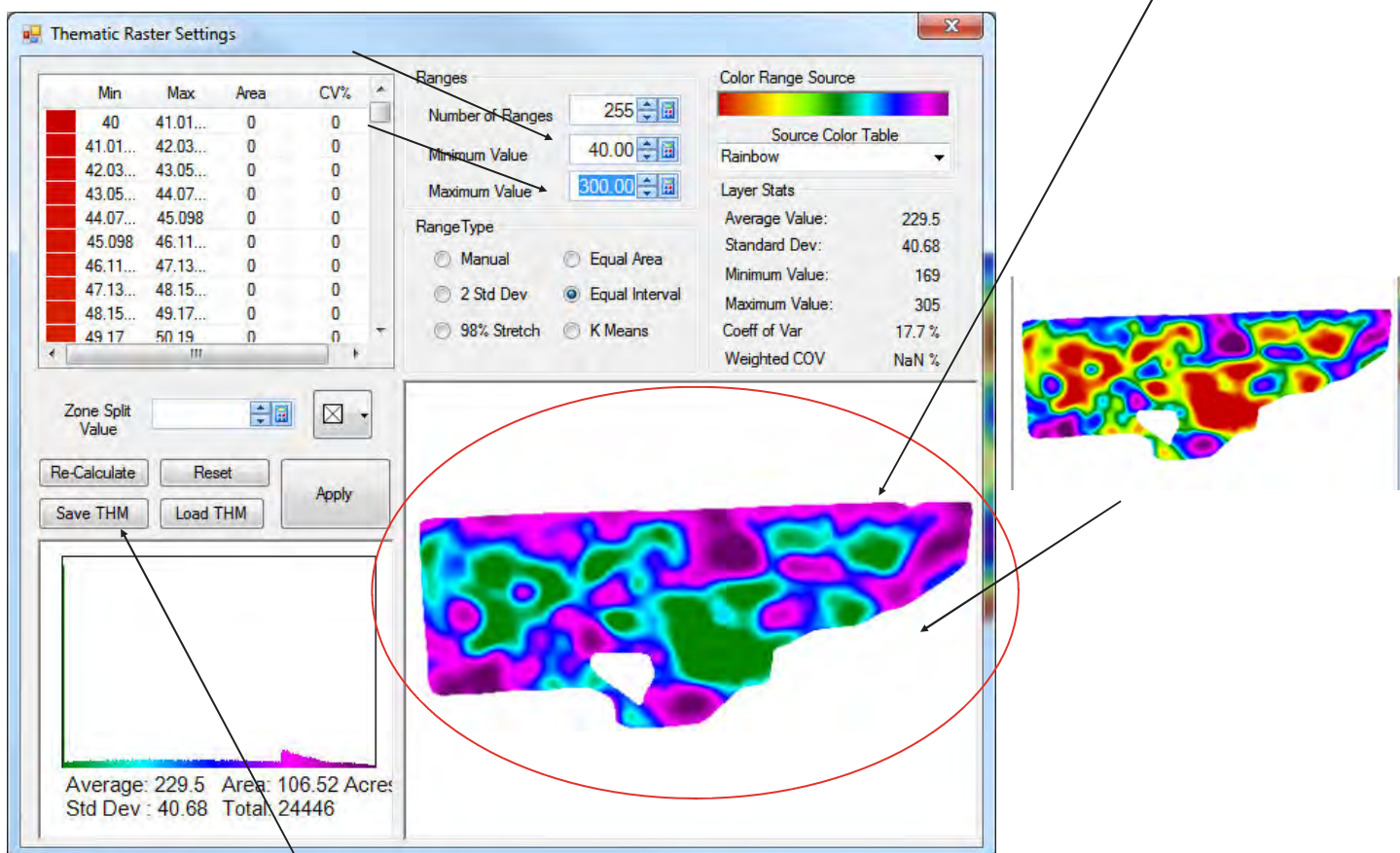
Nutrients	Low Val	High Val
P-Olsen	3	20
P-Bray	3	35
Nitrogen	1	150
Sulfur	5	80
Potassium	40	300
Zinc	0.2	2
pH	5	8
CEC	7	40
OM	1	6

Here are some common value ranges to consider using for different nutrients.

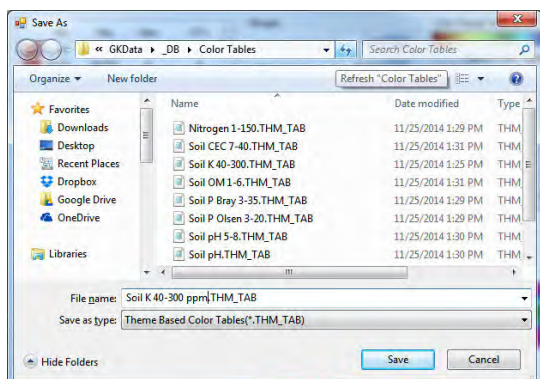
Nutrient Layers

Fixed Color Theme

5. In the area that says "Minimum Value" enter "40" and in the area that says "Maximum Value" enter "300."
6. In the preview window the color adjustments to the map will be visible. Since there is no values below 40 ppm there is no red in the map.



7. After the top and bottom end values are sent properly the theme will need to be saved. Click "Save THM."
8. Give the color table a name. We recommend including the value range used to have it for future reference. This will be stored in the _DB\Color Tables folder.



An example of name would be "Soil K 40-300 ppm." That way if there were multiple Soil K themes it will be easy to distinguish the differences. Since some nutrients may be reported with different units it is also a good idea to include them in the name.

9. Click "Save." Close out of the "Thematic Raster Settings" window. The color theme is now saved and can be applied to other maps. Repeat this process for additional nutrients.

Nutrient Layers

Fixed Color Theme

Applying Color Themes

Color themes can be applied easily two different ways. By using the "Load Fixed Thematic Table" button on the bottom toolbar, or through the common name mapping database when nutrient layers are created.

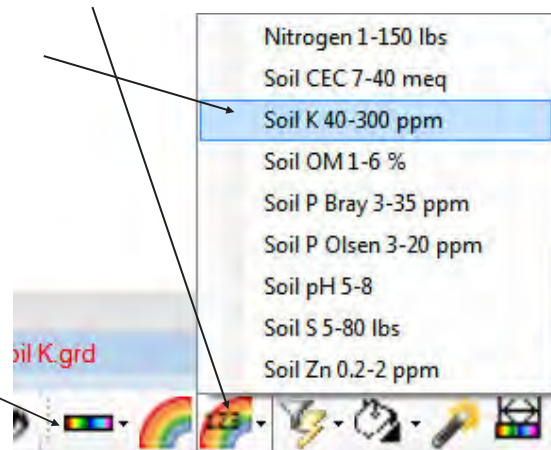
1) Load Fixed Thematic Table—Bottom Toolbar

To load a fixed color theme on any raster the button on the bottom toolbar can be used.

1. Make sure the desired map is the active layer (in red on the bottom of the map window).

Field: Delaware 10 NW106 Layer: Soil K.grd

2. Click the "Load Fixed Thematic Table" button. This will bring up a list of all the color themes that are currently saved.
3. Click on the theme you want applied to the active layer.
4. The theme will be applied.
5. To go back to the original color table use the "Change Color Theme" icon on the bottom toolbar and choose the original color table.



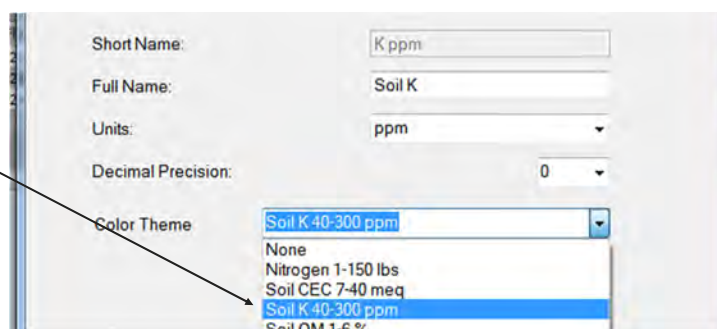
2) Load Fixed Thematic Table—Common Name Mapping Database

Color themes in the "Common Name Mapping" database will only get applied to layers created in the Merge Zone Results or Merge Grid Results windows.

When new layers are created off of a column heading that has not been used before the "Data For Column Name" window will appear. The entries in this window will get applied to the "Common Name Mapping" database and get applied to every layer created from that same column name.

To set a color theme Choose it from the "Color Theme" dropdown menu after all the other information has been entered.

These color themes can be changed in the future by editing the "Common Name Mapping" database.

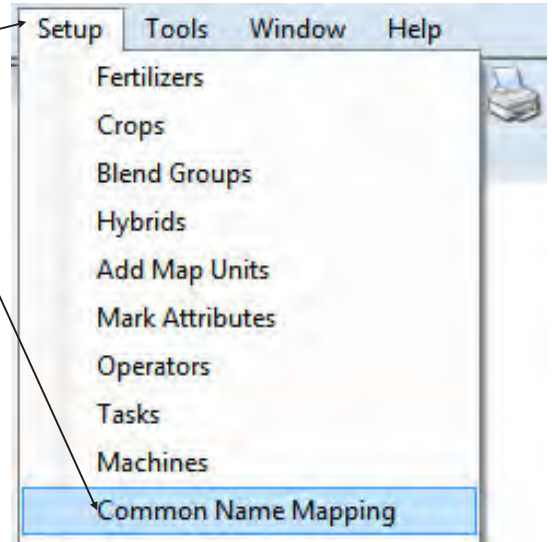


Nutrient Layers

Fixed Color Theme

2) Load Fixed Thematic Table—Editing The Common Name Mapping Database

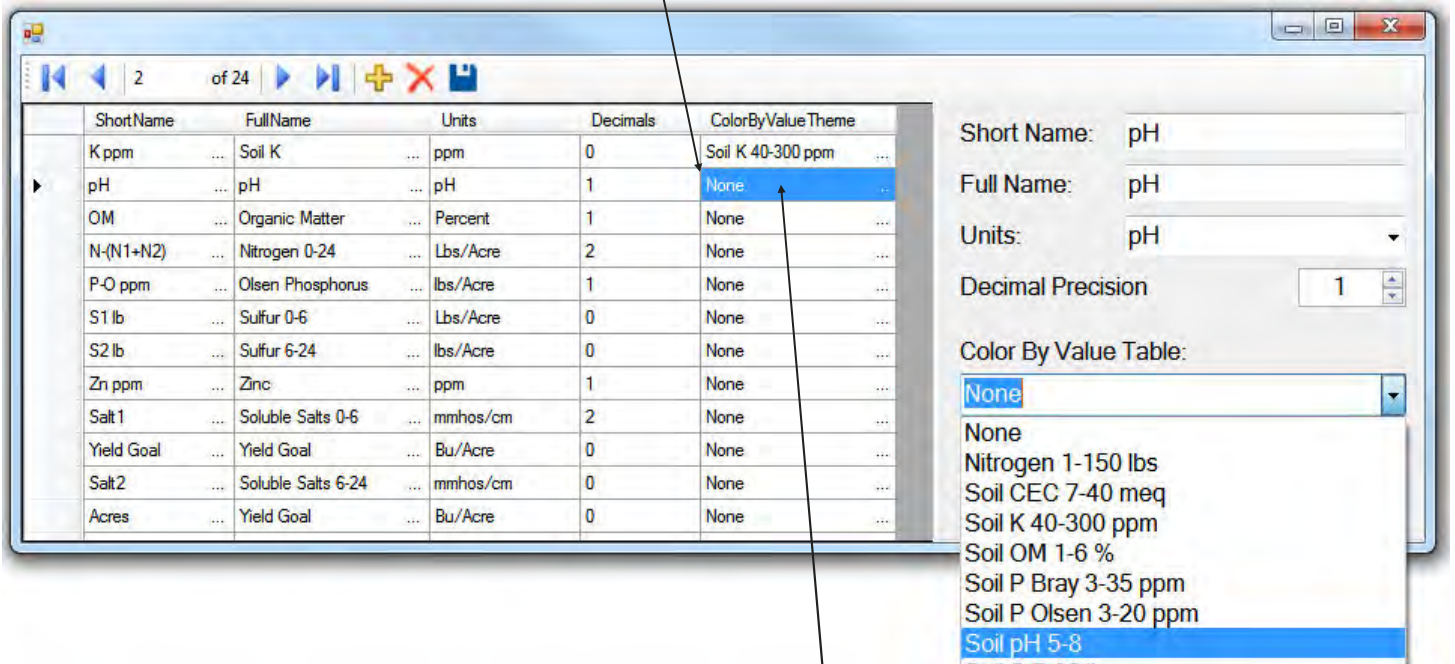
To open up the "Common Name Mapping" database go to Setup > Common Name Mapping at the top of the window.



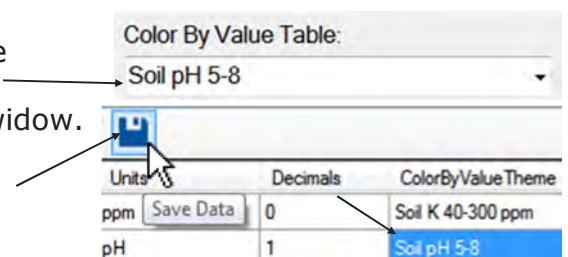
This will open Common Name Mapping.

All previous entries can be edited and have a color theme applied, removed, or changed.

By default all default entries will be set to "None."



1. To change or edit an entry click in the ColorByValueTheme area for the name you wish to be changed. This example will be pH. After clicking on "None" by the pH entry the options or pH layers are populated on the right side of the window.
2. In the "Color By Value Table" dropdown menu choose the desired theme.
3. After the theme is chosen click "Save" at the top of the window.
4. Repeat for additional layers.
5. Exit out of the "Common Name Mapping" database.



Nutrient Layers

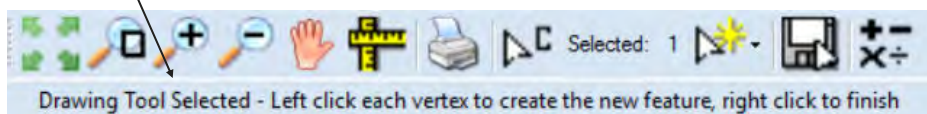
Creating a "Mod Area" or "Check Strip" & Editing Raster Values

1. Turn on the map that is to be modified. (i.e. NH3 or Urea VR map.)
2. Click on "Create New Layer From Template".
3. Select "Mod Area" from the list (You may have fewer options).
4. Now you should have a new shapefile called "Mod Area.shp" appear in your data tree. If you do not, click the "Refresh" button.

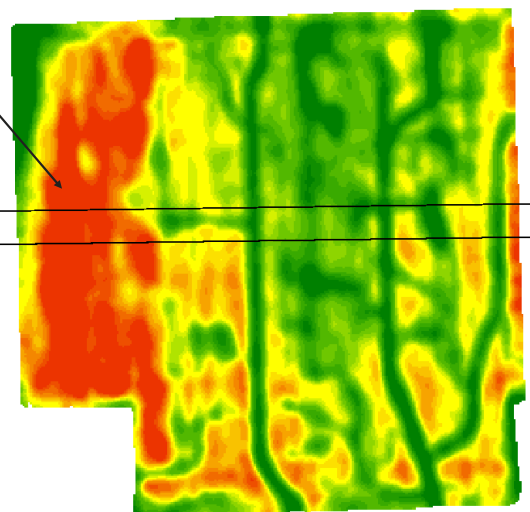
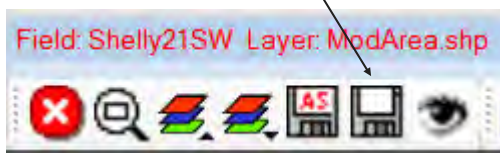


5. Now Check the "Mod Area.shp" to turn it on & make it the Active Layer (**Shown here in RED**).

6. Now click on the **"SHP"** button on the bottom toolbar to start drawing the modification area. (Take note of the instructions at the top of the screen.)



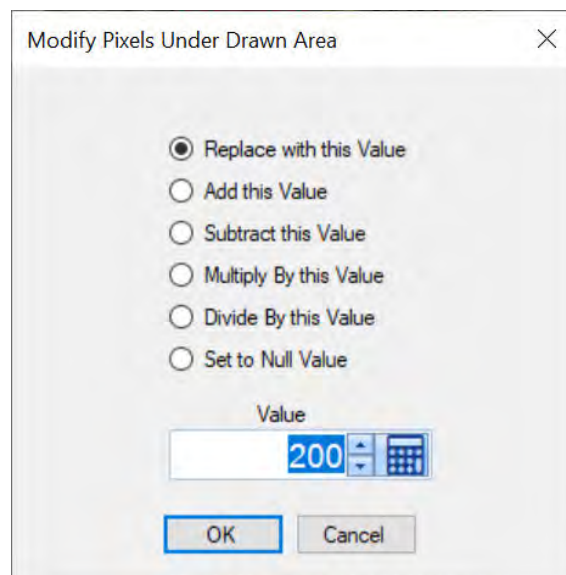
7. Now draw your modified area. (Take note of the Length and Bearing to help with drawing.) To the right is an example of a check strip "Mod Area".
8. Finished Drawing the Mod Area. Go back to step 6 if you want to have more areas in the field. Repeat as needed.
9. Click the "Save Changes" when finished.



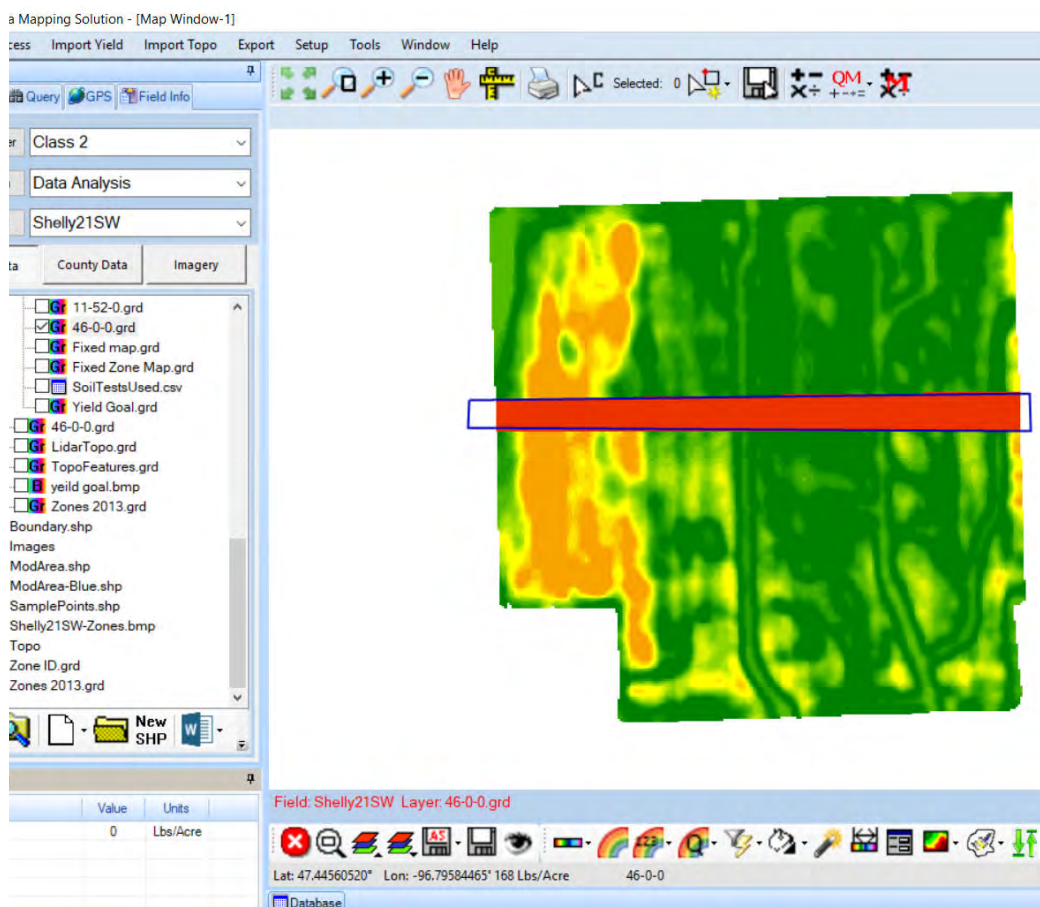
Nutrient Layers

Creating a “Mod Area” or “Check Strip” & Editing Raster Values

1. Make the “ModArea” the active layer
2. Select the “ModArea” objects you want to amend by “Left Clicking” in the object in the MAP WINDOW (*Hold the “Ctrl” key to choose multiple objects*)
3. Turn on your Surface Map to amend (*Ex. 46-0-0.grd*)
4. From the bottom tool bar, click on “Apply Mod to Selected Polygon” 
5. “Modify Pixels Under Drawn Area” Window will open. Now assign a value or add / subtract / multiply / divide the pixels in the ModArea.
6. Click the “Save Changes” when finished (*you may want to do a “Save As” & Re-name if you want to keep the original object*)

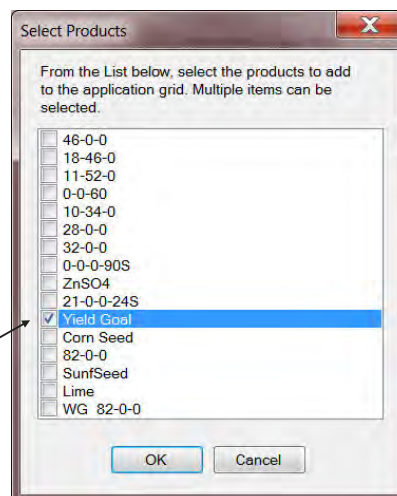
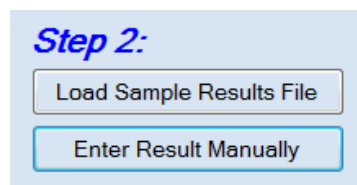


Set to Null Value— Will create a “Hole” of no data under the Mod Area.



Creating a Yield Goal Map

1. Go "Merge Zone Results" Window
2. Turn on "Management Zones" to use to create Yield Goals.
3. Go to "Soil Test Results" tab
4. Step 2: Select "Enter Result Manually"



5. Choose "Yield Goals" & Click "OK"

Step 5: Using the drop down boxes next to each Zone Color Select the Zone from the Soil Test Results that matches up with the Zone

Zone ID	Color	Min	Mean	Max	Area	CoVar%
1	Red	0.733	0.813	0.857	3.9	4.2
2	Orange	0.857	0.916	0.947	22.6	2.6
3	Yellow	0.947	0.978	1.001	46.7	1.5
4	Light Green	1.001	1.027	1.058	49.7	1.6
5	Dark Green	1.058	1.083	1.135	27.0	1.5

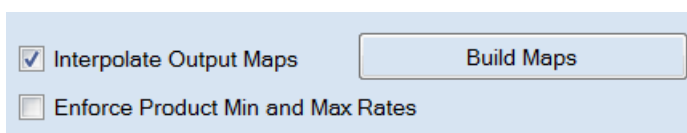
Soil Test Results

Zone_ID	Yield Goal
1	150
2	180
3	190
4	200
5	220

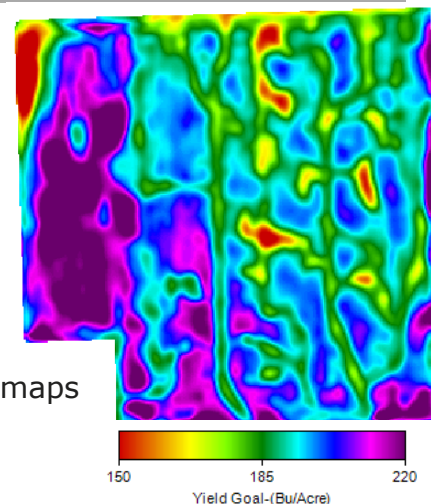
6. Assign yield values to each of the zones.

7. Type in the yield value in the Yield Goal column under "Soil Test Results" to correspond with the correct Zone ID and color.

8. Select "Interpolate Output Maps" then the "Build Maps" button



9. Go to the "View Nutrients Maps" tab to see your Yield Goals.grd maps



Quick Notes For Grid Sampling

1. Setting Up a Grid



1. Go to "Map Window" or "Log and Sample"
2. Select the field from desired grower, farm, and field.
3. Turn on field boundary and any desired background map (County NAIP)
4. Go to GPS mark in the top right hand corner of Layer Selection
5. Select Grid
6. Select your field boundary from the "Bound the Grid to this Layer" dropdown.
7. Select the desired X and Y dimensions of the field grids. Click **"Apply"**
8. Check on the show grid box
9. Align the grid over the field using the up, down, side, to side arrows

☐ Show Grid

10. Rotate the grid if needed by typing in a number or using the arrows in the rotate grid box



11. Check Save Grid & Save Points

12. Click Save Layers and select the location to save them to and the desired name

0.0

13. By default the grid and grid points will be stored under your field data folder for the field you are working

Save Layers

- ☒ Save Points
☒ Save Grid

2. Merging Soil Test Results



1. Go to Merge Grid Results section on main screen, or go to the top and select process => Merge Grid Results
2. Locate the field from the grower, farm, field and select the sample points and the boundary of the field
3. Go to the Soil Test Results tab on the top middle of the screen.
4. **Step 2:** Click load sample results file button and search for your *.xls or *.csv file containing test results
5. **Step 3:** Assign the appropriate columns for the Sample ID on your Samples and Sample ID on the test results
6. **Step 4:** Check which layers you want to build maps for, columns containing any null values will not work (can replace these with zero values so they will merge)
7. Click Merge Tables, the test results should merge with the grid Sample ID file
8. You can now choose to build your maps with Surfer Kriging or Inverse Distance which is default (Kriging smooths the maps out and requires demo of Surfer 8 installed on your PC)
9. Click the Build Maps button
10. Click on the View Nutrient Maps tab to preview the created nutrient maps
11. Your nutrient maps will be automatically stored under a Grid Sample Folder under "Field Data" with the year of the growing season (set in settings/user interface 2) in front of it.

Soil Test Results

Merge Tables

Build Maps

3. Writing a Prescription Using Scripting

1. Go to "Field Data", check on all of the layers you will be using in the script. Click on the "Map Math" button on the top toolbar.
2. Open the desired script you want to use
3. Assign all the selected nutrient layers in the scripting window => Compile Script => Run Script
4. Click the output layers and "Save As." => Rename as the created product. => Repeat Steps for all products.



Grid Sampling—Setting Up A Grid

In this section, we will discuss grid sampling. We will explain how to lay out your grid, take the samples, create nutrient maps, set yield goals, and combine them all to create your prescription.

Creating a Boundary

- Refer to the section in the book—**Drawing Layers (Shapefiles—Vector Data—Polygons, Lines & Points)**
- You can create a boundary with GPS in field (recommended), hand draw it, or from a CLU FSA file

Setting Up a Grid

- You can do this in the “Log and Sample”

Window or “Map Window.”

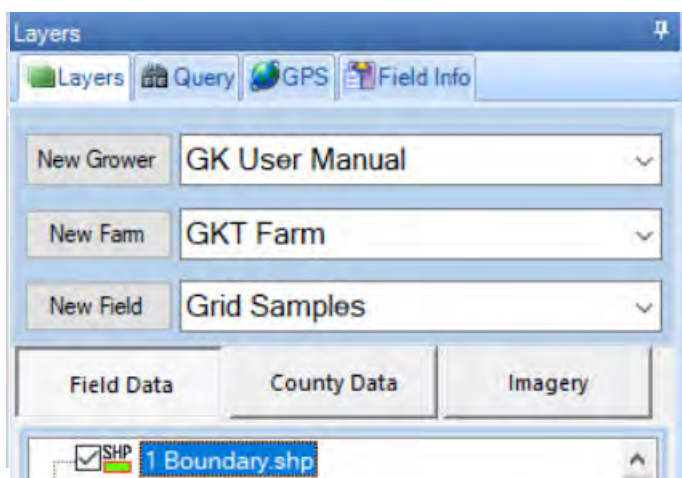
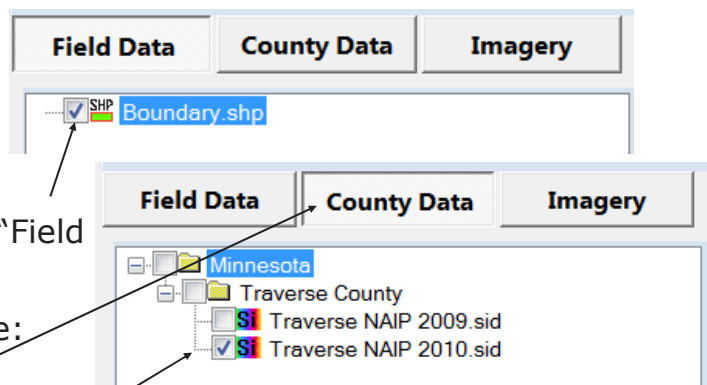
1. Check the boundary of the field under “Field Data”

2. If you wish to have a background image:

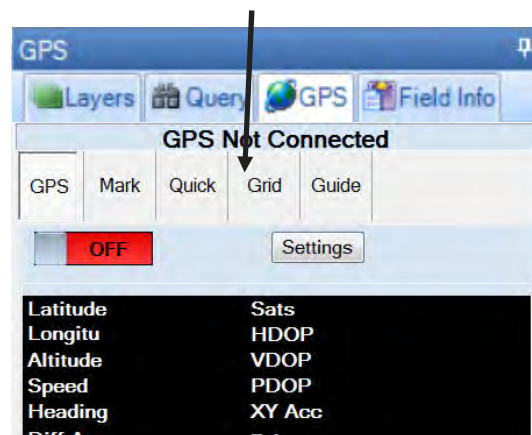
- Go to your “County Data” tab
- Check a NAIP Image for the county you are working in

***If the boundary is selected first, it will zoom to the field**

3. Once you have the boundary and background images both selected, go to the “GPS Mark” button on the top right of the layer selection options.



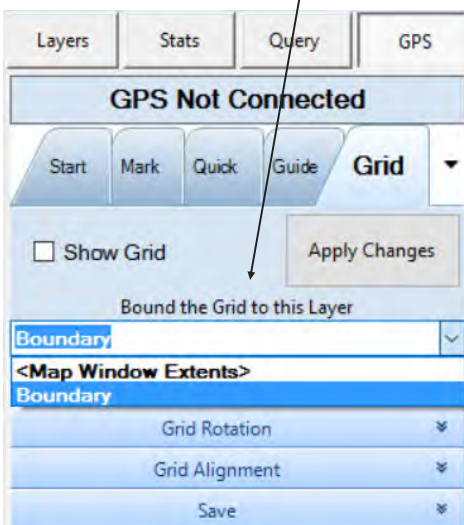
4. Next, select the “Grid” button



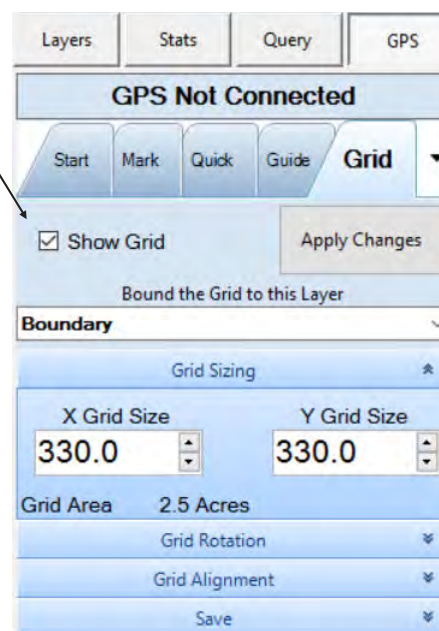
Grid Sampling—Setting Up A Grid

5. From the drop down menu select your boundary which was turned on. Click "Apply"

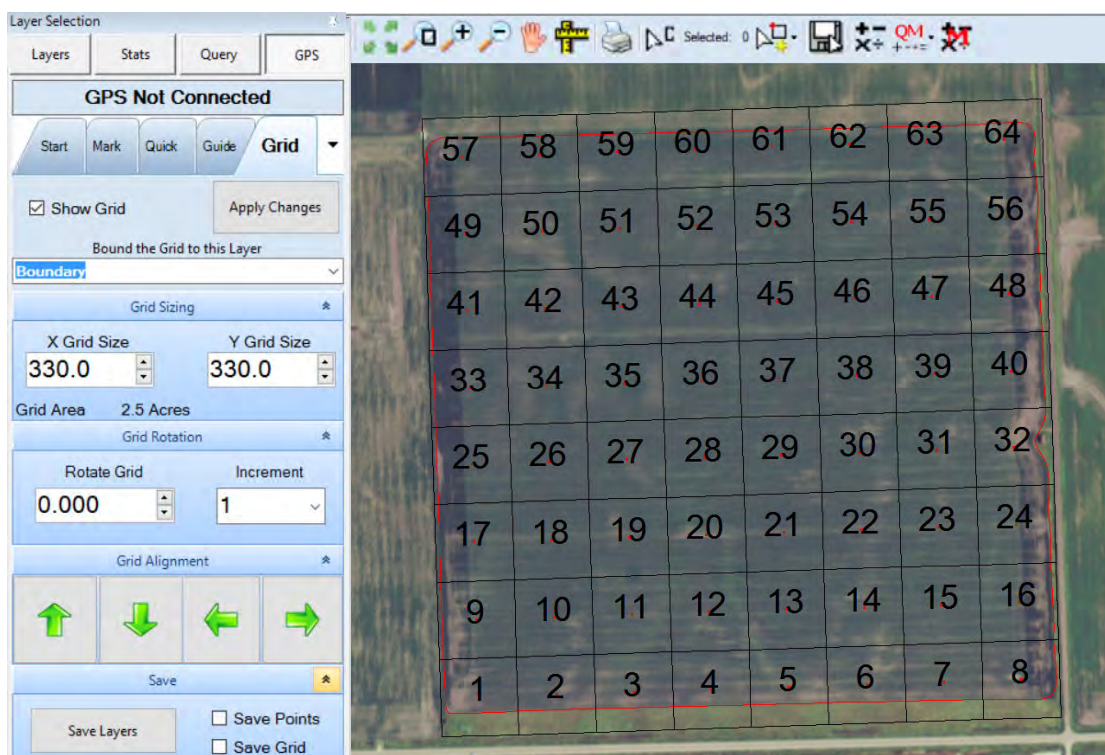
Apply



6. Check the "Show Grid" Box



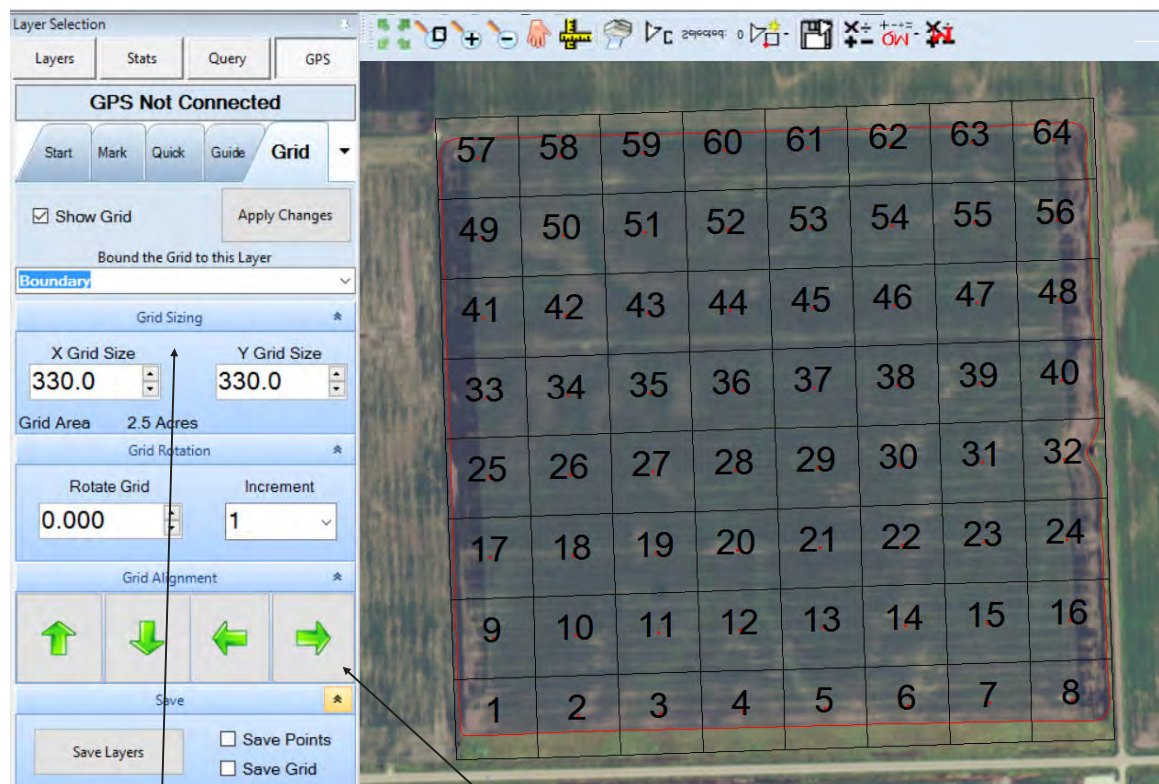
Your screen should now look similar to the image below. The grid size will be defaulted to 330 X 330. From here you can adjust grid alignment, rotation, size, and save your grid and points.



Grid Sampling—Setting Up A Grid

Adjusting Grid

Using the options below, you can adjust the alignment size, and rotation of the grid.



Adjusting Size

- You can adjust the size of your grid by inputting your desired X and Y lengths in the boxes. This can be done by using your keyboard, or using the number pad that appears when you click on the "1 2 3."

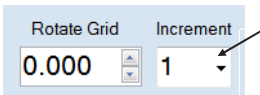


Common Grid Sizes

1 Acres	208.7 X 208.7
2.5 Acres	330 X 330
4.5 Acres	442.7 X 442.7
5 Acres	466.7 X 466.7

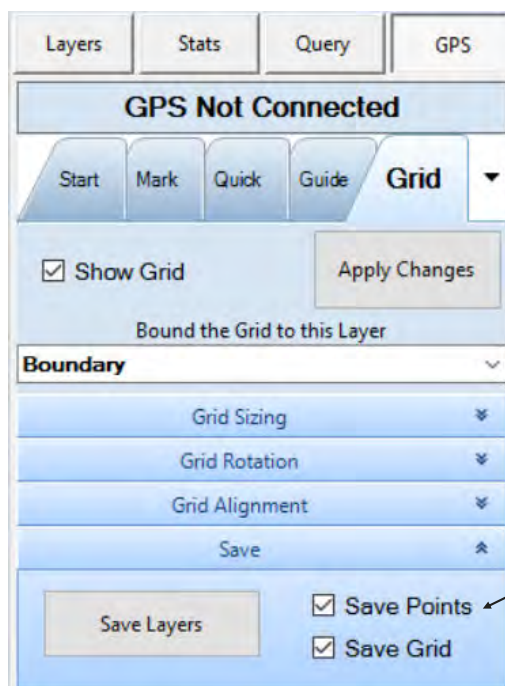
Adjusting Rotation and Alignment

- The alignment (Up & Down, Side To Side) can be adjusted by using the arrows until you are satisfied with the alignment of the grid.
- The grid can also be rotated. To do this, you can use the up & down arrows on the "Rotate Grid" box or you can enter a value with your keyboard.



Increment—Allows for smaller movements of the grid rotation as 1, 0.1, or 0.01

Grid Sampling—Setting Up A Grid

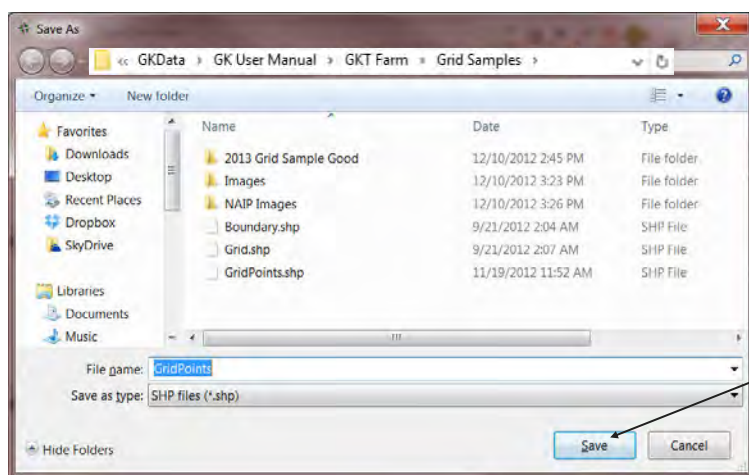
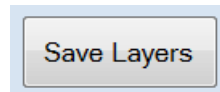


Saving Your Grid

- When the grid is in the ideal position
- Click "Save Layers"

Save the Points & Grids

1. Check "Save Points" & "Save Grid"
2. Once they are checked on, click "Save Layers."

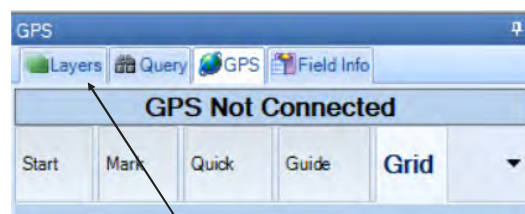
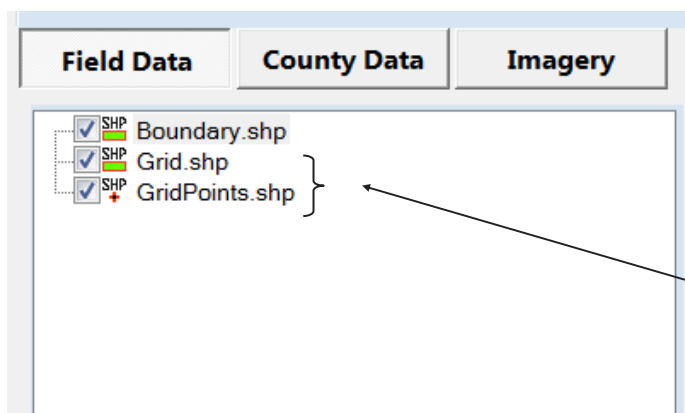
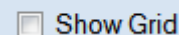


3. Choose the location of where you want to save the layers and their names

**It will be defaulted to your "Field Data" for that field and saved as Grid & GridPoints*

4. Click "Save."

5. Uncheck "Show Grid."



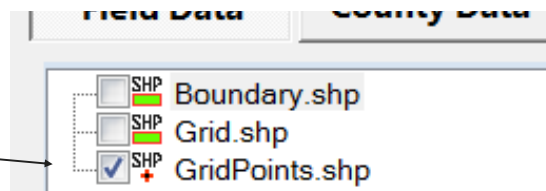
- Go back to the "Layers" tab
- Grid Points & Grid Polygons should now be located under your "Field Data" tab.

Grid Sampling—Labeling The Grid

Labeling Grid Points

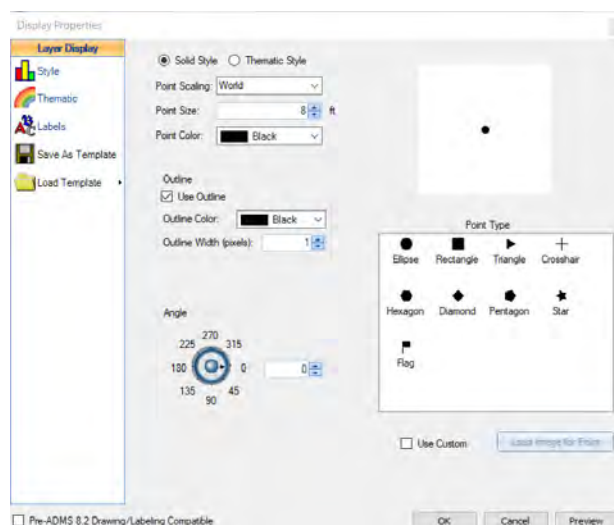
- You can now choose which label your grid points have when you are out in the field sampling.

1. Check "GridPoints.shp"
2. Select the "Layer Display Properties" option below the map window



**Note: make sure your grid points is your active layer*

3. The Layer Display Properties box will come up
4. Select Scaling, Point Size and Point Color
 - ⇒ Fixed Sizing—Always equals that pixel size
 - ⇒ World Sizing—Size changes when you zoom in and out
5. You can also select: —**Point type**—
6. Click "Apply"



Changing Label Style

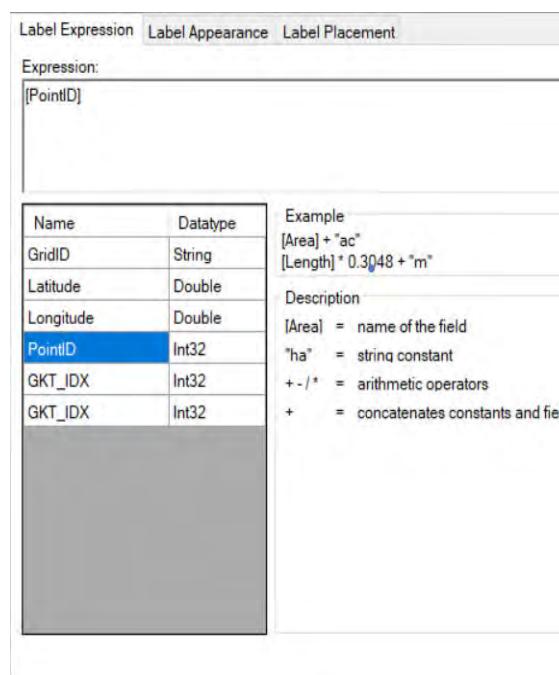
You can also change the size and color you wish the labels to appear

1. Make sure your active layer is the grid points.

Field: Field 1 Layer: Grid Points.shp

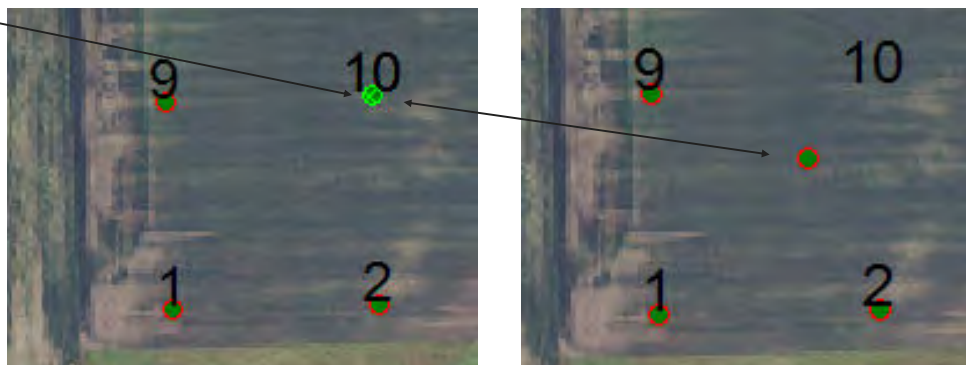
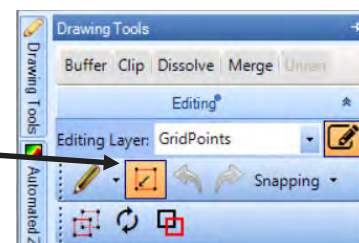
2. Select "Layer Display Properties" on the bottom toolbar
3. Label Expression tab, select column to display
4. Label Appearance Tab size and color for label
5. Label Placement Tab for location of label in relation to point.

⇒ Refer to "Layer Display Properties" section of manual for full description

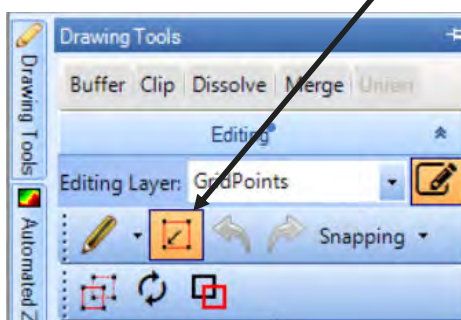


Grid Sampling—Moving Grid Points

1. Open the "Drawing Tools" tab, Select the Layer to be edited
2. Click on "Edit Vertices".
3. Hover over the point. The cursor should change to a four directional arrow.
4. Click, Hold & Drag on the point you wish to move and drag it to the new desired location and release.



5. When done, make sure you **de-select** by clicking on the "Edit Vertices" tool.



6. If the point is in the desired location, make sure you save the layer.

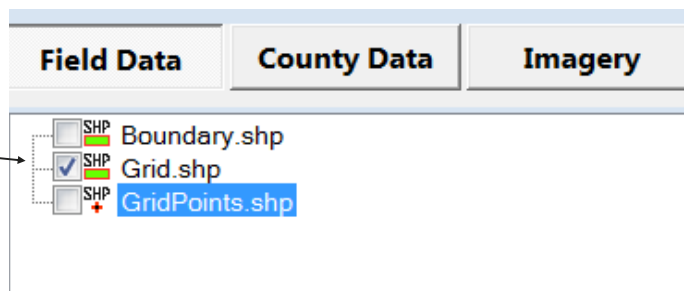


Grid Sampling—Creating Custom Grid Points

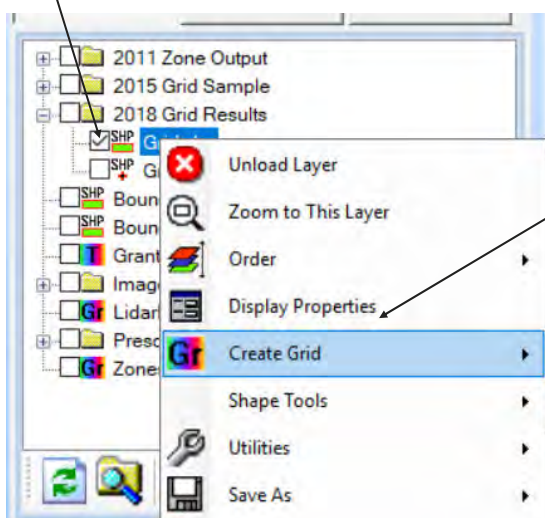
Creating a Custom Grid

If you have followed the previous steps, you will have a grid polygon file that shows the grid squares. This is the file we will be using for this portion of creating a custom grid. If you have not done this, go back and follow the instructions on how to create the grid polygon file.

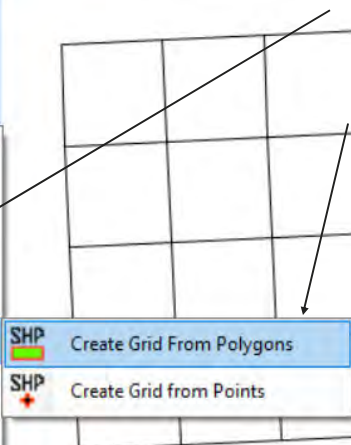
1. Check the grid polygon shape file under "Field Data."



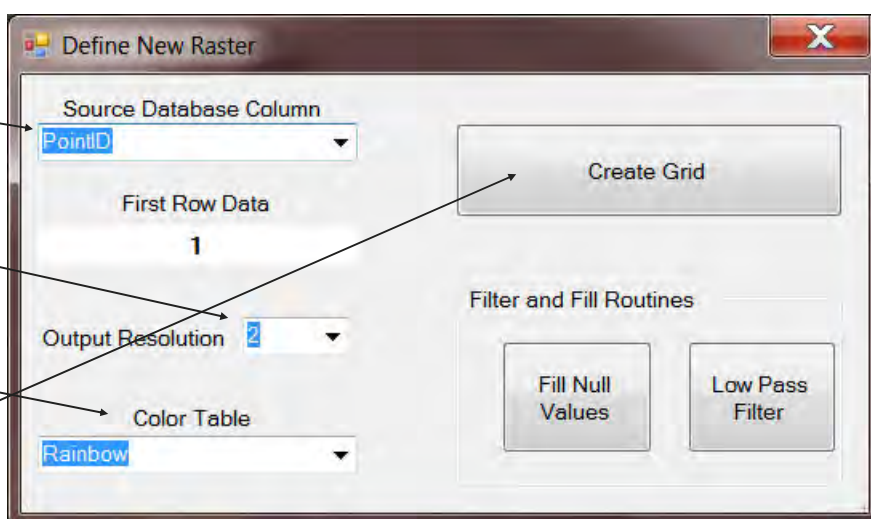
2. Right Click on the File



3. Go to "Create Grid"
4. Select "Create Grid From Polygons"



5. Select PointID in the "Source Database Column"
6. Select the output resolution
7. "2" Meters (recommended)
8. Choose a "Color Table". (Example—Rainbow)
9. Click the "Create Grid" Button



Grid Sampling—Creating Custom Grid Points

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name:

Full Name:

Units:

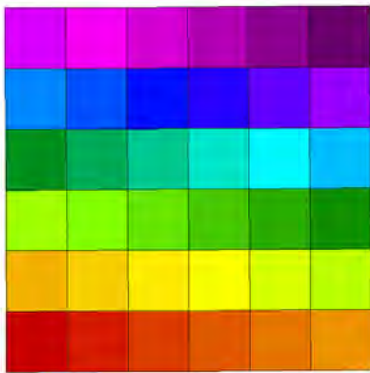
Decimal Precision:

Color Theme:

Common Name Mapping

- ⇒ If you have not done this before, a window will appear and ask you what you want to call your new layer.
- ⇒ **DO NOT** name it according to the field.
- ⇒ This name will be used every time you create a grid from polygons and use PointID as your source column
- ⇒ Make sure you fill in all the information or you will get an error

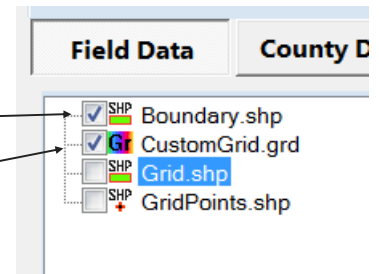
- Your grids should now be colored and look similar to this



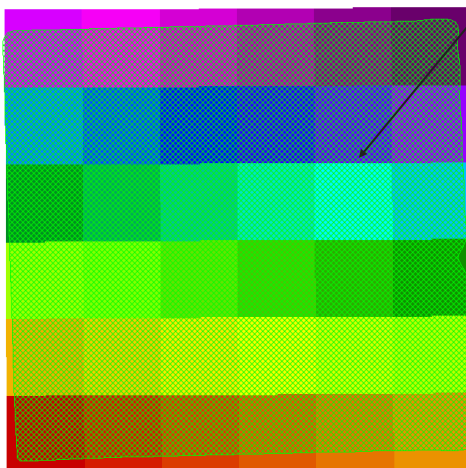
Cropping to Field Boundary

To make sure your points will be within the field, crop this layer to your field boundary.

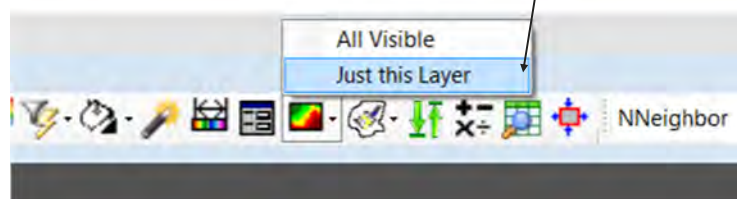
1. Click "Clear Map" 
2. Check the boundary under "Field Data"
3. Check CustomGrid.grd file



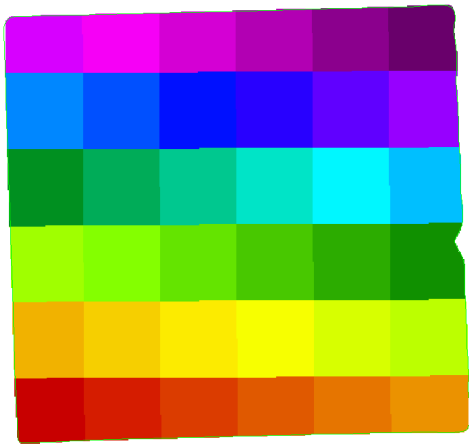
4. Make the boundary your **active layer** Field: Field 3 Layer: Boundary.shp
5. Click inside the boundary in the Map Window so it is selected (it will have green hatching on it)



6. Make your colored grids (*.grd file) your **active layer**
7. On the bottom toolbar, select "Crop Raster to Selected Polygon" Click on "Just this Layer" 

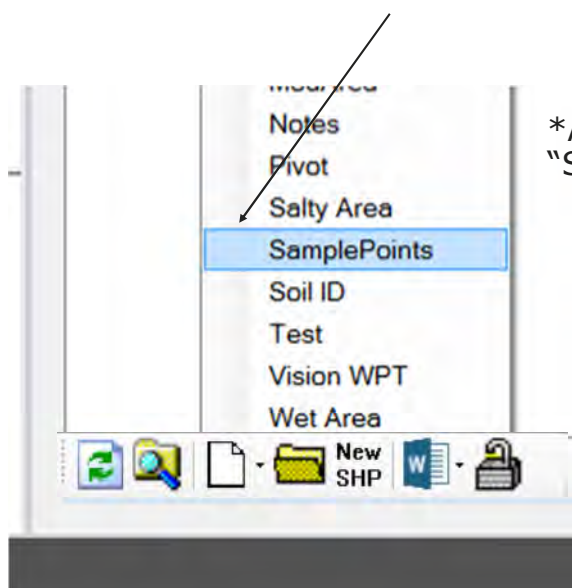


Grid Sampling—Creating Custom Grid Points

8. Click "Save" on the bottom toolbar 
9. Your image should now be cropped to the field boundary 

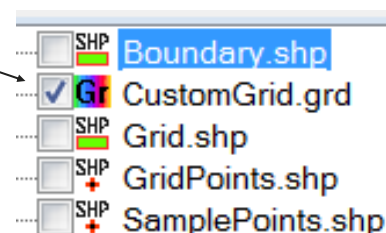
Creating Your Sample Points

1. Click "Clear Map" 
2. Under "Templates"  on the bottom of layer selection, choose "Sample Points"

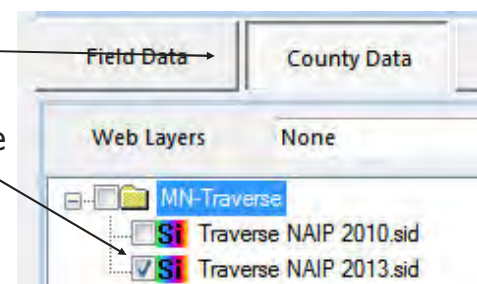


*A new Point Shape File will be created labeled "SamplePoints"

3. Make your colored grid image (*.grd file) your **active layer**.



4. Go to the "County Data" button and check on a NAIP image that represents the field you are working on. This will allow you to have a visual image when you are deciding where to drop the new points.



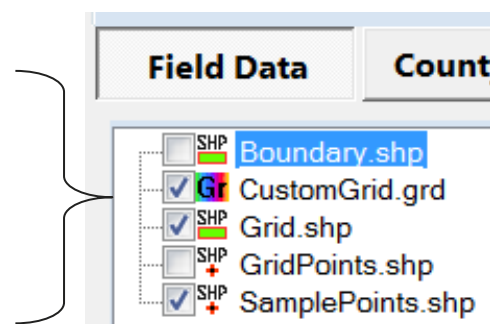
5. Go back to the "Field Data" button.

6. Check on the Grid.shp file

7. Check on the SamplePoints.shp file

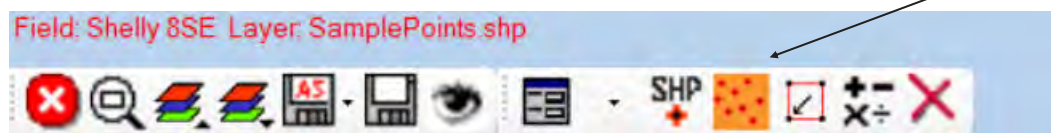
(nothing will appear when SamplePoints.shp is checked on)

This allows you to make a custom grid while remaining in the selected grid size



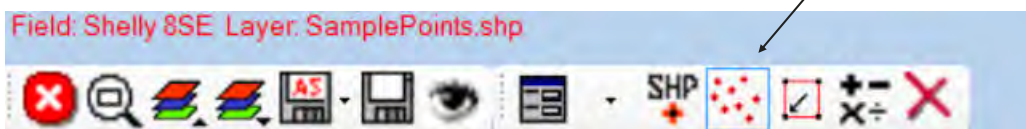
Grid Sampling—Creating Custom Grid Points

8. With "SamplePoints.shp" as your new active layer, select the "Multi Point Draw Tool" on the bottom toolbar below your map window.



9. Click in the grids in the order in which you would like them sampled. (Start at the first one and go to the last one)

10. When you are finished, de-select the "Multi Point Draw Tool". Your new points will automatically save.



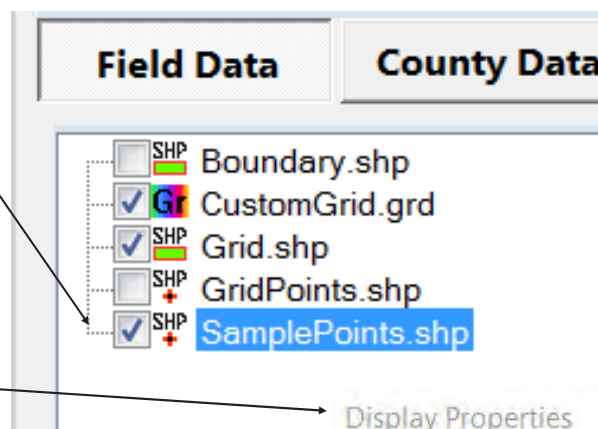
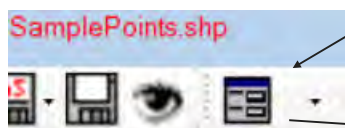
11. You now should have your custom points that look similar to the image below.



Grid Sampling—Creating Custom Grid Points

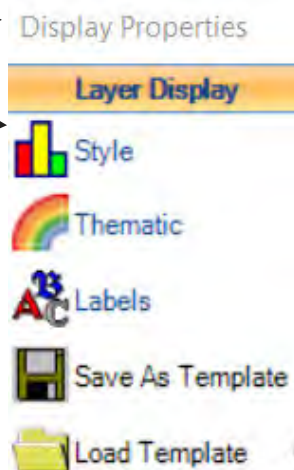
Sizing & Labeling Sample Points

1. Select the sample points file under "Field Data"
2. On the bottom toolbar below the map window, select "Display Properties" Button



Layer Display

1. Go to "Style" button
2. Select your Line or Point Color and Fill color
3. Choose the size of the points
 - Fixed Sizing—Stays the same size (3 pixels recommended)
 - World sizing changes when you zoom in and out (15 to 30 feet recommended)

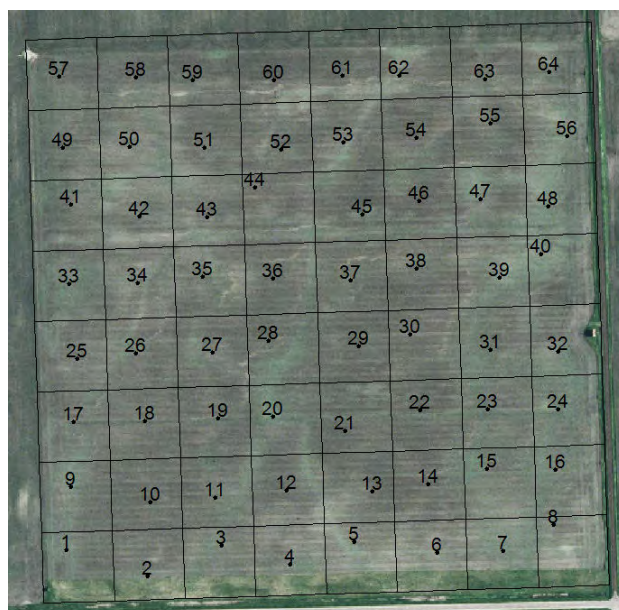


4. Click "**Preview**"
5. Go to "Labels" button
 - a. Label Expression Tab – Select "GKT_IDX" from list
 - b. Label Appearance Tab - Set Pixel Scale to 12 pt
 - c. Label Placement Tab - TopCenter



6. Click "**Preview**"
7. If Good—Suggest "Save as Template"
8. Click "**OK**"

- **In the Future—Use the "Template Button" on bottom toolbar.**
- **You will now have a custom grid to go sample with.**
- **See "Using GPS Controls" for in-field GPS use.**

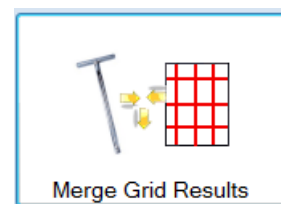


Grid Sampling—Creating Nutrient Layers

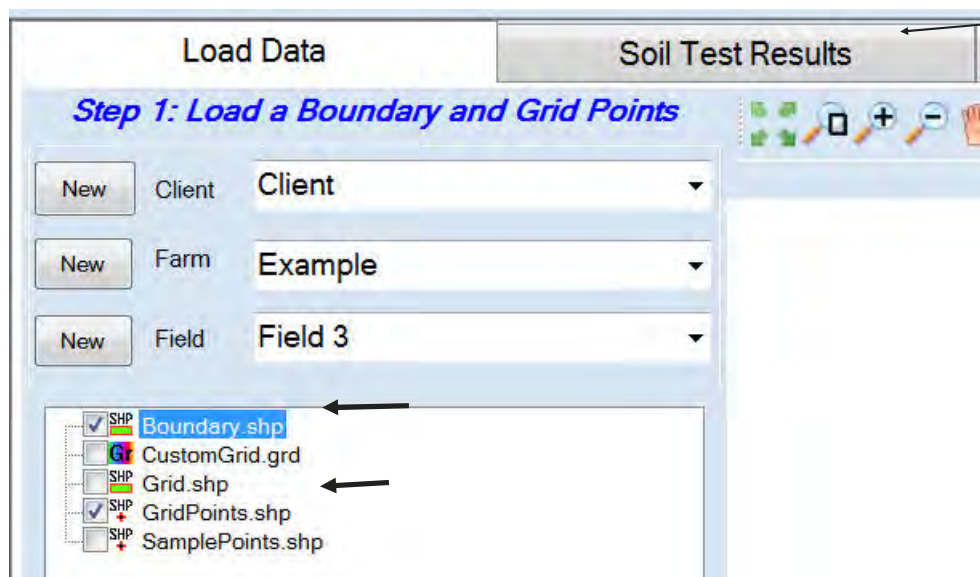
Creating Nutrient Layers

Once you get your soil test results back from the lab, you can now use them to create nutrient maps of the field.

- *This is going to be done in the "Merge Grid Results" window.*



1. Once you are inside the "Merge Grid Results" window, select the appropriate "Grower" "Farm" "Field"
2. Select the grid points and boundary files that are associated with the field



3. When the Grid Points are your active layer, switch to the Soil Test Results tab on the top of the screen.

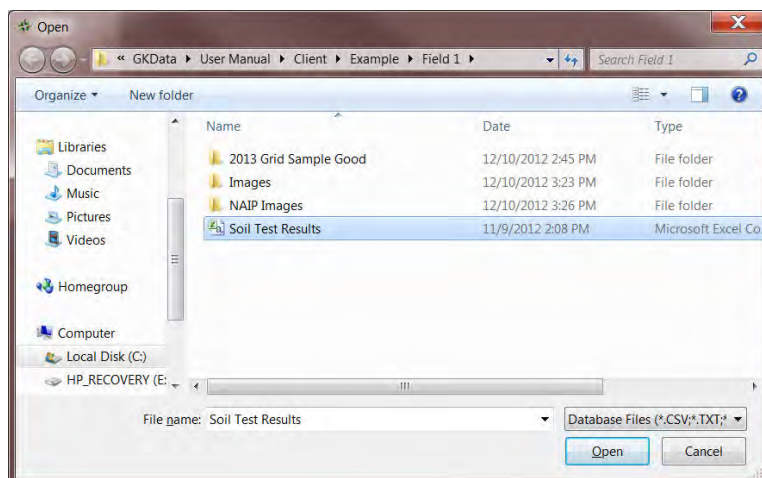
4. Click the "Load Sample Results File" button

Step 2:

Load Sample Results File

This is where you will choose your soil test results file.

ADMS can accept soil test data in several formats CSV / DBF / MDB / TXT / XLS / XLSX



Grid Sampling—Creating Nutrient Layers

5. **Step 3:** Assign Sample Point Grid ID

(Select Column ID that corresponds to the Field—sample points numbers)

6. **Step 3:** Select Soil Test Grid ID

(Select Column ID on the Soil Test that matches - sample point numbers)

Make sure that the sample results file has the EXACT same numbering system as the points.

You can temporarily change or delete any value or row in the soil test results they will not be changed on the original file.

A column with any null values (blank cells) cannot be merged or mapped.

If a value in the sample results is null value (blank cells) they can be changed to 0 to merge correctly.

Step 2:

Load Sample Results File

Step 3:

Select Sample Point Grid ID

PointID

Select Soil Test Grid ID

Sample ID

Step 4:

Soil Test Layers

- ☐ Ref No
- ☐ GrowerID(25)
- ☐ Fld ID(1st 8)
- ☐ Sample ID
- ☐ County
- ☐ Twp
- ☐ Qtr(11)
- ☐ Sect No
- ☐ Acres
- ☐ pH
- ☐ BpH
- ☐ OM
- ☐ N1 lb
- ☐ N2 lb
- ☐ N3 lb
- ☐ N1/N2/N3

Grid Sample Points

GridID	Latitude	Longitude	PointID	GKT_IDX
1-1	45.716419	-96.45787	1	1
2-1	45.716419	-96.45658	2	2
3-1	45.716419	-96.45528	3	3
4-1	45.716419	-96.45398	4	4
5-1	45.716419	-96.45269	5	5
6-1	45.716419	-96.45139	6	6
7-1	45.716419	-96.45009	7	7
8-1	45.716419	-96.44879	8	8
1-2	45.717323	-96.45787	9	9
2-2	45.717323	-96.45658	10	10
3-2	45.717323	-96.45528	11	11
4-2	45.717323	-96.45398	12	12
5-2	45.717323	-96.45269	13	13
6-2	45.717323	-96.45139	14	14
7-2	45.717323	-96.45009	15	15
8-2	45.717323	-96.44879	16	16

Soil Test Results

Ref No	GrowerID(	Fld ID(1st	Sample ID	County
6564901	Example	Field 1	1	MN
6564902	Example	Field 2	2	MN
6564903	Example	Field 3	3	MN
6564904	Example	Field 4	4	MN
6564905	Example	Field 5	5	MN
6564906	Example	Field 6	6	MN
6564907	Example	Field 7	7	MN

Loading Equations Directly From MS Excel

- You can bring equations directly in from Excel if from recommendations already on the spreadsheets

Step 4:

Use With Pre-Merged File

Soil Test Layers

- ☐ Sample ID
- ☐ Sect No
- ☐ Acres
- ☒ pH
- ☒ BpH
- ☒ OM
- ☒ P-O ppm
- ☒ K ppm
- ☒ Ca ppm
- ☒ Mg ppm
- ☒ S1 lb
- ☒ Zn ppm
- ☒ Salt 1
- ☒ CEC meq
- ☐ CCE% D1
- ☒ 11-52-0

Select By Named Group

<Build All>

Save New Group

Edit Groups

- Instead of selecting the nutrient, select the column name which contain the equation to create the map for (ex: 11-52-0)
- The software will read the value in the column and not the whole equation

Grid Sampling—Creating Nutrient Layers

7. Check the boxes by items to create Nutrient maps or Rx maps. This can be one layer for a single product application, or many layers for soil tests, seed and multi-product application.

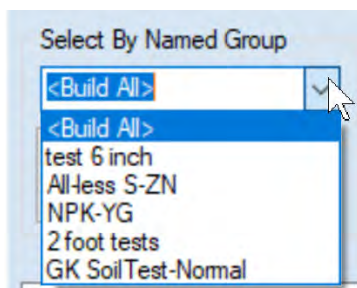
NOTE: Once a box is checked, built and added to "Common Name Mapping". This Product name will "auto check" the next time you load a soil test with that Product name.

- 8a. Select By Named Group—will allow you to save "Groups" of what you want checked on to build.

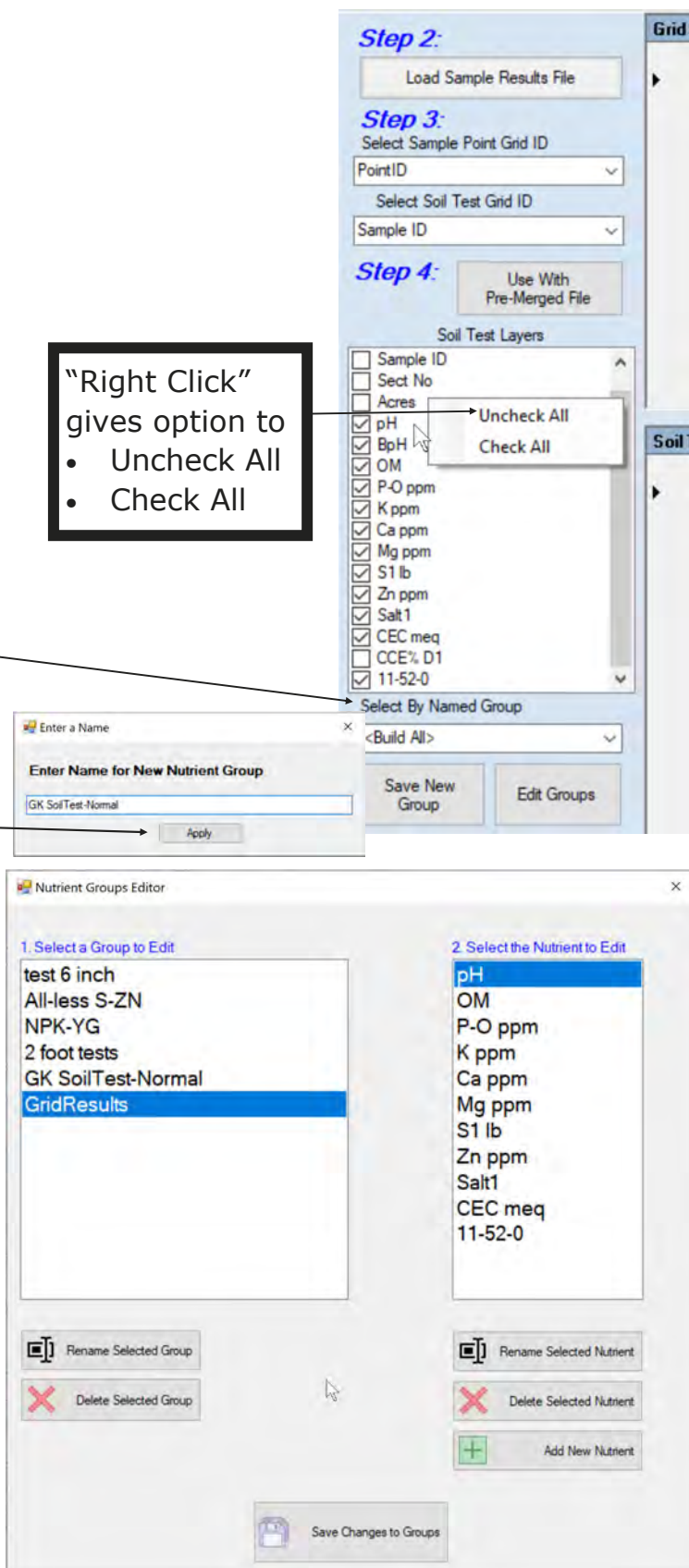
- Save New Group—name the group and click "Apply"

- Edit Groups—Allow user to:
 - Rename, Delete Groups.
 - Rename, Delete, Add Nutrients.

- 8b. Next time through you can choose your "Name Group" from the dropdown.



9. When all the desired nutrients are selected, click "Merge Tables"



Grid Sampling—Creating Nutrient Layers Phosphorous Conversion

Using CSV/XLSX Soil Test Results—Phosphorous Conversion

Soil phosphorous values may be tested and reported in several different ways such as Olsen, Bray, and Mehlich 2 & 3. Due to variables like pH differences some samples may be tested as one type and other samples tested as another. For example a high pH test may have an Olsen result where a lower pH may have a Bray result. ADMS cannot distinguish these differences. So there are some conversion tools to update columns that may have zeros in them, or create a new column if the phosphorous result needs to be a certain type for recommendations or scripts.

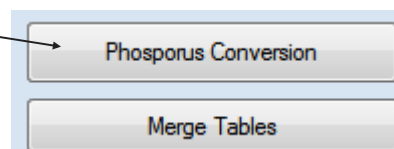
Updating Existing Columns

If there is a column that has only some values reported in it. It can be updated using the other Soil P column. For example these results have three zones reported as Olsen Values and only one zone reported as a Bray value.

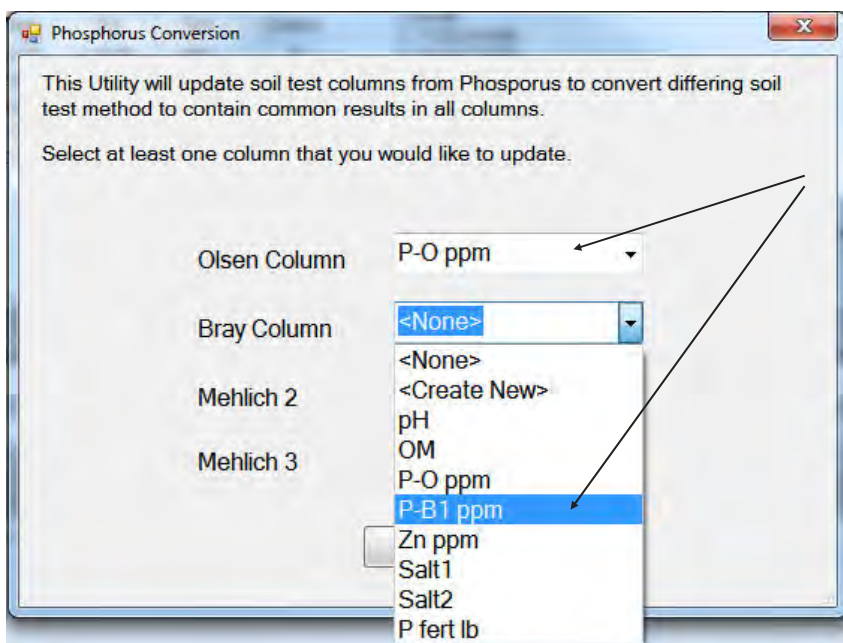
To report everything in P-B1 a conversion must be ran before the maps are created.

1. Click on the "Phosphorous Conversion" button.

P-O ppm	P-B1 ppm
9	0
7	13.3
6	0

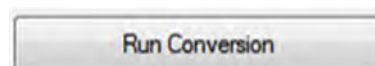


The "Phosphorous Conversion" window will appear.



If the columns have values in them they will show up as a dropdown option.

2. Choose corresponding columns.
3. To update values two columns must be filled in. ADMS will use the values in one column to convert to the other value. In this example the Olsen values will be converted to Bray (P-B1).
4. After the dropdowns are filled in click "Run Conversion."



5. After clicking "Run Conversion" the missing values will be updated.

P-O ppm	P-B1 ppm
9	14
7	13
6	9

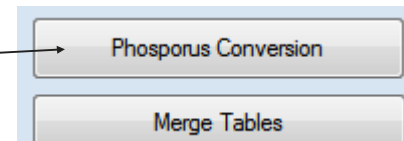
Grid Sampling—Creating Nutrient Layers Phosphorous Conversion

Using CSV/XLSX Soil Test Results—Phosphorous Conversion

Creating New Columns

If soil test results are reported as one value, but they need to be converted to be used in recommendations or scripts it can be done using the same tool. Instead of updating an existing column it will create a new one based on existing values.

1. Click on the "Phosphorous Conversion" button.

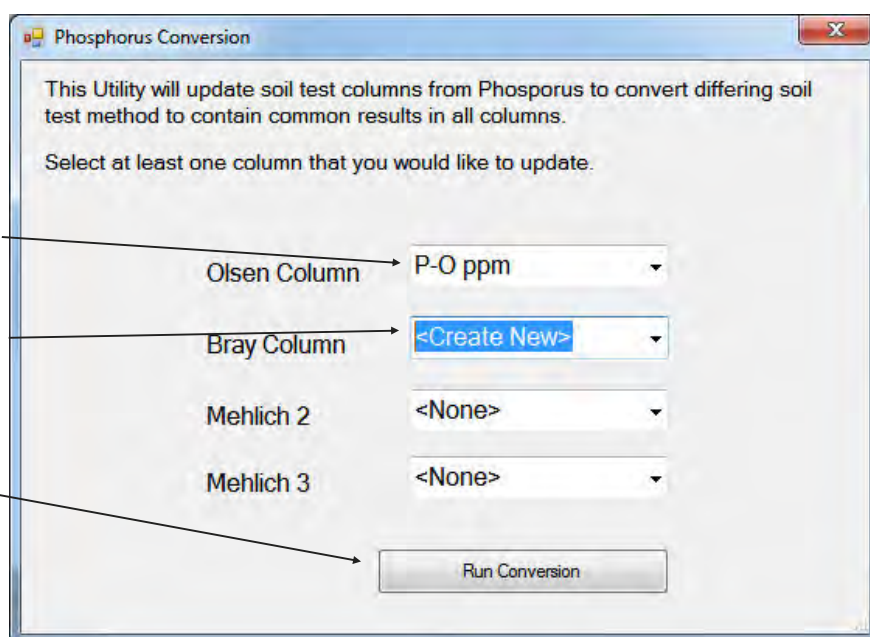


2. The "Phosphorous Conversion" window will open.

3. Select existing Soil Phosphorous column from the dropdown.

4. Select "<Create New>" for the soil test value that needs to be converted.

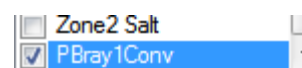
5. Click "Run Conversion."



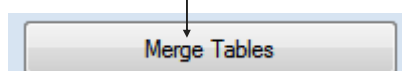
6. After the phosphorous conversion has run it will create a new column of the converted soil test values. And can be merged with the sample points.

7. Nutrient layers can be built off of these the same as any other column.

8. Click "Merge Tables" to merge with the sample points.



PBray1Conv
14
10
9



Grid Sampling—Creating Nutrient Layers

- The soil test results will now merge with the grid sample points file.

Soil Test Results				View Nutrient Maps							
Grid Sample Points											
GridID	Latitude	Longitude	PointID	GKT_IDX	pH	OM	P-O ppm	K ppm	Zn ppm	Salt1	
1-1	45.716419	-96.45787	1	1	6.3	4	20	234	1.39	1.3	
2-1	45.716419	-96.45658	2	2	5.9	3.5	21	257	1.4	0.41	
3-1	45.716419	-96.45528	3	3	5.7	4.5	12	225	1.3	1.09	
4-1	45.716419	-96.45398	4	4	6.3	3.6	15	194	1.42	0.76	
5-1	45.716419	-96.45269	5	5	6	3.2	24	229	1.1	0.35	
6-1	45.716419	-96.45139	6	6	5.7	3	16	197	1.51	0.73	
7-1	45.716419	-96.45009	7	7	6.3	3.7	25	253	1.42	0.35	
8-1	45.716419	-96.44879	8	8	7.2	3	40	1012	1.62	1.95	
1-2	45.717323	-96.45787	9	9	5.9	4	20	266	1.45	0.57	
2-2	45.717323	-96.45658	10	10	6	4.5	12	325	1.69	0.19	
3-2	45.717323	-96.45528	11	11	5.9	4.1	9	258	1.53	0.73	
4-2	45.717323	-96.45398	12	12	6.5	4	9	290	1.18	0.26	
5-2	45.717323	-96.45269	13	13	5.8	4.2	11	302	1.3	0.13	
6-2	45.717323	-96.45139	14	14	6.1	3.8	11	254	1.59	0.42	
7-2	45.717323	-96.45009	15	15	6.5	3.7	11	241	1.41	0.24	
8-2	45.717323	-96.44879	16	16	6	3.6	15	238	1.72	0.51	
Soil Test Results											
Ref No	GrowerID(	Fld ID(1st	Sample ID	County	Twp	Qtr(11)	Sect No	Acres	pH	BpH	OM

9. After the two tables are merged, you can choose to "Grid with Surfer Kriging" (**This is optional.** If you are going to use Kriging, you must have the demo version of Surfer 8 installed)

The software by default will use inverse distance if you leave the box unchecked, you DO NOT need surfer to do this.

Phosphorus Conversion

Merge Tables

☒ Grid with Surfer Kriging

Build Maps

10. Select "Build Maps"

Grid Sampling—Creating Nutrient Layers (Common Name Mapping)

- If this is the first time you have done this, you will be asked to assign a name to your nutrient. This is so that all nutrient output maps share a common name among all of the fields you load test results for.
- DO NOT use the field name as part of your name
- Make sure and fill in all the boxes (Full Name, Units, and Decimal Precision)
- These names will stay this way. This keeps them the same when you are using scripting to write the prescription

Data for Column Name

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name: pH

Full Name:

Units:

Decimal Precision:

Color Theme: None

OK Cancel

- A default color theme may also be applied. Refer to that section of the book for more explanation.

Data for Column Name

The information below will be used to create new layers when data with this short name is used to create data in the future.

It will help to provide consistent naming of output layers.

Short Name: pH

Full Name: Soil pH

Units: units/acre

Decimal Precision: 1

Color Theme: None

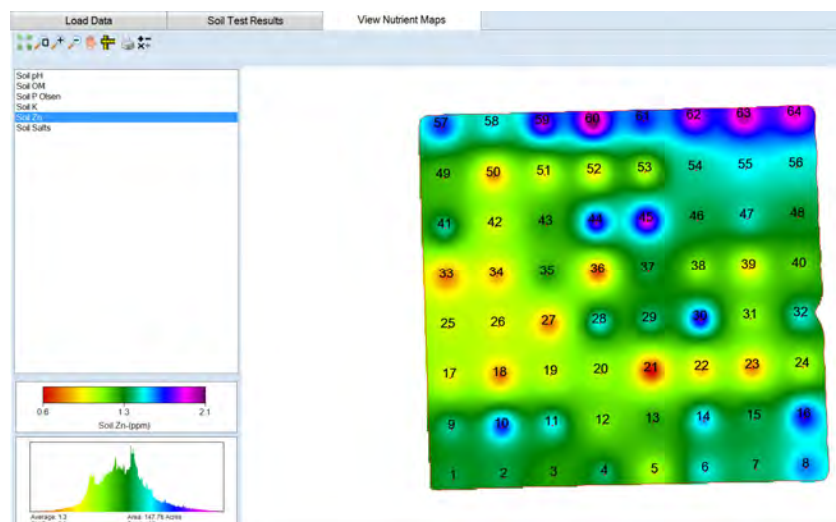
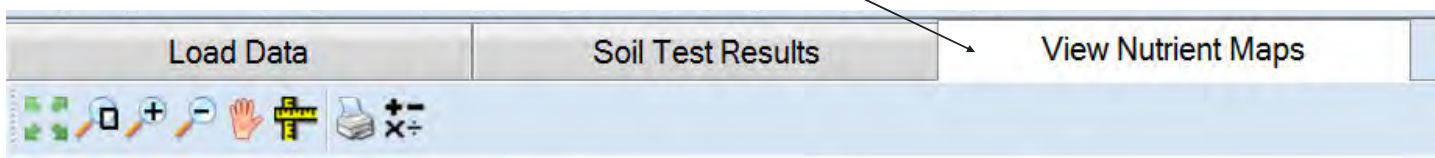
OK Cancel

11. Once you have a name, units, and decimal precision assigned, click "OK" and go on to the next one.

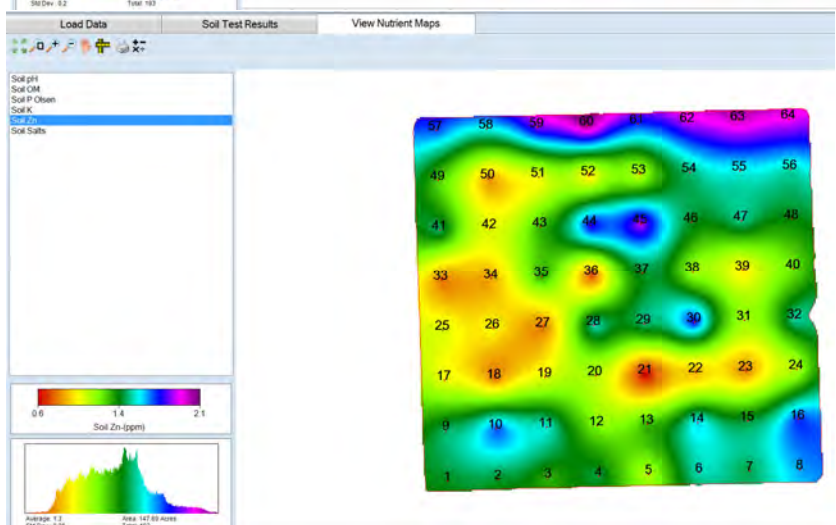
- Do this until the Data for Column Name boxes stop appearing.

Grid Sampling—Creating Nutrient Layers (Inverse Distance & Kriging)

12. Select the "View Nutrient Maps" Tab on the top of the screen. You can now view your created nutrient maps for the field.

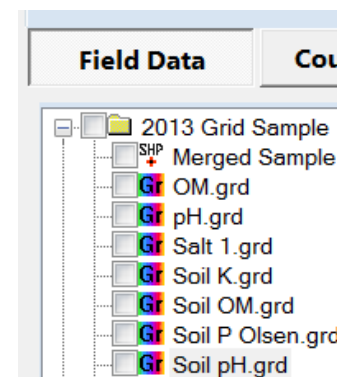


- Created With ADMS Inverse Distance



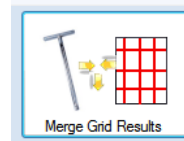
- Created With Surfer Kriging

- The newly created nutrient layers will be stored under "**The Year**" **Grid Sample** folder under "Field Data"
- You can change the year of the output folder: Go to Tools/Settings/User Interface 2 and change the current season



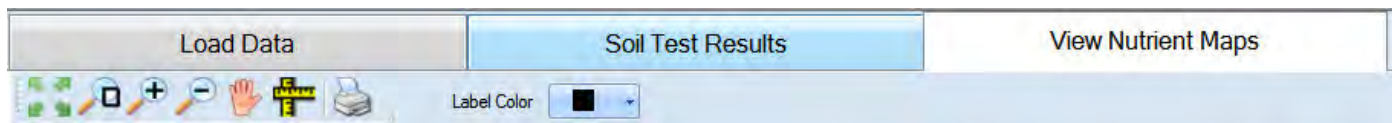
Grid Sampling—Printing Grid Nutrient Layers

Starting at version 6.4.1, there is an option within the software that allows printing of the nutrient surfaces while automatically changing the labels on the sample points to correspond with the nutrient maps.



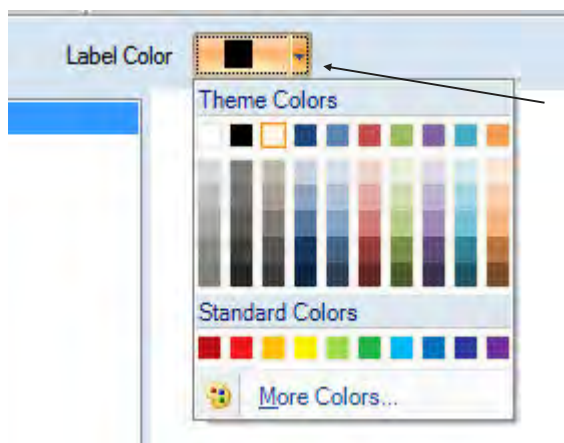
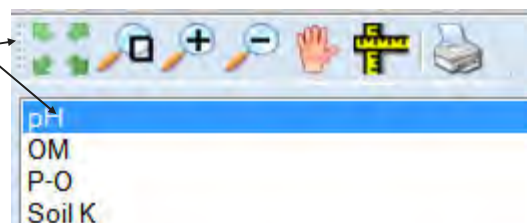
After following the steps to build nutrient maps, stay in the Merge Grid Results window.

1. Go to the “View Nutrient Maps” tab.



2. The nutrient maps will be displayed in the window. The labels will be automatically turned on to correspond with the correct nutrients. If they are not visible, click on one of the nutrient maps on the left side of the window.

3. If the map does not fill the entire window click:
“Zoom to Extents.”



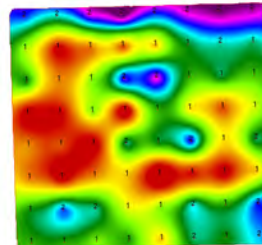
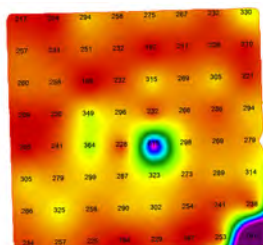
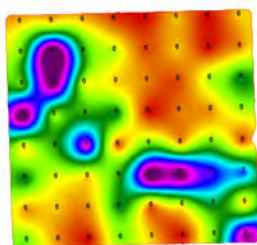
4. Before printing, there is an option to change the label colors if desired.

**Note this will change all of the labels to the selected color*

5. After the desired label color has been selected click the “Print Button” on the top toolbar.



The maps will print with the correct labels for each nutrient.

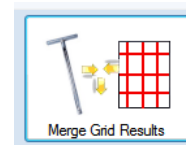
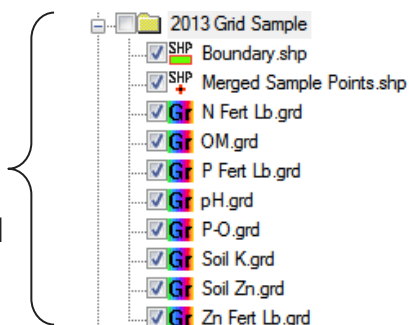


Note: Clicking on Product Names in the list will change / assign print order to match your clicks.

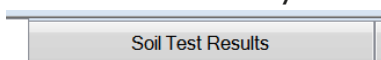
Grid Sampling—Printing Grid Nutrient Layers

If existing nutrient maps exist with a merged sample points file, this same printing function can be used.

1. Open "Merge Grid Results."
2. Under the "Load Data" tab select:
 - Boundary
 - Merged Sample Points
 - Nutrient layers that will be printed



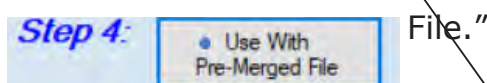
3. After these layers are all turned on, go to the "Soil Test Results" tab.



4. The merged sample points will automatically be visible at the top of the window under "Grid Sample Points". The nutrient columns should be visible.

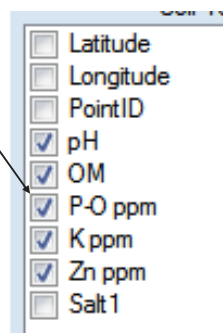
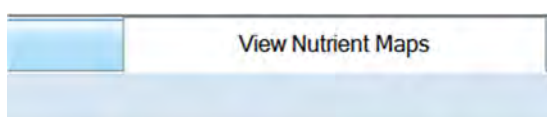
Grid Sample Points											
GridID	Latitude	Longitude	PointID	pH	OM	P-O ppm	K ppm	Zn ppm	Salt1	GKT_IDX	
1-1	45.71641922	-96.45787048	1	6.30000019	4	20	234	1.38999999	1.29999995	1	
2-1	45.71641922	-96.45658112	2	5.90000001	3.5	21	257	1.39999998	0.41	2	
3-1	45.71641922	-96.45528412	3	5.69999981	4.5	12	225	1.29999995	1.09000003	3	
4-1	45.71641922	-96.45398712	4	6.30000019	3.59999999	15	194	1.41999996	0.75999999	4	

5. Proceed to **Step 4:**
 - Click "Use With Pre-Merged File."



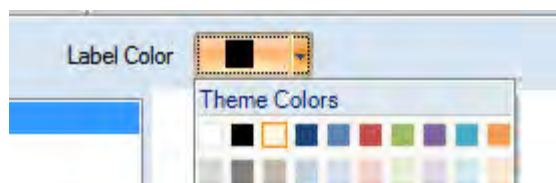
6. Under Soil Test layers, the nutrient maps that were turned on will automatically have a check mark in front of them.

7. Select "View Nutrient Maps."



8. The maps will now be visible with the correct sample points turned on.

9. Change the label color if desired.

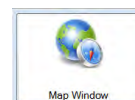


10. Select the print icon at the top toolbar to batch print all the surfaces turned on.



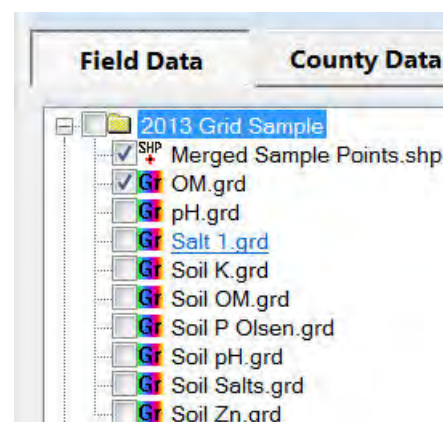
Grid Sampling—Printing Grid Nutrient Layers

You should now have all the components you need from your soil test results; your nutrient maps, your boundaries, and depending on the prescription you are going to be using, you may want to have a yield goal map. Refer to that section in the book on how to create that map. You can now print your maps, be ready for the prescription writing process.



Printing Soil Test Result Maps

- Nutrient maps can be printed and overlaid with the corresponding grid points and the soil test results
- This has to be done individually for each nutrient map



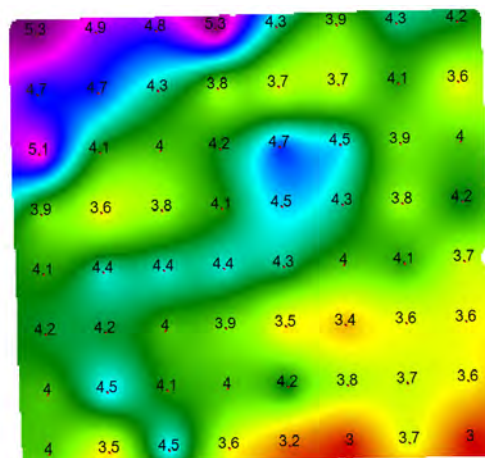
- Go to the Grid Sample File
- Check the nutrient *.grd file (ex: OM)
- Select "Merged Sample Points"

- Select the "Layer Display Properties" button on the bottom toolbar



- Make sure labels are visible
- Select the corresponding nutrient out of "Label Expression" tab, Change "Label Appearance" to fit and "Label Placement"
- Click "OK"
- For further detail, refer to "Layer Display Properties" section on how to change and save as template

- The point labels should now be the same as the test results.
- This can now be printed.
- Repeat from the top of the page as needed for the desired nutrients



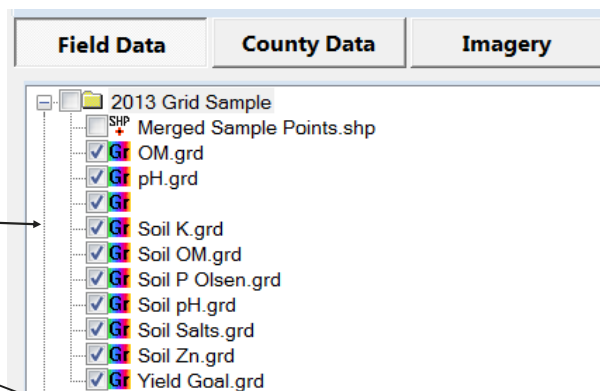
Grid Sampling—Using Scripting To Write Prescriptions

Writing a Prescription From Nutrient Maps Using Scripts

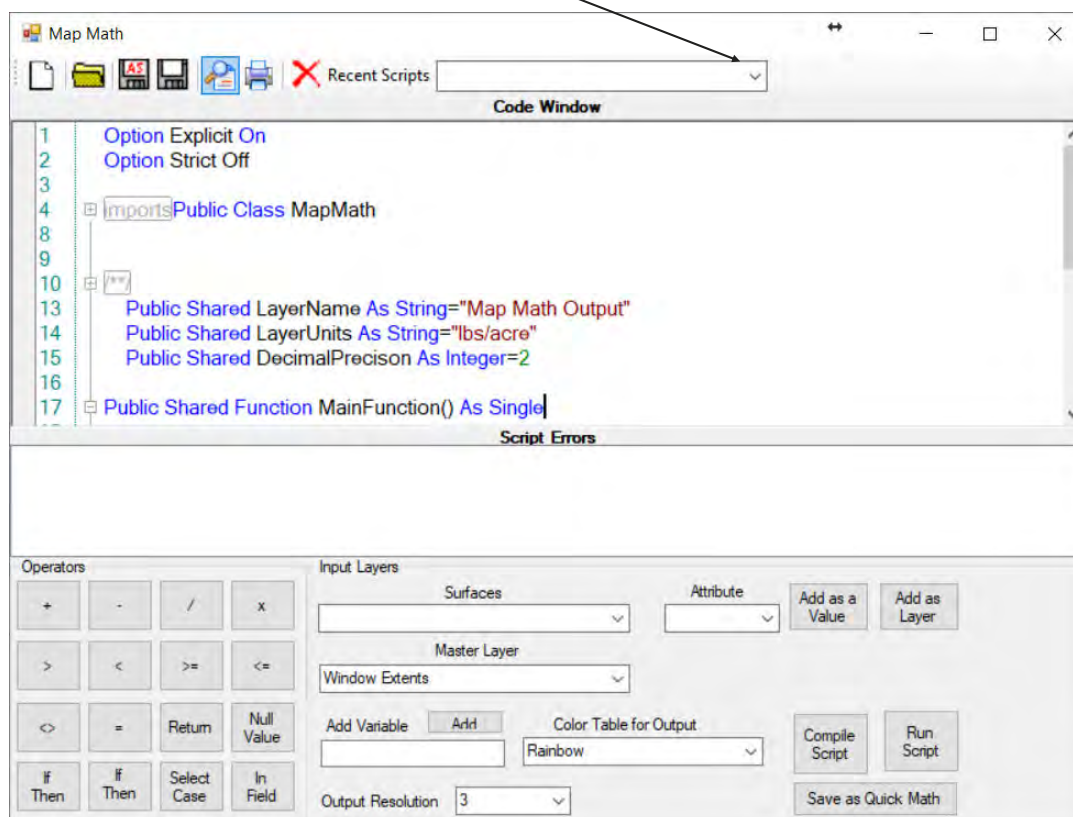
Once you have all of the desired nutrient maps created, you are ready to create the fertilizer prescription using the scripting method. You can use an existing prescription or create your own by following the instructions in the **Getting Started With Map Math** Section.



1. Under Layer Info, select Clear Map so there are no loaded layers in the map window.
2. Select all the input layers that will be used to create the prescription.
3. On the top toolbar, select "Multi Layer Map Math" button

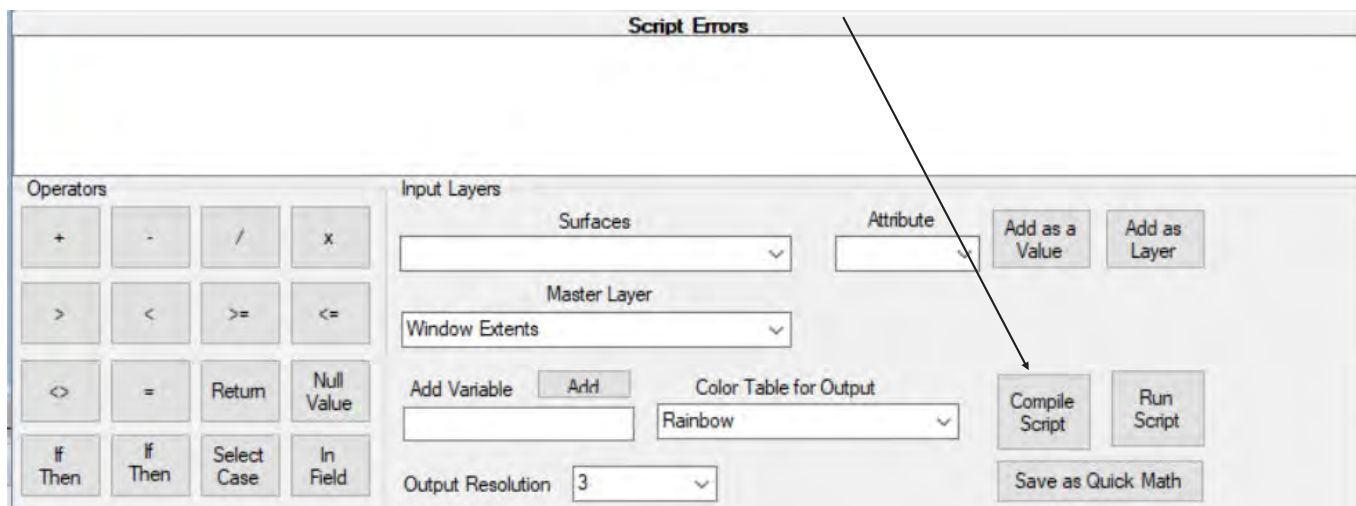


4. Load the script that you wish to use. If you have used some recently, they will be in the "Recent Scripts" dropdown.
5. If you are going to load a new script, select the folder icon

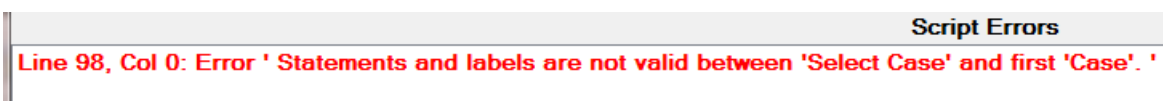


Grid Sampling—Using Scripts To Write Prescriptions

13. Once everything looks the way you want, select “Compile Script”



14. If there are errors in the script, it will show under script errors, fix any errors, and compile again



15. Once you see there are no errors in the script, click “Run Script”

The Script Compiled without errors! :-)

Run Script

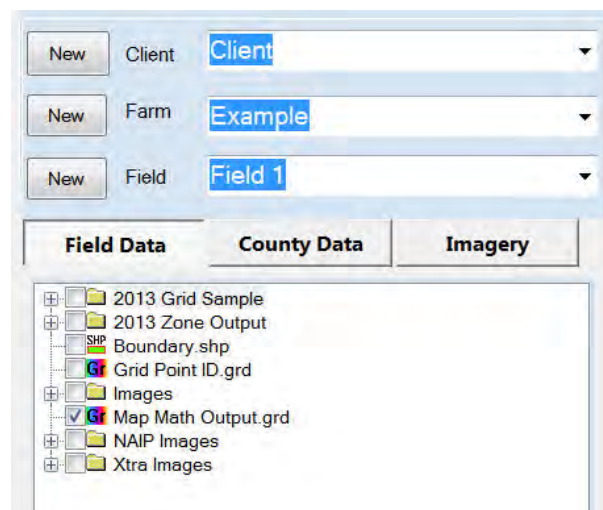
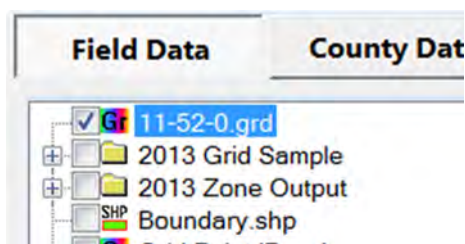
16. You should now have a layer called “Map Math Output”. This is the 11-52-0 product map

17. Click “Save As” on the bottom toolbar



18. Save this map as 11-52-0

19. Make sure and rename each product map. If you leave it as “Map Math Output” it will be replaced each time you run the script and create a new product.



20. This process can now be repeated for all of the products you wish to apply.

21. After the maps are built, follow the instructions on the *Exporting Prescriptions* Section. This gives you step-by-step instructions for each type of controller.

Scripting—Using GK Created Scripts

The instructions in "Using GK Created Scripts" will walk you through some of the most common scripts used in Ag Data Mapping Solution. There are MANY more script that can be used or created. The idea below will tell you a little about the script and what it does and what data you have to enter.

Reminders – Here are some "Scripting Terms" to remember as you are reading through the scripting instructions below.

Null Value = essentially areas in a surface that have "Pixels" with no "Data Value". This means it is not a 0 to 1,000,000,000 value, it is a NULL VALUE. See the scripting section on "What is a Null Value?" for further explanation.

If in Field = if there is a hole in one surface (no data in an area), then there is a hole in the output surface of that field. Because there is data missing in one map the math operation will NOT run on that area, returning a NULL VALUE (not zeros).

Upon creating your "MapMath" layers, we suggest "SAVE AS" and renaming your layer to represent your newly created map.

-Script Explanations-

2 Layer Add – Will Add 2 surfaces in the "Same Field", using "If in Field" logic.

- To assign different "UNITS" on line 8 (default – lbs/ac)
- Assign Input Surface names on lines 16 & 17 (Add as a Value)
- The "Math" is done on line 20
- Useful for checking total seed in Soybean "Offensive-Defensive Soybean" Seeding maps
- Creates a new Surface named "MapMath-2LayerAdd.grd"

2 Layer Difference – Will Subtract 2 surfaces in the "Same Field", using "If in Field" logic.

- To assign different "UNITS" on line 8 (default –Units/Ac)
- Assign Input Surface names on lines 18 & 19 (Add as a Value)
- The "Math" is done on line 22
- Useful for checking your "LIDAR vs RTK" Elevation maps
- Creates a new Surface named "MapMath-2LayerDiff.grd"

Scripting—Using GK Created Scripts

Apply Linear Values – Allows the user to enter an “AVERAGE” rate you would like applied on a field. Then assign a Low Rate % and a High Rate % indicating how much you want to go down & up from the Average rate. NOTE: Input layer should be a layer that represents “PRODUCTION or YIELD” of a field.

- Assign Input Surface name on line 21 (Add as Object)
- Line 22 = Average Rate to apply (example 120 lbs/acre wheat seed)
- Line 23 = Low Rate % (example 30 – create a low rate of 84 lbs/acre)
- Line 24 = High Rate % (example 20 – create a high rate of 144 lbs/acre)
- Example Note – VRT would go from 84 to 144 and the average would be “ROUGHLY” 120

The average is usually off a little, based on the math being done in a “linear” equation and the spatial data is not.

- The “Math” is done on line 37-50 (do not edit)
- To assign different “UNITS” on line 60 (default –lbs/acre)
- Useful for creating fertility maps and seeding maps
- ** GK Technology Inc. recommends Zone Soil Testing and assigning rates to zones **
- Creates a new Surface named “Map Math Output.grd”
- Consider renaming on line 9

Average All Layers-Equalized – Will Equalize all the layers turned on, Add them together, takes a count of how many surfaces are turned on and return an Average Equalized Layer, using “If in Field” logic.

- To assign different “UNITS” on line 7 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 19-25
- Useful for merging multiple years of data (Ex. Yield / Imagery / Topo / Veris)
- Creates a new Surface named “Layers Merged-Eq.grd”
- Consider renaming on line 6

Average All Layers-Equalized-wHoles – Will Equalize all the layers turned on, Add them together, takes a count of how many surfaces are turned on and return an Average Equalized Layer, using “Null Value” logic. This means that the areas of maps that have “Holes” (missing data) will calculate their own values.

- To assign different “UNITS” on line 7 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 15-35
- Useful for merging multiple years of data (Ex. Yield / Imagery / Topo / Veris)
- Creates a new Surface named “Layers Merged-EqH.grd”
- Consider renaming on line 6

Scripting—Using GK Created Scripts

Corn Seed-Max-Min – Will give you a “Corn Seeding Rate” based of a Divisor & Yield Map. Requires a Yield Map or a Yield Goal map to use this script. Useful for creating Corn Seeding Maps.

- Assign Input Surface name on line 28 (Add as a Value)
- Line 22 = Minimum Seed Rate
- Line 23 = Maximum Seed Rate
- Line 24 = Divisor value (X) (Example $-(\text{Yield Goal} / X) * 1000 = \text{Seeding Rate}$)
- Line 31 = Seeding Rate Increment (1000 will give seeding rates of 30,000 & 31,000 with no rates between)
- The “Math” is done on line 38-44
- Creates a new Surface named “Corn Seed.grd”

Merge All Visible-Lbs-Ac – Uses the “null values” function. This script will return the value at each pixel on each map. If the maps overlap, it will return the value of the first map turned on.

- To assign different “UNITS” on line 7 (default –LbsAc)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 18
- Useful for merging data from multiple adjacent fields.
- Creates a new Surface named “Merged Layers.grd”

Merge All Visible-Normalized - Uses the “null values” function. The script will “Normalize” all the surfaces that are turned on and visible. This script will return the value at each pixel on each map. If the maps overlap, it will return the value of the first map turned on.

- To assign different “UNITS” on line 7 (default –Units/Ac)
- Runs Script on all Surfaces that are turned on!!
- The “Math” is done on line 18
- Useful for merging data from multiple adjacent fields.
- Creates a new Surface named “Merged Layer-Normalized.grd”

Min-Max Lbs-Ac - Uses the “null values” function. The script will take a “Prescription map.grd” and allow you to set the Max and Min rates you will use. So if you had a map that went from 0 - 330 lbs. of UREA with a rate at every pound 0,1,2,3....., and your “Spreader” could only spread 0 & 100-300 lbs. of Urea (rates from 1-99 cause erratic rates). You can set parameters to make rates to fit the controller limitations.

- To assign different “UNITS” on line 7 (default –Lbs/Ac)
- Assign Input Surface name on lines 18 (Add as a Value)
- Assign “ZeroBreak” on line 22 - any pixel value in the map lower than this will go to “0” & any value higher than this value, but lower than the “MinRate” will become the “MinRate” value.
- Assign “MinRate” on line 24 – aside from “0” this will be the lowest rate on the map.
- Assign “MaxRate” on line 26 – This is the max value that will be assigned in the map, any values higher than that value will become the “MaxRate” value.
- The “Math” is done on line 30-51
- Creates a new Surface named “Map Math Output.grd”

Scripting—Using GK Created Scripts

Net Revenue - Uses the "If in Field" function. The script will require Yield data, all your VRT seed and fertilizers for the field you are working on. You will also need to have values for the selling price per bushel, cost per ton of product (fertilizer), the cost per bag of seed and the Fixed cost for the farm (less the VRT products).

- Line 6 will create a new Surface named "Net Revenue.grd"
- To assign different "UNITS" on line 7 (default -Dollars/Acre)
- Assign Input Surface name on lines 18-24 (Add as a Value)
- Assign the values for commodity, fertilizer, seed and fixed cost on lines 26-41
- The "Math" is done on line 48
- Note: before closing this script, suggest saving these values and renaming to save time.
 - Example - Save & Rename "Net Revenue-Corn-2018"

YieldMaxLayer - Uses the "If in Field" logic. Looks through all the layers turned on and finds the layer with the highest value at every pixel. This script is designed to work with yield data from the "Same Crop" on a given field.

- Creates a new Surface named "Yield Max Layer.grd" on line 25
- To assign different "UNITS" on line 26 (default -bu/ac)
- Runs Script on all Surfaces that are turned on!!
- The "Math" is done on line 54-55
- Useful for finding - maximum potential yield on any one crop with multiple years of yield data.

Grid Sampling—Sampling Methods

Grid Sampling Methods

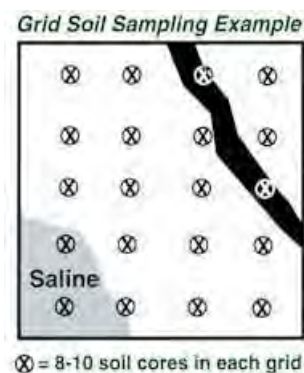
When soil sampling, it is important to make sure you take an accurate representation of the field. Here are some general guidelines to follow when out sampling.

Credit for this information is from AGVISE Laboratories: <https://www.agvise.com/resources/guides/>
& The University of Nebraska Lincoln (UNL): <https://cropwatch.unl.edu/soil-fertility/>

Grid Soil Sampling: Grid soil sampling involves dividing whole fields into small equal sized areas or grids (1-5 acres) (see example). The soil cores from each grid are collected either from the center point of the grid or from random cores within the grid. A minimum of 8-10 cores from each grid is required to provide enough soil for all laboratory analysis to be completed.

Sample Handling - Soil Fertility Analysis

Proper soil sample handling procedures depend on which nutrient analysis is requested. Soil samples that will be analyzed for nitrate-N should be kept cool or shipped to the laboratory immediately. If samples are stored in a warm area for extended periods of time, the nitrate level in the sample will increase. Warm temperatures during shipping or storage increase the activity of microbes in the soil sample. This microbial activity causes the release of additional nitrate-N in the soil sample bag. If this happens, the laboratory analysis for nitrogen will be incorrectly high, due to improper sample handling.



Soil samples that will be analyzed for all other nutrients are not affected by temperature and do not need special handling.

Credit for the above information is given to Agvise Laboratories:
<https://www.agvise.com/wp-content/uploads/2020/03/AGVISE-Soil-Sampling-Guide-2019.pdf>

Grid Sampling

A well-done nutrient map derived from a grid sample can be a valuable resource for many years. Consequently, the density should be adequate to provide confidence in the accuracy of the maps developed from the data. We suggest analyzing one sample per acre, which is composited from five cores collected in a tight radius about the sample point (Figure 3). This density will result in a map that will be good for many years —10 to 20 years for soil organic matter and cation exchange capacity; five to ten years for pH; and four to five years for phosphorus, potassium and zinc. On fields in which variability is expected to be low, a sampling density of two to two-and-one-half acres per sample may be acceptable. Grid sampling at densities coarser than one sample for every 2.5 acres is not recommended, if the goal is to develop a resource of nutrient maps that can be used with confidence over several years.

Credit for above information is given to UNL: <http://extensionpublications.unl.edu/assets/pdf/ec154.pdf>

Grid Sampling—Sampling Methods

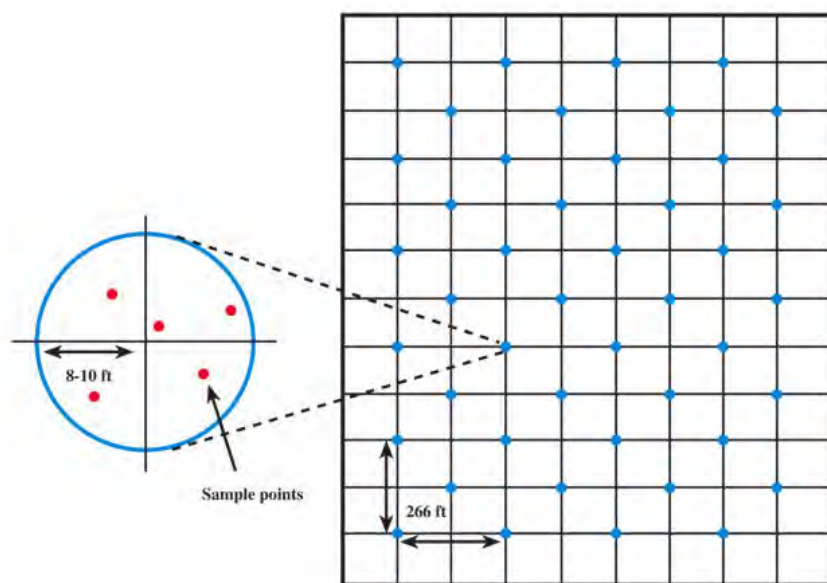
Sampling Pattern and Depth

An offset grid pattern is recommended as shown in the figure below. This will provide more information at a lower cost than a regular grid pattern. Individual cores should be collected in a radius of 8-10 feet of the grid point, to a depth of 8 inches. The grid point should represent the central position of a composited sample. Collect samples within the 8-10 foot radius randomly, in order to avoid systematic patterns such as starter or pre-plant bands. Conduct a general fertility analysis on the samples, including soil organic matter, pH, phosphorus, potassium and other nutrients of interest.

Frequency

As already mentioned, a nutrient map derived from a grid-sampled field can last a long time. If variable rate application of fertilizer or lime occurs, this will have the potential to change nutrient levels or soil pH over time. Soil phosphorus levels will not change drastically with single variable rate applications. We suggest that grid samples be collected every five years for phosphorus. Lime application according to recommendations should amend soil pH for 8-10 years. Even if variable rate lime application has occurred according to a grid-sampled map of pH, it should not be necessary to grid sample for soil pH for 8-10 years after application.

Residual Nitrate Sampling. Grid sampling for nitrate-N is not recommended because annual fluctuations in nitrate levels would require annual grid sampling, which is not cost effective for most crops with current fertilizer prices. Instead, residual nitrate sampling (to a depth of 3 feet) should be done on a directed sampling basis.



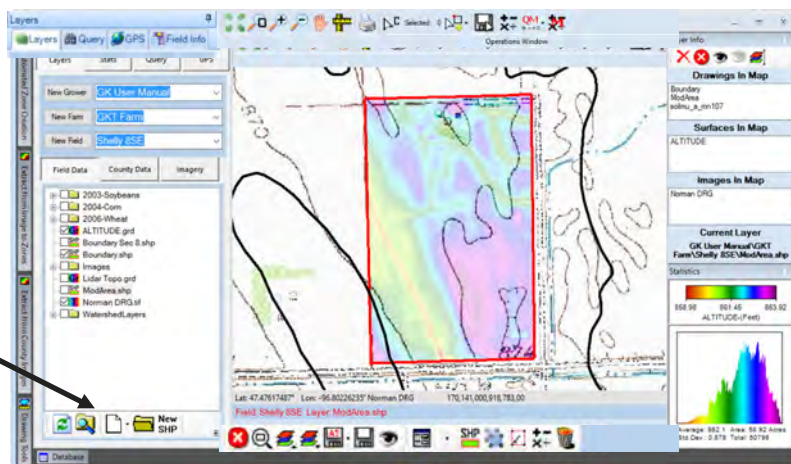
Credit for the above information is given to UNL:
<http://extensionpublications.unl.edu/assets/pdf/g1740.pdf>

My Notes

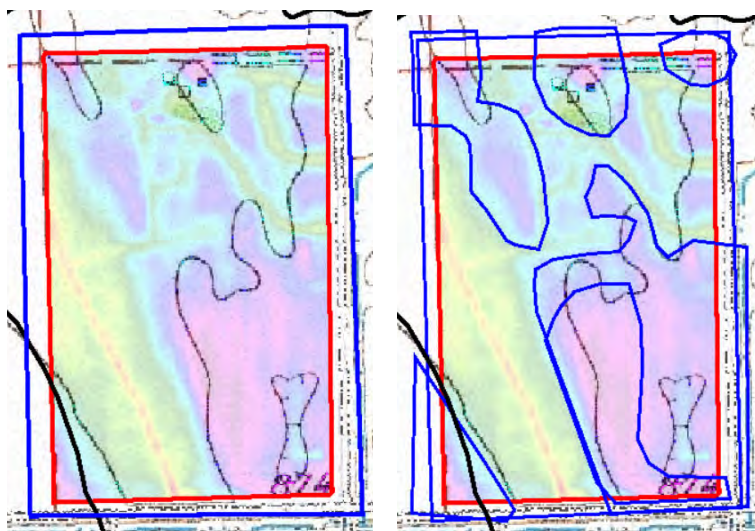
VRT Map from Hand Drawn Polygons

To create simple manual zones based on Images, Elevation, Soil types, Data Points or what ever criteria you want to use.

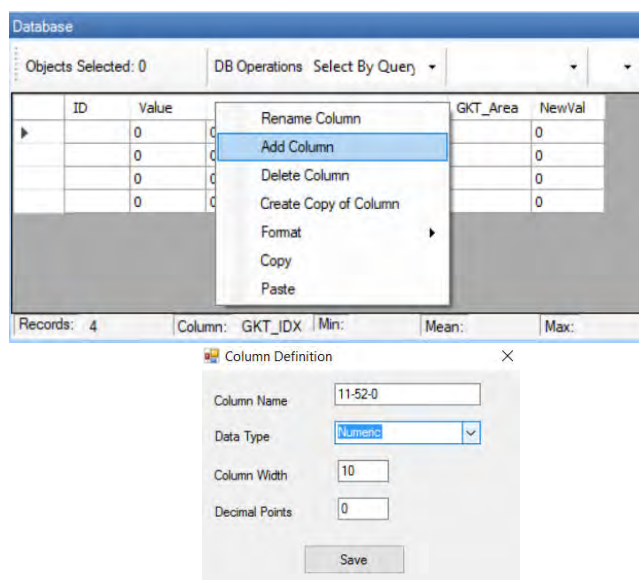
1. Open any layers of data you feel useful for defining your VRT application areas.
2. Select "**ModArea**" from Template
3. Make sure "ModArea" is checked ON and set as **Active Layer**.



4. Select "**Draw A New Object**" SHP 
5. Draw your primary boundary for VRT area, it should drawn larger than the field or original boundary and it will be trimmed later.
6. Draw in all the areas of "different rates". *Order of Drawing is VERY IMPORTANT the last object drawn is on "TOP"*
7. Each area will have it's own line in the database.
8. The "ModArea" Template does NOT have the columns for the VRT maps that are being created.



9. Go to the lower left hand corner of the screen and click "Database"
10. Right click any header & "Add Column"
11. Name the new "Column" note you are limited to 10 characters
12. Set the settings like picture to the Right. <<**Data Type = NUMERIC**>>



VRT Map from Hand Drawn Polygons

13. Click the "**Database**" tab at the bottom left of screen. Apply a Rate to each zone.

14. Once rates have been entered. "**Save**" the ModArea.shp. (consider "**Save As**" and renaming to a more fitting name)



Database

Objects Selected: 0 DB Operations Select By Query

NewVal	ID	GKT_IDX	GKT_Length	GKT_Area	46-0-0	11-52-0
0		1	7173.1	70.538	250	50
0		2	2817.7	6.871	200	100
0		3	1567	3.959	150	0
0		4	931.7	1.433	300	50
0		5	4926.2	23.866	275	50
0		6	2028.5	4.1	225	100
0		7	3044.5	7.592	325	75

Record Count: 7 ColumnID: NewVal Min: 0 Mean: 0 Max: 0

Database

18. Right click ModArea.shp, select "**Create Grid**" & "**Create Grid from Polygons**"

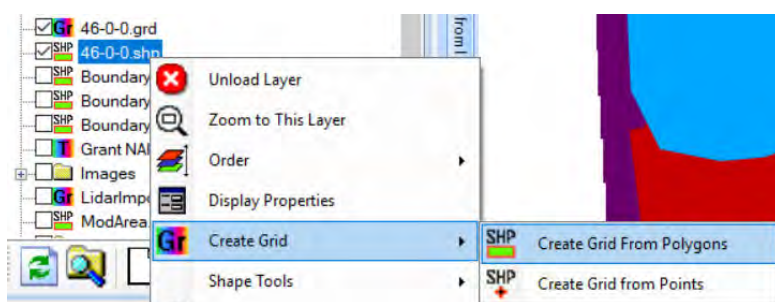
19. "**Source Database Column**" - 46-0-0

"**Output Resolution**" - "3"

"**Color Table**" - "Rainbow"

Select "**Create Grid**"

*Consider clicking the "**Low Pass Filters**" 5 to 10 times if you want smoother rate changes.*



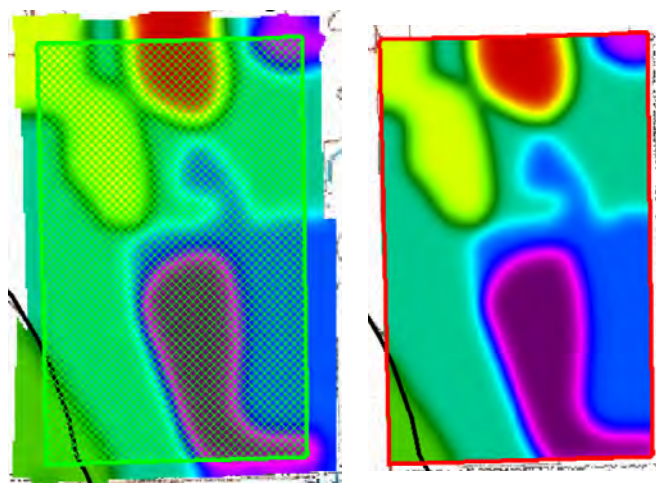
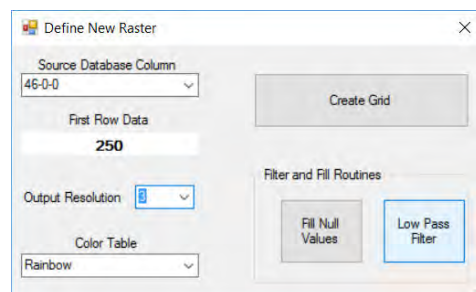
20. Crop / Trim xxx.grd to the Boundary. Check on Boundary.shp should be the **active layer** and Click inside the boundary in the map window making it **Lime Green**

21. Select 46-0-0.grd it is now the **active layer**

22. Click the "**Crop Raster to Selected Polygons**" & "**Just this Layer**"

23. "**Save**" the xxx.grd

24. xxx.grd VRT map is ready to Export.

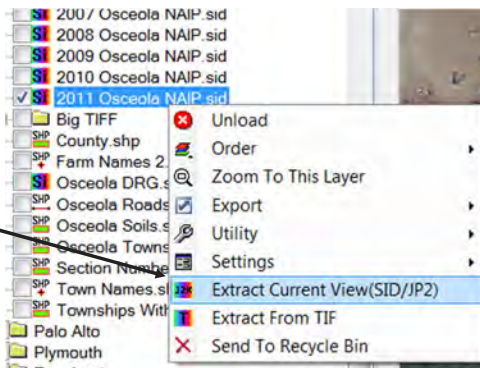


Making A Test Prescription

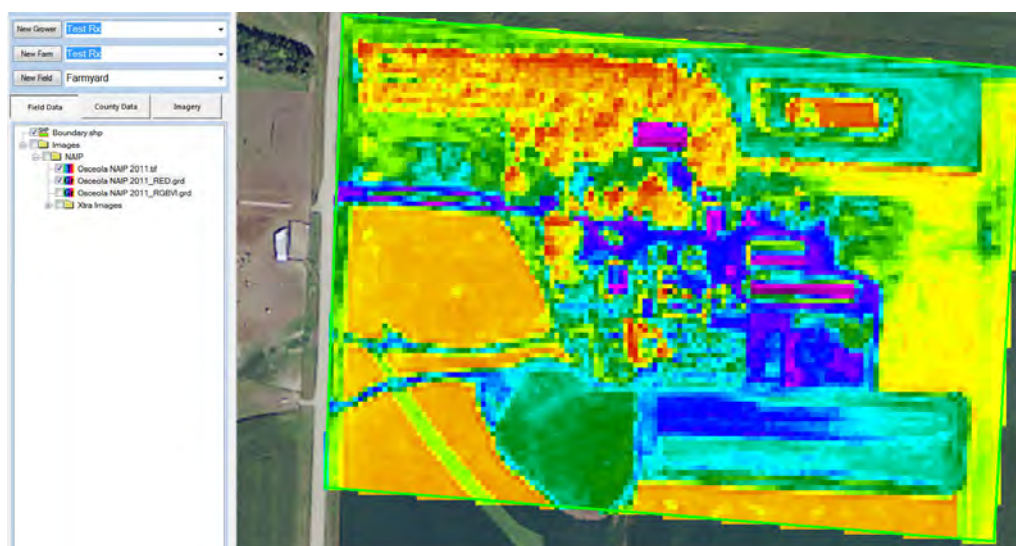
If you are creating prescription maps that are for seeding or fertilizer, it is always a good idea to create a test map. This will allow you to make sure that everything is working properly before it is time to be in the field. Often the best place to do this is right in your farmyard or by your shop where the equipment is located.



1. Locate your farm on a county NAIP image.
2. Right click on the .sid file you have turned on.
3. Select "Extract Current View (SID/JP2)"
4. Select "Save" this will save it to "Field Data" and will be in "Images\NAIP."



5. Draw a boundary around the test area. (Refer to: *Creating Zones From Boundaries*)
6. Once the boundary is drawn, "Save Changes" 
7. With boundary as the active layer, select inside so the green hatching appears.
8. Under "Field Data", make the NAIP image the active layer. Field: Farmyard Layer: Boundary.shp
9. The bottom toolbar will change to display the "SNG" and "VI" buttons. 
10. For most NAIP images select the "RED" under SNG or "RGB VI" under the VI button. If the image has an NIR band it can be selected instead under the SNG button.



11. This map will now be used as the test prescription.

- Rates will be imputed into it to represent the product that is going to be applied.
- This will be exported as a prescription to the controller that will be applying the product.

Making A Test Prescription

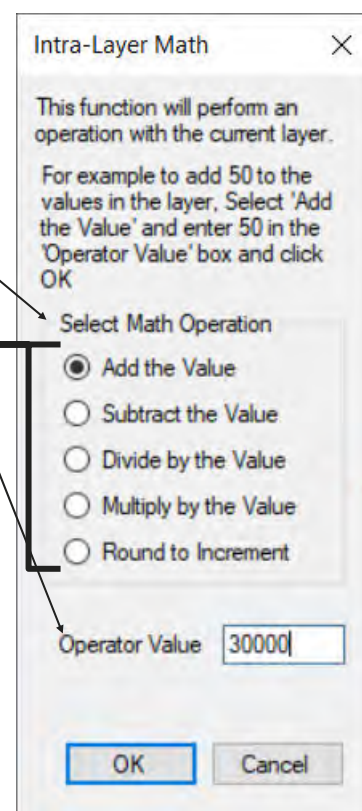
To quickly modify the values of the test prescription, a function called "Intra-Layer Math" can be utilized with the extracted NAIP (*.grd file) that will be used as the test prescription; it is found on the bottom toolbar.



This function can be used to quickly add, subtract, multiply, or divide all of the values in the map. This allows for quick value changes to get as close as possible to represent the actual rates that will be applied in the field.

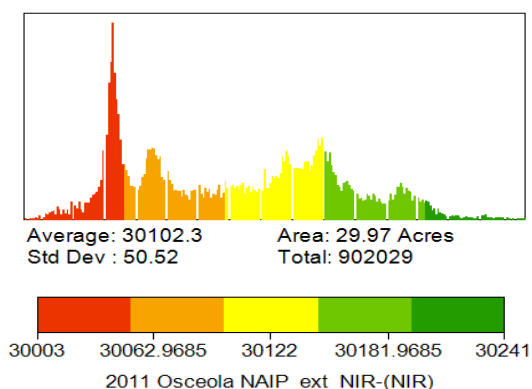
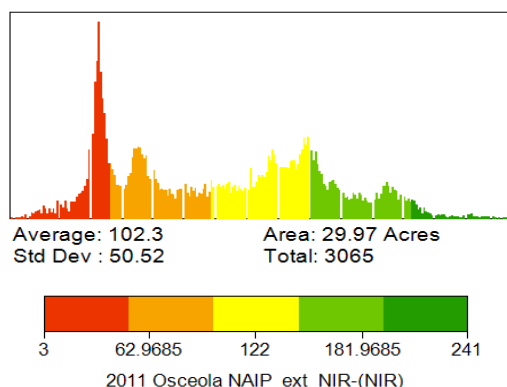
This example will be for a corn seed prescription map.

1. With the *.grd file as the active layer, select the Intra-Layer Math button on the bottom toolbar. 
2. A window will appear to:
 - Select A Math Operation _____
 - Choose the value you will be using for the math operation.
3. This example will add the value of 30,000 to every pixel in the map.
4. Click "OK"



All of the map values will change with the statistics and the histogram remaining the same.

Since this is not an in-field situation, it is only important to get close to the rates that are going to be applied. The goal here is to get something you can test the controller with to make sure everything is working properly before heading to the field.



- There are other ways of creating test prescription maps. Refer to the Nutrient Layers section of the book and Creating Prescription Maps—Manually. These outline how to enter in target rates based on each zone.

Making A Test Prescription

Using a mod area to add a zero rate.

A mod area can be used to add additional rates into the map such as a zero rate. This will give you more control to see what is happening at a specific location in the yard. It is done the same as a test strip.

1. Create a new layer from template. This is located at the bottom of the "Field Data" tab.
2. Once ModArea is selected, make sure it is checked on and it is the active layer.

Field: Farmyard Layer: ModArea.shp

3. On the bottom toolbar, select the "Draw a New Object" icon.

4. On the map, draw the area where the new rate is going to be.

- Left click to drop a point, right click to close the polygon.

5. When ModArea is completed, "Save Changes."

6. With the ModArea as the active layer, click inside the polygon on the map window so it turns green.

7. Select the test.grd map in "Field Data" to make it the new active layer.

Field: Farmyard Layer: Seed.grd

8. Click "Apply Mod to Selected Polygon" on bottom toolbar. Select it.

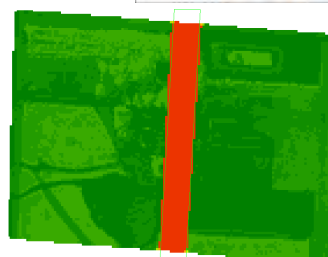
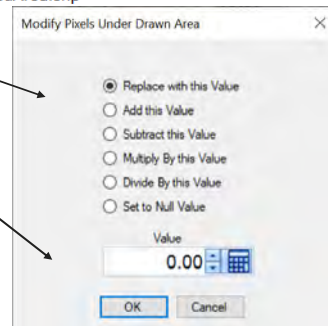
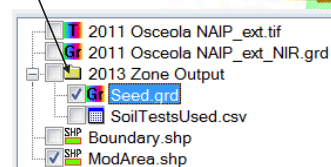
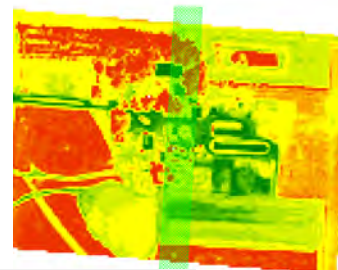
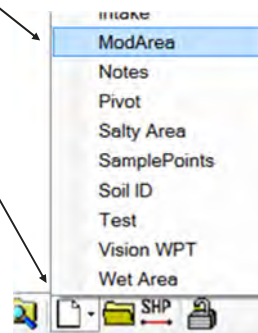
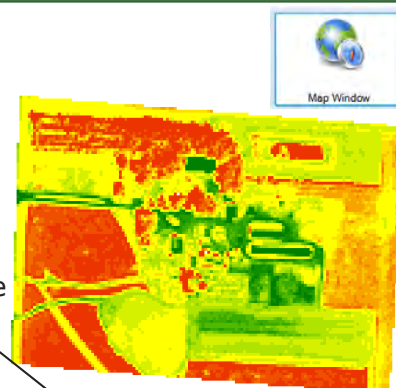
9. A window will appear that gives you math operations that can be performed on the area under the polygon. Choose "Replace with this Value." Enter in the new rate that will be under the Mod Area. Click OK.

10. Make sure the test.grd is the active layer and "Save Changes."

- Note the color table has changed due to the zero rate. The other areas will have the same rates that were entered earlier.

Export the test map

- Follow the instructions in the *Export Prescription Maps* section to bring it to the controller that will be used for testing.

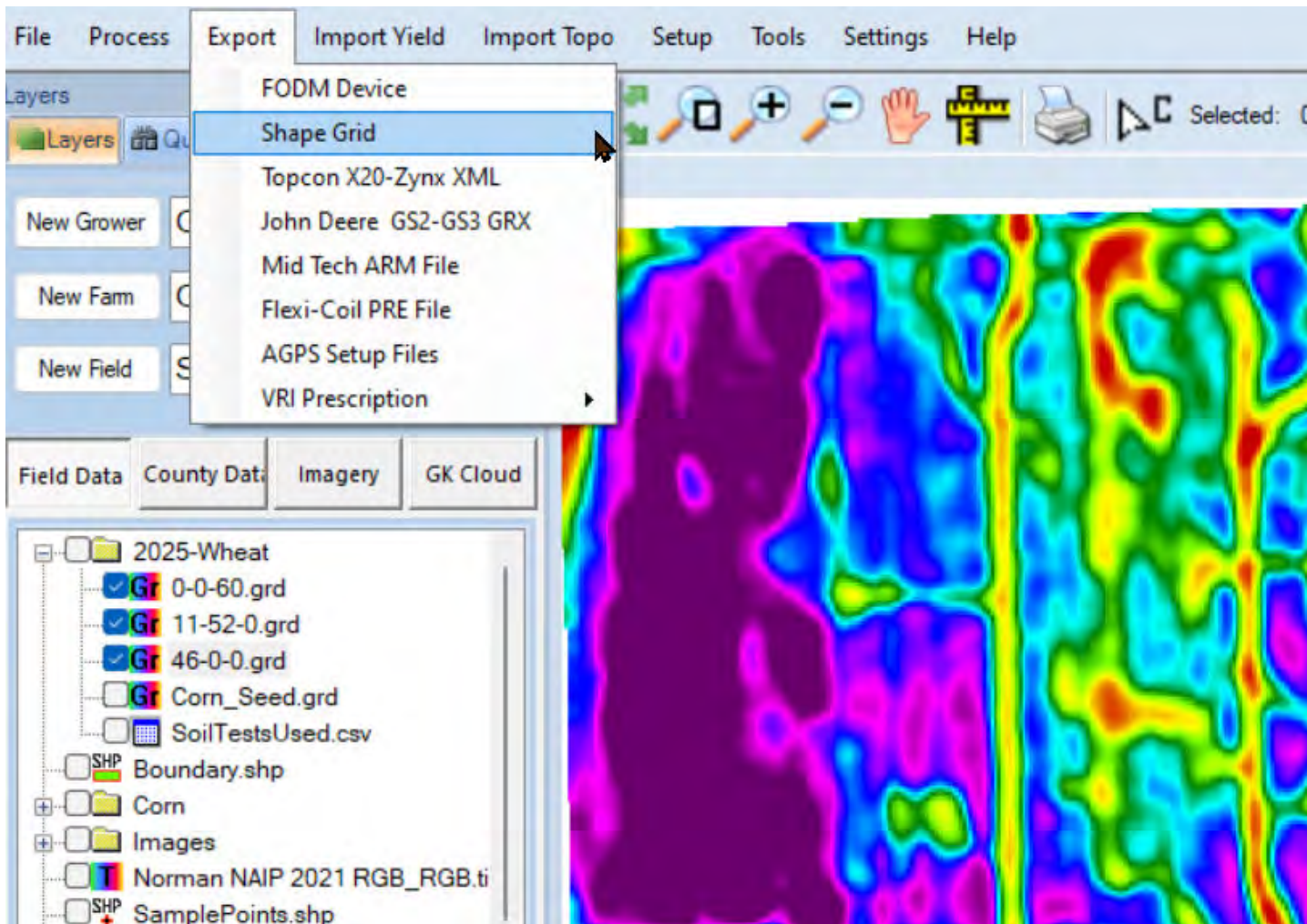


Export Prescription Maps—Shape Grids

Exporting to a Shape Grid

Exporting files as “shape grids” is used for sending files directly to controllers in a shapefile format. It can also be useful for exporting maps to other software for map creation or for data transfer. Keep in mind, the output settings you use in ADMS may cause controller problems when exporting the same file out of other software.

1. Turn on **ONLY** the VRT Surface maps to be exported.
 - Background “Images” turned on will not cause any problems.
 - This is a good time to do your Printing
2. On the Top Toolbar—Choose “Export” & “Shape Grid”



Export Prescription Maps—Shape Grids

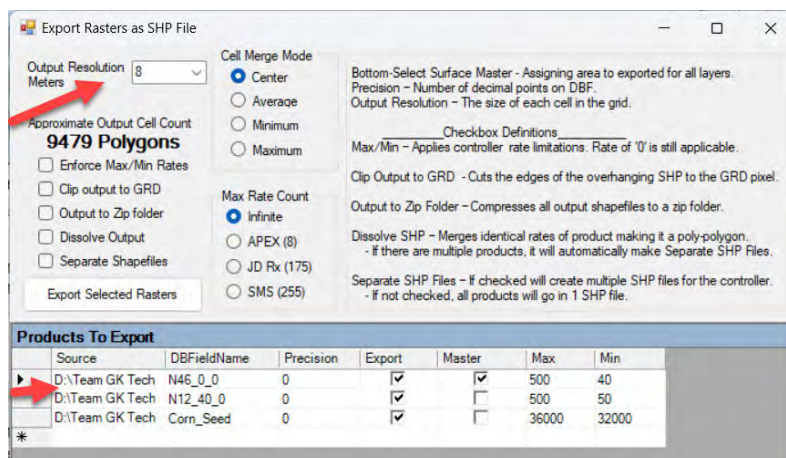
Exporting to a Shape Grid (cont.)

Output Resolution Meters

Change resolution number (in meters) to increase or decrease the number of polygons exported (Cell Count) to meet controller limitations.

Note: Changing value in drop down will change the “**Approximate Output Cell Count**” (polygon count)

Note: in this example there are 3 maps turned on to show different functions. Map information shows up in “Products to Export” discussed later.



Enforce Max/Min Rates

Function for controller limitations—minimum / maximum application rates (Values auto populate or type in values below in Max & Min cells).

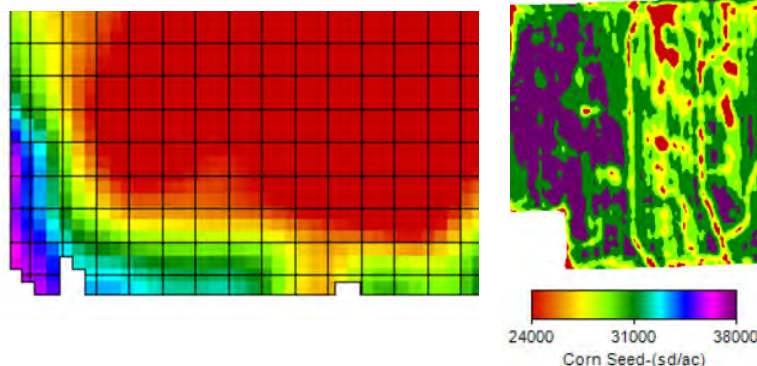
Example– 12-40-0 has rates from 0 to 112, going up in 1 increments. Checking Enforce (50 for Min) still gives a “0” then values less than 25=0 & 25-50=50 So rates in DBF will have 0 then the next rate will be 50, and 50 to 112 is Variable. Max/Min values can be edited in Products to Export. (NOTE may affect total LBS of product applied)

Note: If GRD product name matches a Product ID from the Fertilizers Database it will automatically populate the Max / Min Column Values in the database. If GRD does not match, uses values from the color bar.

Clip output to GRD

Clips the prescription **Shape Grid** being created to the prescription GRD file.

Note: Using “Average” Cell Merge Mode will give best results Clipping. May not be best answer with Hard Breaks.



Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

Output to Zip folder

If Checked. Creates Shapefile in export location as normal, also creates a **Zipped File** of the same prescriptions. Zip File is ready to email or send to the web.

☐ Enforce Max/Min Rates
☐ Clip output to GRD
☐ Output to Zip folder
☐ Dissolve Output
☐ Separate Shapefiles

Dissolve Output

Function should only be used with maps that have "Hard Breaks". This works best with maps that have less than 20 hard break rates.

Suggested Output Resolution:

- Keep "Approximate Output Cell Count" Under 40,000 polygons usually works best with "Hard Breaks"

NOTE: Does not work with maps with high rate counts or "Interpolated" prescription maps.

Example:

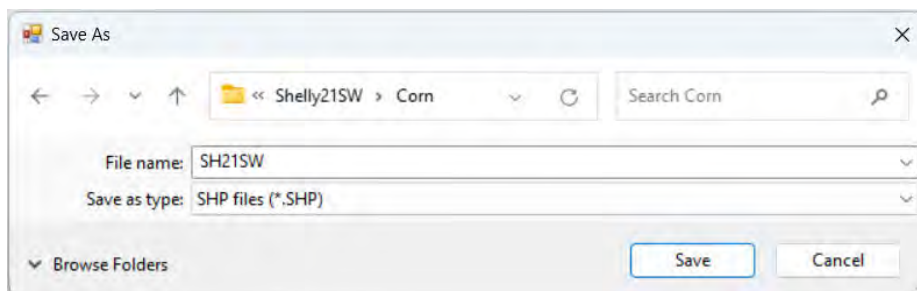
Corn_Seed = Yes Dissolve (hard breaks)

46-0-0 & 12-40-0 = No do not Dissolve (interpolated)

Separate Shapefiles

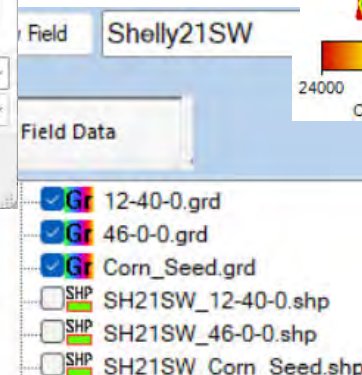
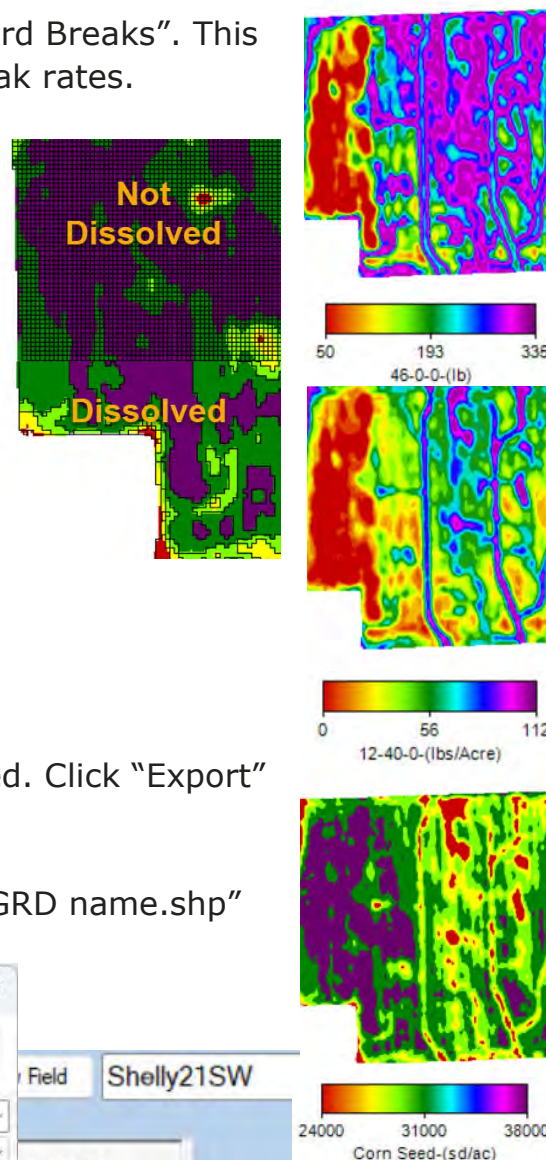
Works with export of Multiple GRD files being converted. Click "Export" and in the "Save As" window, type only the Field ID

ADMS will add the "GRD" name - Example: "Field ID_GRD name.shp"



—See output .shp names to the Right. >>>

NOTE: Will not work with a single map.

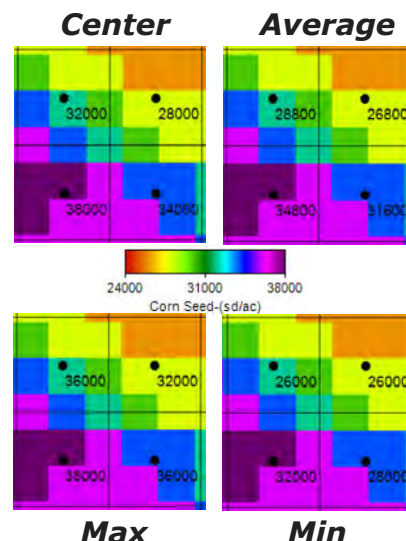
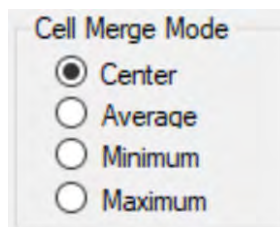


Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

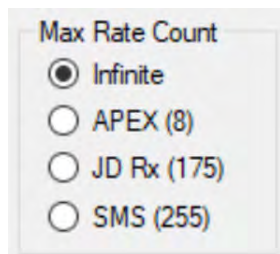
Cell Merge Mode

- **Center**—returns the pixel value at the “Center” of the SHP Grid
- **Average**—returns the “Average” of the pixels under the SHP Grid (Will result in rates not in the .grd map)
- **Minimum**—returns “Min” pixel value under the SHP Grid
- **Maximum**—returns “Max” pixel value under the SHP Grid



Max Rate Count

- **Infinite** - No limitation on the number of individual rates in output map Shapefile-DBF.
- **Apex (8)** - Limits map to 8 rates .
- **JD Rx (175)** - Limits map to 175 rates .
- **SMS (255)** - Limits map to 255 rates.



Products To Export							
	Source	DBFieldName	Precision	Export	Master	Max	Min
▶	C:\Dropbox (Team	N46_0_0	0	☒	☒	500	40
	C:\Dropbox (Team	N12_40_0	0	☒	☐	500	50
	C:\Dropbox (Team	Corn_Seed	0	☒	☐	36000	32000

Products to Export

Source

Location of the product layer.grd DO NOT edit this data.

DBFieldName

NAME of product.grd and Name of New Column in SHP file. Name can be edited, limit names to abc123-__ characters. Limited to 10 digits. (NO special characters). ADMS automatically adds “N” on products with # for first charter. N = Numeric

Precision

Shows the number of decimal points in a rate (suggest “0” for most Rx)

Export

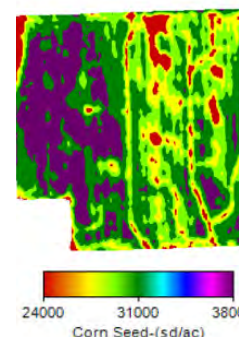
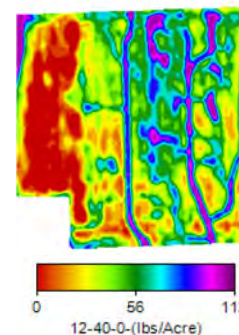
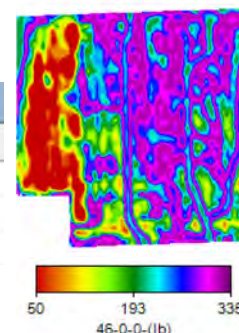
If checked the layer will be included in the export

Master

Sets area of all maps to be exported based on the overlapping areas to this layer.

Max & Min

Values come from “Fertilizers” table first, based on .grd name. If no name match, max/min from color bar will populate values. For Controller Limits, Min of 50 will still have a “0” on 12-40-0 (less than 25=0 & 25-50=50) 0_50 to 112 is Variable. These values can be edited. (NOTE may affect total LBS of product applied)



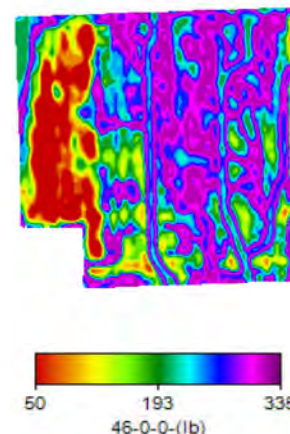
Export Prescription Maps—Shape Grids

Exporting to a Shape Grid (cont.)

Note: in this example there are 3 maps turned on to show different functions.

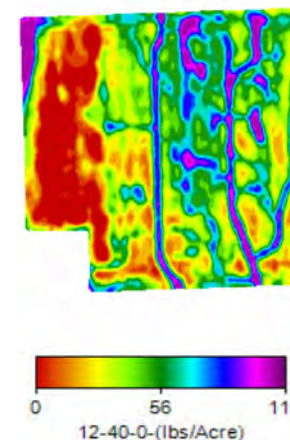
Most VRT Fertilizer maps (No zero rates or Max/Min)

Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Do not check
Cell Merge Mode	Average
Max Rate Count	Infinite—normally (see controller notes)
Precision	"0"
Dissolve	Checked (No) do not dissolve



VRT Maps built with "MAX/MIN" and Zero rates

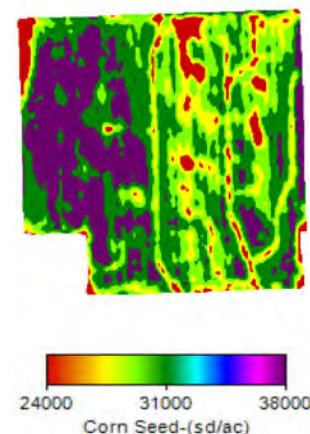
Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Checked "ON"
Cell Merge Mode	Center
Max Rate Count	Infinite—normally (see controller notes)
Precision	"0"
Dissolve	Checked (No) do not dissolve



VRT Maps built for Corn Seed—NOT Interpolated maps

—(Hard Rate Breaks)—

Export Setting	Resolution 6 or 8 meter for most
Enforce Max/Min Rate	Do not check
Cell Merge Mode	Center
Max Rate Count	Infinite (always on Hard Breaks)
Precision	"0"
Dissolve	Checked (Yes) do dissolve



See individual CONTROLLER NOTES on the next page.

Export : SHP Grid (SHP / SHX / DBF / PRJ)

	Agleader ALL & SMS	CNH Pro700 Pro1200	John Deere 2600- 2630 -4600 Op. Center	Outback Max & Rebel FarmWorks	Precision Planting 20/20 FieldView	Raven Envizio	Raven Viper Pro Viper 4	Raven CR7 & CR12	Topcon X30-35 C3000	Fendt	Trimble ALL
Max Cell Count	30,000	500	20,000	20,000	10,000	2,500	20,000	10,000	30,000	20,000	1,500
Suggested Cell Count	< 10,000	HB*	< 10,000	< 10,000	< 10,000 Sugg HB*	HB*	< 10,000	< 10,000	< 10,000	< 10,000	HB*
Separate Shapefiles	Either**	Checked	Checked	Checked	Checked	Checked	Either**	Either**	Either**	Checked	Checked
Cell Merge Mode	Center	Center	Center	Center	Center	Center	Center	Center	Center	Center	Center
Max Rate Count Interpolated	SMS 255	SMS 254	JD RX 175	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	SMS 254
Max Rate Count Hard Breaks	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite	Infinite
Dissolve Output	Either***	Check	Either***	Either***	Either***	Check	Either***	Either***	Either***	Either***	Check
Location of Shapefile on USB or Card	On Root	Shapefile\	Rx\	On Root	On Root	ePro\ WorkOrders \rxMaps\	viper/misc \rxMaps\	On Root	VRC\ Or OnRoot	OnRoot	AgGPS\ Prescriptions\ Prescriptions\
Folder to zip for Website			Rx\		All Fields SHP/SHX/ DBF/PRJ						Precision IQ Structure- Prescriptions\
HB*	"Hard Breaks" Notes on previous 4 pages & next 4 page. "Dissolve" & "Round to Increment" functions used (consider on 300+ac fields)										
Either**	Controller works with a Single Rx Product per 1 Shapefile(SHP) or Multiple Rx Products per 1 Shapefile(SHP)										
Either***	Controller handles Standard SHP Grid (use on Full Interpolation.grd) or Dissolved SHP Grid (use on Hard Break.grd)										

Export Prescription Maps—Hard Breaks

Round to Increment—Surface.grd

There are many uses for this tool. A common example would be working with a controller that has a limit to the number of Polygons or Rates or BOTH. Below is a 46-0-0 map that is going out to a Trimble Easy Guide 500. Controller is limited to 1,500 polygons and 255 rates. Example uses (20)-shows how the rates will become 160-180-200-220 and so on.

1. Turn on the Rx.grd map to be Rounded.

2. Click on the “Intra-Layer Math” button on bottom toolbar.

3. Check “Round to Increment” option

4. Type in the “Increment Interval” you want on the map.

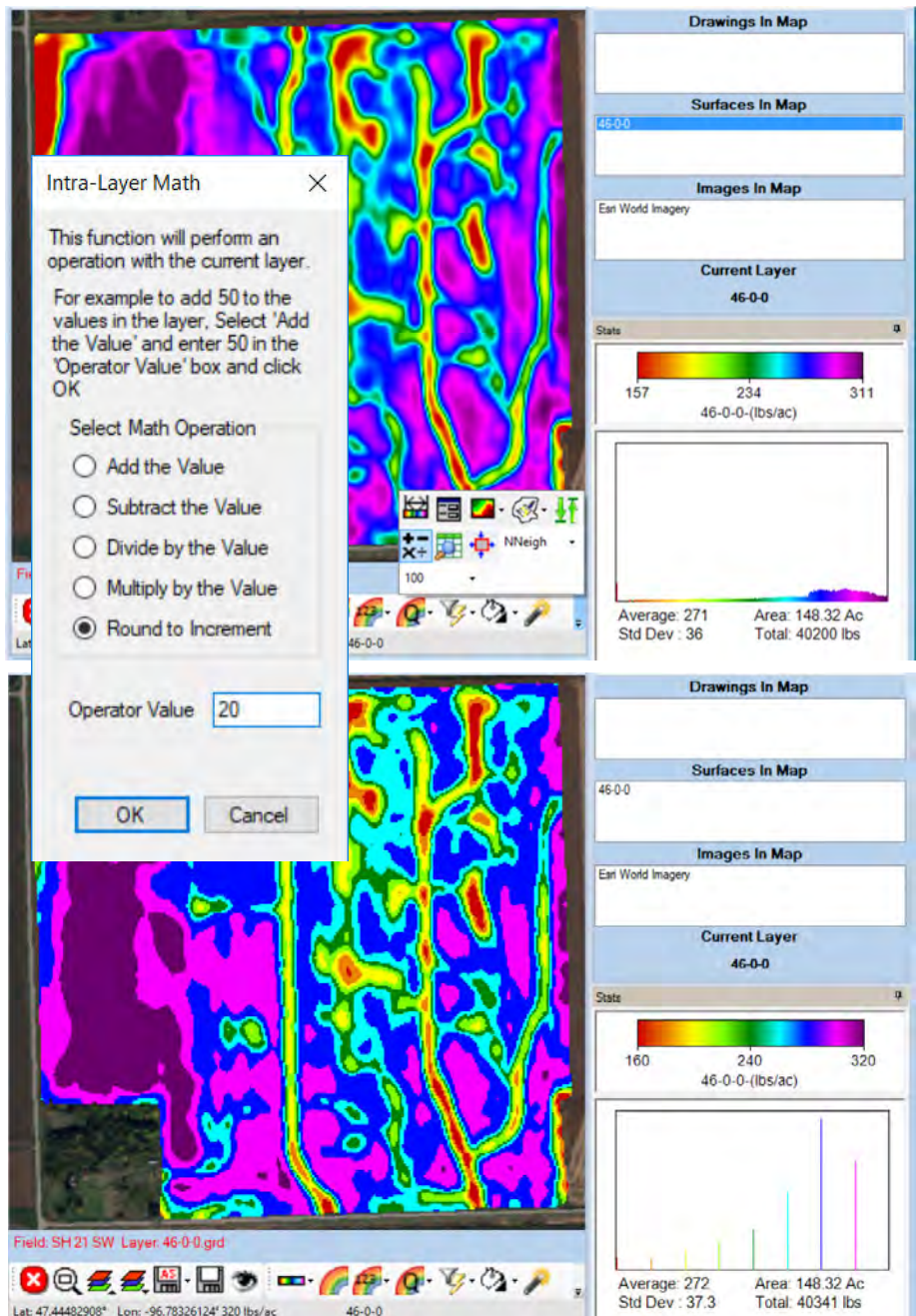
5. Click “OK”

Note: the Average & Totals will change slightly.

6. If maps look good, Click the “Save” or “Save As” button.

Highly Suggested: use as a SURFACE round to Increment User can PRINT the surface maps getting all the rates, breaks and totals.

7. Now maps can be exported using whatever method you choose. (contour/grid/fodd) SHP with Dissolve is suggested



Export Prescription Maps—Hard Breaks

Exporting for Large Fields with Polygon Limitations

This method will work well for CNH—**Pro700** & **Pro1200**. Also for **Trimble** controllers needing one Rx application and the **20/20 Precision Planting Gen 3** monitor.

Start here if you have "0" Rates in VR map

In map window - NOTE- this step is needed if you have "0" rates in the field. If no "0's" the smoothing can be done on the Rx.grd

Turn on zones.grd

Save As - zones.grd to new name Zones-SM.grd

Zones-SM.grd smooth 3 times with 5x5 smooth & save

In merge Zone Results

Turn on Zones-SM.grd

Write the RX maps as normal using the "interpolate" and "enforce product max min"

Start here if you have NO "0" Rates in VR map

In map window

This process is for "interpolated" VR maps

Turn on the Rx.grd (this is where you would smooth if you did not smooth zones)

Suggest doing 2 – 5x5 smooths

On bottom tool bar – "+-x/" button

Round to increment

Try to get roughly 10 - 15 rates (find a nice # 5/10/15/20/25/30) are nice break points.

Once happy save the Rx.grd

Like to "Clear Map" here

Turn on Rx.grd

Export as SHP Grid

Leave at all the setting here at defaults

6m –(good 30ac to 350ac) _ (Over 350ac Use 8m good to 700ac)

Center / Infinite / 0 decimal

Export and do NOT rename

Export Prescription Maps—Hard Breaks

Round to Increment—SHP Files

There are many uses for this tool. A common example would be working with a controller that has a limit to the number of Polygons or Rates or BOTH. Below is a 46-0-0 map that is going out to a Trimble Easy Guide 500. Controller is limited to 1,500 polygons and 255 rates. Example uses (20)-shows how the rates will become 160-180-200-220 and so on.

1. Turn on the Rx.SHP map to be Rounded.

2. Click on the “Perform a Math Operation on a Column” button on bottom toolbar.

3. Choose Column to Modify.

4. Check the “Round to Increment” option

5. Type in the “Operator Value” & Click “OK”

6. If Values in Database look good, Click the “Save” or “Save As” button.

Prefer doing Round to Increment on Surfaces so they can be printed. Then Exported as a SHP.

7. Now maps can be handed off to most controllers that support SHP.

NOTE: Look at using “Dissolve” drawing tool

Reminder: Color bar in lower Right is for SURFACE not SHP.

The screenshot displays the ADMS software interface. A 'Column Math' dialog box is open, showing options for performing a math operation on a database column. The 'Database Column to Modify' is set to 'N46_0_0'. The 'Operator Value' is set to 20. The 'Round to Increment' option is selected. The background shows a map with a color scale from 157 to 311. The 'Database' table at the bottom shows the following data:

	N46_0_0	N11_52_0	GKT_IDX	GKT_Length	GKT_Area
250	120	1	78.74	0.009	200
240	120	2	78.74	0.009	220
240	120	3	78.74	0.009	240
240	120	4	78.74	0.009	260
240	120	5	78.74	0.009	280
240	120	6	78.74	0.009	300
240	120	7	78.74	0.009	320

Summary statistics: Average: 271, Area: 148.32 Ac, Std Dev: 36, Total: 40200 lbs.

Export Prescription Maps—Hard Breaks

Exporting for Large Fields with Polygon Limitations

Check on / turn on the Rx.shp that was just created

Right click on the Rx.shp – Go to “Shape Tools” & “Dissolve”

Dissolve by the Rx column name

At the Bottom – Name it the FieldName-Rx.shp

Run the Dissolve tool

Clear map

Turn on the FieldName-Rx.shp

Click on “Save As”

in the rename window, click on the “FieldName-Rx.shp” which populates the name box
browse over the USB or Folder for all the vrt maps.

For Pro700 – should be selected on or into a folder name “Shapefile”

And hit save, ready for the field.

NOTE- You can only have 1 product per SHP file. SHOULD NOT have 2 products in 1 SHP for the dissolve.

Some NOTES: Watch your SHP file here, if you get complicated / noisy zones-rx files or put in too many rates the SHP file will get too big. Too big is a relative term. If you start getting SHP file larger than 1mb it can cause problems. This is essentially a LOT of vertices. To fix this, change the resolution of the export shp grid or get less rates at round to increments or smooth the maps more.

	46-0-0-3m.dbf	3/24/2022 ...	OpenOffic...	1,150 KB
	46-0-0-3m.GKT_VAF	3/24/2022 ...	GKT_VAF F...	3 KB
	46-0-0-3m.prj	3/24/2022 ...	PRJ File	1 KB
	46-0-0-3m.shp	3/24/2022 ...	DWG True...	9,198 KB
	46-0-0-3m.shx	3/24/2022 ...	SHX File	542 KB
☒	46-0-0-3m-Dissolve.dbf	3/24/2022 ...	OpenOffic...	1 KB
☒	46-0-0-3m-Dissolve.GKT_VAF	3/24/2022 ...	GKT_VAF F...	3 KB
☒	46-0-0-3m-Dissolve.prj	3/24/2022 ...	PRJ File	1 KB
☒	46-0-0-3m-Dissolve.shp	3/24/2022 ...	DWG True...	1,093 KB
☒	46-0-0-3m-Dissolve.shx	3/24/2022 ...	SHX File	1 KB
	46-0-0-6m.dbf	3/24/2022 ...	OpenOffic...	288 KB
	46-0-0-6m.GKT_VAF	3/24/2022 ...	GKT_VAF F...	3 KB
	46-0-0-6m.prj	3/24/2022 ...	PRJ File	1 KB
	46-0-0-6m.shp	3/24/2022 ...	DWG True...	2,300 KB
	46-0-0-6m.shx	3/24/2022 ...	SHX File	136 KB
☒	46-0-0-6m-Dissolve.dbf	3/24/2022 ...	OpenOffic...	1 KB
☒	46-0-0-6m-Dissolve.GKT_VAF	3/24/2022 ...	GKT_VAF F...	3 KB
☒	46-0-0-6m-Dissolve.prj	3/24/2022 ...	PRJ File	1 KB
☒	46-0-0-6m-Dissolve.shp	3/24/2022 ...	DWG True...	542 KB
☒	46-0-0-6m-Dissolve.shx	3/24/2022 ...	SHX File	1 KB

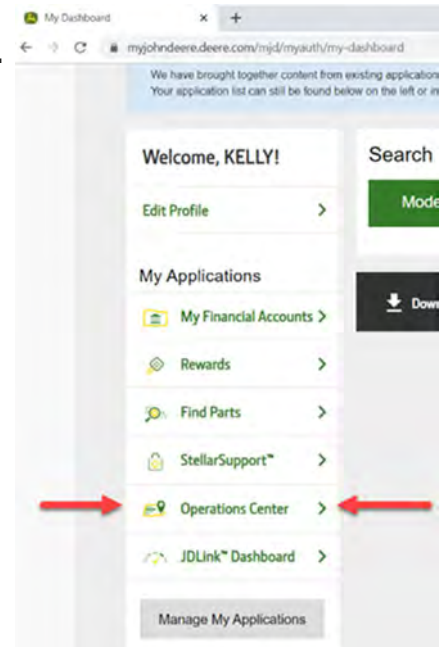
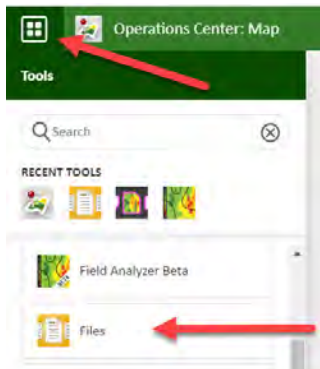
Exporting Prescription Maps

To upload xxxx.zip Variable Rate files into **my John Deere**.

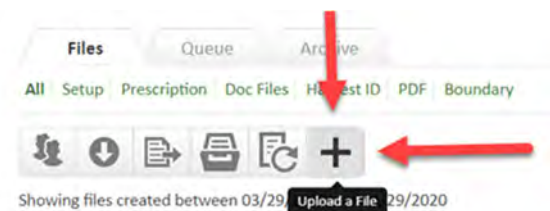
Go to <https://myjohndeere.deere.com/mjd/my/login>

Click on "Operations Center"

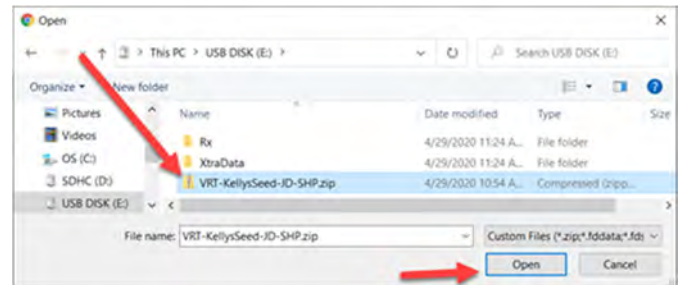
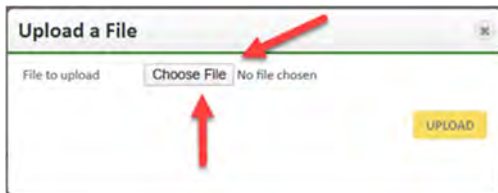
Click on the  Button and Choose "Files"



In the Files window – click on the  Button



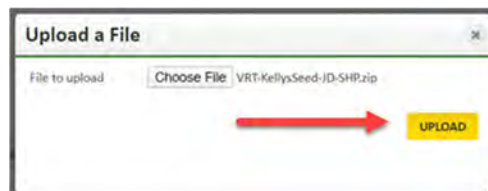
This will open the Upload a File window "Choose File"



Browse to the - VRT-JDSHP.zip folder location & Select & Open.

NOTE this an "Rx" folder with shp/shx/dbf/prj files zipped by Right click on Rx and send to compressed zip for those who are building the files. Can have many fields and files.

Click "Upload"

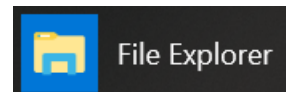


There may be a delay and you may have to click the  Button again and reselect the "files". You should see your upload file.

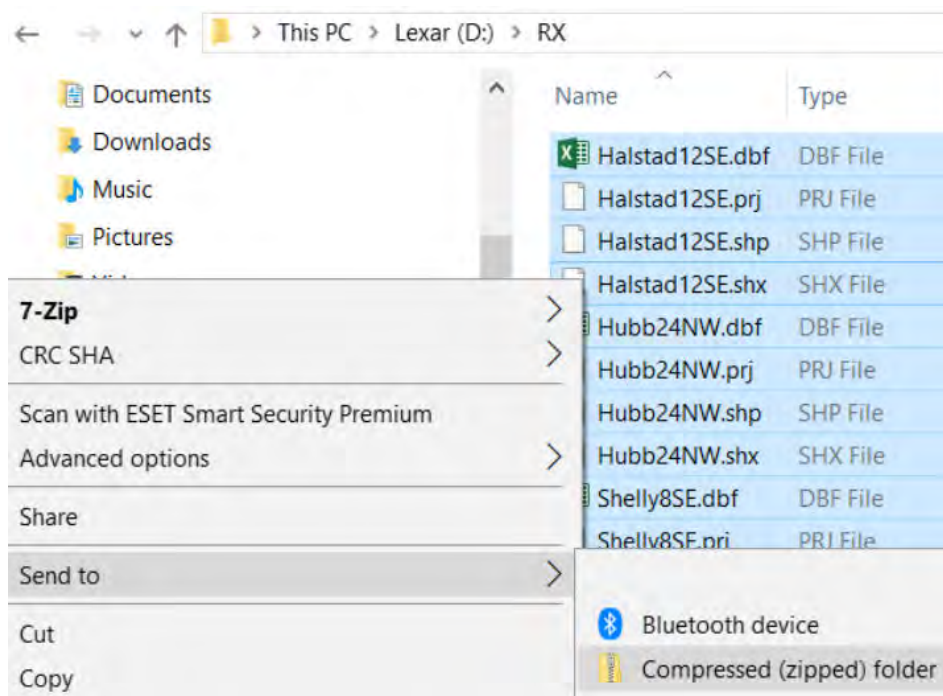
Final Step – Check the file to send to the Equipment
Click the "Send Files to Equipment" button.

Exporting Prescription Maps

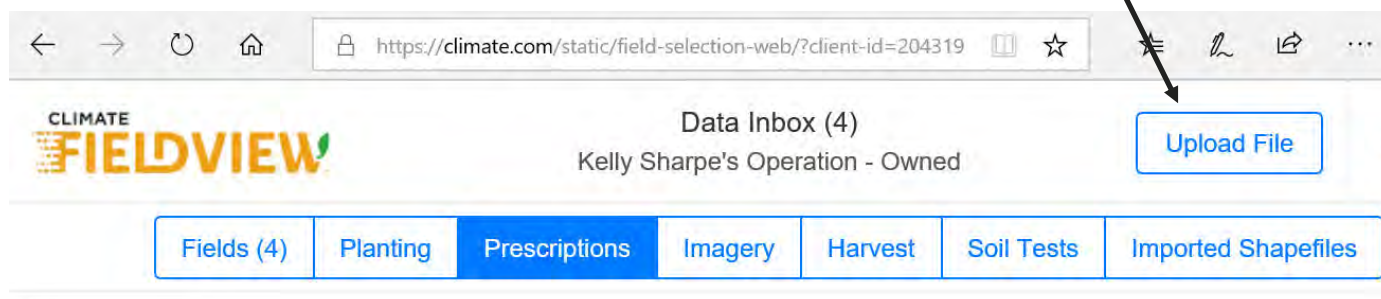
SHP Files to Climate Field View



1. This function is done in "File Explorer"
2. Files have been exported as SHP file Rx maps (SHP Grid or SHP Contours).
3. Save all you files back to 1 location as you were sending them to USB.
4. Once all the files are in one location, "Highlight or Select" all the files.
5. Right Click on the files, choose "Send to" and "Compressed (zipped) folder"
6. Repeat for other Farms



7. Go to your preferred "FieldView" account.
8. Browse to Import and highlight "Prescriptions", then click "Upload File".
9. In File Explorer find the xxx.zip file you created.
10. Once you click "Open" the system unzips and stores files in their system. May take a while for maps to be viewable in the system.



Exporting Prescription Maps

Rx Map to a John Deere GS2—GS3 (2600—2630) as GRX

Note: 4600 does NOT support GRX files!

Layers:

Check the layers to be exported to the rate controller card.

Grid Res (meters):

We recommend leaving the "Grid Res (meters)" at "3". This should work with almost all field sizes.

(Reducing this down to 1 meter is recommended if you are doing test strips in the field.)

Rate Count:

This is the number of "Rates" that will be written into the map. For seeding, drop the "Rate Count" to the number of different seeding rates in the field. (You may want to reduce this if you are exporting a Corn seed map that only has 8 rates).

Field ID:

This will automatically populate. You may need to shorten the name due to the fact that the finished product will pull its name from this column.

Export Path:

Always write the GRX files out to the root of a jump drive or a data card. Also, you can only have 30 prescriptions in the GRX folder per data card. Do NOT save a GRX folder within an existing GRX folder!

The maps will NOT work if you do!!

Product Name:

Select the type of product to be applied. (These can be modified & added in the Database tab.) If your product does not show up in the list, go to "Database" and "Products".

Out Of Field Rate:

This is the rate used when traveling outside of the field boundary.

Lost GPS Rate:

This is the rate used when the GPS signal is lost.

Unit of Measure:

This is the unit of measure for the desired application. Match this to the prescription map.

Rx Type:

- **Liquid applicators** get "Application By Volume"
- **Dry Fert** gets "Application By Mass"
- **Row crop planters** get "Seeding By Count"
- **Air seeders with seed** get "Seeding By Mass"

Final Step: Click "Export"

NOTE: Seeding / Planting & Liquid products - must re-select the "Rx Type" & "Units of Measure" before "Export"

Export Prescription Maps—FODM Device

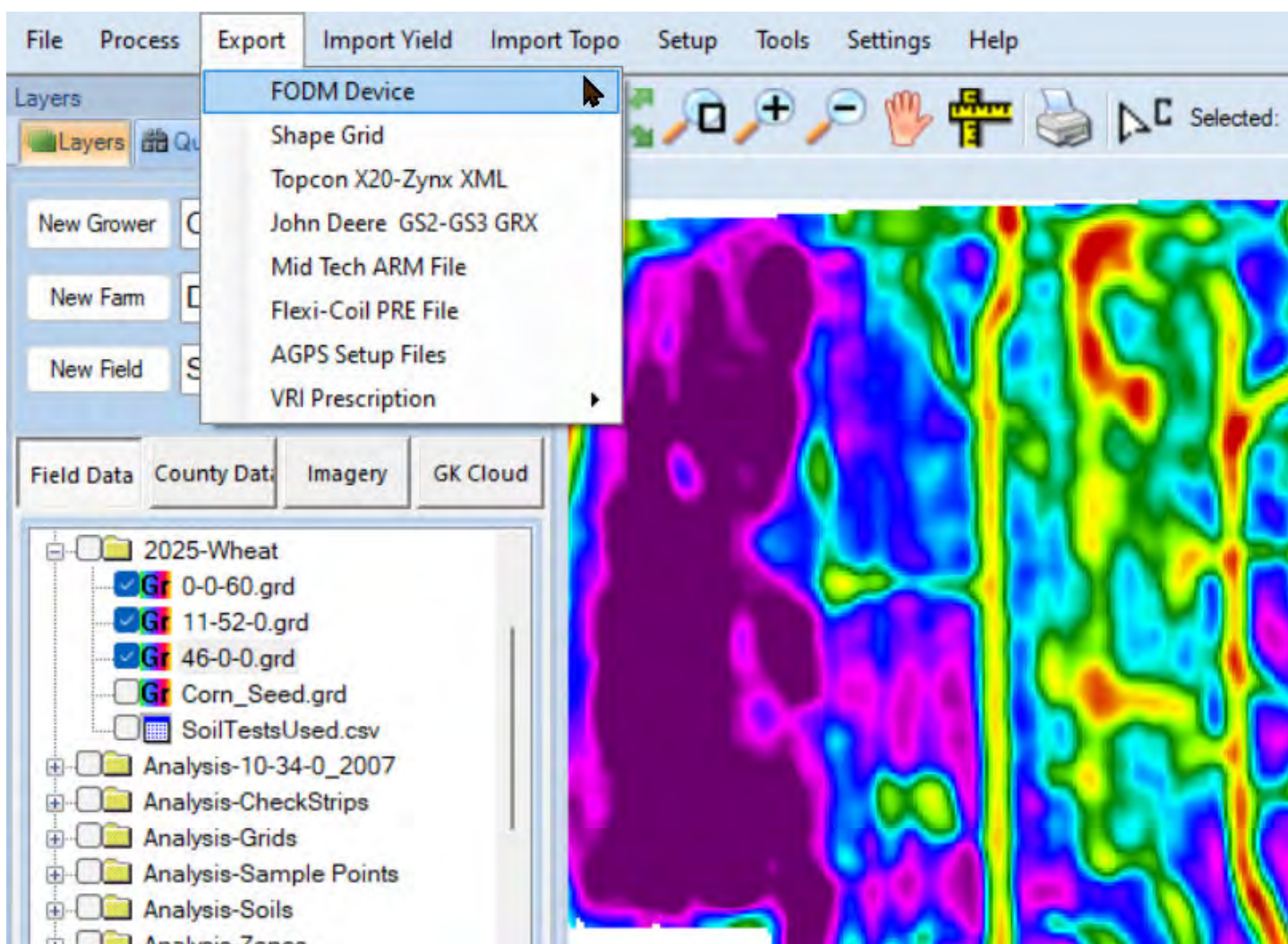
Exporting to a FODM Device

Exporting Fertilizer Prescriptions is recommended only in “**Map Window**”. You will need to go to this window to print out your maps.

Make sure the “Field Boundary.shp” is turned on and the Surface Maps to export. Nothing else should be turned on at this time.

NOTE: Export 1 FIELD at a time with multiple products per FIELD.

See the Following Pages for Instructions for YOUR Controller.

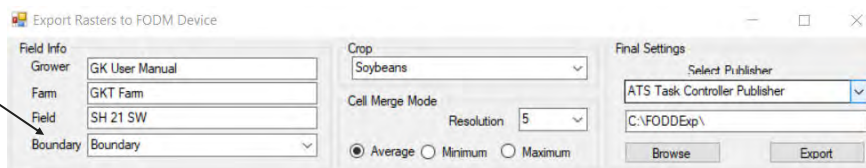


Export Prescription Maps—FODM Device

Exporting Prescription Maps

1. **"Export Rasters to FODM Device"** window and under the Field Info make sure the Grower, Farm, and Field are correct
2. Select the field boundary.

Note: Poly-Polygons may cause problems?

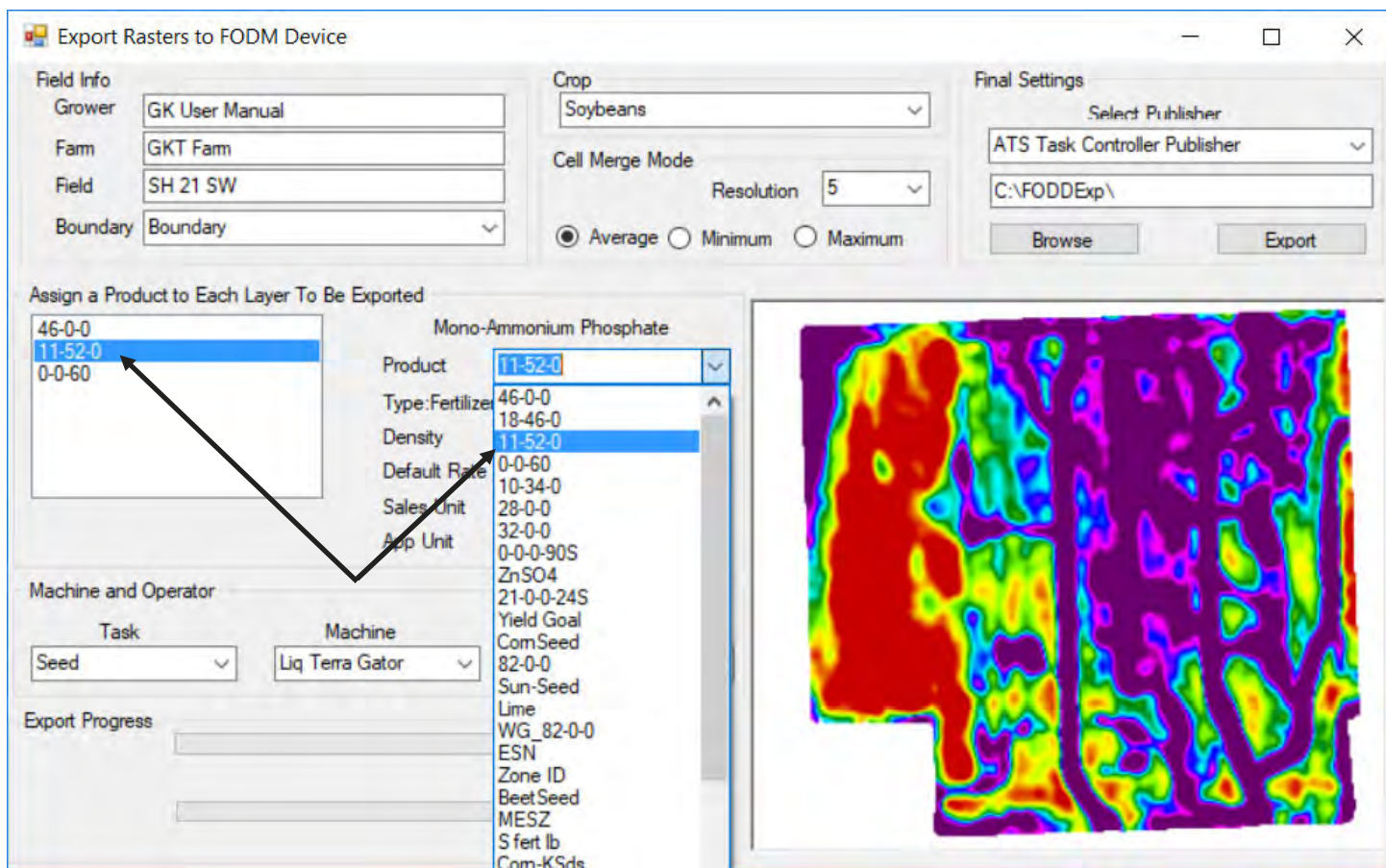


3. Next, **"Assign - Product To Each Layer To Be Exported"**. This is done by "Selecting" or "Highlighting" the Prescription name and choosing the correct "Product" from the drop down list.

NOTE: Default rate must be set in the "Setup" & "Fertilizers" buttons.

4. Choose your "Task" / "Machine" / "Operator" / "Crop"

NOTE: To add a Task, Machine or Operator to the drop down go to the Top Menu of ADMS and Click on "Setup" and choose the item. (+ to add new and "Save")



Export Prescription Maps—FODM Device

Exporting Prescription Maps

5. Assign Resolution Suggest 5 or 6 and cell merge mode (use Average)

6. Select “Controller”

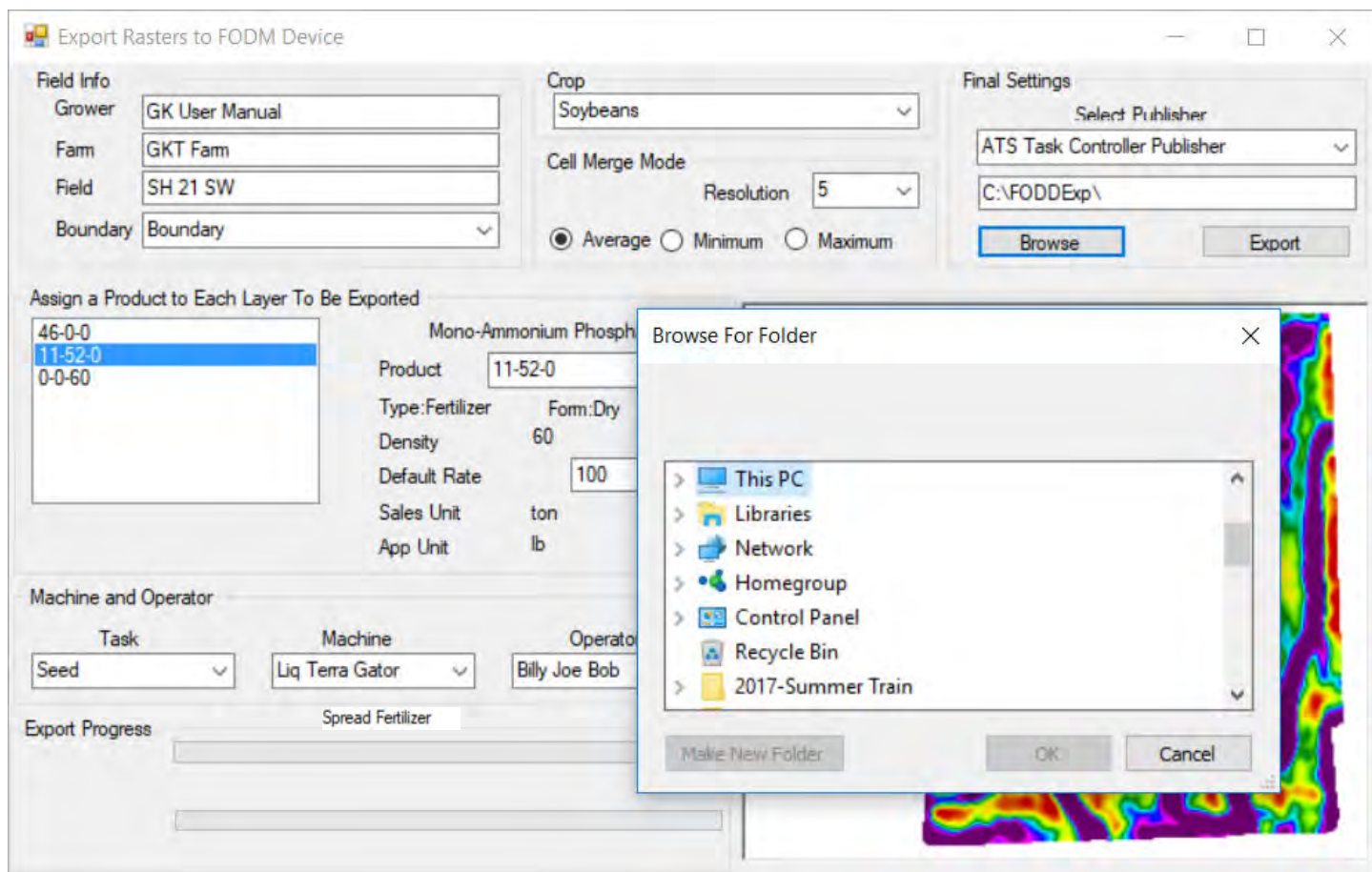
7. Choose the output or Save Location using the “Browse” button.

NOTE: Usually leave the location at default location shown below. Then move the files later.

8. Click “Export”

9. Final “Controller” setting values are highlighted in the “FODM Device” table on the next page.

If missing a controller and need more FODD’s. Contact the folks at GK Technology. They will assist you in finding the drivers you need.



Export Prescription Maps—FODM Device

Export : FODM Device

	Agleader Insight & Integra "IRX"	Agleader PF3000 & Insight "TGT"	Mid-Tech	AGCO - Falcon2	Agco GTA C-1000 Falcon VT Amity	Outback Max&Rebel	Topcon X30 Topcon X35 C-3000	CNH Pro700 IntelliView II (Version 2)	CNH Pro700 IntelliView II (Version 3)
Controller: Selection	AgLeader IRX Publisher	AgLeader TGT Publisher	Mid-Tech Prescriptions	ATS Falcon Publisher	ATS Task Controller Publisher	ATS Task Controller Publisher	ATS Task Controller Publisher	ATS Task Controller Publisher	ATS Task Controller Publisher
Filename Template:	Any that use %ProductID	Any that use %ProductID	Any that use %ProductID or %ProductName	Any that use %ProductName	NA	NA	NA	NA	NA
Cell Size	10	25	5	6	8	8	8	8	8
Cell Rate Method	NA	NA	NA	Centroid	Centroid	Centroid	Centroid	Centroid	Centroid
Task Controller Version	NA	NA	NA	NA	FinalDraft Version 1	FinalDraft Version 1	FinalDraft Version 1	Standard Version 2	Standard Version 3
Merge or Dealer ID	NA	NA	NA	6 digit spreader ID # required	**No on first Rx Yes-Multiple	**No on first Rx Yes- Multiple	**No on first Rx Yes- Multiple	**No on first Rx Yes- Multiple	**No on first Rx Yes- Multiple
ISO Compliant or Export Boundaries	NA	NA	False	NA	No	Yes	No	Yes	Yes
USB Folder Structure	IRX file on ROOT of USB	TGT on ROOT of Card	Field Folder to ROOT of Card	All TIFs on root of 3.5" floppy - 1 field / disk	TaskData on Root	TaskData on Root	TaskData in ISOXML folder	TaskData on Root	TaskData on Root
			NOTE: The Field Folder will contain a xxx.arm file.	NOTE: Multiple TIF files can be in a Grower - Field structure for USB	**NOTE: ALL "ATS Task Controller" Using the "Merge" function, Always "No" on the first export. Then Use "Yes" if you want to do multiple fields of "Rx" in 1 TaskData Folder. NOTE: Can re-name the TaskData folder to Field Name - still in ISOXML Folder				

Export Prescription Maps - Kinzie—Blue Vantage

Kinzie—Blue Vantage—SHP Export

This export has not been “automated” in ADMS yet. It will be soon. Ask GK Staff if there is an update. The Blue Vantage will only apply 1 product. Here is the process that worked in 2022.

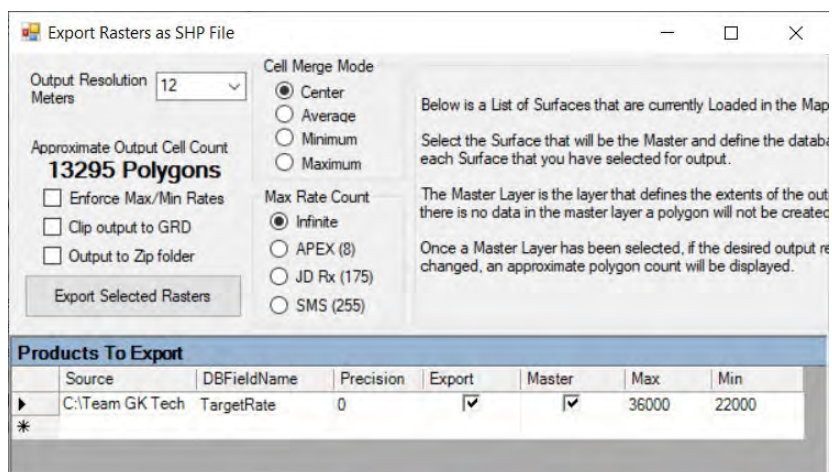
Turn on Rx.grd to export. It should be in hard break increments with less than 15 rates.
- Go to “Save As” name the new .grd “TargetRate” (name must be exact, no spaces).

Clear map & turn on TargetRate

Export & Export SHP Grid

Use settings like you see on the Right.

- 12 meter
- Cell merge—Center
- Max Rate—Infinite



Note, leave the name as “TargetRate.shp”

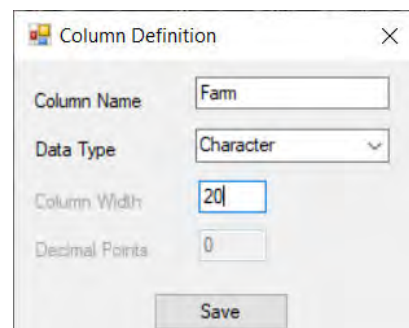
Clear Map—Right Click on the TargetRate.shp—Choose “Shape Tools” & “Dissolve”

- Field to Aggregate = TargetRate
- Output—use “field name”

Turn on the “Field Name Rx.shp

NOTE— needs “Columns” & “Header Names” exactly like below.

- Right click to add the header
- Farm & Field names as you see fit less than 20 characters.
- Operations & Units like below



Database					
Objects Selected: 0		DB Operations Select By Query			
	TargetRate	Farm	Field	Operation	Units
	28000	FarmName	FieldName	Planting	sds/ac
	29000	FarmName	FieldName	Planting	sds/ac

Place the shp/shx/dbf/prj files in a “FieldName/Prescription” folder on USB

Export Prescription Maps - Mid Tech

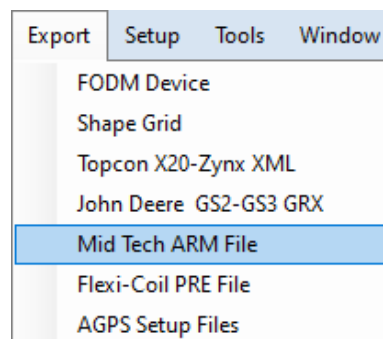
Mid Tech .arm file Export

1. Turn on just the .grd products to export for a given field.

- Can do multiple products for 1 field
- Each ARM file will represent 1 field

2. Turning on boundary is not necessary.

3. Go to "Export" & "Mid Tech ARM File"



4. Adjust "Output Resolution Meters" to less than 3,000 Polygons.

- Suggest less than 2,500 Value is an Estimate

5. Click Dropdown for "Product Name" & assign Product

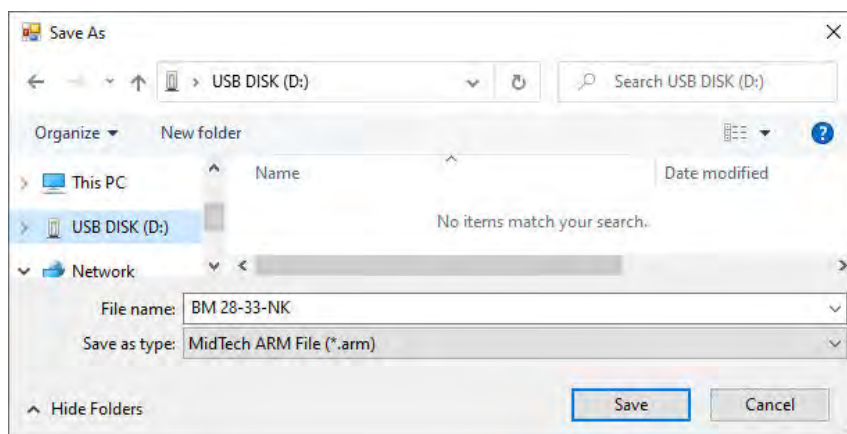
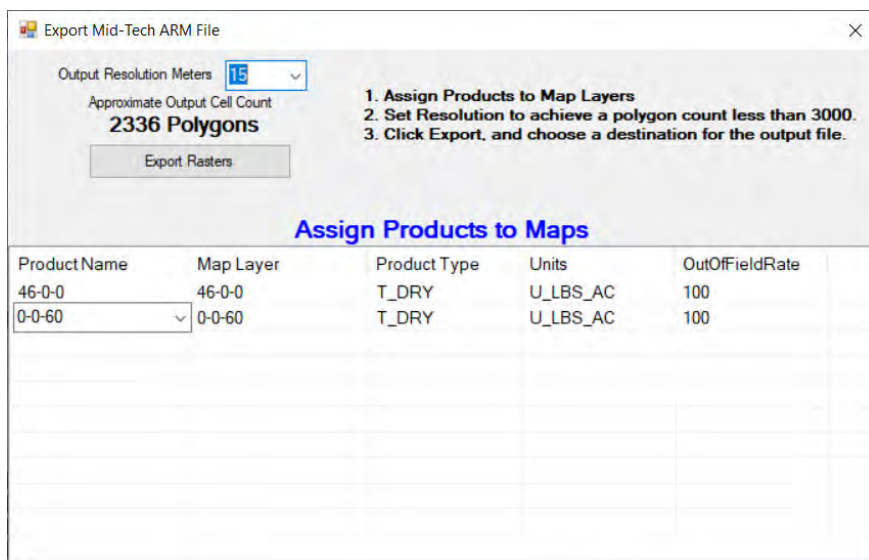
NOTE: Product Type / Units / OutOfFieldRate are set in "Setup" & "Fertilizer" off the Top Toolbar.

6. Click "Export Raster"

7. Choose an "Export Location". Suggest saving to USB or Data Card for controller.

8. Click "Save"

Repeat for each field



Exporting Prescription Maps—Topcon X20 / Zynx

Export a Prescription to a Topcon X20 / Zynx

1. **Rates** - The Zynx export uses the values in the "Thematic color" table for rate definitions.

If you set your map to rainbow with 255 colors and you have "10 rates" in the field, you will still get 255 actual rates. If you open the object and edit with the thematic color tool and take it down to 5 zones, you will get 5 rates. It doesn't matter if you "interpolated" the map or not. (Pay attention to the color table in the lower right hand corner of the Zynx Export Window.)

2. Start ADMS Map Window and then turn on the prescription files (i.e. 82-0-0.grd) in the order that the machine (air seeder/spreader) tanks/hoppers are arranged. The order that the layers are turned on is the tank the product goes to. (You can't change them out in the field either!!). So if the air seeder is a 2 bin and has seed in the 1st tank and 11-52-00 in the second, turn on the seed.grd file 1st, then turn on the 11-52-00.grd 2nd.

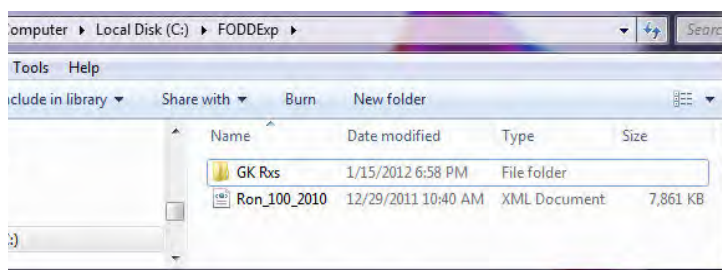
- Unused Tanks - If the machine has a tank or a "channel" that is not being used, you need to assign a blank map to that channel / tank.

3. Now to export, on the Menu toolbar, click "Export" & "Zynx" & "Variable Rate Map".

- A Zynx Prescription Export window should appear (see upper right).

4. Start working on the top left of the window and move your way down.

	Min	Mean	Max	Area	App Rate
0	0	0	0	22.618	
0.6	0.6	0.6	0.002		
1.3	1.3	1.3	0.002		
1.9	1.9	1.9	0.002		
2.6	2.6	2.6	0.002		
3.2	3.2	3.2	0.002		
3.8	3.8	3.8	0.002		
4.5	4.5	4.5	0.002		
5.1	5.1	5.1	0.002		
5.7	5.7	5.7	0.002		
6.4	6.4	6.4	0.002		
7	7	7	0.002		
7.7	7.7	7.7	0.002		
8.3	8.3	8.3	0.002		
8.9	8.9	8.9	0.002		



5. Fill in your name as the "Author". (This is optional).
6. Verify the "Customer", "Farm", & "Field" cells are correct (this should be filled automatically).
7. Select your "Area Units" (i.e. "acre").
8. Type in any desired notes (optional).
9. Next, set the application info for each layer. This has to be done for each product and follow this process through for each product/tank before moving on to the next product!
 - a. Set "Product ID".

Exporting Prescription Maps—Topcon X20 / Zynx

Export a Prescription to a Topcon X20 / Zynx

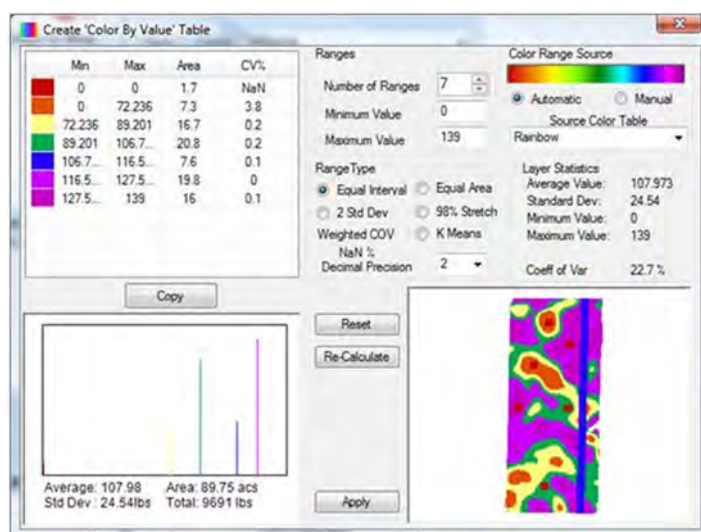
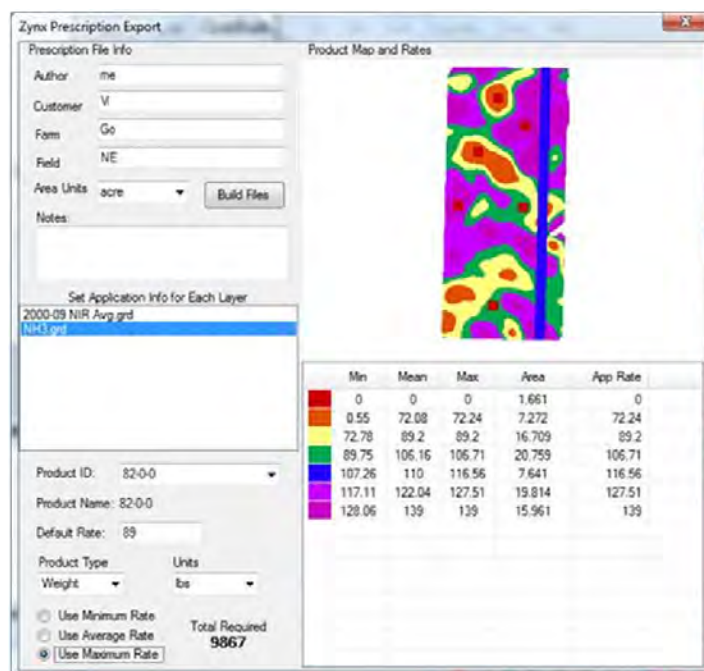
- Type in the Default Rate (numbers only).
- Choose the "Product Type".
- Select the "Units".
- Then click the desired rate (radio button).
 - Use Minimum Rate – Drops the App Rate to the min value of that zone.
 - Use Average Rate – Makes the App Rate the mean of that zone (Most common).
 - Use Maximum Rate – Increases the App Rate to the max value of that zone.

NOTE: Pay attention to "App Rate" on the color table in the lower right of the export window! You will see the "App Rate" column does not populate until you click "Use Average Rate". (Some Rx maps will NOT get rates on a tank as a result!)

- THEN** go back to the next layer and start this process over for each layer. Problems have occurred by not checking the ID, Rate, Type, Units and etc. in the correct sequence!

Example

Look at the "ZERO" rate on this map. The Red area was set in the thematic color to min of 0 and a max 0.00001.



- Click "Build Files". (It will create an ".xml" file with the Farm, Field, & Year in it (see below)).
- That should do it. Now place that xxxx.xml file on the hard drive of the controller under the "C:\Lynx" folder.

Exporting Prescription Maps—VRI

Pivot Grid

Number of Segments—divides each wedge into segments

Pivot Grid

Boundary Field

Center Point: Easting/Northing or Longitude/Latitude

X: 299272.891232818 Y: 5238191.0268707 ☐ From Map

Start and End Angles of the pivot

Start: 0 End: 360

Split the pivot into pie-spliced angles

10

Radius (Units in ft)

1200

Number of Segments

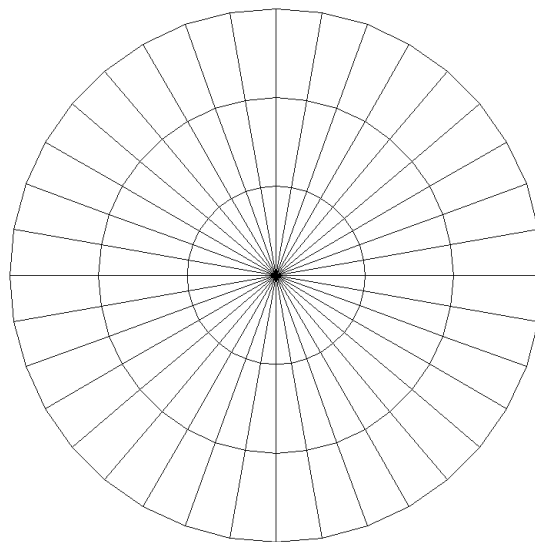
3

Zone Table

Id	Length	Remaining
1	400	800
2	400	400
3	400	0

If this value is greater than 0, then the pivot will be split into banks with concentric circles spaced at the distances specified in the table below.

Cancel Run



When the number of segments is changed, a Zone Table appears to enter the radius of each segment. In the example above, the total radius is 1200 ft, which is to be divided into 3 segments. When a length of 400 is entered for segment one it calculates the remaining distance of the radius to be 800 and will continue calculating as other numbers are entered for the other segments.

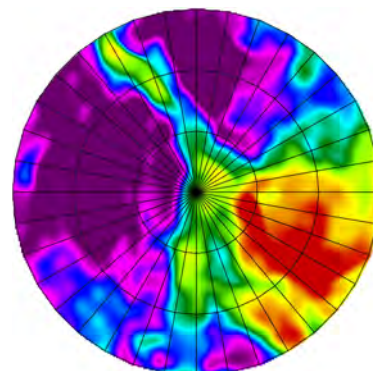
Output Polygon—use the default name or enter the desired name of the output file

Click—**“Run”** to create the pivot grid shapefile

Exporting a VRI Prescription

In order to export a prescription out to a controller, the Rx shapefile has to contain the rates for each polygon, which will ultimately be in a shapefile form.

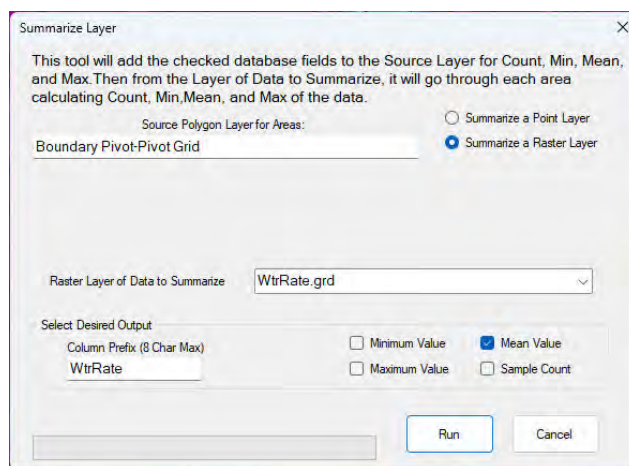
1. Turn on the Pivot Grid shapefile that contains the wedge polygons to be used for the Rx.
2. Turn on the Rx raster map with the water rates for the pivot
3. Right-Click on the shapefile name and select Utilities-Summarize Another Layer



Exporting Prescription Maps—VRI

Creating a VRI Prescription Cont'd

4. Select **Summarize a Raster Layer** since it will be the source for the values being added to the shapefile
5. Select the name of the "Rx" raster layer
6. Select **Mean Value** for desired Output and **Run**
7. Click on the **Database** button at the bottom of the map window to confirm the new column has been added (WtrRateAVG).



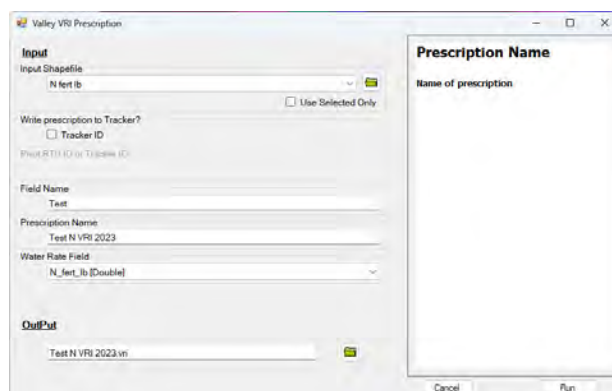
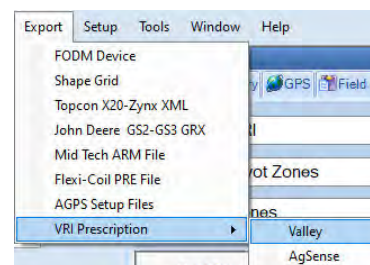
Exporting a VRI Prescription

- At the top of the Map Window, Right-Click on Export, VRI Prescription and select Valley or AgSense

Valley

For Valley controllers, the input rates should be represented as percentages ranging from 0 to 100.

1. Select the input file, which is the product shapefile
2. Uncheck Use Selected Only, unless you only want to export specific polygons of the shapefile
3. Uncheck Tracker ID, unless you have one to enter
4. Change the Field Name if desired
5. Name the prescription
6. Click **Run**, the resulting file will be a VRI

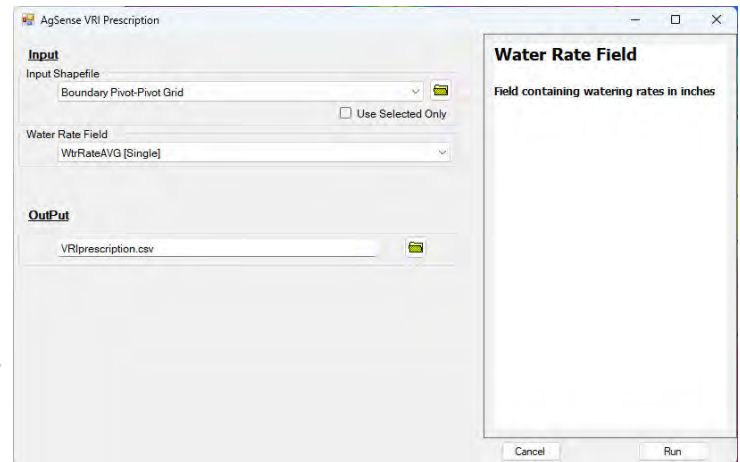


Exporting Prescription Maps—VRI

Exporting a VRI Prescription Cont'd

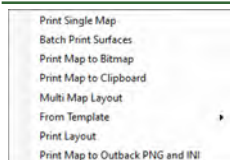
AgSense

1. **Input Shapefile:** Select the shapefile containing the rates of the Rx
2. **Water Rate Field:** Select the column that contains the rate values
3. **Output:** Use the default name or enter the desired name.
4. Click **Run**, the resulting file will be a CSV



Printing

Print—Tools and Tips

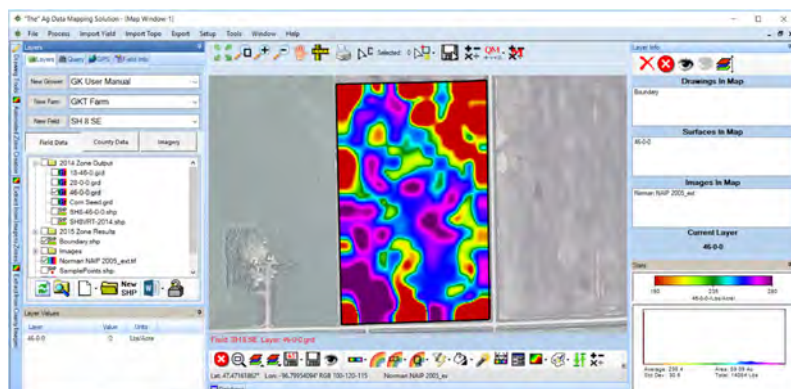


Printed maps are used to convey or transfer data to customers and co-workers. Whatever you see in the window is what will show on the "Printed Map".

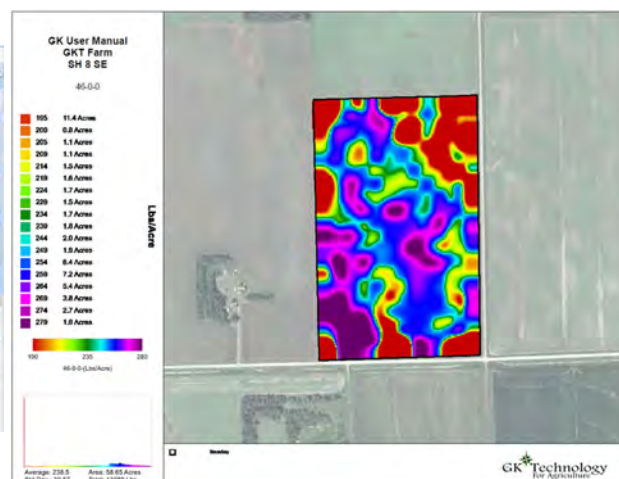
If you want a logo on the bottom of the map, you must add it by going to "Tools" and "Set Current Logo" (logo must be an image format of jpg / bmp / png / gif).

When printing any maps, take note of the shape of the "Map Viewing" area. If you have a "wide screen" monitor, your viewing area is a wide rectangle. This will make for a Printed map that will get sized down. Simply pinning open the "Drawing Tools" will resize the map window. Basically make the Map window viewing area something near a "Square" viewing area.

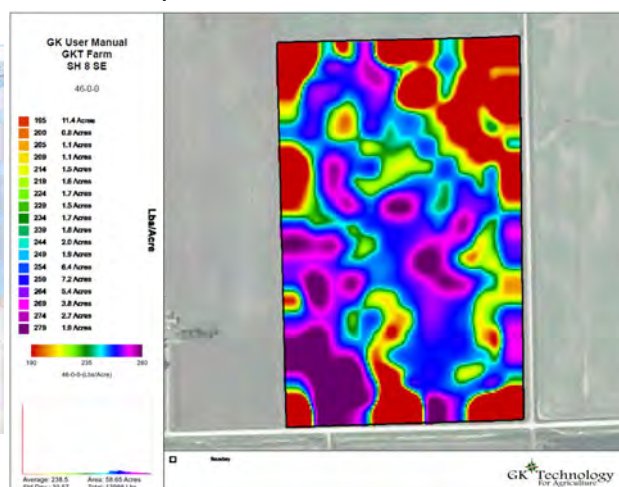
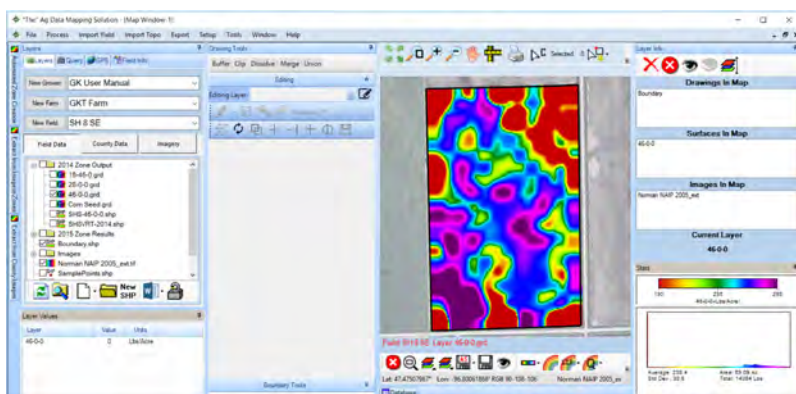
Note the shape of the Map window on the "Left". Now look at the Print out on the "Right"



Resized Map window



Printed map



Color Bar—Shows Min & Max values of the surface

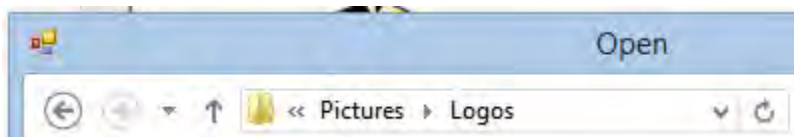
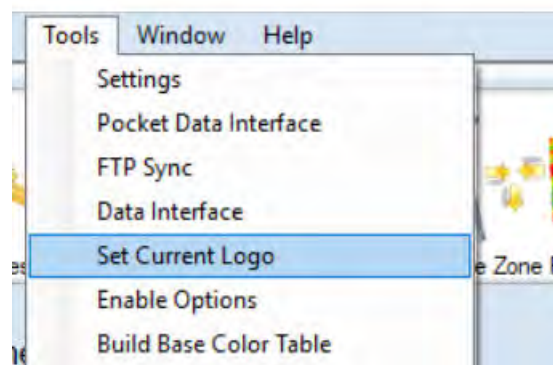
The Acres on the Color Chips MAY NOT add to field total acres (more Colors than Chips)

Statistics—Shows the Average—Acres—Standard Deviation—Total Product/Units

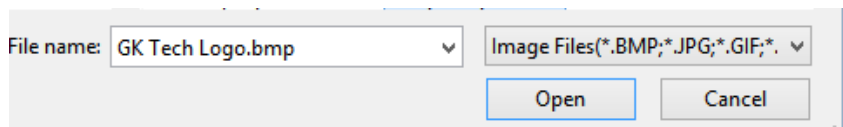
Setting A Logo

Within ADMS there are some options to customize printouts with a logo of your choice.

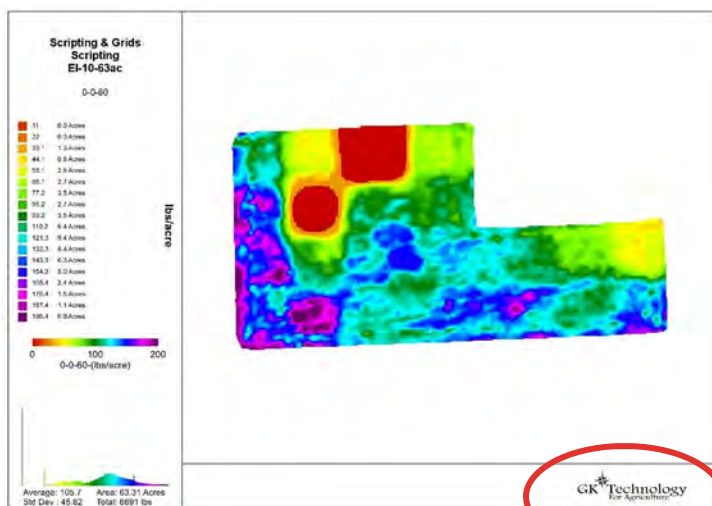
1. Go to Tools & Set Current Logo
2. Click "Select Logo"
3. Browse to the location of the logo image file on your computer



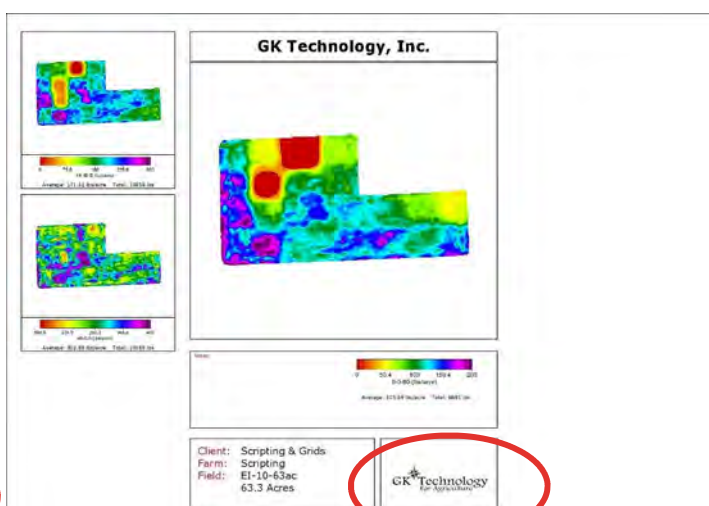
4. Click "Open" and there will be a preview of the logo in the select main logo window. Don't worry if it looks distorted, it will print properly.



5. Print the maps normally using either the single map print, or multi map layout. The selected logo will now appear on the printouts.



Single Map



Multi Map Layout

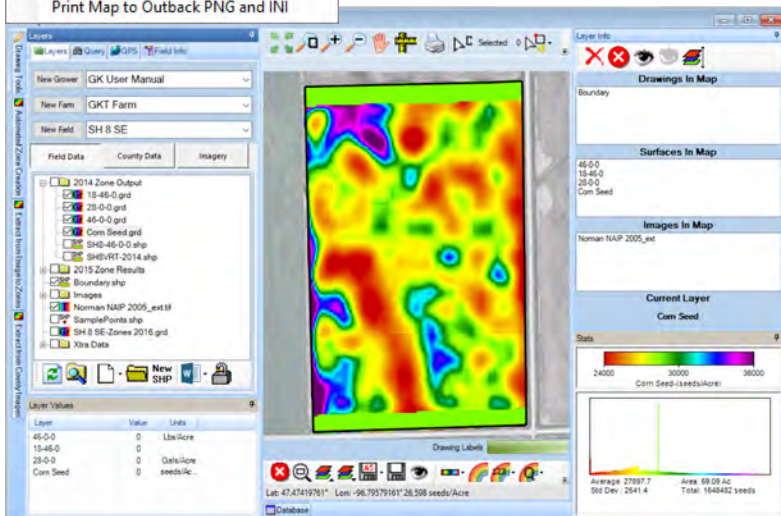
Printing

Print—Batch Print Surfaces



Map Window

- Print Map
- Batch Print Surfaces
- Print Map to Bitmap
- Print Map to Clipboard
- Multi Map Layout
- Print Map to Outback PNG and INI

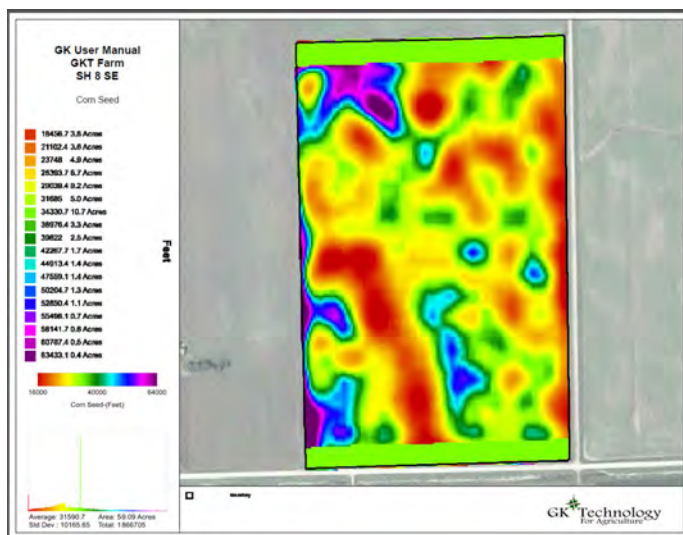
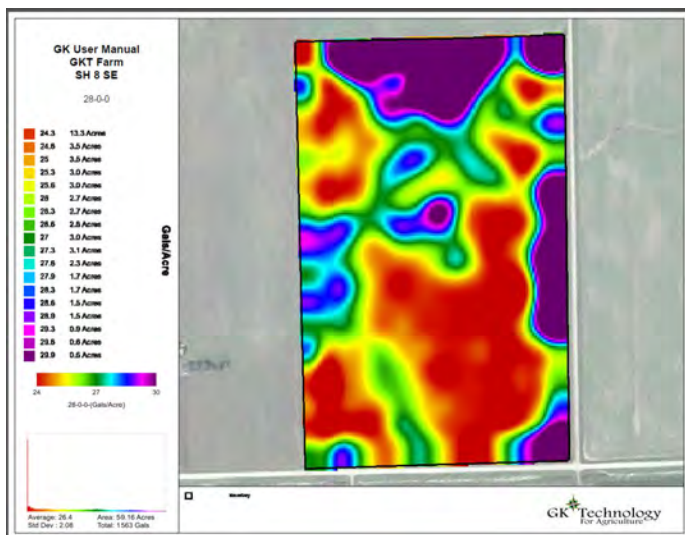
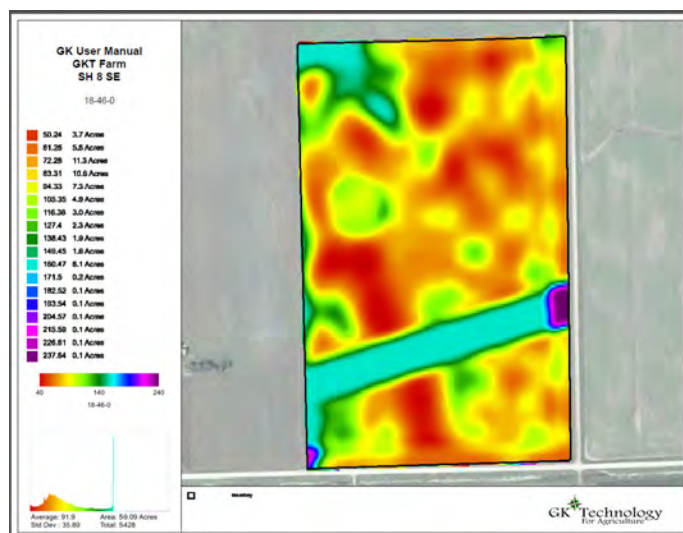
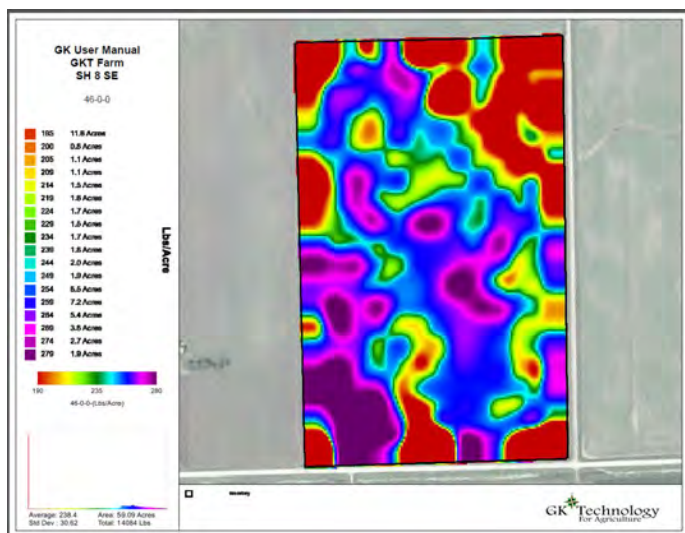


If you have Multiple Surface Maps to print out, turn them on in the order you want them to be printed.

Go to Print & Batch Print Surfaces

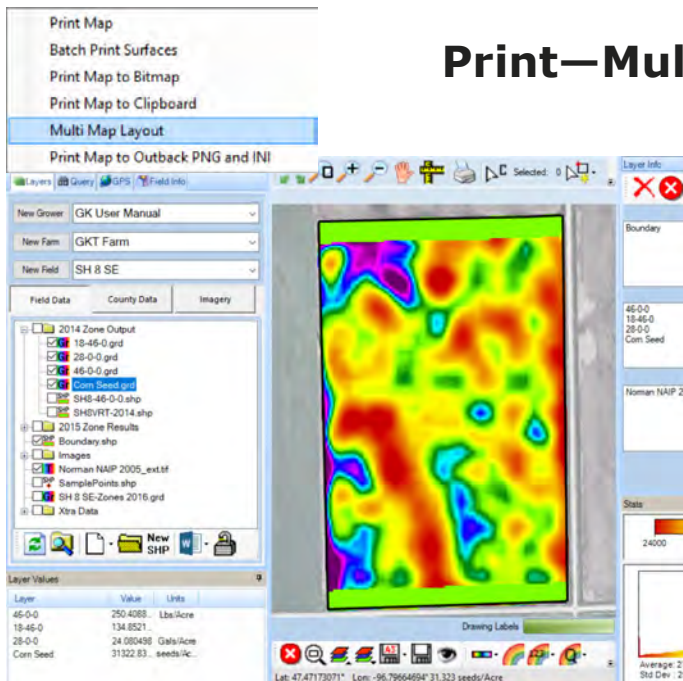
Option: to print a "Summary Page" that gives Acres, Investment, Average and Total amount of product to apply for all products on an additional page.

Note: Investment is calculated from values under "Setup" & Fertilizers".



Printing

Print—Multi Map Layout



This function will print 7 maps on 1 page.

If you have Multiple Surface Maps to print out, turn them on in the order you want them to be printed.

First map turned on goes to the middle. Then top to bottom & top to bottom

Go to Print & Multi Map Layout

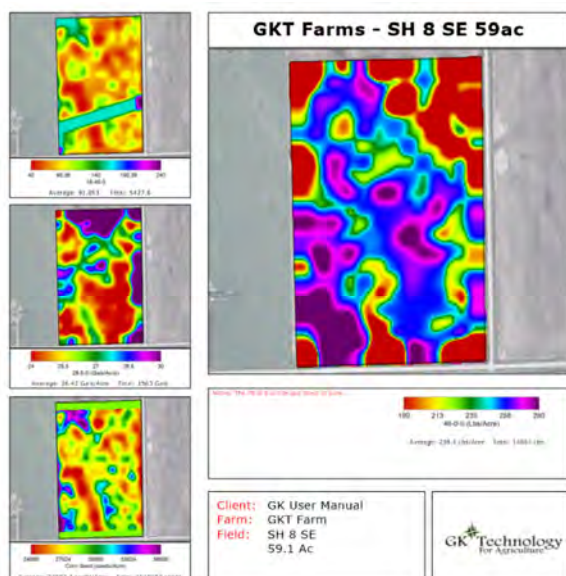
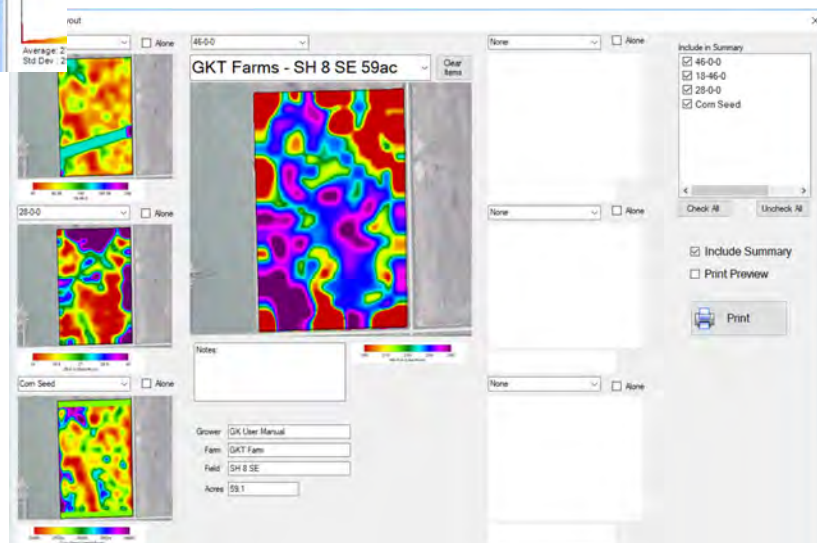
Type the "Custom Header"

Re-order or re-locate maps by click the drop downs above the images.

Type any "NOTES" you want in the middle box. (limited to roughly 15 lines of text)

OPTION: Summary – creates a second page with Product Summary's

OPTION: Print Preview



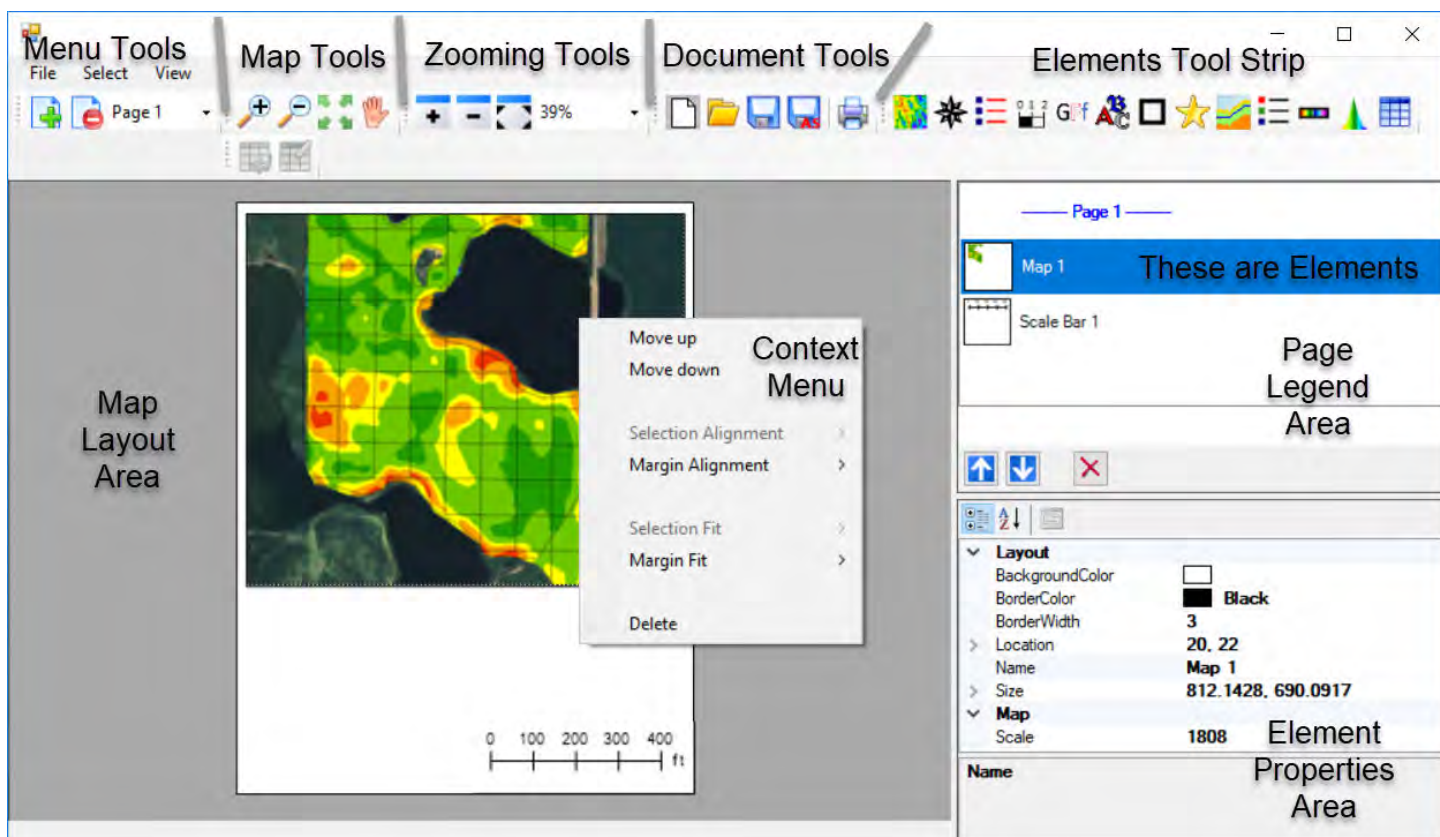
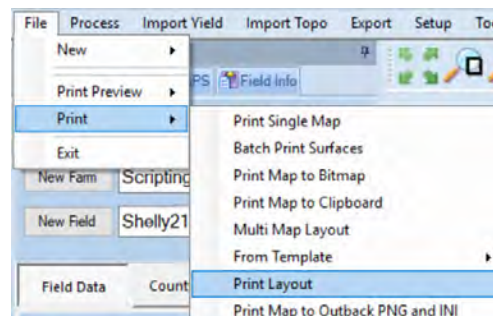
Grower: GK User Manual Farm: GKT Farm Field: SH 8 SE		Notes: The 28-0-0 will be put down in June.		Layer Summary: 2014 Zone Output Print Date: 1/6/2018	
Product	Rate Range	Average Rate	Investment	Required	
46-0-0	186 - 213 - 238 - 259 - 288	238	\$2,183	14,084	
18-46-0	142 - 161.25 - 182 - 198.25 - 214	92	\$1,031	5,428	
28-0-0	24 - 28.5 - 32 - 36.5 - 40	26	\$	1,563	
Corn Seed	20000 - 21000 - 22000 - 23000 - 24000	27898	\$	1,648,482	

Printing

Creating Print Templates

These instructions will give you a general guide of how to use the "Print Templates". You will need to play around and explore the full extents of the functions in this tool.

1. Tool is designed or "Map Window" in ADMS
2. Turn on layers so they show as you want.
3. Choose "File" / "Print" / "Print Layout"
4. The "Print Layout" window will open (note names below)
Note: under "File" and
5. By Default it will have a "Map 1" - ADMS Map Window
- Note: going to edge or corner and resize. Also click-hold-slide objects around
Right clicking on objects will open the "Context Menu" (play with these tools)
After resizing the "Map 1" view box—Click on Zoom button in "Map Tools"
6. Adding more "Elements" by Clicking on them in the "Elements Tool Strip" and dragging a rectangle where you want them placed. (drag-size-move till your happy)

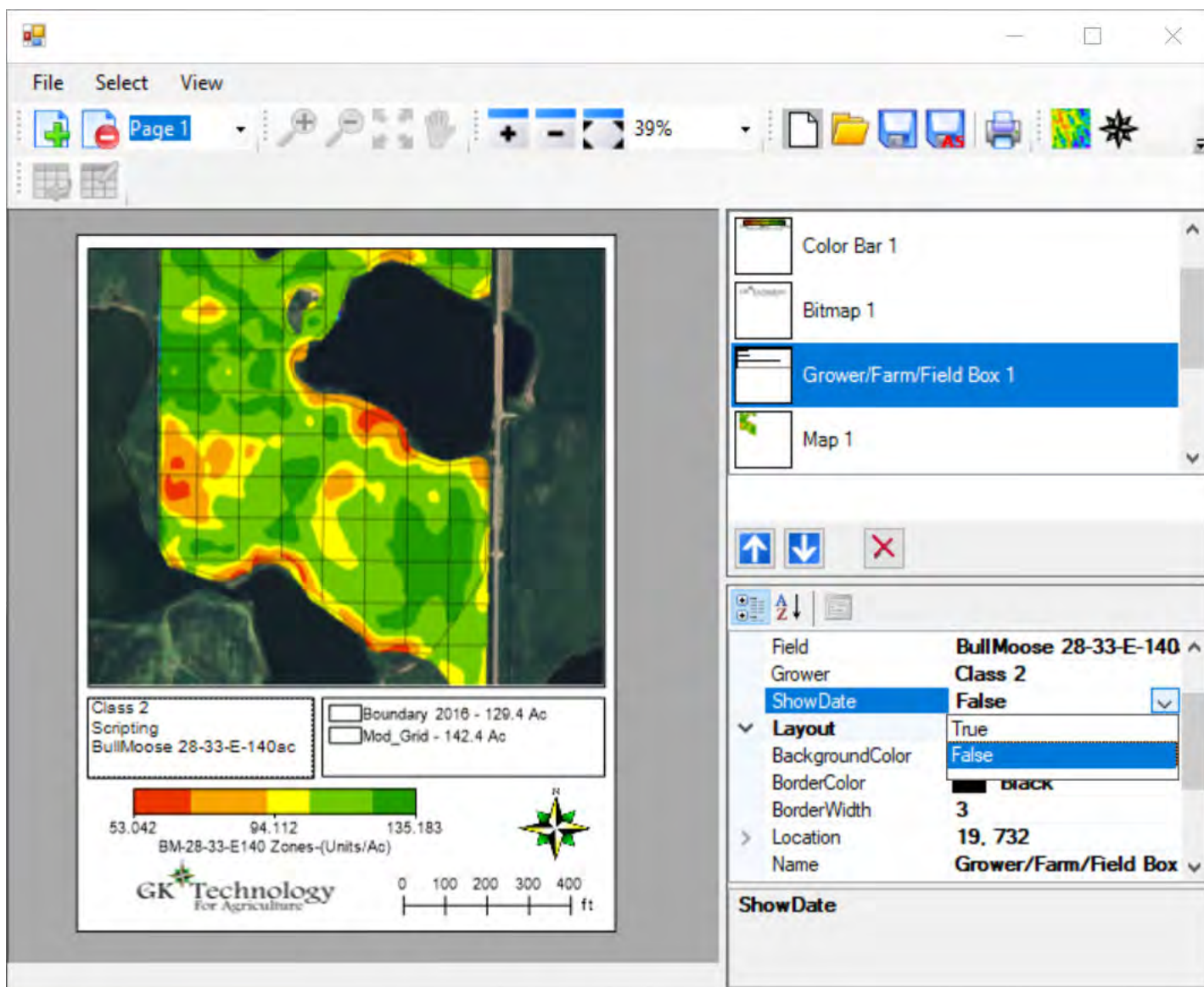


7. Add more elements to get the look you are looking for.

Printing

Creating Print Templates

8. This is close to a view I would like to save
9. There are some items I would like to highlight in the "Elements Properties"
10. Some boxes have "Drop Downs" - ex-switching "ShowDate to False"
11. Clicking on "BorderColor" will open a color chart to change colors
12. Beside "BorderWidth" just type the width of border—switched from 0 to 3 pixels
13. "Elements Properties" is again a play around area, lots of functions here.
14. Work through each "Element" and get them how you would like them.



15. Finally go to the "File" and "Save As".
16. Suggest "Printing" a test page on PAPER or PDF to confirm your final product.

NOTE: If you do more edits, make sure you "SAVE" it may not auto ask if you close.

Printing

Using Print Templates

Turn on your Map Window so it is ready to Print.

Once the templates have been created they can easily be used by going to "File" / "Print" / "From Template" and choose your template.

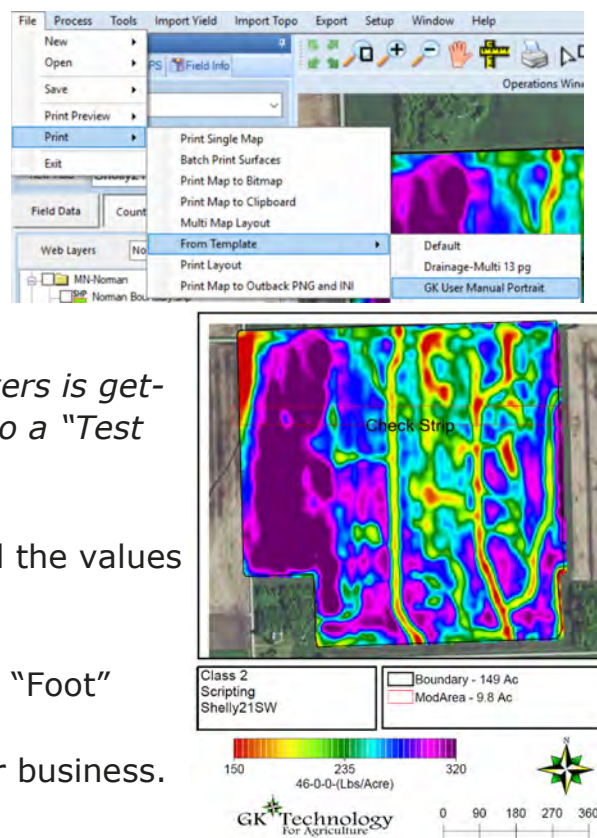
A Print Dialog window will open and click "Print"

Note: My maps on the next field using different layers is getting some minor issues. This is because I did not do a "Test Print" and work out the issues.

Issue 1 Font Size in the "Color Bar" not showing all the values below.

Issue 2-"Scale Bar" too far to the right missing the "Foot"

Create your own templates and "CUSTOMIZE" your business.

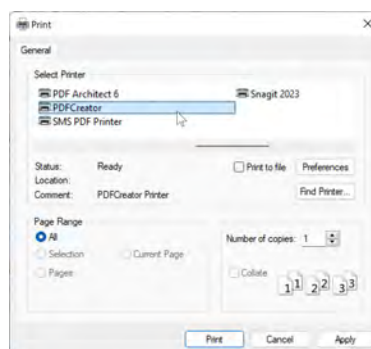


Print Preview

Allows a Single map or Batch prints to be viewed before they are printed. Click **File, Print Preview** to view options

Print Single Map w Preview:

Use to preview and modify a single map to be printed



Batch Print Surfaces w Preview:

Use to preview and select layers for a batch printing method



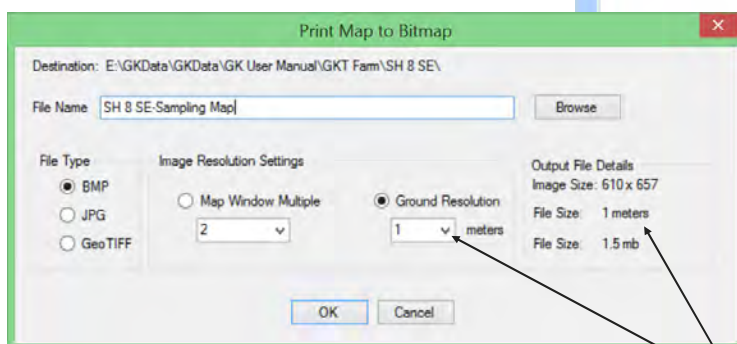
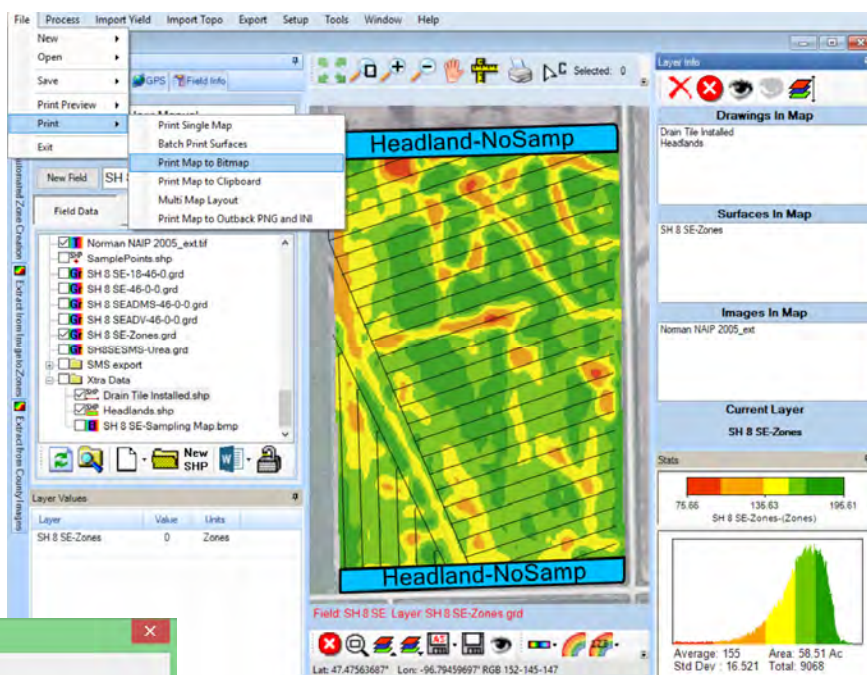
Printing

Print—Print Map to Bitmap



Print Map to Bitmap takes a "Geo-Referenced" screen shot of the map window. These maps can be taken to other software packages and allow you to have 1 map to show many pieces of data. This function is designed for "FIELD DATA", NOT FOR Township or County viewing. This does not work well on data AREAS larger than 2 or 3 miles square.

1. Turn on all the data you want to see in final map
2. Layer the data in the correct order (transparencies may be helpful).
3. Zoom in tightly on the data you want to Print.
4. If you are using labels, make sure they are large enough to read.
5. Go to "File" "Print" "Print Map to Bitmap"
6. Assign a "File Name".
Typically Field-Event
Ex. -SH 8 SE-Sampling Map
7. Choose "File Type"
Depends on what software you are going to? Most support BMP.

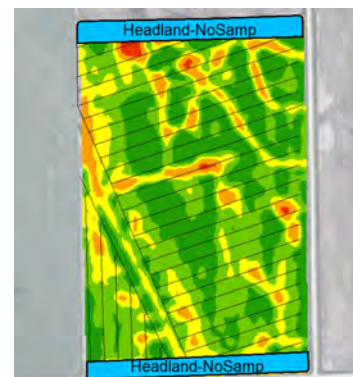


8. Choose "Image Resolution Settings"

Suggest trying to keep Resolutions in that 1 to 2 Meter range no greater than 5.0mb in size. Some software & Controllers are limited on what file size you can send them.

Adjust values by moving between "Map Window Multiple" & "Ground Resolution"

9. Click "OK"
10. For these files to work you will have to move both the image file and the world file.
(bmp & bpw or jpg & jgw or tif & tfw)



Printing

Print—Print Map to Outback PNG and INI



Print Map to Bitmap takes a “Geo-Referenced” screen shot of the map window. These maps can be taken to **Outback—MAX & Rebel** allowing user to have 1 map to shown as a background map on the display.

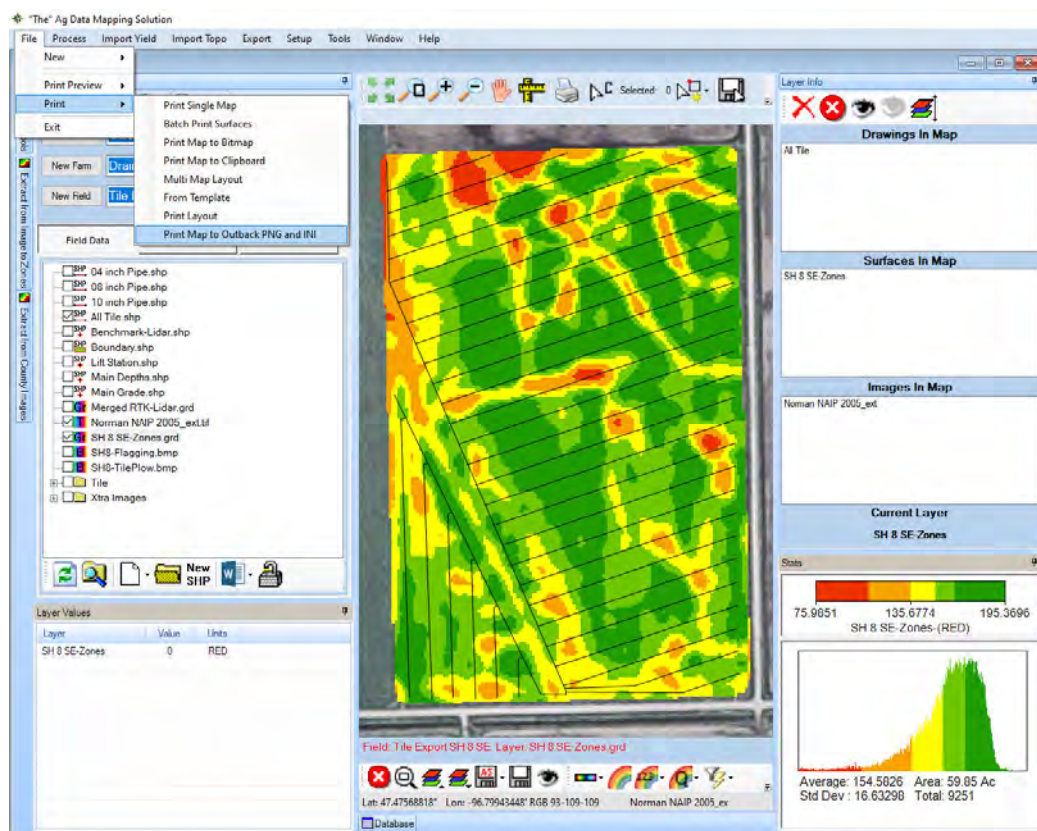
Turn on all your data as you would like to see them. In the field.

Example here:

Management Zones
with Tile Lines.
Assuring we don't hit
Tile or disturbed soil.

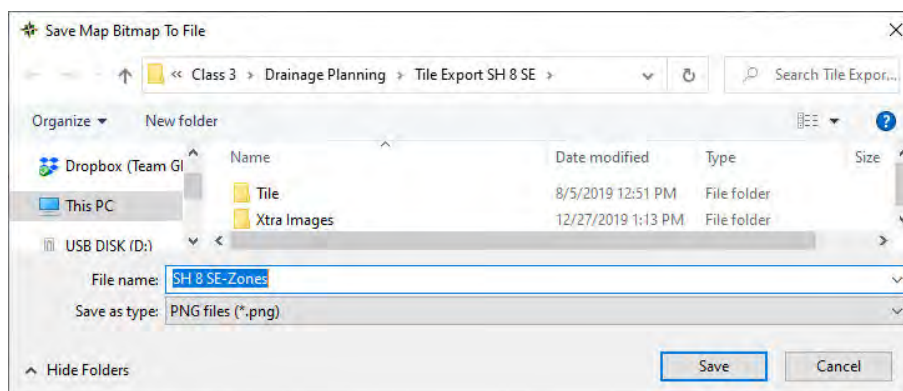
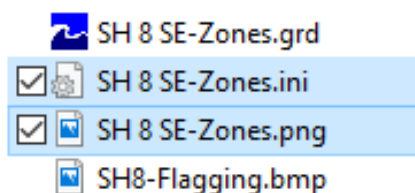
Go to “File” and “Print
Map to Outback PNG
and INI”.

In the “Save Bitmap to
File” window. Choose
a Save to location



Choose a unique name, important if you are doing multiple fields.

NOTE: When moving files—**MUST**
move both PNG & INI files.



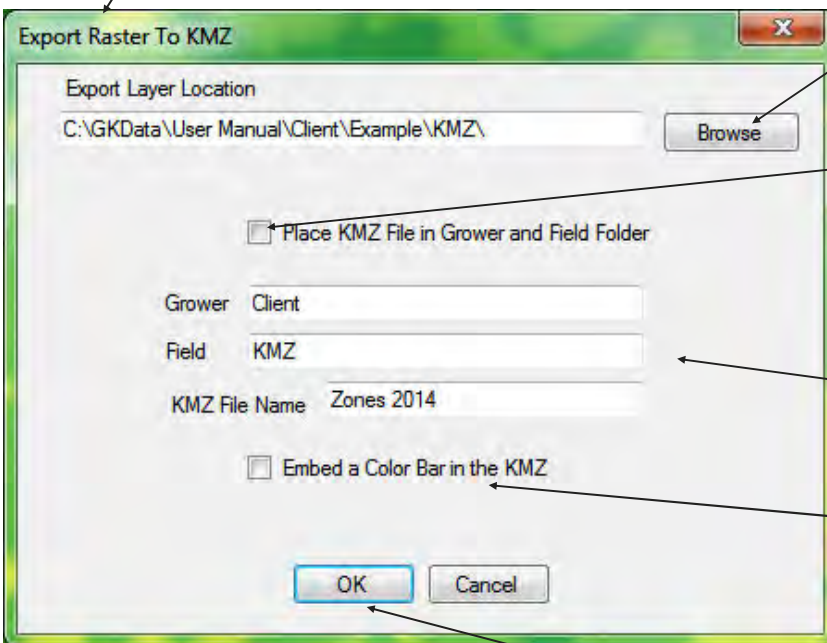
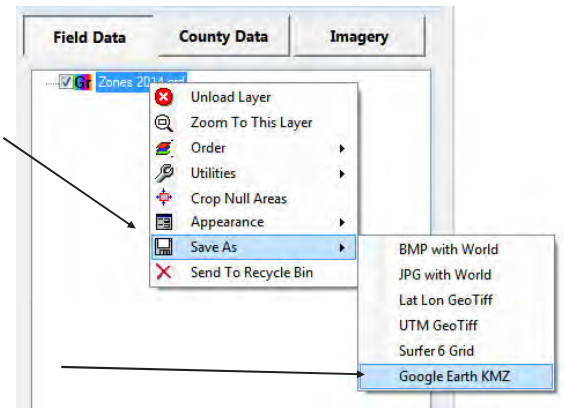
Exporting Files As KMZ For Google Earth™



Google Earth™ allows images to be opened within the desktop software or on a mobile version such as Android or iOS. This file is called a KMZ file (Zipped KML- Keyhole Markup Language). The single file contains both the geo-referencing file and the image which will be displayed as an image overlay in Google Earth™. Once exported the KMZ file can simply be opened and Google Earth™ will zoom to its location.

Only images and surfaces are supported in this export.

1. Turn on the layer that will be exported.
2. Right click on the file select: Save As => Google Earth™ KMZ
3. The "Export Raster To KMZ" options will open.



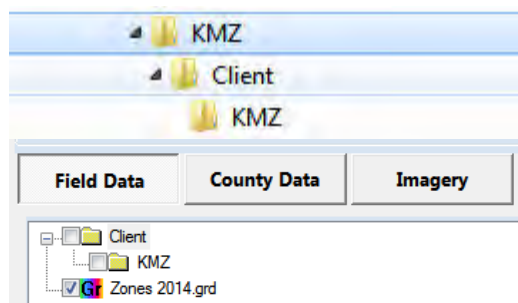
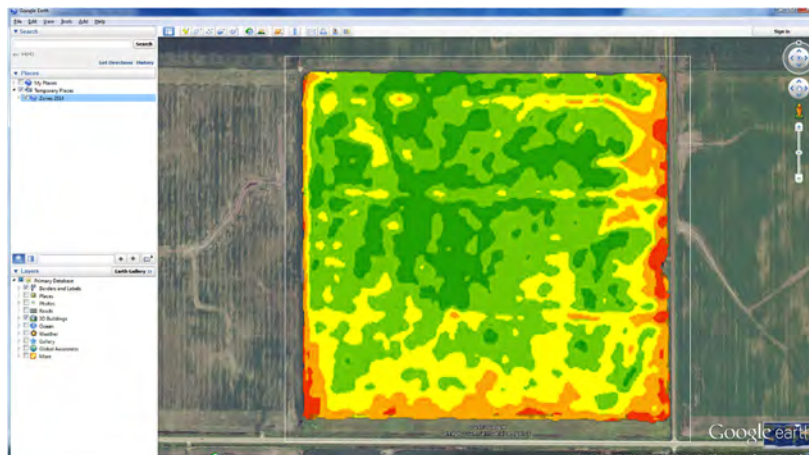
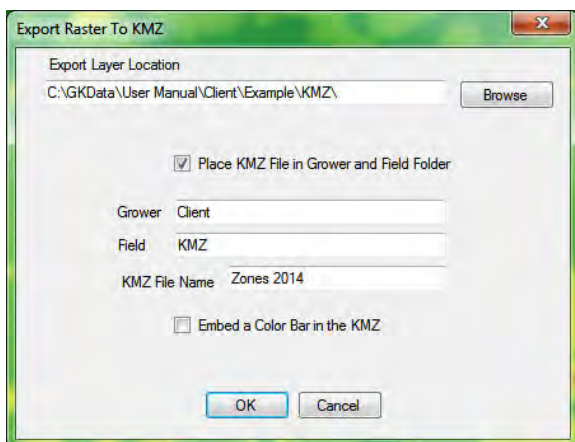
4. Browse to the desired export location
5. *Optional:* Place KMZ in Grower and Field folder. This will export to the selected location, but will place the file in a Grower & Field folder structure.
6. *Optional:* Edit the Grower, Field, and KMZ File Name if desired.
7. *Optional:* Embed a Color Bar in the KMZ. This will show the statistical color bar on Google Earth™ giving the ranges of the map. (This can only be done with "Surfaces")

8. When all of the desired options are selected click "OK." The file will be exported to the selected directory with the options that were selected.
9. A program will have to be installed on the device you are using (Windows, Android, iOS) to read the KMZ file (Google Earth).

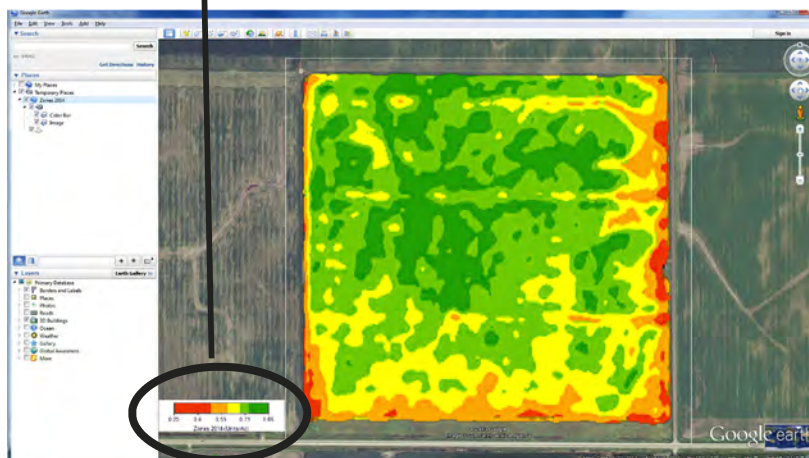
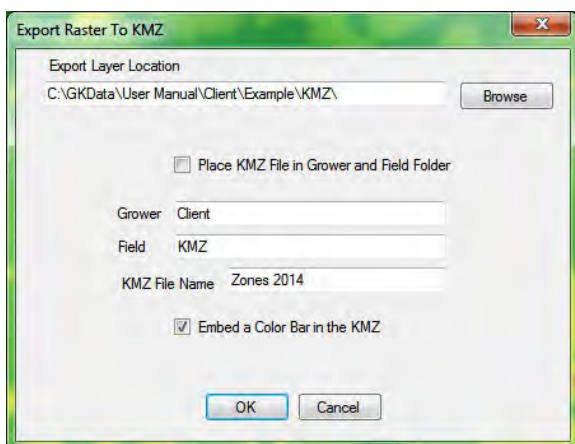
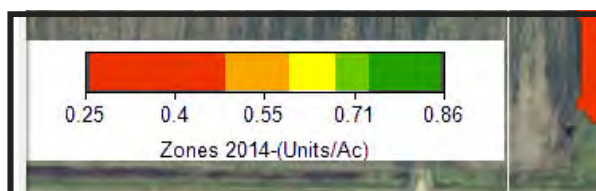
Exporting Files As KMZ For Google Earth™ - Examples



This is an example of the file structure that will be created when the option to "Place KMZ in Grower and Field Folder" is selected. The KMZ file WILL NOT be recognized in ADMS.



This example will show the statistical color bar if "Embed a Color Bar in the KMZ" is checked on.



Exporting KML Files For Google Earth™

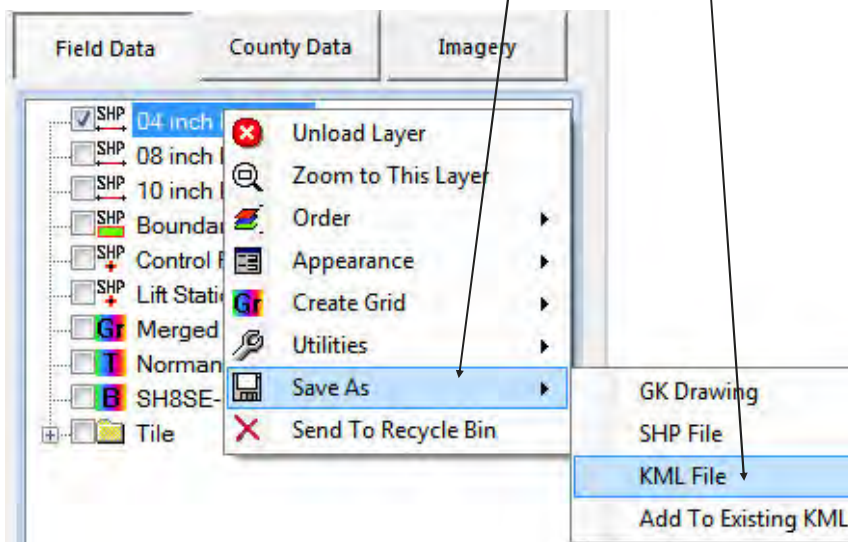


Google Earth along with some other software packages will allow vector files to be opened with- in different desktop and mobile applications. The file type that is used has the extension *.KML which stands for keyhole markup language. Vector files such as points, lines, and polygons can be saved to one or multiple KML files for viewing in these applications.

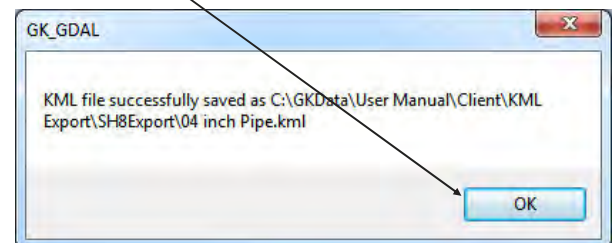
Saving Vector Files As KML Files

This example will use a tile plan as an example.

1. Turn on the SHP file that you wish to save as a KML.
2. Right click on the file select "**Save As**" & "**KML File**"



3. After selecting "KML File" a window will appear saying that it has been successfully saved and the path where it was saved to. These files will get saved to the same location as the SHP file they were saved from.
4. Click "OK."



The KML file can now be opened in Google Earth & Google Maps or other applications.

NOTE: ADMS does not save out any size / label / color pallets for GOOGLE.

Example of 4 inch Pipe.kml in Google Earth >>>

NOTE: After creation—Refresh Data Tree
KML files can be opened in ADMS Data Tree



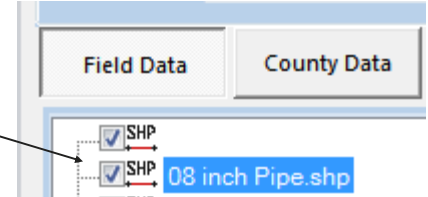
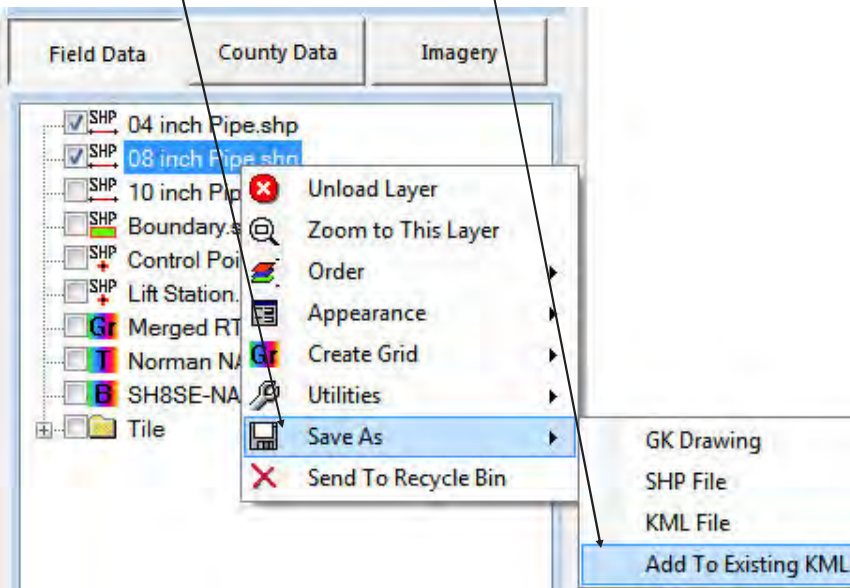
Exporting KML Files For Google Earth™



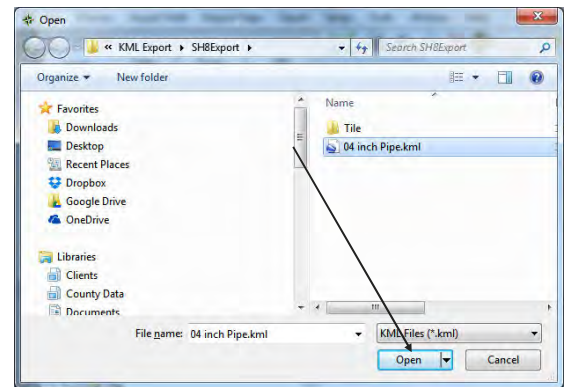
Adding to KML files

There are times when you may want to add additional types of vectors to an existing KML file. These could include boundaries, different pipe sizes, or any other shapefile. This can be done using a similar process as saving them individually.

1. Turn on the SHP file to add to the existing KML file.
2. Right click on the file to add and select:
 - **"Save As" & "Add To Existing KML"**



3. Browse to the location of the existing KML file.
4. Click **"Open."**
5. The file is now saved to the existing KML and can be opened in Google Earth or ADMS.



This processes can be repeated as many times as necessary to combine all of the files.

Notice the mains have been added into this file.



Exporting GeoJSON & GeoParquet



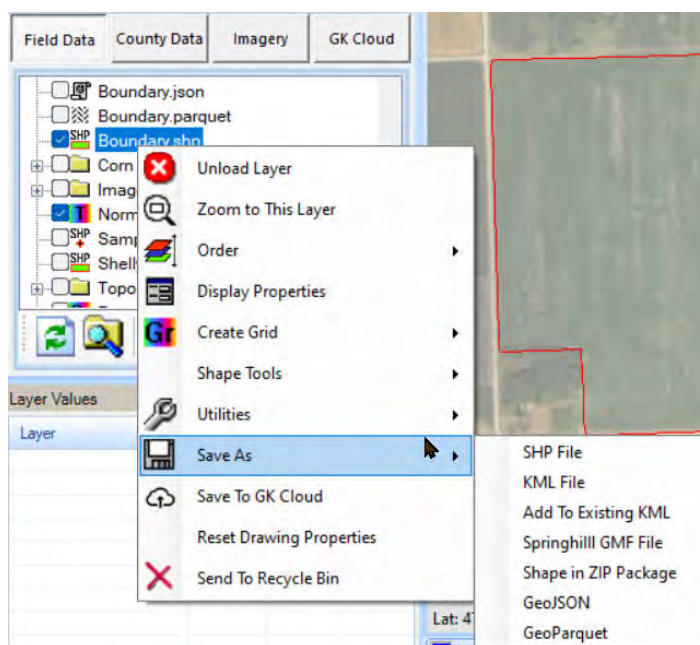
The GeoJSON & GeoParquet are two Vector file formats that can exist as point / line or polygon formats.

GeoJSON file format is fairly common and generic, non-proprietary format used throughout the GIS industry.

GeoParquet file format is a format that was developed for AgGateway & ADAPT Standard, is developing tools and platform to get ag data talking across manufactures.

To create these files in ADMS, simply create a SHP file to fit your needs. Make sure you have Saved the SHP file.

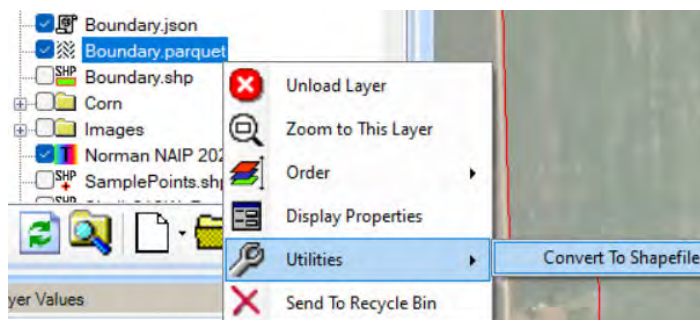
- Turn on SHP file and "Right Click" on file name.shp
- Save As
- Choose GeoJSON or GeoParquet
- File will automatically be created using the original SHP file name at the same location.



Both GeoJSON & GeoParquet are supported to be opened in ADMS. There is one unique option when working with these files. The options are the same for both formats.

Checking on either file will display its data in the map window and Database. If edits need to be made, GK suggests converting file back into a SHP File.

- Right click on the File name.
- Choose Utilities & Convert to Shapefile
- File will automatically be created using the original file name at the same location.

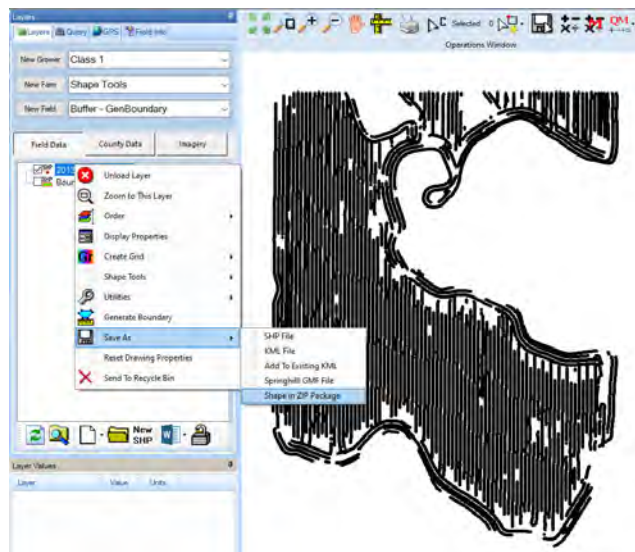


Shape in Zip Package

Shape in Zip Package– Saves a Shapefile to a zipped folder.

- Option to include the Grower, Farm, Field (GFF) in DBF.

1. Check on shapefile file to make it visible.
2. Right click on the name of the shapefile.
3. Select **Save As** and **Shape in ZIP Package**.
4. Once you have the desired settings, click **OK**.



Output Path Creation

Send to Field Folder

- Saves the zip file to the field folder the file is located in.

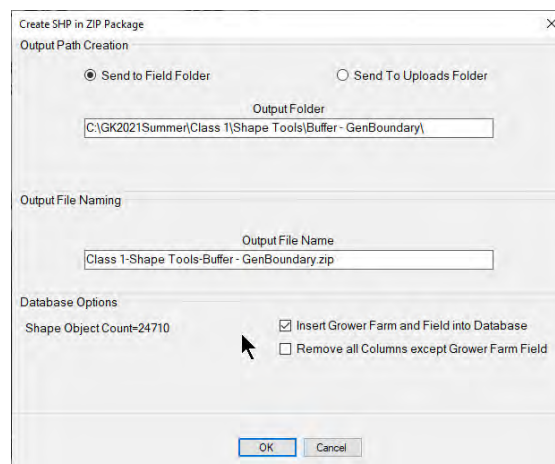
Send to Uploads Folder

- Saves the zip file to an Uploads folder in the _DB folder.

Output File Naming

Output File Name

- automatically creates the name from the GFF, but allows you to add or change it to a desired name.



Database Options

Insert Grower Farm and Field into Database

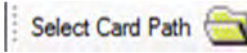
- Adds a Grower, Farm, and Field column to the shapefile database.
Note: **Do NOT** add GFF option to Prescription SHP files.

Remove all Columns except Grower-Farm-Field

- Reduces the database file to only the GFF columns prior to being zipped.

Quick Notes For Topography—RTK

Importing Topography Data - RTK

1. Open into "Map Window".
2. "Import" – (Select the file type you want to import (ex-JD-GS2))
3. Select the folder location - "Select Card Path"
4. Check all the files to "Import" 
5. Click "Process Selected Files."
6. All the files will go to the "Grower" "Farm" "Field" structure just like you had them in the GS2 Display



Creating Boundary

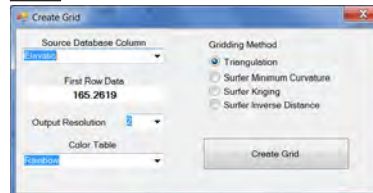
1. Select the desired Client, Farm and Field.
2. Turn on the elevation points first, then the county NAIP.
3. **To Create Boundary from CLU** – turn on the "County CLU.shp" and make sure it's the **active layer**.
4. Click on the "Area Replace" button and click inside of the correct CLU boundary or drag a rectangle (select multiple, hold down "Ctrl"). 
5. The boundary will appear **Lime Green**
6. Click "Save Selected Objects"  top toolbar, Name, Save.
----- OR -----
3. **To Hand Draw a Boundary** - Click the "Create New Layer from Template"  button and select "Boundary" from the list.
4. Check the "Boundary.SHP" ☒ Boundary.SHP file to turn it ON & make sure it is the **active layer on the bottom toolbar**.
5. Select "Draw New Object"  button on the bottom toolbar.
6. Draw the boundary by "Left Clicking" around the field (hold the "Alt" or "Shift" key & "Left Click" to undo points) & "Right Click" to finish.
7. Click "Save" on the bottom toolbar. 

Cleaning Up Elevations

1. Turn on the Elevation Points (CSV or SHP)
2. Click on the "Database" - Bottom Left Corner.
3. Click on "GPS Status" Header descending (Click again-ascending)
4. Look at the Data and select points to delete – if needed – (delete VDOP & HDOP greater than 3 / GPSAccV greater than 13)
5. Click on the "Delete Selected Objects"  on the bottom toolbar.
6. Click "Save" or "Save As" on the bottom toolbar (If "Save As" rename EX.-Topo-Cleaned-2008.shp). 
7. Go to "Layer Info" & "CLEAR MAP"

Create Grid Map

1. Check on the "Elevation.shp" Point file.
2. "Right Click" the name "Elevation.shp".
3. Select "Create Grid"
And "Create Grid from Points"
Adjust your settings like this
4. "Column Name Mapping"
5. Click "Create Grid"
6. Go to "Layer Info" & "CLEAR MAP" 



Crop to Raster

1. Turn on Boundary and select "Area Replace"  off of the top toolbar.
2. Click inside the Boundary polygon making it **Lime Green**
3. Turn on "ElevationRTK.grd" and select "Crop Raster to Selected Polygon" 
4. Click "Save" on the bottom toolbar 
5. Clear Map 

Create Watersheds

1. Make sure "Elevation-RTK.grd" is checked on.
2. On the Top Toolbar select "Process" & "Watershed Modeling"
3. In the "Create Watershed Layers"
Topo Source "Elevation-RTK"
Units in "Feet"
Flow Density 40 (usually)
4. Click "Create Watershed Layers" (auto saved)

Create Contours

1. Create Contour Layers – set "Break Points" to "1.0"
2. Click "Create Contour Layers"
3. FINISHED.....

Quick Notes For Topography—LiDAR

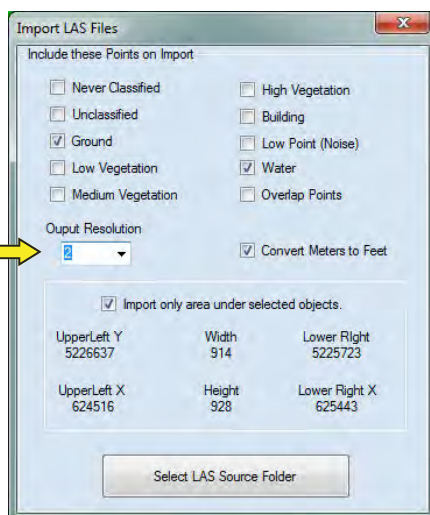


Creating Project Boundary

1. Select the desired Grower, Farm and Field.
2. Turn on your County Data
3. **To Create Boundary from Sections** – turn on the “County Sections.shp” and make sure it’s the **active layer**.
4. Click on the **“Area Replace”**  button and click inside of the correct Section boundary (to select multiple, hold down “Ctrl”).
5. The Section will appear **Lime Green**
6. Click **“Save Selected Objects”** top toolbar, Name, Save. 
- OR -----
3. **To Hand Draw a Boundary** - Click the **“Create New Layer from Template”**  button and select **“Boundary”** from the list.
4. Check the **“Boundary.SHP”**  **Boundary.SHP** file to turn it ON & making it the **active layer on the bottom toolbar**.
5. Select **“Draw New Object”**  button on the bottom toolbar.
6. Draw the boundary by “Left Clicking” around the field (hold down “Alt” key and “Left Click” to undo points) and “Right Click” to finish.
7. Click **“Save”** on the bottom toolbar. 

Importing LiDAR

1. Turn on “Boundary.shp” **active layer on the bottom toolbar**.
2. Click on **“Area Replace”**  button and click inside the Polygon. (Polygon will appear **Lime Green**)
3. Go to “Import Topo” and select “LIDAR LAS Import”
4. Make sure you are checked on
 - Ground
 - Water
 - Convert Meters to Feet
 - Import only area under selected objects.
5. Output Resolutions = **2** meter
6. Click “Select LAS Source Folder”
7. Choose the Correct Folder
8. Click “OK”



Create Field Boundary

1. Turn on the “LidarImport.grd”
2. Zoom to the field.
3. Click on “Create New Layer from Templates”  Choose “Boundary”
4. Select “Draw New Object”  from the bottom toolbar.
5. Draw a new field boundary to represent the “Drainage” of this field.

Note: This boundary is usually “Smaller” than the fields tillable acres.

6. Save the “Boundary.shp”  on the bottom toolbar.

7. Go to “Layer Info” & “CLEAR MAP” 

Crop to Raster

1. Turn on Boundary and select **“Area Replace”**  off of the top toolbar.
2. Click inside Boundary polygon making it **Lime Green**
3. Turn on the “LidarImport.grd” and select **“Crop Raster to Selected Polygon”** 
4. Click **“Save As”** on bottom toolbar 
5. Name “LidarTopo.grd”
6. Unload & Reload “LidarTopo”
7. “Crop Null Values” 

Create Watersheds

1. Make sure **“LidarTopo.grd”** is checked on.
2. On the Top Toolbar select **“Process”** & **“Watershed Modeling”**
3. In the “Create Watershed Layers”
 - Topo Source “LidarTopo”
 - Units in “Feet”
 - Flow Density 40 (usually)
4. Click “Create Watershed Layers” (auto saved)

Create Contours

1. Create Contour Layers – set “Break Points” to “1.0”
2. Click “Create Contour Layers”
3. FINISHED.....

Creating Topography & Watersheds

This section of the help guide we will be looking at extracting topography data, cleaning, merging and turning the point files into surfaces. Once the topography surfaces are created, it will be processed in the Watershed Modeling, creating a series of water management layers.

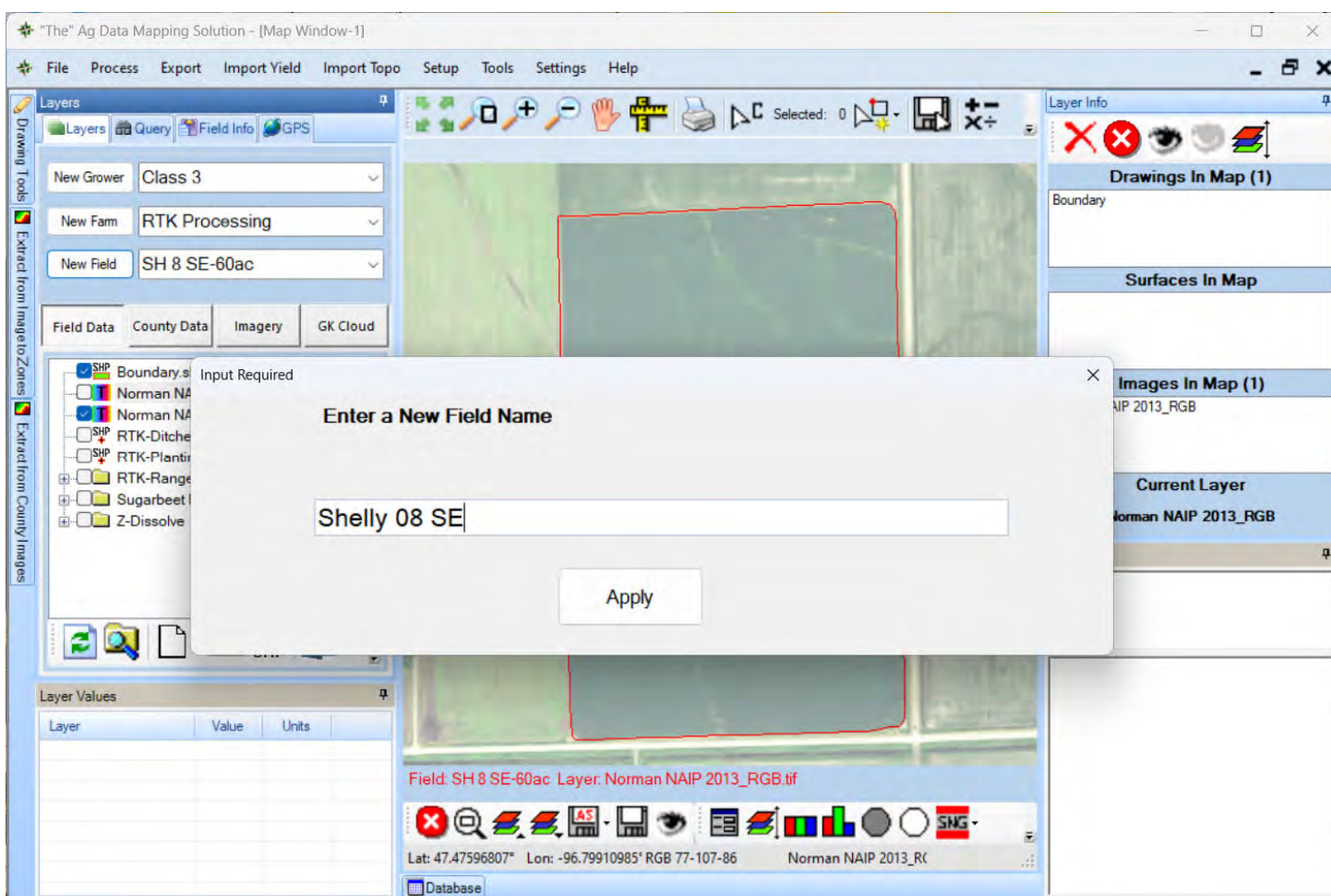
Start up Ag Data Mapping Solution and select the **"Map Window"** button.



1. When the **"Map Window"** opens up, select the desired "Grower", "Farm" and ***Creating: GROWER - FARM - FIELD***

"Field". If they do not exist, click on the **"New"** buttons to the left of the name. An **"Input Required"** window will open up in the middle of the screen to enter the new name, do so and click **"Apply"**. Now the desired field is selected.

2. When selecting "Grower" make sure to select the "Farm" & "Field" also.

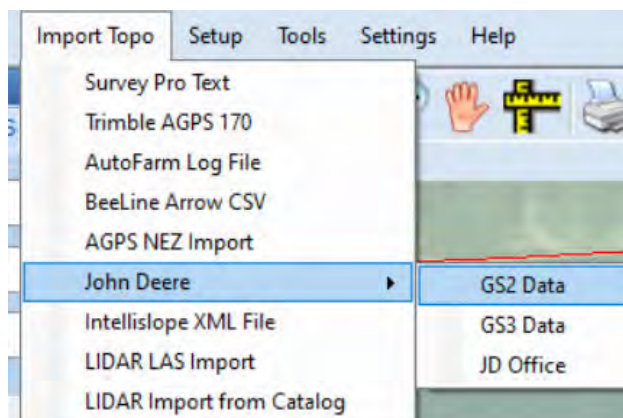


Creating Topography & Watersheds

Importing Data

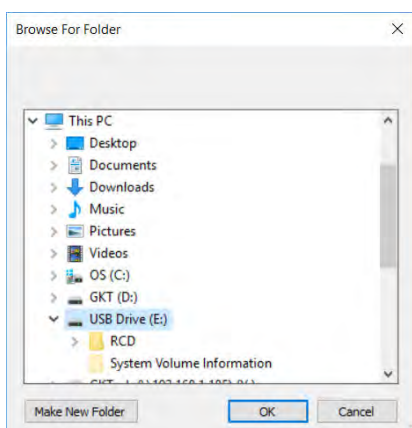
Once selected to the desired "Field", select **"Import Topo"** from the menu and choose the source where the Topo Data is coming from.

Example—John Deere 2600 (GS2 Data) combine data



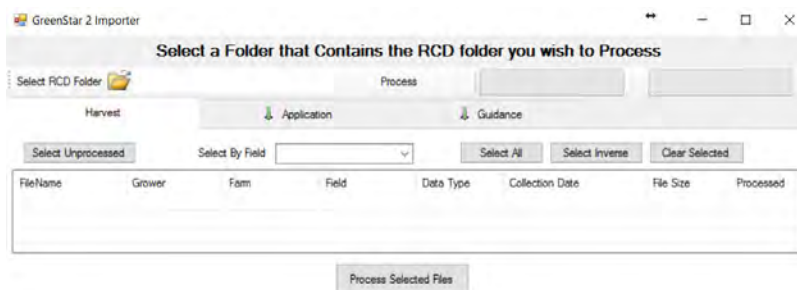
Next, "Browse" to the desired files or select where the data is stored.

Example—Select RCD Folder

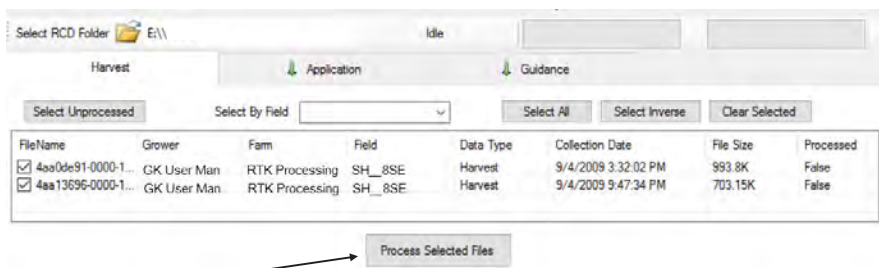


Select the location of the data.

Example — "USB (E:)"



Select the desired import files.



Click the **"Process Selected Files"** button.

NOTE: Import will create the Grower / Farm / Field names in the data tree as shown in the data list on the import for the GS2 & GS3 imports.

Creating Topography & Watersheds

Adjusting levels between multiple "Point" SHP files

Many times there is a need to combine data from multiple SHP files to make one dataset for surfacing.

In Ex.—Combine 1 = Black Pts
Combine 2 = Red Pts.

If the two files were collected by different machinery, or different base stations setups, there may be a need to adjust one of the Elevations to get them to match. And there may also be some bad points to filter out of the data.

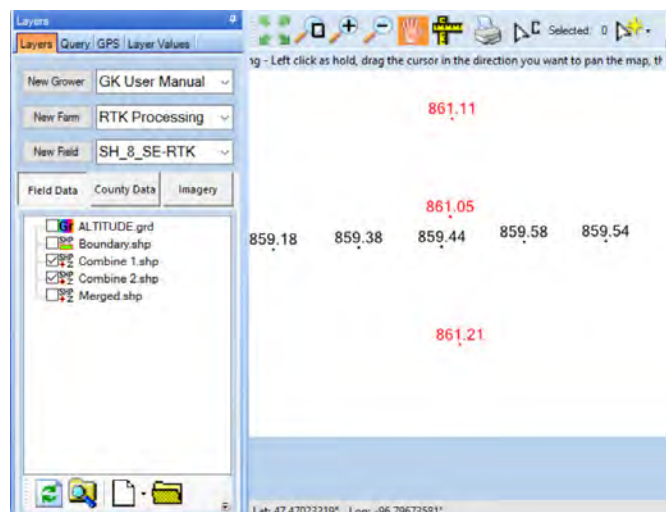
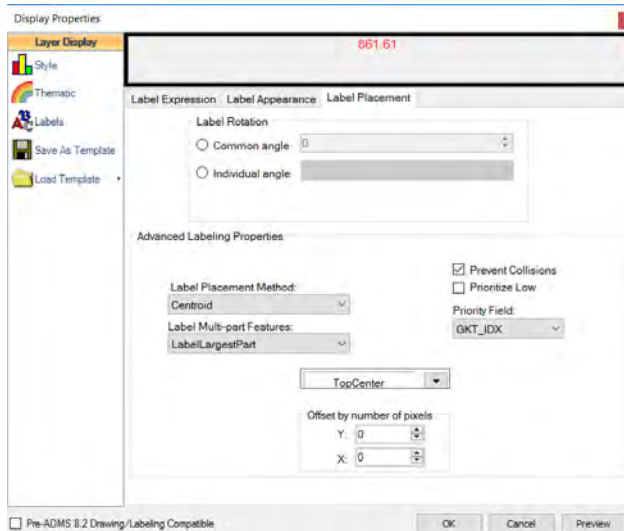
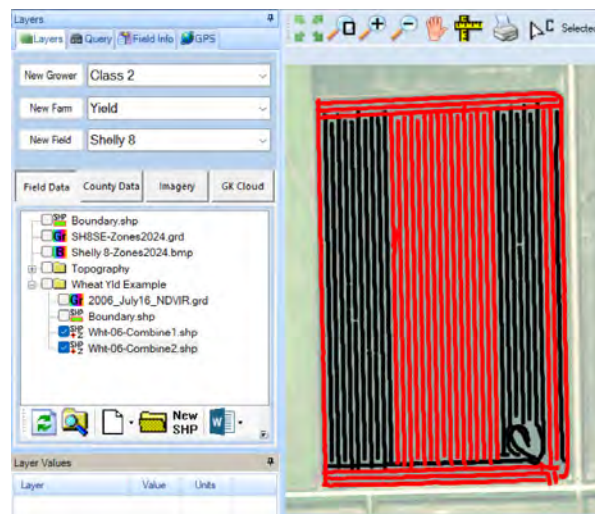
Essentially, looking to find areas where the point files overlap each other. Then find points very close in elevation to each other and check the elevation values between them. The arrow points to the areas that overlap between these two shapefiles.

To add Labels and change color of Points:

- Select "Combine2.shp" = **Active Layer**.
- Bottom toolbar, click **"Display Properties"**
- **"Style"** Button
 - Point Scale = Fixed
 - Point Size = 2 pixels
 - Point Color = Red
 - Point Outline = Red
- **"Labels"** Button
 - "Label Expression" - select "Altitude"
 - "Label Appearance" - Pixel Scale = 12
 - Color = Red
 - Precision = 2
 - "Label Placement" - TopCenter
 - Check Prevent Collisions
- Click Preview
- If it looks correct Suggest "Save as Template"
- Click OK

After applying labels to each of the SHP files, zoom in on the overlap areas and find points close to each other and check the elevations between the points. Look for any large differences. Keep in mind not to get too picky, standard error of an RTK receiver is 0.16 feet.

We suggest taking five or more readings and use average difference. (Consider putting #'s into Excel) Ex. 860.59 - 858.46 = 2.13' difference

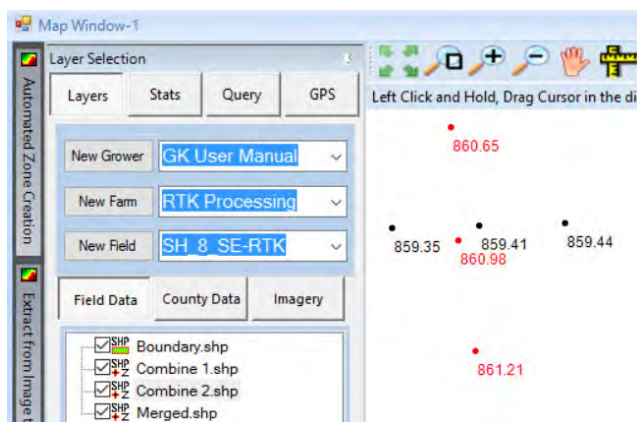
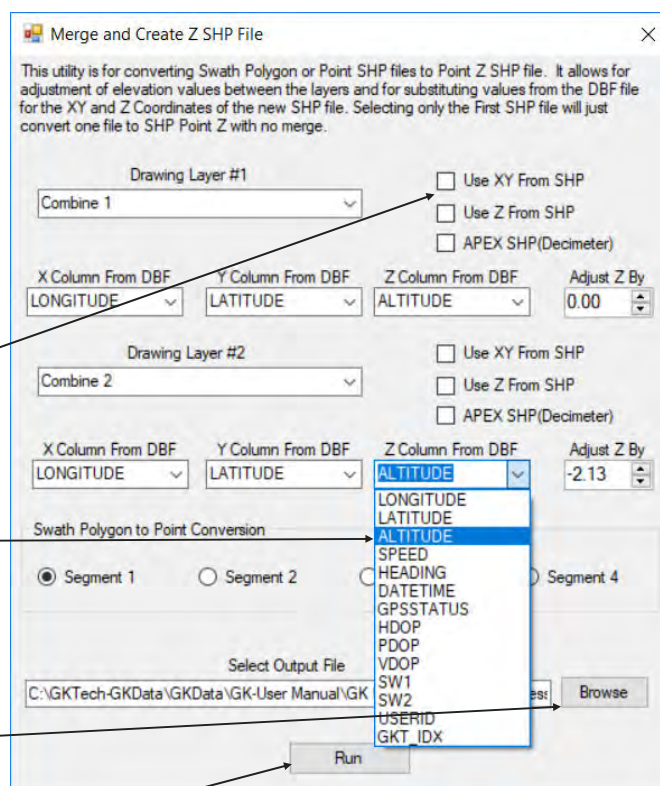
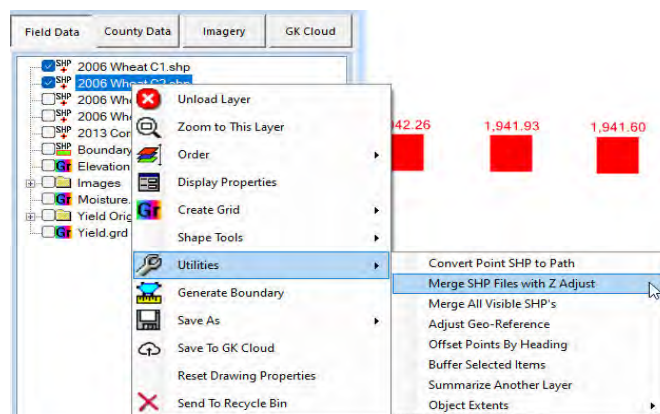


Creating Topography & Watersheds

Merge SHP Files with Z Adjust

When you have two layers of different elevations that need to be put together, the **"Merge SHP files with Z Adjust"** will take care of the problem. (*Do Not use on Yield Data*)

1. Make sure that both the layers are turned on and you have done the math to know how much you will have to move the given layer up or down.
2. "Right click" on the file name in the data tree, and select **"Utilities"** and **"Merge SHP Files with Z Adjust"**.
3. The **"Merge and Create Z SHP File"** window is now open. Select the two input layers using the dropdown arrows on Drawing Layer #1 and #2.
4. Once you have selected the input layer, the "X Column From DBF" should say LONGITUDE and the "Y Column From DBF" should say LATITUDE. If the "X" and "Y" are empty and you do not find these pieces of information under the dropdown arrows, select the **"Use XY From SHP"** box. This will apply the Lat/Lon from the given object (imbedded into the code of the object).
5. Next select the dropdown arrow under the **"Z Column From DBF"**. There should be a piece of data about Elevation or Altitude.
6. Next, in the **"Adjust Z By"** box, enter the value for the object you want to adjust up or down. You should only enter a value for one object (either Drawing 1 or 2).
7. **"Browse"** to the desired output location, and save the file as a new and identifying name, such as **"Merged_Topo"**.
8. Click the **"Run"** button and this will merge these two SHP files together.



Continue to "creating the topo map".

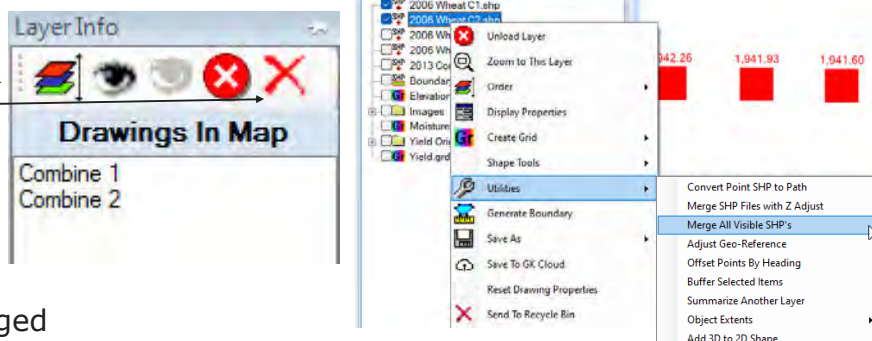
Creating Topography & Watersheds

Merge All Visible SHPs

When multiple layers of SIMILAR elevations or SIMILAR yields need to be combined, use the **"Merge All Visible .shp's"**

1. Start by going to **"Layer Info"** & **"Clear Map"**.

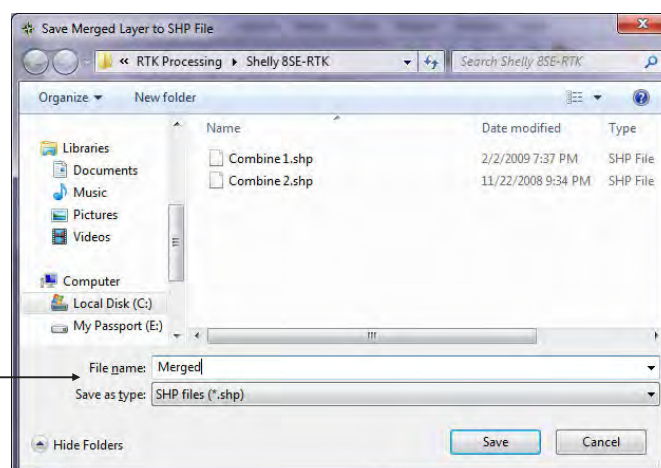
(This is to verify that only the desired layers are selected since multiple layers can be merged at one time with this tool).



2. Next, turn on all layers to be merged (**word of warning:** do not turn on any background "drawings" such as roads, sections and etc. They are shapefiles and will cause an error on the file merge).

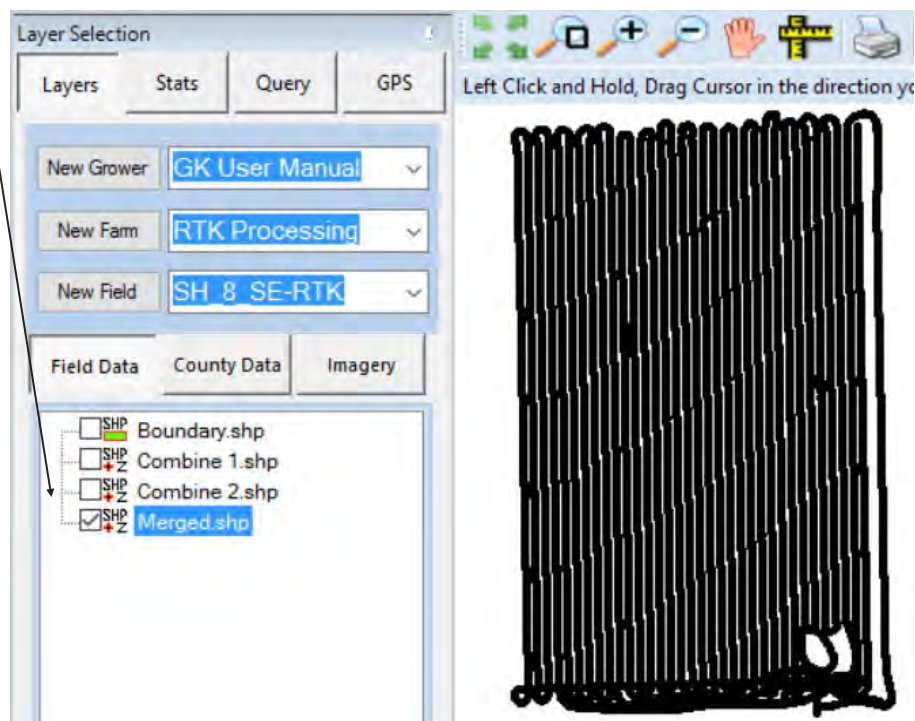
3. "Right click" on any of the files to be merged and select **"Utilities"** → **"Merge All Visible.shp's"**.

4. This will bring up a **"Save As"** window. Make sure to create a new & identifying name for this object such as **"Merged"**.



5. There will now be a new file in the Data Tree named **"Merged"**.

Continue **"creating the topo map"**.



Creating Topography & Watersheds

Cleaning Elevation Data—Database Tab

In most cases I wait till all my data sets are merged before cleaning, it makes for only 1/2 the work. In some cases, you may need to clean the data up before merging, but this is rare.

Before getting going, understand that not all RTK Data collection equipment collects data the same way. Some will "log" Quality information and some will just log Lat/Lon/Elevation. A good system will log additional Quality information.

1. Turn on complete data collection for the field (again all the data should be in 1 SHP file).

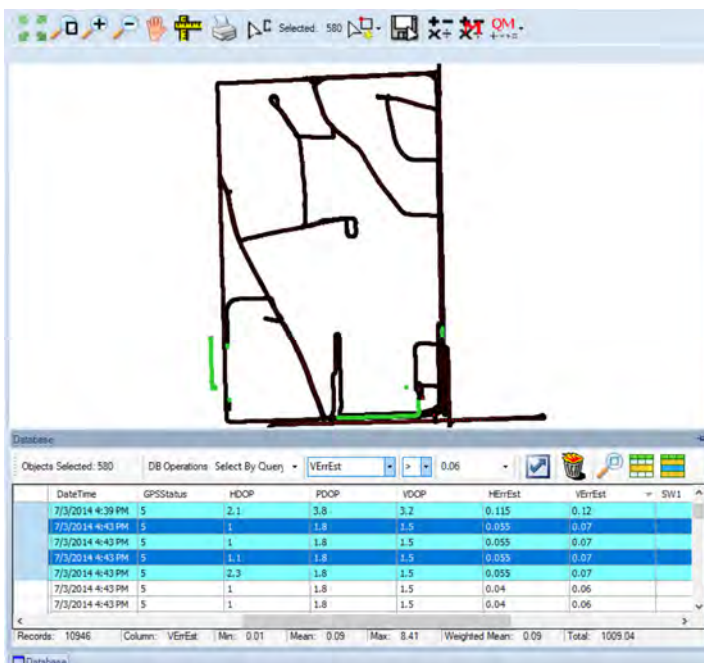
2. Click on the "**Database**" tab Bottom Left, the data table will open up.

3. By clicking on the column "names", you will be able to sort the data ascending or descending. This is very useful for "deleting" unwanted data. By clicking on the gray area to the left side of the rows, you will be able to select objects within the active layer. By using the "Shift" key you can select multiple rows of data. You can also use the "Ctrl" key to select multiple points.

4. When working with Topography data, there are usually columns for signal correction or signal quality. You need to find out what values are acceptable for your application and use this "Table" to delete unwanted or invalid points.

5. There is also a "**DB Operations—Select By Query**" function. By using this, you can choose <>= functions to help select values to delete. Choose or type in a value to query & Click "**Run**".  Delete unwanted Points 

6. Save the edited layers. You can either save them as the same name you imported them and you will have to re-import them if you want to see or use any of the deleted data, or name the file with a "New File Name". This allows the user to come back and look at the "original" data again at any time.



Columns to Cleanup & Suggestions

HDOP	Delete greater than 3.0
VDOP	Delete greater than 3.0
RTK	Use ONLY RTK FIXED Data RTK Extend or Float = DELETE
HErEst	Delete greater than 0.06
VErEst	Delete greater than 0.13
GPSAccV	Delete greater than 13

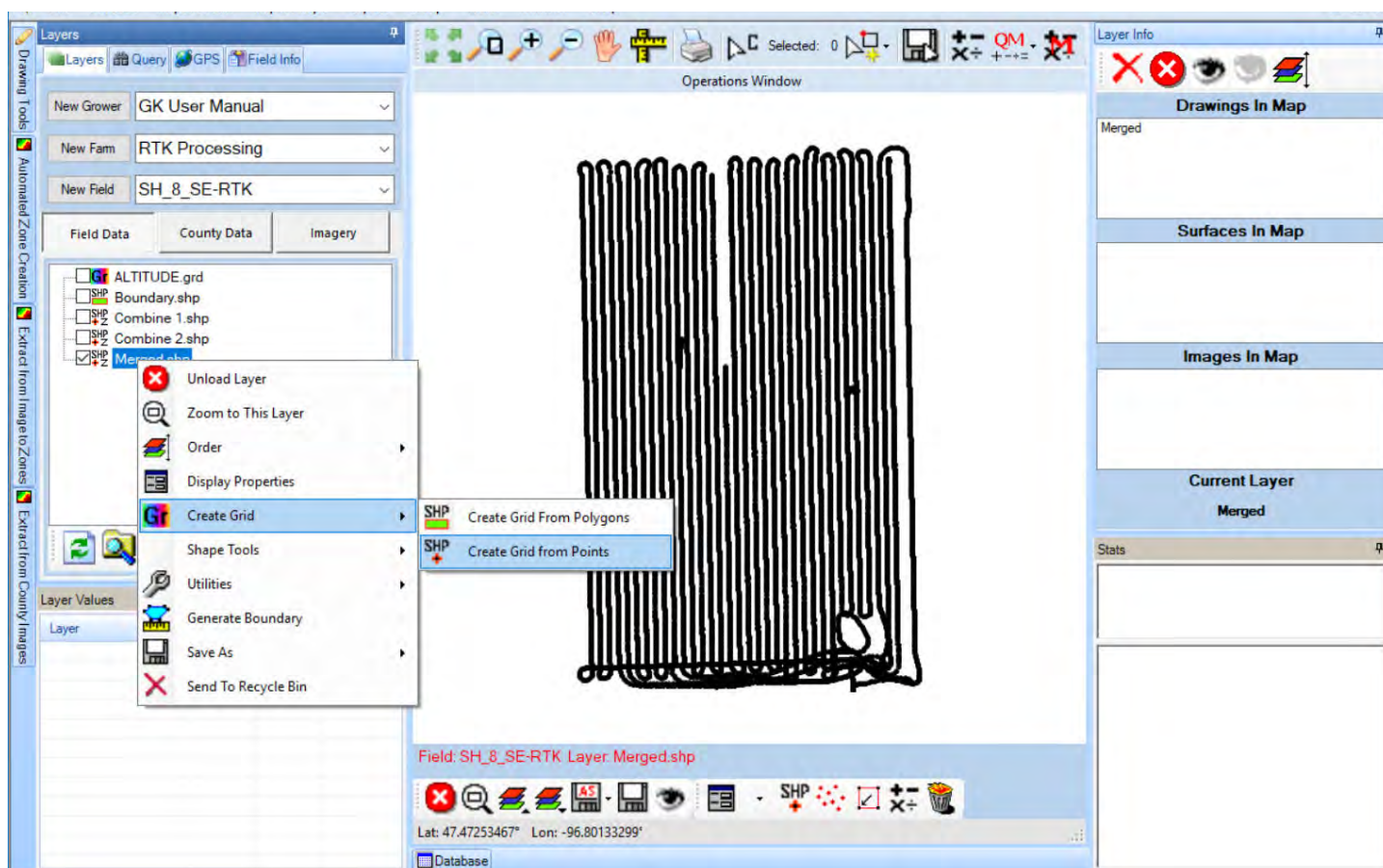
There are many more column names and values. Generally delete out data that indicates the potential for vertical error over...

0.4 foot
5.0 inches
0.13 meters

Creating Topography & Watersheds

Creating the Topography Map

- Once the SHP file data is cleaned up and merged, it is ready to be converted from Vector (.shp) to Raster (.grd).
- ADMS uses a function of "Triangulation" to create the .grd Surface.
- Turn on the "Elevation.shp" (shp/csv/dbf or any Vector points file)
- Right click on the layer name
- Choose "Create Grid" & "Create Grid from Points"



Creating Topography & Watersheds

Creating the Topography Map

Grid the Points

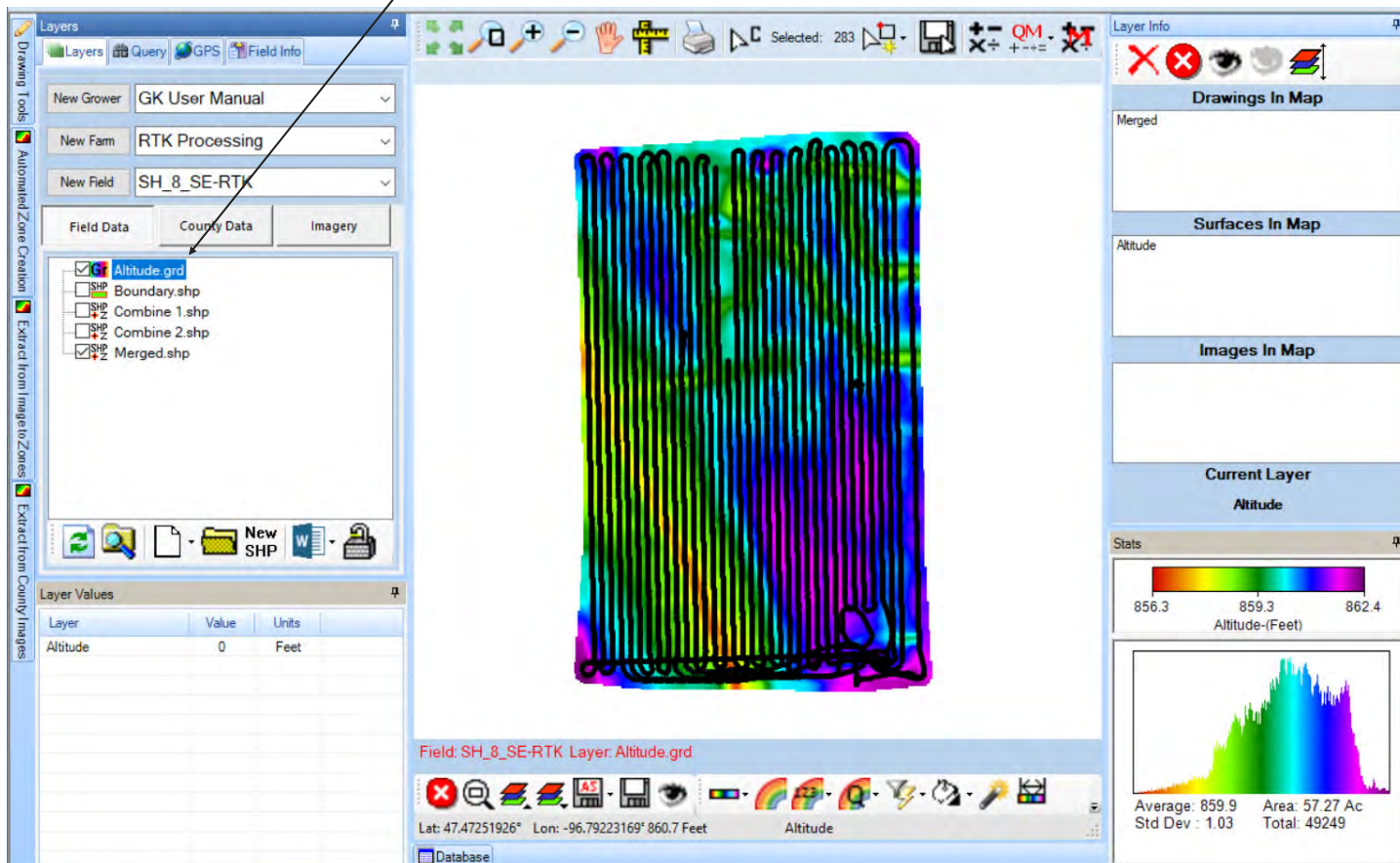
In the dropdown box labeled **"Source Column"**, check the column that contains the elevation data. In this case it is labeled **"Altitude"**.

Click **"Create Grid"**

First time creating a new Column Name. The **"Data for Column Name"** window will open. Fill in all the boxes. Once done this window will not open again.

To edit names & values go to Setup & Common Name Mapping.

Refresh the tree and check the box to display the new grid.



Creating Topography & Watersheds

Creating the Topography Map

Select the Boundary

Check the box next to the field boundary to turn it on. Then using the selection tools on the main menu, select the boundary to be used to crop the image.

Field Boundary Not Selected

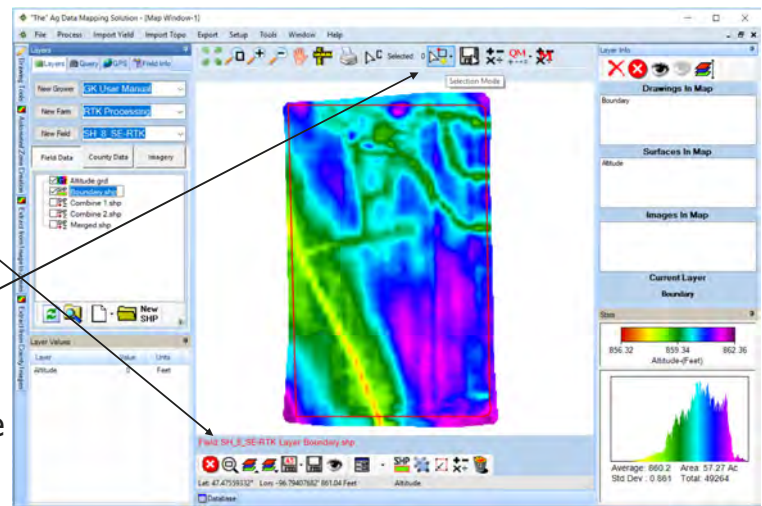
1 – Check the **"Boundary"** button in the data tree.

2 – Make sure the **"Active Layer"** address line say **"Boundary.shp"**.

3 – Make sure the **"Area Replace"** button is selected.

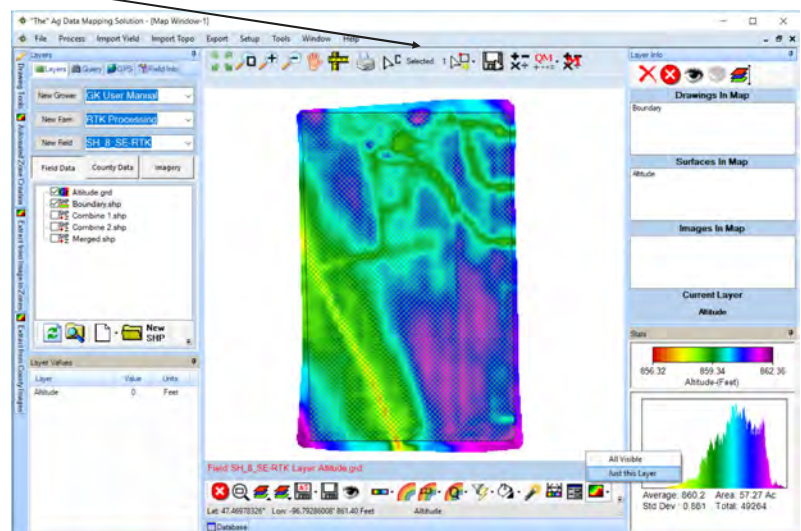


4 – Place the mouse cursor inside the field boundary and "left click".



5 – Take note of the **lime green** cross hatching (indicates that the boundary has been selected). Also, the "Selected 1" on the top tool bar

Field Boundary Selected



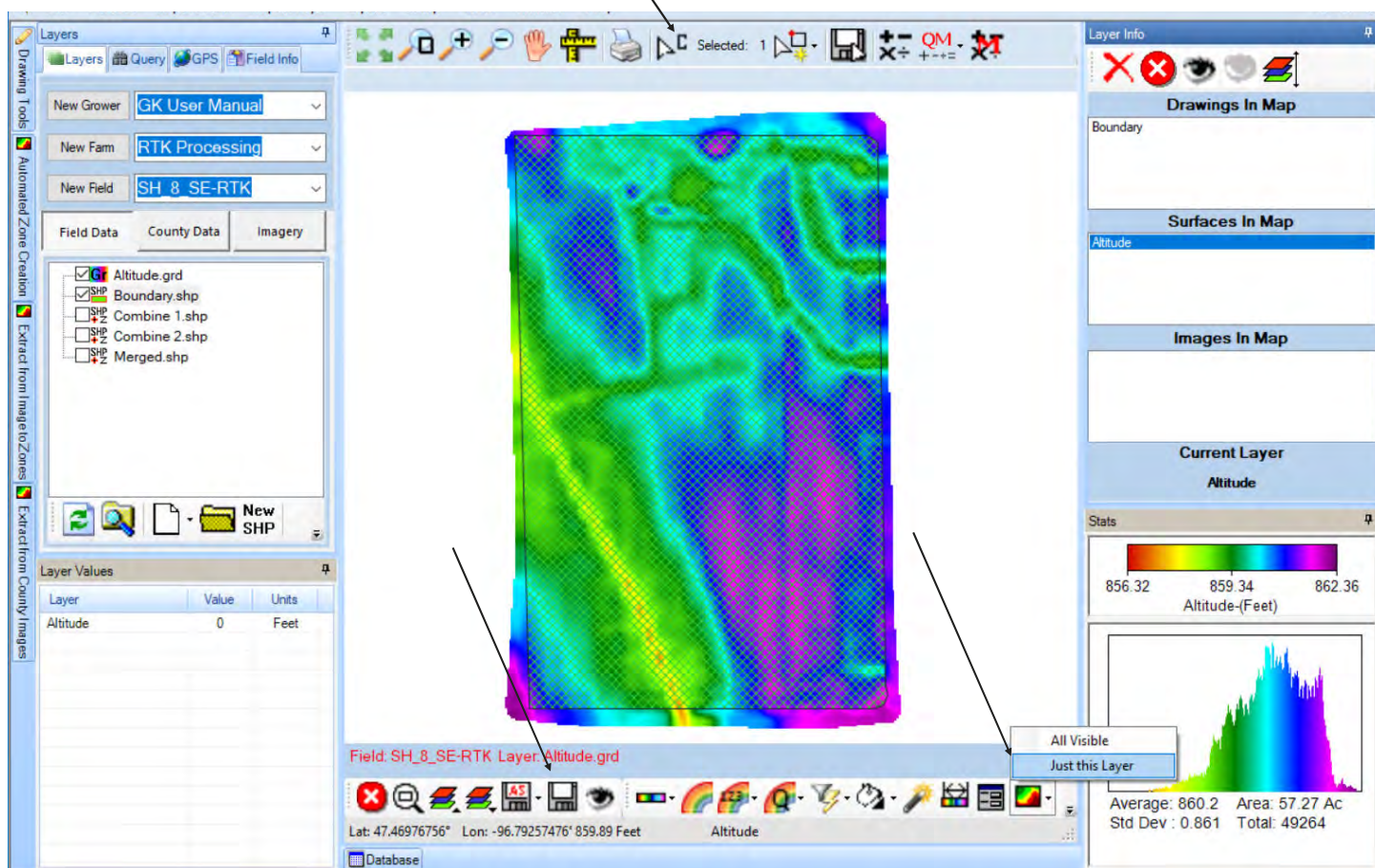
Creating Topography & Watersheds

Creating the Topography Map

Cropping the Grid to a Boundary

- Set **"Active Layer"** to the Elevation.grd or Altitude.grd
- Go to **"Bottom Toolbar"**
- Click on **"Crop Raster to Selected Polygons"** button. Select "Just This Layer"
- Click the **"Save"** button on the **"Bottom Toolbar"**.
- Click the **"Clear Selection"** button OR Click anywhere in the map window outside the field boundary to remove the or **lime green** selected boundary.

Next Step "Watershed Modeling"



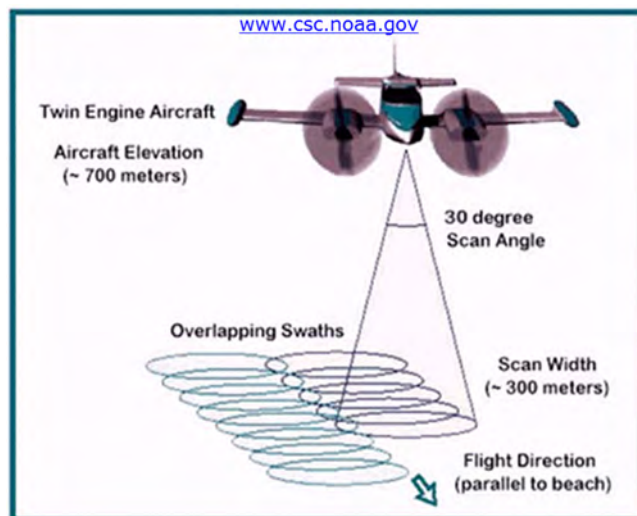
LiDAR—General Info

LiDAR = Light Detection And Ranging

LiDAR is collected by a plane shooting a NIR (Near Infra-Red) laser at the earth and measuring the re-reflectance time back to the plane.

Flight Info—

- Plane is equip with RTK & Data collection PC
- Equip with special LiDAR sensing tools
- High winds & gusts cause inaccurate readings
- Flight Elevation (approx.) ~ 2,300'
- Pass Width (approx.) ~ 985'
- Flight Speed (approx.) ~ 100-200 mph



LiDAR may be an excellent topography data source in many cases. Typically it is going to be a 1 time collection event in most areas, and it has some limitations we need to understand. It is important to have a good idea of when (year) the data was flown. LiDAR is typically collected at times of minimum vegetation (Fall—Winter—Spring)

LiDAR Facts—

- Elevations at the top of dense vegetation (cattails, heavy grass & weed patches)
- Reads the tops of buildings and structures
- Reads the elevation of the surface of water or snow
- Accuracy in tree covered areas are always questionable (density of trees & organic matter on the ground)
- Road ditch bottoms are always questionable due to the previous points
- Know year of LiDAR collection (useful for surface drainage changes or standing water)
- Know the "accuracy" rating for your LiDAR data. QL3 data = 8" / QL2 & QL1 data = 6"
- Every LiDAR reading gets classified (suggest using Ground & Water for drainage in ADMS)

GK Technology's preferred LiDAR data type is LAS or LAZ file

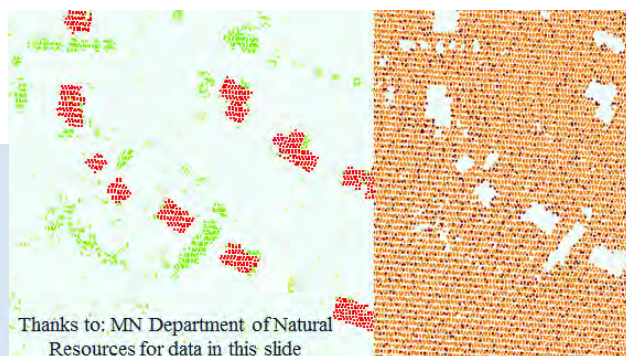
- UTM coordinate
- X&Y units = METERS
- Z units = Feet or Meter

☐ Never Classified	☐ High Vegetation
☐ Unclassified	☐ Building
☒ Ground	☐ Low Point (Noise)
☐ Low Vegetation	☒ Water
☐ Medium Vegetation	☐ Overlap Points

Output Resolution: ☒ Convert Meters to Feet

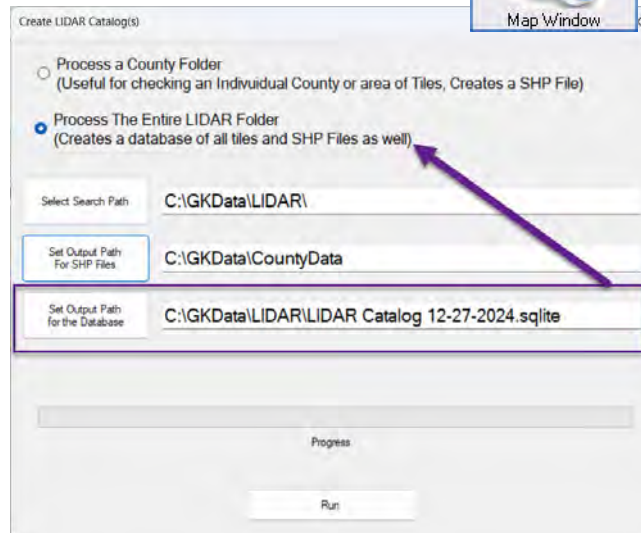
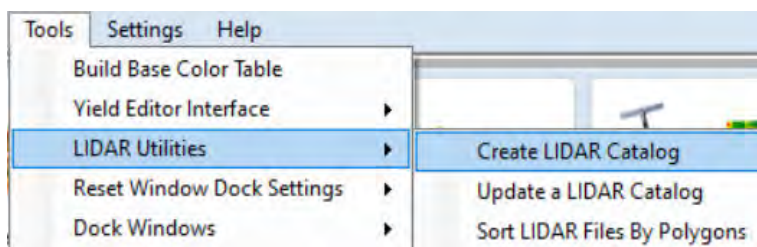
☒ Import only area under selected objects.

UpperLeft Y	Width	Lower Right
5260405	719	5259686
UpperLeft X	Height	Lower Right X
665772	503	666275



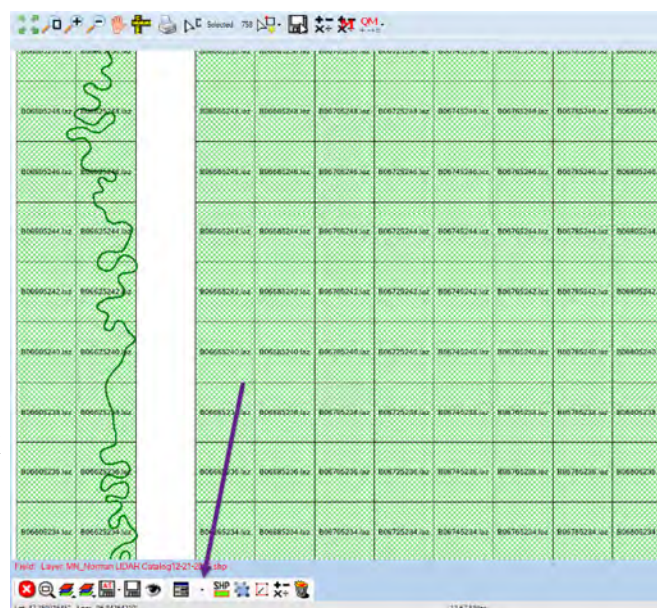
LIDAR Utilities-Create LIDAR Catalog

Tools here create shapefiles to index for your LAS/LAZ files and gives the option of making a Catalog of entire library to speed & ease processing.



1. On the Top Menu bar, click on "Tools" > "LIDAR Utilities" > "Create LIDAR Catalog"
2. Choose between:
 - **Process a County Folder**—Will look for LAS & LAZ files within one folder, will not look in sub folders. Creating a SHP Polygon file of every tile with information "LIDAR Tile Names" & "LIDAR Locations".
 - **Process The Entire LIDAR Folder**—Looks in the Selected folder, and sub-folders creating a "LIDAR Catalog" of all the LAS & LAZ files that ADMS can use later. Using the "LIDAR Catalog" means user do not have to choose folders and locations for LIDAR. Importing LIDAR speeds up. Also creates SHP File with the "LIDAR Tile Names" & "LIDAR Locations".
3. **Select Search Path**—location of LAS & LAZ files
4. **Set Output Path for SHP Files**—Location where SHP files will be created.
5. **Set Output Path for the Database**—If using the Process The Entire LIDAR Folder—Must choose a location for storing LIDAR Catalog.sqlite file. *Suggest putting it in the LIDAR folder where data is stored.*
6. Click **Run**

Once done, go to the output SHP location, there will be SHP file with the date processed. Turn it on. To label the Polygons, there should be a "Layer Display Properties"—Template under the dropdown arrow, "County Data" and choose the "Lidar Tiles GK". May have to tweak label size.



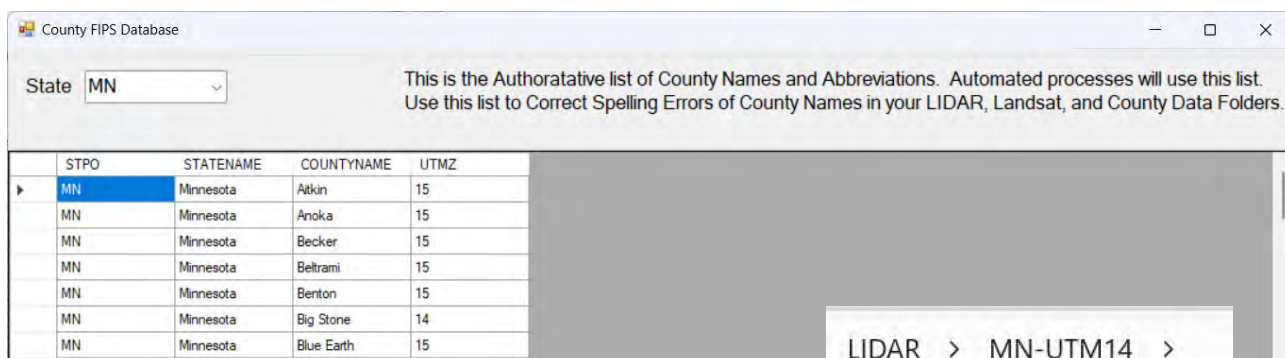
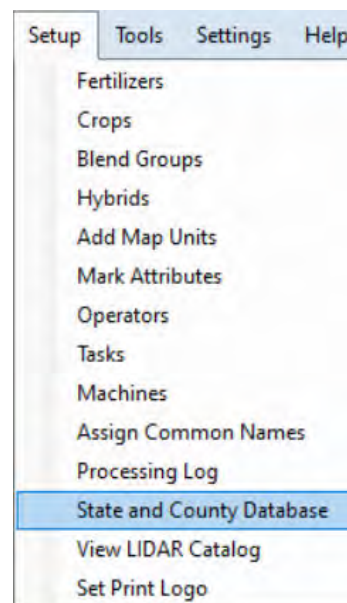
LIDAR Utilities-Create LIDAR Catalog

Create LIDAR Catalog.... Continued

NOTES:

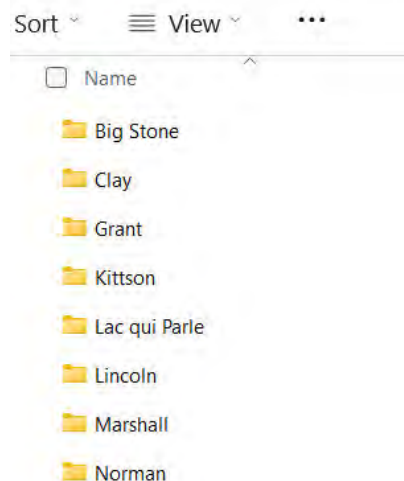
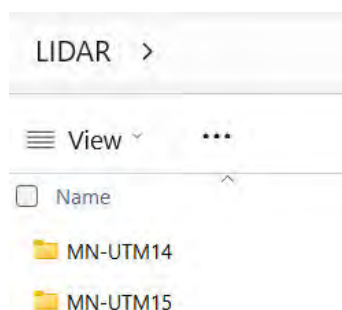
Using the “**Process The Entire LIDAR Folder**” option has it’s nuances.

- Folder structure must be laid out in an exact name and order.
- LAS & LAZ files must be in a folder with the State-UTM# that matches up with the State and County Database Ex-MN-UTM14 (see example at bottom of page)
- Inside that folder, there must be a folder of “County Names” that match this database
- Inside each county we need all the LIDAR LAS or LAZ files
- LAS & LAZ files need to be projected in UTM coordinates that match the State-UTM#
- LIDAR Search function looks for file extensions that start with “.LA” for .LAS & .LAZ. If there are file extensions in these folders with .LA** can cause errors.
- Suggest Storing the Catalog in the same location as the Lidar data.



Correct Naming Structure
&
Folder Layout

If you add LIDAR
Use the **Update a
LIDAR Catalog**
function.

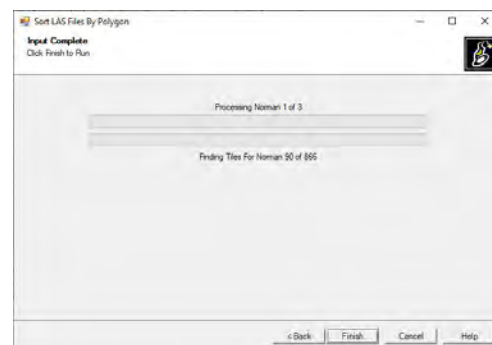
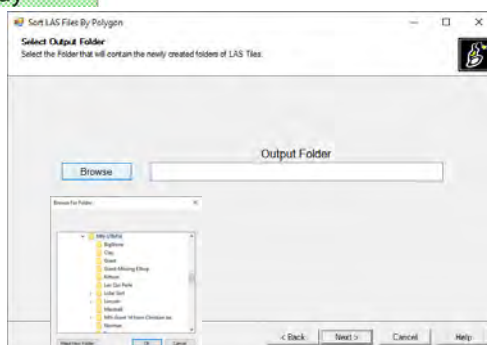
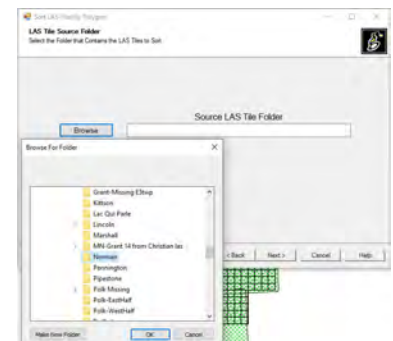
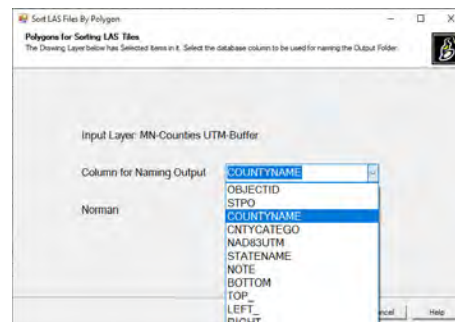
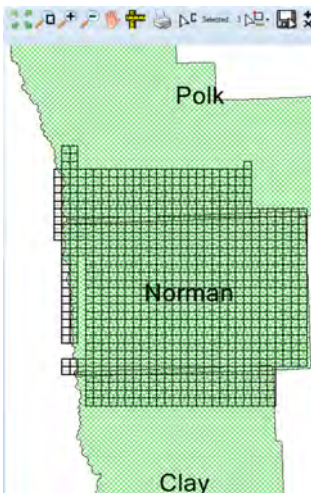
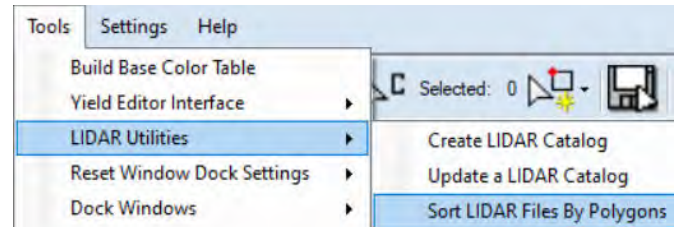


LIDAR Utilities– Sort LIDAR Files By Polygons

This tool sorts and copies Lidar tiles from multi-county projects into separate County folders.



1. Turn on County boundary by State.shp
2. Right click on file in data tree, "Shape Tools" > "Buffer"
(Suggest 2000 Ft)
1. Select buffered counties in the project area
2. Turn on LAS Catalog of the project to verify
3. On the top toolbar click on "Tools" > "LAS Utilities" > "Sort LAS Files By Polygons".
4. In the new window click "Next"
5. Select Column for Naming new folders "COUNTYNAME"
6. Click "Next"
7. Browse to folder containing LAS/LAZ tiles.
8. Click "OK"
9. Click "Next"
10. Browse to "Output Folder"
11. Click "Next"
12. Click "Finish"
13. This creates the folders, copies the LAS/LAZ tiles and creates an LAS Catalog for each county. **Note: This process can take hours for large projects and will require more available hard drive space than the original project size for doing calculations.**



Processing LIDAR LAS Files

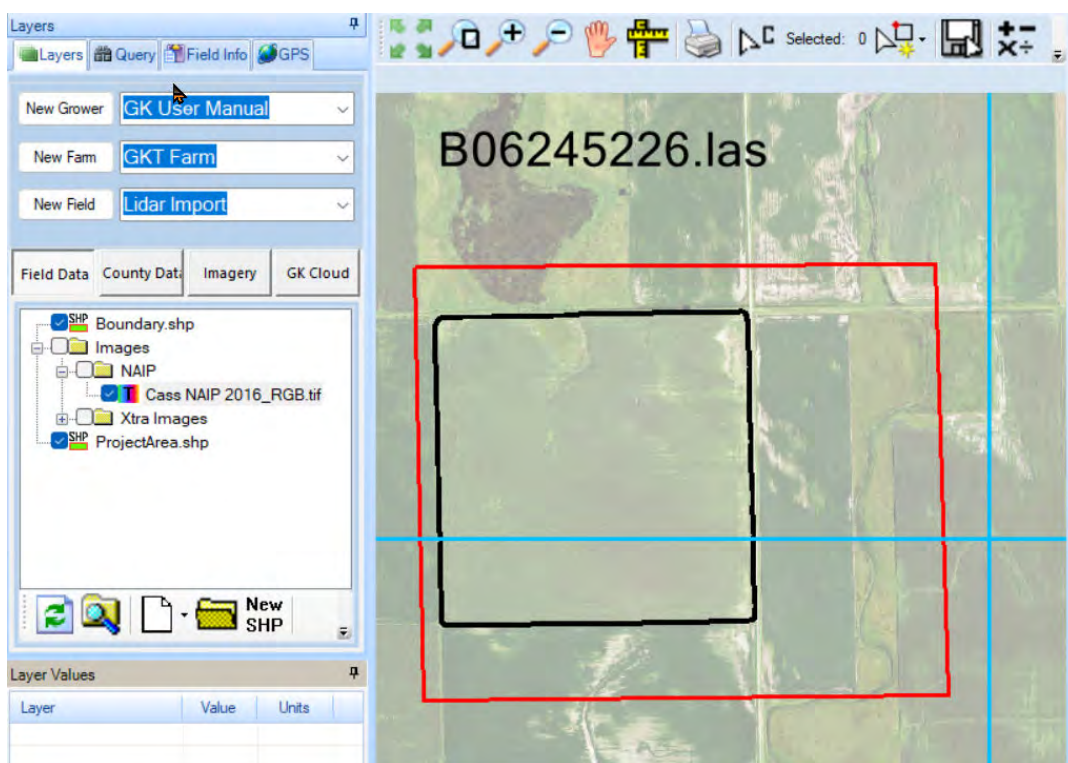
To utilize the "LiDAR" data you have downloaded. (See Downloading LiDAR)



1. Draw boundaries to define the areas you want to process.
You may want to have two boundaries created.

Boundary —Field Boundary—This polygon will define the field (or section) and will be used for running your watershed modeling. Keep in mind the accuracy of this boundary will affect the "Flow Accumulations", "Depressions" and "Watersheds".

Project Area —Tile Area—This polygon will encompass the whole field area and also the potential tile "Outlet" area. This object will NOT be used for watershed modeling.



Field Boundary in Black

Project Area Boundary in Red

Lidar Tile Boundary in Blue

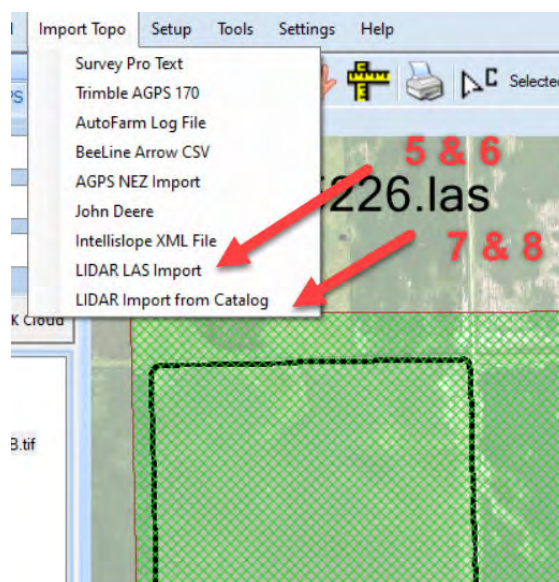
For "Project Area" Processing data from 2 tiles—6245226 & 6245224—"Selecting" boundary below automates tile selection

2. To "Import LiDAR" you must turn on the "Boundary" and "SELECT" it.

*Boundary will turn **LIME GREEN***

3. Go to the "Menu Bar" & click on "Import"
Select "Lidar LAS File"

4. At the next step you will have 2 options
LIDAR LAS Import (steps 5&6) (*Suggested*)
Or
LIDAR Import from Catalog (steps 7 & 8)



Processing LIDAR LAS Files

Import Information below is focused on using the LIDAR for "Watershed Modeling". If you are doing 3D for VRT or Tile/Ditch/Surface design work. GK suggests importing LIDAR at 1 meter up to 1200 acres.



LIDAR LAS Import (Suggested for most users)

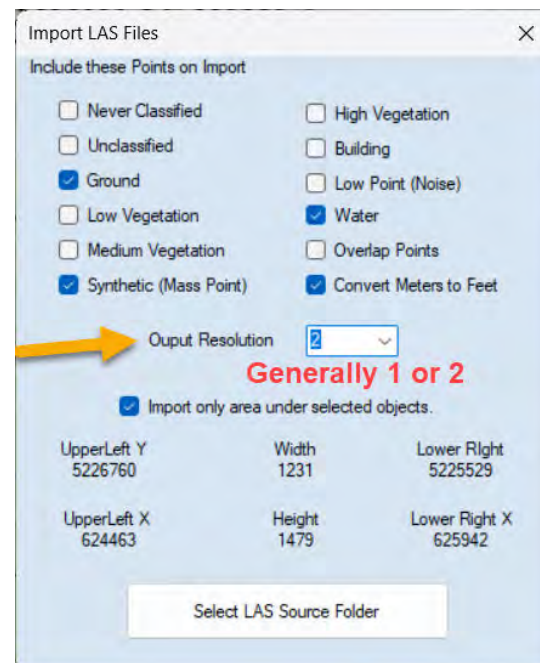
5. Import LAS Files—Adjust your settings to...

Default should be correct

Check—Ground, Synthetic, Water, Convert & Import only area under selected objects.

Output Resolution = 2 meters

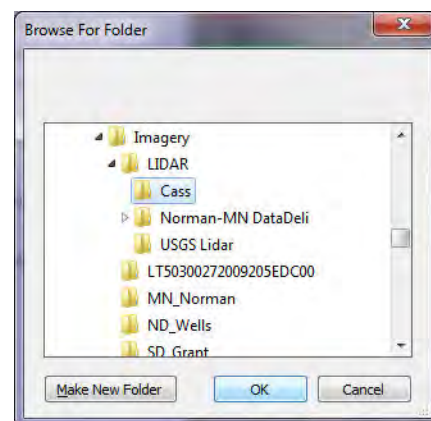
Resolution settings—Watershed Modeling
Less than 40ac— 1 meter
40ac to 2500ac—2 meter
2501ac to 9000ac—3 meter



6. Click on the "Select LAS Source Folder"

Browse to "Folder" containing the "LAS or LAZ" files & Click "OK"

Should be in C:/GKData/Imagery/LIDAR
OR C:/GKData/Imagery/LIDAR/county name

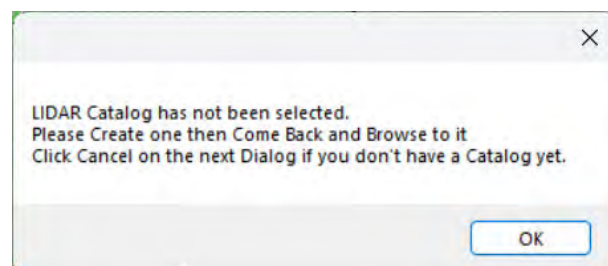


LIDAR Import from Catalog (For Users with Large Datasets & Multiple LIDAR Folders)

First time this tool is used. Most likely will see a Warning or Question. Select the "Catalog" you created.

Once the Catalog is Created and running. ADMS will "auto" find your Lidar Files (State & County).

If you have Multiple Datasets for 1 county name. User can still select the Dataset you would like. Click the Dropdown for "County".



Processing LIDAR LAS Files

LIDAR Import from Catalog

7. Import LAS Files—Adjust your settings to...

Drive Letter Redirect—if the Catalog is on a different Drive / Path than the LIDAR Data. Must change Drive Path to location of the Data.

Check—Ground, Synthetic, Water, Convert

8. Output Resolution = 2 meters & Click "OK"

Resolution settings—for Watershed Modeling
 Less than 40ac— 1 meter
 40ac to 2500ac—2 meter
 2501ac to 9000ac—3 meter

9. After Click "**OK**" and the LiDAR tiles will be processed to the "Selected Boundary" Larger "Project Boundary".

Note:ADMS will find the "LiDAR tiles" bases on "Selected Boundary"



10. Go to "Layer Info" & "Clear Map"

11. Turn on "Boundary.shp" (may want to re-draw at this time)

12. Left Click inside Field Boundary — it will turn **Lime Green**

13. Turn on "LidarImport.grd"

14. Click "**Crop Raster to Selected Polygon**" on the Bottom Toolbar  "Just this Layer"

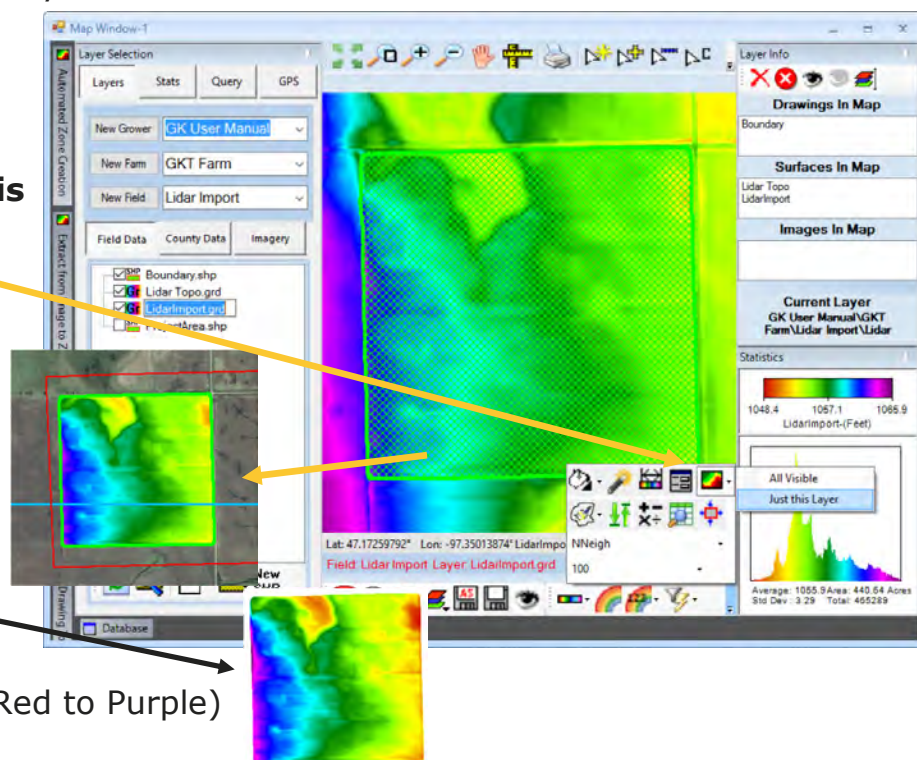
15. Click "**Save As**" on the Bottom Toolbar 

16. Rename and click "Save"
Suggest renaming to "LidarTopo"

17. "Clear Map" 

18. Turn on "Lidar Topo"

Turning on re-sets color table.
 (Orange to light purple then Red to Purple)



Creating Topography & Watersheds

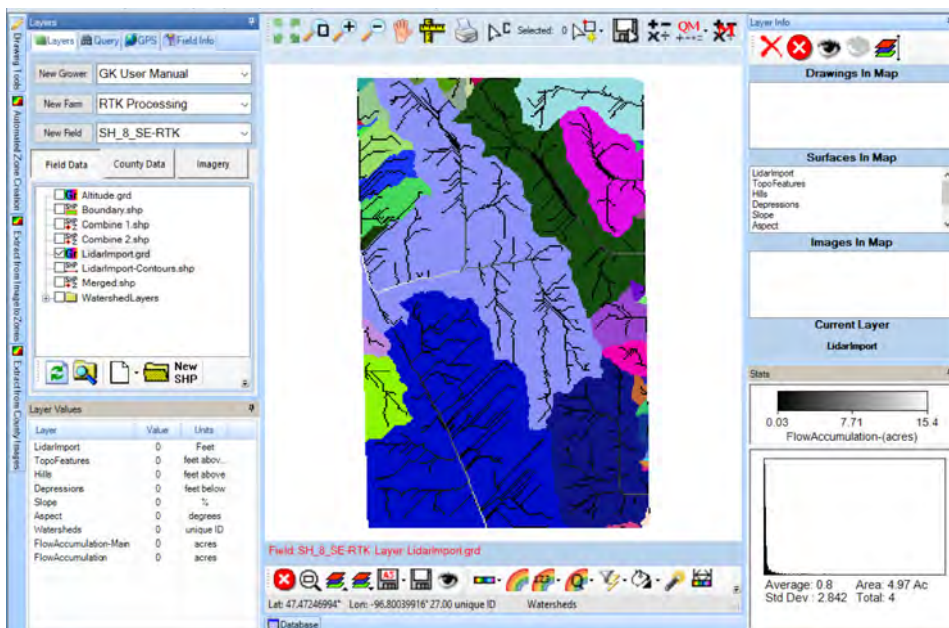
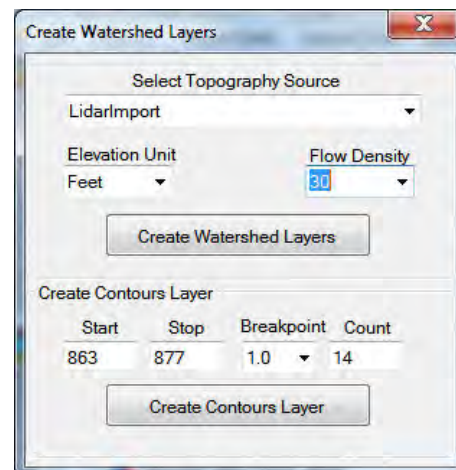
Creating the Topography Map



Running the Watershed Modeling Routine

Open into the "Map Window"

- Select the desired "Grower", "Farm" and "Field".
 - Turn on the "Altitude.grd" or "Lidar Topo.grd" for the field
 - Top Menu Bar select "Process" and "Watershed Modeling"
1. In the "**Select Topography Source**" drop down, select the layer that was created in the "Grid Points" method on the previous page.
 2. In the "**Elevation Unit**" drop down box, select the Units of elevation surface feet or meters. This setting is necessary for computing the slope of each cell in the field. The horizontal units are in meters, by defining whether the units are in feet or meters, the % slope is calculated correctly.
 3. For a starting point, leave the "Flow Density" set at 40. This number can be raised or lowered, to provide more or less detail in the flow accumulation layer. Raising this number provides more detailed flow paths.
 4. Click "**Create Watershed Layers**" button
 5. When the progress bars disappear, a view like the one below will be displayed. That view is the flow accumulation layer over the top of the watershed's layer.
 6. The flow paths should make sense to you when you look at them. If they do not, there may be some false data in the topography layer that is not representative of what is happening in the real world. Looking at the depressions layer to see if the areas defined as concave "bowl" shaped areas in the field are correct will help to determine if the data is correct. Excessive area showing up in the depressions layer may indicate that an outlet for water was not represented correctly in the topography map.



Creating Topography & Watersheds

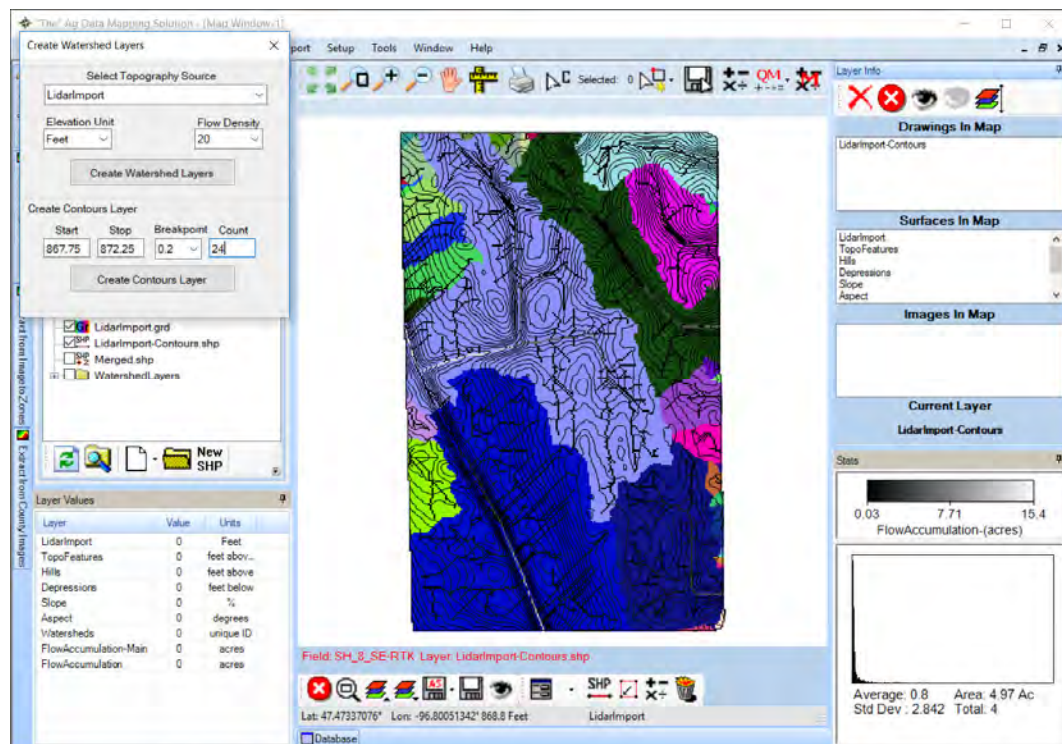
Creating the Contour Map



Running the Contour Routine

Open into the "Map Window"

- Select the desired "Grower", "Farm" and "Field".
 - Turn on the "Altitude.grd" or "Lidar Topo.grd" for the field
 - Top Menu Bar select "Process" and "Watershed Modeling"
1. In the "**Select Topography Source**" drop down, select the layer that was created in the "Grid Points" method on the previous page.
 2. In the "**Elevation Unit**" drop down box, select the Units of elevation surface feet or meters.
 3. The "**Start**" / "**Stop**" are the lowest / highest elevations of the Topography map.
 4. The "**Breakpoint**" is how many "**Feet or Meters**" between the Contour Lines to be created, if you use the dropdown values the "**Count**" will automatically update.
- NOTE: "**Breakpoint**" can be Manually entered, but the "**Count**" will not update automatically. The "**Count**" must be manually calculated and updated.
5. The "**Count**" is how many Contour Lines will be created starting at the "**Start**" creating a Contour Line and moving up a "**Breakpoint**" creating a contour and moving up a "**Breakpoint**" until it reaches the "**Stop**".
 6. Click the "**Create Contours Layer**"



Using the Point Offset Routines to Adjust for Better Topography Maps

Some GPS data logging packages use an offset while collecting data. This is visible in planting data from both Deere and Ag Leader.

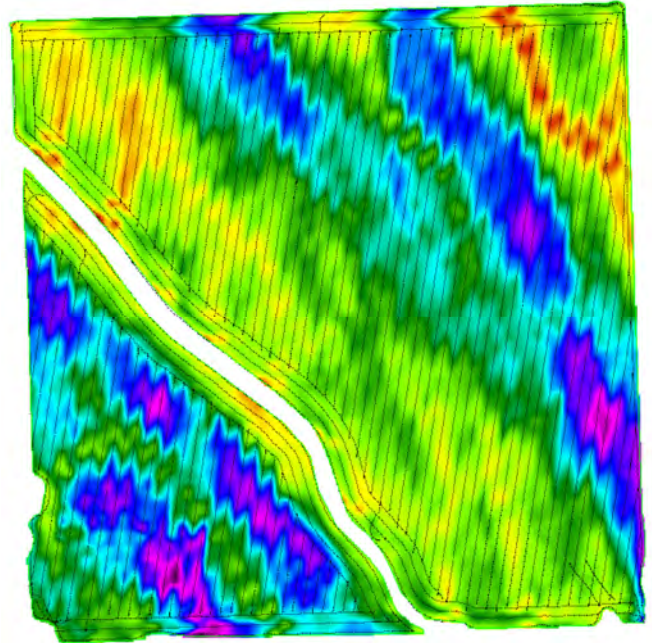
While it makes sense for the planting data, the altitude attribute that is written to the file is for the altitude at the GPS receiver, not at the planter. And a topography map with the appearance of the one to the right is the result. Note the zippered appearance of the edges of all of the features of the maps.

To correct for this problem and to make better topography maps, we need to try to correct the data using some data in the log file.

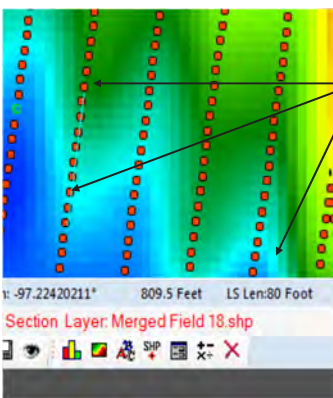
In order for this to work, there has to be an attribute in the database for the direction of travel or 'Heading'.

Below right is a Deere GS2 collected database, imported using the 'Import Topo' menu in Ag Data Mapping Solution. It is imperative that there be a heading column to make this work.

In order to fix this, we need to figure out how far the offset is from the GPS to the planter. If you are the grower, you probably know this number, if not, we will have to figure it out by zooming in on a zippered area and measure the peak to trough of the wave made by the zipper.



In this case, that peak to trough measurement is about 80 feet. So an offset of 40 feet would be about right.



Peak
Trough
And distance from
peak to trough of
80 ft.

Database						
Objects Selected: 2		DB Operations Select By Query				
	LONGITUDE	LATITUDE	ELEVATION	DISTANCE	HEADING	GKT_IDX
▶	-97.22772217	49.18292236	809.02001953	66.90000153	188.3999939	1
	-97.22771454	49.18293381	808.98999023	124.40000153	188.69999695	2
	-97.22771454	49.18294144	809.01000977	90.19999695	188.69999695	3
	-97.22771454	49.1829567	809.04998779	138.69999695	188.69999695	4
	-97.22774506	49.18279266	809.04998779	1828.19995117	8.5	5
	-97.22774506	49.18281174	809.07000732	232.19999695	8.39999962	6
	-97.22773743	49.18283463	809.15002441	242.30000305	8.39999962	7
	-97.2277298	49.18285751	809.25	273.3999939	9.19999981	8
	-97.2277298	49.18288422	809.28997803	281.20001221	9.80000019	9
	-97.22772217	49.18291092	809.30999756	280.79998779	10.69999981	10
	-97.22771454	49.18293381	809.32000732	280.3999939	11.19999981	11
	-97.22770691	49.1829567	809.41998291	277.20001221	11.19999981	12
	-97.22769928	49.1829834	809.57000732	277.70001221	10.69999981	13
	-97.22769165	49.18300629	809.69000244	278	10.19999981	14
	-97.22768402	49.18303299	809.72998047	282.29998779	10	15
	-97.22767639	49.18305588	809.88000488	278.5	9.69999981	16
	-97.22766876	49.18308258	809.90997314	278.3999939	9.39999962	17
Record Count: 19667		ColumnID:	Min:	Mean:	Max:	Weighted M
Database						

Applying The Offset

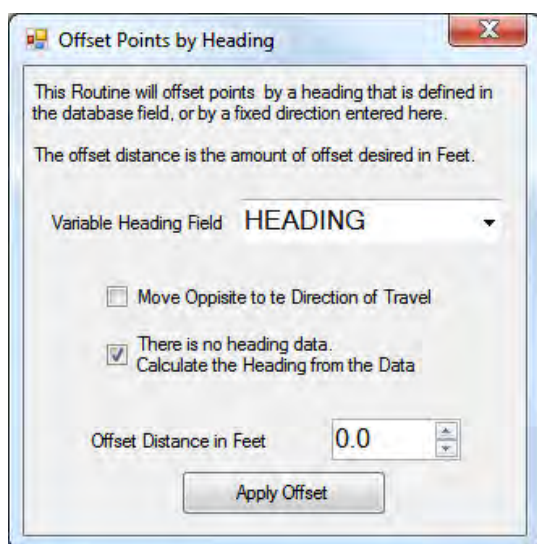
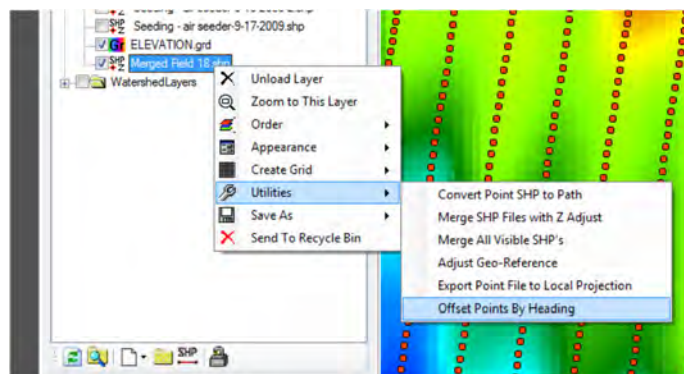
The tool to adjust for this is called 'Offset Points by Heading', and it is on the 'Utility' menu on the right click of a shapefile in the data tree.

After clicking on 'Offset Points by Heading' the dialog below appears.

In the Variable Heading Field box, select '**Heading**'. Change the offset distance to feet. Since the direction we want to offset the distance is in the direction of travel, leave the box labeled 'Invert the Heading Value' unchecked.

Then click '**Apply Offset**'.

View the results and see if the offset looks

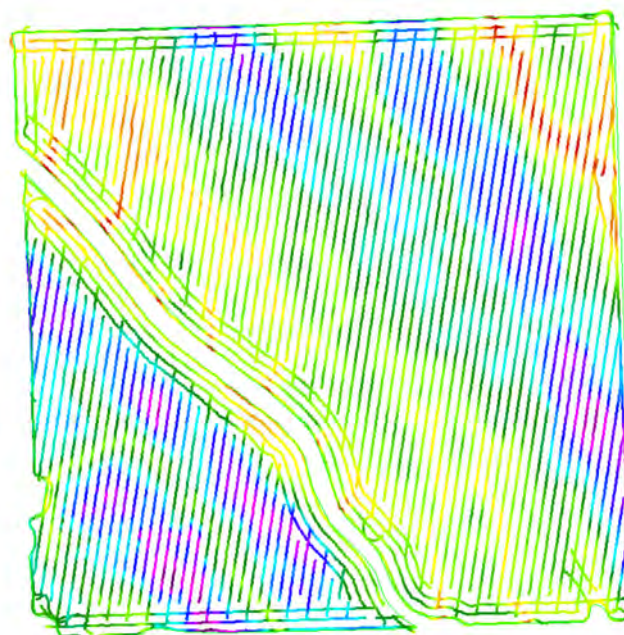
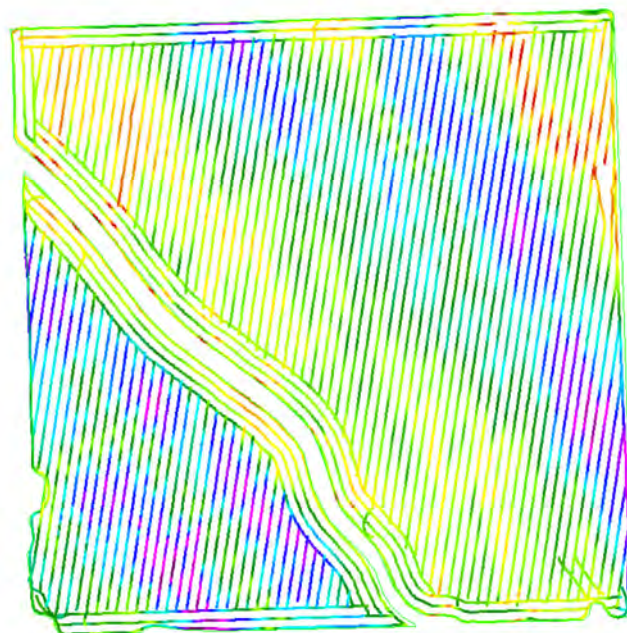


right. If not, unload the shape points file, do not save the changes. Reload it and try again with a slightly different number.

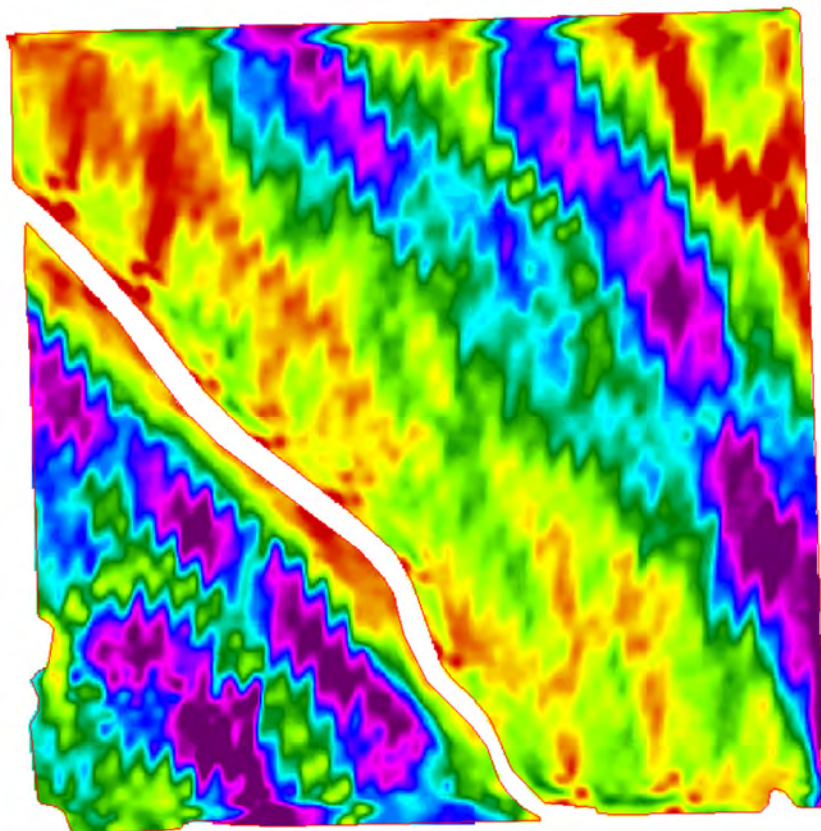
When you have the result you want, save the SHP points file to a new layer, and grid it.

You can already see in the point map to the right that it is a much better map.

Check out the next page for before and after maps.

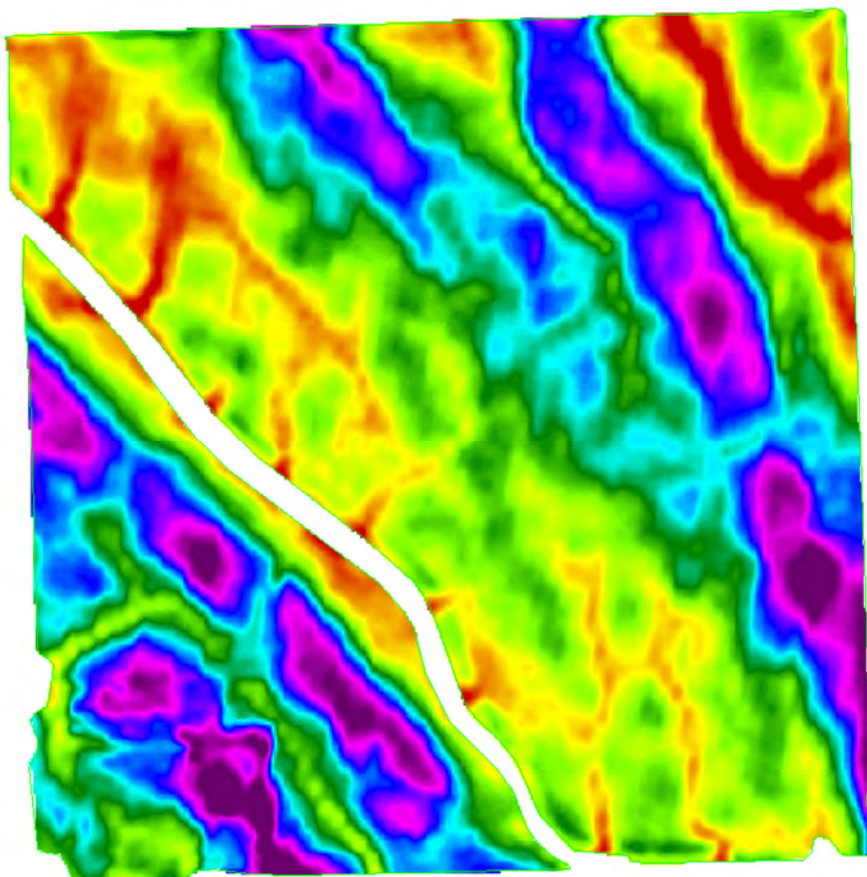


Before and After Offset Heading Correction



***Before
Offset
Points
By
Heading***

***After
Offset
Points
By
Heading***



Surface Re-projection

Re-Project the Raster

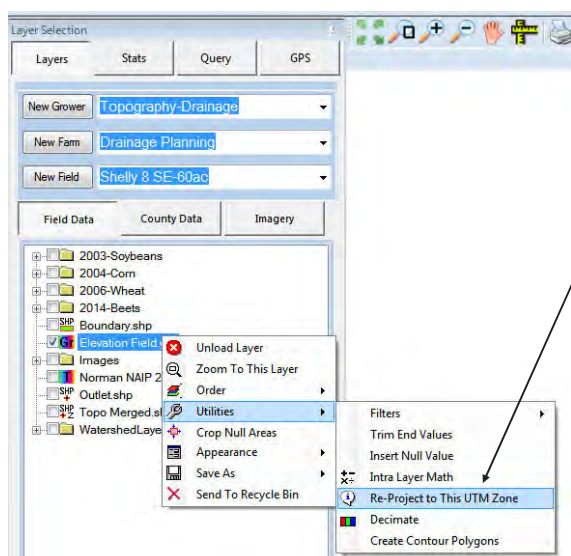


The data is projected in UTM Zone 15, lines up with boundaries and has the correct coordinates in UTM 15. If you are displaying the rest of the data for this farm in Zone 14, will need to re-project this data to display it with NAIP data, or other raster data.

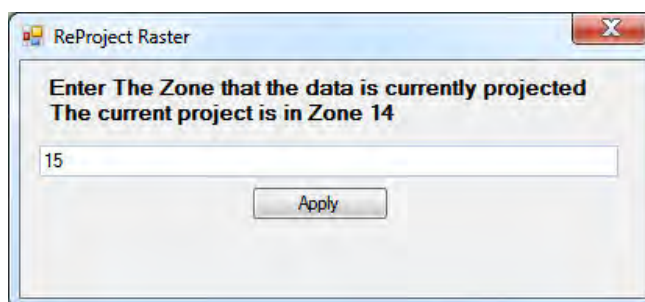
Close "Map Window" and set yourself to the correct UTM. In this example that is Zone 14.

Turn on the Raster to Re-project, and right click

Utilities —> Re-Project to This UTM Zone.

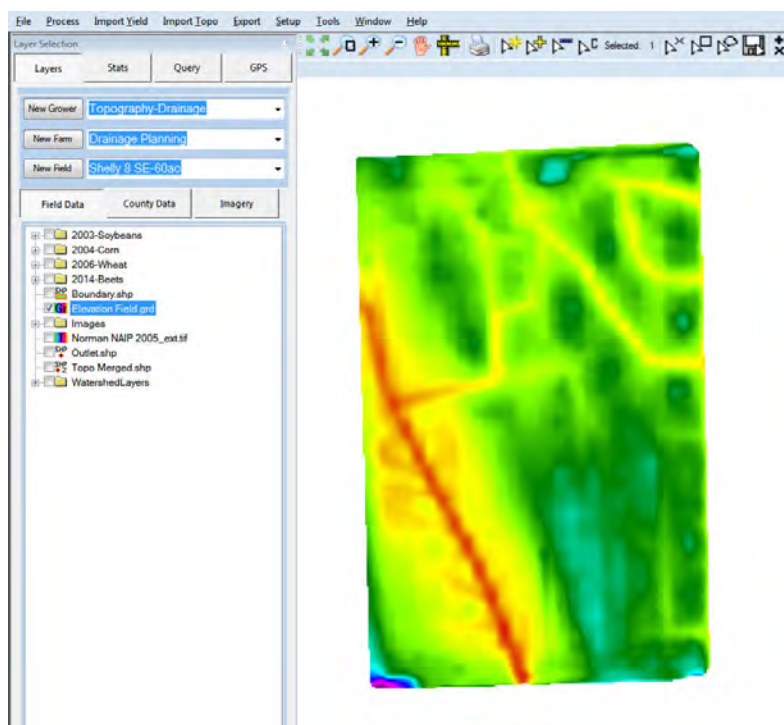


The dialog box below will appear. The data is currently in Zone 15, so enter 15 in the box and click 'Apply'.



The resulting image will now be rotated and scaled to fit in Zone 14.

Then make sure the re-project surface is the active layer, and "Save" the layer.



LiDAR-RTK Merge—Collecting RTK Data to use with LiDAR

We are going to use an example where LiDAR topography is 5 years old and the field has had some surface drainage done on it. This brings up a very important questions. Does that make it any LESS ACCURATE? In this case YES. There are surface drains that have been cleaned. Other examples where this would work well—CRP—Lidar collected in a wet cycle with standing water and many others.



The end use for this data is "SURFACE DRAINAGE". Because it is only being used for surface drainage, only the "Field Ditches" and "Road Intersection" were collected using RTK. If this data would have been for tile, we may have wanted to drive the "Ridges or High spots".

Good RTK collection for this process would include (highs, lows, outlets & road centers).

- driving field ditch bottoms
 - road ditch bottoms
 - low areas
 - outlet & inlet areas
 - ridges
 - most importantly county road centers north and south
- The road centers will be used for adjusting "X,Y,Z" on the data set
- if the RTK is going to be used for the "Control Point" collect it.

At the point that you are collecting data in field. We suggest that you use your NAIP and LiDAR data for collecting the in field data with ADMS. It will save time and assure you get all the data collected without having to make multiple collections. Also, you will see these "LARGE" deviations in data collection geo-referencing (shown below).

Note: This method works well in scenario's where you are updating small areas or specific passes within the field. This method does not work as well with "Whole" field RTK data collections.

Red Points = LiDAR Control Points (not RTK)

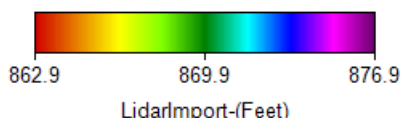
- This Red Point is at the "Road Intersection"
- Points set by hand off the LiDAR map

Black Points = RTK collected using "Mobile Base"

- Note the "Geo-Reference"
- CROSS (+) should be at "Road Intersection"

Collected by driving the center or the road east—west & north—south

Colored map = LiDAR Topography Map



LiDAR-RTK Merge—Adjusting Geo-Reference—Moving RTK

Need to decide which data set is the "control" for setting your "Control Point".

**** In this case we are using the "LiDAR" as the "MASTER"**

**** Moving the RTK DATA.shp**



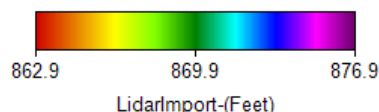
Turn on data in this order

1. Black Points = Ditch Bottoms.shp RTK Data collected with Mobile Base
 - Note the "Geo-Referencing"
 - CROSS (+) should be at "Road Intersection"

Collected by driving the center or the road east—west & north—south

2. Red Points = LiDAR Control Points (not RTK)
 - This Red Point is at the "Road Intersection"
 - Points set by hand off the LiDAR map

3. Colored map = LiDAR Topography Map



4. Zoom into the Road intersection area (Area for geo-referencing)

5. Use the "Measure" tool to get some close estimates for how much to move the .shp (est. 50' south and 30' west)



6. Right Click—RTK Points (Ditch Bottoms.shp)
 - choose—Utilities
 - Adjust Geo-Reference

7. Use the "Arrows" or type in the values to move the data. Click "Apply"

8. Repeat step 7 till the data lines up perfectly. Then pan around the field to confirm.

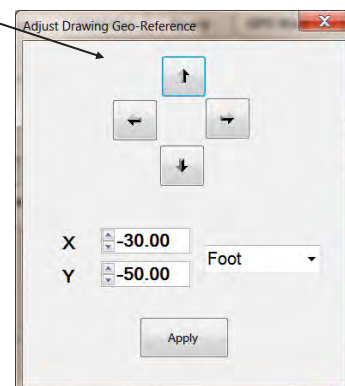
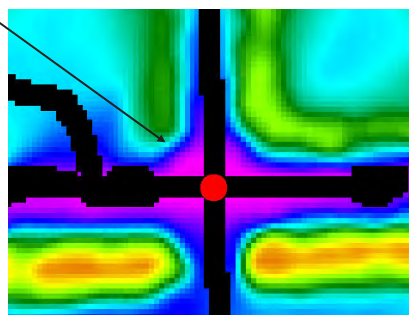
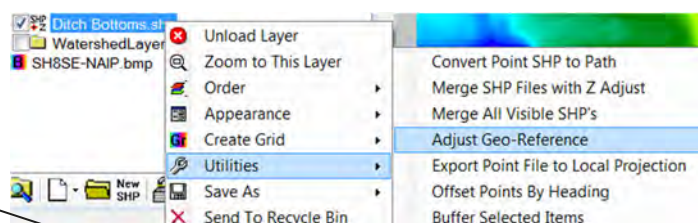
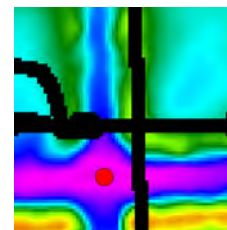
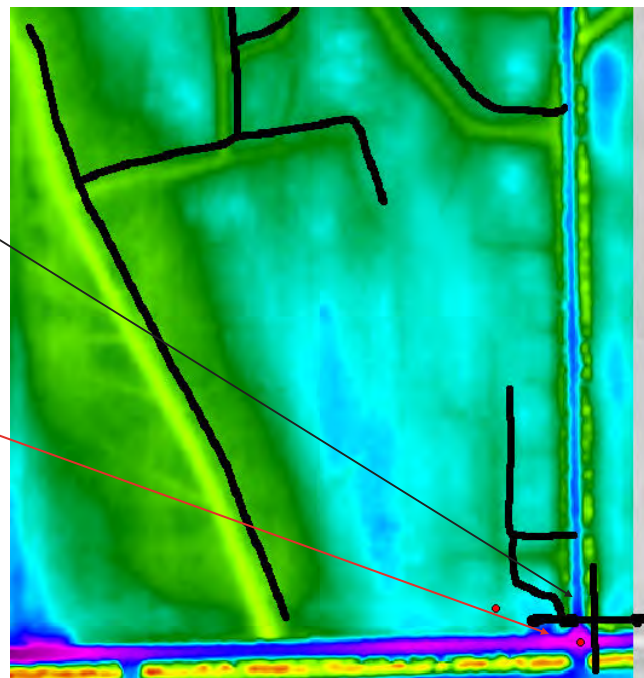
*Example Adjustment:
Ended up 33' West
51' South*

9. Suggest clicking "Save As" "Ditch Bottom-Adj.shp" or something to identify the changes done.

Or

Just "Save"

(original data location — GONE)



LiDAR-RTK Merge—Adjusting Geo-Reference—Moving LiDAR

Need to decide which data set is the "control" for setting your "Control Point".

**** In this case we are using the "RTK" as the "MASTER"**

**** Moving the LiDAR DATA.grd**



Turn on data in this order

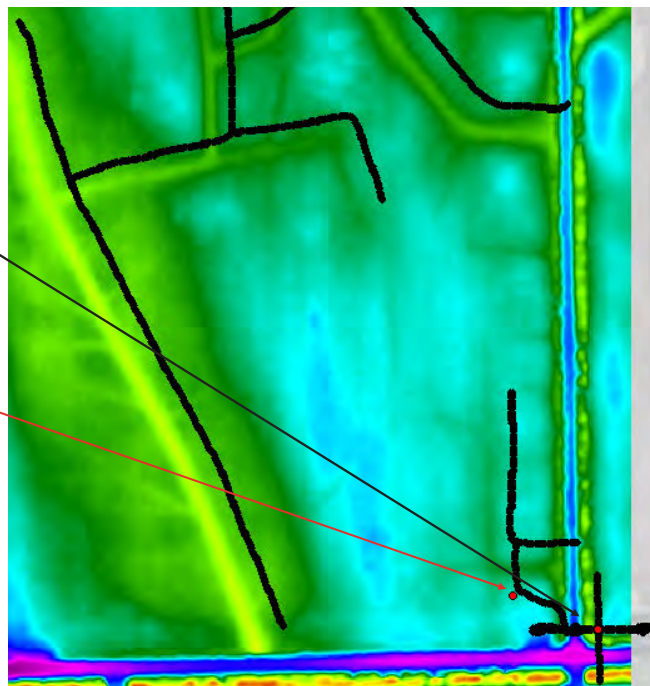
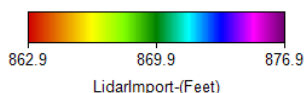
1. Black Points = Ditch Bottom.shp "RTK Mobile Base"

- Note the "Geo-Reference"
- CROSS (+) is at "Road Intersection"

Collected by driving the center or the road east—west & north—south

2. Red Points = RTK Control Points (not LiDAR)
 - This Red Point is at the "Road Intersection"
 - Second point set at a "Physical" mark, a "stake" driven in the ground in this example.

3. Colored map = LiDAR Topography Map
 - Road Intersection needs to be aligned with RTK CROSS.

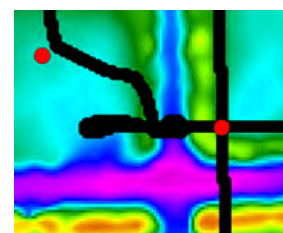


4. Zoom into the Road intersection area (Area of geo-referencing)

5. Use the "Measure" tool to get some close estimates for how much to move the .shp (est. 50' north and 30' east)



The movement will be made in "METERS" so divide the values by 3.2808 (est. 15.24 meters north and 9.14 meters east)



6. Make "LidarImport.grd" your active layer

7. Click the "Surface Properties" button on the bottom toolbar.

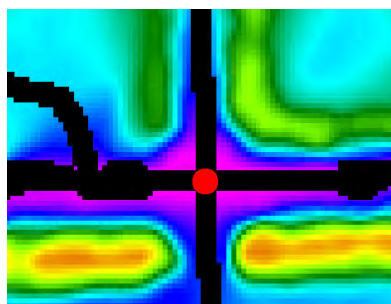


8. Write down the Northing—Easting values so you know your starting point

9. Use the Arrows to "Adjust Geo-Reference" till the data lines up perfectly. Then pan around the field to confirm alignment.

- Confirm Units = Feet
- Confirm Decimal Precision = 1

10. Click "Save"



Set Raster Attributes

Adjust Geo-Reference

Rows: 717 Columns: 506

Northing: 5260385.725

Easting: 665753.692

X Resolution: 1

Y Resolution: 1

Update Position

Data

Minimum Data Value: 862.89196777

Maximum Data Value: 876.90112304

Units: Feet

Decimal Precision: 1

Apply

LiDAR-RTK Merge—Adjusting Elevation & Merging Rasters

The LiDAR and RTK are “aligned” on a X-Y axis. We need to adjust the Z axis. You must have data in areas where the elevation that has NOT changed over time. In this example we are using the road and the field entrance.



1. Turn on “LidarImport.grd” and “Ditch Bottom.shp”

2. Make **Ditch Bottom.shp** the Active Layer

3. Click on the “Change Draw Style” 

- Change settings like this
- Click “Apply”

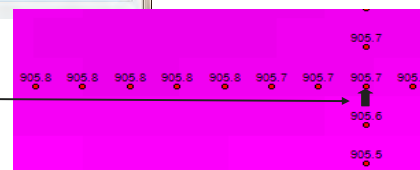
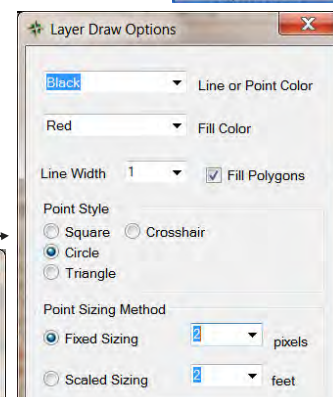
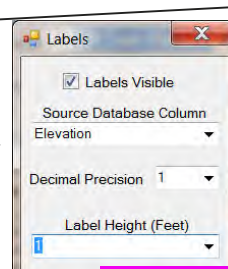
4. Click on the “Change Label Settings” 

- Change settings like this
- Click “Apply”

5. Zoom to the area of the data to take elevation readings

6. Scroll your mouse over the SHP point

Take readings RTK 905.7'
- LiDAR 875.3'
Difference 30.4'



7. Repeat this function several times (5 to 10 suggested).

Average all the “Difference” values. This will be the amount you adjust the “Elevation Data”
For this example the average was 30.43’

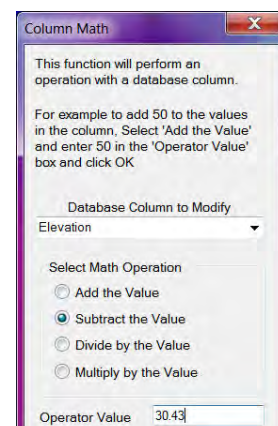
To Adjust the SHP RTK Data

1. Make **Ditch Bottom.shp** the Active Layer

2. Click the “Perform Math operation on a Column” on the bottom toolbar. 

3. Choose column to amend & “Add” or “Subtract” & enter “Value”
This example “Elevation” & Subtract & 30.43

4. Click “Apply” and “Save”



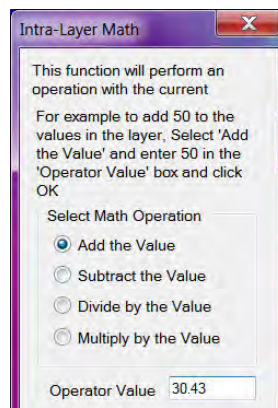
To Adjust the GRD LiDAR Data

1. Make **LidarImport.grd** the Active Layer

2. Click the “Intra-Layer Math” on the bottom toolbar. 

3. Choose column to amend & “Add” or “Subtract” & enter “Value”
This example “Elevation” & Subtract & 30.43

4. Click “OK” and “Save”



LiDAR-RTK Merge—Adjusting Elevation & Merging Rasters

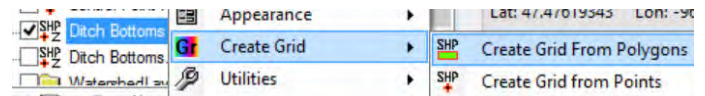
Both the LiDAR & RTK are adjusted to match on the X / Y / Z axis. The final step is going to be "Merging" the data sets. There are two methods of merging that could be used in ADMS, merge as "Rasters" or merge as "Vectors". This example will show you the "Raster" method.



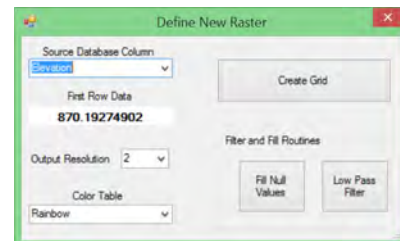
Start by "Clearing" the map.

1. Turn on **Ditch Bottom.shp** & make it the Active Layer

2. Right Click on the Ditch Bottom.shp
*Note: "Point Size" will effect the next step.
 Generally use 10' - "World Size"*



3. Select "Create Grid" & "From Polygons"
 - Select Column—Ex. = "Elevation"
 - Output Resolution = 2
 - Color Table = Rainbow
 - Click "Create Grid"



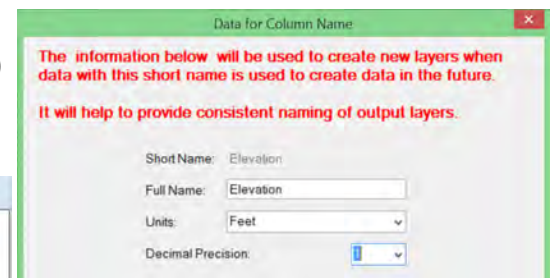
You may be prompted "Data for Column Name" Window. Fill in like below & click "OK"

NOTE: DO NOT use "field names" - use "Event names"

- "Fill Null Values" - click 1 time (data in pass should touch)
- "Low Pass Filter" - click 1 time

4. Turn off Ditch Bottoms.shp

5. Turn on the LidarImport.grd & Elevation.grd
 - May want to toggle Front to Back to compare.



6. Layer sequence is very IMPORTANT.
 -The first surface turned on (Back/Bottom) will be on top after the "MERGE"
 -Only turn on surfaces to "Merge" (no extras)

7. Click "Multi-Layer Map Math"  button top toolbar

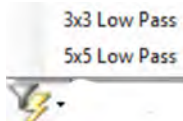
8. Go to the "Open Existing Script" button 

9. Choose "Merge All Visible—Feet"

10. "Compile" & "Run Script"

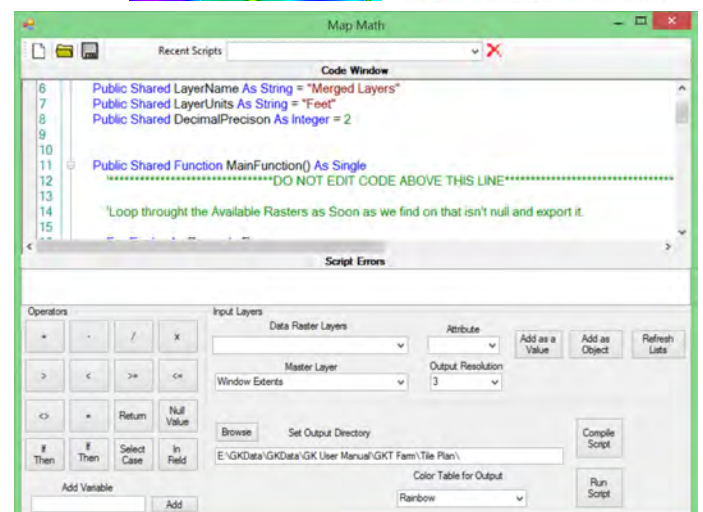
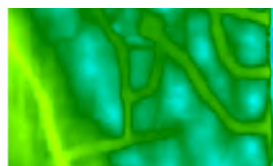
11. Close "Map Math" window

12. Typically do a 3x3 Smooth Filter



13. "Save" the "Merged Layers.grd"
 - Suggest re-naming "Merged RTK-Lidar.grd"

14. Ready for Watershed or Drainage Planning.

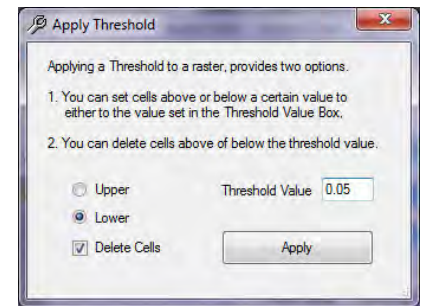


Quick Notes For Drainage Planning—Map Window

Adjust Depressions—Main Depressions



1. **"Map Window"**
2. Open **"Depressions"** set as the **active layer**, select **"Trim End Values"**.
3. **"Apply Threshold"**, select "Lower" & "Delete Cells", we suggest starting "Threshold Value" at 0.05'
4. Click **"Apply"**.
5. Look at new "Depressions", inspect the map, if satisfied go to 7
6. *If you want to trim more repeat 3 & 4. If you went too far, "Clear Map" and DO NOT SAVE CHANGES to Depressions.grd.*
7. Click on the **"Save AS"**  icon on the bottom tool bar. Rename to **"Depressions-Main"** & click Save (if you do not do this, you will lose the original Depressions layer).
8. Under the **"Layer Info"** tab, click on **"Clear Map"**. 



Creating Dump Areas

1. Turn on all the maps required to help define the dump areas.
 2. Click **"New"**  and select **"Dump Areas"**.
 3. Click on the newly created **"Dump Areas.SHP"**  **Dump Areas.SHP** file to turn it on and make it the **active layer**.
 4. Select the **"Draw New Object"**  from the bottom toolbar - Left click around your
- Dump Area - Right Click to close Polygon.
5. Repeat step 4 to create all your Dump Areas for this field.
 6. When finished, **"Save"**  from the bottom toolbar - Dump Areas.shp

Saving Images for Ditching

1. Turn on your desired layers to view while ditching (combination listed below)
 - A. County NAIP, Flow Accumulations, Main Ditches, Hills, Dump Areas
 - B. Watersheds, Flow Accumulations, Main Ditches, Depressions, Dump Areas
 - C. Topo Features, Flow Accumulations, Main Ditches,
 - D. May want to use the **"Transparency"** settings.
2. Go to **"File"** - **"Print"** - **"Print Map to Bitmap"** (Suggest file size less than 5mb for SD)
3. Location, save this file into the same field folder you were working in.
4. Name the file something simple that captures the field location ex - sec32sw
5. Save this file as a BMP for most applications
6. Click **"Save"**

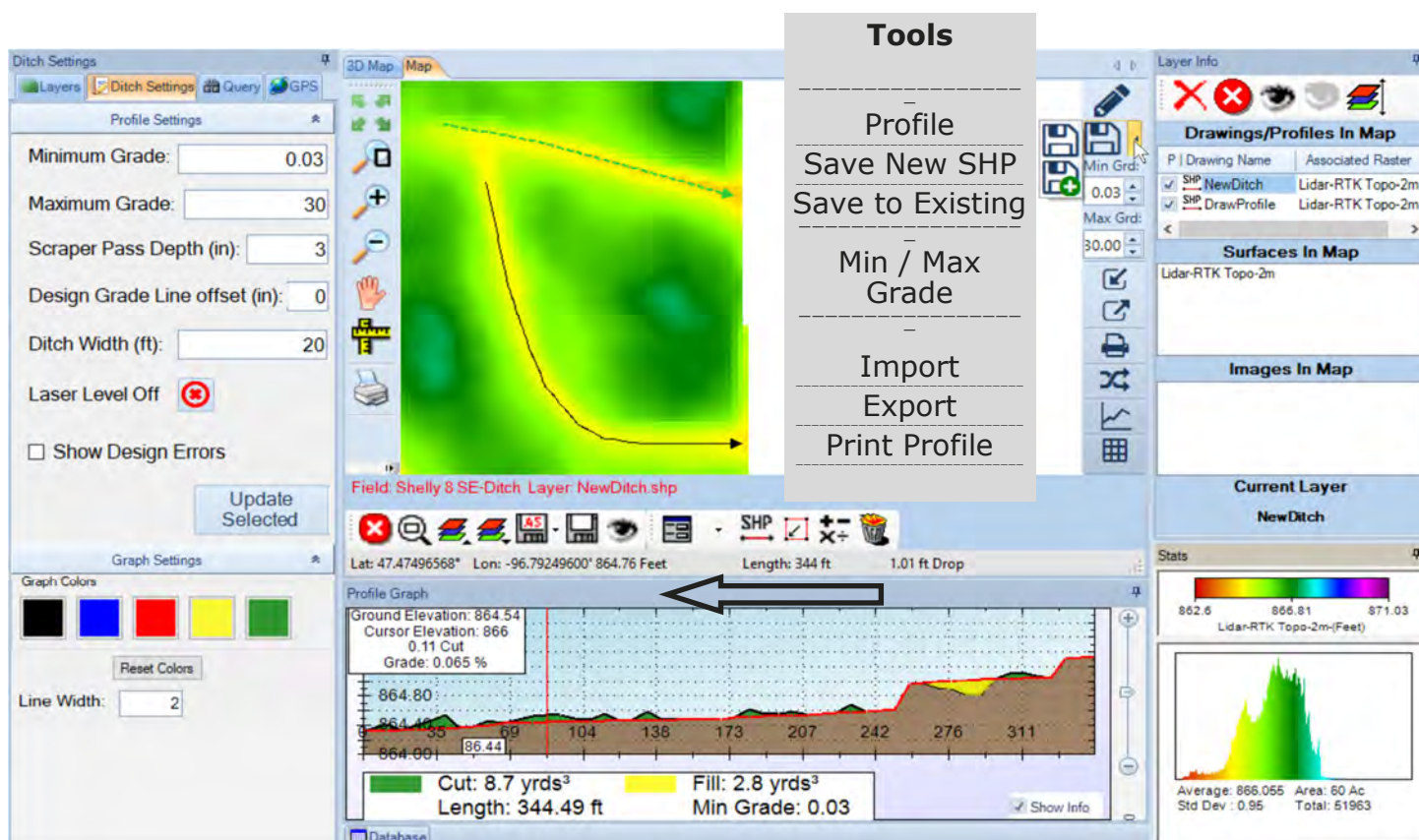
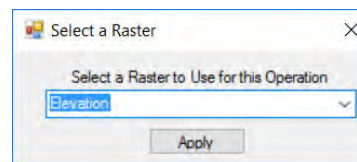
Moving BMP Files to Other Devices

1. In most cases, you will be moving files with removable storage drives.
2. In ADMS, click **"Explore this Folder"** icon 
3. You are now looking inside the **"Field Folder"** in Windows File Explorer.
4. Using our example, highlight both **sec32sw.bmp** and **sec32sw.bpw**.
5. **"Copy"** these two items (select **"Edit"** - **"Copy"** from the toolbar).
6. **"Paste"** them onto a removable storage & take them to other devices (AMW/ APEX/ SMS/ Farmworks)
7. Now ready to take the removable storage to other PC or device.

Quick Notes - Drainage Design (Ditch Button)

Before opening up "Drainage Design" or "Surface Shaping" window, have all the Surfaces & Background images built.

1. Click on the "Profile" button.
2. Assign the "Elevation.grd" to be the "Select a Raster".
3. Left Click out the path where you want water to flow off the field (draw towards the outlet recommended).
4. Right Click to finish Profile.



Profile Window— "Show Info" Not Checked on, no cursor, no Cut/Fill & no Map location icon.

"Show Info" Checked on, move cursor in Profile, see Red Line & see the Cut/Fill/Depth/Grade and the location icon in Map Window.

Optional—"Save Profile to existing SHP". *NOTE: Active layer = NewDitch.shp in example.*

Repeat Steps to preview & confirm ditch locations and directions.

Print profiles to have a hard copy & have estimated yards of CUT.

Export maps for use in SD Drain—Ditch.



Surface Drainage - Buttons & Tools

Below are basic functions of the surface drainage window.

To the right side of the page are the buttons of the "Right Side" of the Drainage Window.

Draw Single Ditch - This is used to draw in the location of an existing or proposed ditch; drawing from top to bottom, in the direction of water flow.
Tool draws 1 line & must be reselected for next line (left click draw & right finish).

Save Drawing to New SHP File - Saves unsaved "Draw Ditch" to new SHP file.

Save Drawn Ditch Layer to the current 'active' ditch layer - Saves unsaved "Draw Ditch" to the "Set Ditch Layer".

Min: - Minimum Grade (Rise / Run * 100) Ex—0.05 = 0.5' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the profile, or you can type in this box.

Max: - Maximum Grade (Rise / Run * 100) Ex—10.00 = 100' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the profile, or you can type in this box.

Import Projects - will import projects from data collected in SD Drain—Ditch.

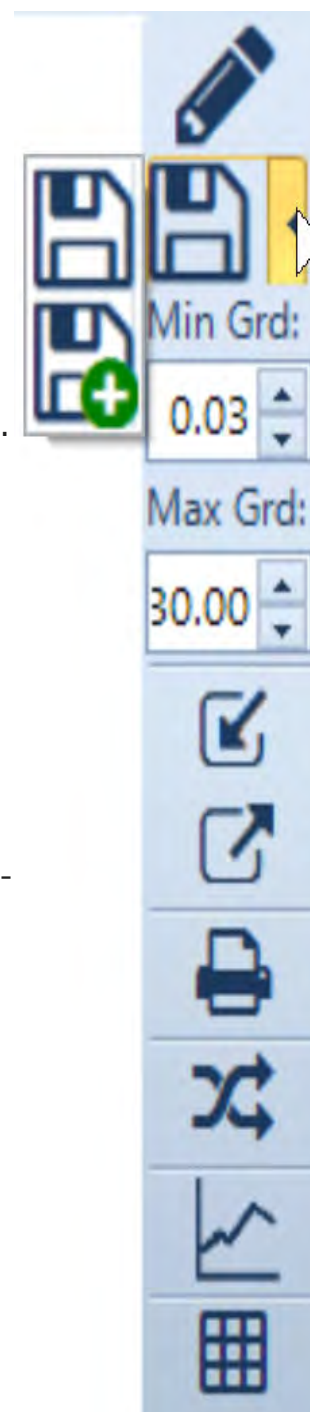
Export Projects - will export the data that is turned on as a "project" for SD-Drain—Ditch

Print - This button will print the overhead map view with the "Profile" below along with the "Cut & Fill" yards values.

Reverse Ditch Direction - Change the direction of the "ditch" that is showing in the profile.

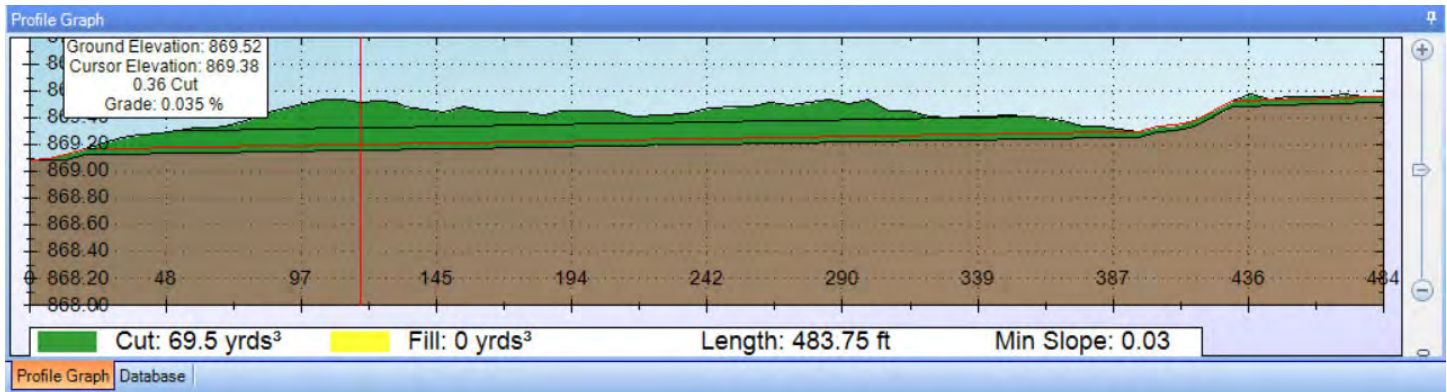
Edit Graph - Clicking will open the "Edit Profile" window. See info on the following pages.

Reload Lines from Database - Will reset all unsaved changes back to the last save DBF values for ditch lines (DGLO / MinGrd / MaxGrd / Nudge / Cut / Fill).



Surface Drainage - Scraper Settings

As we draw in Ditch profiles, you will see the "side profile" or the "cut profile" of the proposed ditch. ADMS has calculations for "Best Fit Grade Control" or "Stepped Grade Control" to allow the user to move as little soil as possible. See the Red horizontal line below.



Ditch Settings

Layers Ditch Settings Query GPS

Profile Settings

Minimum Grade: 0.03

Maximum Grade: 30

Scraper Pass Depth (in): 3

Design Grade Line offset (in): 0

Ditch Width (ft): 20

Laser Level Off

☐ Show Design Errors

Update Selected

Graph Settings

Graph Colors

Reset Colors

Line Width: 2

On the Left side of the screen is the Layers tab. The "Ditch Settings" allow you to change the behavior of the "Profile" calculations. All Grade values are calculated using fall / length. **Example 0.05 grade= 0.5' fall / 1,000' run.**

Minimum Grade—is the least amount of grade given to the "best fit grade control" profile line calculation.

Maximum Grade—is the largest amount of grade given to the "best fit grade control" profile line calculation.

Scraper Pass Depth—is the amount of cut your scraper can take per pass in inches (0 = No Pass Depth Lines).

Design Grade Line offset—will automatically add "0.5" to each "Profile Cut" as ditch maintenance (suggest 0).

Ditch Width—How wide to cut the ditch, used to calculate the Yards of removal (suggest 2x scraper width).

Laser Level—Off/On—"Off" mode uses "Best Fit Grade Control"; "On" mode uses just a single grade.

Show Design Errors—will pop up errors as you select or draw Profile Lines similar to in-field machine controls.

Save as Default—Saves Scraper Setting for all future use and will be this way on re-open of the window.

Submit Changes—Sets updated values to existing line in Map Window.

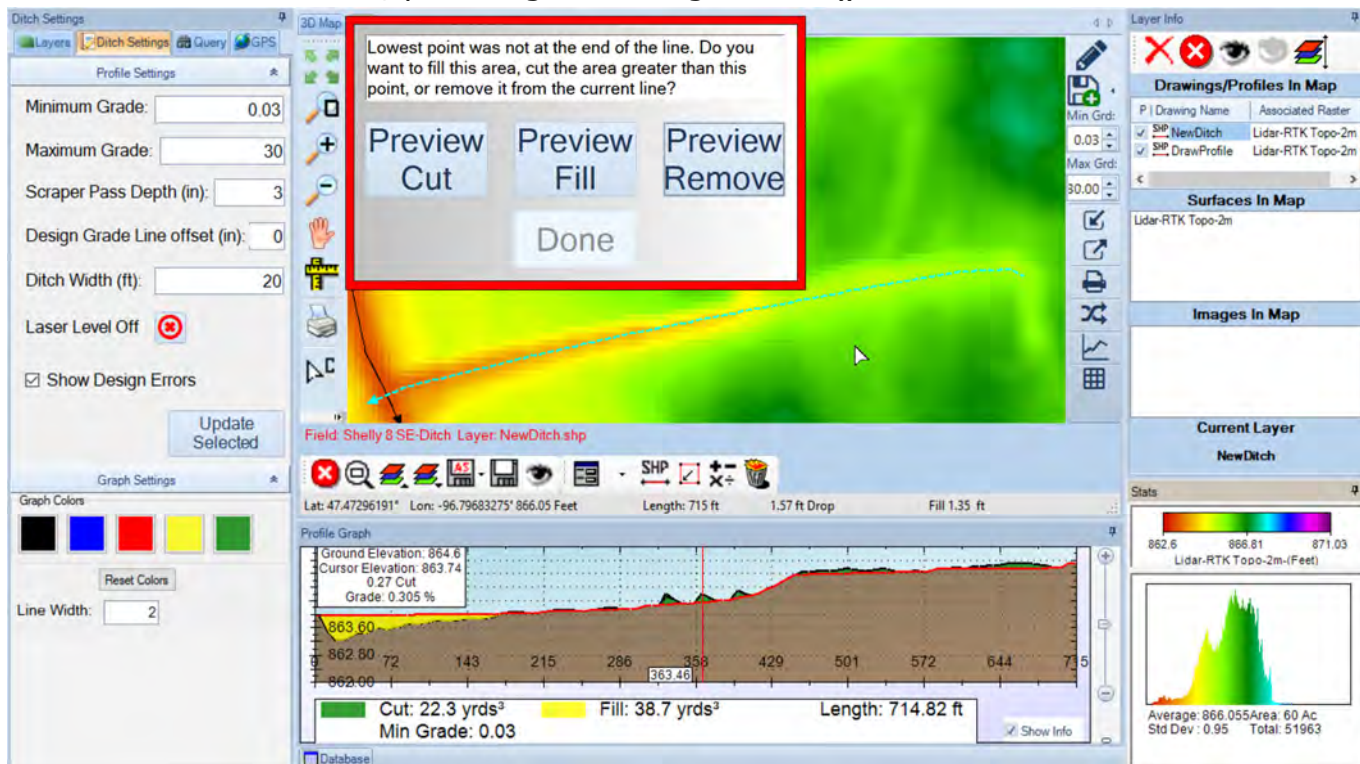
Graph Colors—allows user to choose line and fill colors of the "Profile Graph" (more information in "Profile Graph Window" section).

Surface Drainage - Show Design Errors

In the Ditch Settings tab, there is an option to "Show Design Errors". The concept here is that the design grade line is always trying to flow water to an outlet at the end point of the line. "Design Errors" will warn you when it cannot do this at the end point or any other areas in the profile line.

This is a very important function in our SD Drain-Ditch software. It may or may not be as helpful in ADMS. This example will show you what it can do.

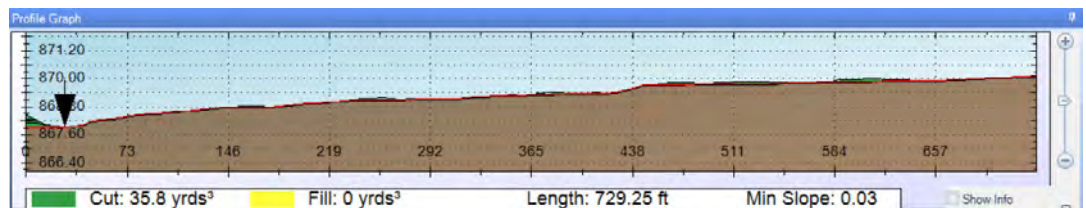
Example Below: As you draw in a LATERAL DITCH, feeding into MAIN DITCH. If the ditch is drawn too LONG like below, you will get a "Design Error" ().



Black Arrow = Point of error /edit.

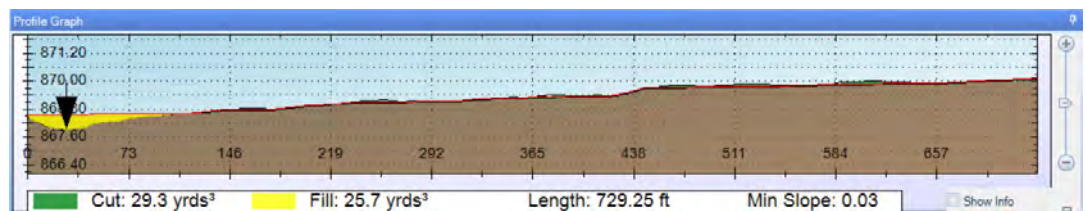
Preview Cut ->

Notice the Green area of Cut on the Left of the Black Arrow.



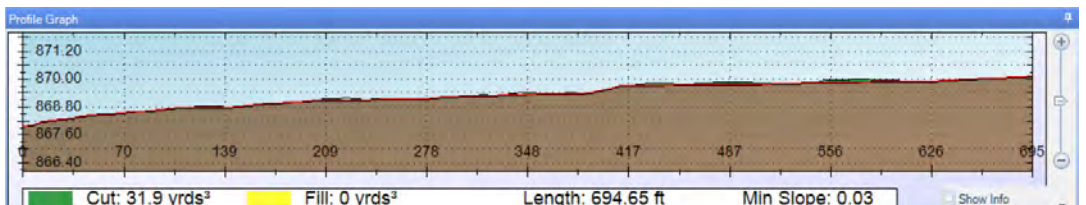
Preview Fill ->

Notice the Yellow area of Fill under the Black Arrow.



Preview Remove ->

The area to the Left of the Black arrow is Removed.



Surface Drainage - Setting Raster Source—Profile

Layer Info-Tab on the right side of the window allows you to see all the layers you have or had turned on.

In the "Drawings/Profiles In Map", take note that the "Drawing Name" and "Associated Raster" will allow users to see what "Surface" is being used to Calculate the "Profile Line".

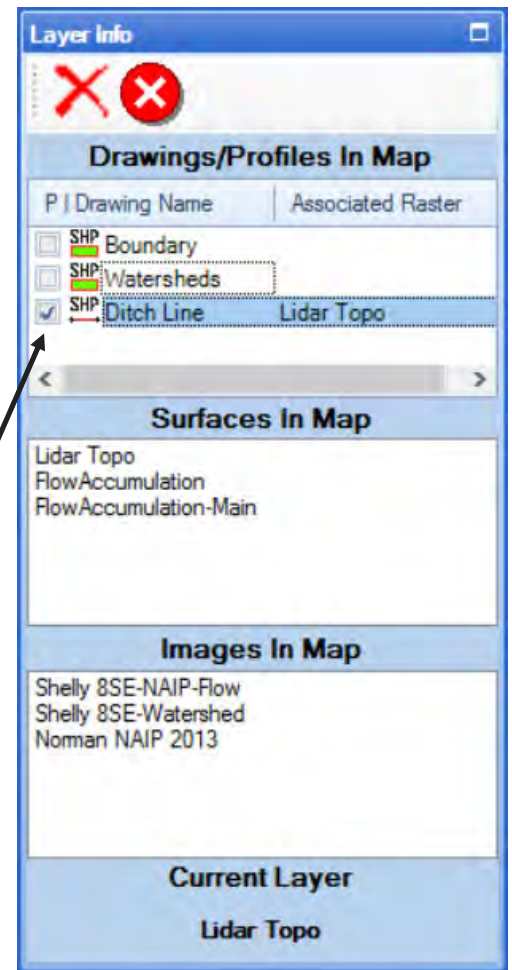
The "P" (Profile) check box will set that layer to be used as a "Profile Line", gathering it's attributes from a Surface Raster layer.

ADMS can only associate Surface Raster to Line files.

"CHECKING" the "P" box will allow you to make the association for the line to the Surface Raster.

Once that data is "Associated" to a line, that Line becomes a "poly Z" Line.shp file. This means that the line has x,y,z properties at each location in the line where it intersects a raster pixel. This process will ADD many more vertices to lines.

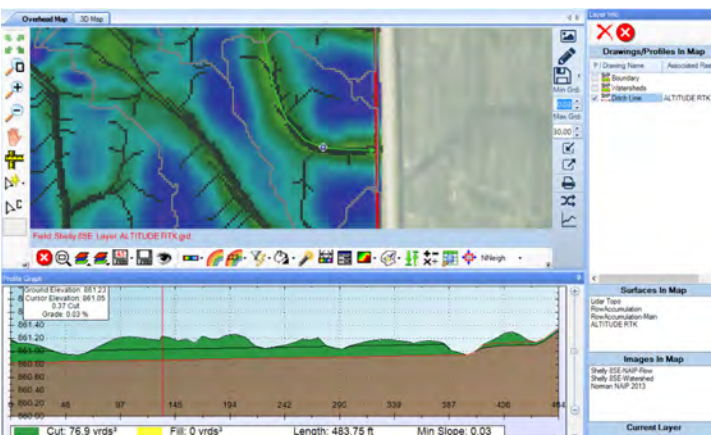
These are the lines that will show in the 3D window.



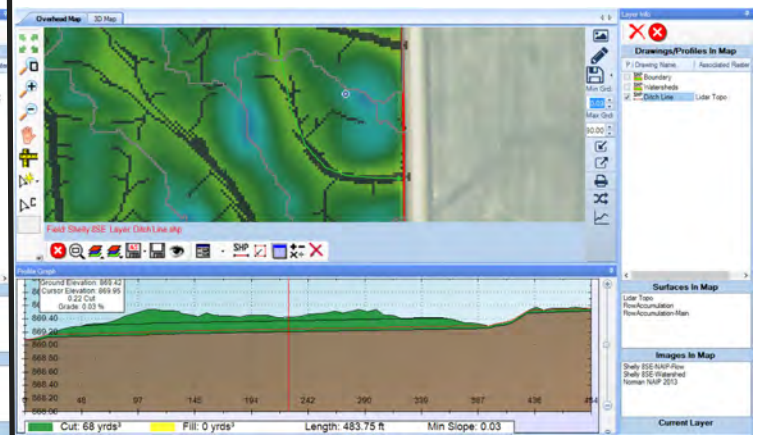
Example of "Switching Surface Raster Layers" - below on the LEFT is RTK data collected by Combine, 34 foot passes. Below to the Right is Lidar data collected at 1 meter (3.3') resolution.

Notice on the "Profile", the Left end of the line is always OUTLET SIDE. The RTK did not drive in the road ditch so we do not have elevations there; Lidar does in this example so it calculates a slightly different Profile cut for the exact same Line location.

RTK Data 1/sec at 34' passes

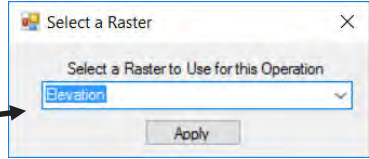


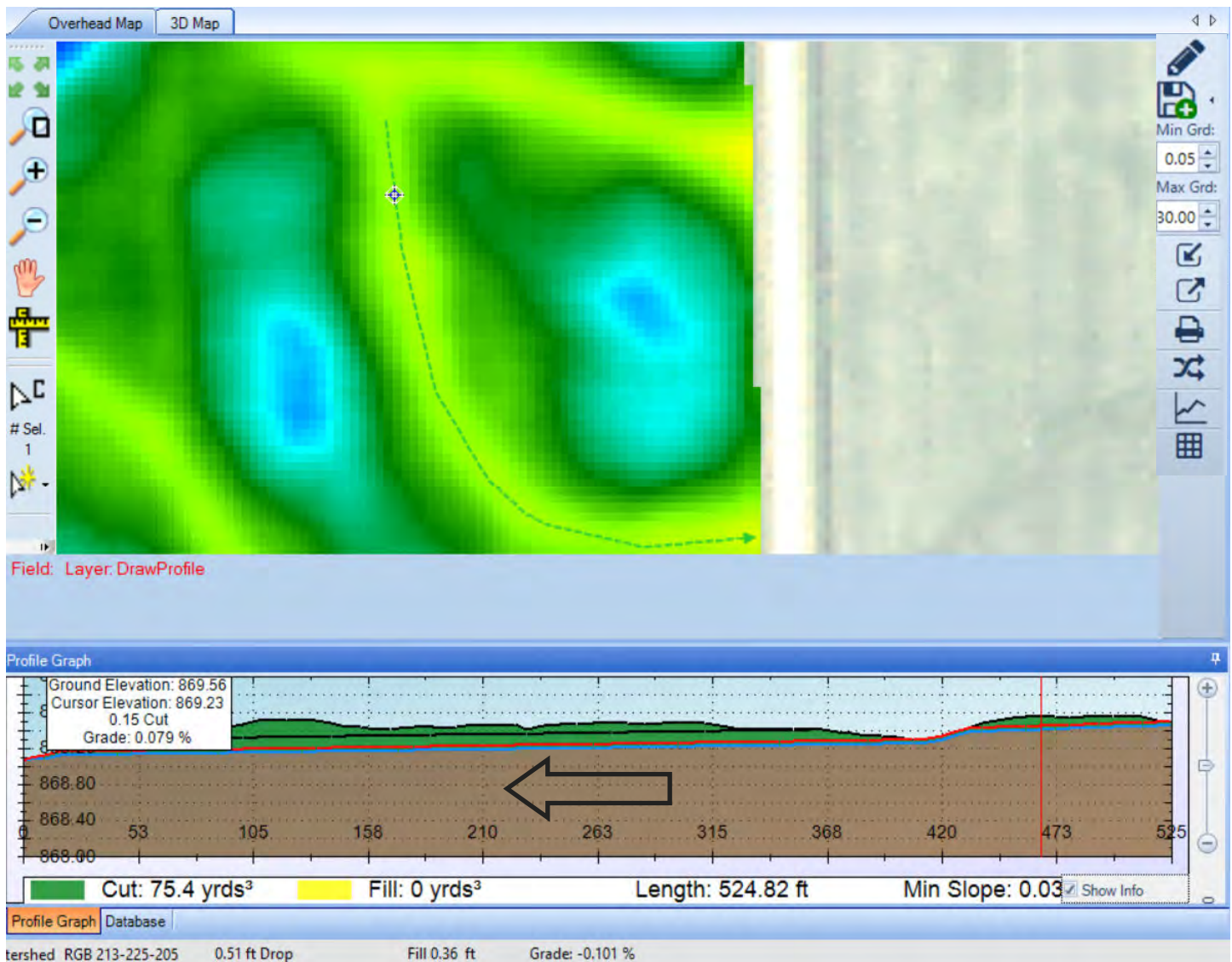
LiDAR data at 3.3' resolution



Surface Drainage - Profile Button

With the "Profile" button, users can quickly calculate the best method / direction to drain fields.

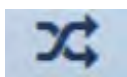
1. Check On the "Elevation.grd" in the "Layers" tab.
2. Check On all the layers you may want to use.
3. Zoom to the area of the field to be drained.
4. Click on the "Profile" button 
5. Assign the "Elevation.grd" to be the "Select a Raster". 
6. Left Click out the path where you want water to flow off the field (draw towards the outlet recommended).
7. Right Click to finish Profile.
8. DrawProfile.shp in the Map Window has an "arrow" for "flow direction"



Note: As the Profile is being drawn at the bottom of the screen, it shows "Drop/Rise" & "Cut/Fill" based off minimum grade & "Grade". These values are from starting point to cursor or last point on the Profile Line.

Surface Drainage - Reverse Ditch Direction

In drawing in Ditch Lines / Profile Lines, you should always draw in the direction of water flow. This means start on the high end and draw to the outlet.

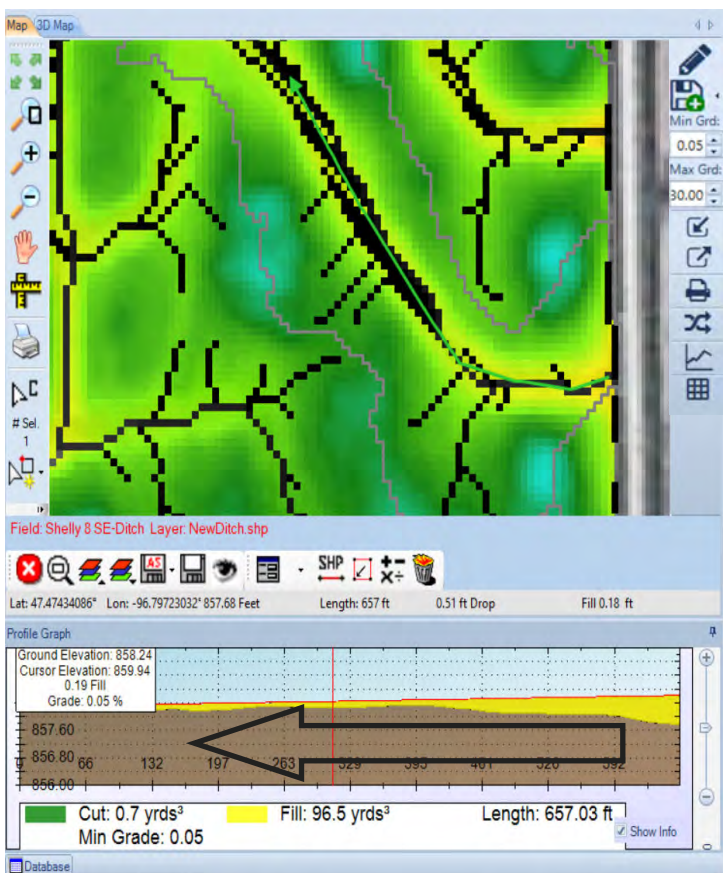


If drawn against the direction of flow, the cut calculations will be off. By clicking the "Reverse Ditch Direction" the problem is gone.

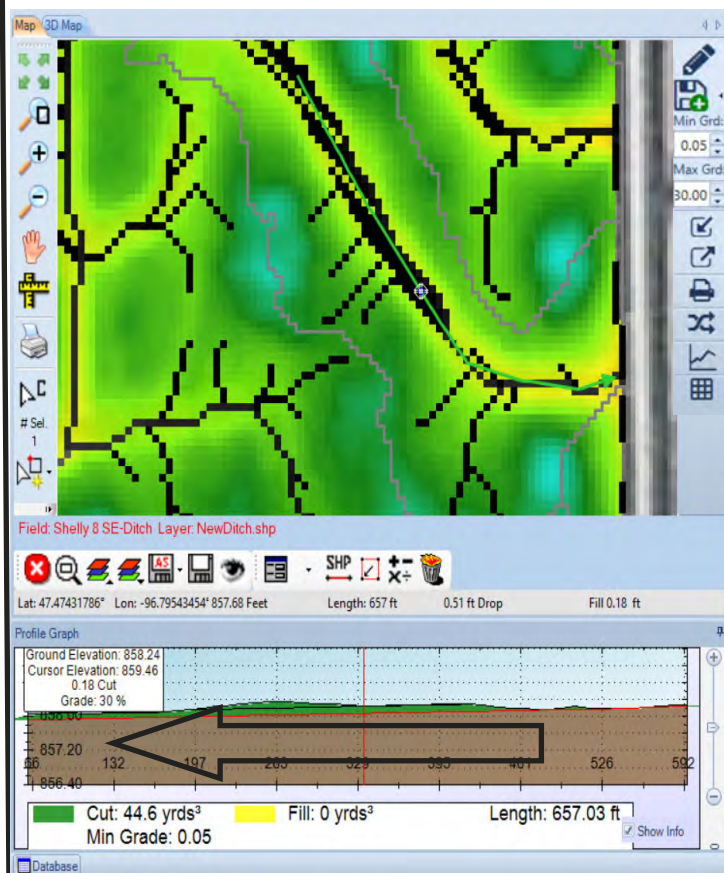
In the Profile Graph, the LEFT side is always the OUTLET. Water is always moving right to left in the "Profile Graph" window.

On the "Overhead Map", you will see an Arrow at the outlet end of the line/profile to show which way the water is trying to flow, based on the line Directionality.

Drawn from Outlet to High Spot



Reverse Ditch Direction button used

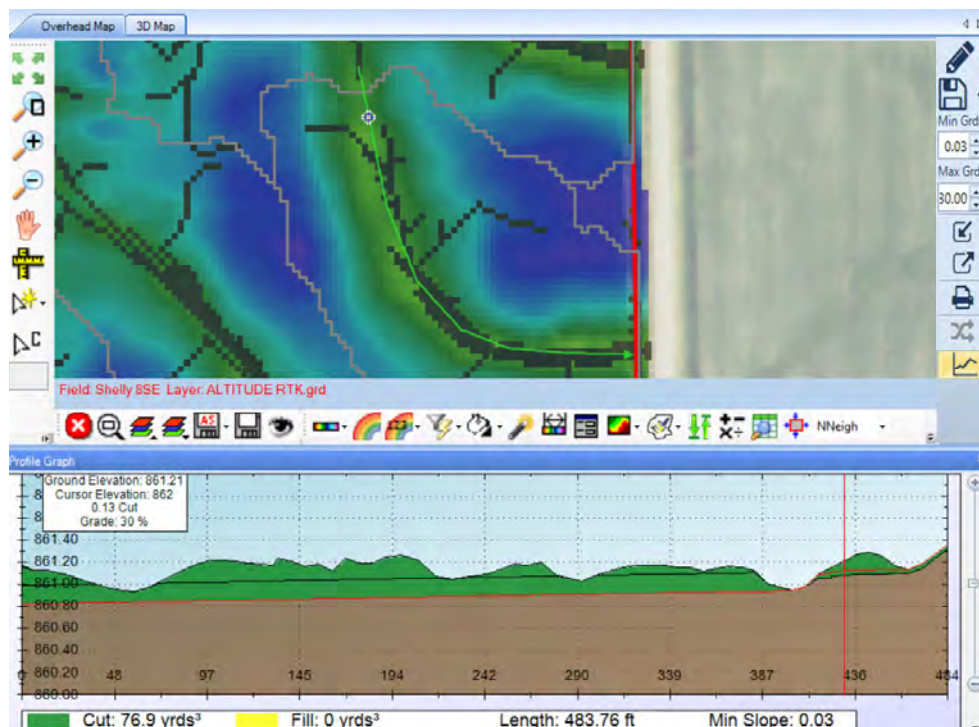


Surface Drainage—Edit Graph

The function of the BFGC, “Best Fit Grade Control”, is an awesome feature, but it has it’s drawbacks.

If the profile comes across an area that is Falsely Low or an area that would be a FILL, the BFGC is always cutting.

Edit Graph function to correct these issues.



Click the “Edit Graph” button and the edit window will appear.

Edit Graph - works on a 2 point select system, deleting all the surface values between the 2 points.

As shown to the Right:

- Selected 2 points
- Point marks on soil surface
- Click “Preview”

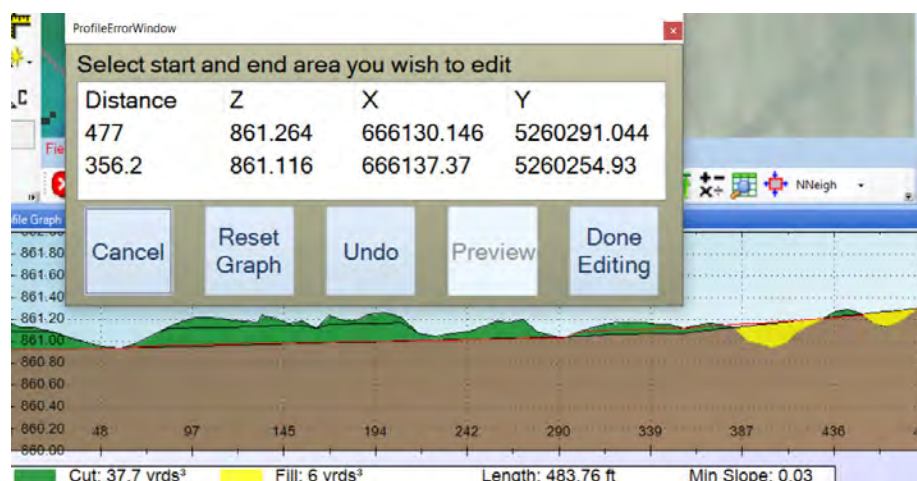
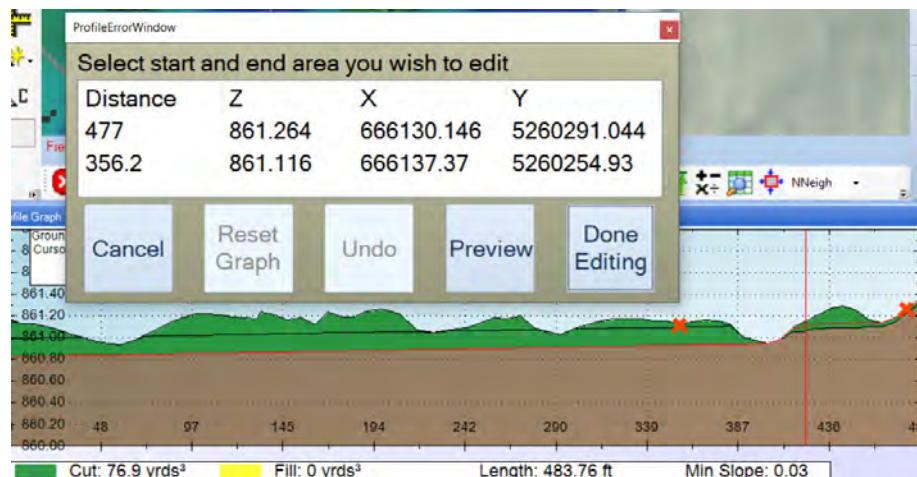
Note: the Cut / Fill #'s updated.

If you want to edit more click 2 more points & Preview.

“Undo” will undo the last edited area.

“Reset Graph” removes all edits and starts over.

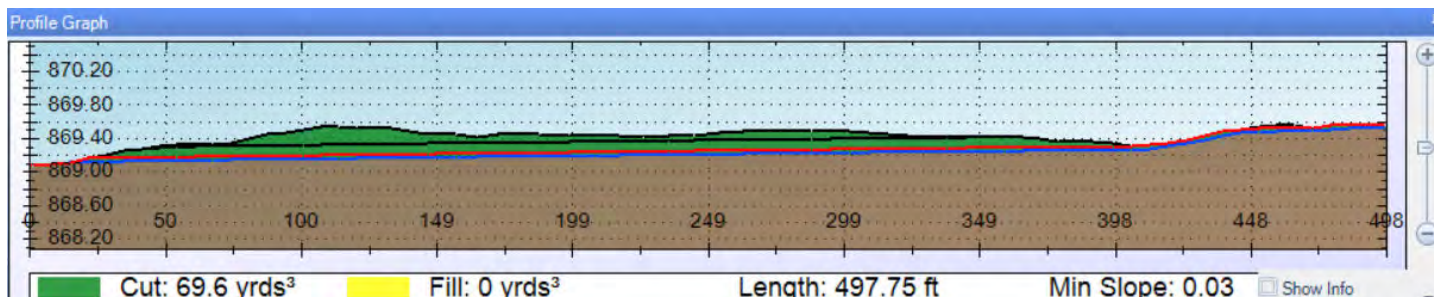
If Edits look good, “Done Editing”.



Surface Drainage - Profile Graph Window

In the Drainage Window as you draw profiles or recall SHP lines ("P" checked on in Layer Info- "Select Raster Source"); there's data that shows at the bottom of the screen in the "Profile Graph". This will explain how to navigate this window.

On the map window area, the line that is being used as the profile will appear as a Lime Green color with an "Arrow Head" at the outlet end. In the Profile Graph, flow is always right to left.



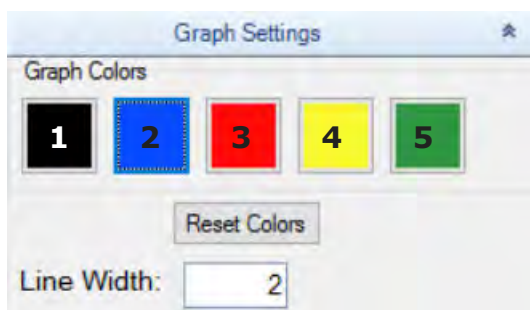
Cut Value—is estimated cubic yards of soil moved based off "Ditch Width".

Fill Value—is estimated cubic yards of soil moved based off "Ditch Width".

Length—total length of the profile.

Min Slope—is the Minimum Slope set in the above settings.

NOTE: These values show up on the "Print Profile" function.



Graph Colors (info shows up on mouse hover of color).

1. Ground Line Color & Scraper Pass
2. Grade Line Color
3. Design Grade Line Color
4. Fill Color
5. Cut Color

Reset Colors - rests to original defaults.

NOTES: with your CURSOR in the Profile area.

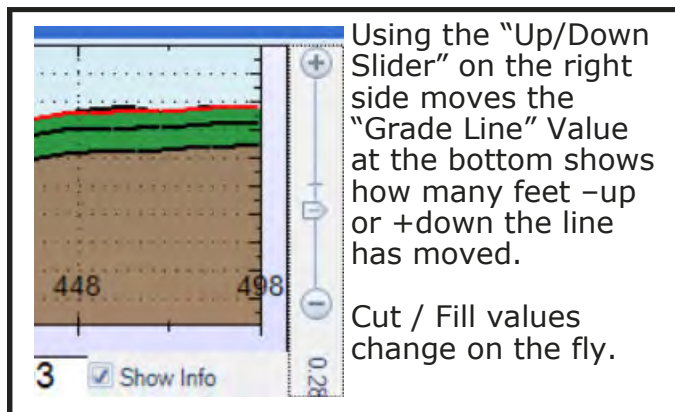
Mouse Scroll Wheel = Zoom in on the graph.

Left Click, hold & drag = Pan the graph left / right / up / down.

Double Click = Reset the graph to full view.

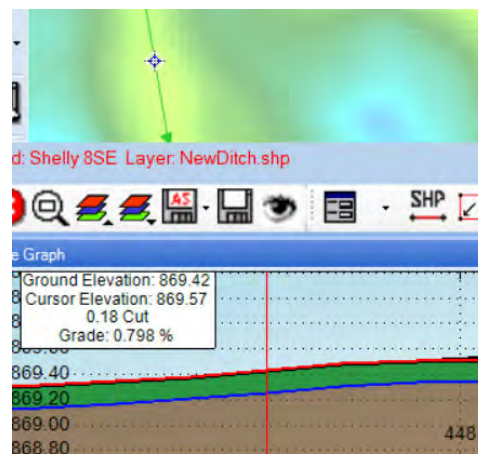
"Show Info" box:

- Checked = you will see a "Red" vertical line in profile, stats and cursor location on map.
- Not Check = no location or stats.



Using the "Up/Down Slider" on the right side moves the "Grade Line" Value at the bottom shows how many feet -up or +down the line has moved.

Cut / Fill values change on the fly.



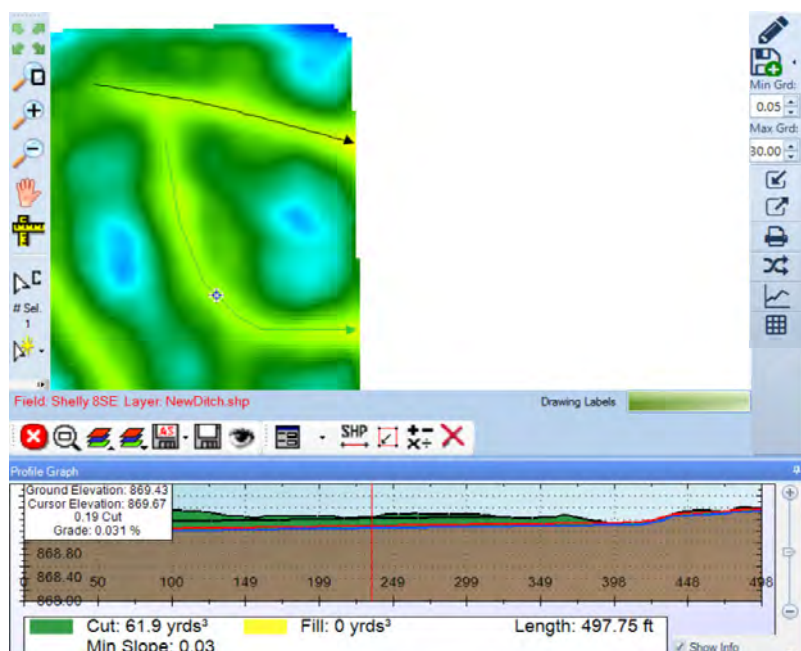
Surface Drainage - Printing

Printing can be done of any profile line, Saved or not Saved.

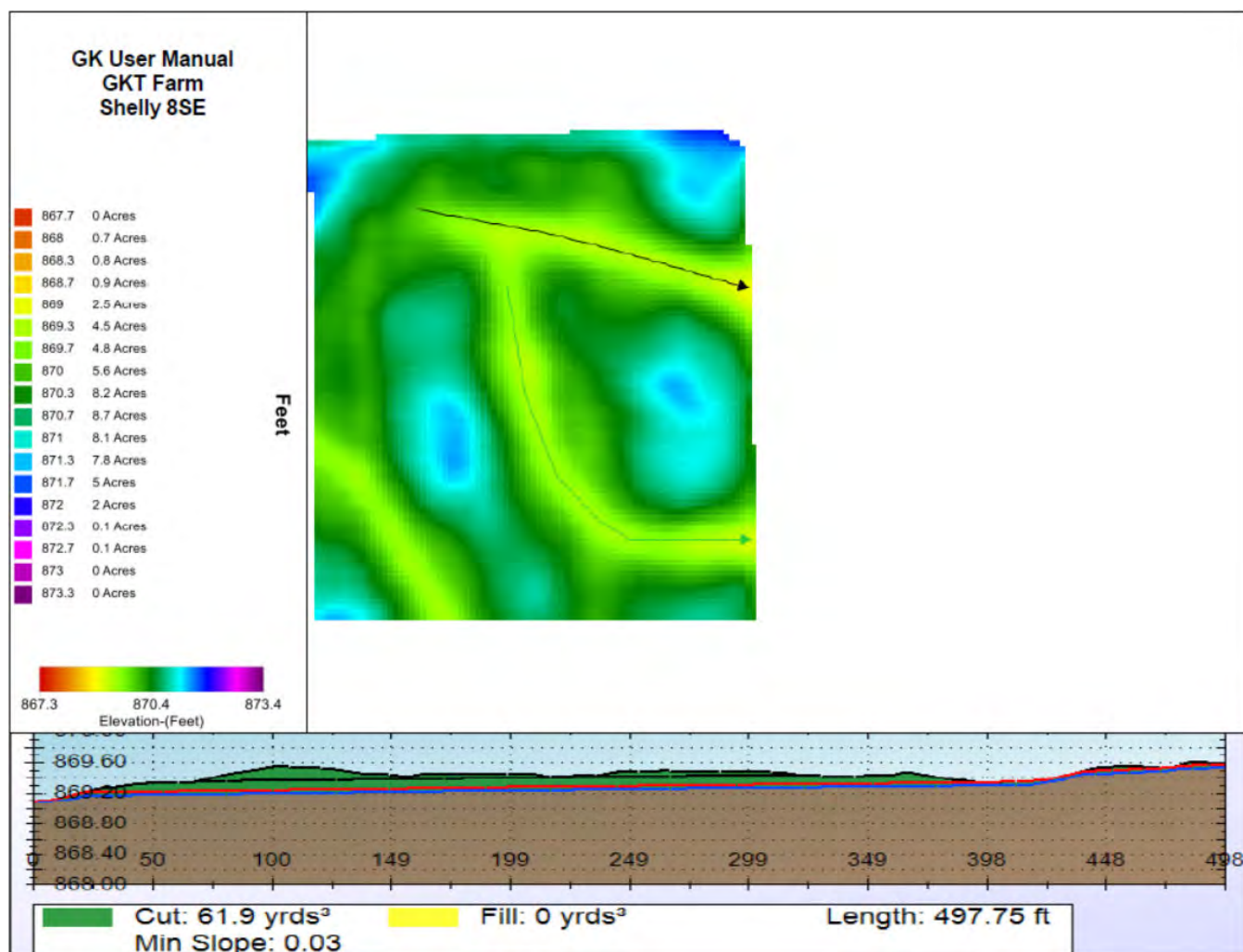
It is suggested to "Save" the Profiles.

To Print Profile—

- Zoom to Ditch Line to be printed.
- Turn on maps so they show up how you want it printed.
- Make sure your active layer = layer to be printed.
- Select the Ditch Line in Map Window.
- Adjust Grades and Slides on Profile.
- making the profile show as you want.
- Click on the "Print Profile" button.



Example of a Print—Below



Creating Tile Plan

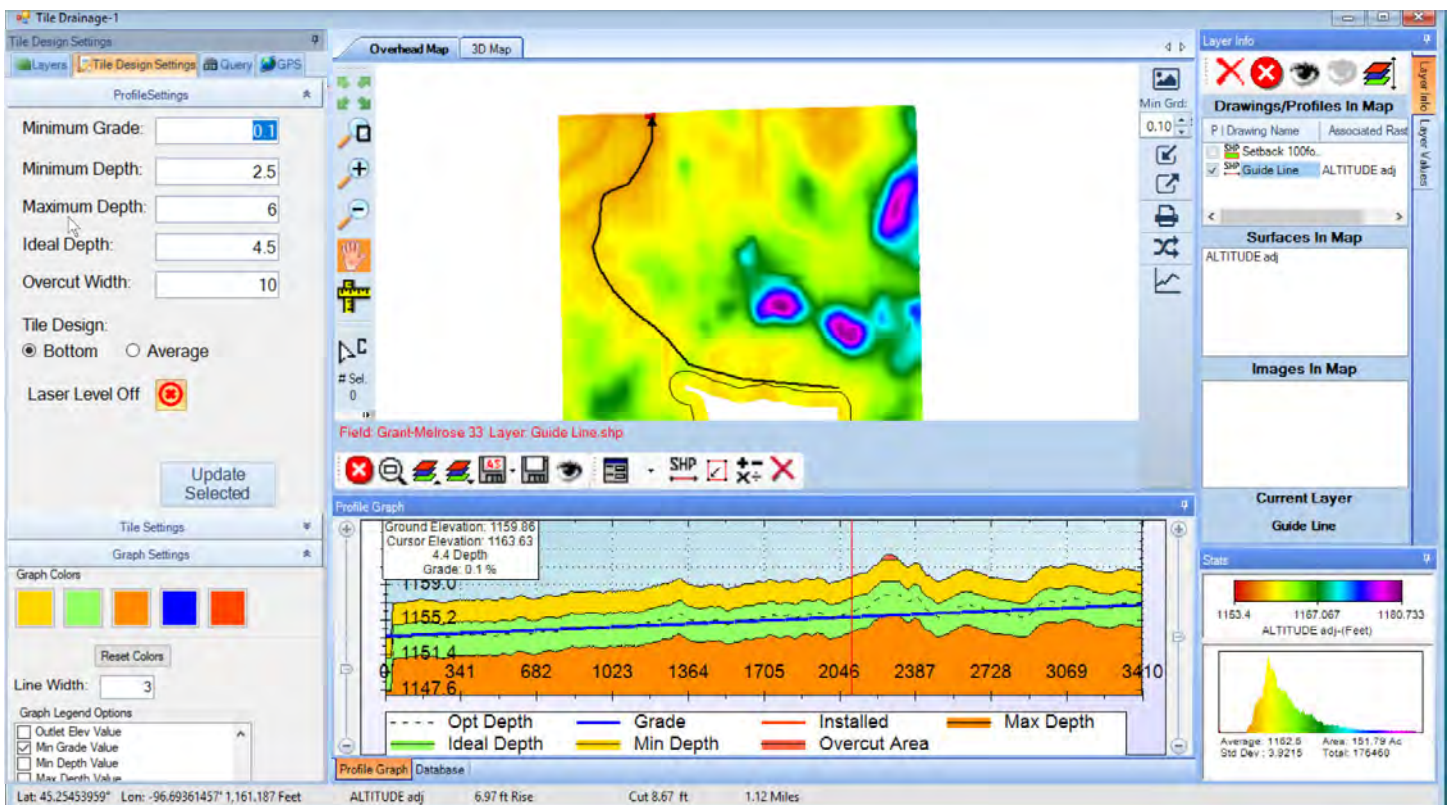
Tile Design

The idea of tile design can be as simple, or complex, as you want it to be. Tile plans have many factors that can influence the decision-making process. At this point in time, our software can calculate the number of acres within a watershed. We do **not** calculate drainage co-efficient and pipe size. Users need to use a pipe size calculator for this determination. Always remember the most important part of the whole project is your outlet elevation reading.

Components that should be completed **before** starting a tile design.

1. Collection of RTK, or LiDAR, topography data.
2. Outlet elevations have been determined (data collected).
3. Data has been processed into ADMS through Watershed Modeling & Contours (1 foot).
4. Tile "Templates" have been built in ADMS.
5. Wetland and utility locations have been defined, (final verification required).
6. Permission: Project permitting and the ability to do the project has been verified.

The following "Tile Planning" example will require the data sets shown below.

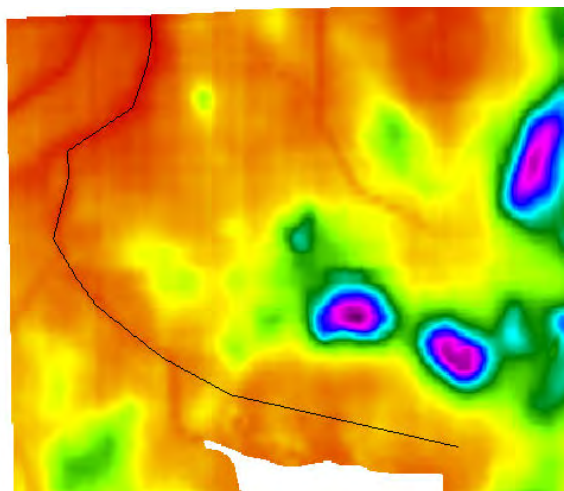


Creating Tile Plan

Directions for the Project

Land Owner wants to

- Pattern Tile : Red & Orange areas of the field
- Spacing : 100'
- Drainage Coefficient : 1/4"
- Soil Types : Sandy Clay Loam
- Wetland Setbacks : Yes
- Buffer : 200' set back on the 15ac wetland on south end
- Minimum Grade : 0.1% (1' drop per 1,000')
- Minimum Install Depth : 2'.
- Optimum Install Depth : 4'.
- Maximum Install Depth : 6'.



Steps:

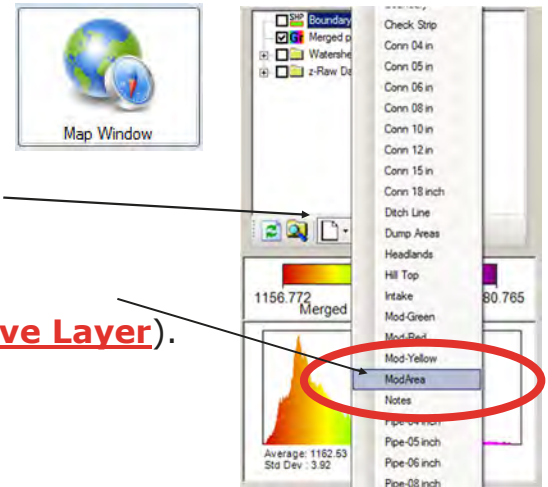
1. Create outlet points.grd (if required).
2. Merge with Topography.grd (if required).
3. Create set back for wetland & utilities.
4. Determine the locations of the "Mains".
5. Choose "Pattern" design & guide lines.
6. Use Tile Calculator - Determine "Tile Size".
7. Draw in "Sized Tile Plan".

Here is the ROUGH plan sketched out on a FSA map.

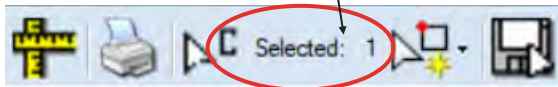


Creating Tile Plan—Modify Topography Maps using ModArea

1. Turn on the topo file that is to be modified, i.e. **"Merged points-Altitude.grd"**.
2. Click the "Create New Layer from Template" button.
3. Choose the "ModArea" template.
4. Check it in the data tree. (It should now be the **Active Layer**).
5. Zoom in to the area that needs to be modified.
6. Select the "Draw New Object" button.



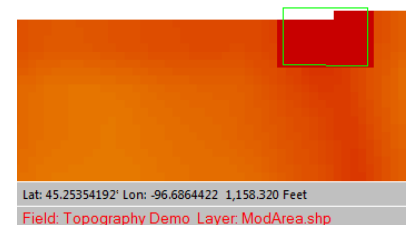
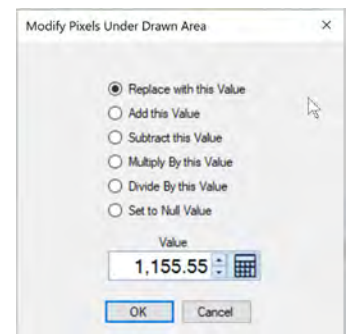
7. Draw a polygon around the outlet area (this will normally be a culvert or ditch bottom with a **KNOWN** elevation).
8. Use the selection tools on the top toolbar to select the ModArea (Again, this is indicated by the green crosshatch making sure only one polygon is selected.)



9. Now, make the “**Merged points-Altitude.grd**” is the **Active Layer**.



10. Check "Apply Mod to Selected Polygons" Magic Wand button.
11. In the popup "Modify Pixels Under Drawn Area" box, check the "Replace with this Value" radio button and type in the **KNOWN** elevation.
12. Click OK and save. You have now successfully adjusted your topography map to reflect the correct outlet elevation.



Creating Tile Plan—Outlet Points

Data Collection - GPS Example

We suggest using a pickup or an ATV for collecting field data. However, many times in topography data collection, you cannot get to a location to collect a point with a tractor, pickup or an ATV. Have a grade rod with a mount for the GPS at the exact same height as the pickup mount. GPS must have at least 25' of cable to get to ditch bottoms or culverts. Use Quick Marks in ADMS since other marking devices may, or may not, log elevation values.

Data Collection - Laser Example

Get a survey rod and setup Laser at a 0 grade.

Mark a GPS point in the field

Take a Grade Rod reading (on paper)
Reading 4.3'

Mark a GPS point near your Culvert or Ditch bottom reading

Take a Grade Rod reading (on paper)
Reading 7.8'

Subtract the two values $7.8 - 4.3 = 3.5$ Drop

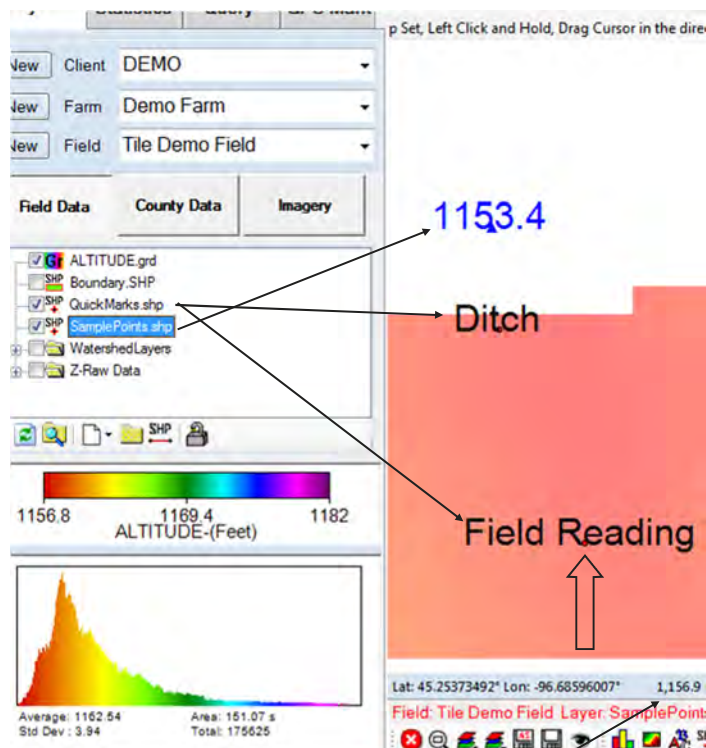
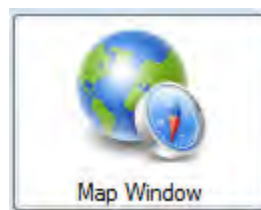
Create a New SHP file "Create Layer from Template" - "Sample Point"

Check on Sample Point.shp and Click "Draw New Object" "SHP" button

Mark a point in the bottom of the ditch just in from your GPS Mark Point.

Get the Value from the "Field Reading" off the "Cursor" value = 1156.9

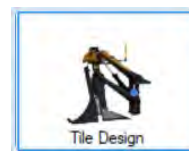
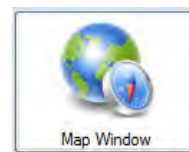
Go to the "Database" tab and enter 1153.4 in the Elevation column ($1156.9 - 3.5$ Drop)



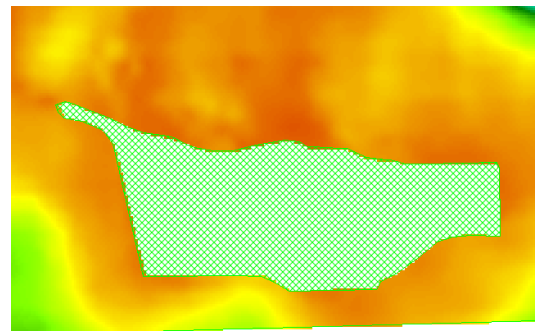
Surfaces In Map				
ALTITUDE				
Database				
Objects Selected: 0 DB Operations Select By Query				
PointID	Latitude	Longitude	Elevation	
▶	45.25393677	-96.68603516	1153.4	

Creating Tile Plan—Setbacks (Buffer Selected Items)

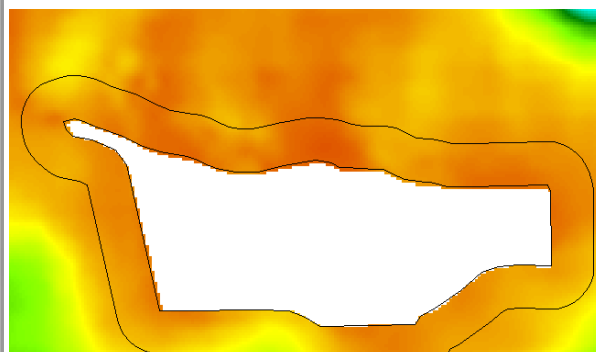
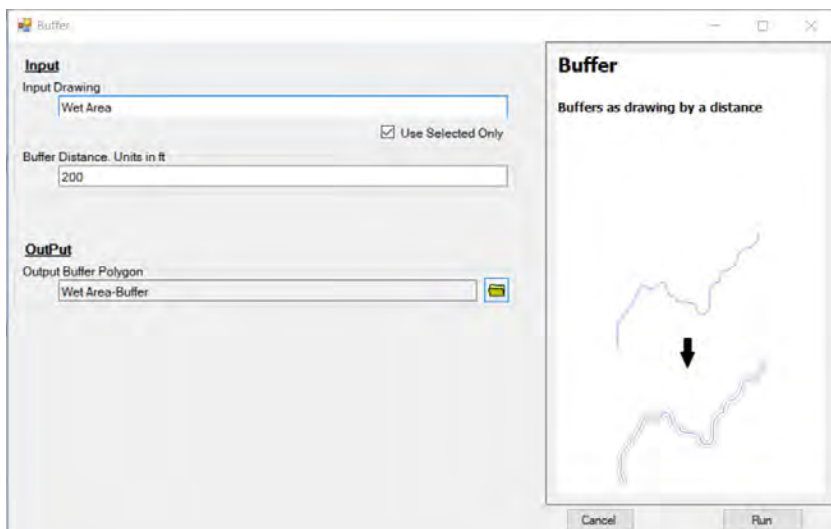
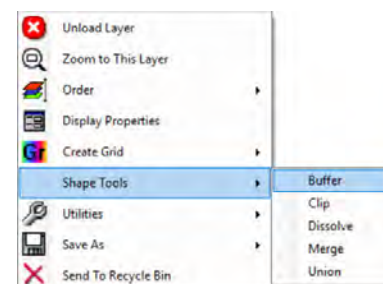
To create wetland or utility setbacks", you must first draw a boundary around the "Wetland"



1. Turn on the "Field Data" layers needed to define a wetland or utility.
2. Select "Wet Area" from the "Create Layer from Template" list.
3. Zoom in to the area of interest.
4. Check on Wet Area.shp.
5. Bottom Toolbar, click "Draw New Object" - "SHP" button.
6. Draw a boundary around the Wetland
7. Once Finished "Save"
8. Clear Map



1. Check on Wet Area.shp.
2. Click inside the "Polygon" making it **"1 Selected Object"**.
3. Right Click on the "Wet Area.shp" then "Shape Tools" then "Buffer"
4. Name the file to be created by clicking on the File button — example "Setback 100foot.shp"
5. Adjust the "Buffer Distance" ex—100 feet
6. Click "Run"



Creating Tile Plan—Calculating Tile Size

You will need a Drainage Slide Rule for this part. Slope & drainage coefficients (how much water is drained in a 24 hour period) & soil types play a large role here.

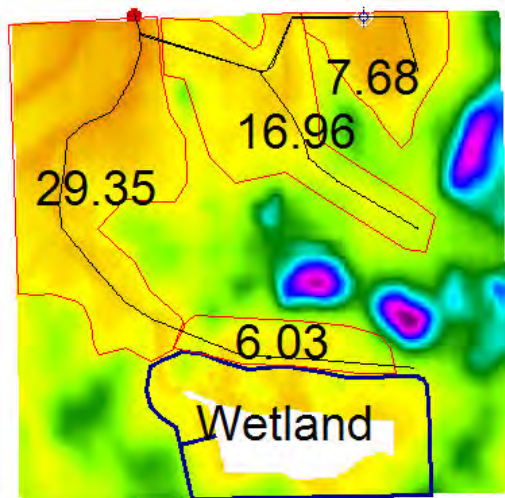
Using the Flow Accumulations, Main Ditches, Boundary templates and any custom Tile Worksheets you may have.

For this project, a 1/4" drainage coefficient and using the idea that the pipe will always be at a minimum grade of 0.10%, we are going to write down a few numbers so we are not jumping back and forth to the calculator.

At this point, you may want to use a combination of paper and software for taking notes.

In this example, we are draining about 65 acres total

NE—Hole is 11 acres—From flow accumulations & 7.68 acres from boundary



The values in this chart are copied for the "Pipe Size & Acres Drained Calculator" produced by Prinsco & University of Minnesota Extension

Pipe Acre Capacity @ 0.10 Grade			
Tile Size	Drainage Coefficient		
<i>inches</i>	1/4"	3/8"	1/2"
3	2.4	1.6	1.2
4	5	3.3	2.5
5	9	6	4.5
6	15	10	7.3
8	32	21	16
8 DW	40	26	20
10	50	34	25
10 DW	72	48	36
12	82	55	41
12 DW	117	78	58
15	127	85	64
15 DW	211	141	106
18	205	137	103
18 DW	343	229	172
24	442	295	221
24 DW	738	492	369

DW = Dual Wall Pipe

Creating Tile Plan—Drawing In Sized Tile

You should now have all the pieces of the puzzle and be able to draw out your tile plan.

We recommend drawing in the "Proposed Main" first. This helps provide direction on where to more appropriately place the laterals on the plan and allows clipping to the main. More detailed instructions are on the following pages. Also, calculate a "Distance" value i.e. 4" tile @ 1/4" Drain Coefficient & 0.1% grade.

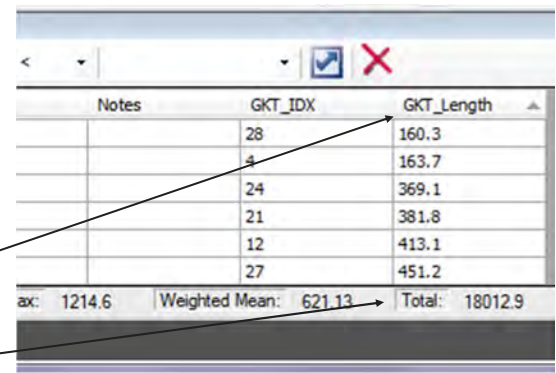
$$5 \text{ ac} \times 43,560 \text{ (sq ft/ac)} = 217,800 / 100 \text{ (tile spacing)} = 2,178 \text{ (Max footage for 4")}$$

1. Turn on all the layers you need to draw in your tile lines & zoom to the desired area.
2. Draw in "Proposed Mains" and all "Laterals"
3. Click on the "Create Layer for Templates" button.
4. Choose the correct tile size.
5. Check the tile size in the field data.
6. Click on the "Draw Layer".
7. Draw in a tile line over the "Proposed Main".
Suggest using the "Trace and Snapping" functions in Drawing Tools.
8. Repeat 5 & 6 until done with this tile size & "save".
9. Go to step 3 for the next tile size.

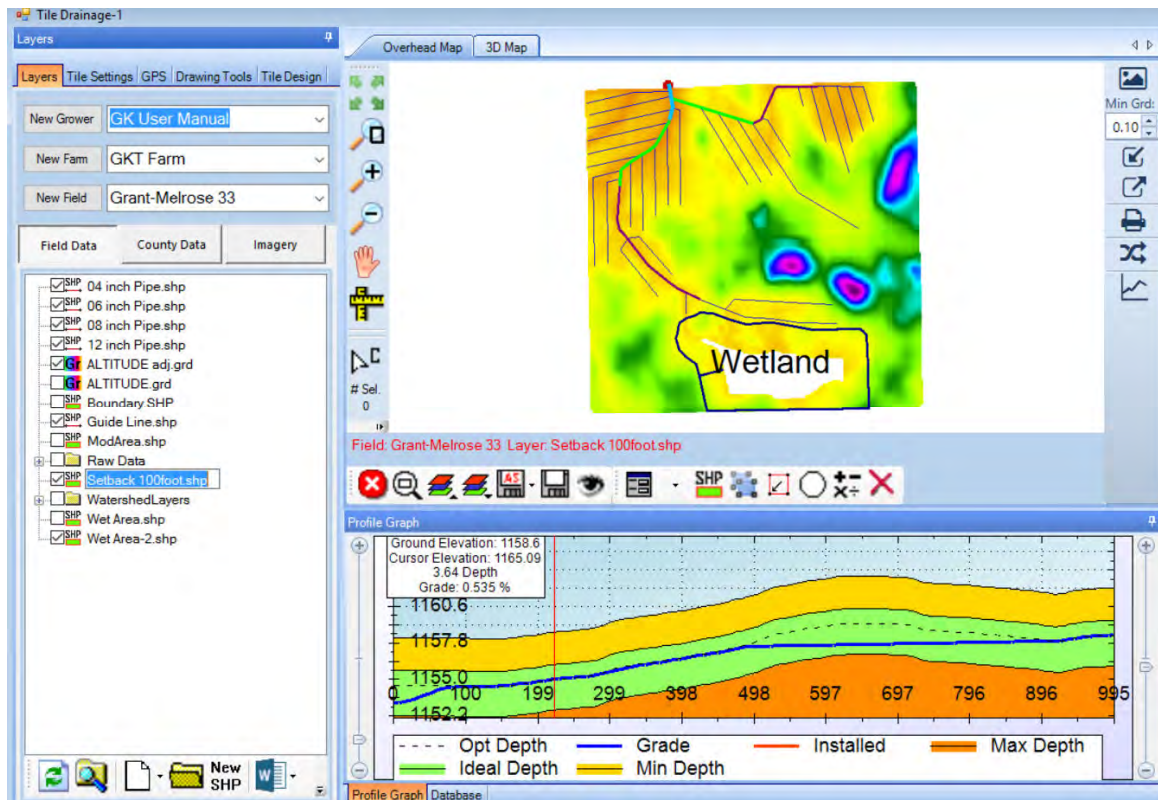
Click on the "Database" tab.

Click on column header "GKT Length".

Bottom of the window, "Total" Feet of Pipe.



Notes	GKT_IDX	GKT_Length
	28	160.3
	4	163.7
	24	369.1
	21	381.8
	12	413.1
	27	451.2
ax: 1214.6	Weighted Mean: 621.13	Total: 18012.9



Tile Design—Right Side Buttons

Below are basic functions of the Tile Drainage window. There are some buttons that are unique to the "Tile Window". On the Right side of the window are the buttons only found in this window.

Set Elevation Layer - the "surface" layer that will be used to calculate the "3-D" tab.

Min: - Minimum Grade (Rise / Run * 100) Ex—0.05 = 0.5' rise / 1,000' run. By clicking up and down, you will click the grade by 0.01 per click, changing the tile profile.

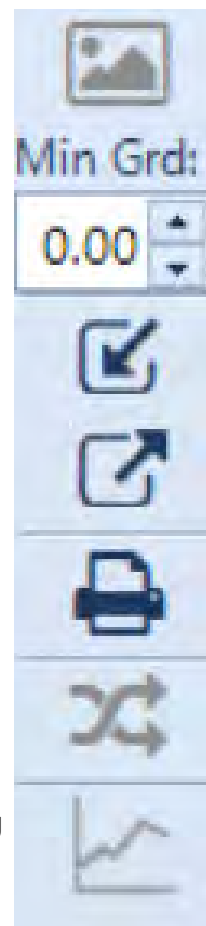
Import Projects - will import projects from data collected in SD Drain—Tile.

Export Projects - will export the data that is turned on as a "project" for SD-Drain Tile.

Print - This button will print the overhead map view with the "Tile Profile" below along with the "Tile Length" & "Overcut" cubic yards values.

Reverse Tile Direction - Change the direction of the "Tile" that is showing in the profile.

Edit Graph - Clicking will open the "Edit Profile" window. See info on the following pages.



Please NOTE, there is no "Profile" button like the drainage window. At this time, we feel the function of drawing SHP lines and getting "Tile Profiles" from this source will get users the data required.

Tile Design-Tile Settings

"Tile Design Settings" allows you to change multiple factors about the way tile lines are calculated. These changes can be made to the line being worked on or to all lines in the future.

Profile Settings

Minimum Grade—is the least amount of grade that will be used to calculate the line. Greater Grade is expectable

Minimum Depth—the Shallowest depth a tile line will be installed. Measured to the Bottom of the tile line.

Maximum Depth—the Deepest depth a tile line will be installed. Measured to the Bottom of the tile line.

Ideal Depth—is the most Effective Depth to install tile for a given area of the field or soil type. ADMS will do what it can to keep as much of the tile line at or near this depth.

Overcut Width—the width of soil removal if the tile depth goes deeper than Max Depth. Giving the Estimated Cubic Yards of soil to move allowing the tile plow to go through.

Tile Design: Bottom / Average—will move the "Design" method to follow to the bottom / average of the "Ideal Depth".

Laser Level—sets the Grade value to a FIXED grade.

NOTE: Once finished adjusting values—Click the "Update Selected".

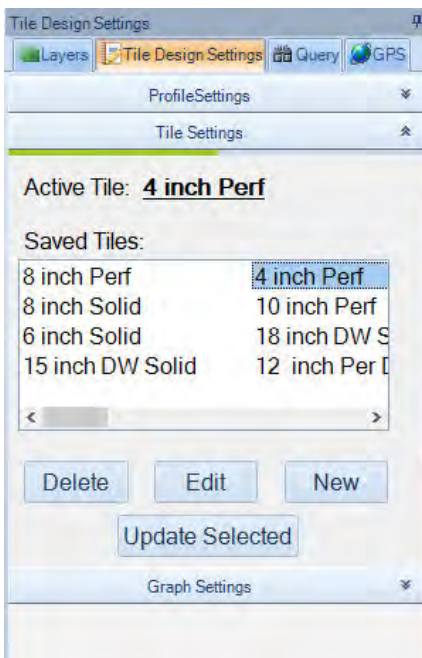
- This will change values on all "Selected" lines and any future drawn lines.

Tile Design-Tile Settings-Sizes

"Tile Design Settings" allows user to change multiple factors about the way tile lines are calculated. These changes can be made to "Selected" and to all lines in the future. Below is a description of each parameter setting.

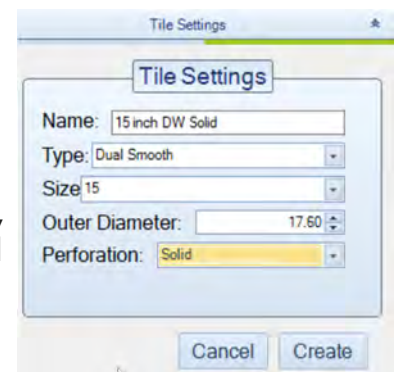
Tile Settings

Used to create different tile sizes and perforation styles. This applies the outside diameter of tiles so Warnings for Min Depth are correct and will come into play when designing for plowing both directions with SD Drain. By knowing the outside diameter of the tile, plans can be better laid out for plowing over the main. Will also allow parameters for each line to be loaded in SD Drain.



To create a new size

1. Click on the "New" button.
2. Type "Name" of new tile size/style
3. Select "Type" from dropdown
4. Select "Size" from dropdown
5. "Outer Diameter" will auto populate, but can be manually entered as well
6. Select "Perforation" style
7. Click the "Create" button



To Edit an existing "Saved Tile"

1. Select the tile size/type
2. Click the "Edit" button
3. Edit any parameters
4. Click "Create"

To Delete an existing "Saved Tile"

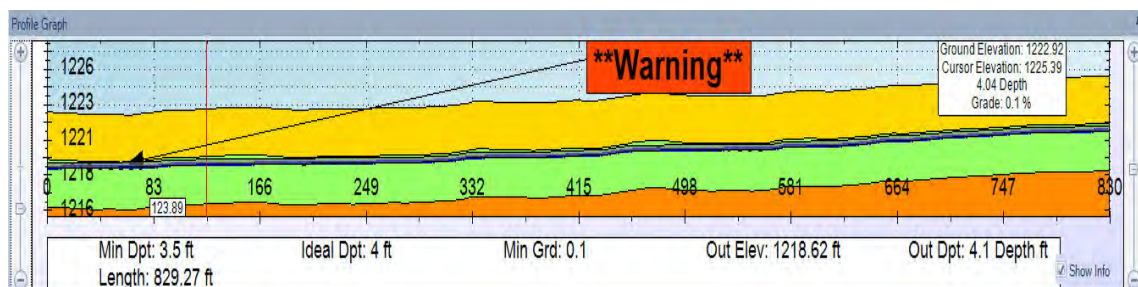
1. Select the tile size/type
2. Click "Delete"

Applying size properties to drawn lines

1. Select your Active size in Tile Settings **before** checking on the P box.
2. Once Tile size is applied, re-selecting the line will create a "shadow pipe" reflecting the "outer diameter" of tile in the Profile Graph.

Update Selected

1. If wrong Active tile was selected when checking the P box, select the lines to be changed and click Update Selected. Click Save on the bottom toolbar.

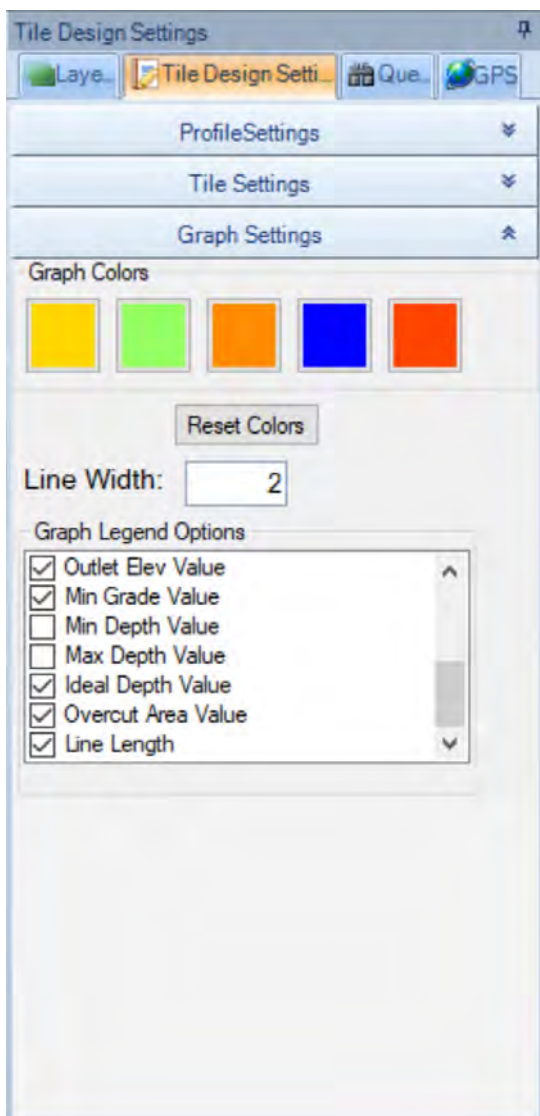


Tile Design-Tile Settings

"Tile Settings" allows user to change multiple factors about the way tile lines are calculated. These changes can be made to the line being worked on or to all lines in the future.

Below is a description of each parameter setting.

Graph Settings

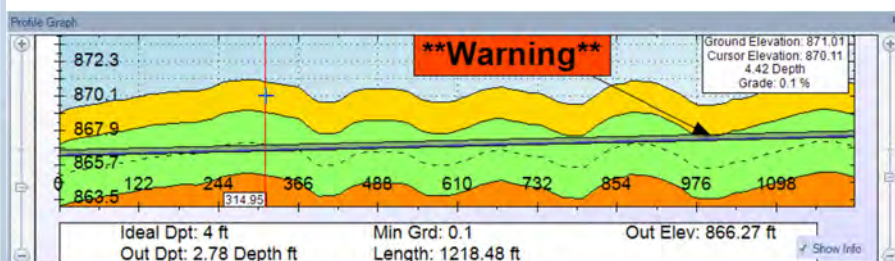


Graph Colors-allows user to change the line colors in the "Profile Graph". Click on the color chip & choose a color from the color table. Default colors listed to the left.

Reset Colors- button resets colors to default settings

Line Width—will adjust the line width (# of pixels) of the "Grade Line" .

Graph Legend Options- Select the items to be displayed at the bottom of the Profile Graph.



Default Graph Color-Chips—

- Yellow = Minimum Depth
- Lime Green = Acceptable Depth
- Orange = Maximum Depth
- Blue = Grade Line
- Red = Installed Tile Line

Suggest Checking ON —Graph Legend Options

- Outlet Depth Value
- Outlet Elev Value
- Min Grade Value
- Overcut Area Value
- Line Length

Tile Drainage—Setting Raster Source—Tile Profile

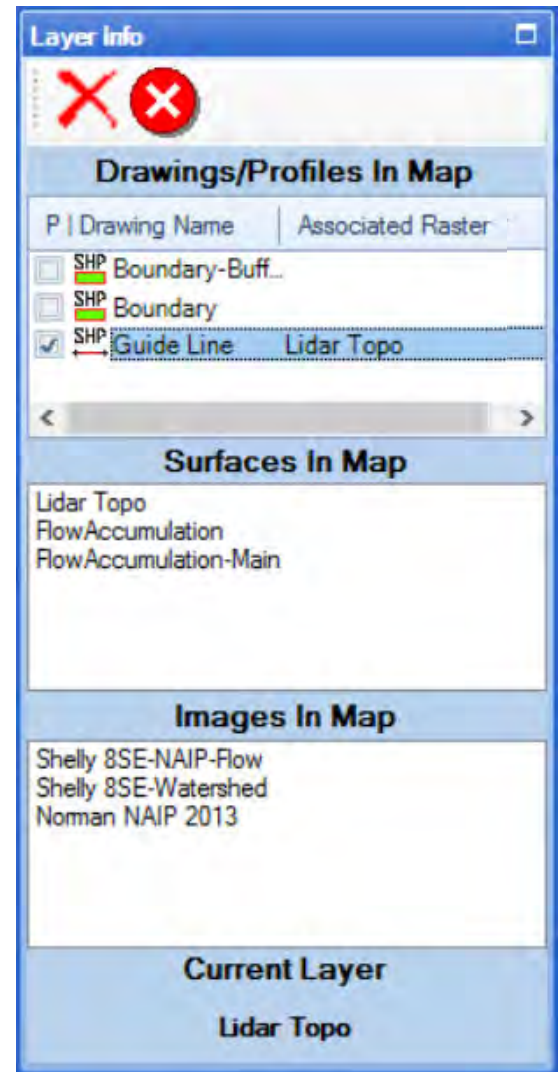
Layer Info-Tab on the Right side of the window allows you to see all the layers you have or had turned on.

In "Drawings/Profiles In Map", take note that the "Drawing Name" and "Associated Raster" will allow users to see what "Surface" is being used to Calculate the "Tile Profile Line". Simply put, ADMS "profiles" Surface Raster at Line.shp "P".

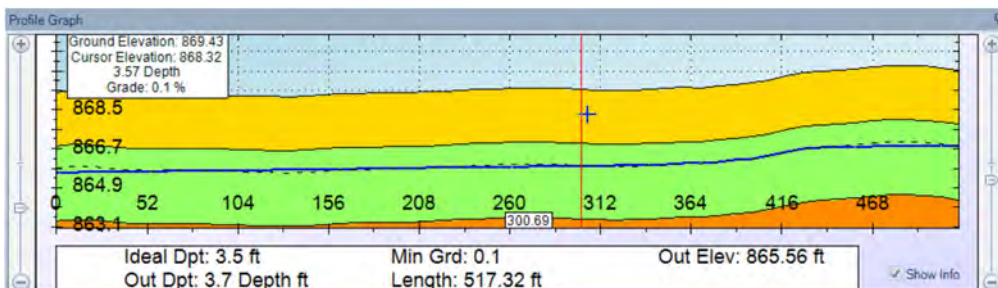
The "P" (Profile) check box will set that layer to be used as a "Tile Profile Line", gathering it's attributes from a Surface Raster layer and "Tile Profile and Tile Settings" Min, Max, Ideal Depths, Tile size, type and outside diameter.

"CHECKING" the "P" box will allow you to make the association for the Guidance Line.shp to "Surface Raster".

Once that data is "Associated" to a line, that Line becomes a "poly Z" Line.shp file. This means that the line has x,y,z properties at each location in the line where it intersects a raster pixel. This process will ADD many more vertices to tile lines.



Tile with checked "P" Box will show in 3D window if associated with the same "Raster" layer as the "Set Elevation Button" (which sets "Raster" for 3D).



Tile Design-Creating Tile Profile

In the Tile Design Window there is no "Profile" button. So to draw a "Tile Profile", you will draw an actual "Line.shp". There are a couple options where to start. Either use -

- "Guidance Line.shp" which will not be used for anything but checking & testing tile locations. This file will end up in "Xtra Data" folder later or get "Deleted".

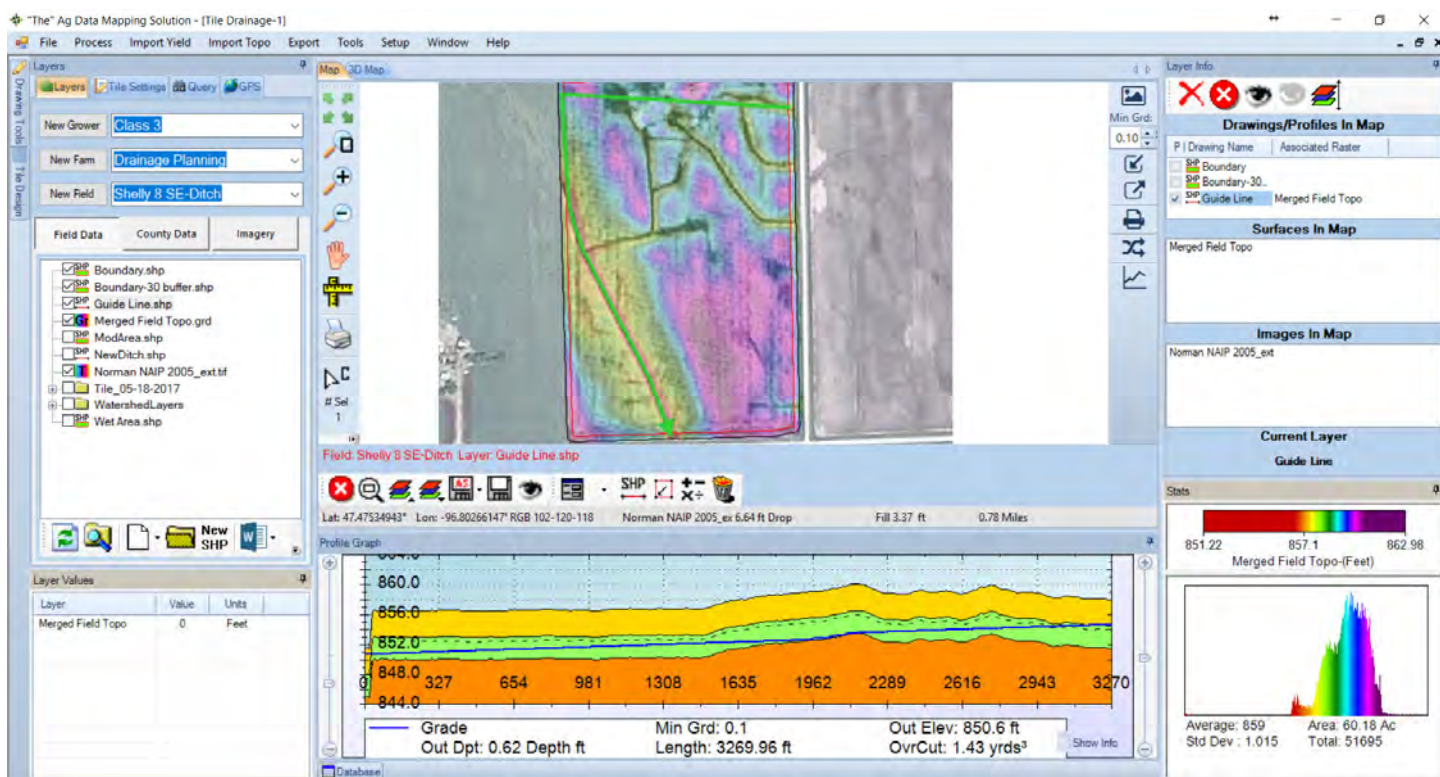
Or

- "04 inch Pipe.shp" this will be used for final tile map. Test & Check tile lines are deleted later.

Example below will use the idea of a "Guidance Line.shp"

Create a Tile Profile

1. Turn on an Elevation.grd (Lidar.grd).
2. Turn on any other helpful layers.
3. Click "Create New Layer from Template" and choose "Guidance Line".
4. "Layer Info" Check "P" Box for Guidance Line".
5. Assign "Lidar.grd" for Associated Raster.
6. Click on "SHP" - "Draw a New Object" .
7. Draw Proposed Tile line in direction of water flow. (Right Click= finish).
8. Note "Arrow" on outlet end of line in over head view (if wrong "Reverse Tile Direction").



Profile Graph (Tile)

Left Side Slider—will Set or Adjust the "Out Depth" in both "Best Fit" or "Laser Level On".

Right Side Slider—will Set or Adjust the "Ideal Depth" when using the "Best Fit" method. In "Laser Level On, this slider does nothing.

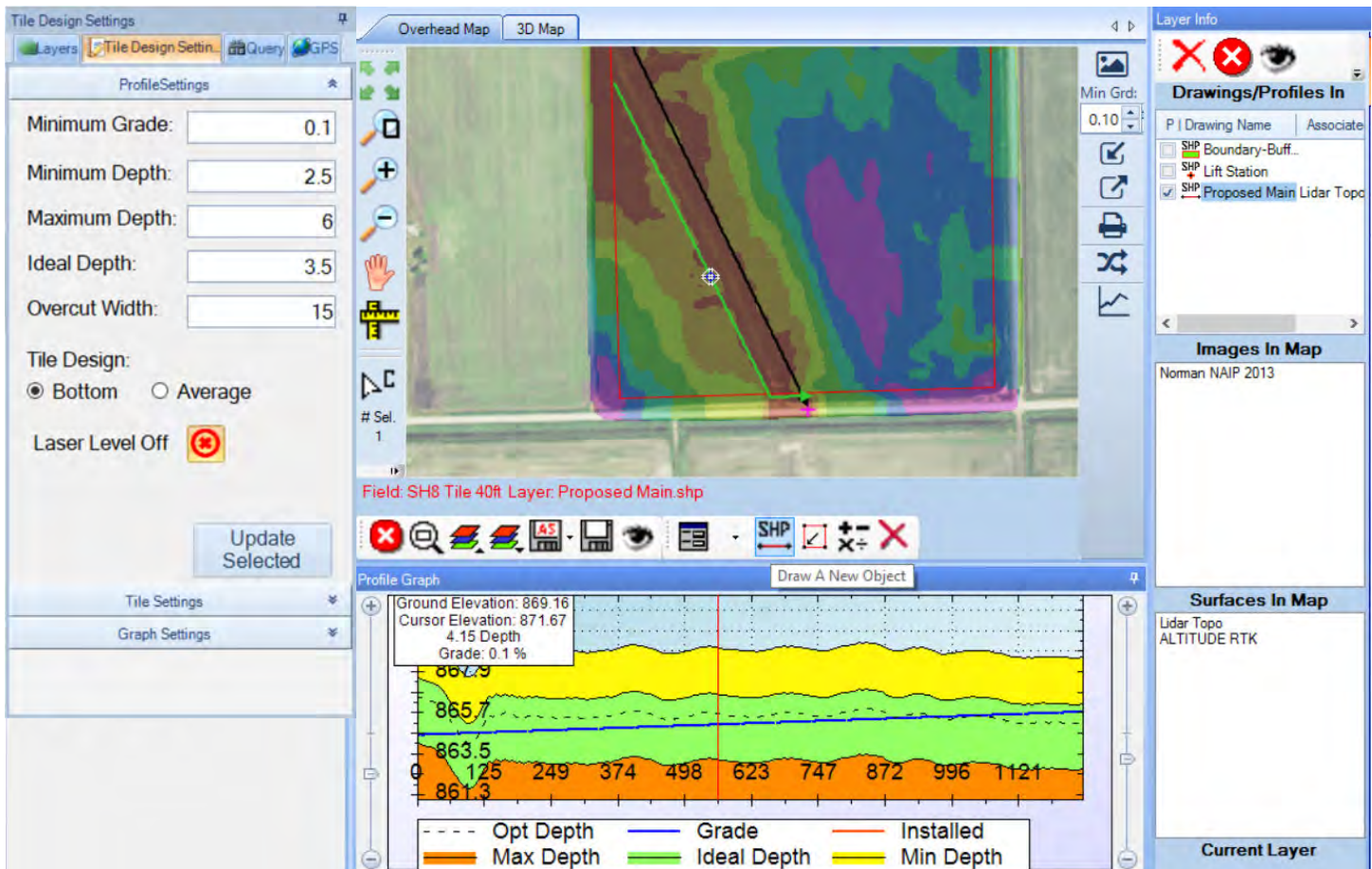
NOTE : These first Tile Lines should be drawn over longest runs hitting lowest areas ending at the proposed outlet location. This will confirm the project will work. Like shown above.

Tile Design—Creating Proposed Main

This function of a "Proposed Main" is a KEY concept for "Tile Design". This line will become the "Outlet End" for all the lines to be drawn in using the Tile Drawing tools. Take time to make sure these lines are drawn accurately.

To create a Proposed Main

1. Turn on an Elevation.grd (Lidar.grd).
2. Turn on any other helpful layers.
3. Click "Create New Layer from Template" button and choose "Proposed Main".
4. "Layer Info" Check "P" Box for "Proposed Main".
5. Assign "Lidar.grd" for Associated Raster.
6. Click on "SHP" - "Draw a New Object".
7. Draw Proposed Tile line (Right Click= finish).
8. Note "Arrow" on outlet end of line in over head view (if wrong "Reverse Tile Direction").



In this example, take note:

There are 2 Tile Lines in the Proposed Main.shp.

Add as many "Tile Lines" as needed in this Proposed Main. Shp.

Remember this will be the outlet point of all your Lateral Tile lines.

Make sure the whole system works before drawing in the Mains!

Tile Design– Ancillary Layers

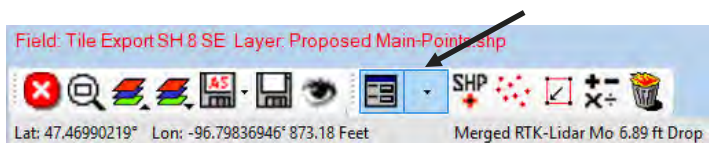
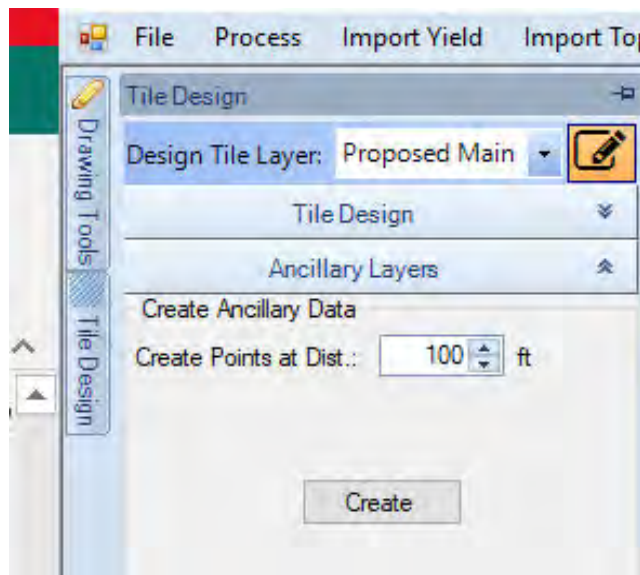
Ancillary Layers function creates depth and/or grade points along the Proposed Main at regular intervals. Would recommend setting Outlet Depth and other Tile settings before creating.

To create Ancillary Layers

1. Turn on an Elevation.grd (Lidar.grd)
2. Turn on "Proposed Main"
3. "Layer Info" Check "P" Box for Proposed Main
4. Select "Tile Design" Tab.
5. Select Editing Layer and "Proposed Main"
6. Set the desired distance between points
7. Click "Create"

Ancillary Layers will show up in the data tree as "Proposed Main-Points"

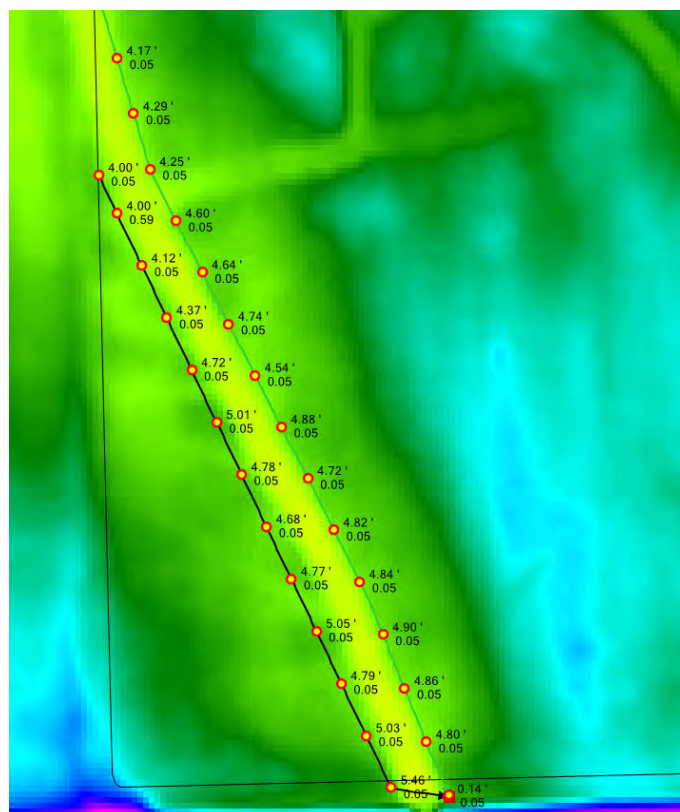
To turn on labels click on "Layer Display Properties"



In this example Main Depth and Main Grade are Displayed for each point.

Would recommend saving a template for these points for future use.

“Layer Display Properties” section of the manual has detailed instructions for creating and saving labels and templates.

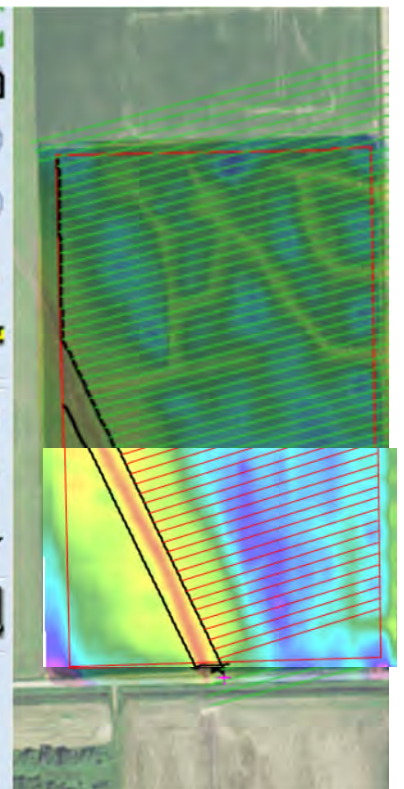
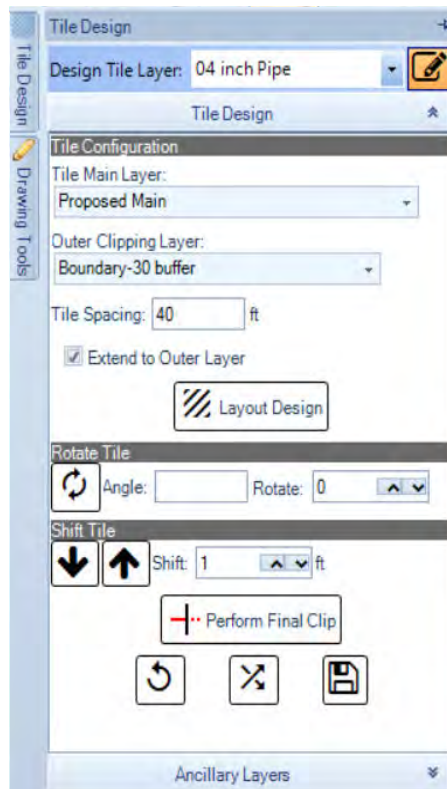
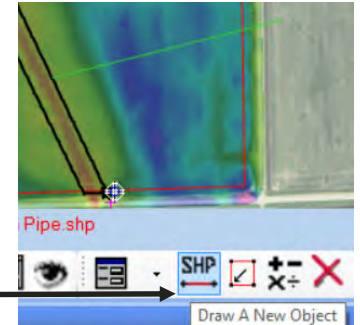


Tile Design—Drawing Laterals “Tile Design” Tab

In Drawing the laterals (ex 04 inch Pipe.shp), use the “Tile Design” tab to do all the hard work. Draw one line per drainage area; let the Tile Design draw the rest.

To Create Laterals

1. Turn on an “Elevation.grd” Layer
2. Turn on “Proposed Main”. Check “P” box in Drawings/Profiles in Map.
3. Turn on a Clip layer for top end of tile. Line.shp or Polygon.shp
4. Turn on any other helpful layers.
5. Click “Create New Layer from Template” button & choose “04 inch Pipe”.
6. Click on the “SHP” on bottom tool bar and draw in a 04 inch pipe.shp, make sure it crosses top end clip and the Proposed Main.
7. Go to the “Tile Design” tab.
8. Set “04 inch pipe” as “Tile Design Layer”.
9. Click “Save Changes” if prompted.
10. Select the line to use.
11. Set “Proposed Main” as “Tile Main Layer”.
12. Set “Boundary -30 Buffer” as “Outer Clipping Layer”.
13. Type in desired Tile Spacing—Ex. 40’.
14. Click “Layout Design”.
15. If any lines show wrong flow direction, select and reverse at this time.
16. **Rotate Tile**—Will allow 15 degrees of rotation from the original drawn angle. Click on the “Rotate” Button and move mouse over the map area, Left Click, hold and move mouse, angle will change or type in values.
17. **Shift Tile**—will move tile lines relative to the Tile Main Layer. Click Arrows to move or type a value. Can only move lines one “Tile Spacing”.



Note: If you are not satisfied at any step click the Reset Design Button

18. Click “Perform Final Clip”.
19. If happy with “Clip” - click “Save” button. Lines will be saved / added to the “Edit Layer”.



Repeat this page for all the areas of Parallel Lateral Tile.

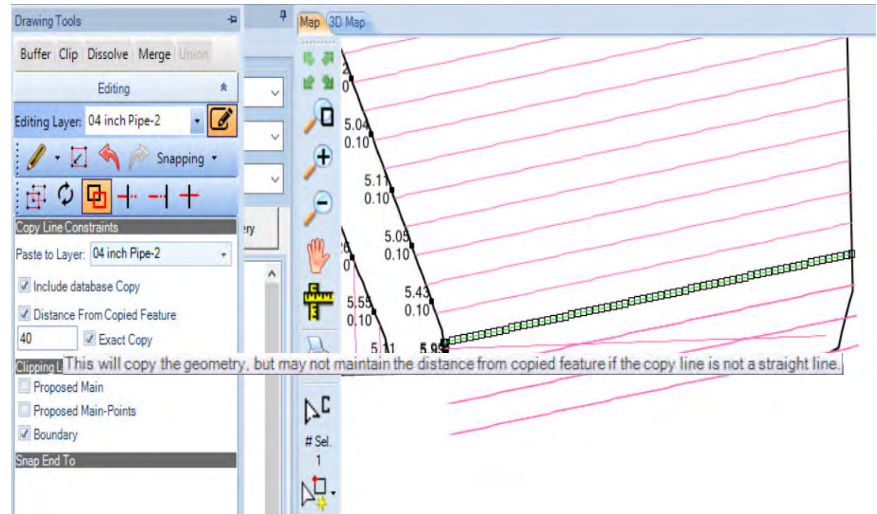
Tile Design—Adding in Random Laterals

As Tile plan gets developed, there will be times that Lines need to be drawn in at random. If “Truly” random and independent of anything else, just freehand draw.

Often these random / additional lines should “Parallel” other lines. Below are a couple tools to help do this function.

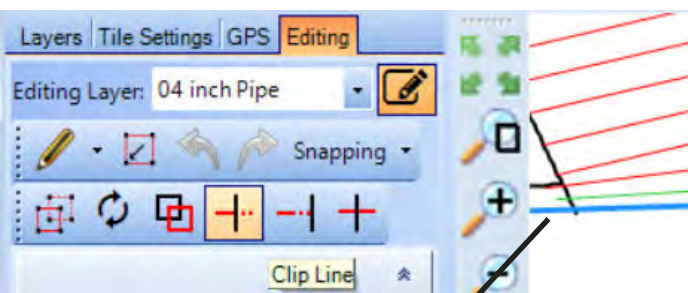
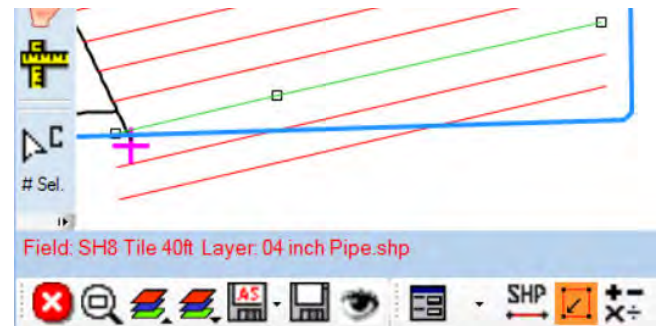
Copy Feature—(Drawing Tools)

1. Edit Layer = layer with line to copy.
2. Click “Copy Feature” button.
3. Set Values like image to Right—correct “Distance”.
4. Left Click on line to copy in Map Window area.
5. Drag your mouse away from the selected line.
6. When correct, Right Click.
7. Lines may need some more editing.



Move Vertices— (Bottom Toolbar & Drawing Tools)

1. Active Layer = layer with line to edit.
2. Click the “Move Vertices” button.
3. Place Cursor over Vertices to move—Left Click, hold and Drag to new location.
4. **Add a vertices**—place Cursor over new location, hold down “Control” key & “Left Click”.
5. **Remove vertices**— place Cursor over existing vertices, hold down “Shift” key & “Left Click”.



Clip Lines— (Drawing Tools)

1. Edit Layer = layer with line to edit.
2. Click the “Clip Line” button.
3. In Map Window—Click on Line to Clip—Line will turn Lime Green & show all Vertices.
4. In Map Window—Click on the Line or Polygon to Clip line “to” (object should turn Pink).
5. Repeat as needed.

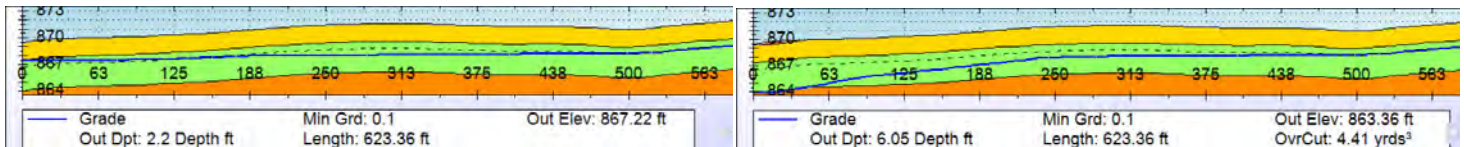
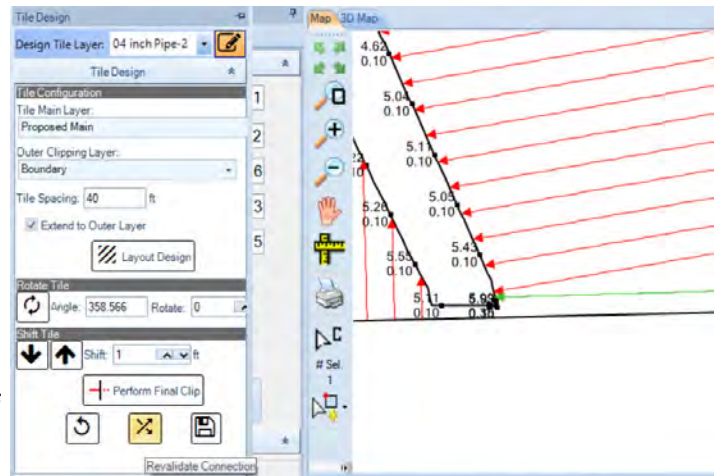
See Drawing Tools Section for more TIPS

Tile Design—Revalidate Connections & Reverse Tile Direction

After adding random laterals to the design the depth of the main can be used as the starting depth of the lateral.

1. Open Tile Design tab
2. Set Design Tile Layer— "04 inch Pipe"
3. Select the line or lines to revalidate
4. Set Tile Main Layer— "Proposed Main"
5. Click the "Revalidate Connection" button

In the example below the outlet depth changed from the "Minimum Depth" 2.2 ft to the depth of the "Proposed Main" 6.05 ft.



In drawing in Tile Lines.shp, we recommend drawing in direction of water flow.

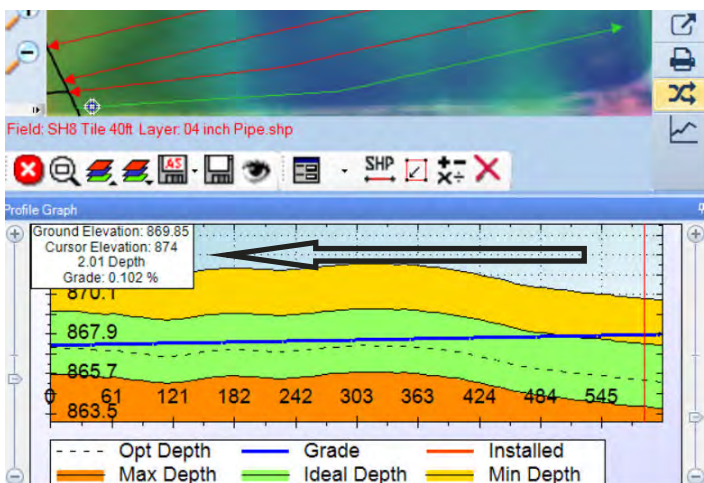


If drawn against the direction of flow, the cut calculations will be off. By clicking the "Reverse Tile Direction" the problem is gone.

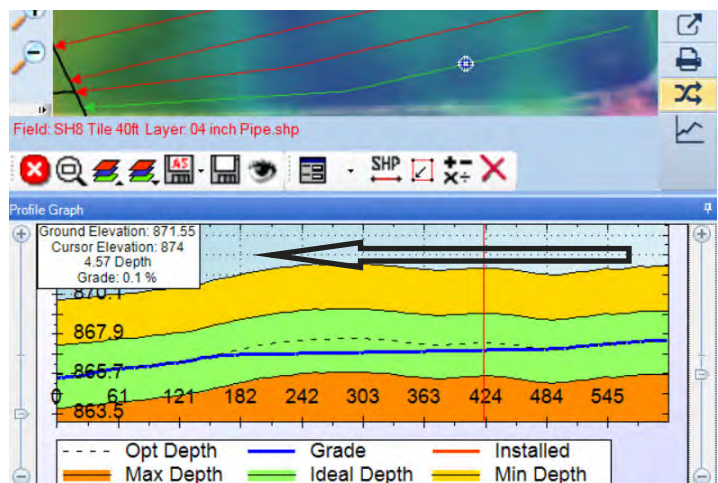
In the Profile Graph, the LEFT side is always the OUTLET. Water is always moving right to left in the "Profile Graph" window.

On the "Overhead Map", you will see an Arrow at the outlet end of the line/profile to show which way the water is trying to flow, based on the line directionality.

Drawn from Outlet to High Spot



Reverse Tile Direction button used

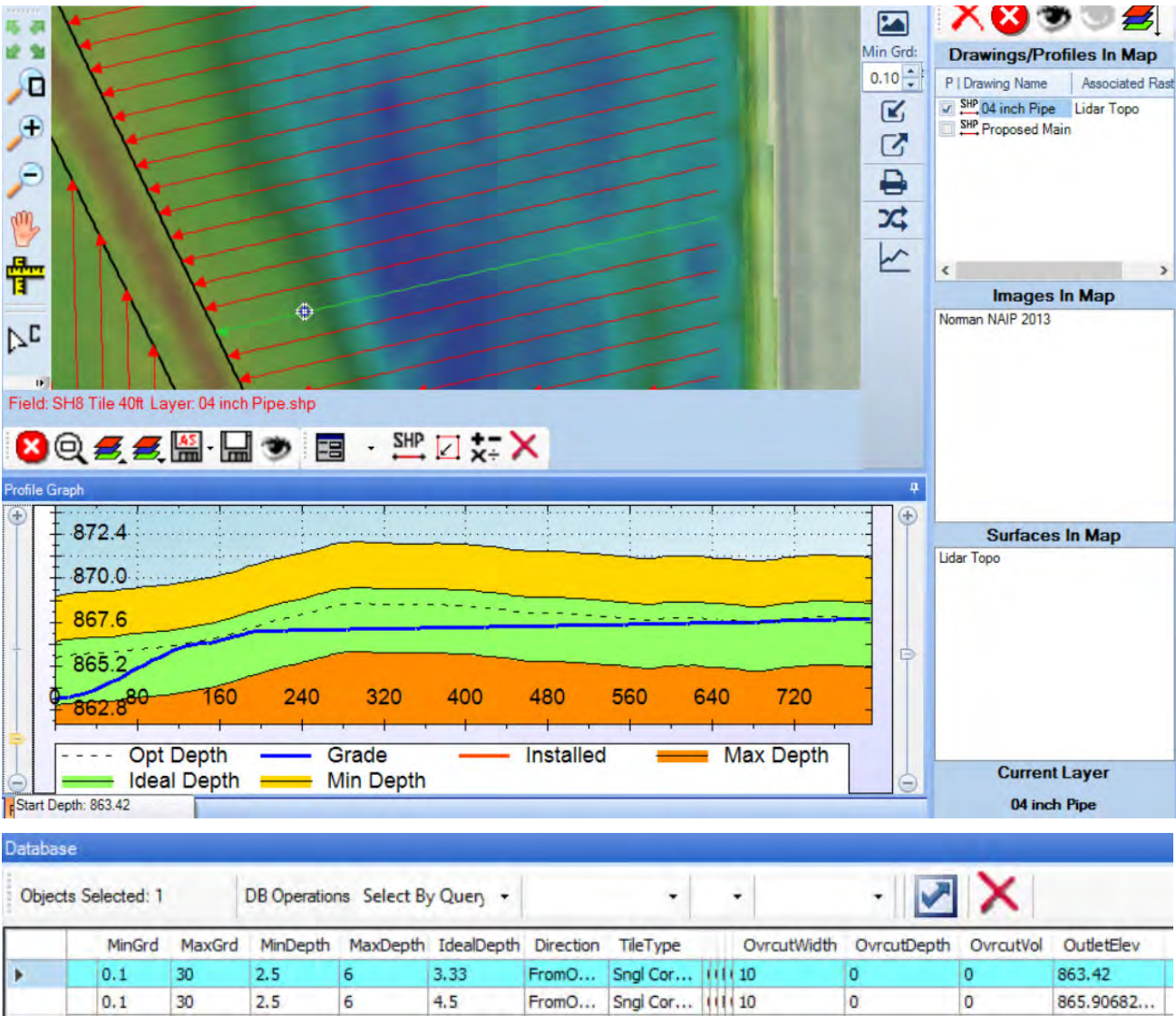
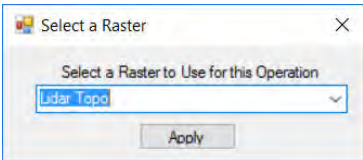


Tile Design—Reviewing Tile Plan

Once you have Lines laid out in the Map Window area of the screen, review the Profile or the proposed install depth / design. Users can quickly click through “Tile Plans” to confirm the plan functionality.

For Tile Design—Turn on or Create a SHP Line & Turn on an Elevation.grd, we suggest turning on any other layers that may be helpful, user preference.

1. Check the “P” Box on Tile Line.shp to calculate Profile.
2. Assign Raster to calculate Profile.
3. Left Click on the Tile Line to review.
4. Profile shows in “Profile Graph”.
5. “Left Slider” will adjust the “Start Depth” (outlet).
6. “Right Slider” will adjust the Ideal Depth.
7. Once the adjustments are made, values update in the Database. These values will carry over to SD Drain-Tile as “Guidance Lines”.
8. Note: manually changing values in Database will change how lines load.



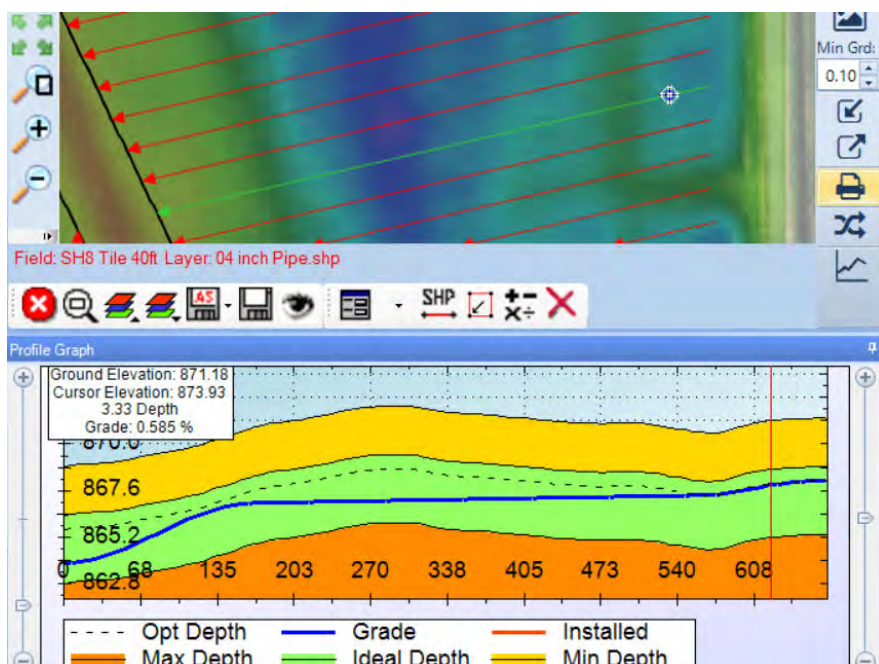
Tile Design—Printing Profile

Printing can be done of any Tile Line.

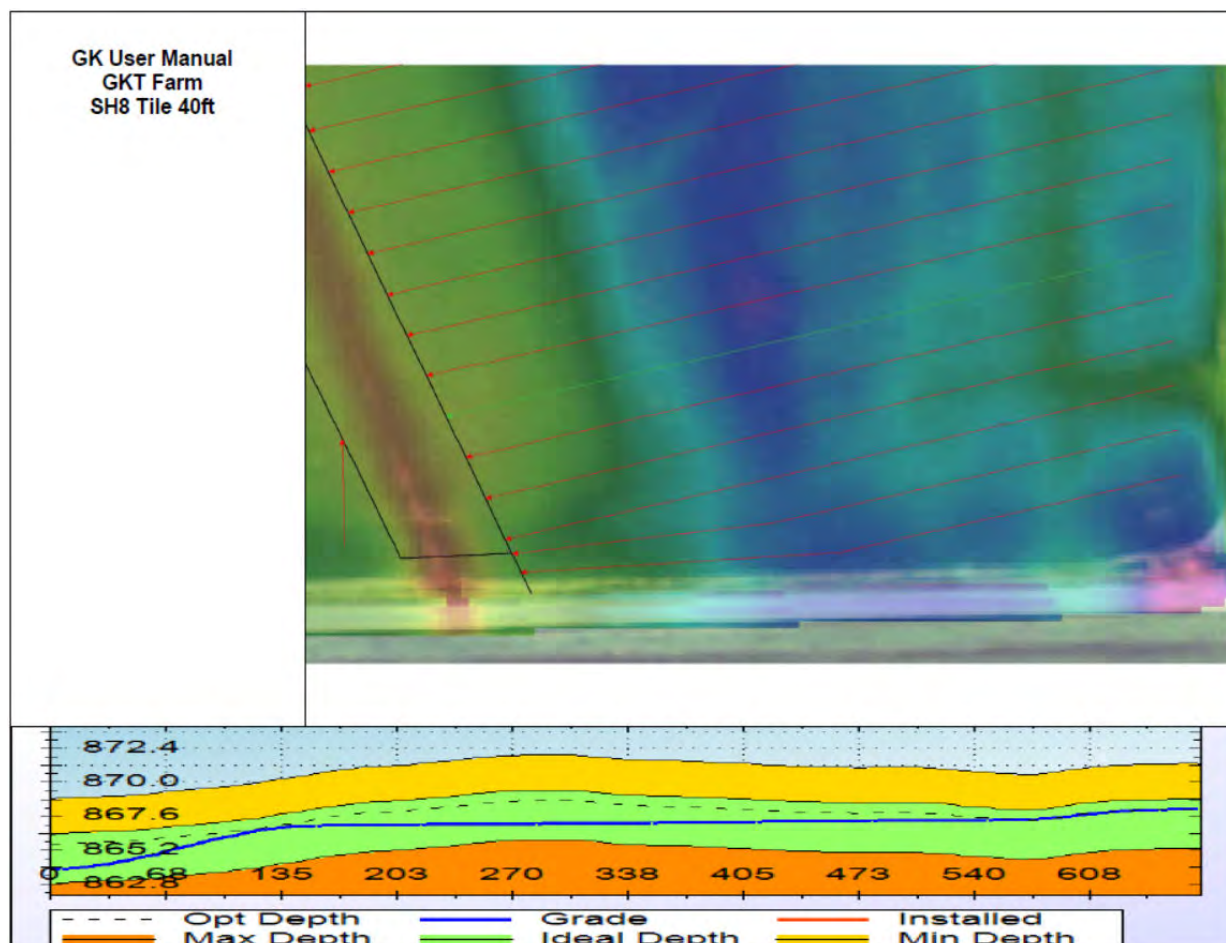
Suggested to "Save" Lines before Printing.

To Print Profile—

- Zoom to Tile Line to be printed.
- Turn on maps so they show up how you want it printed.
- Make sure your active layer = layer to be printed.
- Select the Tile Line in Map Window.
- Adjust Grades and Slides on Profile making the profile show as you want.
- Click on the "Print Profile" button.



Example of a Print—Below



My Notes

Field Shaping for SD Surface

Surface Settings

Settings are similar to the Ditch settings, but affect different tools.

Tools affected by this settings -

- Flow Modeling
- Stair Stepping
- Surface Tools - Cut Hills

Profile Settings

All Grade values are calculated using fall / length.

Example 0.05 grade= 0.5' fall / 1,000' run.

Minimum Grade—is the least amount of grade given to the “best fit grade control” profile line calculation.

Maximum Grade—is the largest amount of grade given to the “best fit grade control” profile line calculation.

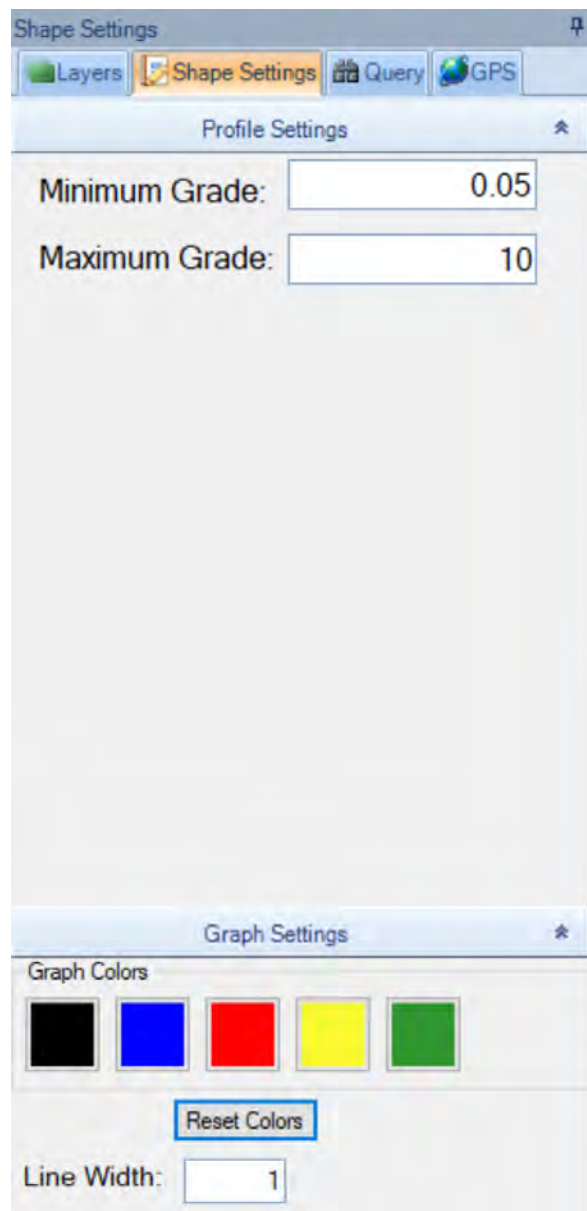
Upon using the “Ditch” function the “Ditch” settings will appear under this tab. See “Ditch” section of user manual for these settings.

Graph Settings

Graph Colors—These colors are for “Profile Graph”. Click on the color chips to change colors.

Reset Colors—Resets the colors to ADMS defaults.

Line Width—This will adjust the number of pixels wide of the profile lines.



Field Shaping for SD Surface - Surface Tools

Surface Tools

Surface Tools are available by "Right Clicking" on the Raster name in the "Layers" list on the left side. There are several tools here and below is a description of their functions.

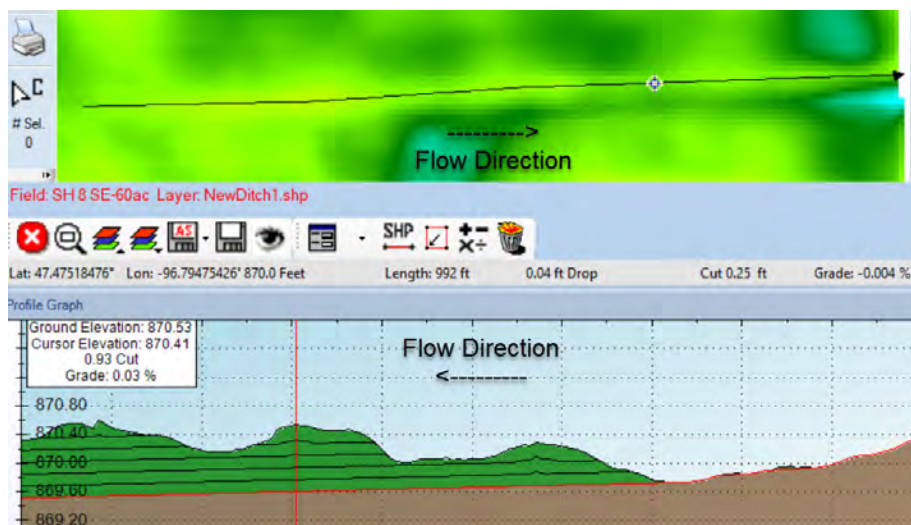
Bezier Raster
Compaction Fill
Cut Hills
FlowSmooth
Morph

Bezier Raster

Bezier Raster is a tool that is used to merge two separate xxx.grd files. The idea of the tool is to "Curve" the data between two elevations that have a drastic difference between the two objects.

Example would be cutting a "NewDitch" through a hill or a tight area. This example would be a bit more like adding in a curved backslope on a ditch.

The "NewDitch.shp" turned on with the "Profile" button checked on. Right Click in the "Layer Info" tab on the "NewDitch.shp" and choose "Export Selected" and "Export Ditch GRD"

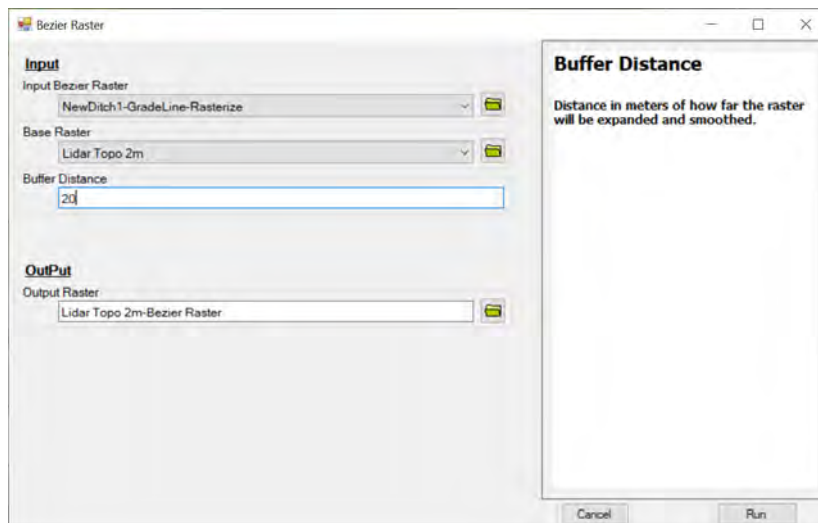


Turn on topo.grd to be edited & turn on NewDitch.grd. Right click on the Topo.grd and go to Surface Tools - Bezier Raster.

Input Bezier Raster = NewDitch or the area to be changed.

Base Raster = Original Topo map to be edited.

Buffer Distance = how many "meters" the data will be curved from the edge of the "input"



Field Shaping for SD Surface - Surface Tools

Bezier Raster

The map will be in Gray Scale, click the "Change Color Theme" button.

Set it to your preferred color. (Ex. is Rainbow)



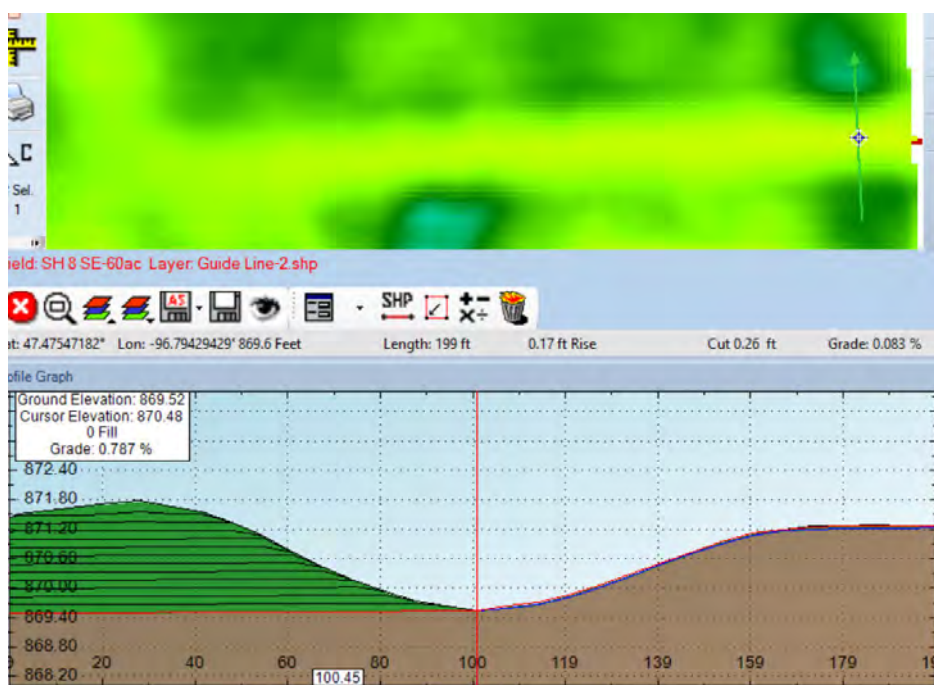
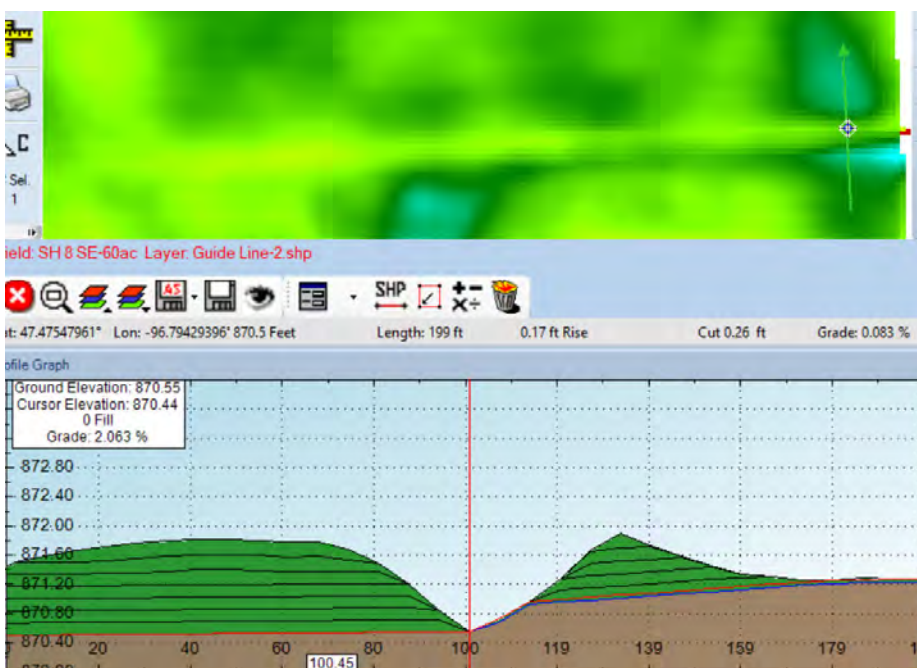
To the Right is a view of the output end of the updated ditch.

Note 2 things:

1- Ground Elevation 870.55'

2- General Side profile shape

20 meters = 65.62', so from the 100' mark in the middle, the Bezier will go 65' left and 65' right.



See the Ground Elevation here is 869.52 at the 100' mark in the middle of the ditch. It has been lowered to match the "NewDitch"

Field Shaping for SD Surface - Surface Tools

Compaction Fill

The Compaction Fill tool is designed to be used as the last step of surface shaping. It will add in soil as a "Percentage" relative to the "Fill Value". Allowing for the settling of loose soil (Compaction). The intent would be that areas of deep FILL would have extra soil and after weathering, time and soil settling would come to the correct final grade/elevation. Please note there should be "Extra Cut" available in the "Cut/Fill Graph" area.

Bezier Raster
Compaction Fill
Cut Hills
FlowSmooth
Morph

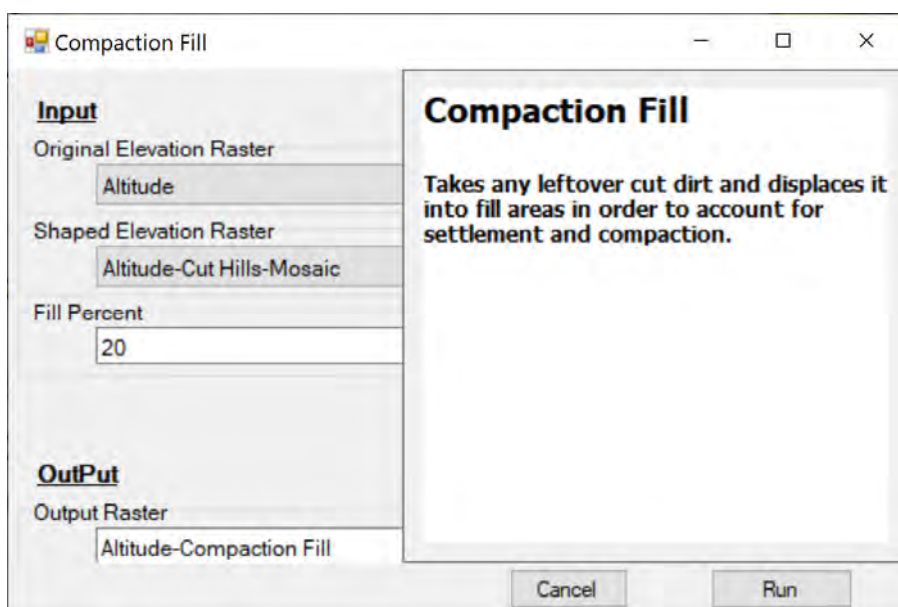
Turn on the original "Elevation.grd" and also turn on the "Finished-Shaped.grd"

Right click on either GRD file name. Choose "Surface Tools" and "Compaction Fill"

Original Elevation Raster—
Choose the Original Elev.grd

Shaped Elevation Raster—
Choose the final elevation.grd that has all the edits where "Flow Modeling" button has all lines working.

Fill Percent— is the amount of extra fill needed as a % increase over original requirement.



Example: An area needing 5" of fill at 20 % will get an extra 1.0" of fill added. Be very aware that soil type and method of fill play HUGE factors here.

NOTES:

Suggestions and Recommendations:

Min—1 to 5 - light flowing soil & box scraper

Mid— 10 to 15 - some lumps in soil & box scraper or ejector scraper

Max— 25 to 30 - lumpy soil & ejector scraper

Final comments: This is the "LAST STEP" before creating "Difference" Map.
Tool is NOT needed on every field.

Field Shaping for SD Surface - Surface Tools

Cut Hills

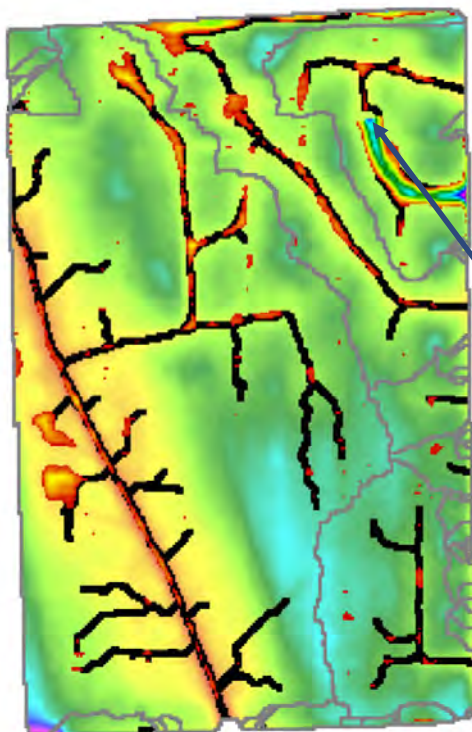
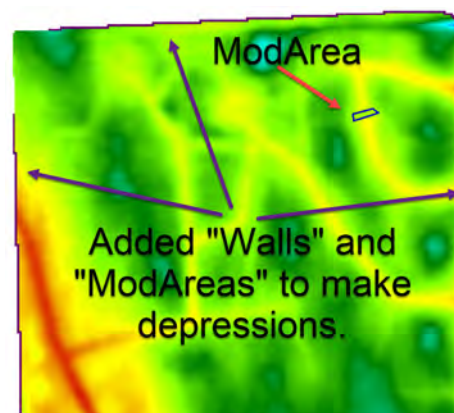
Cut Hills is designed to be a quick fix for taking care of minor pot hole issues and filling the hole by cutting soil off of the Hills to fill the depressions. Tool works great on fields that have a lot of hills and shallow depressions. This tool may not work as well when you get into large rolling hills will huge deep depressions (consider using "Table" or Manual edits in these senecio's).

Bezier Raster
Compaction Fill
Cut Hills
FlowSmooth
Morph

Before using this tool, it is important that you have your field setup so the watershed modeling will "flow correctly" on just your field area. If you are including parts of neighboring fields, it will use soil from all the area in the Topo.grd area in the map (Walls / ModAreas / Updated Ditch bottoms may be suggested for best results).

Suggest running watershed modeling to confirm everything is filling and flowing correct directions.

Once you have got all the hills / depressions forming the way you want. The "Cut Hills" function should work very well to fill depressions.



Concepts here: Make Hills and Depressions where I want them!

WALLS—put up to keep water from flowing to the West and North. Also the wall to the east put up to close up a ditch.

ModArea—added to make the area between the East Ditch WALL and the ModArea become a depression, flowing back to the north, then east (about 0.8 to 1.2 feet of fill in deepest areas)

Field Shaping for SD Surface - Surface Tools

Cut Hills

1. Turn on Topo.grd with all the mods if needed.
2. Right Click on Topo.grd Surface Tools—"Cut Hills"

Input Elevation Raster—already set to the layer you Right Clicked on.

Maximum Cut— the most amount of dirt to REMOVE from any area of the field in this process. Values are in tenths of feet

Minimum Grade—is the Minimum Grade that will be used when removing the hills.

Fill Percent—Value here is a % of "FILL" that will be placed in Depressions.

**CANNOT go over 100%. Idea being leave a little of other tools / functions and not create new issues (depressions).

Depression Distance—How far to reach to grab "Fill" from the edge of the Depression.

Fill Method—is which depression gets filled first

Deepest (done first)

Nearest (done first)

OutPut—Name the file (something unique it doing multiple runs) & Click "Run"

NOTE—If unachievable values in here, it may not finish the process. Give it one or two minutes. If it does not finish, close the processing window and change settings. Try again.

Cut Hills

Input

Input Elevation Raster: Lidar Topo

Maximum Cut: 0.2

Minimum Grade: 0.05

Fill Percent: 100

Depression Distance: 200

Fill Method: Deepest

OutPut

Output Raster: Lidar Topo-Cut Hills

Cut Hills

Cuts soil layer off the top of the hills and uses that soil to fill in surrounding depressions.

Cancel Run

Field Shaping for SD Surface - Surface Tools

Flow Smooth

In this method data is compared to the neighboring data, trying to make all the data within the 3x3 or 5x5 pixel area and maintains the min grade within that area. Concept here is 'smoothing' not filling / cutting. Also, the process is designed to 'maintain' the original main flow paths, minor paths will change.

Bezier Raster
Compaction Fill
Cut Hills
FlowSmooth
Morph

Tool works well as a finishing tool, once you have majority of the cut / fill items done. The core idea here is to take off any fast changing areas (rough edges) and not change the smoother areas of the field.

To use "Flow Smooth", get the cut / fill / mod areas / walls and main flow paths running where you want them.

1. Turn on the Topo.grd that has been modified.
2. Right click on Topo.grd and go to "**Surface Tools**" and "**Flow Smooth**"
3. **Input Raster**— Choose the Topo.grd from the drop down.
4. **Input Polygon (Optional)** - If you would like to apply the "Flow Smooth" to only areas. Draw Polygon.shp to define the areas.

NOTE: The "Use Selected Only" option. For using multiple polygon options. Ex. Watershed.shp

The FlowSmooth dialog box is shown with the following settings:

- Input**
 - Input Raster: Altitude
 - Input Polygon (Optional): [Empty]
 - ☐ Use Selected Only
- Smooth Count**: 1
- Neighborhood**: 3
- Minimum Grade**: 0.05
- OutPut**
 - Output Raster: Altitude-FlowSmooth

On the right side of the dialog, there is a description: "Iteratively smooths the raster using a 3x3 or 5x5 neighborhood averaging. This method also maintains a minimum grade as it works toward higher elevations." At the bottom right are "Cancel" and "Run" buttons.

Field Shaping for SD Surface - Surface Tools

Flow Smooth

5. **Smooth Count**—is the number of times it will run the Smoothing Filter on the field / area.
6. **Neighborhood** - is choosing between 3 pixels x 3 pixels or 5 pixels x 5 pixels sized area smoothing. 3 does smaller amount of change than 5.
7. **Minimum Grade** - This value will assure that all Smoothed area will have at least this minimum grade
Note: 0.05 grade= 0.5' fall / 1,000' run
8. **OutPut**—Assign a unique name here, note you may be running this multiple times to get the result you want. Consider adding "settings values" to the name.
9. Click **Run**

FlowSmooth

Input

Input Raster
Altitude

Input Polygon (Optional)

Smooth Count
1

Neighborhood
3

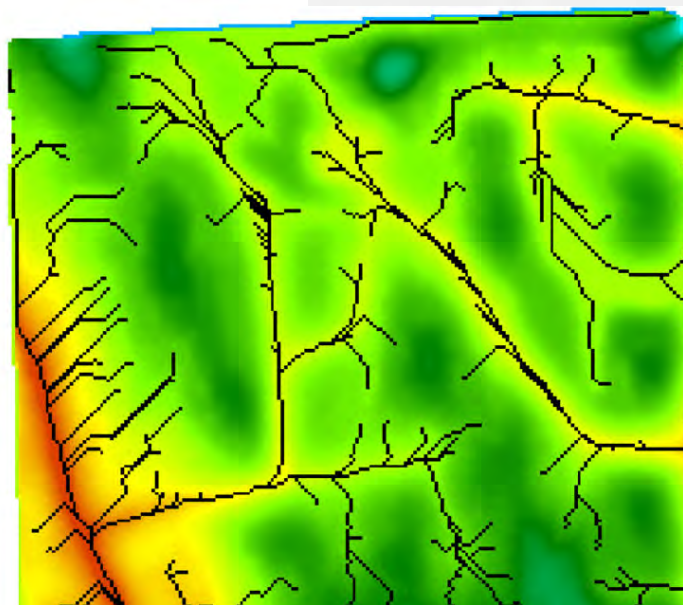
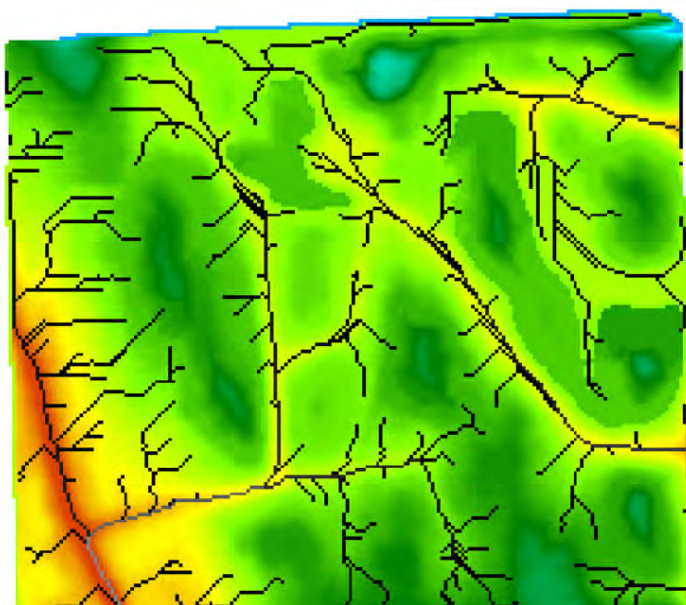
Minimum Grade
0.05

OutPut

Output Raster
Altitude-FlowSmooth

Modified Input Topo.grd

Smoothed Output
Topo.grd



Note the rough edges on the "Left" and smoothed on the "Right"

Field Shaping for SD Surface - Surface Tools

Morph

Removes dams that are creating depressions and uses that soil to fill in the nearby depression and areas that do not meet minimum grade. Technically, this tool should be used as a finishing tool to ensure that everything in the field runs to an outlet, but may also be used to plan where depressions should flow or in simple field designs. If there are large holes or major flow changes, do edits first.

Bezier Raster
Compaction Fill
Cut Hills
FlowSmooth
Morph

1. Turn on the Topo.grd that has been morphed.
2. Right click on Topo.grd and go to "**Surface Tools**" and "**Morph**"
3. **Input Elevation Raster**— Choose the Topo.grd from the drop down.
4. **Input Polygon (Optional)** - If you would like to apply the "Morph" to only areas. Draw a Polygon.shp to define the areas.

*NOTE: "Use Selected Only" For using multiple polygon options.
(Ex. Watershed.shp)*

5. **Input Wall Raster (Optional)** - Allows the use of a Wall.grd outside to force water back on the field to another outlet or a Wall.grd inside the Topo.grd map area to force water to go a given direction or create a ridge.

*Processing
NOTE: This tool
is great for
"Adding Min
Grade" to
Depressional
areas scattered
around a field*

Morph

Input

Input Elevation Raster
Altitude

Input Polygon (Optional)

☐ Use Selected Only

Input Wall Raster (optional)

Minimum Grade
0.05

Fill Percent
10

OutPut

Output Raster
Altitude-Morph

Morph

Removes dams that are creating depressions and uses that soil to fill in the nearby depression; thus, creating as nearly equal cut/fill as possible.

Technically, this tool should be used as a finishing tool to ensure that everything in the field runs to an outlet, but may also be used to plan where depressions should flow or in simple field designs.

Cancel Run

Field Shaping for SD Surface - Surface Tools

Morph

6. **Minimum Grade**—is the Min Grade it will apply to any area of the field that it is removing “dams”. This will not change the grade of less grade that have “Flow” with no “dams”.

7. **Fill Percent** - This is the % of the existing Fill that will be used from the Depressions. Increasing the fill Percent will have large impact on the final map. Suggest using smaller values.

Examples: 50 = 50 % Fill and 50 % Cut

10 = 10 % Fill and 90 % Cut (rec for small area)

0 = 0 % Fill and 100 % Cut (rec for large area)

NOTE: 0 could still get “fill” if there is a dam and min grade is not met.

5. Click Run

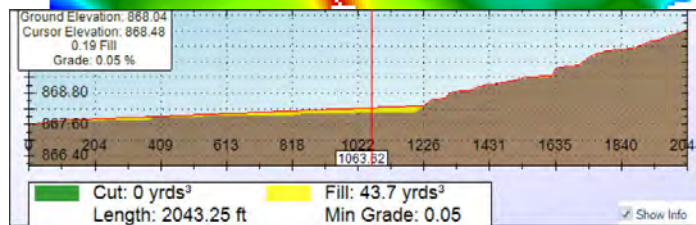
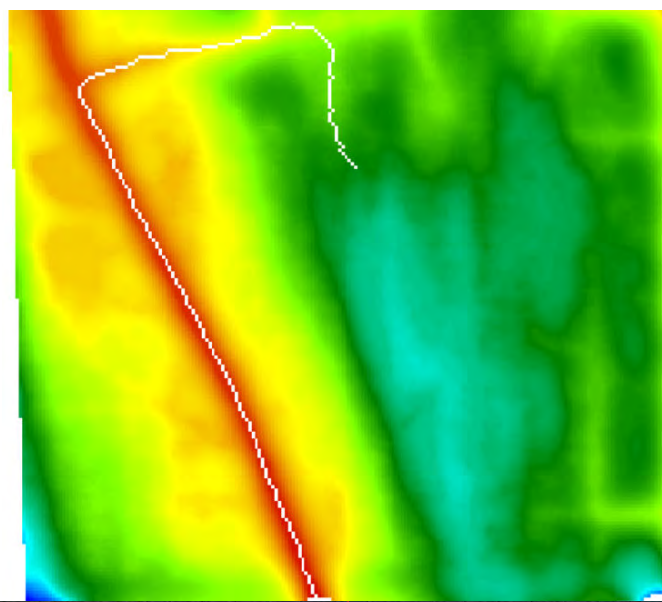
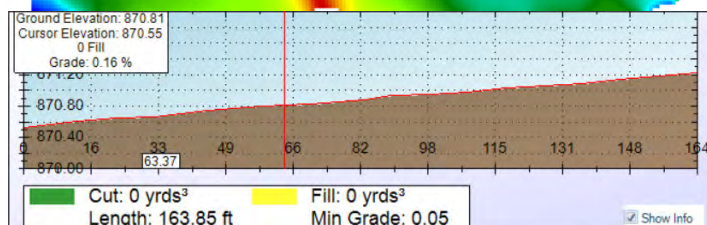
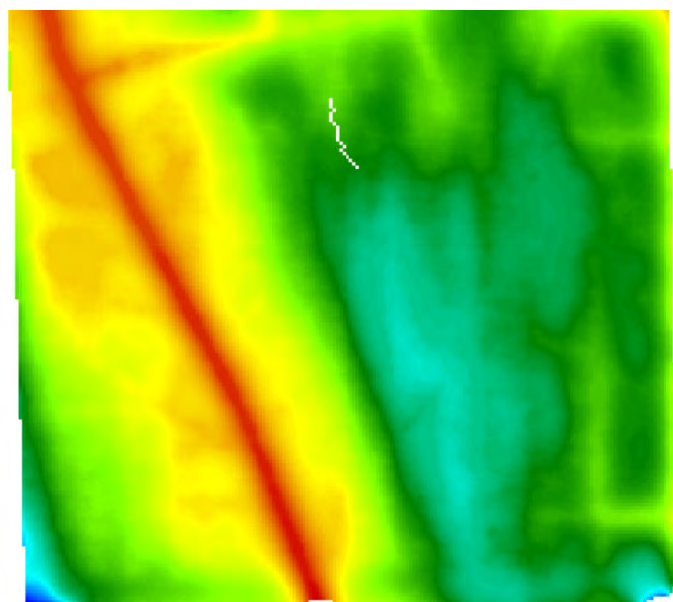
Preview using “Flow Model”



(creates profile to first dam)

Before Morph

After Morph



Field Shaping for SD Surface - Shaping Tab

Build Wall Button



This tool is designed to "Build Wall" around the outer edge of the field, forcing water to go specific directions. It does not build interior walls inside the topo map.

1. Turn on the Topo.grd file you are working on.

2. Click the "Build Wall" button



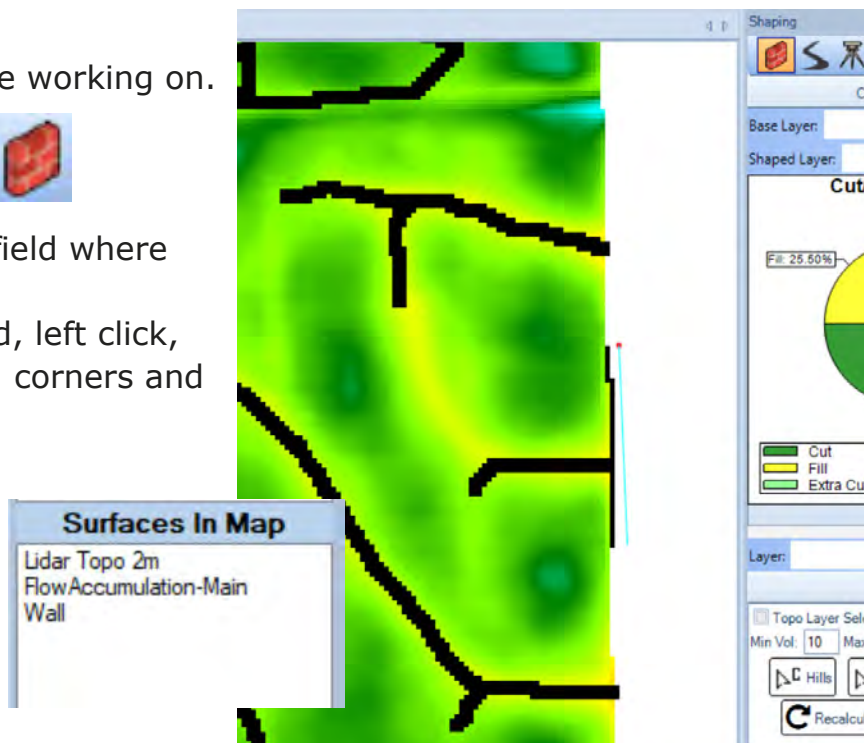
3. Left click along the edge of the field where you want the "Wall".

Note the Red Dot is where I started, left click, left click to define area, go around corners and right click to finish.

4. You now have a "Wall.grd"

5. Click "Save" to keep this object

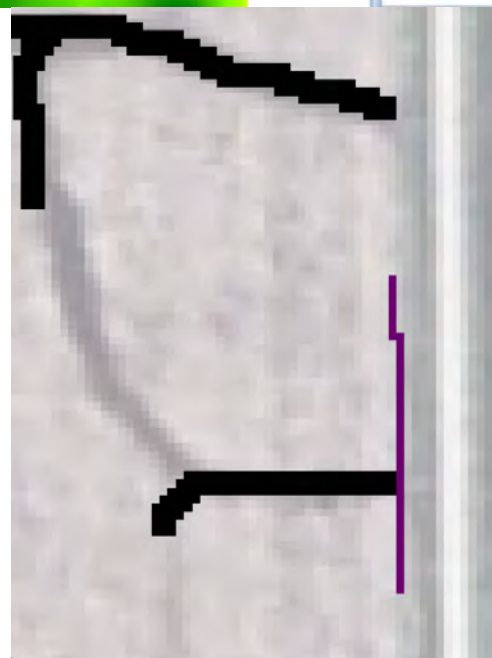
6. Repeat this process to build all your walls.



7. Wall.grd is just the "purple" pixels you see to the right.

8. Must use the "Raster Tools" and "Mosaic" to merge the Wall and the Topo files.

Once the files are merged, you may want to re-run the watershed modeling. Note: if you are doing more interior edits / mods, hold off on the watershed modeling.



Field Shaping for SD Surface - Shaping Tab

Flow Model Button



Tools is generally for later in the process, but can be used at anytime. When the tool is selected, click on a pixel and ADMS show the method by which the water will leave the field and gives the "Profile" of that flow path. It will only run to the first depression and stop or runs off the field edge.

1. Set your active layer to the Topo.grd to Model

2. Click the "Flow Model" button



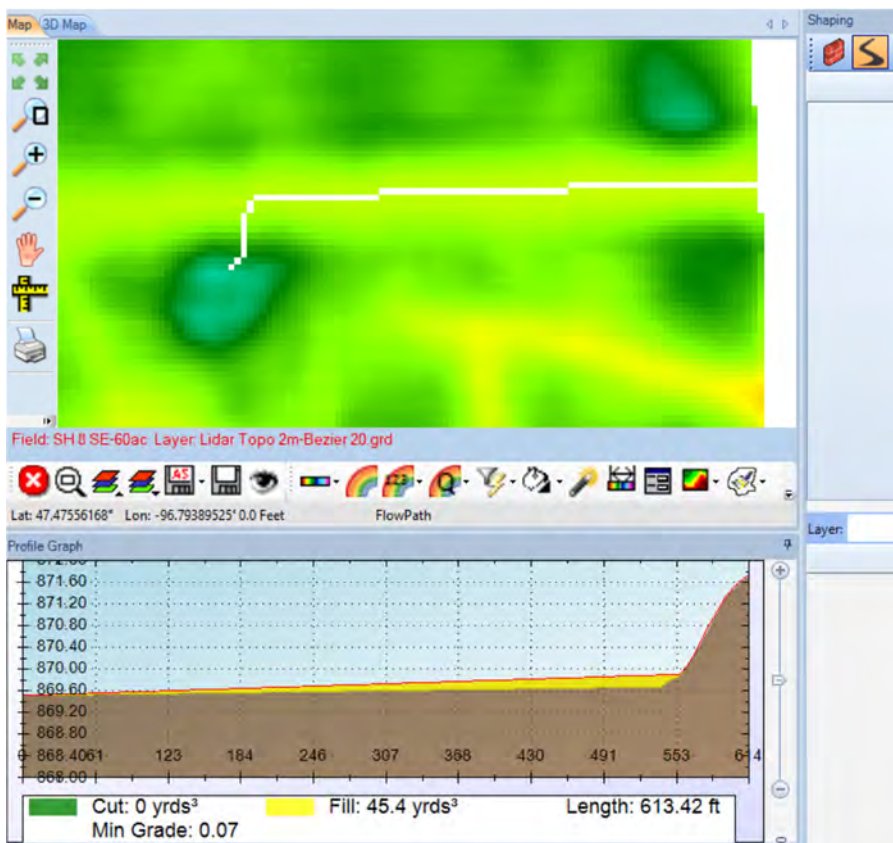
3. Left click on a spot on the map

Show path of water flow and Profile

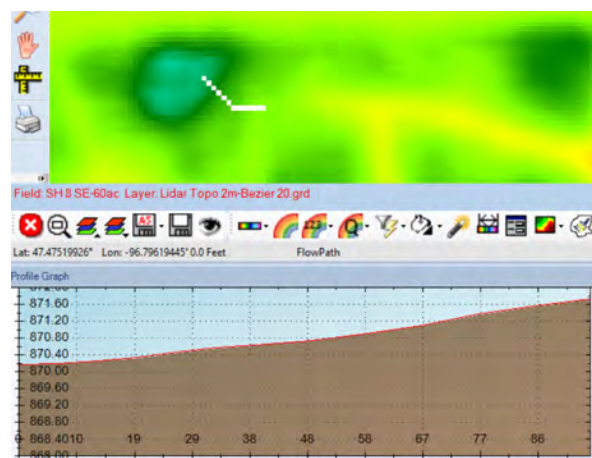
Only runs to the bottom of first depression

NOTE: if the Shaping Tab buttons are "on" or "highlighted" the SHP "Selection" tools will not functions!

Note: below, left image the ditch was edited to 0.03 grade in the ditch settings. The Shape Settings are set to 0.05, so it shows "Fill", but there are not "Depressions" in the Flow Model.



Below, right image—
Hitting a depression.



Field Shaping for SD Surface - Shaping Tab

Grade Button



The function here is straight forward. Draw a polygon around the area you want to put at a laser grade. You get to choose the direction of the grade.

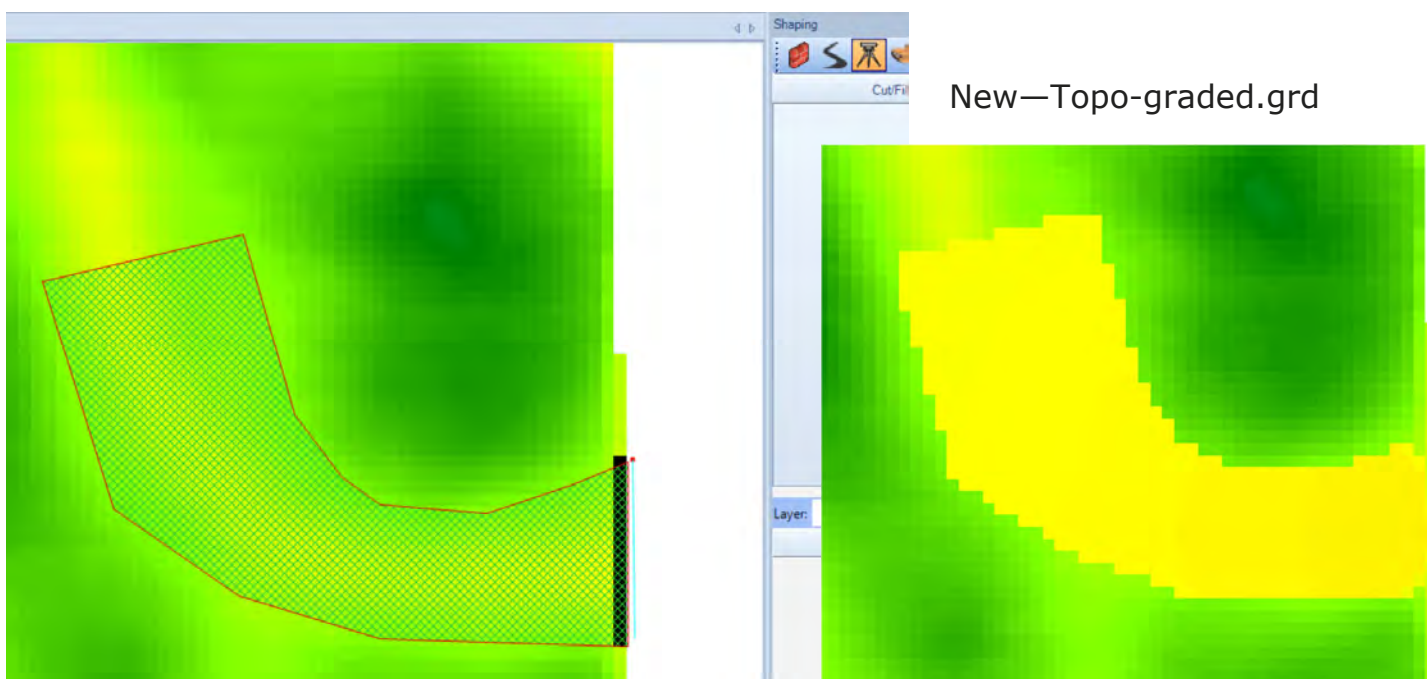
1. Create a polygon to define the area you want to set to a given "single direction laser plane". (suggest using "ModArea.shp").
2. Select the polygon (making the "green crosshatching" - 1 selected object)
3. Change the "**Active Layer**" to the "Topo.grd" (surface to amend).

NOTE: Look at the "Shape Settings" to confirm your "GRADE" being used.

4. Click the Grade button.



5. Left click along the side or sides of the polygon you want to be the "Exit or Outlet Edge" of the Laser plane.
In this process the "Outlet Edge" elevations are pinned to the original elevations at the last pixels of the polygon. With this in mind you may want use the "Shape Tools" and "Bezier Raster" (will round edges) to merge the two rasters
6. Right click to finish the "Exit / Outlet Edge". ADMS will create a whole new updated "Topo-Graded.grd" of the whole field.



Field Shaping for SD Surface - Shaping Tab

Ditch Button



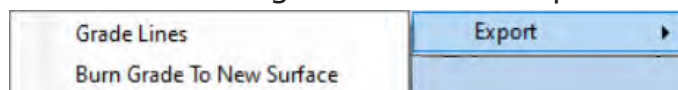
The function of drawing in ditches or flow paths is a critical item in the Surface shaping process. Clicking on the "Ditch" button will give the window the "right side tool bar of the Ditch Window and the ability to "check" the Profile box in the "Layer Info" tab. There are two major functions here

One: Ability to draw in ditches and set grade for new or old ditch bottoms (Cut/Fill).

Two: Function to export out these ditch bottoms with the elevations of the newly calculated Grades (elevations—which may represent Cut or Fill) as SHPz points.

Below is an example of what Ditch bring to the Surface Shaping Window.

1. Turn on the Topo.grd to work on and any other layers needed to assist in drawing.
2. Click on the "**Ditch**" Button 
3. Draw in the ditch where you want them for new and existing that need cleanup.
Use either the "**Pencil**" drawing tool = Draw Profile
Or the "**SHP**" drawing tool = xxxLine.shp (must have the "P" box checked)
4. Make Edits and adjustments to the lines. (Min Grade, Edits, raise/lower Grade Line)
Must do export now, do not unload lines, *"Edits" (Cut/Fills) will be lost*
For multiple lines select them NOW.
5. "**Layer Info**" tab on Right Side. Right Click on the "Drawing Name" to be exported.



-**Grade Lines**—Creates a new GradeLine.SHPz file with the elevations as the "Cut/Fill-Grade Line" elevation

-**Burn Grade To New Surface**—Skips step of creating a Grade Line.SHPz and burns the elevations of the cut into a new surface using the Bezier Curve to embed the ditch updates.

6. "Grade Lines" option will create s GradeLine.SHPz file with elevations of the proposed "Grade Line" burnt into the "Z" attribute of the SHP line file.

NOTE: To convert back to Raster.grd

- Right Click on the GradeLine.shp'z'

- Go to "Shape Tools" & "Rasterize" (leave "field & model" blank)

Field Shaping for SD Surface - Shaping Tab

Ditch Button



6. "Burn Grade to New Surface" - option open the dialog box below.

Input Line File—Select DitchLine SHP with Edits done.

Example is set to NewDitch.shp

Note: "Use Selected Only" as needed

Base Raster—Choose "Raster" being used as "**Associated Raster**" in "**Layer Info**" Tab

Buffer Distance—is how many METERS the "Bezier Curve" will be stretched Left & Right.
Example 10 meter curves out 10m Left and 10m Right of DitchLine.

OutPut—Name something you will know if you are doing multiple areas or multiple buffer distances.

Burn Grade Lines

Input

Input Line File
NewDitch

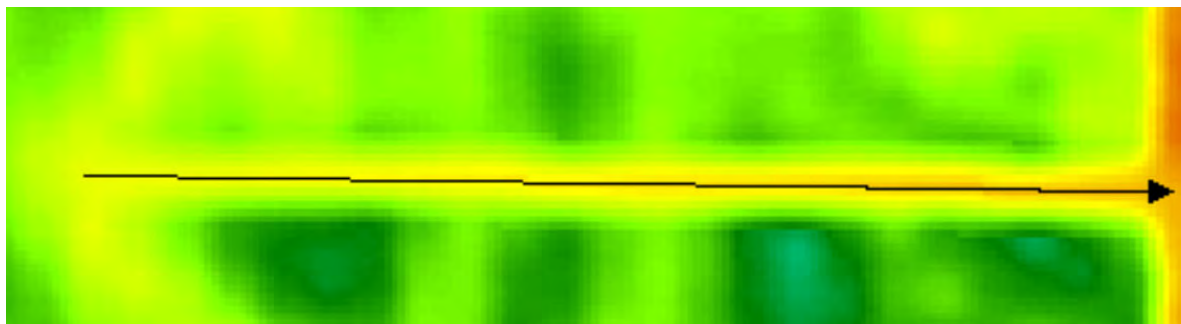
☐ Use Selected Only

Base Raster
Altitude

Buffer Distance
10

OutPut

Output Raster
NewDitch-Burn Grade Lines



Field Shaping for SD Surface - Shaping Tab

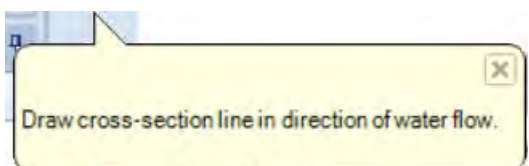
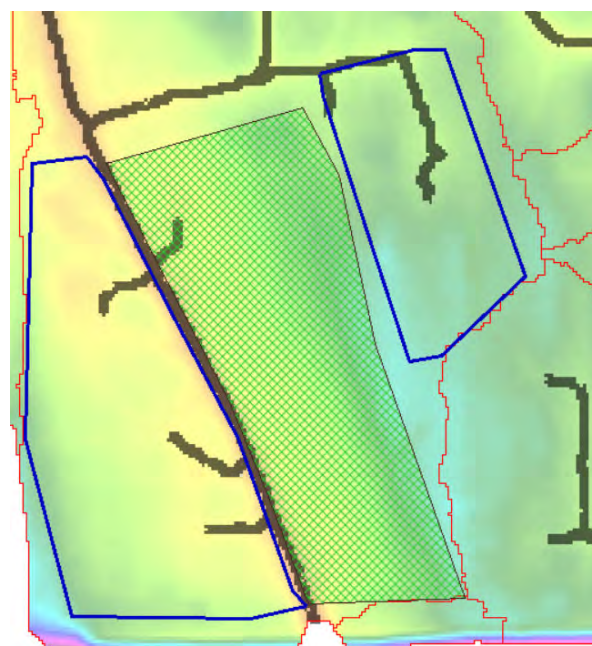
Stair Step Button



This function will give you the ability to run the "Best Fit" ditch function on "Selected Area" of the field. Process repeats the "Best Fit" on 1 pixel wide runs in whatever direction you tell it to run. Values to run this process are coming from the Surface Settings tab.

For laying out the areas to Stair Step, must create polygons to define areas, suggest turning on watersheds and flow paths for best results. Drawing polygons for areas that have fairly similar directionality to the water flow (Aspect may be helpful too).

1. Turn on the Topo.grd to model and Watershed.shp and FlowAccumulations-Main.grd.
2. Click on the "Templates" in the "Layers" tab
Suggest—ModArea
3. Draw polygons around the areas you want to "Stair Step", each area will be ran separate.
4. Select 1 Polygon area to "Stair Step"
5. Make sure the active layer is Topo.grd to amend
6. Click the "Stair Step" Button



7. Draw cross- popup will show in lower left corner. Make sure you draw across the whole object Starting outside and finishing outside the polygon.

NOTE: This is doing a cut / fill with a zero balance. (Ex. 50 yards cut / 50 yards fill)
There is no option for min CUT DEPTH in this function!

Field Shaping for SD Surface - Shaping Tab

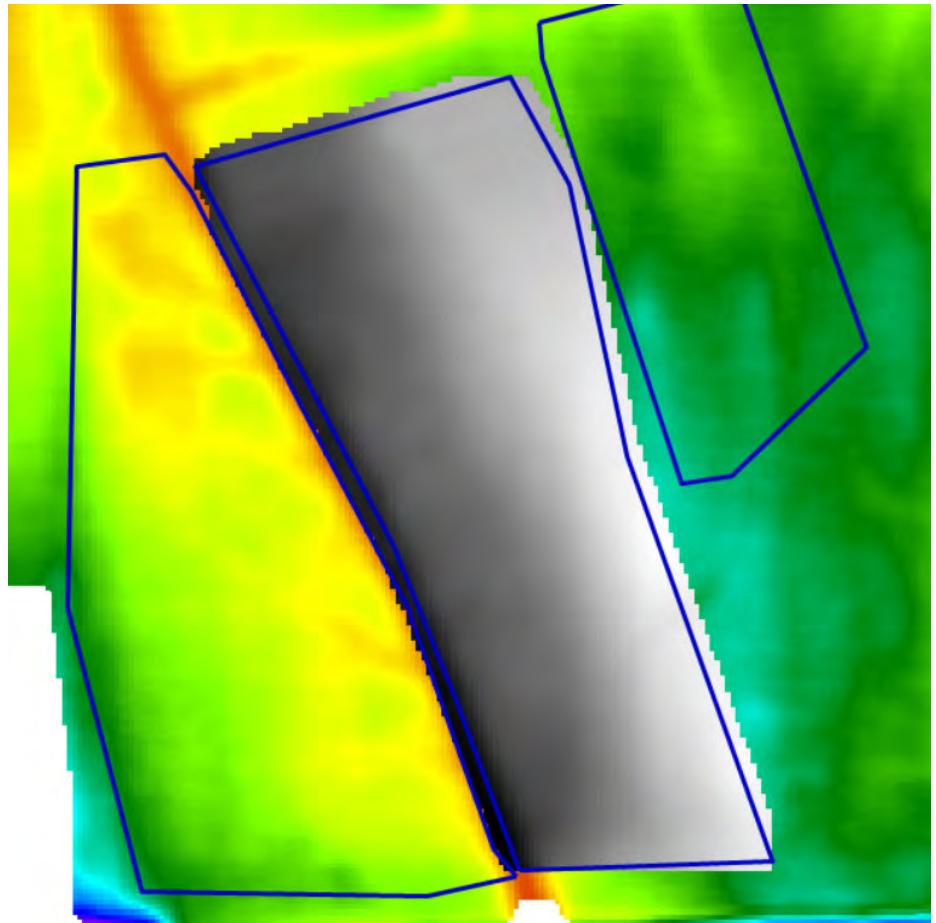
Stair Step Button



8. ADMS will return an updated StairStep.grd map for an area slightly larger than the selected polygon.
9. Make the StairStep.grd the active layer and "SaveAs" suggest naming something unique if doing multiple areas (named this one StairStep-SM.grd (SM-south-mid)).
10. The new layers will be gray-scaled for the color and slightly larger than the polygon.
To Clip to polygon or not? Each one may be different, user preference.
To change color or not? Suggest leaving Gray, will be Mosaiced with Topo.grd.
11. REPEAT as needed for all the areas to Stair Step.

Once all the areas are done we will Mosaic or Bezier the pieces together.

Reminder of the couple pixels outside the area. To Clip to Polygon or not? Your choice.



Field Shaping for SD Surface - Shaping Tab

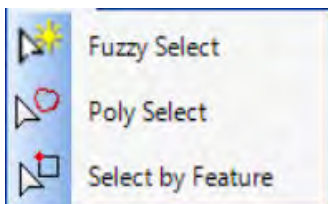
Fuzzy Select / Poly Select / Select by Feature - Buttons

This tools needs to be ran on the Topo.grd for things to function.



Note: may need other "Drawing" files turned on to select the area to edit.

There are 3 options within the Select button.



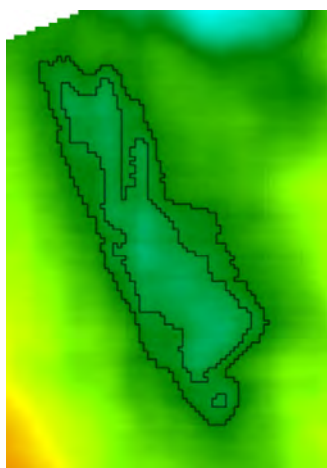
Fuzzy Select—auto draws polygon.shp around a selected pixel—elevation, or something close to it (Fuzzy).

Poly Select—allows drawing polygon.shp & selecting polygons. Selection process NEEDED for the "Smoothing Dropdown"

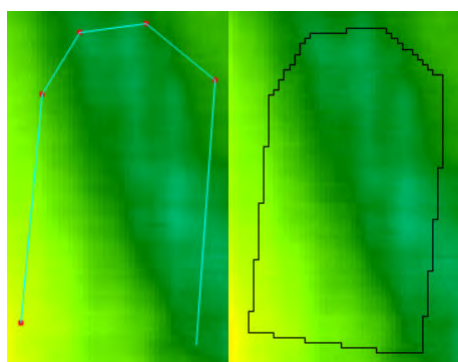
Select by Feature—able to select points/line/polygons. Will create a polygon from any Feature. Drawing polygon around all the pixels that touch the line or points.

Using any of these tools will create a Temporary—Drawing file in the "Layer Info" list. Select and save at anytime, otherwise the next use of the button will delete previous selection.

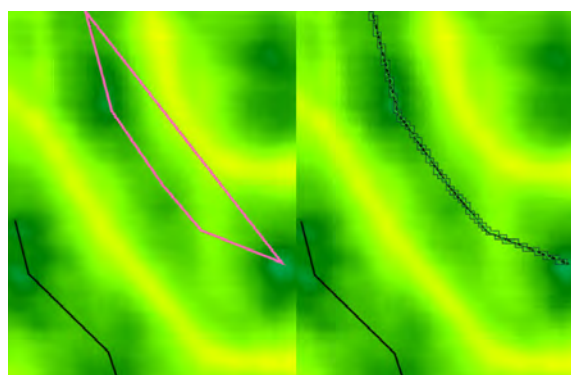
Fuzzy Select



Poly Select
Drawing Finished



Select by Feature (line)
Selecting Poly Selected



Note: - Fuzzy Select tools are drawing around the outline of each pixel.

- putting your mouse over a Fuzzy Select then using your Scroll wheel will increase or decrease the size of the Fuzzy Select area.

Field Shaping for SD Surface - Shaping Tab

Hill / Dep Designer Tab

In this process, users get the option to move soil from one area to another. Basically, move Hills into the Depressions. Software calculates how many yards of soil are needed / available in each area.

Layer—By click the dropdown and selecting a layer name. ADMS will use all the settings and calculate the “Hills” and “Depressions”

Topo Layer Selection—Must be checked to select your hill and depressions in map.
Note: Dragging a rectangle over whole field will show all hills & depressions.

Min Vol.— Minimum “yards” of soil to calculate for cut/fill list.
—smaller number will give more hills/dep
—larger number will give less hills/dep

Max Cut—Maximum depth soil cut in Tenths of feet

Cut/Fill %— 75% here would only fill the Depression 75% from the selected hill. Allowing user to move soil somewhere else to finish filling depression. (does not affect the Cut)

**CANNOT go over 100% fill. Idea being leave a little of other tools / functions and not create new issues (depressions).

C Hills Button— Clears selected Hills

C Dep. Button— Clears selected Depressions

Cut/Fill Button— Move soil from Hill to Depression
Subtracting from Hills—Adding to Dep.

Recalculate Topo— After making many changes this updates all the values in the Stats and volumes.
They will get out of whack.

Create Final— Mosaics all cut/fill.grd's with Topo.grd, creating “Cut_Fill-Final.grd”

Hill\Depression Stats—Gives Statistics of project and selected hill / depressions

Hills Depressions—This table gives you running values of how much cut and fill is available. Also, lets you see/select values (areas) to use with the “Cut/Fill Button”

The screenshot shows the 'Hill / Dep Designer Tab' interface. At the top, there is a 'Layer' dropdown menu set to 'Lidar Topo 2m'. Below it is a 'Table' button. The main section contains several input fields: 'Min Vol: 10', 'Max Cut: 0.2', and 'Cut/Fill %: 100'. There are three buttons: 'C Hills', 'C Dep.', and 'Cut/Fill'. Below these are 'Recalculate Topo' and 'Create Final' buttons. A 'Hill/Depression Stats' section displays the following data:

Hill Vol: 435.9	Dep. Vol: 20.7
Select Hill Vol: 1.9	Select Dep. Vol: 1.8
Hill Area: 41.3	Dep. Area: 4.1
Select Hill Area: 0.2	Select Dep. Area: 0.2

At the bottom, there are two tables: 'Hills' and 'Depressions'.

Hills	Depressions
Volume	Volume
324	12
351	29
13	22
11	46
678	31

Field Shaping for SD Surface - Shaping Tab

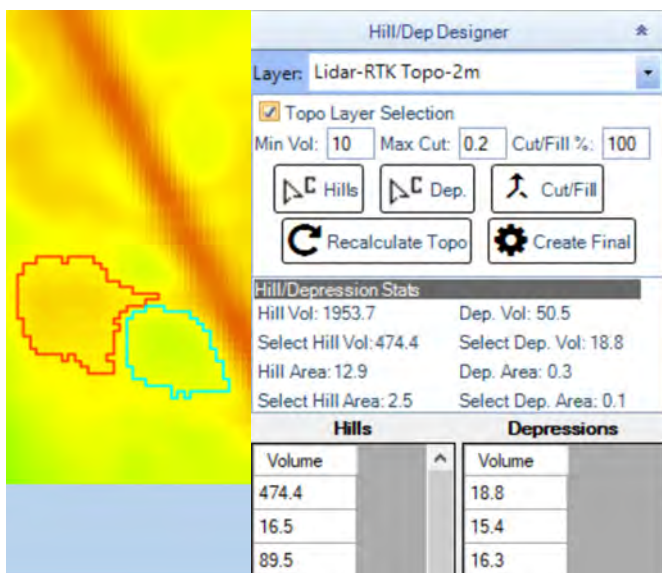
Hill / Dep Designer Tab

1. Suggest starting with a "**Clear Map**". Turn on the most up to date "Topo.grd" map

Note: Hills are Blue Outline and Depressions are Red Outline in this example.

2. Match up Hill and Depression to Merge & Click the "**Cut/Fill**" button to merge

NOTE: If #'s get out of whack, click the Recalculate Topo.



3. Working top to bottom on the **Depression** list, fill in all the Depressions.

Multiple 'Cut_Fill.grd' are added- in Map and stored in an ADMS created "CutFill" folder. If you make a mistake, check and un-check the last cut_fill.grd to confirm. These files can be deleted. MUST RUN Recalculate Topo at this time.

Once you have all the Depressions showing "0" there should be a bunch of gray scaled maps over the Topo.grd map.

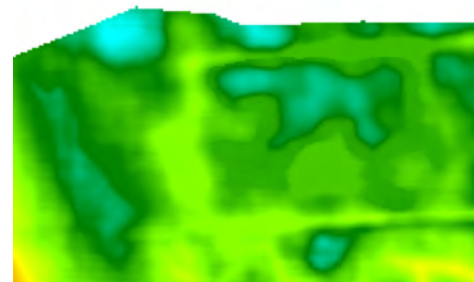
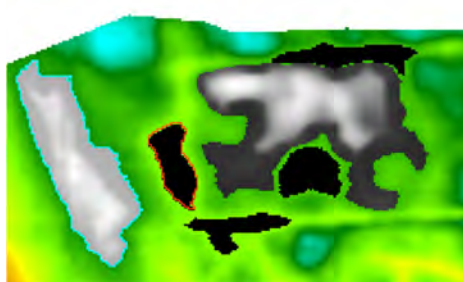
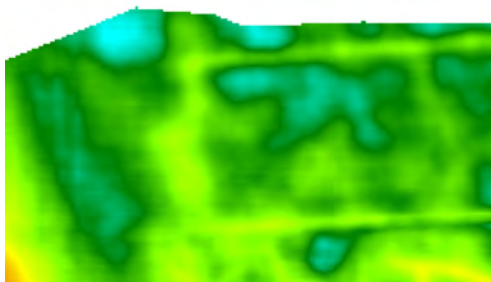
4. Click the "**Create Final**" button. This will Mosaic all the Cut_Fills and the Topo.grd into a Cut_Fill-Final.grd, make sure this is "Saved".

NOTE: Finished product here is not the map to take to the field. There will be small inclusions and dams. Suggest "Flow Smooth" or "Smooth" or "Morph" before sending to the field.

Original Topo.grd

Topo separate Cut/Fills

New-Cut_Fill-Final



Field Shaping for SD Surface - Shaping Tab

Cut / Fill Graph Tab

One of the final steps. Confirm the amount of soil to be moved. One of the final steps to be done.

Base Layer—the original “Topo.grd”

Shaped Layer—Final Topo map with all the functions ran on it.

Graph will help to visualize the amount of soil to move with the “Balance” of cut/fill.

As shown below there is a lot of extra cut available. Make sure you are not over cutting anywhere. May need to go back and make adjustments.

If everything looks good.

Click the “**Create Difference**” button

This will create a “RasterDifference.grd”

The “Base Layer.grd” (original topo) and the “RasterDifference.grd” are the two primary layers that will go out to SD Drain-Surface controller.

NOTES:

To the Right— created a fixed color table

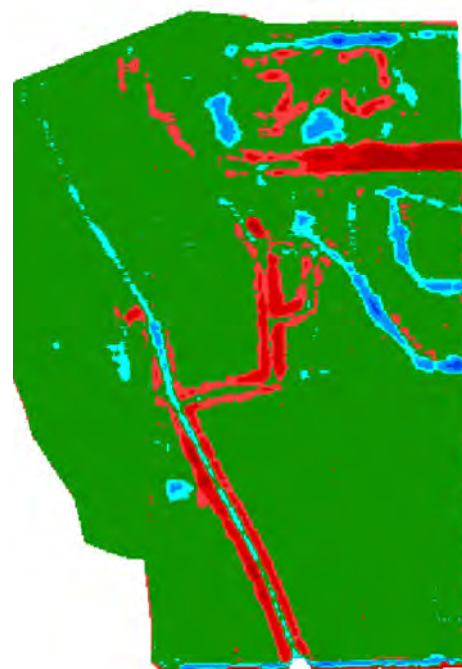
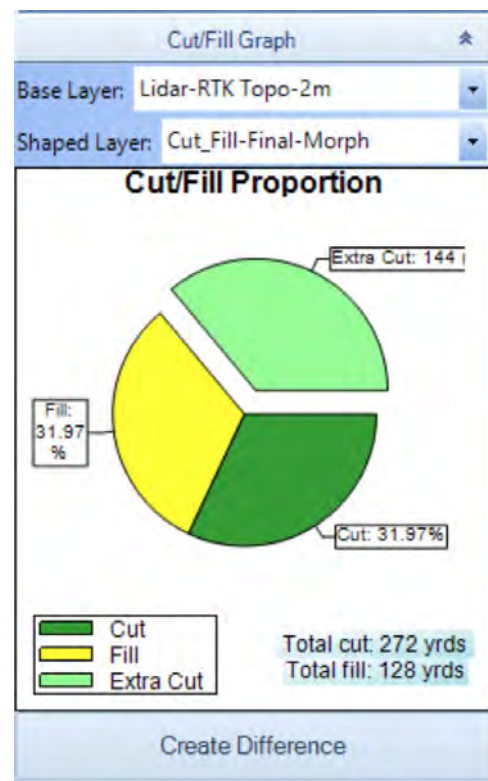
Reds = Cuts

Blues = Fills

Greens = Done

Areas being removed = Negative Values

Areas being filled = Positive Values



Field Shaping for SD Surface – Raster Tools

Area Smooth

The Selection tools are important, and to be used with many different functions. One we have not mentioned in the Surface section is a basic function of ADMS, Smoothing. To use this tool, use your Selection tools and select the area to “Smooth”, making it Cross hatched—Lime Green. .

Right click on the Topo.grd layer to be smoothed.

Go to “Raster Tools” & “Area Smooth”

Assign “Input Raster” & “Input Polygon”

Set the Number of Smooths

Neighborhood—choose 3x3 or 5x5

Check on Edge Lock or Mosaic options

Area Smooth

Input

Input Raster: Lidar-RTK Topo-2m

Input Polygon (Optional): ModArea

Smooth Count: 10

Neighborhood: 3

Lock Edge: ☐ Lock Edge Pixels

Mosaic over original: ☒ True

Output

Output Raster: Lidar-RTK Topo-2m-Area Smooth

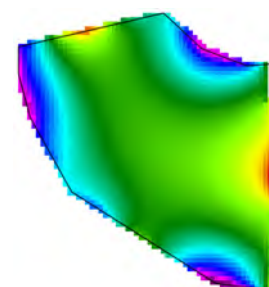
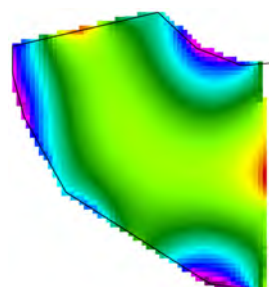
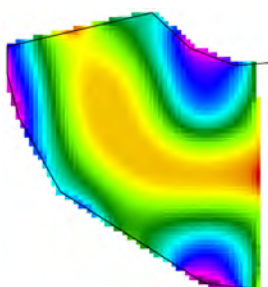
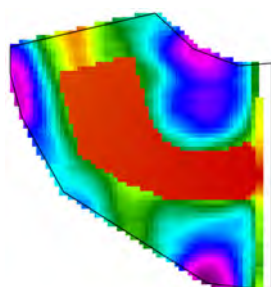
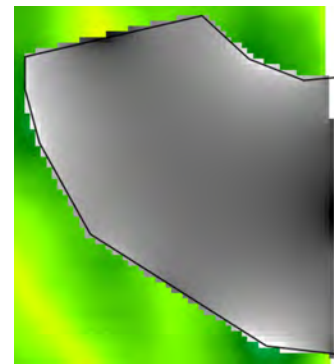
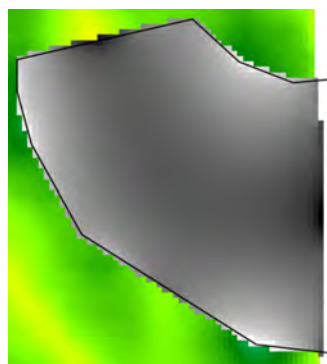
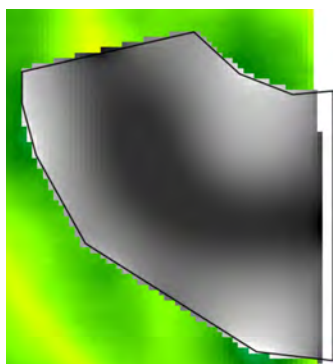
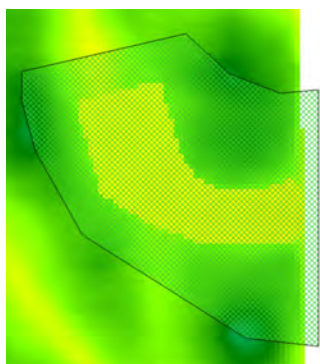
Note: For more info go to the section on “Raster Tools” & “Area Smooth”

Original

Smooth-10

Smooth-30

Smooth-60



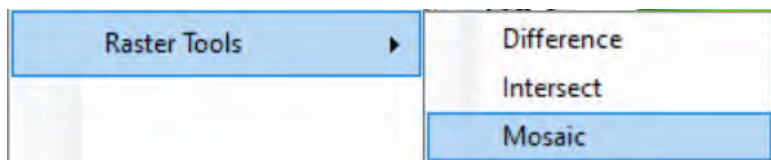
Field Shaping for SD Surface – Raster Tools

Mosaic

This tool may get used MANY times on projects. Putting together different parts of the field / process as you go along.

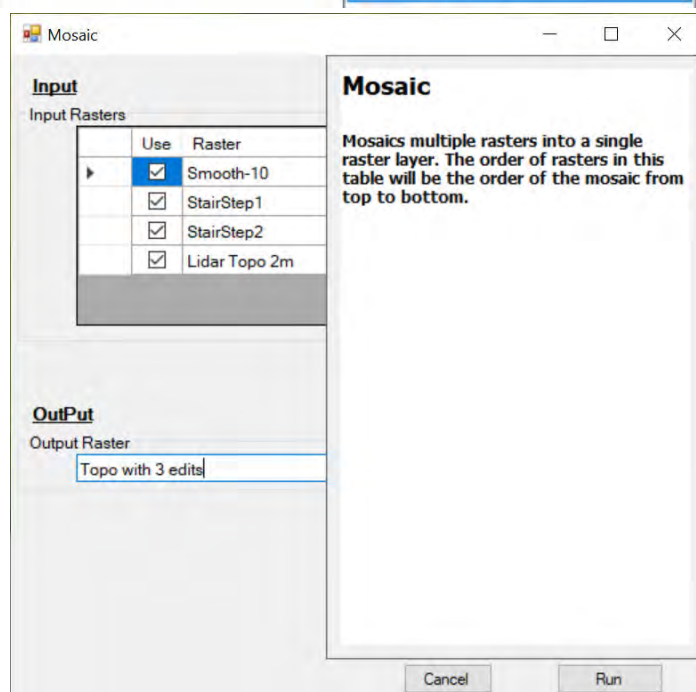
Tools that may require use of this may include—

- Build Walls
- Grade
- Stair Step
- Smooth
- Cut Hills

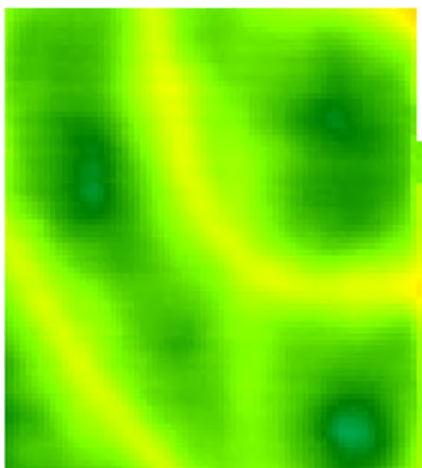


1. Clear map
2. Turn on the GRD maps to merge. Turn on Mods first, then Topo.grd last.
3. Right Click on the Topo.grd to be merged with (helps with naming)
4. Rename and Click Run

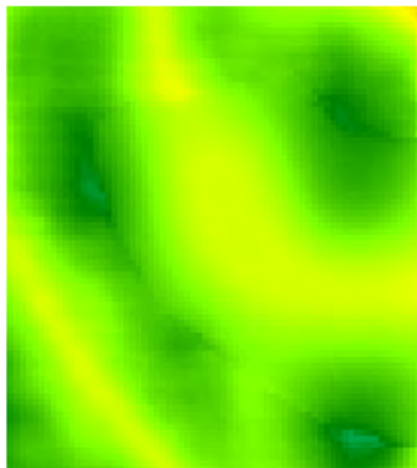
NOTE: The "Order" on "Input Rasters" is important. To change the order, click on the name in the list and drag up or down.



Original



Mod added to Ditch Bottom



Field Shaping for SD Surface

Tools on previous pages can be used in many different ways and combinations. Certain tools are “rough” tools, good starting points. Other tools are more of a “finishing” tools. Below is a bit of an idea of “Starting / Finishing” tools and some can be used as both.

Starting

- Build Walls
- Grade Button
- Ditch Button
- Stair Step Button
- Mosaic

Both

- Cut Hills
- Fuzzy Select / Poly Select / Select by Feature
- Smoothing Dropdown
- Table Tab
- Bezier Raster
- Flow Model

Finishing

- Morph
- Flow Smooth
- Compaction Fill (the last “Edit Tool” used on maps)
- Cut / Fill Graph Table (this is just a visual numbers step)
- Create Difference—is always the last step.

Final product maps may change depending on the controller. These settings and recommendations are for SD Surface.

My Notes

3D Map Window

The 3D Map function adds great perspective to visualize fields, overlay other maps and data. 3D is only a visualization function, this is not where you will do drawing and mapping. The main use is a helpful decision tool.

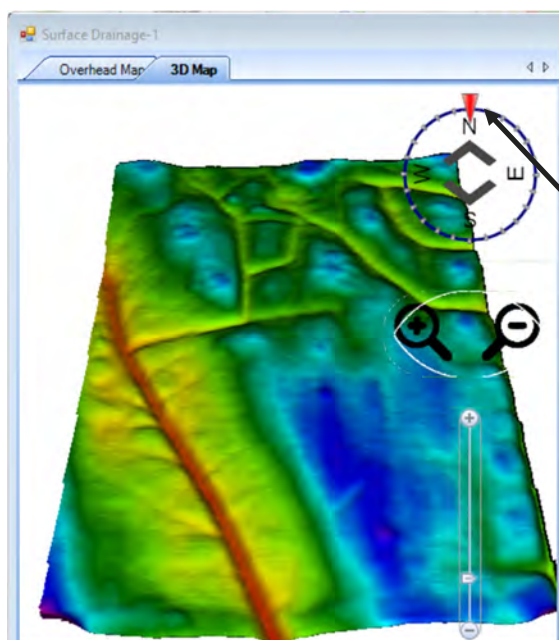


Map Window—Right Click on the “Elevation.grd” and choose “Open in 3D Window”.

Surface / Tile Drainage Windows—“Set Elevation Layer” in the “Overhead Map” tab.

1. Turn on all images or surfaces that may be helpful.
2. Turn on any “line.shp” or “line.json” files to see in 3D. If using “line.shp”, you must check “P” box to make them visible in the 3D window.
3. NOTE: Polygons and Points will not show up in the 3D window.
4. Click on to the “3D Map” tab

In the 3D window, you cannot switch profile lines to see selections or select in the 3D map area.



Tools for navigating 3D.

Pan Map—

“Left Click & Hold” over the 3D map window area, slide the map where you want to be.

“Sliding” the “Height Exaggeration” will re-center the map and view extents.

Rotation—

Rotate by “Right Click & Hold” over the 3D map area.

Rotate by “Left Click & Hold” over the Red Arrow on the “N-S Compass”.

View Angle—

Angle change by “Left Click” on the Gray up/down arrows in the “N-S Compass”.

Zoom In/Out—

Zooming can be done using your “Scroll Wheel” with mouse in the 3D Map area.

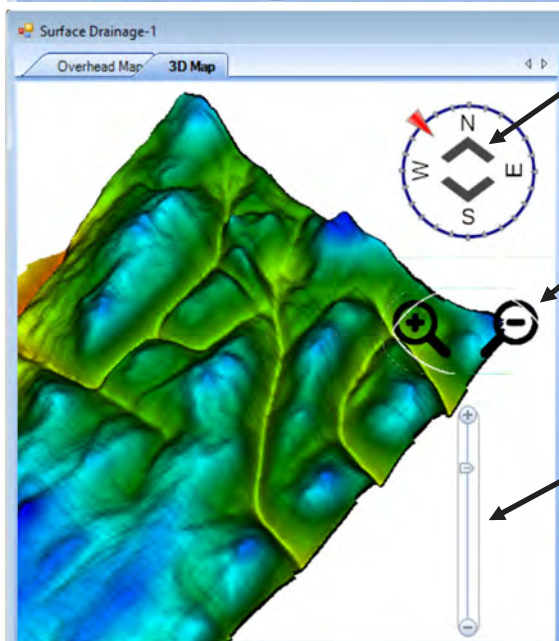
Zooming can also be done by clicking the “Magnifying Glass + / -” button.

Height Exaggeration—

Map Exaggeration can be made by moving the “+ - Slider” Up / Down.

Print from the 3D Window

Click the 3 dots, then the printer symbol to print from 3d window.



3D Map Window

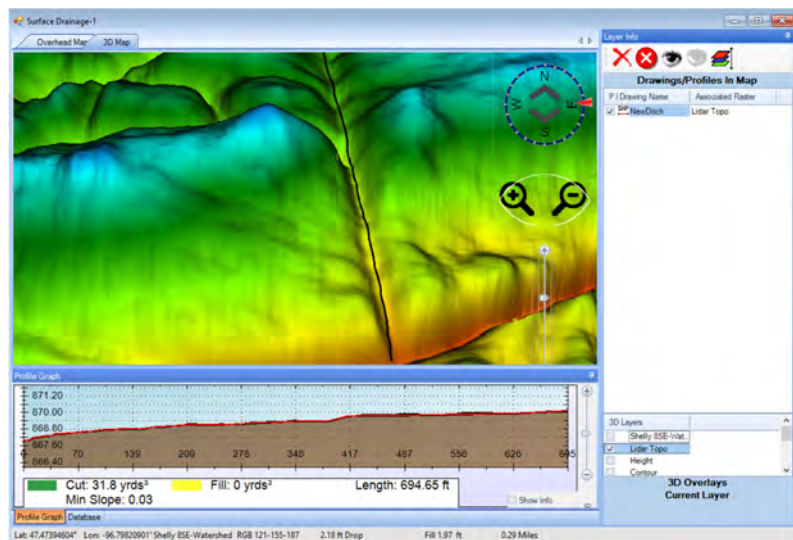
Drainage/Tile Windows "Set Elevation Layer" in the "Overhead Map" tab.



In Map Window, access the 3D window by "Right Click" on the Elevation layer in the "Field Data" tab.

Only the "Last" checked "P" Box will show, draped over the top of the 3D layer.

Note: There is no "side profile window in the Map Window. Views may be slightly different.



Tools on the right side of the map window: by clicking on different "3D Layers", you can switch the view of the 3D Map area.

Data will always be draped over the "Elevation Layer.grd" selected.

Switching the view can show many different features of a field. Turning on many layers will give a real feel for the field.

There are some Fixed items that are always in the "3D Layers" window.

-Height—uses a Rainbow color table applied to elevation.

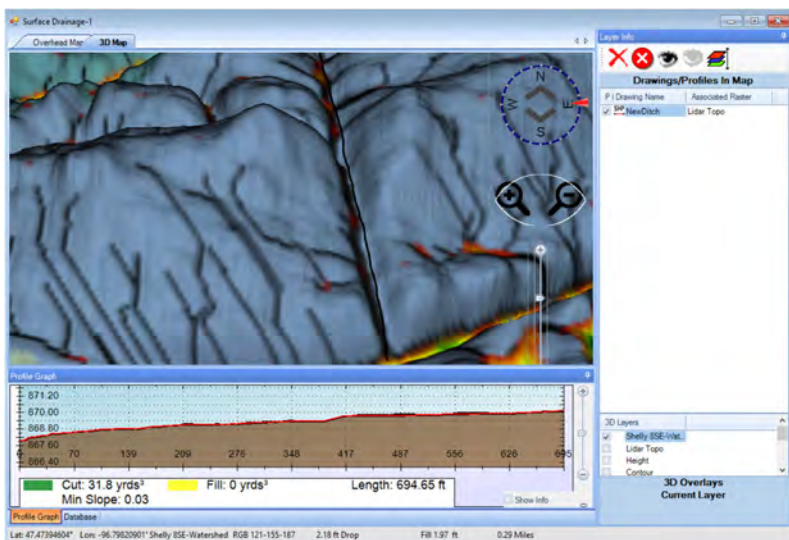
-Contour—uses a Solid green color table with red lines at a fixed spacing relative to how exaggerated the "Elevation Slider" is set.

-Slope—applies a Rainbow color table to the Slope.

-Solid—applies a Light Gray color table to the Elevation.

-BlendRampByHeight—uses a Grayscale color table on elevation

-BlendRampBySlope—uses a green to gray textured color applied to slope.



Height

Contour

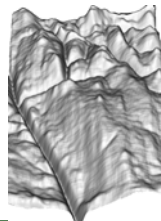
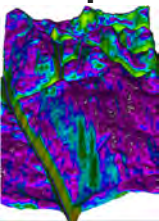
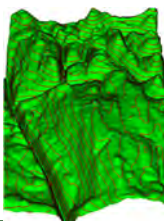
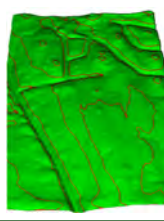
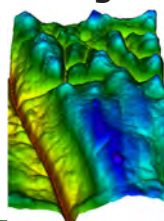
Contour

Slope

Solid

BlendByHeight

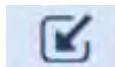
BlendBySlope



Surface Drainage - Import from SD Drain

Importing data from SD Drain—Simply click the “Import” button on the Right side of the screen.

Click the “Import” button on the right menu bar



In the “Export” from SD Drain, it will have a “GKData” folder on your USB drive.

Example - “G” Drive.

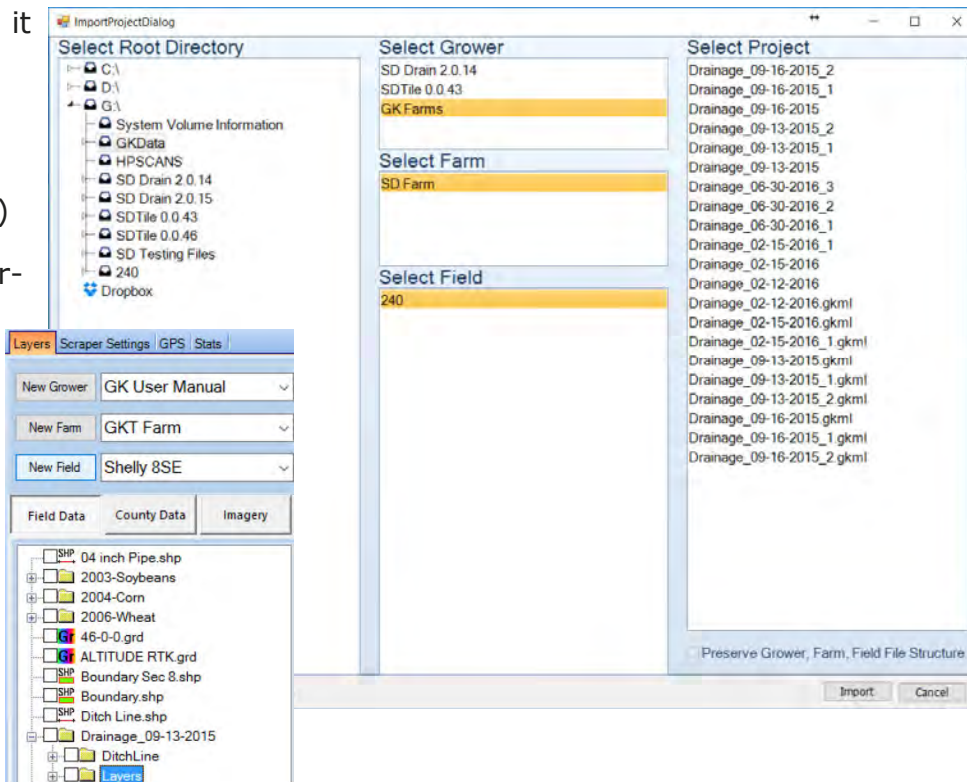
Select GKData (Root Directory)

In the Middle set of windows area, you can select the Grower / Farm / Field to import.

On the Right, select the “Project”.

Files will go into the “Field” being used in ADMS.

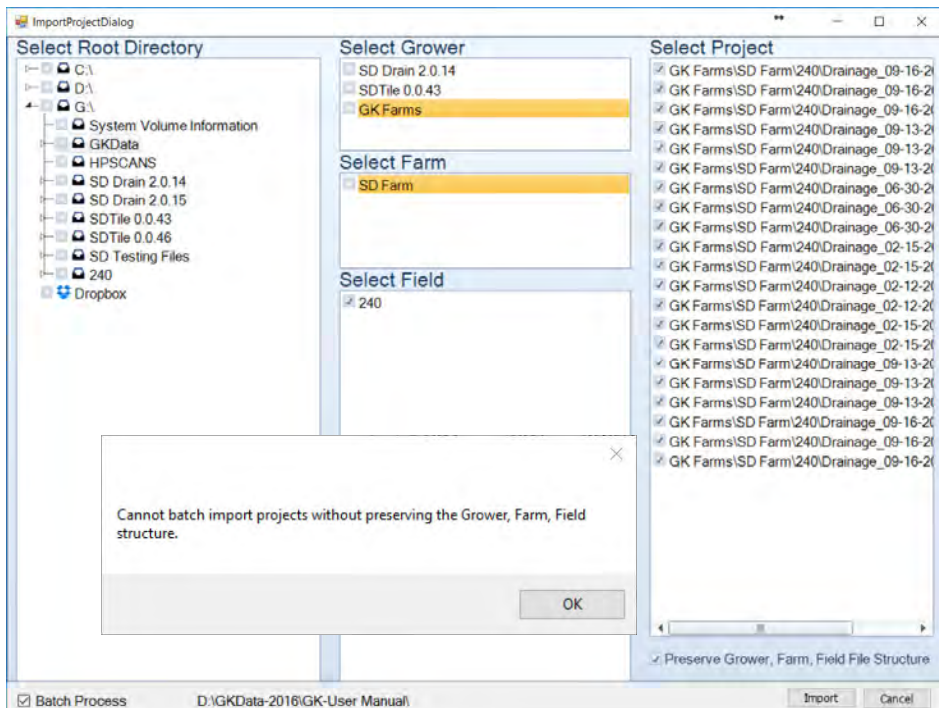
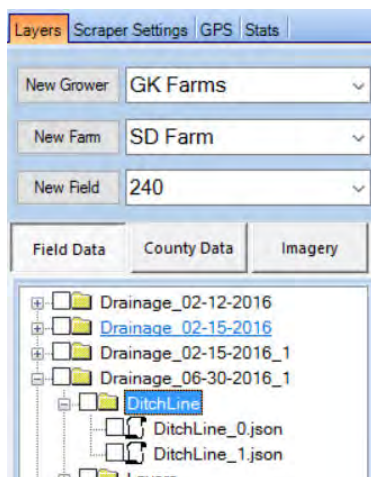
By Checking the “Preserve Grower, Farm, Field Structure”, the data will go to this location, creating this structure in ADMS.



To bring in multiple Grower, Farm, Fields or Projects, check “Batch Process”.

It will automatically choose to Preserve Grower, Farm, Field Structure.

Check on the data to import.

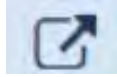


SD Drain-Ditch Export—Single Field

In "Drainage Design" - Check on all the layers to be Exported



Click the "Export" button.



Note: "P" box does NOT need to be checked for export

This process will create a (GFF) Grower/Farm/Field & Project, which will go directly into SD Ditch. In field, user will choose GFF and "Project" and layers will automatically load.

Boundary - Polygon.shp (DumpArea.shp)

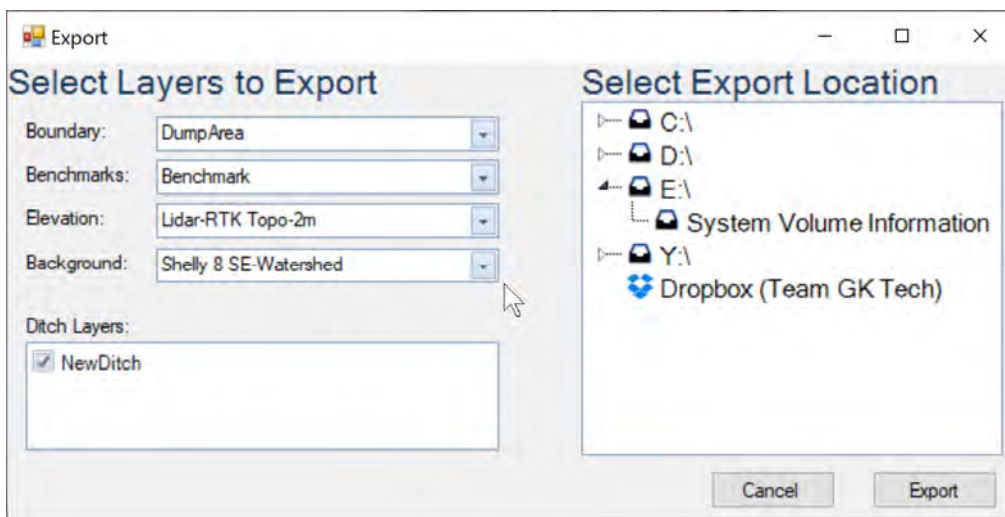
Benchmarks - Point.shp (Benchmark.shp)

Elevation - Surface.grd (Lidar-RTK Topo-2m.grd) - Less than 2mb file size

Background - Image.bmp (Shelly 8 SE-Watershed.bmp) - Less than 5mb file size

Note: Above 4 items - SD Ditch can only use 1 of each item per project startup.

Ditch Layers - Line.shp (Can export 3 "line.shp" layers)



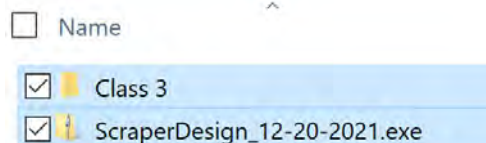
Choose "Export Location"

Click "Export" - GFF & Project structure will be created at the selected location. Done correctly!



A Self Extracting Zip file is also created. Insert USB into SD Tile control computer and double click on the "TileDesign_XDateX.exe" and it will extract to C:\GKData, creating the identical structure to your ADMS.

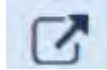
Or you can place the files using the Folder structure.



SD Drain-Tile Export—Single Field

In "Tile Design" - Check on all the layers to be Exported

Click the "Export" button.



Note: "P" box must be checked on for all the Tile Lines.



This process will create a (GFF) Grower/Farm/Field & Project, which will go directly into SD Tile. In plow user will choose GFF and the "Project" and layers will automatically load.

Boundary - Polygon.shp (Setback.shp)

Benchmarks - Point.shp (Benchmark-Lidar.shp) - Benchmark required for Plow Ready

Elevation - Surface.grd (Merged RTK-Lidar.grd) - Less than 2mb file size

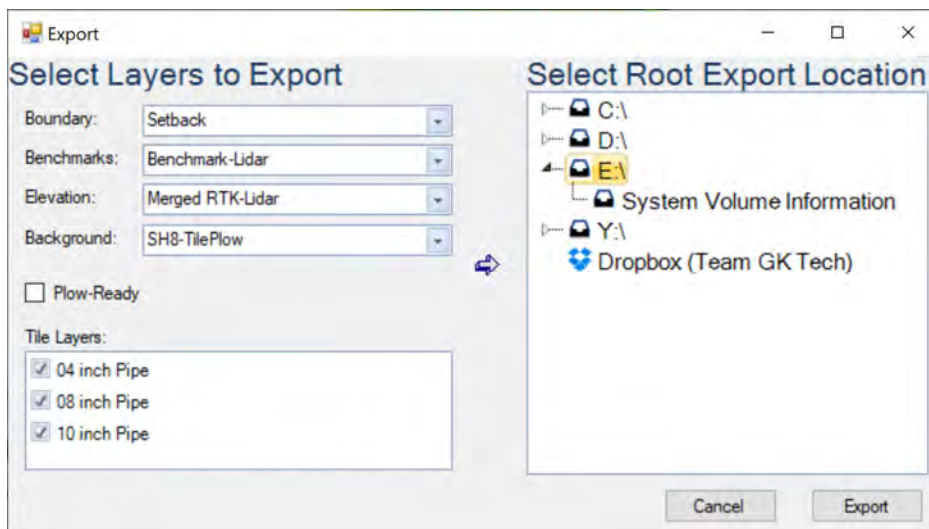
Background - Image.bmp (SH8-TilePlow.bmp) - Less than 5mb file size

Note: Above 4 items - SD Tile can only use 1 of each item per project startup.

Plow-Ready - For commercial / pro level users of SD Tile (plow both directions)

Note: may cause problems in standard version of SD Tile (don't check)

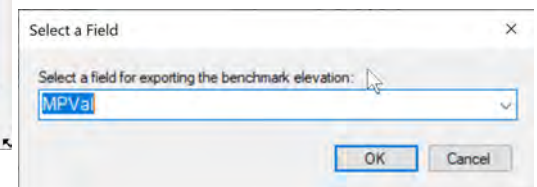
Tile Layers - Line.shp (Can only export 3 layers)



Choose the "Export Location"

NOTE:

If Exporting "Benchmark", a pop up will ask you to set the Database "Field" (column) that shows "Elevation" (ex. MPVal)



*If "Plow Ready" is checked on "Export" button reminds user.
- NOT for Standard SD Tile -*

Plow-Ready is only compatible with the commercial version of SD Tile, which allows users to plow directly from lines generated in ADMS. Are you sure you want to use Plow-Ready?

Yes

No

Click "Export" - GFF & Project structure will be created at the selected location. Done correctly!

A Self Extracting Zip file is also created. Insert USB into SD Tile control computer and double click on the "TileDesign_XDateX.exe" and it will extract to C:\GKData, creating the identical structure to your ADMS.



☐ Name

☒ Class 3

☒ TileDesign_12-20-2021.exe

SD Drain Export—Copy/Paste

Copying Data For SD Drain



The three required file types are:

- **Background Map—(BMP Files):** Layer created using the Print Map to Bitmap function in ADMS

NOTE: Background Maps, can only use one at a time in SD.

⇒ **Copy .bmp & .bpw**

Stay below 5 MB for maximum efficiency, and do not ever exceed 10 MB. For any of the file types.

- **3D Layer—(GRD Files):** Files coming from ADMS are RTK.grd or LIDAR.grd .

⇒ Recommend to clip the elevation layer to the field and not import a larger area into SDDrain and "Crop NULL Value" in ADMS before exporting or moving

⇒ **Copy .grd & .gdw & .COL_TAB**

Suggest using 2m or 3m .grd files, preview in ADMS before export.

- **SHP Files:** This file will be items like ditch lines, tile lines, boundary, watershed polygons, lift station point & benchmark points.

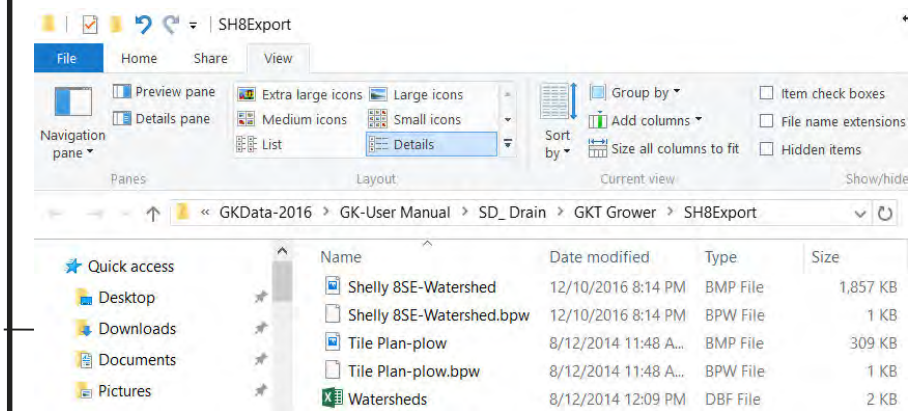
⇒ **Copy .shp & .shx & .dbf & .GKT_VAF**

Example Files to Move

04 inch Pipe.dbf
04 inch Pipe.GKT_VAF
04 inch Pipe.shp
04 inch Pipe.shx
06 inch Main.dbf
06 inch Main.GKT_VAF
06 inch Main.shp
06 inch Main.shx
08 inch Main.dbf
08 inch Main.GKT_VAF
08 inch Main.shp
08 inch Main.shx
Benchmark.dbf
Benchmark.GKT_VAF
Benchmark.shp
Benchmark.shx
Boundary.dbf
Boundary.GKT_VAF
Boundary.shp
Boundary.shx
Ditch Line.dbf
Ditch Line.GKT_VAF
Ditch Line.shp
Ditch Line.shx
Lift Station.dbf
Lift Station.GKT_VAF
Lift Station.shp
Lift Station.shx
Merged RTK-Lidar.COL_TAB
Merged RTK-Lidar.gdw
Merged RTK-Lidar.grd
Norman NAIP 2013.tfw
Norman NAIP 2013.tif
Shelly 8SE-Watershed.bmp
Shelly 8SE-Watershed.bpw
Tile Plan-plow.bmp
Tile Plan-plow.bpw
Watersheds.dbf
Watersheds.GKT_VAF
Watersheds.shp
Watersheds.shx

To view the files size:

- ADMS—Bottom of the Data Tree. "Explore this Folder"
- In File Explorer set "View" tab to "Details"

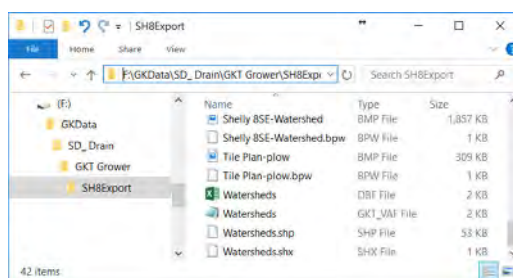
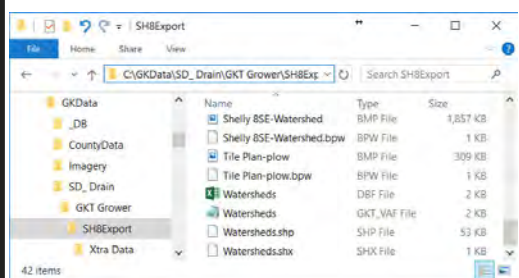


File Structure.—Should have FULL Grower/Farm/Field folder structure.

- Suggest moving across only files needed.

C:\GKData

USB GKData



SD Drain Export—Copy/Paste

XtraData—File Cleanup

1. Create new folder in data tree named **"XtraData"**
2. Drag files not needed in SD Drain to **"XtraData"** folder
3. Suggest keeping Tile or Ditch lines, Benchmarks, Boundaries, Watersheds shape files
4. Topo.grd, bmp background images
5. In ADMS—"Drag & Drop" all the files & folders you do not need into "XtraData" folder



6. Go to "Explore this Folder"

7. On your USB Create **"Files for SD Drain"** folder open this folder

8. Create **"XXGrowerXX"** folder and open this folder

9. Create **"XXFarmXX"** folder and open this folder

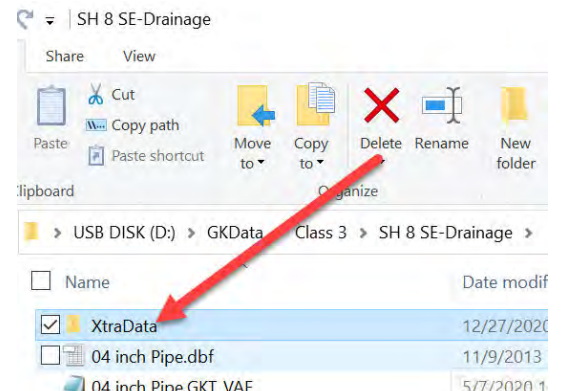
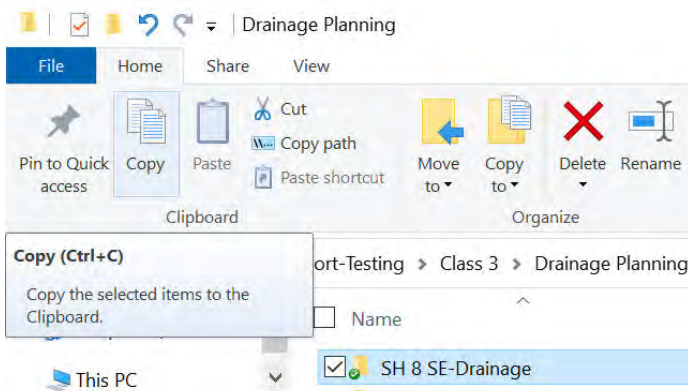
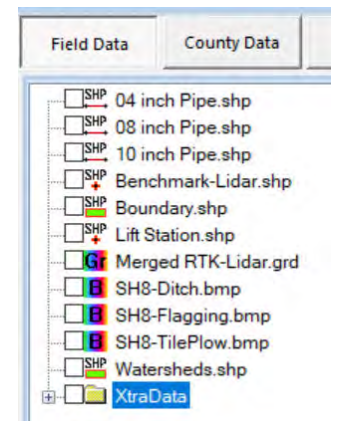
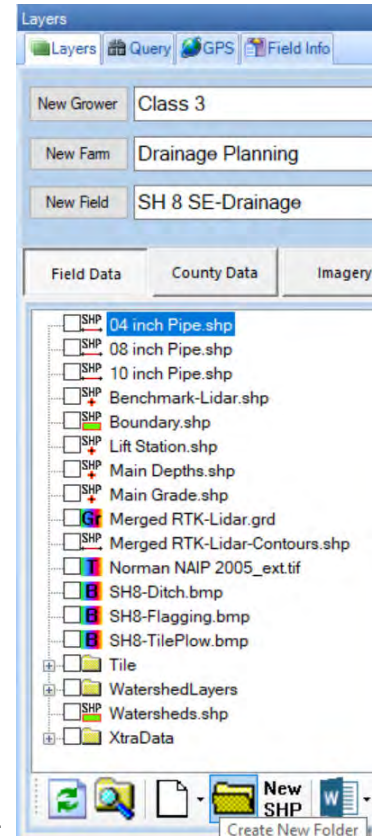
10. Paste your **"XXFieldXX"** here.

11. Open this folder and delete the **"XtraData"** folder

12. On your SD Drain control computer copy the **"XXGrowerXX"**

13. Open file explorer go to Windows C: GKData and paste

14. You are now ready to hit the field with SD Drain Ditch or Tile

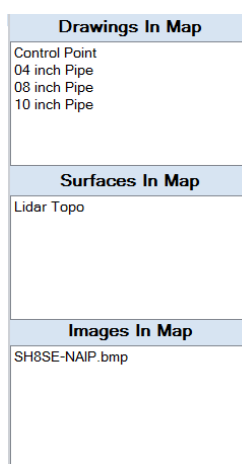
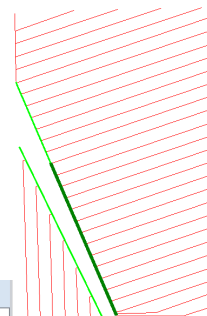
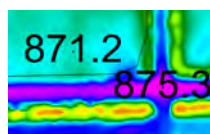


ADMS to AMW-AGPS-GeoLogic Export

Introduction: These instructions will walk you through sending complete plans out to AGPS controller. These files will allow you to utilize Control Points, Background Images, Steering & "PTL". The information below requires that you have collected / created the following.

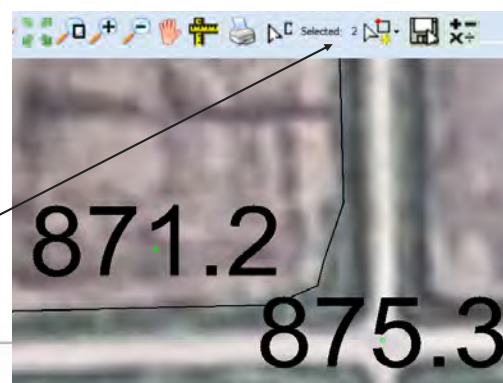


- Control Points or Points file that contains Control Points.
- Tile plan (4"-8"-10" & so on) created that is projected to match Control Points
- Lidar.grd or RTK Topo.grd used to create the Tile Plan projected to match Control Points
- "Print Map to Bitmap" - BMP / BPW created to work with plan



Exporting data to AGPS:

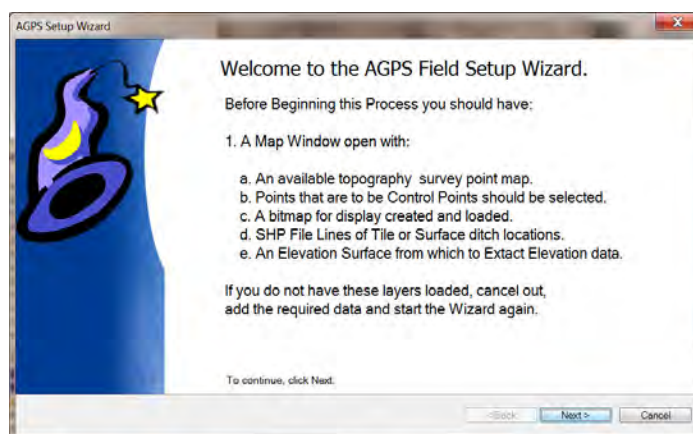
1. Open "Map Window"
 2. Turn on all "Drawing / Surfaces / Images" to be exported, this would include the "Topography.grd" that was used for design
 3. Open the "Points.shp" that CONTAINS the Control Points
 4. "Select" all the "Control Points" for this field / project (example —2 control points)
 5. Menu Bar—Export—"AGPS Setup Files"
- This will open the "AGPS Setup Wizard"



Instructions on this page will tell you what to do.

The next couple pages of the book are "step by step" instructions with "Notes" & "Suggestions"

Click "Next"



ADMS to AMW-AGPS-GeoLogic Export



6. Choose the "Drawing Layer" that contains "Control Point"
 - Assign the Database Column
 - Latitude
 - Longitude
 - Altitude
 - Choose the Coordinate System of the "Tile Plow" AGPS PC

Click "Next"

7. Under the "Description", Name or Describe each Control Point. Make it something meaningful to the Tile Plow Operator.

Note: these were your "Selected Points"

Click "Next"

8. From the drop down list select the "Print Map to Bitmap" background image.

Suggestion : If you are using "Steering Lines" or loading all the "Tile Lines" - DO NOT do a BMP with tile lines on it. Suggest using BMP WITH Control Points and Labels as shown.

Click "Next"

NOTE: if the tile line are drawn beyond the edge of xxx.grd layer the export will error out.

AGPS Setup Wizard
Set a Control Point
 From a loaded Topo Dataset or Quick Mark set a control Point for this field.

Control Point from the Active Map Window

Drawing Layer: Control Point

Latitude: 47.46982956
 Longitude: -96.79396057
 Altitude: 875.331482

Desired Output Coordinate System

☐ Meters
☒ International Feet
☐ US Survey Feet

17,256,350.48 2,185,613.87 875.33

< Back Next > Cancel

AGPS Setup Wizard
Control Point Naming
 Add a point for each of the control points selected.

Name	Northing	Easting	Altitude	Description
Point-1	17256350.48	2185613.87	875.33	Road Intersection
Point-0	17256431.02	2185611.49	871.23	NONE GIVEN

< Back Next > Cancel

AGPS Setup Wizard
Select a Background Map
 Select a Map layer to display as background map in the AGPS Display.

Image Layer for Background Map: User Manual\GKT Farm\Topo\PrintSh8SE-NAMP.bmp

< Back Next > Cancel



ADMS to AMW-AGPS-GeoLogic Export



9. Check on the tile lines you want exported and assign color for the "Tile"

Suggest: Looking at tile lines in the software and matching colors as close as possible. May be slightly different due to limited color "Names".

Click "Next"

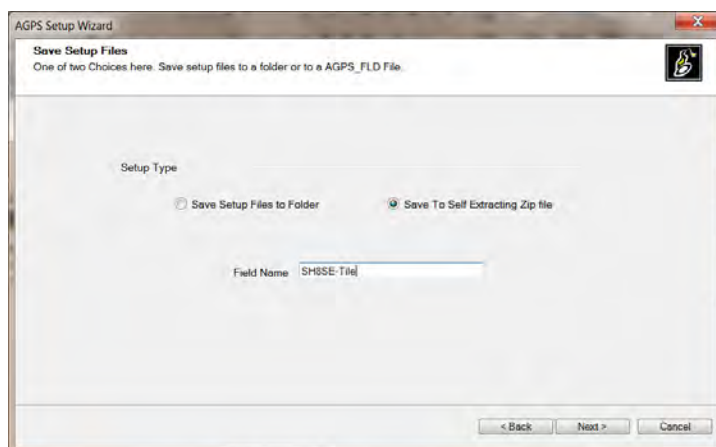
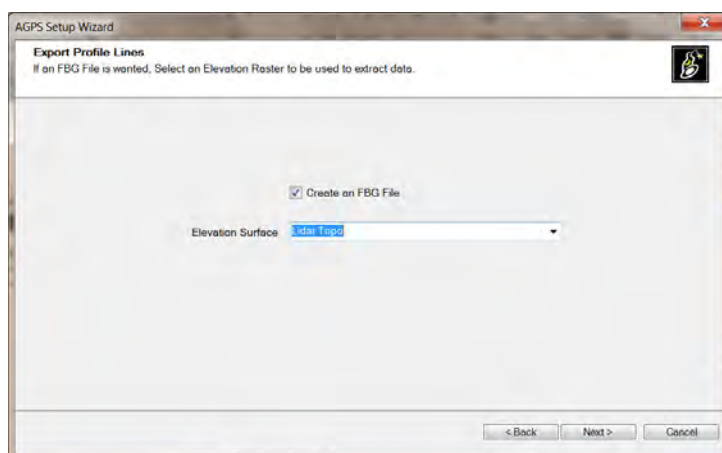
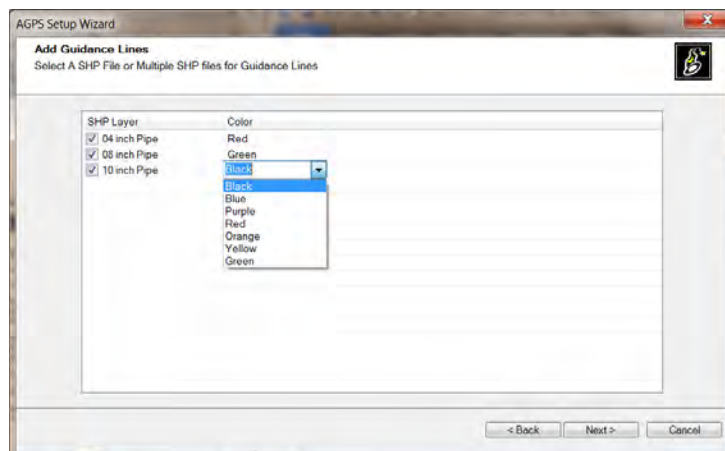
10. Choose the Surface.grd that you used in the "Drainage Planning" window to create your "Profile Lines" and tile design.
- Checking the "Create an FBG File" will create a file for AGPS which will allow PTL.

Note: These elevations will be created based off the intersection of the tile.shp with the xxx.grd no other elevations will be exported.

Click "Next"

11. Choose "HOW" you want the files saved and assign "Field Name" (Name they will see on AGPS)
- Choosing "Save Setup Files to Folder" will put all the AGPS compatible files into a folder at your set location.
 - **SUGGESTED:** Choosing "Save To Self Extracting Zip file" will put all the files in an xxxx.exe file that will automatically put all the files into the C:/amw/data folder on AGPS-PC.

Click "Next"



ADMS to AMW-AGPS-GeoLogic Export



12. Choose a folder to put these files into.

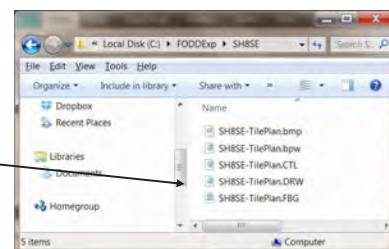
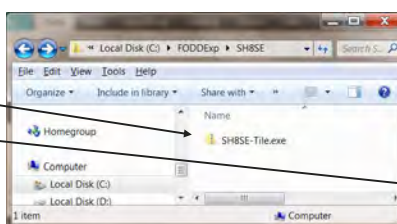
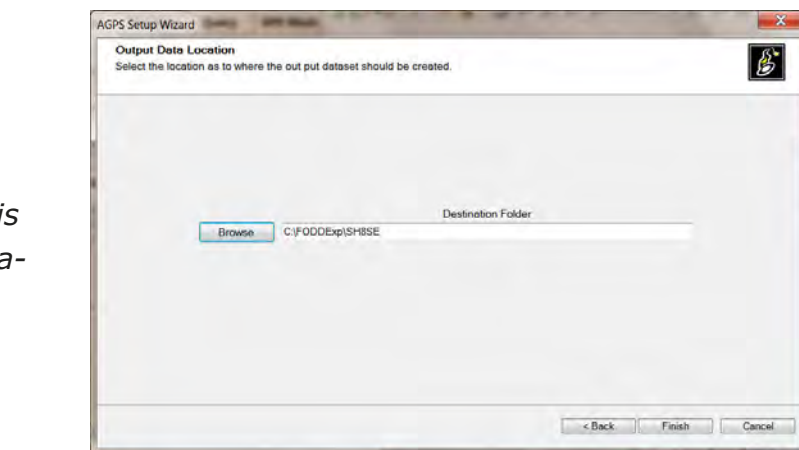
*Consider sending the files back to the Default C:FODDExp & create a "New Folder" named the "Field Name"
Note: This folder must be "EMPTY" this process will not work if there is any data in the folder.*

Click "Finish"

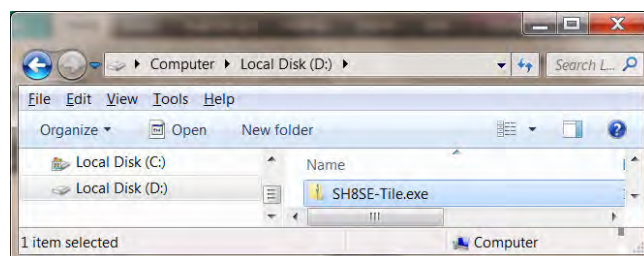
You will get files similar to **ONE** of these

Left = Self Extracting

Right = Files to Folder

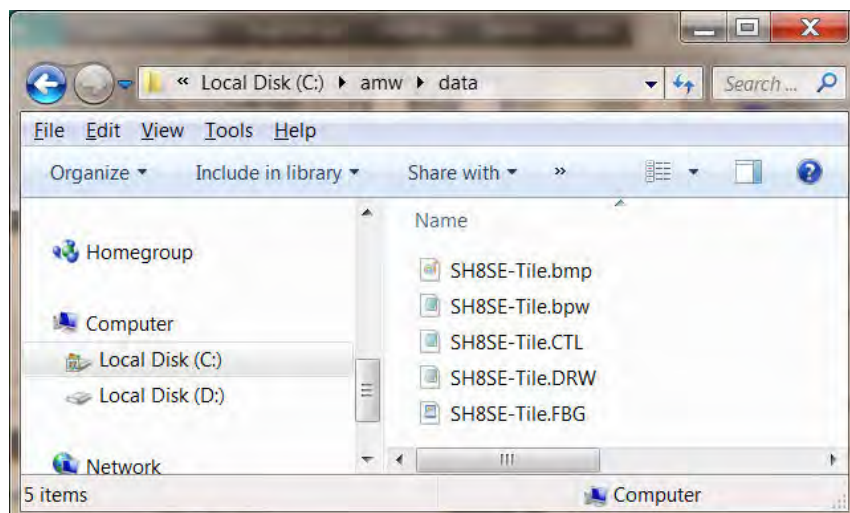


13. Copy the xxxx.exe or the files over to a USB device to take to the tile plow.



Using files in the Tile Plow:

1. Insert USB
2. Double Click on the xxxx.exe file
3. All the files are now created in the C:/amw/data folder



Processing Yield Data

As we make our transformation from a package specifically designed for drainage maps, we will be counting on help from some external tools to extract from proprietary data sources and filter data.

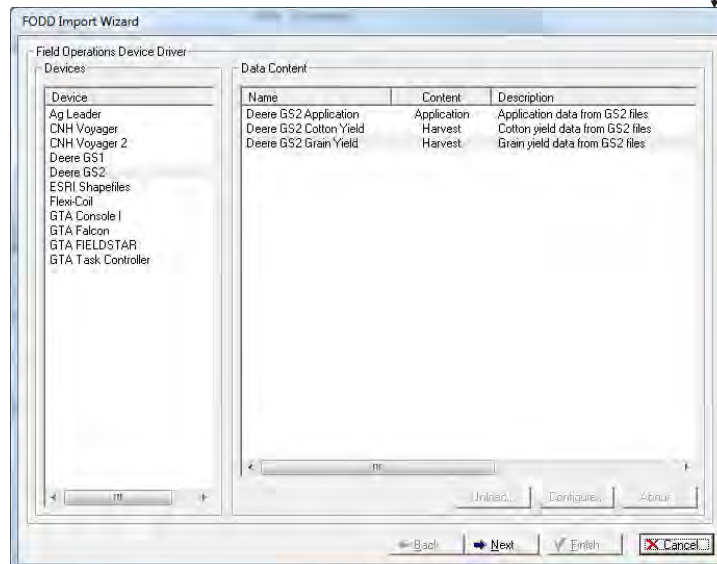
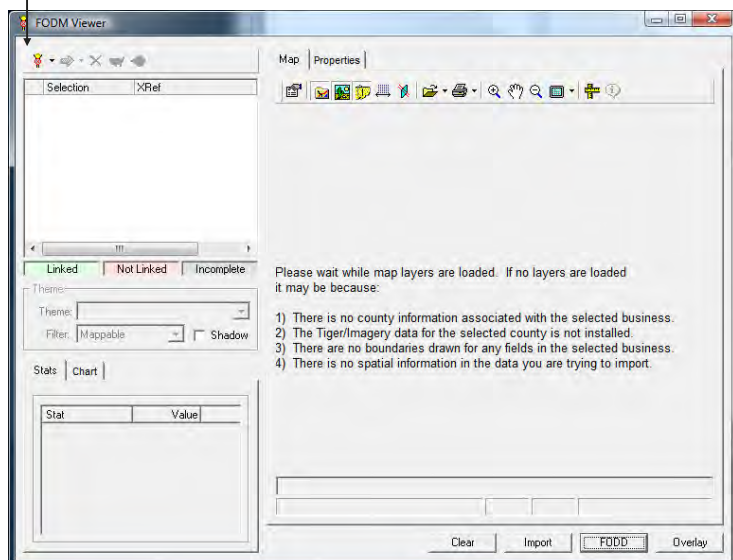
Though this arrangement may seem clumsy, it is the process we have used in house to create yield maps for quite some time.

The tools we will be using to access data from John Deere Greenstar 1&2 systems, the original **Ag Leader YLD** as well as Insight data, and Case Voyager data, is the **FO-Viewer** tool from **Mapshots** that is installed with the **FODD Runtime**.

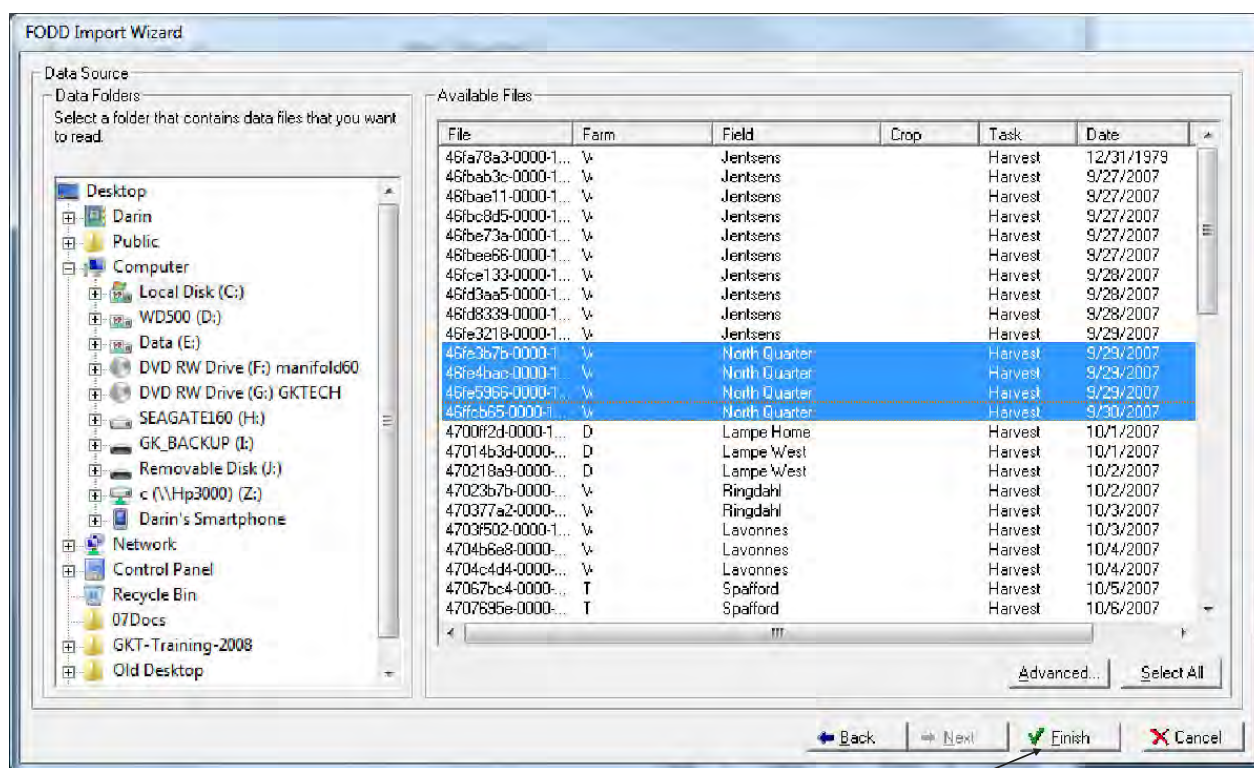
In **Ag Data Mapping Solution** you can start FOViewer if it is installed by clicking **Import Yield & Launch FOViewer**.

FOViewer will startup in the "Device Selection" menu ready to import data. That will bring up the box below right that will show a list of devices from which data can be read. Highlight the device type you wish to read from and the type of data you wish to read, for example Deere GS2 and Deere GS2 Grain Yield, then click **"Next"**.

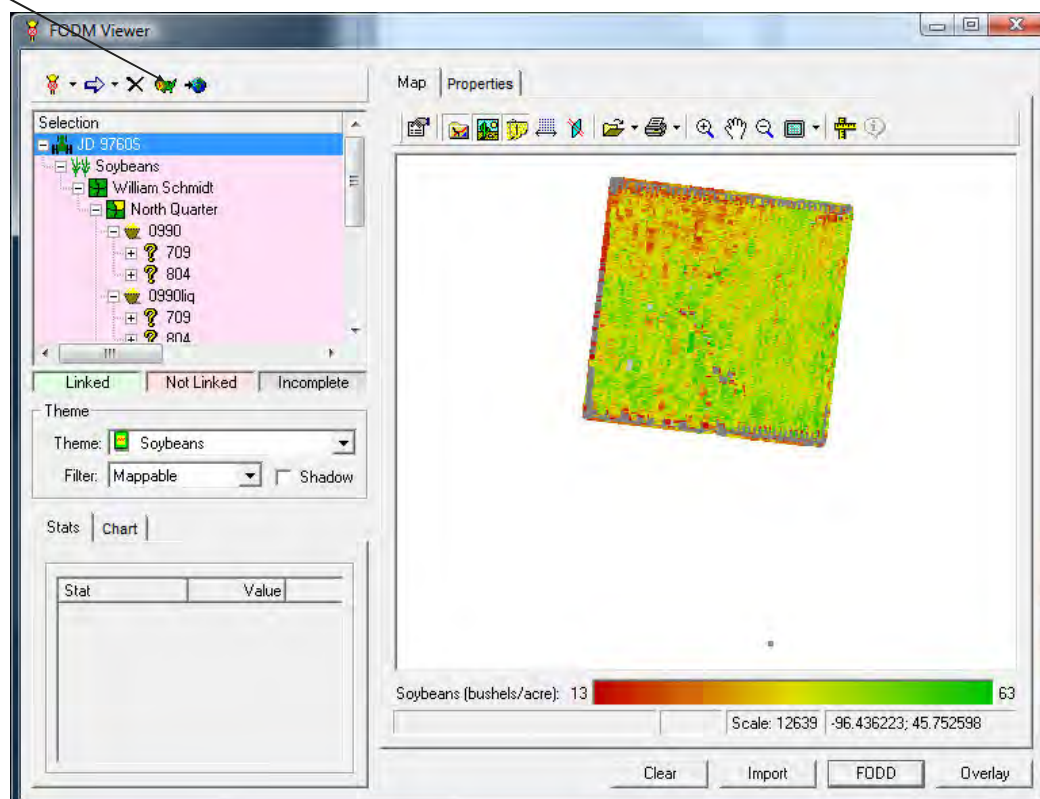
If you need to re-access the "Device Selection" menu, click the arrow to dropdown a menu.



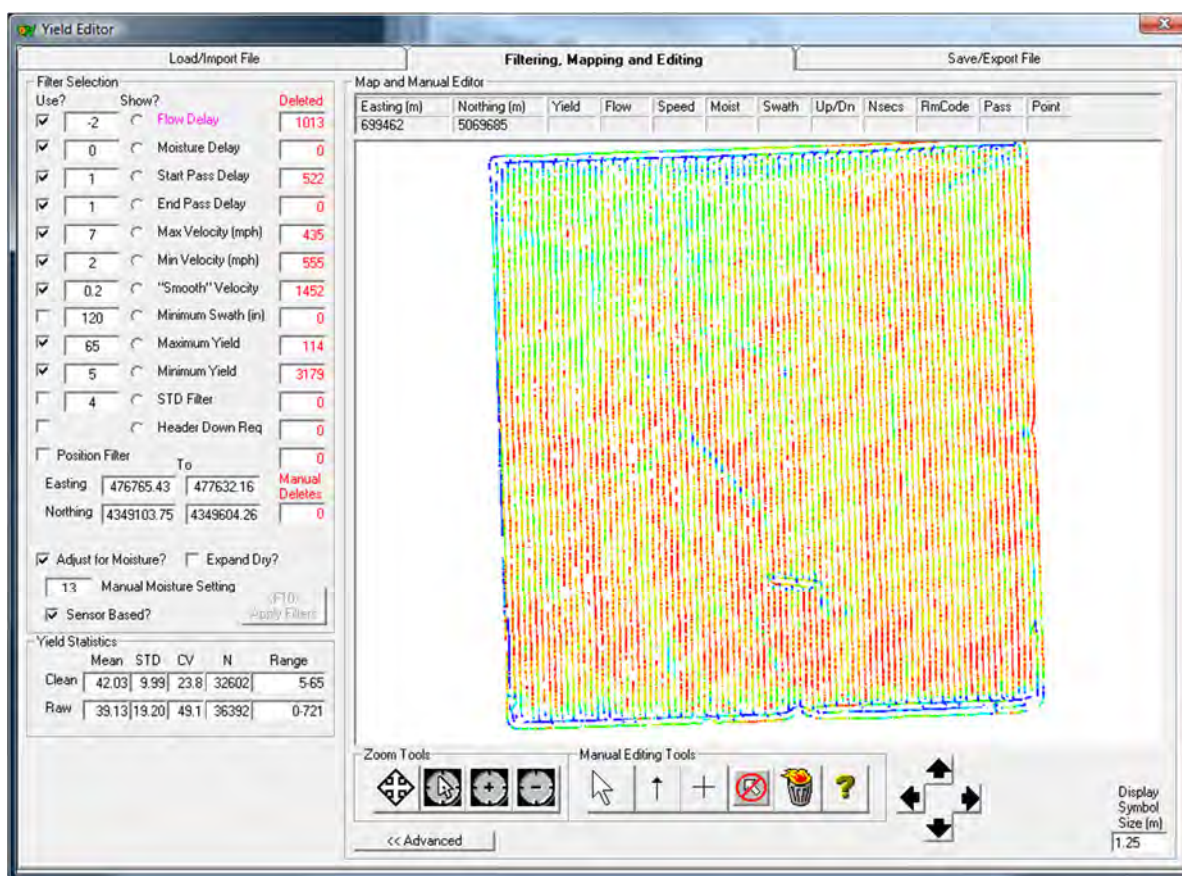
Processing Yield Data



The Farm has been intentionally blocked out, but you can see that a field called North Quarter has been selected for processing. Click **Finish** to bring up the data. Then click the **USA icon** to open the field in Yield Editor.

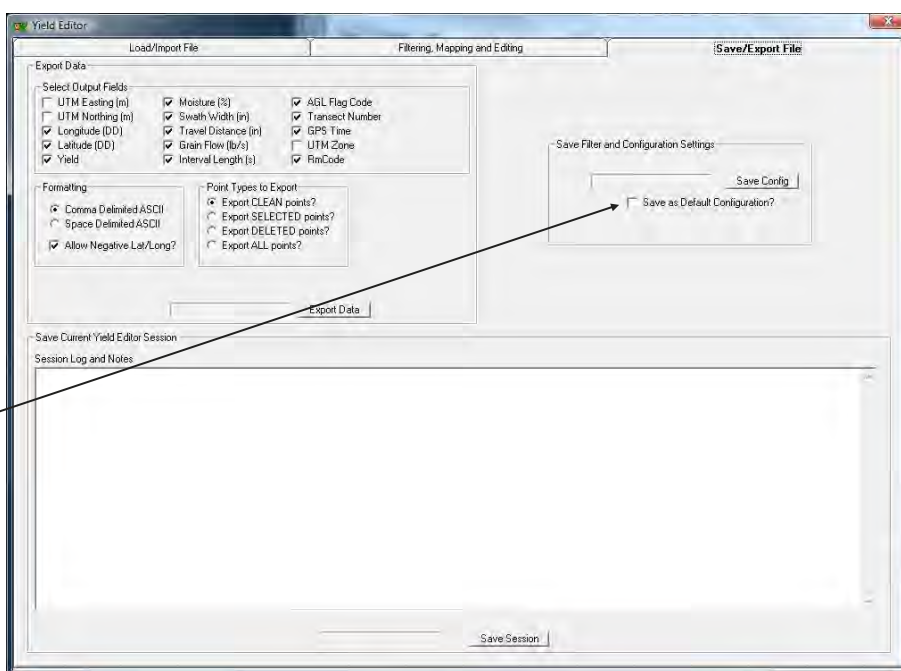


Processing Yield Data



You can see above we have used the Yield Editor Utilities to clean nearly 4000 errant points from the yield data set. And we have adjusted the flow delay by two seconds to precisely align a ditch crossing in the data.

The last step is to export the data to a field folder in Ag Data Mapping Solution. To the right are the proper settings to create the CSV that Ag Data Mapping Solution is expecting. All Output fields except the UTM fields should be selected. After setting the export options as they are shown to the right, check the box labeled **"Save as Default Configuration?"** and then click **"Save Config."**



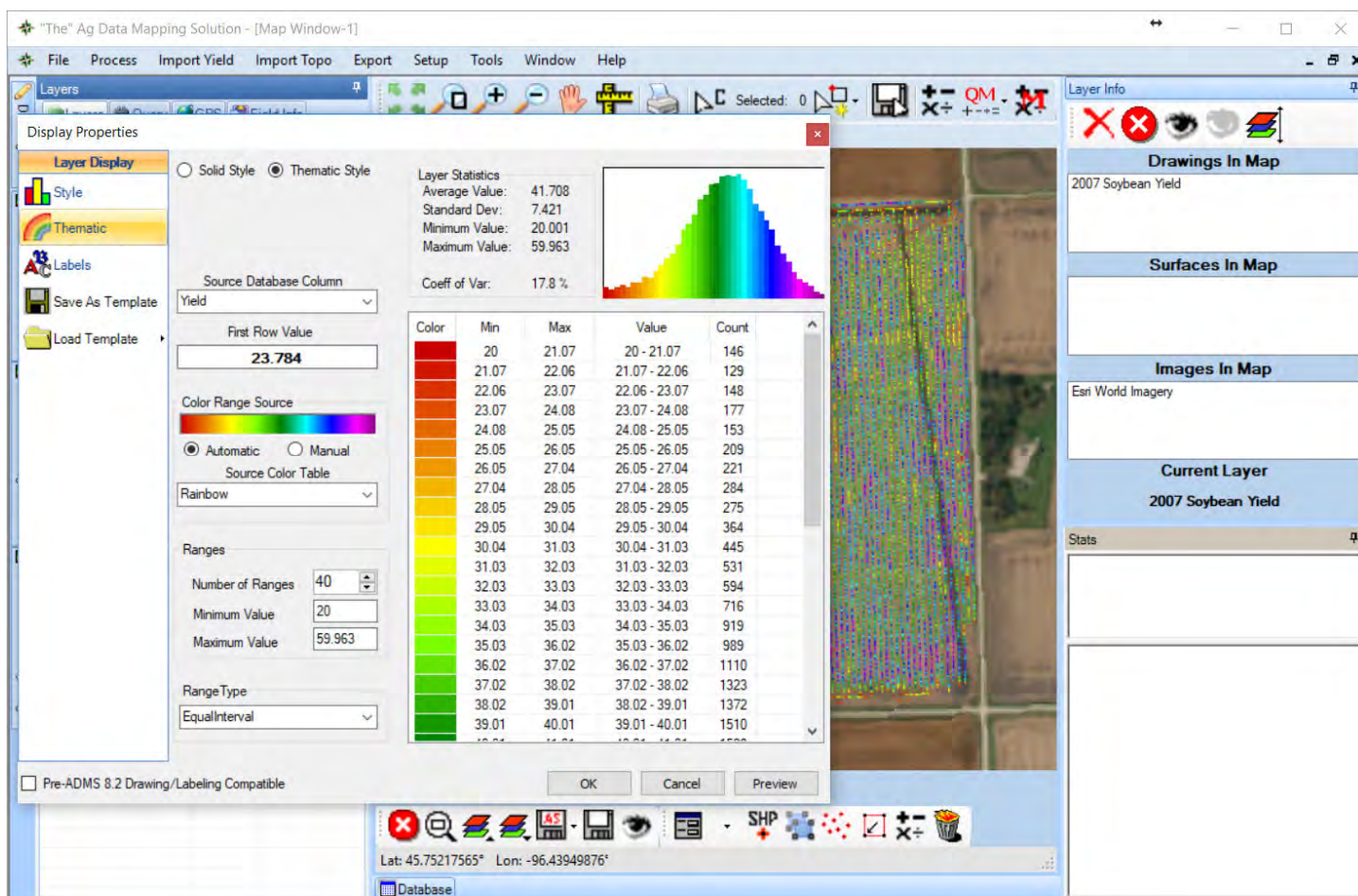
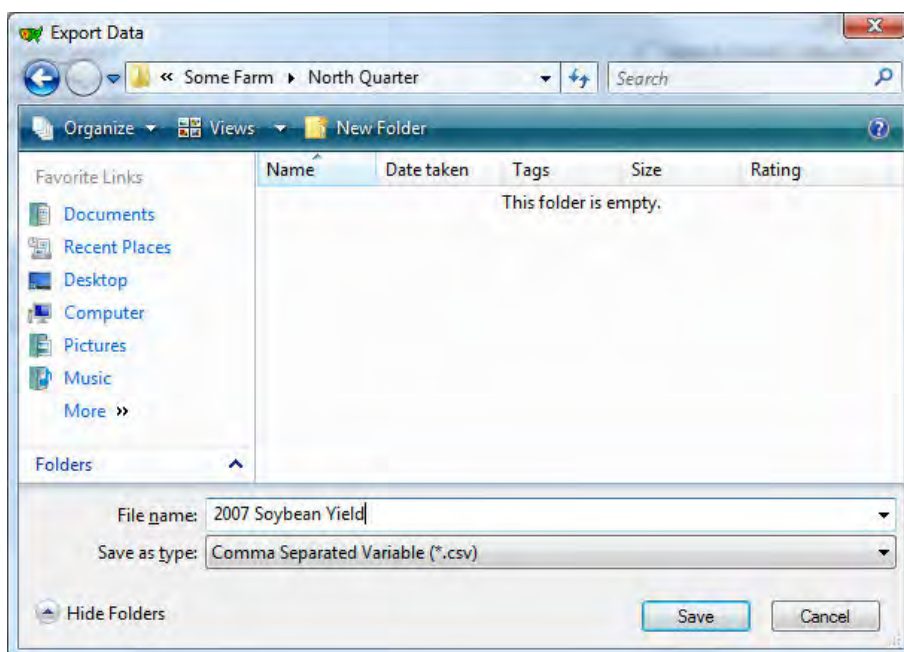
Processing Yield Data

Browse to the proper field folder for the data and click **"Save"**.

You now have a properly cleaned yield data set that you can use, bring up in Ag Data Mapping Solution and set a thematic color table for displaying points.

Go to "Display Properties"

Click on "Thematic"



Importing KB/GK Yield Data

First Step— Open ADMS 32 bit, then go to the Harvester Display with a USB drive.

Turn on the BYM PC and go to **"Windows File Explorer"** or **"My Computer"**

Go to the **"C:/"** drive

Right click on the **"GKYield"** folder & **"Copy"**

Go to your **"Removable Drive"** & **"Paste"**

Second Step—Go back to your Office PC

Open the GK desktop software **Ag Data Mapping Solutions (ADMS)**

In the processing of the Beet / Potato Yield data, we will be using 2 software packages. Though this arrangement may seem clumsy, the tools supplied in the Yield Editor will allow us to quickly process & clean up Beet & Potato Yield data.

In **ADMS**, go to **"Import Yield"** & **"GK Truck Crop Yield Data"**

- Select the **"Grower"** & **"Farm"** to work with.

SUGGEST—Creating a NEW FARM "BeetYield-Year"

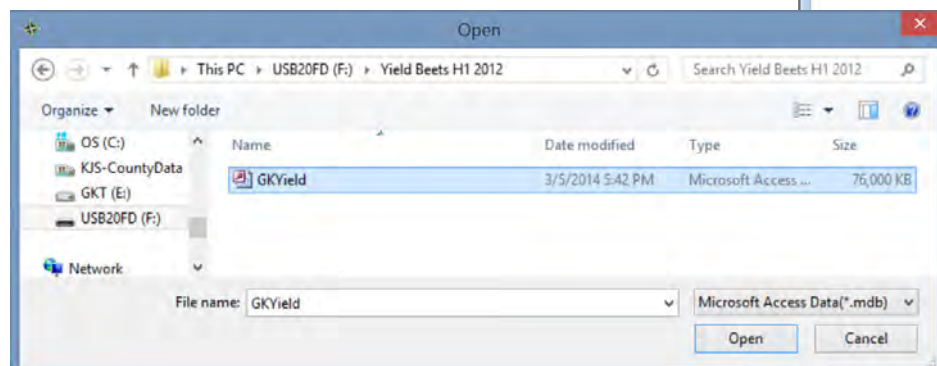
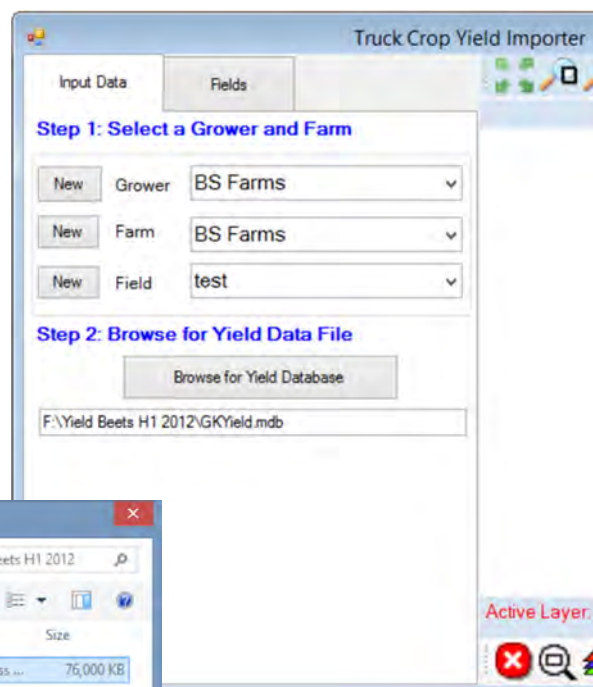
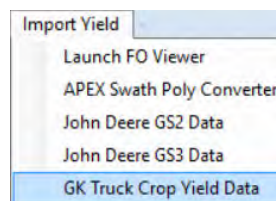
*** NOTE: The "Field" does not matter, the software will create "NEW" field names, based off the names used in the Beet Yield Monitor PC.*

- Click **"Browse for Yield Database"**

- Browse out to the **"Removable Drive"**

- Select the **"GKYield.mdb"**

- Click **"Open"**



Importing KB/GK Yield Data

Click on the **"Fields"** tab

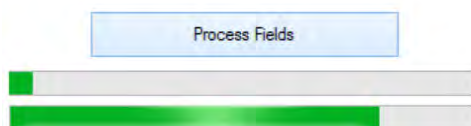
Left click and **"check"** to fields to be imported

Or

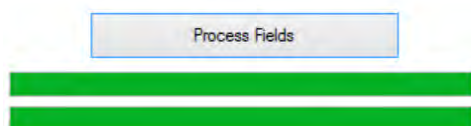
Right click for other section options

Once selected—Click **"Process Fields"**

While processing the **"Progress"** bars will show how far through the process the software is.



When **"Finished"** both bars will be **"GREEN"**

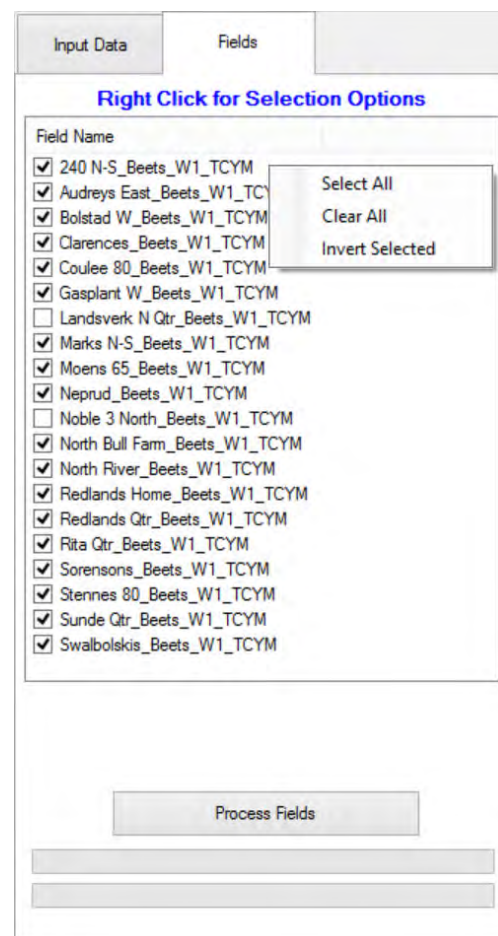


Now **"Close"** the **"Truck Crop Importer"** window.



Back at the **"Start Screen"** in **"ADMS"**

Click the **"Map Window"** button



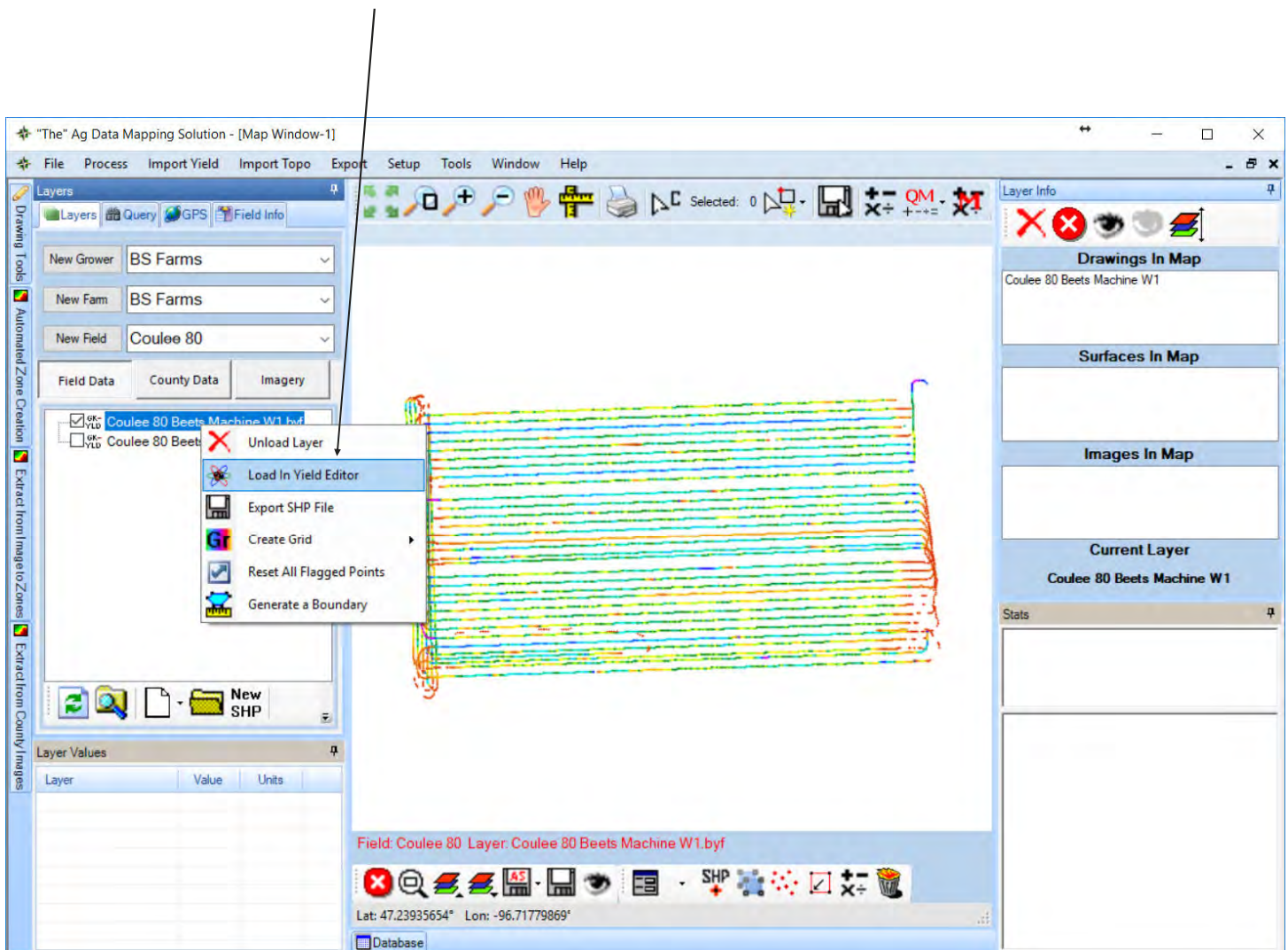
Importing KB/GK Yield Data

In **"Map Window"** select the "Grower / Farm / Field" to work with.

Check on the GK-YLD—.byf file

"Right" click on the "byf-File Name"

Choose Load in "Yield Editor"



Importing KB/GK Yield Data

This will open you into "Yield Editor"; an excellent tool for cleaning up yield data. Upon the first use, you may need to add "Beets" to the Crop list.

⇒ Under the "Load/Import Files" tab

⇒ Check the "Edit Table ?"

⇒ Fill in "Crop Type" = "Beets"

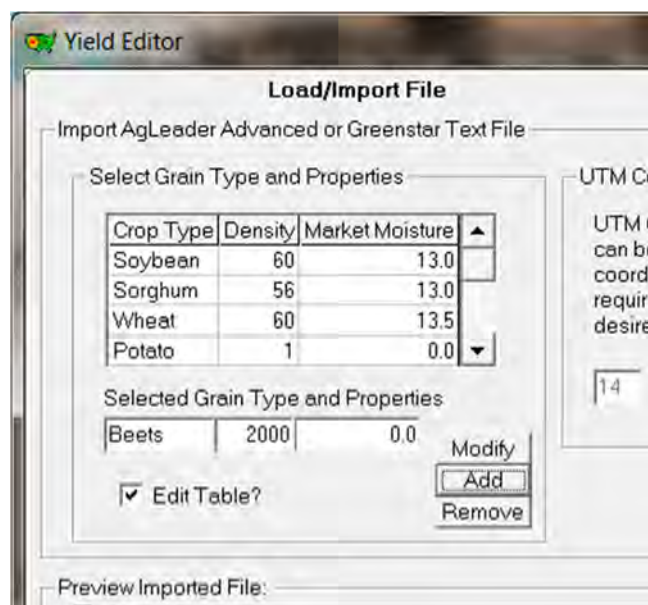
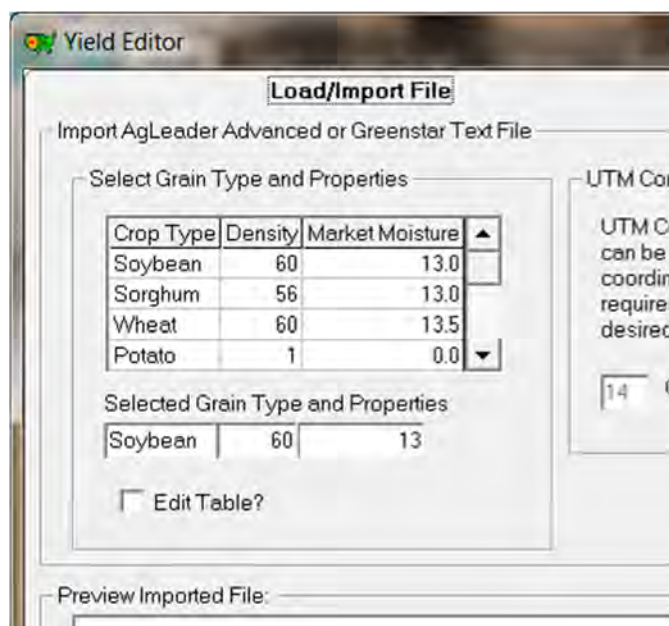
"Density" = "2000"

"Market Moisture" = "0"

Click "Add"

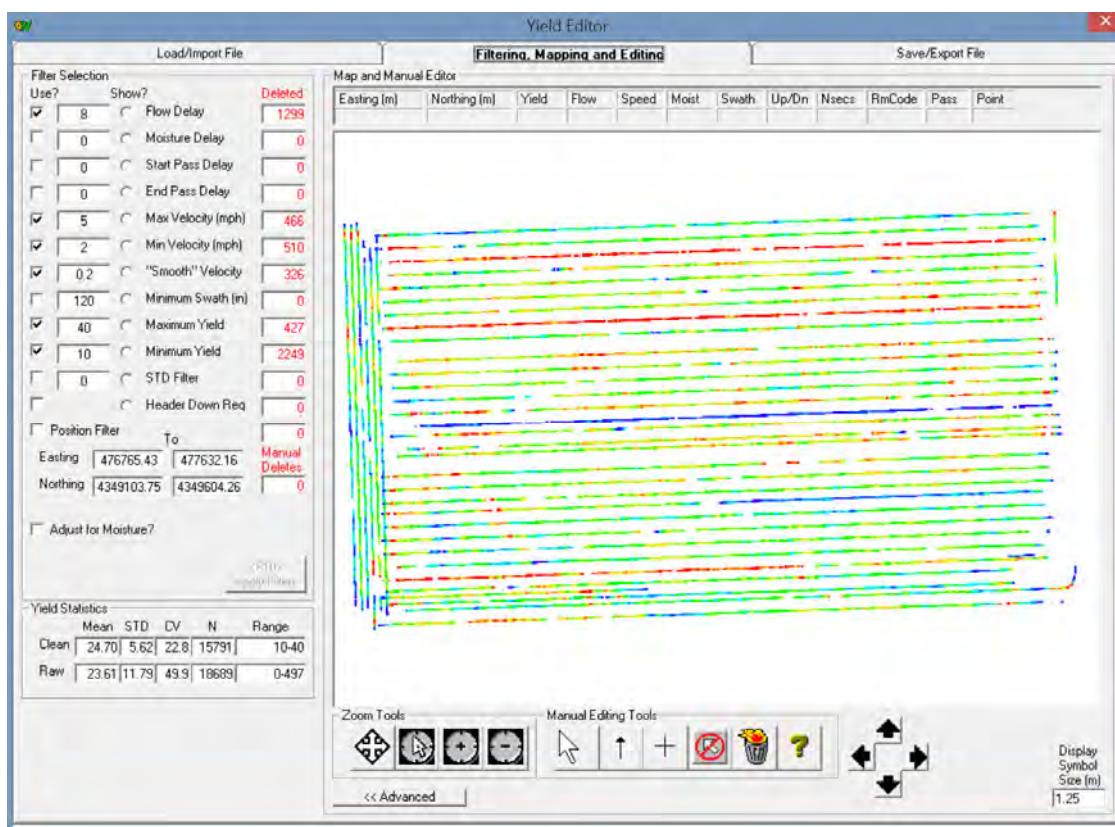
Scroll down the list and confirm that it was added.

Uncheck "Edit Table"



Otherwise, just select the correct crop type by "Double Clicking" on it in the list.

Importing KB/GK Yield Data



You can see in this example we have used the Yield Editor Utilities to clean nearly 3000 errant points from the yield data set.

At this point and time, suggest NOT using the "Moisture Delay", "Start Pass Delay", "End Pass Delay", "Minimum Swath", "STD Filter", "Header Down Req", "Position Filter" or "Adjust for Moisture?". The reason being these items are not logged. If you have a header up-down switch the "Start Pass" / "End Pass" MAY work well.

Please DO USE—

Flow Delay – Adjusts time from GPS to load cell weighing process.

Max Velocity—Speeds faster than this value will be deleted.

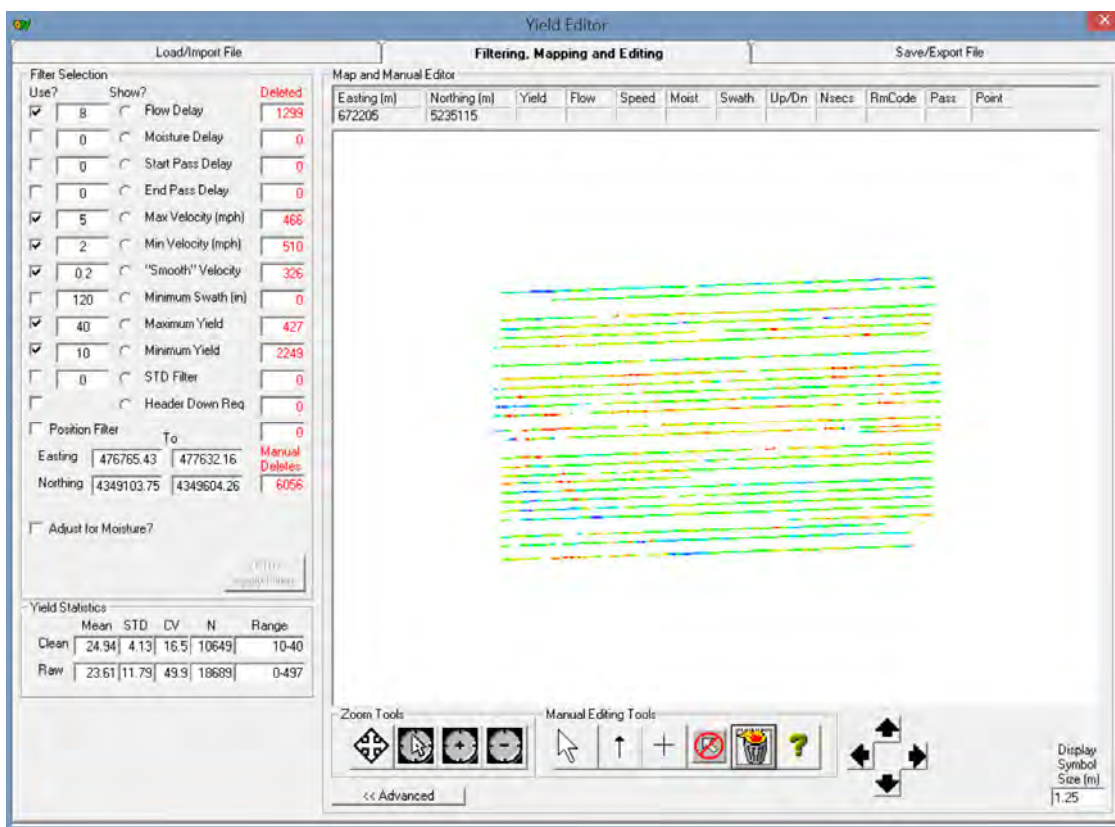
Min Velocity—Speeds slower than this value will be deleted.

"Smooth" Velocity—Used to help identify those regions where rapid velocity changes have taken place. A ratio of 0.2 means that points with velocity changes of more than 20% compared to its neighbors should be removed.

Maximum Yield—Yields greater than this value will be deleted.

Minimum Yield—Yield less that this value will be deleted.

Importing KB/GK Yield Data



**Yield Editor
Color Table
V.1.0.2**

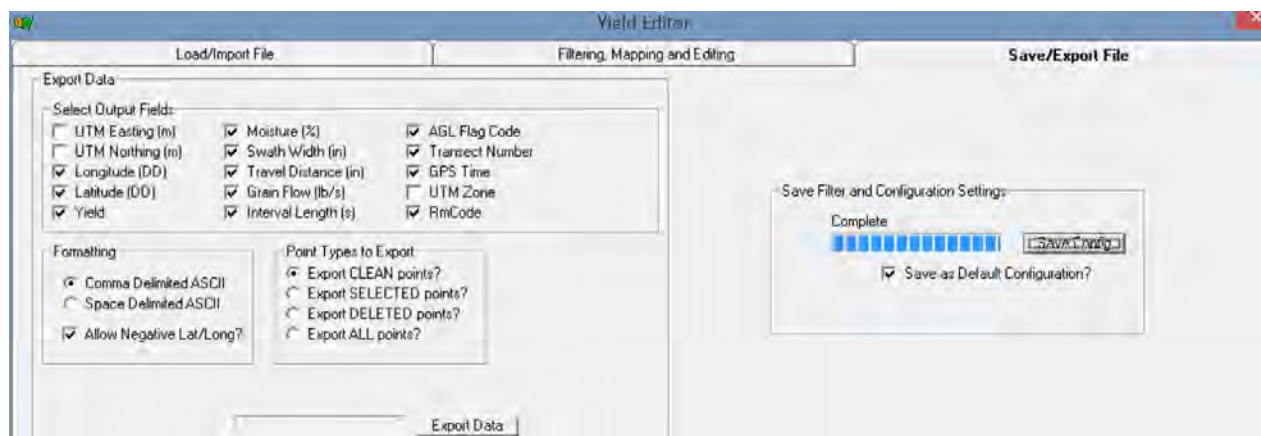
Red = High Yield

Blue = Low Yield

Color Table is not adjustable

Next you can use the "Manual Editing Tools" on the bottom toolbar. This will allow you select down points and "Delete" or trash them. There is no "UNDO" button.

Once done cleaning data, it is suggested that you go to the "Save/Export File" tab and check the "Save as Default Configuration?" and click "Save Config". This will save the settings for your next fields (max—min yield / flow delays).

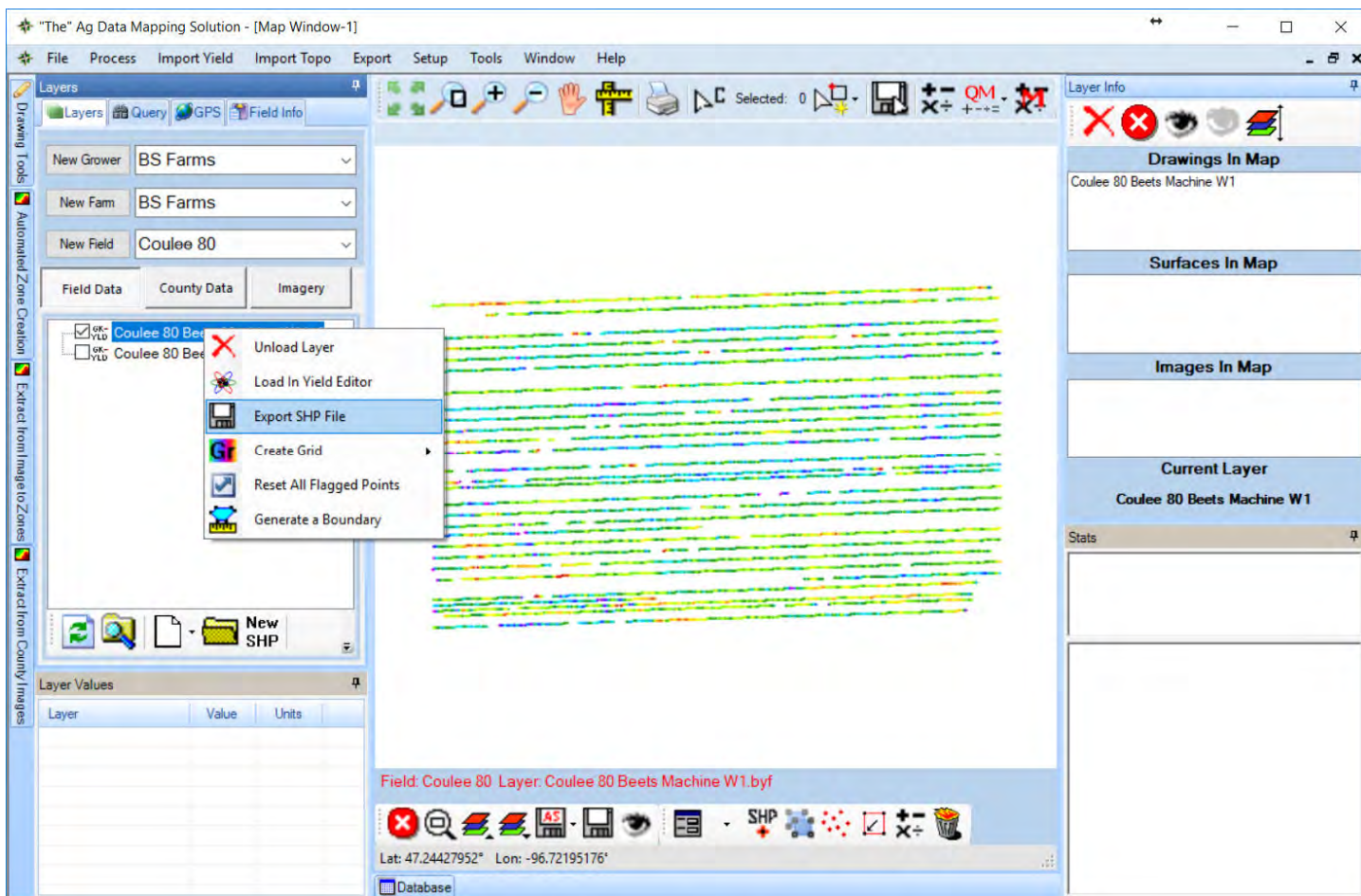


Upon clicking the "X" to close the window, all the settings & deleted points will apply to the data in ADMS.

Importing KB/GK Yield Data

Back in ADMS you can now

- Export as a SHP file to take the data to another software package.
- Merge the BYF with other "Visible" harvest data set for multiple harvesters
- Create a .GRD layer that can be used for VRT or data analysis



See sections of the manual on "Create Grid"

- Create Grid From Points for VRT Zones
- Create Grid From Polygons for Yield analysis

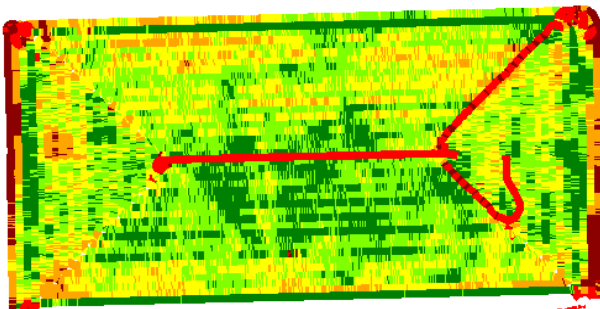
Cleaning Yield Data in Ag Data Mapping Solution

The best place to clean yield data is in "Yield Editor". Unfortunately, there are times that data will come to you in a SHP file or CSV file that can not be taken back to "Yield Editor". To clean up the data, you will have to use ADMS. We want the data in a "Points.shp" file format if you are exporting from another software package.



All of the following work will be done in "Map Window"

The file used in this example came out of APEX 2.7. Take note of the problems with this example.



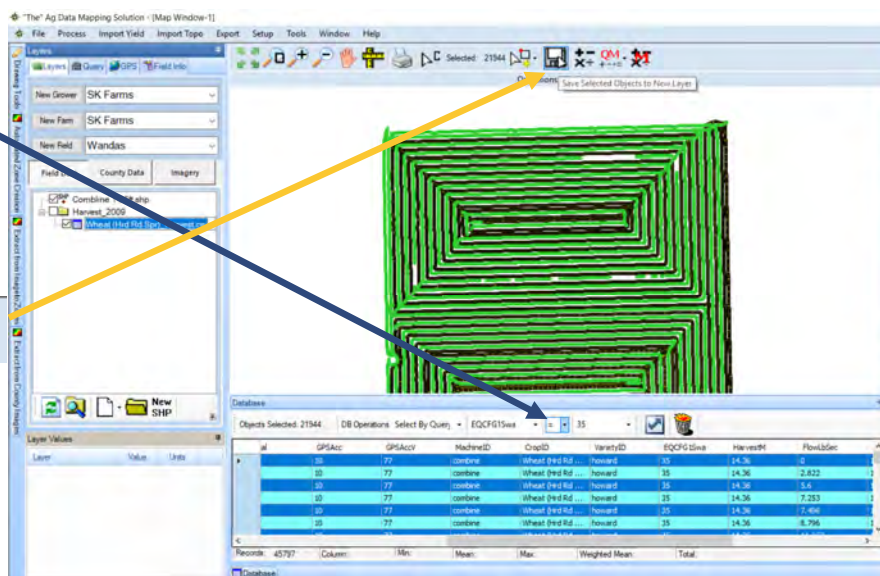
Problems—

1. When data came into APEX it automatically merged the data sets. Assuming that they were "Calibrated". You can see the "Stripes" between the 2 combines that were "Race Tracking" each other. APEX Default map to the Left.

2. Both combines have the same "Machine" & "Operator" names. This makes it almost impossible to separate the two machines. Luckily the "EQCFG1Swa" is different between the two machines (30 foot head and a 35 foot head).

Separating Data Sets-

1. Import or Save SHP or CSV files back into the ADMS—GKData/grower/farm/field structure.
Note: We prefer the SHP file format from most software. There are some exceptions.
2. Turn on the Yield File for the Field (SHP or CSV).
3. Go to the bottom left corner and open the "Database" tab. Look through the columns to find an item that will allow you to "Identify" each combine.
In most cases, "Machine" or "Unit ID" will work
4. In this example, the "EQCFG1Swa" column has several unique values but 30' and 35' are the two header sizes used.
5. Use the "Select By Query" and select to "EQCFG1Swa" and "=" to and "35"
6. Click the "Blue Up Arrow" to Run Query
7. Click on the "Save Selected Objects to New Layer" top Toolbar (name Combine 1.shp)
8. Repeat 5-7 for Combine 2



Cleaning Yield Data in Ag Data Mapping Solution

Now we have two combines in separate SHP files. You may need to clean up data.
This Example—Combine 1 & Combine 2



** If the data is cleaned up when it comes into ADMS, skip the "Cleaning Data" below.

Cleaning Data—Query Tools:

1. Turn on "Combine 1.shp"
2. Open the "Database" tab and select the "Yield" column (Dry Yield in this example)
3. You will notice the values on the bottom toolbar. 0 - 648 bu/ac—Avg 85.2 bu/ac. You will need to select the values to clean the data up to.
4. Use "Select By Query" and "Less Than <" for this example using 20 bu/ac "Run Query"
 - Click the "Delete Selected Objects"
5. Use "Select By Query" and "Greater Than >" for this example using 120 bu/ac "Run Query"
 - Click the "Delete Selected Objects"
6. Save SHP file when finished. (Optional -"Save As" name it "Combine1Cleaned.shp" keeping original data)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & 4 & so on.

Make sure you use the same values or value range (will affect normalizing, merging and color tables) (20-110 for this example or 30-120 be acceptable, value range of 90 for both)

The screenshot shows the Map Window-1 interface. The main map area displays a field map with a grid of lines. The bottom toolbar shows the selected layer as 'Combine 1-35ft.shp' and the selected column as 'DryYield'. The bottom status bar shows the following statistics: Records: 21944, Column: DryYield, Min: 0, Mean: 85.2, Max: 648.37, Weighted Mean: 85.2, Total: 1869576.92.

EQCFG15wa	HarvestM	FlowLbSec	CalFactor	WetYield	DryYield	GKT_IDX
35	14.35999966	0	100	0	0	1
35	14.35999966	2.82200003	100	41.319771	41.146801	2
35	14.35999966	5.59999999	100	46.20219	46.008781	3
35	14.35999966	7.25299978	100	38.063999	37.904659	4
35	14.35999966	7.49599981	100	39.464081	39.298882	5
35	14.35999966	8.79599953	100	43.815289	43.63187	6
35	14.35999966	11.6619997	100	62.453499	62.192059	7

Cleaning Yield Data in Ag Data Mapping Solution

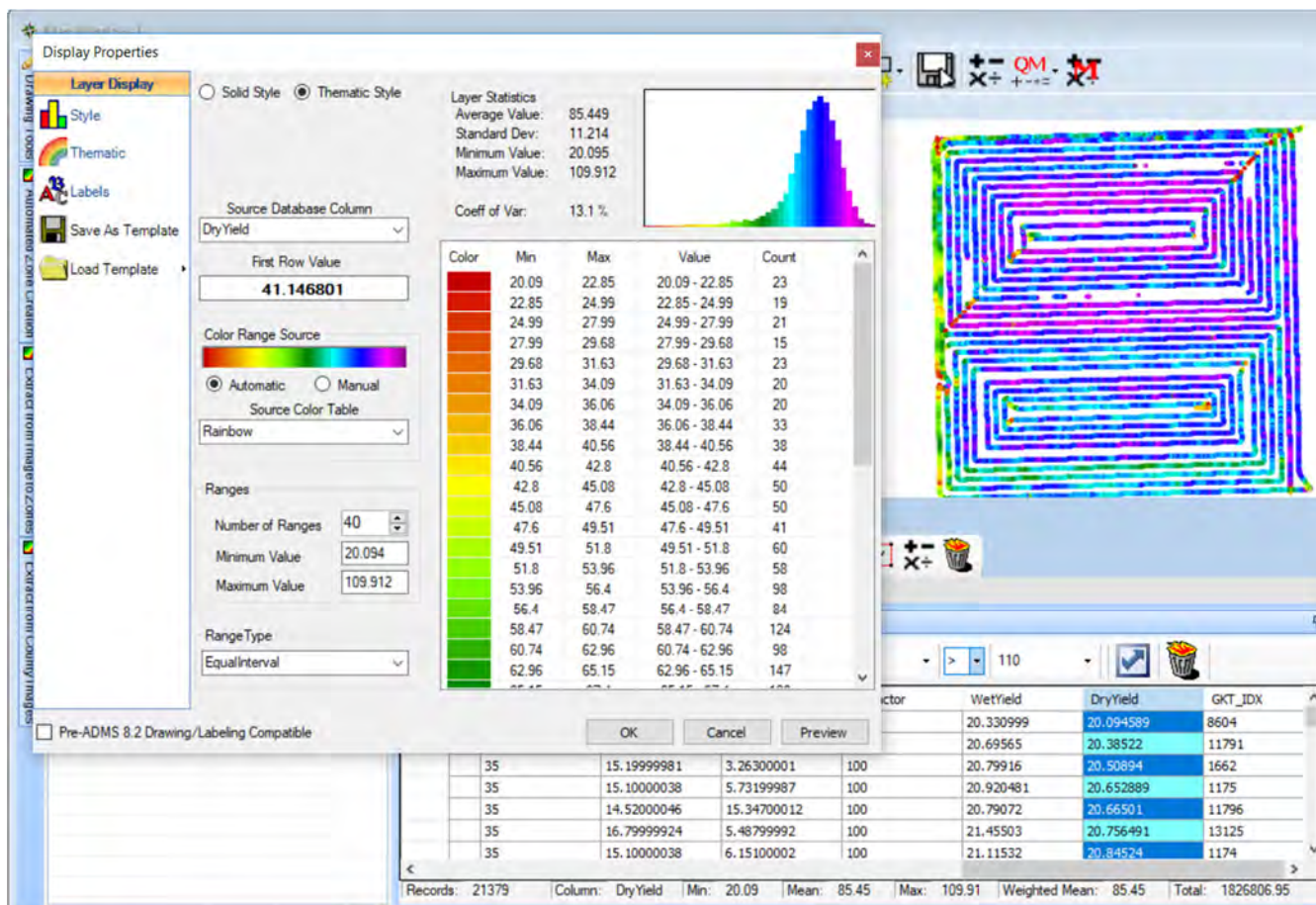
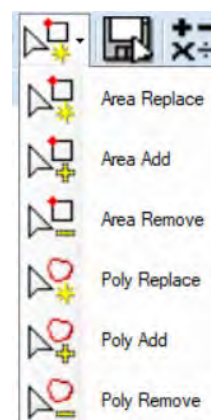
Now we have two combines in separate SHP files. You may need to clean up data.
This Example—Combine 1 & Combine 2



** If the data is cleaned up when it comes into ADMS, skip the "Cleaning Data" below.

Cleaning Data—Selection Tools:

1. Turn on "Combine 1" (for this example)
2. Go to the bottom toolbar, Click "Layer Display Properties" - Adjust setting for the "Thematic" like below
 - *Thematic Style - Source=DryYield - Ranges 40- Rainbow
3. On the top tool bar, Click "Selection Mode" and "Area Add" or "Poly Add"
4. Draw around data to delete. (note: "Selected: #" of objects-top tool bar)
 Repeat step 4 to select more objects
5. Click the "Delete Selected Objects to Firey Can Of Death" button.
 Repeat 4 & 5 as needed for this SHP file
6. Save the SHP file when finished.
 (Optional - "Save As" name it "Combine1Cleaned.shp" keeping original data)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & "4" & so on.



Normalizing Yield Data

In normalizing yield data, there are two concepts to keep in mind

1. Data Extents or Data Range—

GOOD—Combine 1 & Combine 2 cleaned up to 20 bu to 120 bu wheat

BAD—Combine 1 cleaned up to 5 bu to 120 bu wheat

Combine 2 cleaned up to 15 bu to 120 bu wheat

2. Data sets are coming from comparable or similar areas.

GOOD—2 combines "following" each other will normalize and merge very well in most cases.

BAD—Combine 1 harvested the East 80 and Combine 2 harvested the West 80, cropping history, soil types and drainage all could be major issues.



We are going to be working with data that is cleaned to meet the above specifications.

This Example—Combine 1 & Combine 2

1. Turn on "Combine 1"
2. Go to your "Database" tab in the bottom left corner
3. Find your "Yield" column and Left Click on the header (Dry Yield for this example)
 - Take note of the "Mean:" value on the bottom of the Database
4. Click on the "Preform Math Operation on a Column"
 - Divide by the "Mean:" value (85.45 in this example)
5. Go back to the "Database" click on the "Yield" column header
 - Take note of the "Mean" value now = 1 (if not 1, clear map and start over)
6. Click on "Save As" button & add "Normalized" to the name (Ex. Combine 1 Normalized.shp)
7. Repeat steps 1-6 on "Combine 2" and "Combine 3" & "4" & so on.

Field: Wandas Layer: Combine 1-Cleaned.shp

Lat: 47.44658844° Lon: -96.99655694°

Objects Selected:	DB Operations	Select By Query	DryYield	120		
EQCFG1Swa	HarvestM	FlowLbSec	CalFactor	WetYield	DryYield	GKT_IDX
35	14.35999966	2.82200003	100	41.31977081	41.14680099	1
35	14.35999966	5.59999999	100	46.2021904	46.00878143	2
35	14.35999966	8.79599953	100	43.81528854	43.63187027	3
35	14.35999966	11.6619997	100	62.45349884	62.19205856	4

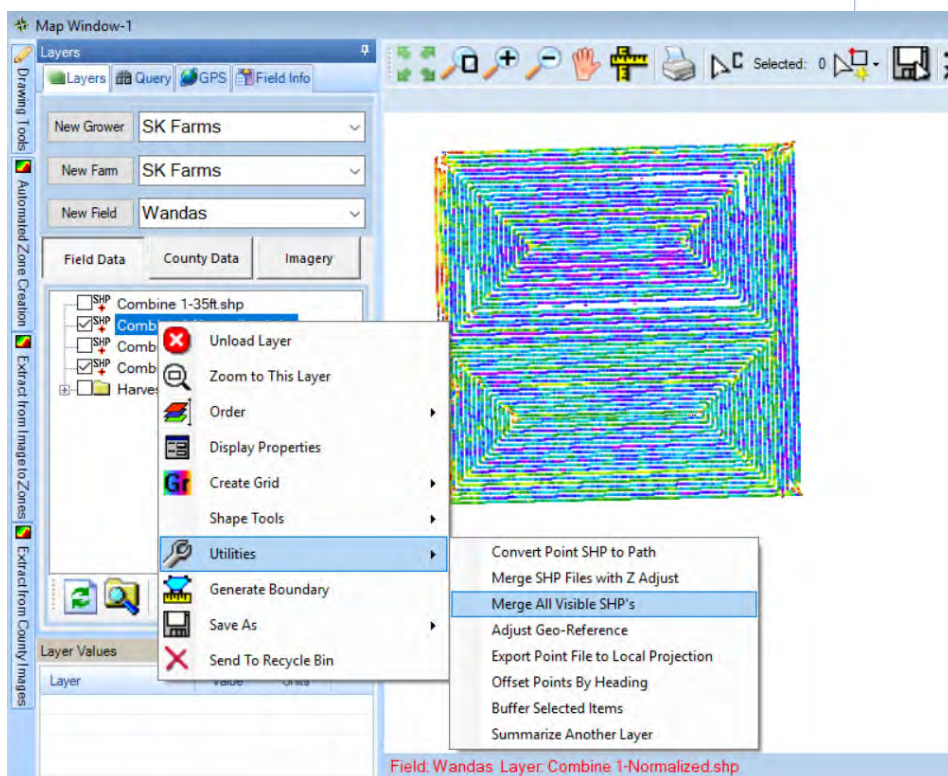
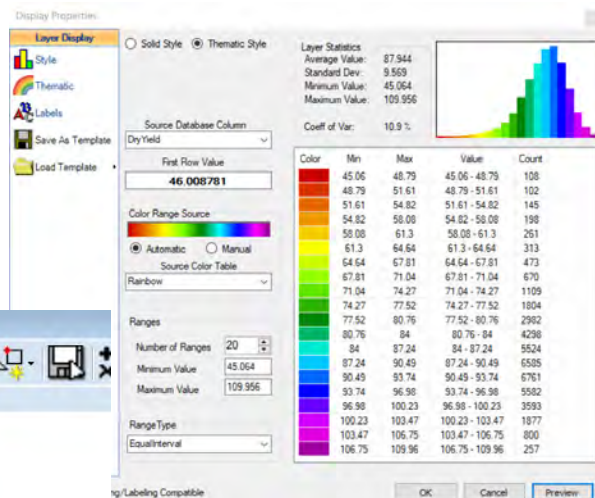
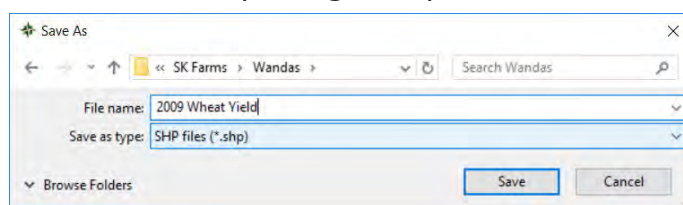
Records: 21187 | Column: DryYield | Min: 40.01 | Mean: 85.94 | Max: 109.91 | Weighted Mean: 85.94 | Total: 1820811.49

Normalizing Yield Data

The final step in Normalizing Yield Data is merging the data set & adjusting the data back to YIELD / ACRE



1. Start out by doing a "Clear Map" under the "Layer Info" tab
2. Turn on "Combine 1 Normalized.shp" & "Combine 2 Normalized.shp" & 3 & 4 and so on.
Only turn on the "Normalized Yield Data" to merge (NO boundaries or images)
3. Right Click on either "Combine # Normalized.shp" file
4. Choose "Utilities" and "Merge all Visible SHP files"
5. Set the "File Name" of the new layer to represent the "Year-Crop-Merged.shp".
In this example "2009 Wheat Merged.shp"
6. Turn on the New "2009 Wheat Merged.shp"
7. On the bottom Toolbar click the "Perform Math Operation on a Column"
-Multiply by the "Actual Yield" (Example 88 bu)
8. Go to the bottom toolbar Click "Thematic Draw Settings" - Adjust setting like "Thematic Mapping"
9. Click on the "Save" button on the bottom toolbar



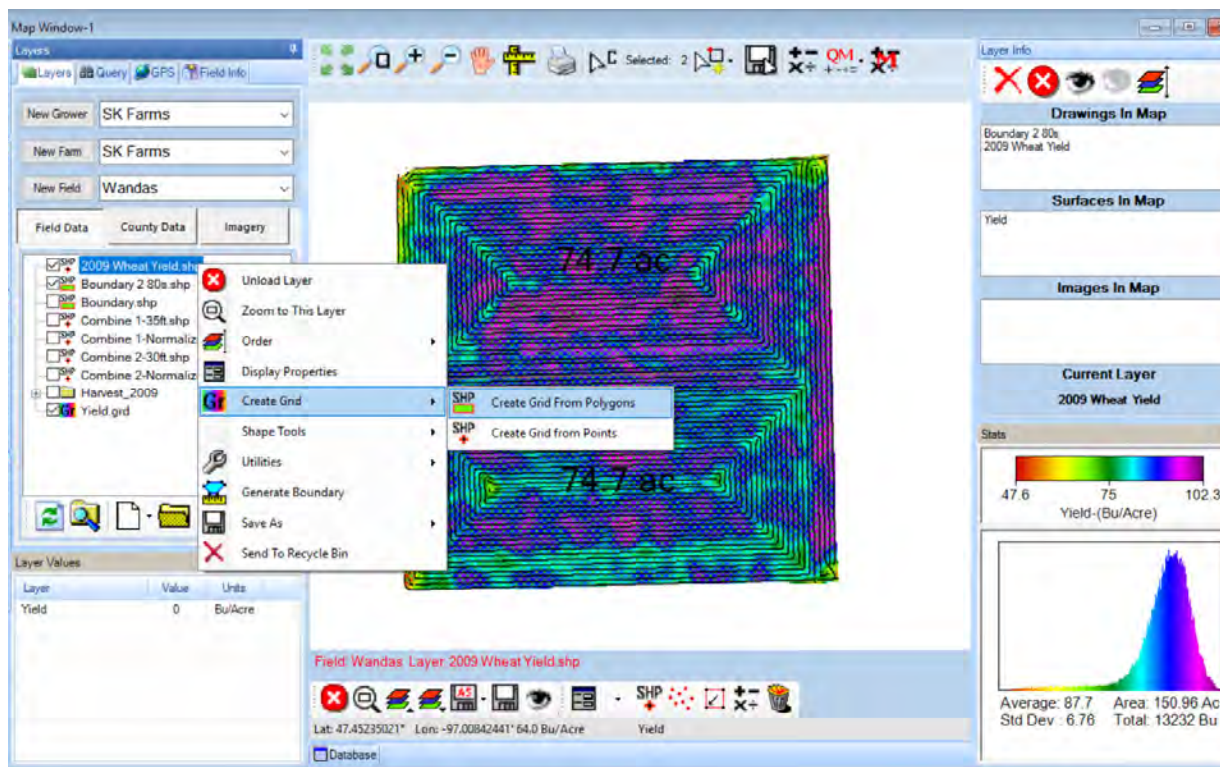
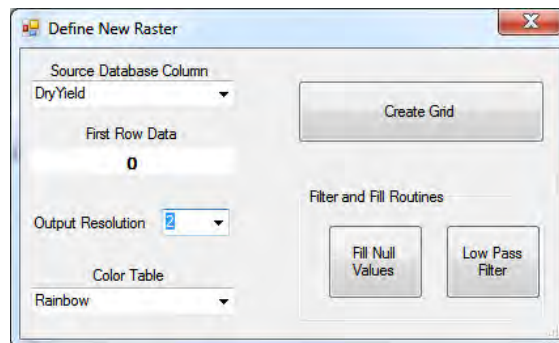
Create Grid from Polygon—Yield Data

You have now cleaned up your Yield Data in either ADMS or Yield Editor, and perhaps merged multiple combines. The Yield data is either in a .SHP or .CSV file format. This format is NOT ready for making management zones or use in scripts. You must have all your Yield Data for the field merged into one Shape File or CSV.



For Analysis:

1. Turn on the Yield.shp or Yield.csv. (example will be using Yield.shp)
2. Right Click on the Yield.shp
3. Choose "Create Grid" and "Create Grid from Polygons"
4. Click "Create Grid" button - *(stop at any step here for visual analysis)*
Use the "Fill Null Values" button to fill in areas that don't have Yield Data
Use the "Low Pass" button to smooth out the data
(Suggest 2 or 3 clicks)
5. Once filled, Turn on the "Boundary.shp" - Left Click in map to "Select" it
6. Click on the "Yield.grd" file name to make it the active layer
7. On the bottom toolbar, click "Crop Raster to Selected Polygon"
8. Save the "Yield.grd" file

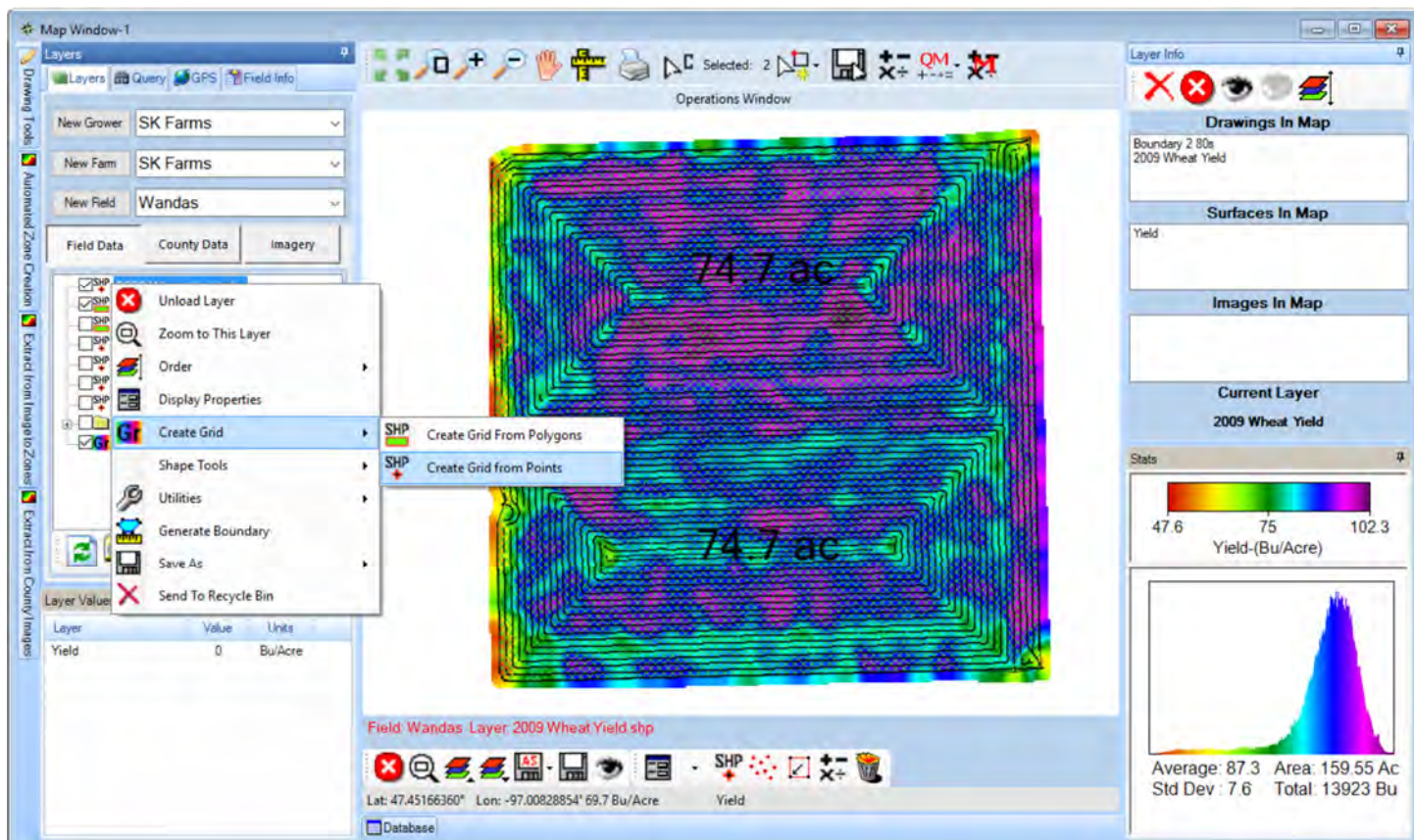
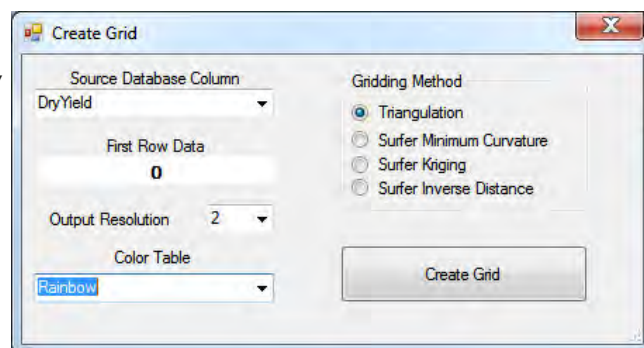


Create Grid from Points—Yield Data

This format is NOT ready for making management zones or use in scripts. You must have all your Yield Data for the field merged into one Shape File or CSV.

For Zones:

1. Turn on the Yield.shp or Yield.csv. (example will be using Yield.shp)
2. Right Click on the Yield.shp
3. Choose "Create Grid" and "Create Grid from Points"
Adjust settings similar to image to right
4. Click "Create Grid" button
At this point you can "Un-Check" the Yield.shp
5. Turn on the "Boundary.shp" - Left Click in map to "Select" it
6. Click on the "Yield.grd" file name to make it the active layer
7. On the bottom toolbar click "Crop Raster to Selected Polygon"
8. Save the "Yield.grd" file
This file is now ready to be used for Management Zones or Scripting



Cleaning Yield Data for Zones – Raster Method

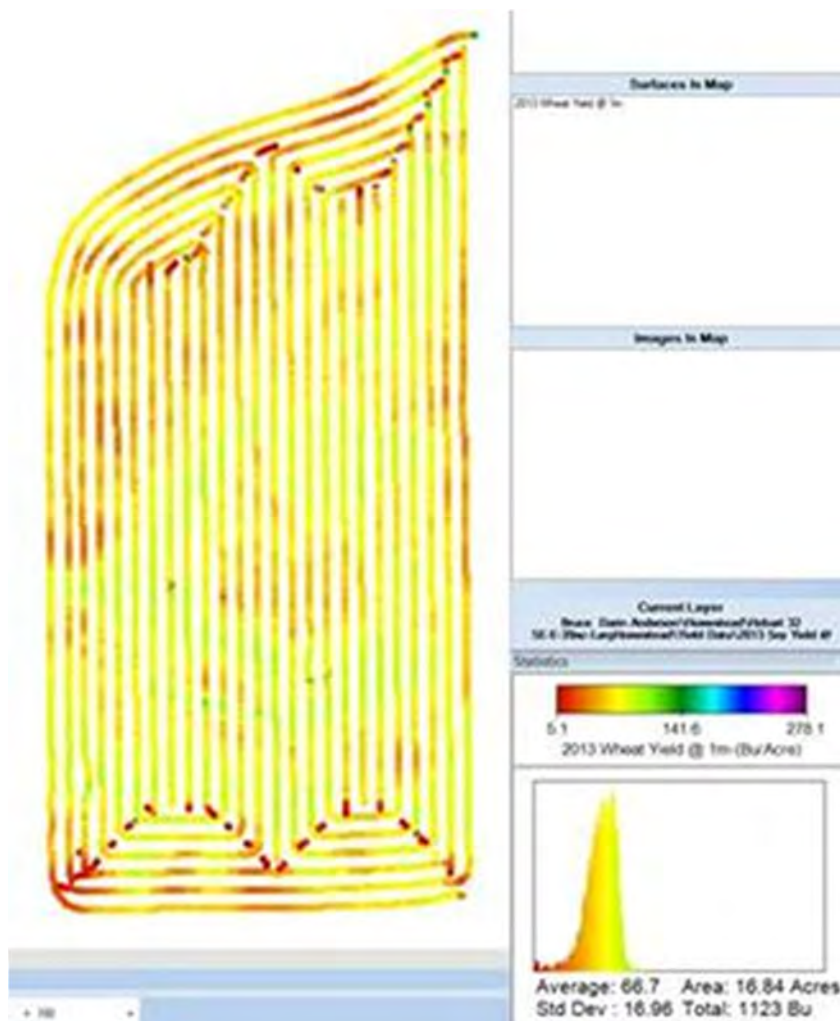
The Process shown and explained in the next four pages is done with the intent of using the data for "Management Zones". This process is designed to eliminate split variety issues & pass to pass issues. Also, this can be a very fast way to clean up yield data for Zones.

This is a summary of the process

- Set data point size to 5 feet (world scale) – Squares.
- Create Grid from polygons @ 1 meter – note suggest setting point size to 5 feet & Squares.
- Trim End values & Delete Cells from the data set (yield range).
- Fill in all the voids / holes of "Farmed Areas".
- Click "Save"
- 1— "Raster Tools" & "Pixelize" & Done
- OR —————Note There are two methods here —————
- 2— "Raster Tools" & "Resample"- decrease resolution to 5 meter or 10 meter.
- 2— A few - 5x5 Fills (great for filling large voids).
- 2— 1 - 5x5 Smooth.
- 2— "Raster Tools" & "Resample"- - increase resolution to 2 or 3 meter.
- 2— 1 - 5x5 Smooth.
- 2— Save the Yield Zone.grd. & Done

Below is a look at the process in visual & step by step method.

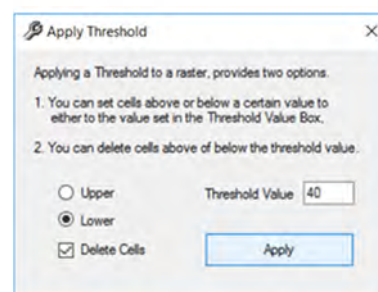
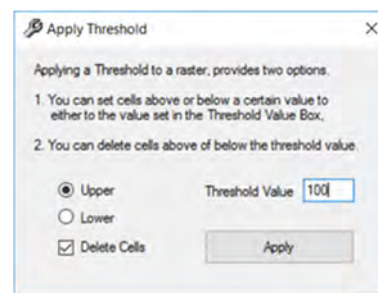
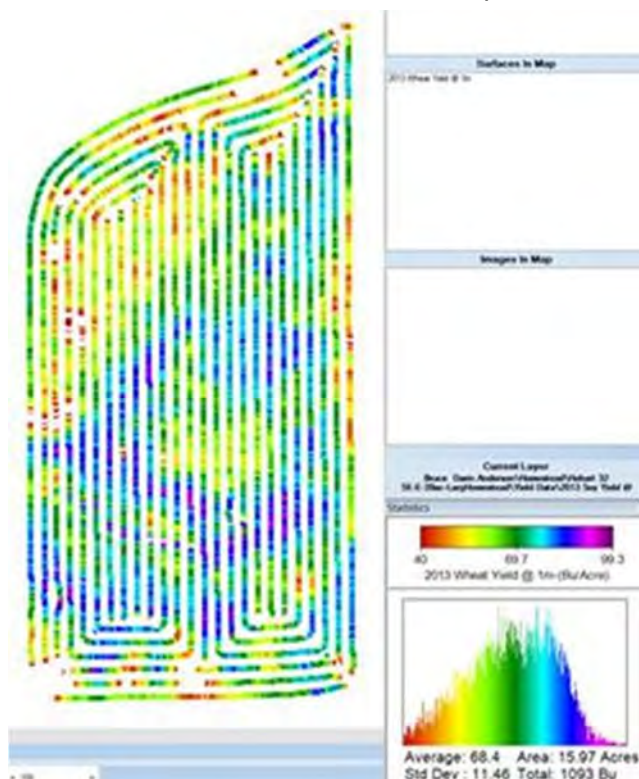
1. First set the data point.shp size to 5 feet (World Scaling) & (Squares).
2. Create Grid from poly @ 1m (yield column).



Cleaning Yield Data for Zones – Raster Method

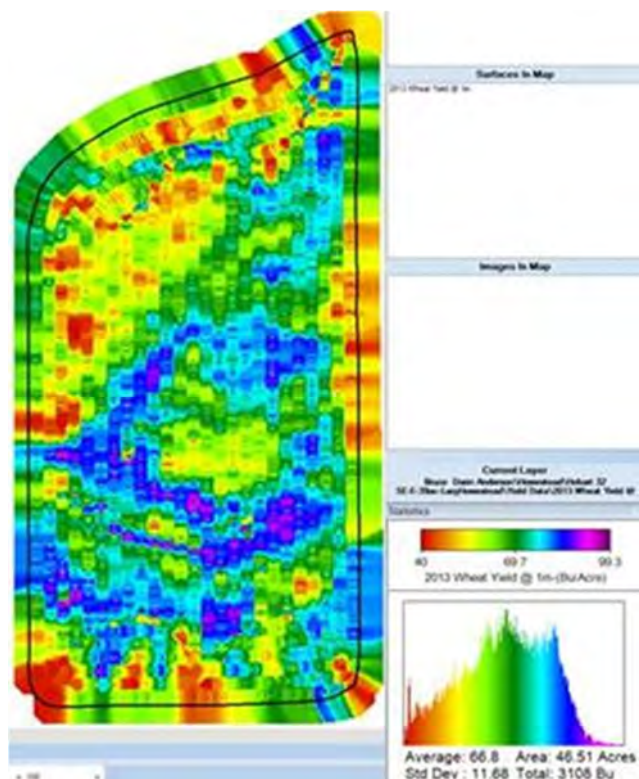
3. Trim end values top & bottom.

-Ex -Wheat Trimmed End Values to 40 & 100 bu/ac.



4. Next 5x5 fill (Bottom Toolbar) the 1m.grd till you fill all the farmed area.

NOTE:
Click—"SAVE"



At this point it is suggested to use to "Pixelize" if all the data is there for your field.

If you are missing large areas of the field follow the "Raster Method"

The two methods are basically the same, "Raster Method" is slower, but has more custom options.

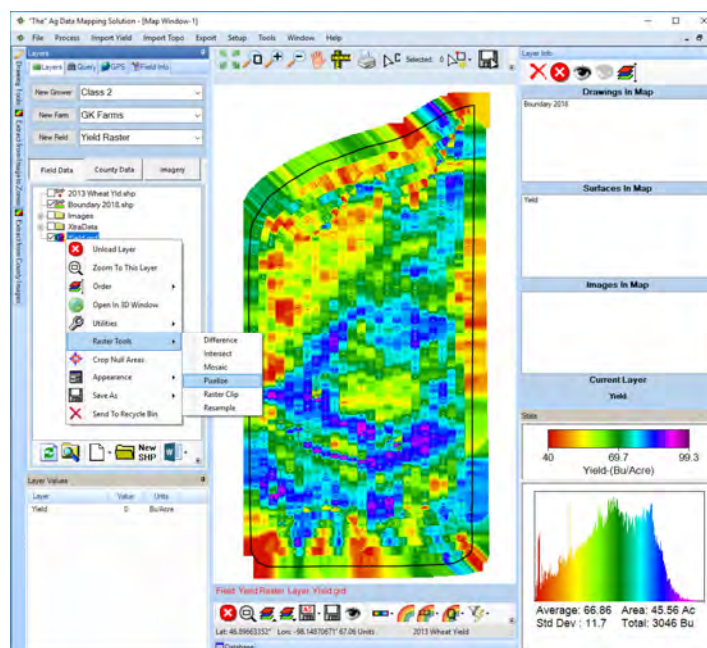
Cleaning Yield Data for Zones – Raster Tools

Pixelize

Smooths the raster by resampling the data to a lower resolution, smooths it, then resamples back to a higher resolution.

1. Turn on the raster "Yield.grd", make sure you have "Saved" any editing!
2. Right click on "Yield.grd" and select "Raster Tools", select "Pixelize".
3. Select "Input Raster"
4. Set the "Pixelization Resolution" for the raster. Set the resolution for the size of the event that is going to be smoothed out (Ex-Header width in meters).
5. Select "Number of Smooths" (5x5) to be run on the low resolution raster. (see notes on the "Yield Raster" settings)
6. In the "Output Raster" type in the name of the new Raster.grd, ADMS will auto-name, feel free to change.
7. Set "Output Resolution" value is in meters. (suggest 3 meter)
8. Click "Run".

New 2013 Wheat Yield.grd is now in the Field Data tree. Suggest "Cropping" the layer to the field boundary.



Input

Input Raster: Yield

Pixelization Resolution: 10

Number of Smooths: 1

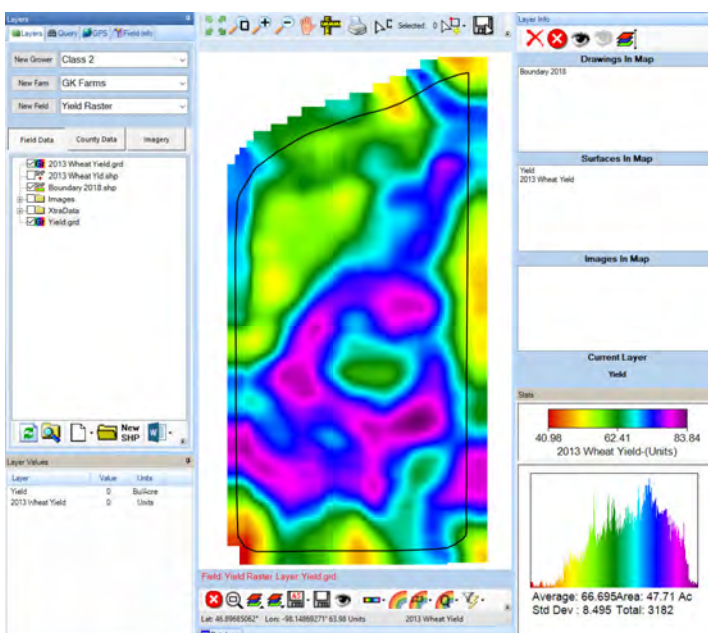
Output

Output Raster: 2013 Wheat Yield

Output Resolution: 3

Number of low-pass 5x5 smooths to be performed after the image is resampled at the 'Pixelization Resolution'

Cancel Run

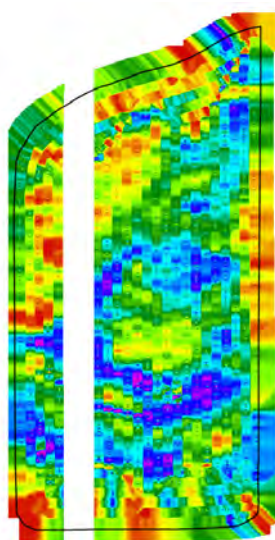


Cleaning Yield Data for Zones – Raster Method

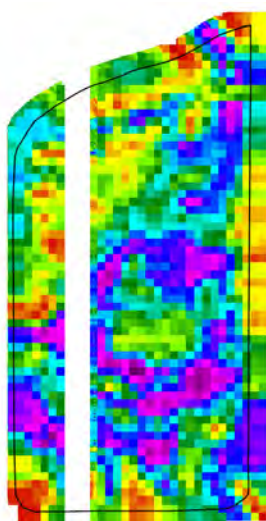
Raster Method

5. Right Click on the xxx.grd name in the data tree.
Choose - "Raster Tools" and "Resample"
Ex - Resampling @ 10 meter

1 meter
with Voids



10 meter
with Voids



Adjust "Output Resolution"

5 Meter = Fairly clean looking data

7 Meter = Normal Data small inclusions

10 Meter = Pass to Pass errors pretty ugly data

12 Meters = Borderline – horrible looking data

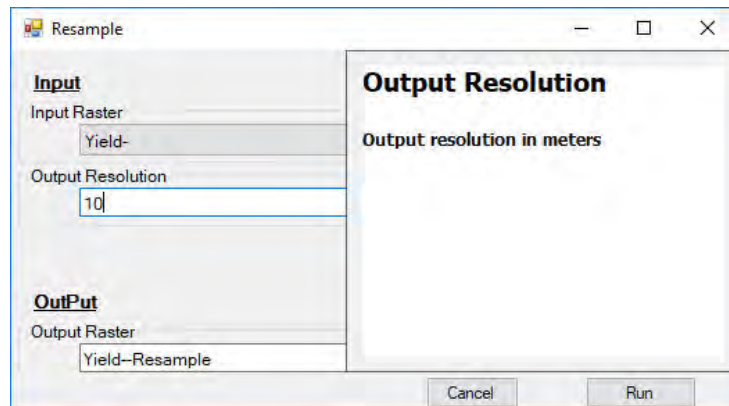
15 Meter = Last ditch effort to get something useable

6. Using 5x5 "Fill Filter" to fill in the Voids on 10 meter



3x3 Fill

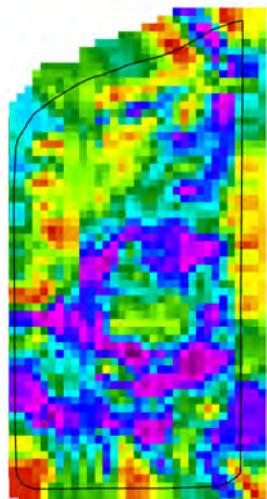
5x5 Fill



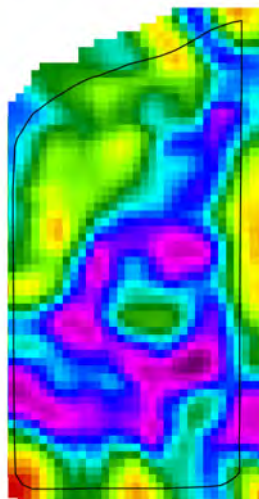
7. Do 1- 5x5 "Smooth on Bottom Toolbar (to the 10m .grd)



10 meter
Voids Filled



10 meter
1–5x5 Smooth



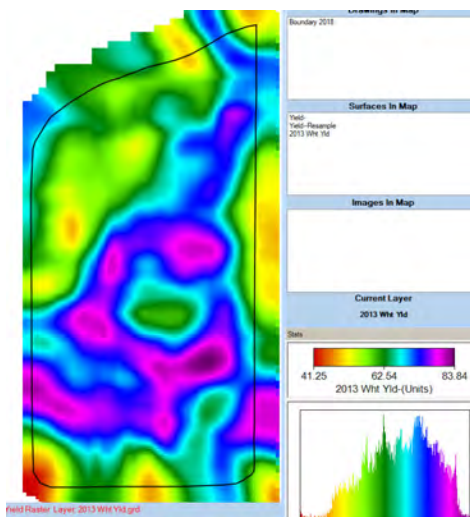
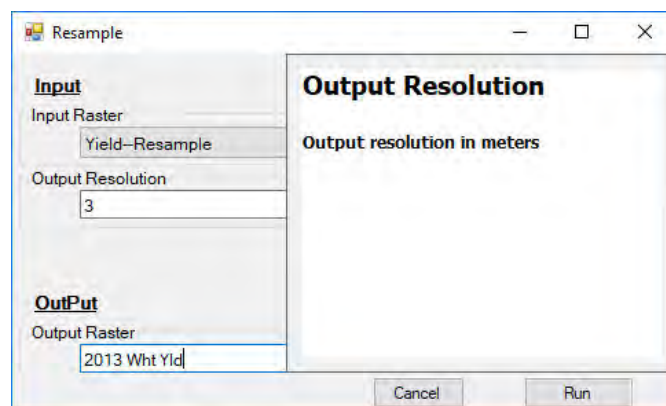
Using the "Fill Filter" at the Low Resolution gives a very nice finish. Final product is not so stretched in fill areas.

Keep in mind when you are missing HUGE areas, look at imagery!

8. "Save" the work on the "Yield-Resample.grd"

Cleaning Yield Data for Zones – Raster Method

9. Right Click on the "Yield-Resample.grd"
Choose - "Raster Tools" and
"Resample"
Ex - Resampling @ 3 meter
-Note: Watch "Input Raster"
10. Set "Output Raster" name - "2013 Wht Yld"
Click "Run"

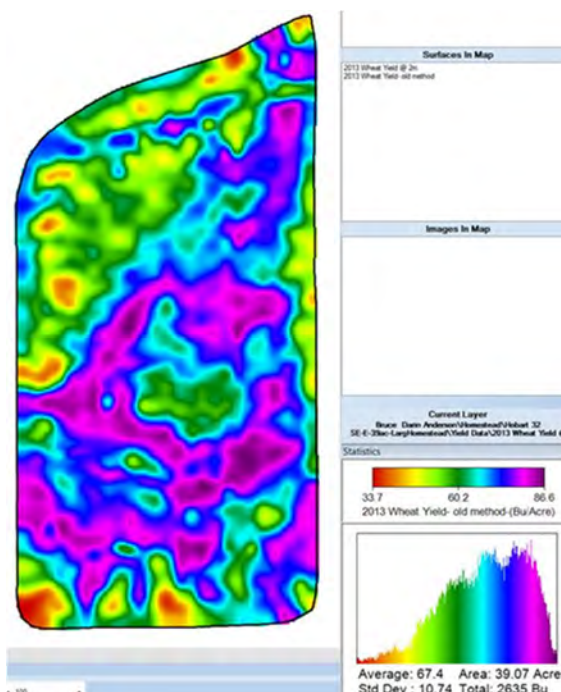
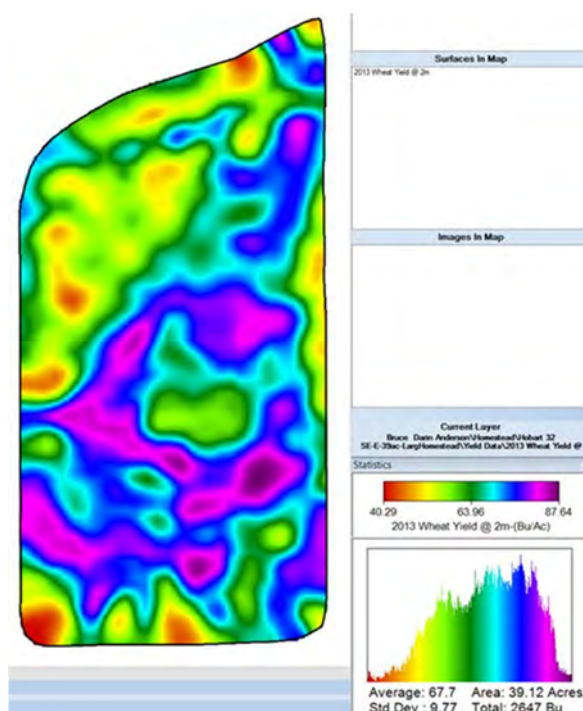


NOTE: Examples below the Black Line did not have "Voids" in them.

11. Suggest doing 1-5x5 low pass  and Crop to boundary. 

This is Raster Zones Method (7meter)

This is Yield Editor Points Cleaned



Data Analysis

Doing Data Analysis on Yield Data

Introduction

Data Analysis can be as simple or complex as you want it to be. The next examples can be put together in many different ways, so feel free to jump around and use the tools in different combinations. Here is a list of the tools.

- **Correlation Matrix (All Raster)**
- **Query Tools (All Raster)**
- **Clipping Tools (SHP & Raster)**
- **Summarize to Another Layer (SHP & Raster)**
- **Intra-Layer Math (All Raster)**
- **Scripting—Efficiency & Difference & Others (All Raster)**
- **Using Combinations—(SHP & Raster)**

Data analysis on yield will require several different layers, here are some suggested layers.

- Zones as SHP and as GRD (Zones with hard breaks—Fixed Zones)
or
- Grid points or Grid polygons (use Buffered.SHP (suggest 50' or 100') & create a .GRD layer from "PointID" or "GKT_IDX" (use 1 meter resolution))
- Soil Test Results as .GRD (N P K S Zn pH OM and others)
- Variable Rate Rx maps as .GRD (Urea DAP Potash Seed and others)
- Yield GOAL as .GRD
- Current year of production Yield Map as .GRD

NOTE: resolution, values, buffer distances, fills, smooths & method of data cleanup may affect results of analysis.

- There may be other layers that can be used. Above are some suggestions.

Final NOTE before getting started. The SHP - "Display Property" setting may have large affect on the final product. Pay attention to these settings, repeat them across all data analysis. Same goes for the GRD resolution.

The following are examples to give you ideas. The Settings and Values should be changed to fit your needs.

Data Analysis

Correlation Matrix

The Correlation Matrix is a useful tool for measuring similarities and differences between layers such as imagery, yield, and prescription maps. For data Analysis, consider Adding the Soil Tests Nutrient to the Applied Nutrient. This will give you a more accurate correlation than just the "Fert Application". The correlation matrix uses the Pearson correlation coefficient & measures the linear correlation between two variables. The output value will be between -1 & +1. The closer the value is to +1 the stronger the correlation.

http://www.ezanalyze.com/help/res_corr.htm

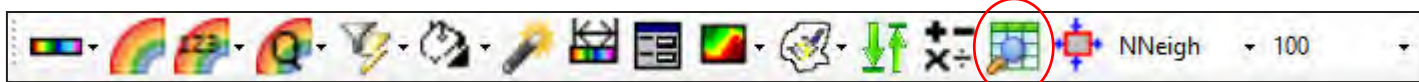
1. Start with a clear Map Window. 

2. Turn on all surfaces to be correlated.

Note: All surfaces turned on will be included in the matrix. The more surfaces to be correlated, the longer it takes to calculate.

- ☒  2013 Corn Yield.grd
- ☐  46-0-0.grd
- ☒  Corn Seed.grd
- ☒  Corn Yield Goals.grd
- ☐  MESZ.grd
- ☒  Total N.grd
- ☒  Total P.grd
- ☒  ZnSO4.grd

3. On the bottom toolbar, select "Calculate Correlation Matrix."



4. A table will appear displaying correlation values between two surfaces at each row and column intersection.

5. If desired, save the spreadsheet as a *.CSV file by clicking "Save" in the top left corner.

LayerNames	2013 Corn Yield	Corn Yield Goals	Total N	Total P	ZnSO4	Corn Seed
2013 Corn Yield	1.000	0.560	0.558	0.567	0.567	0.561
Corn Yield Goals	0.560	1.000	0.996	0.988	0.995	0.990
Total N	0.569	0.996	1.000	0.991	0.991	0.991
Total P	0.577	0.988	0.991	1.000	0.987	0.985
ZnSO4	0.578	0.995	0.991	0.987	1.000	0.994
Corn Seed	0.575	0.994	0.992	0.986	0.995	1.000

Correlation Value

Less than 0.3

0.3—0.5

0.5—0.7

0.7—1.0

Meaning

Not Meaningful

Weak Correlation

Moderate Correlation

Strong Correlation

- Correlation does not imply causation. Just because two values are similar or show a strong correlation does not mean that they are related to each.
- Negative numbers indicate an inverse correlation. An example would be a correlation between an elevation map and a yield map, where on a hill top the elevation is high, but the yield is low.

Data Analysis—Query Tools

Query Tools—Raster & Shape

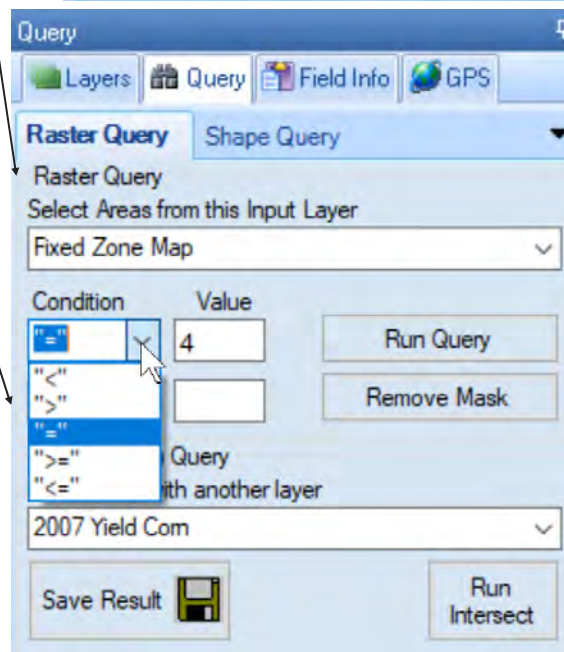
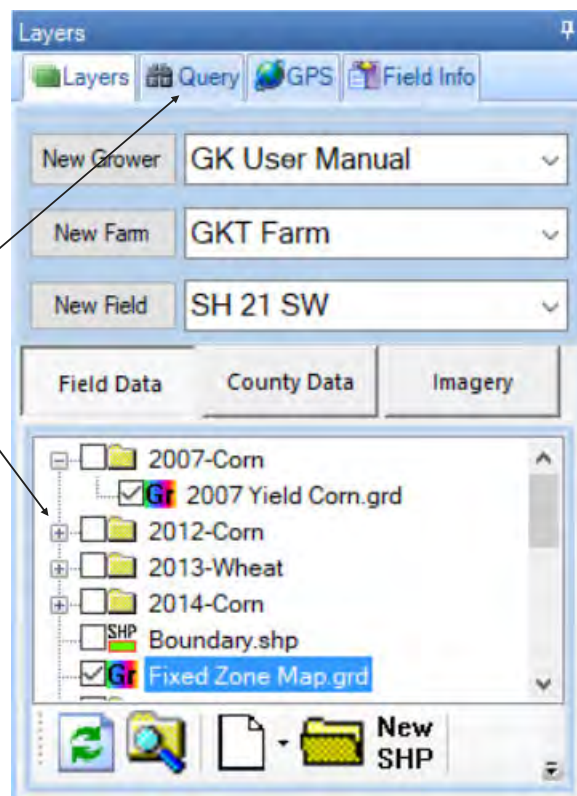
Query Tools allow selection of specific areas of a field surface and intersect or analyze that area with another surface. Examples of uses for the **Query Tool** are: select a Variety or Hybrid in field and intersect with yield, or select a specific range of Veris data and intersect it with a grid soil test to find a relationship between them. Query tools are limited to imagination and the created surfaces.

Start by opening a **"Map Window"** and selecting the desired Grower, Farm and Field.

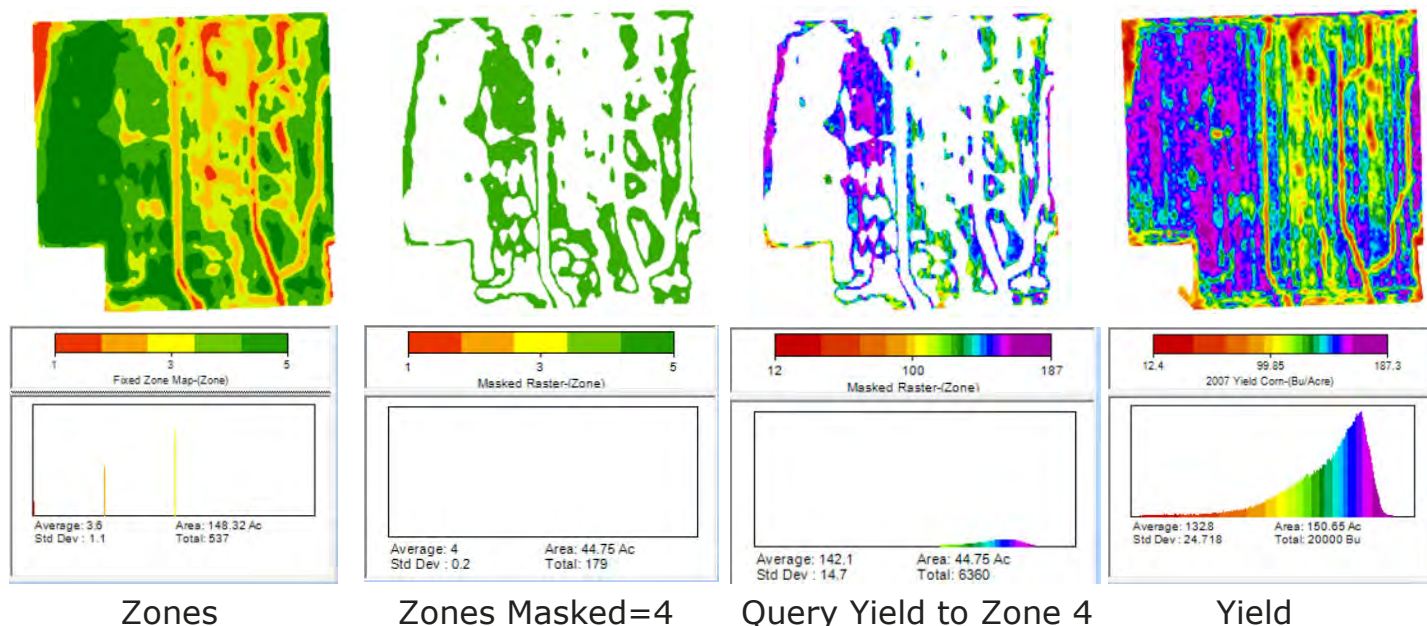


Raster Query

1. Turn on the surfaces to analyze. At least two surfaces are required, but there is no limit to the number of surfaces that can be analyzed.
2. Select the **"Query"** tab. and the **"Raster Query"** tab.
3. Under the **"Select Areas from the Input Layer"** drop down menu, select the layer to mask.
4. Select the area of the layer to analyze. In this example, Zone layer has values from 1 to 5 - specific a number, use the **"Equal To ="** selection. If you are selecting a range of values (i.e. lbs of Fertilizer applied), use the **"Greater Than >"** **"Less Than >"** selections.
5. Click the **"Run Query"** button. This will "mask" all other values.
6. Choose **"Intersect query with another layer"** in this case it is 2007 Yield Corn.grd.
7. Click the **"Run Intersect"** button which will pull the "yield" for just the visible area.



Data Analysis—Query Tools



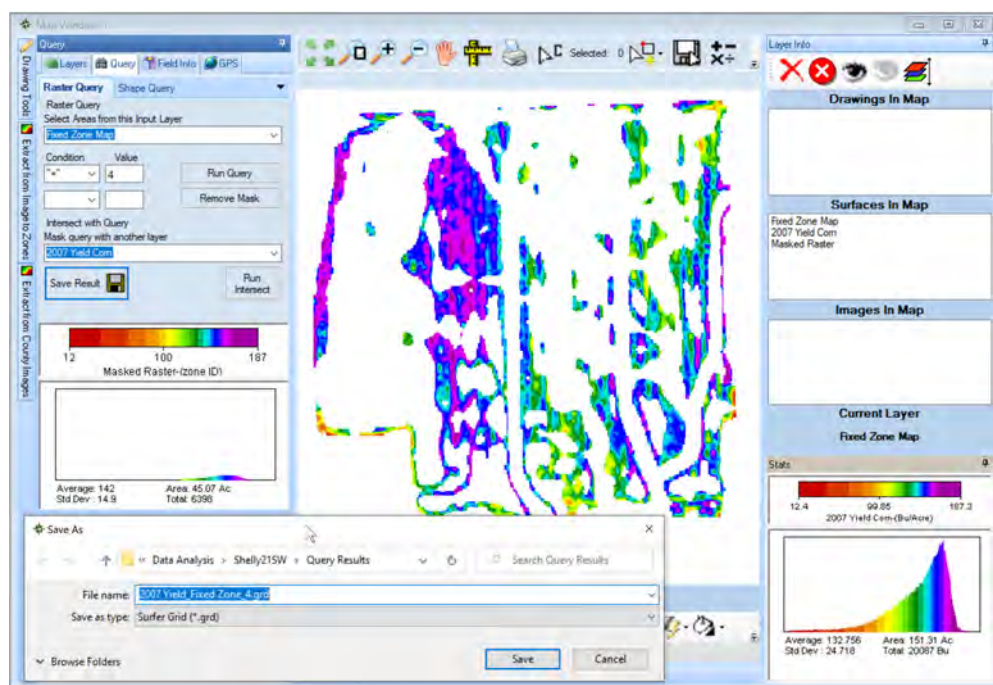
8. Once the “Run Intersect” has been run. Note: The Statistics on the Right Side have “Whole Field values / acres” the Statistics on the Left Side have “Query values / acres”

9. Click the “Save Results” button to save or print the Query. Note: ADMS automatically creates a “Query” folder in the data tree and auto names it. Edit the “File Name” if needed and click “Save”.

10. To finish or do another query, click **“Remove Mask”**.

^ MUST DO ^

Note: to print, Remove mask and “Clear Map” & turn on the layer.grd in the “Query” folder



Data Analysis—Query Tools

Shape Query



This tool is designed to Query between two "Shapefiles". Turn on the SHP datasets to use in Query.—Ex. will be using "Zones.shp" as separate polygons and "SugarbeetYield.shp" data points.

Go to the "Query" tab and "Shape Query" tab

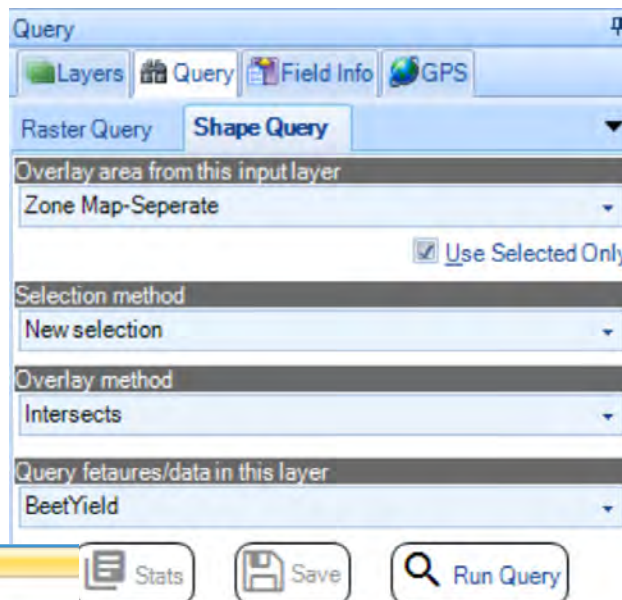
Overlay area from this input layer—Layer will define area of the Query, can be a point/line/polygon. Ex. ZoneMap.shp

—Check—**Use Selected Only** if needed. Extracting data from a multiple treatment object.

Selection method—Choose one.

- **New selection**—makes a new selection (selected objects) on each "Run Query"
- **Add to selection**—adds to selection on each "Run Query"
- **Remove from selection**—remove / un-selects items on "Run Query"
- **Select from current selection**— allows you to limit a selection within a selection.

New selection
Add to selection
Remove from selection
Select from current selection



"Stats" button after Run Query to get Stats about selection.
Note: Choose "**Column**" for Stats

Overlay method—methods by which two layers interact for creating selections.

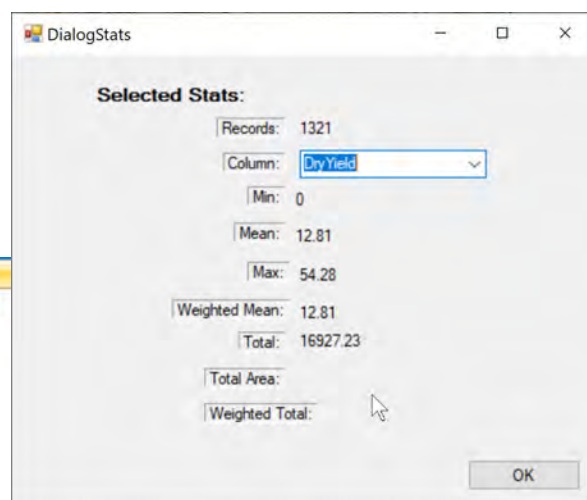
- **Intersects**—works well with lines & polygons as input layer (Default)
- **Within a distance of**—Works with points/line/polygons as input layers.
—Opens dialog to type in distance
- **Contains, Touches, Crosses, Covered By, Covers, Overlaps, Within, Disjointed**

Intersects
Within a distance of
Contains
Touches
Crosses
Covered By
Covers
Overlaps
Within
Disjointed

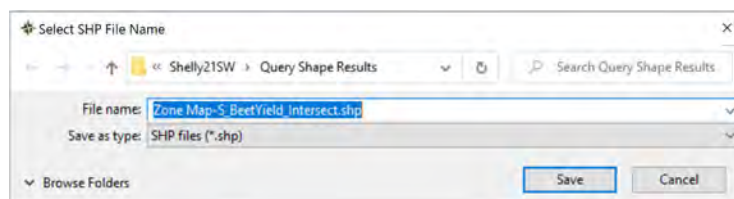
For more info on Overlay method - web search for —NetTopologySuite Geometry

Query features/data in this layer—Layer that contains all information to be Queried. Ex BeetYield.shp

Run Query—Creates query selections



"Save" button saves Selected objects to a new SHP file. Automatically saves in "Query Shape Result" folder.



Data Analysis—Clipping Tools

Clipping Tools - to Zones

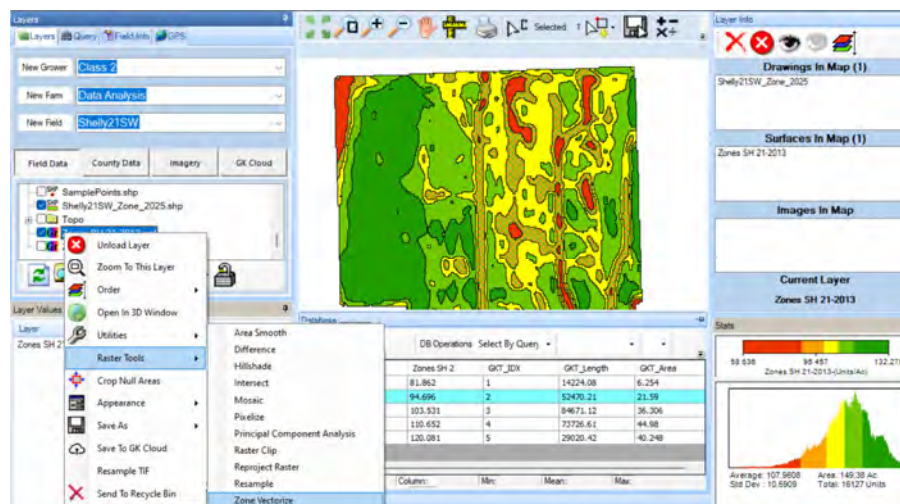
Example will use "Zones.grd" and clip them to "Yield.grd" & "46-0-0.grd"



1. Turn on Zones.grd (original or fixed zone-example used original) Right Click on Zones and go to "Raster Tools" & "Zones Vectorize"
Click "Run"

2. Now a "Contour SHP" of each Zone exists as Zones.shp (5 polygons here)

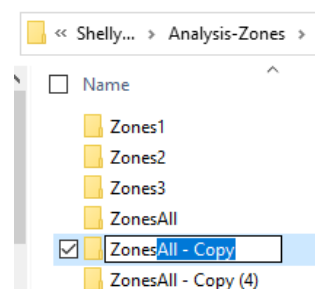
Suggest moving zone.shp into "Analysis-Zones" folder.



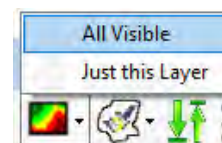
3. a. Turn on Yield.grd
- B. Select Save As
- C. Create NEW Folder "Analysis- Zones"
- Inside here create "ZonesAll" folder
- D. Save - Yield.grd

Repeat Save As by placing the 46-0-0.grd in "ZoneAll" folder for all layers to analyze.

4. In Data Tree—"Explore this Folder" - "Copy" the "ZonesAll" folder
Paste the "ZonesAll" folder 5 times creating "ZonesAll-Copy"
Rename these to "Zones1" & "Zones2"



5. Back to ADMS—do a "Clear Map" & "Refresh Data Tree"
Open "Analysis-Zone" - turn on "Zone.SHP" & "Select" Zone1
—Optional—"Shape Tools" & "Buffer" in (-20' & Add Zone1 to name)
—Optional—Make "Buffer-Zone1.shp" active layer and "Select"
Open "Zone1" folder - Click on all the .GRD files in here
Bottom Toolbar click "Crop Raster to Selected Polygon" & "All Visible"
"Clear Map" and Repeat last 6 steps on each "Zone".



Consider Merging buffered Zones & Summarize to Another Layer—"ZonesAll" folder.

Data Analysis—Clipping Tools

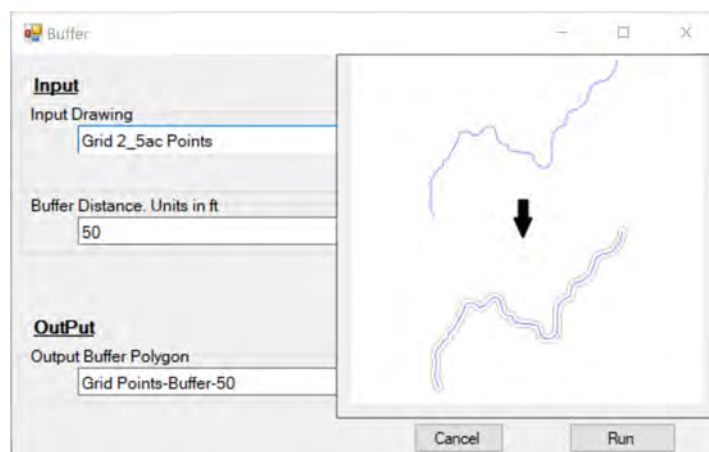
Clipping Tools - to Grids



This example we will use "Grids.shp" and clip them to the "Yield.grd" and "46-0-0.grd".

- 1
 - a. Turning on Yield.grd
 - b. Save As
 - c. Create NEW Folder "Analysis-Grids"
 - d. Save - Yield.grd

Repeat steps 1a-1d on all layers to analyze



2. Turn on the "Grid Points.shp"
3. Go to "Shape Tools" & "Buffer" & 50' (Value is a Radius)
4. Save back to the "Analysis-Grids" Folder
Name new layer:

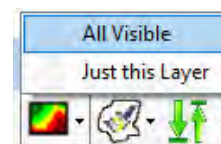
"GridPointsBuffer50ft.shp"

5. Click "Run"

NOTE: Could use the Grid Polygon.shp—(buffer in Negative values)

We now have a "Polygon SHP" of each Grid Point.

6. Do a "Clear Map"
7. Open "Analysis-Grids" - turn on "GridPoints-Buffer50ft.shp"
8. Select All of the Grid Polygons, making them GREEN.
9. Check on all the .GRD files in "Analysis-Grids"
10. On the bottom Toolbar, click on "Crop Raster to Selected Polygon" & "All Visible"



These GRD's may be great for presentation & printing.

Suggest doing a "Summarize to Another Layer" on "GridPoints-Buffer50ft.shp".

Data Analysis—Clipping Tools



Clipping Tools - on Check Strip / Check Blocks

This example we will use "Checkstrip.shp" & clip them to "Yield.grd" and "46-0-0.grd".
Note: Suggest having a comparable size area parallel or perpendicular (blocks) to the "Check". Shown here Red Poly = 2 Check Areas 200' Wide

1. a. Turning on Yield.grd
- b. Save As
- c. Create NEW Folder "Analysis-Checkstrip"
 - Inside of here create a new folder "CheckALL"
- d. Save - Yield.grd

Repeat steps 1a-1d on all layers to analyze

2. In Data Tree-"Explore this Folder" - "Copy" the "CheckAll" folder. Paste the "CheckAll" folder 2 times creating "CheckAll-Copy"

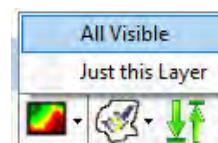
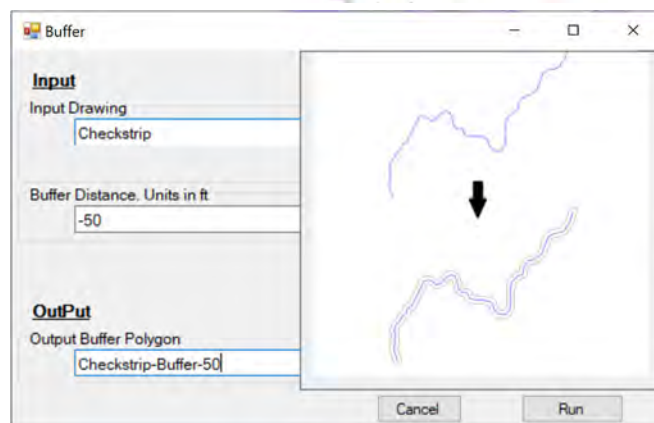
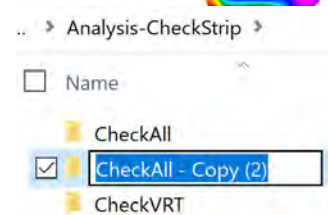
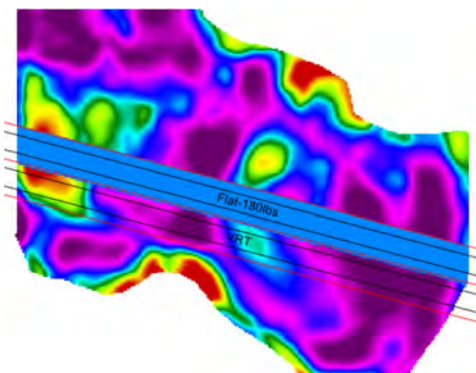
Rename these to "CheckFlat" & "CheckVRT"

3. Turn on the "Checkstrip.shp".
4. Go to "Shape Tools" & "Buffer" & -50' .
5. Save back to "Analysis-Checkstrip" Folder.
6. Name new layer "Checkstrip-Buffer-50ft.shp". 7. Click "Run"
8. Do a "Clear Map"
9. Open "Analysis-CheckStrip" - turn on "Checkstrip-Buffer50ft.shp"
10. Select All of the Grid Polygons, making them GREEN.

11. Check on all the .GRD files in "Analysis-Grids / CheckAll"
12. On the bottom Toolbar click on "Crop Raster to Selected Polygon" & "All Visible"
13. Repeat steps 8-12, "Selecting" only CheckFlat then CheckVRT areas.

These GRD's may be great for presentation & printing.

Suggest doing a "Summarize to Another Layer" on "CheckAll-Buffer-50ft.shp".



Data Analysis—Summarize Another Layer

Summarizing how multiple data layers interact with each other may be desirable. The “Summarize to Another Layer” tool allows summary of yield or soil test results by grid or zones. There are many combinations of data that can be considered with this tool.



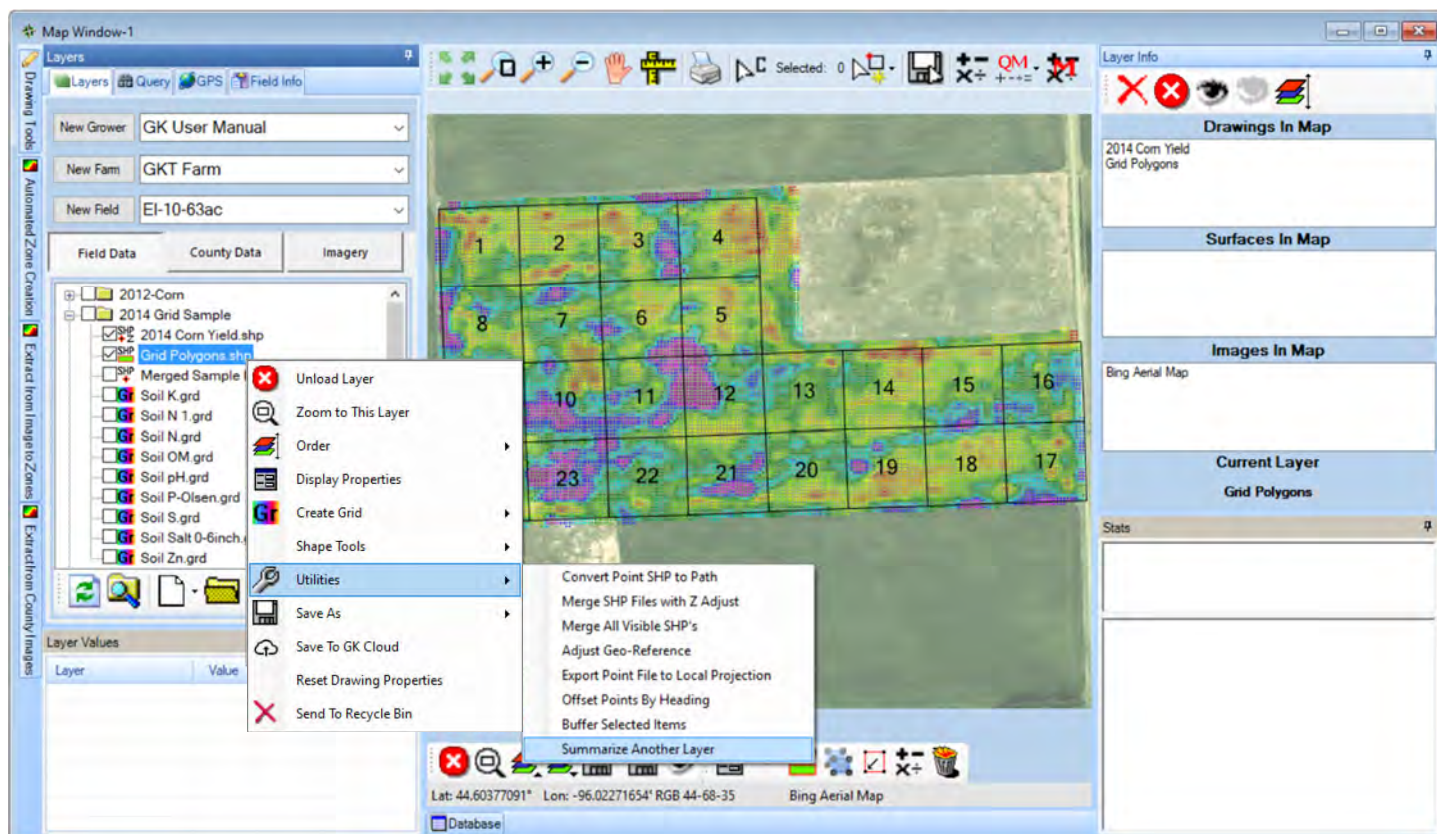
These examples will start at the point that grid/zones, Rx maps and yield data exist for a field.

Summarize—Grids (First Product/Shapefile/Vector)

In this example, grid sample results are run against yield data and 11-52-0. Each “summarized” product must be done as separate runs of this process.

NOTES: Suggest only turning on the “Drawing Layers” and “Surface Layers” that are being considered. This will make things go smoother and cause less confusion.

1. Turn on Grid (Polygons) and Yield.shp for the first run.
2. “Right Click” on the “Grid.shp” (polygons)
3. - Utilities - Summarize Another Layer



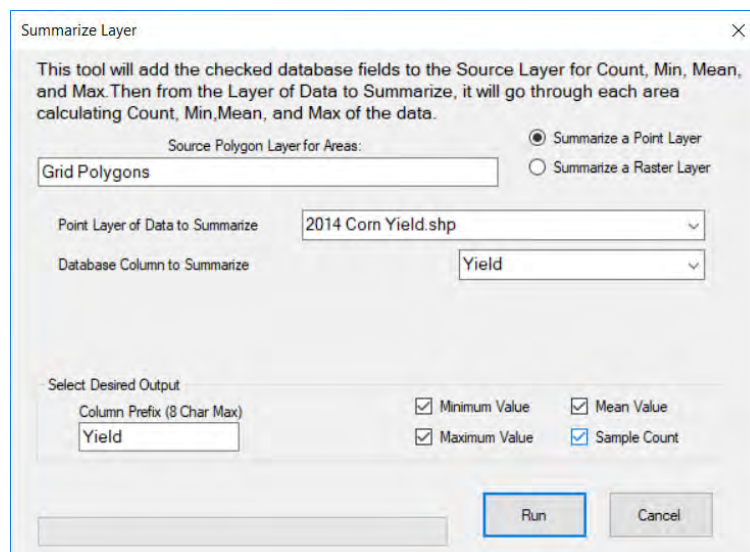
Data Analysis—Summarize Another Layer

This will open the Summarize Layer window. Since we are using a Yield.shp we need to choose "Use Drawing"

3. Go down to the "Drawing Layer of Data to Summarize" and choose the "2014 Corn Yield.shp"

4. Choose the "Database Column to Summarize" in this example it is "Yield"

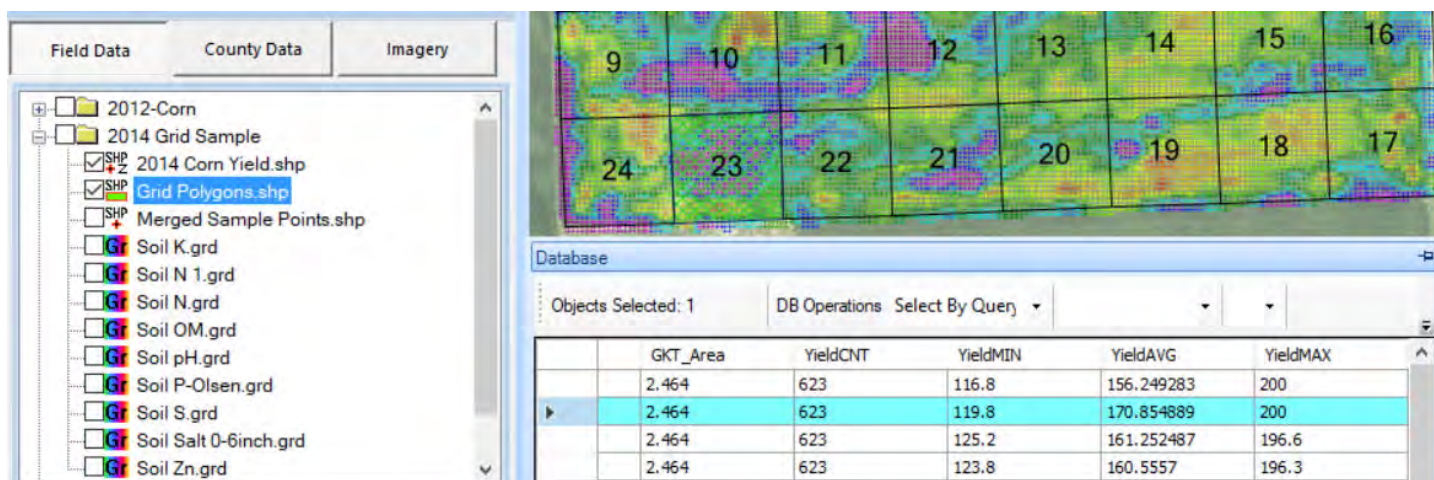
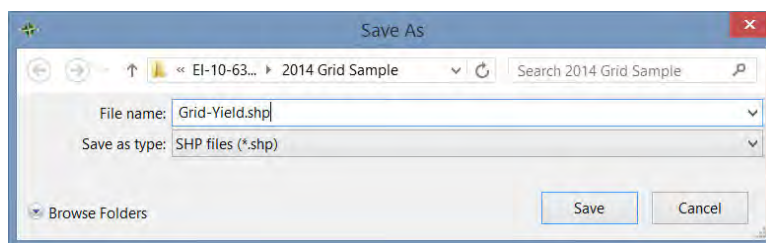
5. Click "Run"



6. Once done running. Make sure your active layer is "Grid Polygons.shp" (layer that was the source of the summary).

7. Click "Save" or "Save As"

Example of Save As >>



The newly updated .shp file has 4 new columns in it. A column for RecordCount / Min / Avg / Max of the 2014 Corn Yield for each Sample Grid.

Data Analysis—Summarize Another Layer

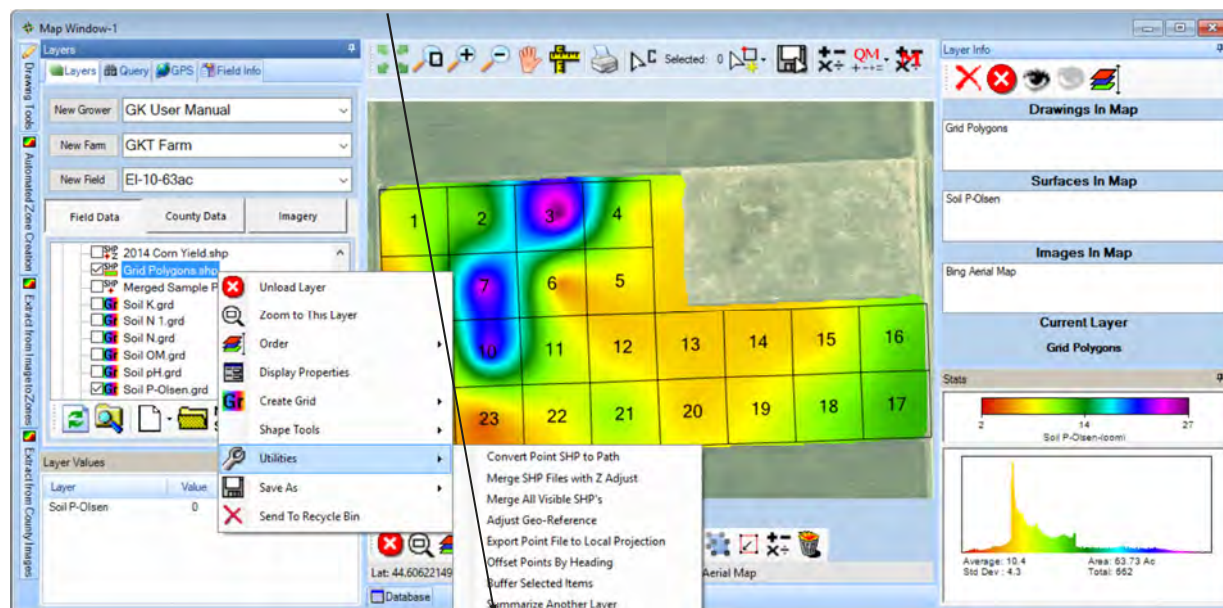
Summarize—Grids (Second Product/Raster)

Summary of First product—"2014 Corn Yield.shp" is done, now summarize Soil P-Olsen.grd

1. Turn on Grid.shp (Polygon) and Soil P-Olsen.grd for the second run.

2. "Right Click" on the "Grid.shp" (Polygon)

2a. - Utilities - Summarize Another Layer



This will open "Summarize Layer" Window

3. Choose "Use Raster"

4. Under "Raster Layer of Data to Summarize" choose "Soil P-Olsen.grd" for this example

5. Click Run

6. Make sure the Grid.shp (polygon) is the active layer

7. Click "Save" or "Save As"

NOTE: In the "Database", selecting ALL and "Right Click" and "Copy". The data can be Pasted into Excel.

Summarize Layer

This tool will add the checked database fields to the Source Layer for Count, Min, Mean, and Max. Then from the Layer of Data to Summarize, it will go through each area calculating Count, Min, Mean, and Max of the data.

Source Polygon Layer for Areas:

☐ Summarize a Point Layer
☒ Summarize a Raster Layer

Raster Layer of Data to Summarize:

Select Desired Output

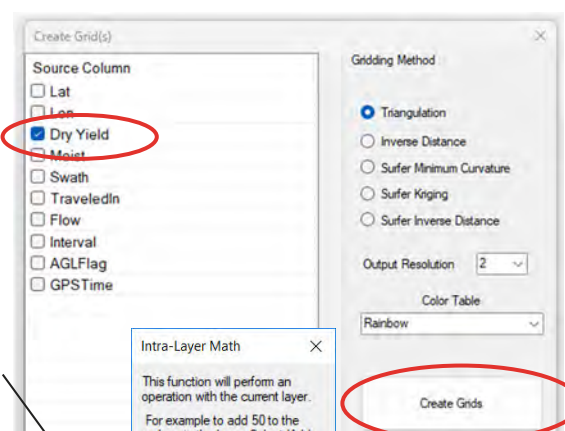
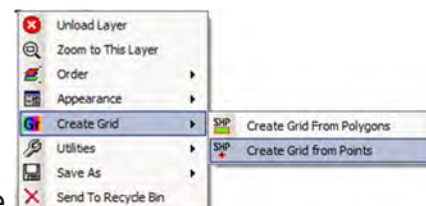
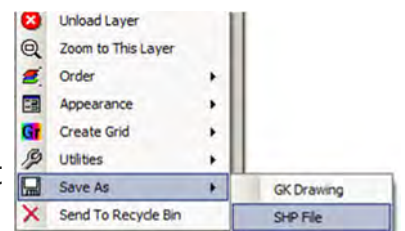
Column Prefix (8 Char Max):

☒ Minimum Value ☒ Mean Value
☒ Maximum Value ☒ Sample Count

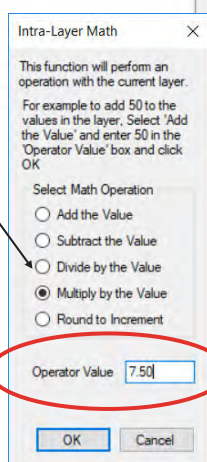
Rename Column	Yield	GKT_Area	YieldCNT	YieldMIN	YieldAVG	YieldMAX	Soil P-OCNT	Soil P-OMIN	Soil P-OAVG	Soil P-OMAX
Add Column	2.464	623	118.6	160.8199	200	1147	2.02376485	5.95258427	14.5385218	
Delete Column	2.464	623	125.9	158.533875	200	1149	3.83034134	8.829892	16.02375	
Create Copy of Column	2.464	623	119.8	170.854889	200	1145	4.08260345	6.80607	11.9796019	
Format	2.464	625	127.6	155.047363	199.8	1132	5.056077	10.9523411	17.7924137	
Copy	2.464	623	116.8	156.249283	200	1146	5.58621264	7.81599665	9.951082	
Record	Min:	2.02	Mean:	7.55	Max:	14.17	Weighted Mean:	7.55	Total:	446.23
									Total Area:	59.13

Data Analysis—Intra-Layer Math (Profit Map)

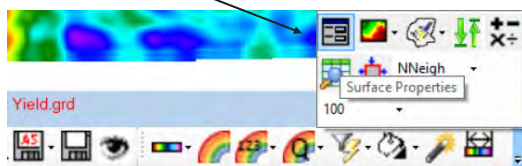
1. Turn on the **"Soybean Yield.csv"** in ADMS.
2. Right click on it and click Save As ->SHP File and save it as **Soybean Yield.shp**.
3. Turn on the **"Soybean Yield.shp"**.
4. Right click and click Create Grid -> Create Grid from Points.
5. In the "Create Grid" popup window, select "Dry Yield" in the drop-down menu and click Create Grid.
6. Turn on the new **"Soybean Yield.grd"**. (It should be the **Active Layer**).
7. Select the "Intra-Layer Math" button.



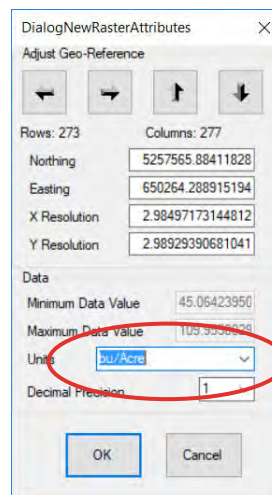
8. Click the "Multiply by the Value" radio button and enter the sale price of that crop/unit and click OK.
9. Now, make sure the **"Soybean Yield.grd"** is still the **Active Layer**.
10. Select the "Intra-Layer Math" button again.
11. Click the "Subtract the Value" radio button and enter the input cost per acre, click OK.



12. Now click the "Surface Properties" button.



13. Select the proper Units for the crop and click OK.



14. Click Save As on the bottom toolbar, name **"Net Profit.grd"** You have now successfully turned a yield data map into a net profit map.

Data Analysis—Scripts (Multi-Layer Map Math)

To use below, turn on suggested layers.grd & click on Multi-Layer Map Math top toolbar.

- Choose "Open Existing Script"

2 Layer Difference - This is a method of getting the difference between Yield Data and Yield Goals. Turn on these two maps as .GRD files. The script will simple subtract the New Yield Data from your Yield Goal map.

- Line 7 will create a new Surface change name "Yield Difference" (as GRD)
- To assign different "UNITS" on line 8 (Bu/Ac)
- Assign New Yield.grd to "Map1" on line 19
- Assign Yield Goal.grd to "Map2" on line 20
- The "Math" is done on line 23

Efficiency Nitrogen - The script will return Yield / total lbs of Nitrogen. Must turn on a Yield, any application.grd that have "N" source, soil test "N" and Organic Matter.

- Line 11 will create a new Surface change name "Nitrogen Efficiency" (as GRD)
- To assign different "UNITS" on line 12 (yld/lb)
- Assign Input Surface name on lines 25-38 (Add as a Value)
- Assign the values for commodity, fertilizer, OM Multiplier and fixed cost on lines 33-38
- The "Math" is done on line 41

Net Revenue - The script will require Yield data, Soil Test layers, all your VRT seed and fertilizers for the field you are working on. You will also need to have values for the selling price per bushel, cost per ton of product (fertilizer), the cost per bag of seed and the Fixed cost for the farm (less the VRT products).

- Line 7 will create a new Surface named "Net Revenue" (as GRD)
- To assign different "UNITS" on line 8 (default -Dollars/Acre)
- Assign Input Surface name on lines 19-25 (Add as a Value)
- Assign the values for commodity, fertilizer, seed and fixed cost on lines 28-42
- The "Math" is done on line 48

NOTES:

- Before closing script, "Save" or "SaveAs" to keep these values.
- Fixed Color Tables can be very helpful here. Suggest using or creating fixed colors for these layers.
- If you do not see these scripts, contact us at GK Technology Inc.

Data Analysis—Using Combinations

The previous “Data Analysis” pages have shown how to use individual functions. This page will outline how to use functions in combination, note the order is important and combinations don’t need all steps run.

- **Correlation Matrix**
- **Query Tools (saved Query’s) & Clipping Tool (Called “QueryClip” below)**
- **Summarize to Another Layer (Called “Summarize” below)**
- **Intra-Layer Math**
- **Scripting**

Here are a few great combinations we use.

Combo 1—Zones & Check Strips

1. Scripting
2. Clip all GRD’s to (check strip.shp)
3. Consider clipping the Check.grds to the Zones.SHP (for presentation)
4. Then Summarize on the Zones.SHP for whole field—All.grd’s
5. Then Summarize against the clipped Check Strip—All.grd’s
6. Then Correlation on the Whole field (Zones.grd & All.grd’s)
7. Then Correlation on the Check Area (Zones.grd & All.grd’s)

Combo 2—Script & Zones

1. Scripting
2. QueryClip (zone / check strip-block)
3. Summarize
4. Correlation

Combo 3—Yield & Zones (most common)

1. Scripting
2. Summarize
3. Correlation

There are many more combinations out there. Enjoy.

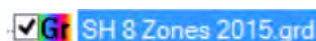
Quick Notes for GPS—In Field Topo/Points

Starting—New Field

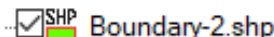
1. Click on the **"Log & Sample" or "Map Window"**.
2. Select the Grower, Farm, and Field you want to work with.
3. Turn on the Maps that you want to work with.

- Put a "Check" in front of the name

Examples - Need Zones on for sampling



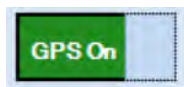
- Create a blank boundary file to collect a new boundary



More background data is not a bad thing, use what you like.

Connect GPS

4. Go to the **"GPS"** tab
5. Connect GPS—
6. Cursor will show your location on the screen to the Right Side.

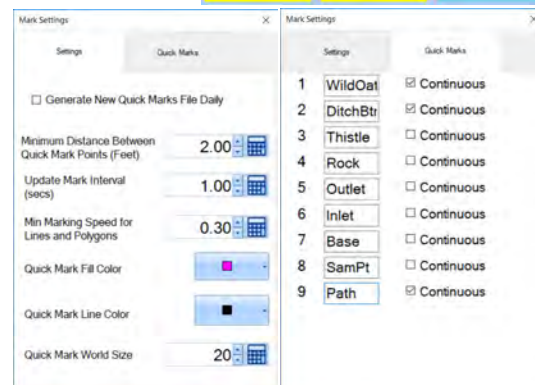
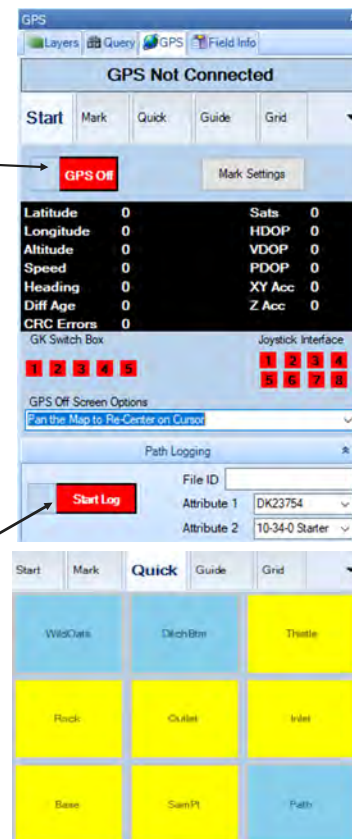
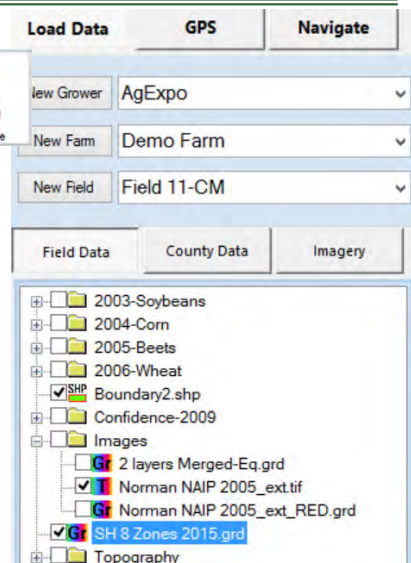


Starting New Data Collection—Topo

1. Open **"Map Window" or "Log and Sample."**
2. Select the Grower, Farm, and Field you want to work with.
3. Turn on the Map you want to work with.
4. To Collect Topo—"Start Log" When done—"Stop Log"

⇒ *This is for Topo "Collection"*

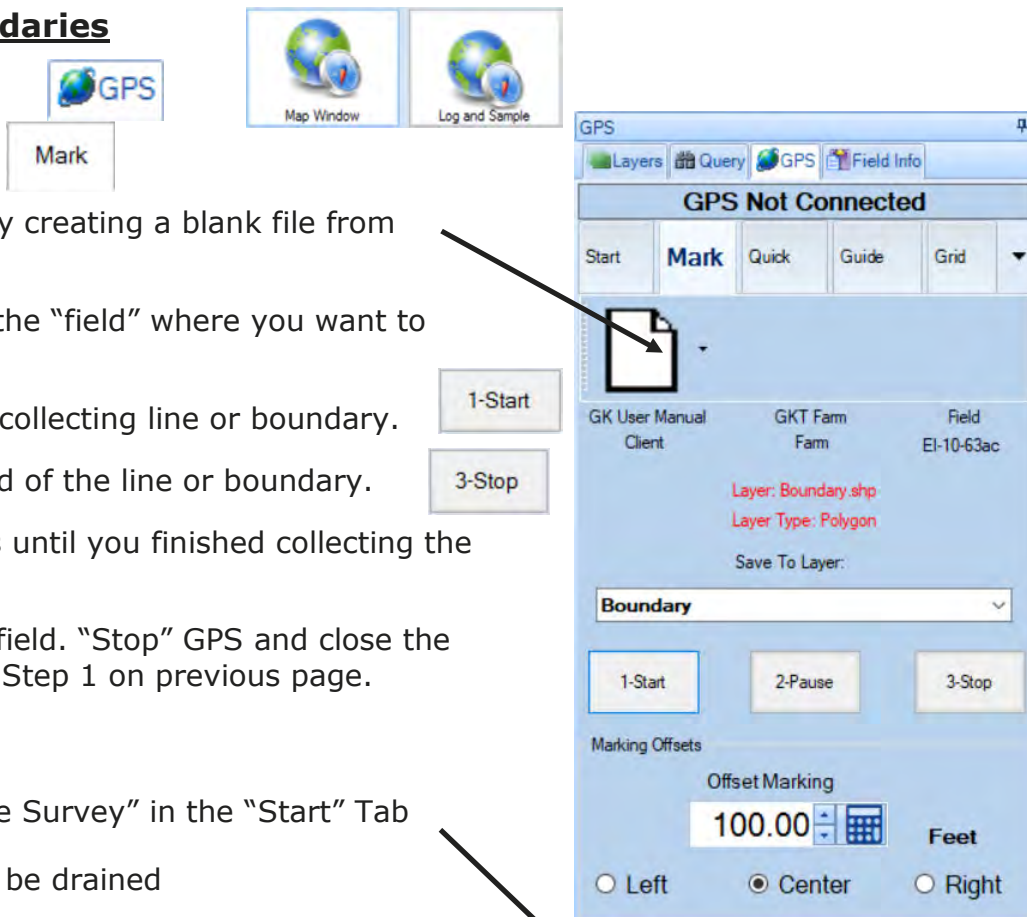
5. To mark other "Points" - Go to the **"Quick"** tab
 - a. Naming Quick Marks—Go to the "GPS" tab
 - b. Click on "Mark Settings" Button
 - c. Recommend settings like below
 - d. Name "Quick Marks" as you see fit
 - i. Limited to 8 characters
 - ii. Continuous—Will collect a point every second or every 2 feet.
6. To use the Quick Marks, simply click on the button you want to mark.
7. When starting a new field - start at the top of the page.



Quick Notes For GPS—In Field Lines/Boundaries/Drainage

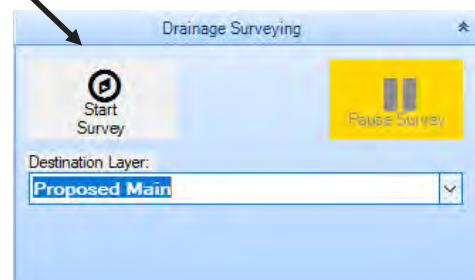
Marking Lines & Boundaries

1. Go to the "GPS" tab
2. Go to the "Mark" tab
3. "Select a Destination" by creating a blank file from template(ex. Boundary)
4. Move to the location in the "field" where you want to start collecting data.
5. Click "1-Start" to begin collecting line or boundary.
6. Click "3-Stop" at the end of the line or boundary.
7. Repeat previous 2 steps until you finished collecting the lines or boundaries.
8. When finished with the field. "Stop" GPS and close the software and start over at Step 1 on previous page.

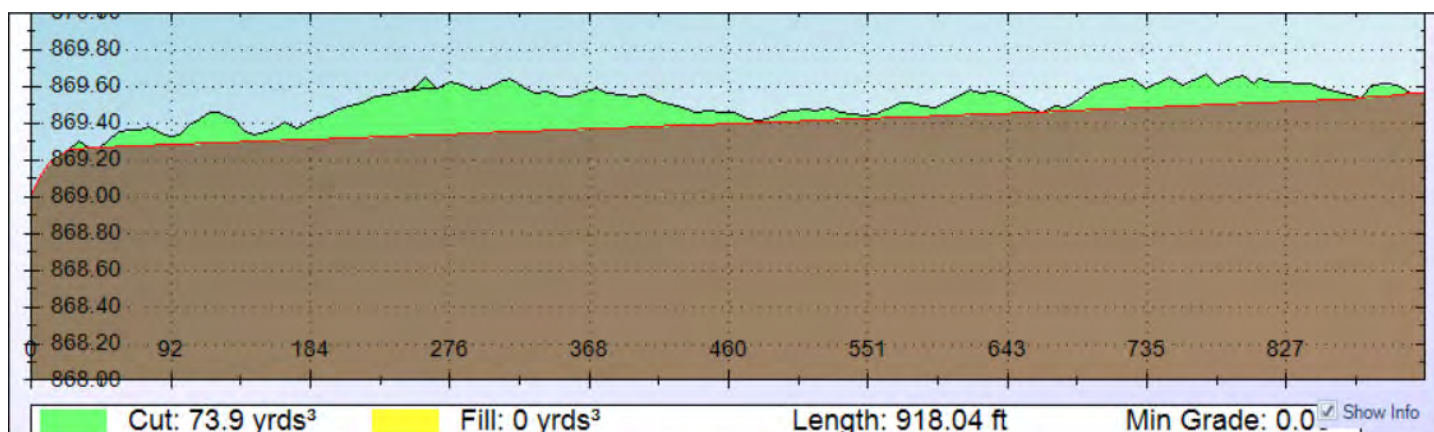


Drainage Survey

1. Click open the "Drainage Survey" in the "Start" Tab
2. Go to the hole / area to be drained
3. Surveys must be ran in the direction of water flow.
4. Click the "Start Survey" button
5. Drive ditch / tile line (pause to go around obstructions). In the drainage windows you will see profile generate as you drive.
6. Click "Stop Survey" at the end of the ditch / tile



If you are in the "Drainage" or "Tile" windows, a "PROFILE" will appear at the bottom of the window



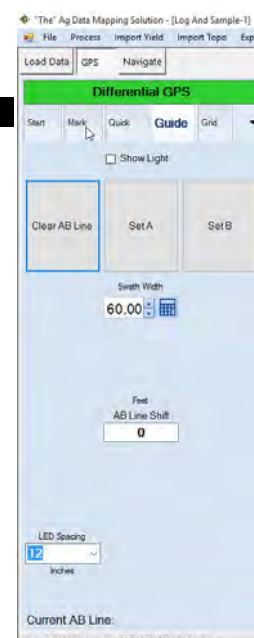
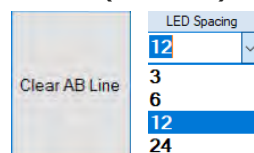
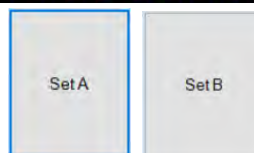
Quick Notes for GPS—Guide and Navigate

Guide Tab



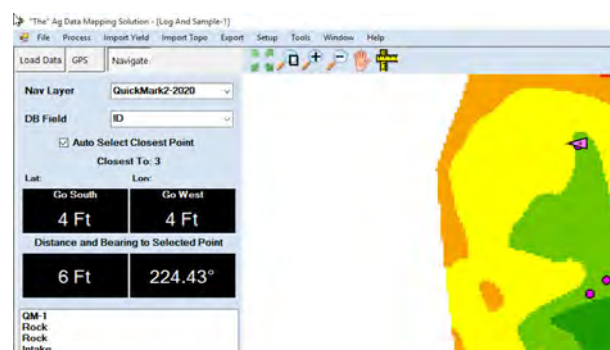
The Guidance Tab gives the function of an A-B Line Lightbar. It does not allow Curved lines. Just straight A-B Lines.

1. Turn on GPS in the "Start Tab"
2. Check the "Show Light" box
3. Click the "Set A" button
4. Drive to the other end of the pass
5. Click the "Set B" button
6. Set the "Swath Width"
7. To shift the line enter a positive or negative number (in feet)
8. To start a new line, click "Clear AB Line"
9. LED spacing is selectable via the dropdown.
10. To correct to the line, steer towards the yellow light

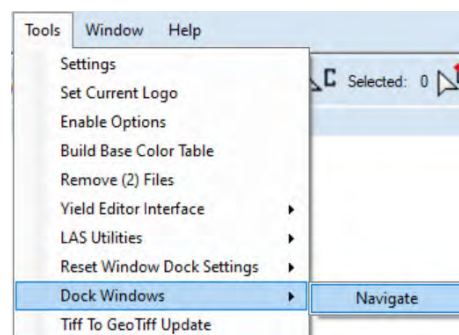


Navigate Tab

1. Turn on a points layer in the "Load Data" tab
2. Turn On GPS in the "Start Tab"
3. Select your "Nav Layer" from the drop down
4. Check the "Auto Select Closest Point" or select a point by clicking on it in the "Map Window"
5. The numbers in the boxes will navigate to the point selected by showing distances & bearing.



NOTE: In Map Window—To turn on these Navigation Tools. Go to "Tools / Dock Windows / Navigate"



Quick Notes For GPS—Setup Instructions

General GPS Information

Generally there are 2 major uses for GPS coming into ADMS

1. General Position—most cases this data is coming in via USB or Bluetooth. Most of the time the NEMA strings here are locked and cannot be adjusted.
2. High Accuracy RTK—most cases the data is coming in via 9 pin Serial connection. Most systems have adjustable Baud Rates and GPS Hertz rates (Hz). Most systems need to be adjusted before connecting to ADMS.

Baud Rate—is generally the number of bits per second. To find out what the baud rate is set to, suggest using the "Find GPS" function of ADMS. (NOTE: To collect GPS Data at 5 Hz you must be set to 19200 or higher on your Baud rate)

GPS Hertz or Hz is defines 1 Hz as one cycle per second or in the GPS function, one GPS Data String per second.

- Hz	=	Data String / 1sec	=	Seconds / 1Data String	=	ADMS Config Value
- 0.5	=	0.5 Strings/1 sec	=	0.5 / 1 = 2 Sec/String	=	2
- 1	=	1 Strings/1 sec	=	1 / 1 = 1 Sec/String	=	1
- 5	=	5 Strings/1 sec	=	5 / 1 = 0.2 Sec/String	=	0.2
- 10	=	10 Strings/1 sec	=	10 / 1 = 0.1 Sec/String	=	0.1

3 GPS NEMA Strings (required & 1 optional)

(National Marine Electronics Association)

- GGA**—GPS fix location, supplying Longitude, Latitude, number of satellites, signal quality, and altitude.
- GSA**—GPS quality DOP (dilution of precision) of active satellites.
- RMC**—GPS time, date, speed, and heading information. If RMC is not available **VTG** can be used.
- GST**—(Optional) - give GPS vertical and horizontal error in "meters"

Windows—"Device Manager" - Manual GPS Check

1. **GPS Port**—To find out if your GPS registered a COM port # , "Right Click" on the "My Computer" or "This PC" icon, then select "Manage".
2. This will open your "Computer Management" window. Select "Device Manager" and "Ports (COM & LPT)." You should see a series of PORT numbers similar to below. Pick out the one that matches the port you are connecting to. If you are unsure, it may be a trial and error method in Ag Data Mapping Solutions.

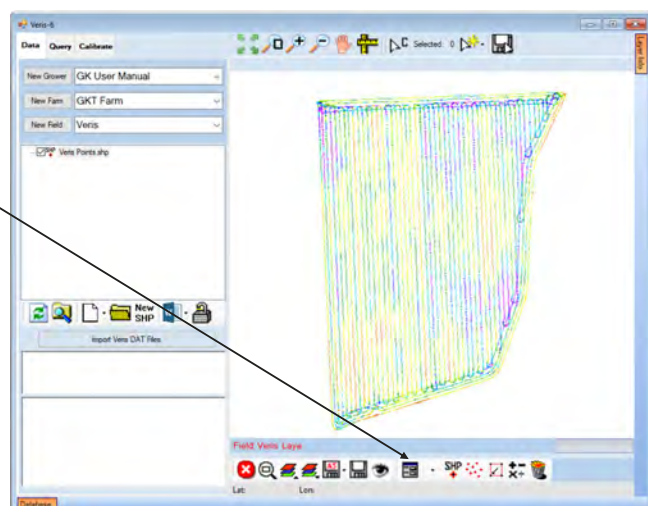
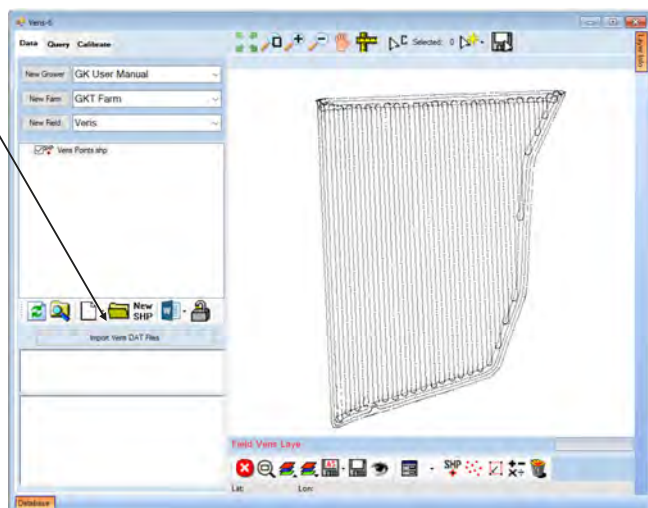
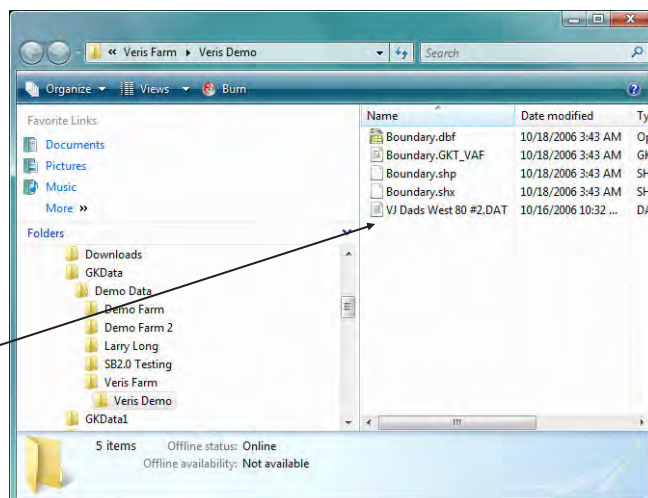


Processing Veris Data

Importing Veris DAT Files

In this section, you will be importing Veris DAT Files for a field and combining them into a single SHP file for surfacing.

1. Start Ag Data Mapping Solution and go to the top tool bar, select the **"Process"** item, then **"Veris Data"**.
2. Select the Correct "Grower", "Farm" and "Field" for the data you are importing.
3. After selecting, or creating, the proper Grower Farm and Field, click the "Explore This Folder" icon in the data tree. Paste in the Veris DAT file or files you wish to process. You may also want to add a Boundary file if you have one.
4. Click the "Import Veris DAT Files" button. Choose one or multiple DAT files to import. If you choose multiple DAT files, all files will be merged into one "Veris Points" shapefile. As the data is imported, bad data such as negative values are filtered out of the data.
5. Columns named 'NormSurf' and 'NormDeep' are added to the data. These values are the normalized values for the surface and deep data layers.
6. From there, you can use the 'Display Properties' and 'Thematic' to set the color for the points. This is just for appearance. The data created for creating zones will be in surfaces which we will describe on the next page.

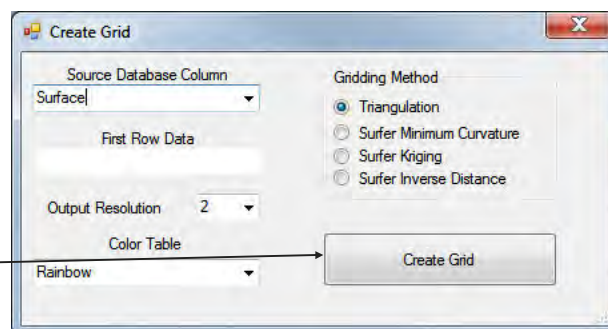


Processing Veris Data

Surfacing Veris DAT—SHP Files

In this section, you will be creating surfaces from shapefiles, and combining surfaces to create a single map for defining zones.

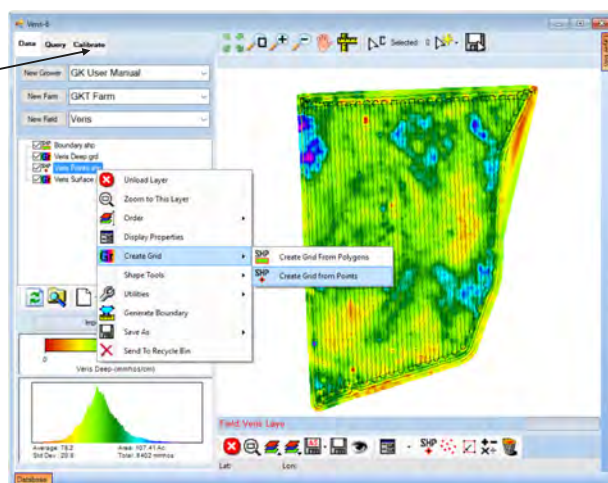
- Right click on the Veris Points shapefile in the data tree. Choose "Create Grid"- "Create Grid from Points". The dialog to the right will appear.



- Under "Source Database Column" select the "**Surface**" item. Then click "Create Grid".

- Once that process completes, change the "Source Database Column" to "**Deep**" and Click "Create Grid" again.

- Then switch to the "Calibrate" tab. Select the surface and Deep layers in the dialog boxes. Choose the weighting value for how much you would like each layer to influence the new output layer. By default the values are set at 60% Surface, 40% Deep. Click "Run Veris Calibration".

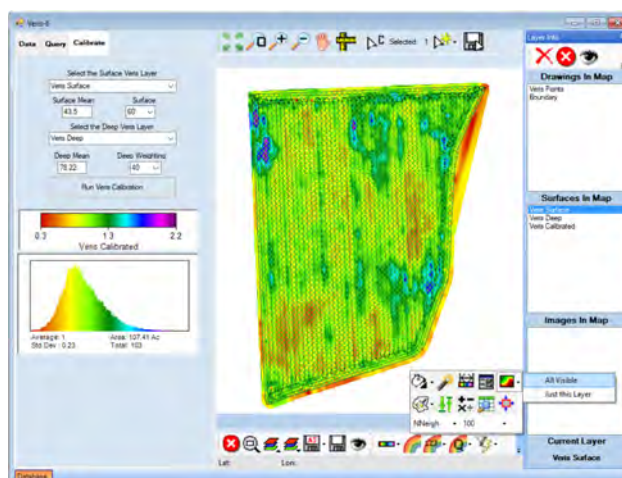


- Select the "Boundary" and click inside the Polygon in the map window, "Selecting" it.

- Choose any of the Veris.grd files, go to bottom tool bar and click "Crop Raster to Selected Polygon" & "All Visible"

Note: this will cut and save in one step.

- Set the zones using the Thematic Color tool. A good choice is a 5 zones using K-Means.

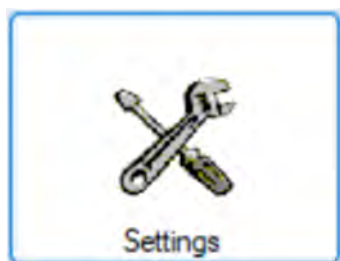


GK Cloud

The GK Cloud enables file transfers from ADMS to the GK Field Mapper app, available on Google Play and the App Store.

A new GK Cloud account can be created in either ADMS or the GK Field Mapper app. The same login credentials work for both.

Creating a GK Cloud Account—Settings Page

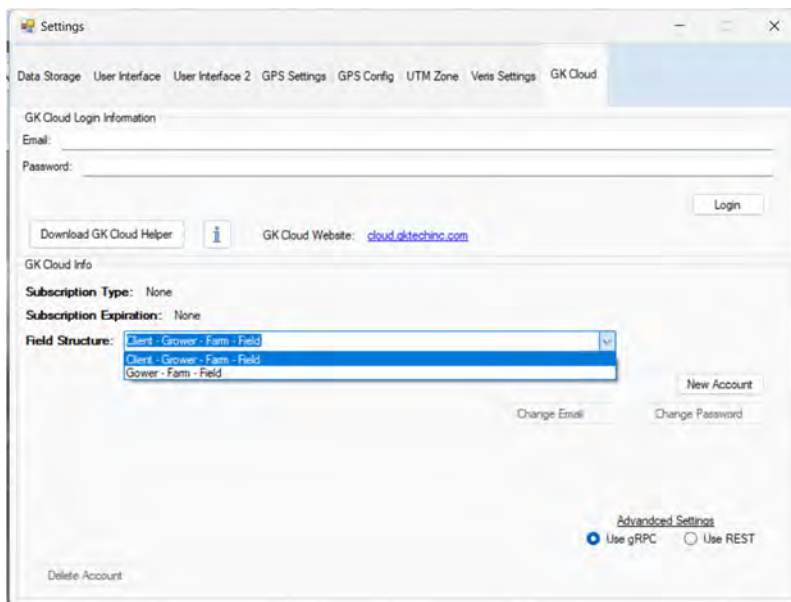


To set up a GK Cloud account in ADMS:

1. Go "Settings" and open the GK Cloud tab
2. Enter an email and password.
3. Select a Field Structure:

- *Consultants Package* users: Choose "Client - Grower - Farm - Field"
- All other users: Choose "Grower - Farm - Field"

Note: Field Structure selection is permanent. For changes, contact GK Technology.



Once complete, click "New Account"

Download GK Cloud Helper - This app runs in your taskbar tray as "GK Cloud Sync," automatically syncing any file or folder changes to your GK Cloud.

Account Management

- **Change Email:** Opens Change Email window.
- **Change Password:** Opens Change Password window.
- **Delete Account:** Click to delete all data on the GK Cloud.

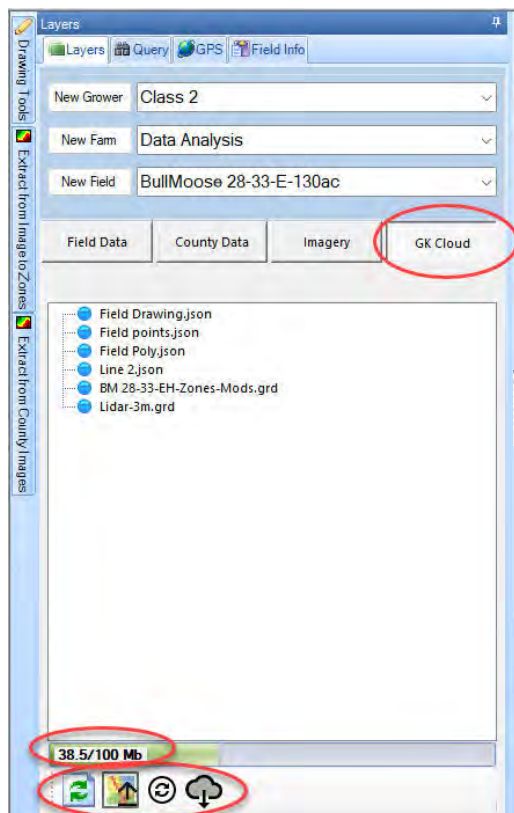
Advanced Settings

- **Use gRPC:** Default setting appropriate for almost all operating systems.
- **Use REST:** Choose if you are running Windows 10.

GK Cloud Website: <https://cloud.gktechinc.com/>

GK Cloud

GK Cloud Tab—Buttons & Features



GK Cloud Tab has its own unique buttons & user interface tools.

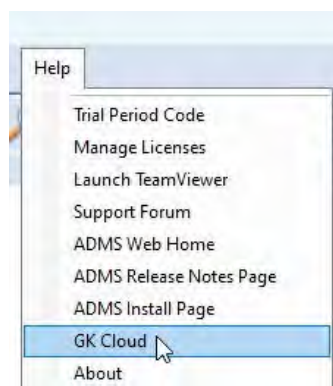
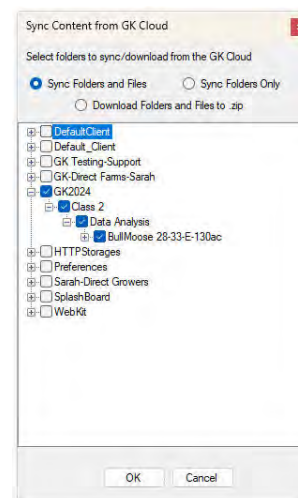
Data Storage Summary: 38.5 MB of 100 MB Subscription data storage are currently being used.

Buttons at the bottom of the data tree:

-  1. **Refresh Tree:** Updates data tree with new files transferred from Field Data or GK Cloud.
-  2. **Upload all files from the map to GK Cloud:** Forces upload of files from the GK Cloud Tab (ADMS) to GK Cloud (Web).
-  3. **Sync all files to and from the GK Cloud:** Forces data to Sync both way from the GK Cloud Tab (ADMS) to GK Cloud (Web).



4. **Sync specific folders from the GK Cloud:** Opens a "Sync Content from GK Cloud" dialog box. User can select specific folders within the Client/Grower/Farm/Field structure to sync with GK Cloud. Files in ADMS will be uploaded to GK Cloud and files in GK Cloud will be imported into ADMS within the selected folders only. Option to download GK Cloud data into a ZIP file.



Please sign in to access GK Cloud Server.

Email

Password

☐ Remember me?

GK Cloud can be accessed directly by going to "Help" and "GK Cloud". Access GK Cloud using GK Cloud email and password.. Web-site allows user to evaluate which files are in the GK Cloud and perform basic file maintenance.

GK Cloud

Transferring Data from ADMS to GK Cloud



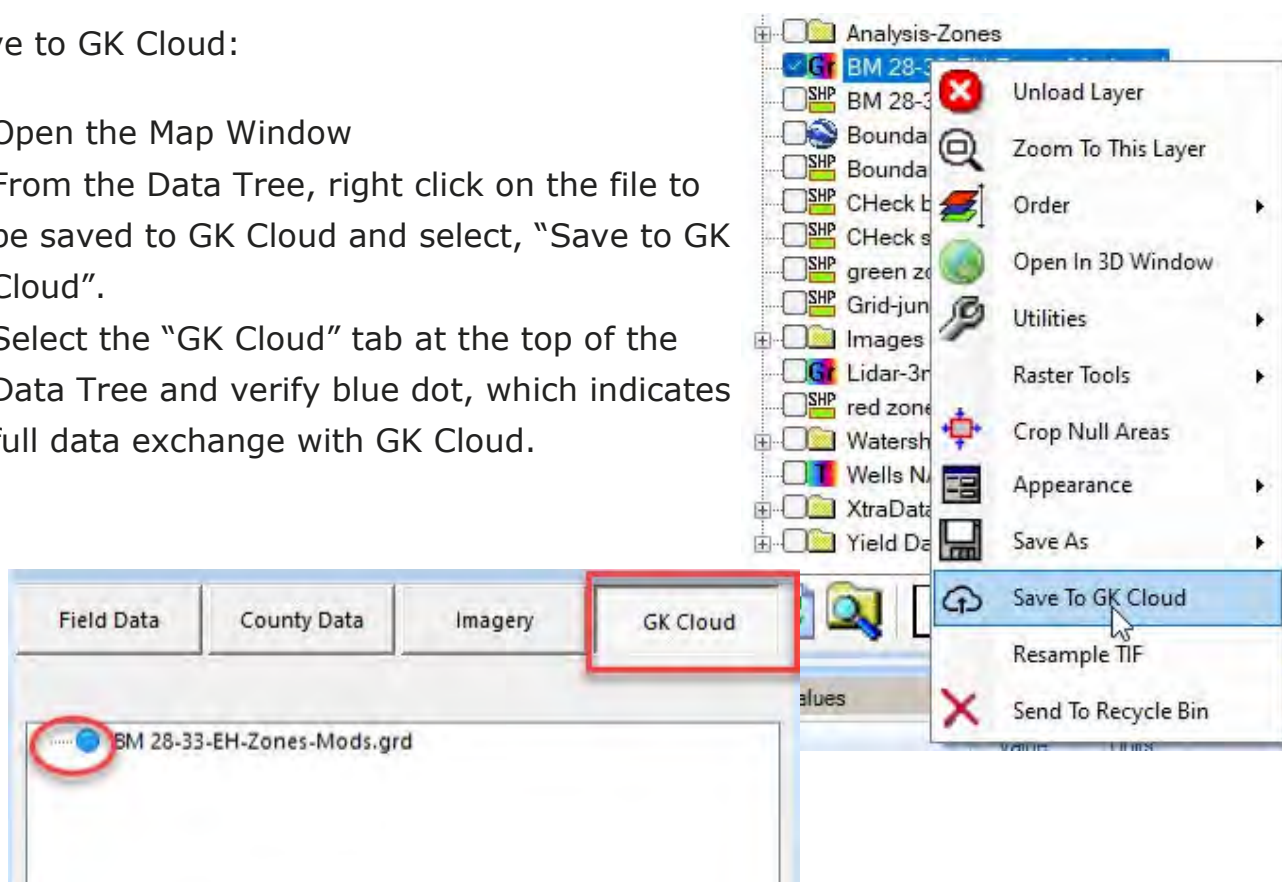
Files can be transferred from ADMS to GK Cloud and used in GK Field Mapper (GKFM). GKFM App will support the following files from ADMS: SHP, GRD, and BMP.

Note: All files saved from ADMS to GK Cloud are automatically assigned the correct EPSG code. Information is added to the .GDW, .BPW & .PRJ as required for GKFM.

Note: Moving files "Manually" to the GK Cloud (not via ADMS) will not update EPSG codes and may cause problems in GKFM.

To Save to GK Cloud:

1. Open the Map Window
2. From the Data Tree, right click on the file to be saved to GK Cloud and select, "Save to GK Cloud".
3. Select the "GK Cloud" tab at the top of the Data Tree and verify blue dot, which indicates full data exchange with GK Cloud.



GK Cloud Dot Colors—indicate the state of data exchange with GK Cloud

1. **Blue:** Data has been fully exchanged between ADMS and GK Cloud
2. **Yellow:** Previous version of this file has been downloaded to ADMS and updated version is available on GK Cloud
3. **Orange:** Layer is in ADMS, but has not been uploaded to GK Cloud
4. **Red:** Layer is in the GK Cloud, but has not been downloaded to ADMS

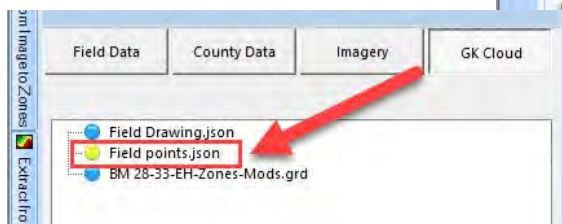
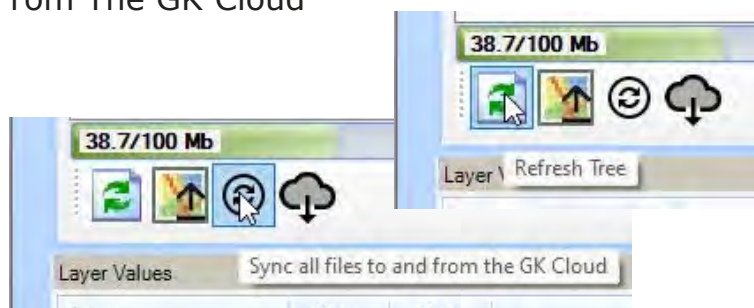
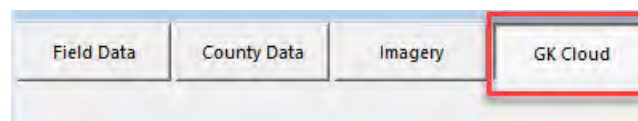
GK Cloud

Importing Data from GK Cloud to ADMS

To Save Files from GK Cloud to ADMS:



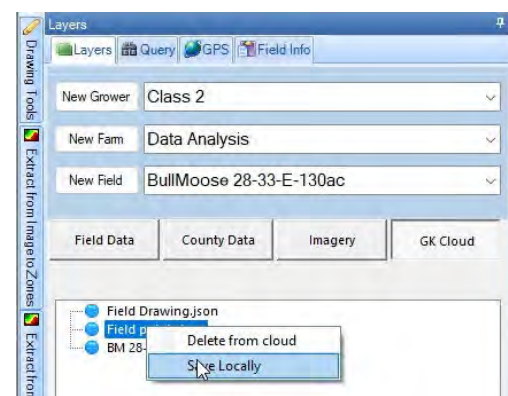
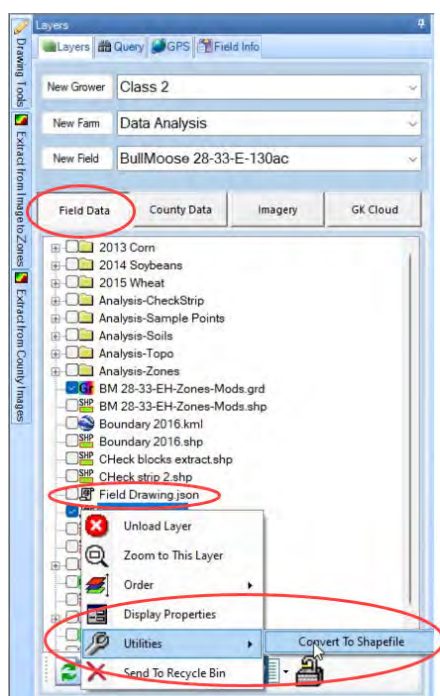
1. Open the Map Window
2. Go to the "GK Cloud" tab on data tree.
3. At the bottom of the data tree, Click either the "Refresh Tree" button or "Sync All Files To and From The GK Cloud"



4. Points / Lines / Polygons files downloading from the GK Cloud will appear in the GK Cloud tab. The file should come in as .JSON file type.

5. To work with imported data in ADMS, it needs to be "Saved Locally".

- Go to the "GK Cloud" tab
- Right Click on the .JSON file & "Save Locally".



6. Go to the "Field Data" tab—note the .JSON file.
 - If you do not see the file Click "Refresh Tree"
7. To Edit or Modify Vector Files in ADMS, the .JSON file MUST be converted to a shapefile format.
 - Right click on the .JSON file.
 - Go to "Utilities" and "Convert to Shapefile".

My Notes

Glossary

GFF—Is a GK Technology abbreviation for Grower / Farm / Field data structure.

GIS— Geographic Information System is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

Projection—A method by which the curved three-dimensional surface of the earth is portrayed on a two-dimensional flat surface. This generally requires a mathematical transformation of the earth's lines of longitude and latitude onto a plane. Every map projection distorts distance, area, shape, direction, or some combination thereof.

Spherical Coordinate System—A coordinate system that uses positions of latitude and longitude to define locations of points on the surface of the earth.

Cartesian Coordinate System—Defined as a flat coordinate system placed on the surface of the Earth. In some projections it's not flat in the sense that it follows the earth's curvature in one direction and has a known scale of error in the other direction relative to the distance of the origin. The most well-known coordinate system is the Universal Transverse Mercator (UTM). It is very easy to work with, fairly accurate over small distances making measurements such as length, angle and area very straightforward.

UTM—Acronym for *universal transverse Mercator*. A projected coordinate system that divides the world into 60 north and south zones, 6 degrees wide. This is what everything is projected in within the software. Being in the correct UTM zone is critical to ensure the location is accurate.

Datum— Point, line, or surface used as a reference. The datum defines an ellipsoid and through set points on the ground they are related to points on the ellipsoid, the center of the earth is defined. There are many different datums used for measurements locally and worldwide. Common datums are WGS84 and NAD83.

NAD 83— *North American Datum of 1983*— Datum defined to remain consistent over the years for the North American Continental Plate.

WGS 84— Most well known datum. Gives a good approximation of points over the entire world and in theory remain consistent over time.

Latitude— The angular distance, usually measured in degrees north or south of the equator. Lines of latitude are also referred to as parallels.

Longitude—The angular distance, usually expressed in degrees, minutes, and seconds, of the location of a point on the earth's surface east or west of an arbitrarily defined meridian (usually the Greenwich prime meridian). All lines of longitude are great circles that intersect the equator and pass through the North and South Poles.

Hard Breaks— Variable rate maps that have less than 20 rate breaks. Breaks may be coming from not interpolating maps in merge zone results or using a Rate Increment function.

Glossary

Vector—A coordinate-based data model that represents geographic features as points, lines, and polygons. Each point feature is represented as a single coordinate pair, while line and polygon features are represented as ordered lists of vertices. Attributes are associated with each vector feature, as opposed to a raster data model, which associates attributes with grid cells.

Point— Zero dimensional and do not have a volume, area, or length. Points have many uses, they can be yield, mark areas in the field, define elevation along with many other types of data.

Line— A path that is connected by at least two vertices. However, multiple consecutive vertices can be used to create a curved line.

Polygon— A combination of multiple line segments that represent a closed shape. Polygons are vector data and can be grids or boundaries.

Raster— This is how images are displayed within the software. Where each pixel has one or multiple values associated with it. This gives increased accuracy and more detail when creating application maps. It is a spatial data model that defines space as an array of equally sized cells arranged in rows and columns, and composed of single or multiple bands. Each cell contains an attribute value and location coordinates. Unlike a vector structure, which stores coordinates explicitly, raster coordinates are contained in the ordering of the matrix. Groups of cells that share the same value represent the same type of geographic feature.

Multiband Raster (Image)— A raster image that has more than one value associated with it at every pixel. Each band (reference to the color band on the electromagnetic spectrum) represents a segment of the electromagnetic spectrum collected by the sensor. When displayed the image is a color composite of each band. An examples of multiband images are ortho and satellite images.

Single Band Raster (Surface)— An image with one set of values per pixel.

Image—In the software an image usually is the county data or satellite imagery scenes before any data analysis has been done. It is a representation or description of a scene, typically produced by an optical or electronic device, such as a camera or a scanning radiometer. Common examples include remotely sensed data (for example, satellite data), scanned data, and photographs.

Surface— In the software surfaces are represented by almost any type of created raster data. This include elevation, yield, application raster maps, and satellite imagery. A surface is a geographic representation of a set of continuous data (such as elevation or geological boundaries); a spatial distribution which associates a single value with each position in a plane, usually associated with continuous attributes.

Ancillary Data— In GIS processing, data from other sources used to assist in analysis and classification or to populate metadata for another object.

Glossary

- MID**— MapInfo interchange format (always paired with MIF)
- MIF**— MapInfo interchange format (always paired with MID)
- SHP**—A vector data storage format for storing the location, shape, and attributes of geographic features. A shape file is stored in a set of related files and contains one feature class. Shapefiles can be used to represent lines, points, or polygons. Often times you will see shape files as field boundaries, sample points, yield points, elevation, and in tile planning. Shapefiles have at a minimum of three files associated with them to make them functional. These are a SHP, SHX, and DBF. The SHP file contains the primary geographic reference data in the file. SHX file is the index portion of the file. DBF is the database file. The shapefiles attributes are stored in database format and have a columnar structure for each attribute.
- CSV**— Common separated value. Stores data in plain text form. Can be opened in Microsoft Excel and in a text file editor (notepad). They are primarily separated by a comma. CSV files are generally used to import soil test results and yield data.
- XLS**— File extension used to identify the file as a Microsoft Excel file. XLS files are used when importing soil test results into the program.
- XML**— Extensible Markup Language—A markup language that defines a set of rules. These can be both human and machine readable. Textual data format, and is widely used to represent data structures.
- SID**— Compressed image that is created using the multi-resolution seamless image database. This is commonly used to partition large geo-referenced raster images. A common SID image is ortho imagery.
- JP2**— Compressed images with the metadata with XML embedded data. Geo-referenced images can be opened and displayed correctly on the earth's surface.
- JPEG**— Joint Photographic Experts Group—Common image compression method. Compression can be adjusted to select between size and quality of the image. Some of the original image quality is usually lost in the compression and cannot be restored. JPEG images can also support millions of different colors.
- BMP**—Bitmap Image File—Raster image files that can be edited, saved, geo-referenced, and used within the software. Often times they work well because they are compatible with other software packages and contain a higher resolution than a JPEG.
- TIFF**— Tag Image File Format— A common format for exchanging raster graphics images between application programs, including those used for scanner images. TIFF files can be composed of multiple of single bands and be georeferenced. There are many different types of TIFF file formats and not all are supported within the software. Often TIFF files will be satellite imagery scenes

Glossary

- GRD**—Grid files which are used to generate maps. Most raster data created within the software is automatically saved as a GRD file. However, these files can be manually saved as a BMP, JPG, or TIFF file and maintain the geo-referencing. GRD files contain two-dimensional uniform lattices (regularly spaced, rectangular array) of XYZ data (e.g. easting, northing, and elevation); may be in a binary or text format, but is most often saved in the binary format.
- NIR**— Is a method of light extraction. This can be used on ortho images as well as satellite imagery. The best images to use this for are bare soil images. The NIR light is electromagnetic radiation with longer wavelengths than those of visible light, extending from the nominal red edge of the visible spectrum at 0.74 micrometers (µm) to 300 µm.
- NDVI**— NDVI is best used on vegetative images which can be satellite or ortho images. It gives a good measure of light reflectance on green vegetation. It is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not. NDVI is defined as $NDVI = (NIR - VIS) / (NIR + VIS)$
- RGBVI**—Is Red Green Blue Vegetation Index combines the Red Green and Blue band. It is useful in images that do not have NIR but do have vegetation in the image. $RGBVI = G^2 - (B * R) / G^2 + (B * R)$
- Geo-referenced**— To define an objects location. This gives the images a position on the face of the earth.
- Remote Sensing**— To gather information about an object without physically being there. Most often this term is used to acquire information from aerial or satellite imagery which gives information about the field.
- CIR**— Refers to an Image that is "Color Infrared". This means that there is an Infrared, red, and green band in the image. However band the orders may differ between them (e.g. NRG & NGR).
- NRG**— An image that has an Near-Infrared, Red, and Green band in it, in that order.
- RGB (Color)**— Also referred to as a "color" or "true color" image. These images only have a red, green, and blue band in them. Since it is lacking Infrared, NDVI and NIR extractions cannot be done on them.
- BW**— A term often seen on WMS links refers to a black and white image.
- LiDAR**—Which stands for Light Detection And Ranging = Elevation data collected by using reflected NIR light. Measuring the response times and color intensity LiDAR returns accurate elevation data and can create classifications of what the light hit (Ex.—ground, vegetation, buildings or water).
- Photogrammetry**— Is the science of making measurements from photographs. Using complex 2D and 3D models and known measured values, this process can give relatively accurate XYZ locations.