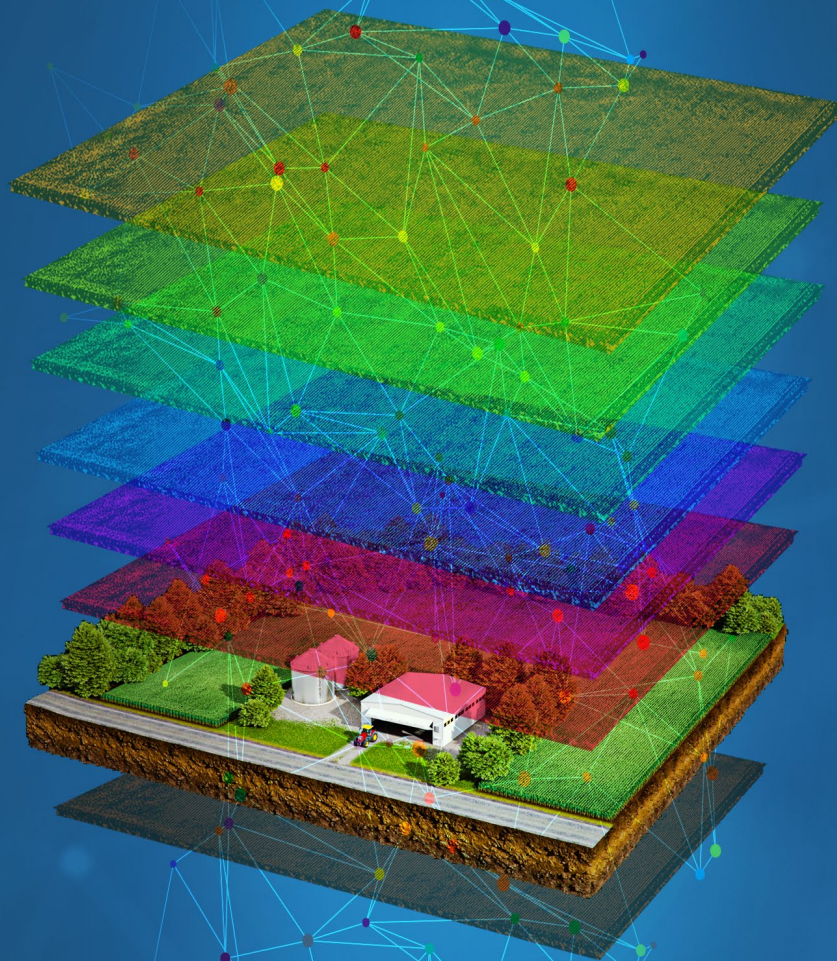


CASE STUDY



Demystifying Drainage

The Power of Ditching in the Age of Precision Ag



Every farmer has “that” field. You know the one. The one you hate to drive through because of the thick mud that clings to your tractor tires. The one that makes you dread replants rather than celebrate strong emergence whenever even the slightest rain comes down. The one you know needs to be fixed, but how to do so always eludes you. Is it worth the astronomical price to tile it? Is ditching going to work or just further erode it? Will the yield saved even be worth the cost in the end?

The primary issue facing farmers with poorly drained fields is a lack of clear information. Everyone knows the frustration of massive replants and lost yields, but the price tag attached to the solutions is often significant. No one wants to throw tens or even hundreds of thousands of dollars at a solution that may not pay off in the end, and for good reason. But the risks of these methods are slowly fading into the past.

Digital agricultural technology has come a long way in the past decade, and new methods of identifying and solving drainage issues in both a time- and cost-effective manner are becoming more and more readily available. This case study will examine how a field with a truly deplorable state of drainage, requiring regular replant on over half its acreage and producing subaverage yields in 2020, went to requiring no replant and promising strong yields in 2021. This was made possible by new advances in ditching technology, facilitated by Intelinair’s AGMRI AI Platform’s accurate and consistent insights on the state of the field.

THE MOON FIELD

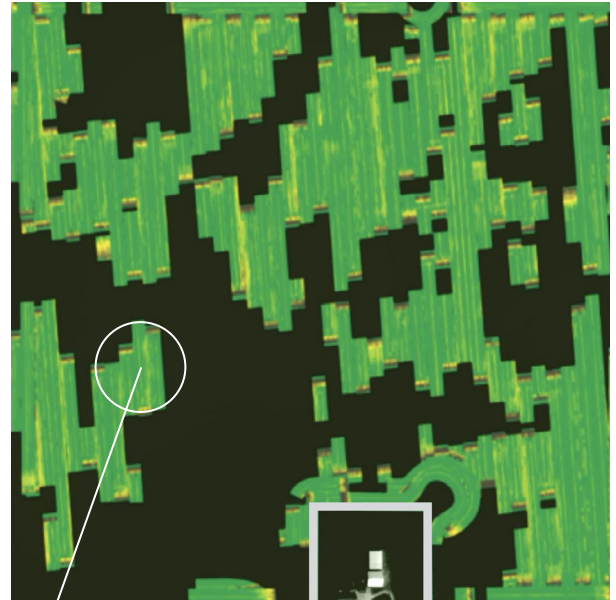


The “moon” field - many of the visible ponds are over an acre in area.

The field in question is a large, 149-acre plot in central Illinois, which cycles between corn and soybean production each season. It is clearly one of “those” fields; even the slightest rain forms pools of standing water all across its surface, ruining yields. Looking at aerial images provided by AGMRI, the field’s pockmarked surface of acre-sized ponds is more reminiscent of the crater-ridden surface of the moon than the neat lines of the picture-perfect farm. And the damage, of course, was more than aesthetic. In late April 2020, shortly before the field’s first emergence, a mere inch and a half of rain caused these ponds to fill. The resulting damage devastated the seedlings in the field, necessitating 83.3 acres of replant: over half of the field’s total acreage.

A MERE INCH AND A HALF OF RAIN... DEVASTATED THE SEEDLINGS IN THE FIELD, NECESSITATING 83.3 ACRES OF REPLANT: OVER HALF OF THE FIELD’S TOTAL ACREAGE

The farmer of this field knew that this was a problem year after year, but the real issue he faced was finding the appropriate solution. When it comes to fixing poor drainage, farmers are stuck between a rock and a hard place—the former being the enormously expensive but effective project that is tiling, and the latter the imprecise art of ditching. Ditching is cheaper, but is often an exercise in hopeful guesswork that is not guaranteed to pay off. And without easy access to ditching technology, the price can quickly move out of the affordable range. Thankfully, by combining the information processing power of Intelinair's AGMRI platform and new advances in precision ditching, this farmer was able to remove almost all the risks associated with this method and reap its potent benefits.

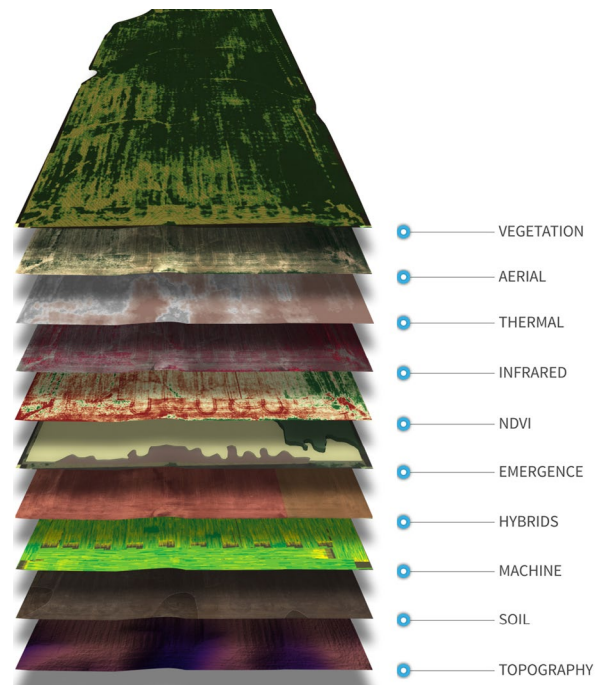


AGMRI's map of the replanting operation. Over half the field experienced significant loss.

EYES IN THE SKY AND HOLES IN THE GROUND

The owner of this field is subscribed to Intelinair's AGMRI Platform. AGMRI is the revolutionary decision support platform for Ag that uses machine learning, computer vision, and high-resolution imagery to construct a "digital twin" of any field under its purview.

This digital twin is an exact copy of the field in digital space, including information such as soil composition, field topography, and color, thermal, and infrared images taken by plane, drone, and satellite. All together, this provides an uninterrupted view of every acre from planting to harvest. This is all processed by a series of powerful machine learning algorithms that produce multiple vegetative health indices, and are capable of detecting everything from emergence to disease to weeds.



AGMRI's "Digital Twin" analyzes all aspects of a field from the ground up.

All of these issues can be immediately viewed and acted upon via alerts and visualizations that appear right on the user's smartphone. AGMRI can even wirelessly export custom prescriptions to machinery in the field, connecting these big-picture insights to the day-to-day work on the farm.

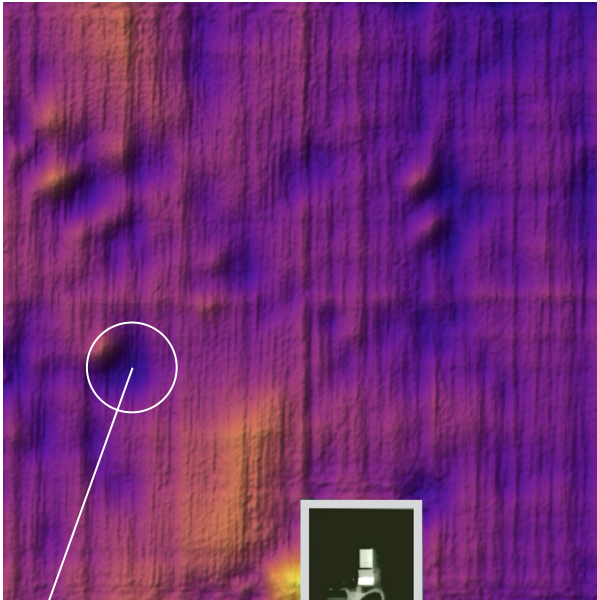
In this farmer's situation, AGMRI provided two things. Firstly, the farmer was able to quickly react to the damage caused by the rains, getting timely feedback on which acres were damaged and in need of replant without a lengthy manual scouting operation. Any time lost manually scouting a field is replant opportunity lost, and AGMRI provided a transparent, detailed view of the field and was able to automatically identify areas in need.

Second and most importantly, however, AGMRI provided the information needed to demonstrate the scale of this field's drainage issues and the total cost of losses. The farmer was able to take a complete, historical view of his field across several growing seasons, and recognize that this issue was not going away any time soon. End of season yields across the years were consistently low, and he stood to reclaim a sizable amount if he invested in fixing the field's drainage. However, he did not want to immediately opt for an expensive tiling project while there were other options that could be explored-and this field would be the perfect testing ground.



An AGMRI replant opportunity alert from the field in 2020.

AGMRI PROVIDED A TRANSPARENT, DETAILED VIEW OF THE FIELD AND WAS ABLE TO AUTOMATICALLY IDENTIFY PROBLEM AREAS...GETTING TIMELY FEEDBACK ON THE ACRES IN NEED OF IMMEDIATE REPLANT.



Topographical map of the field.

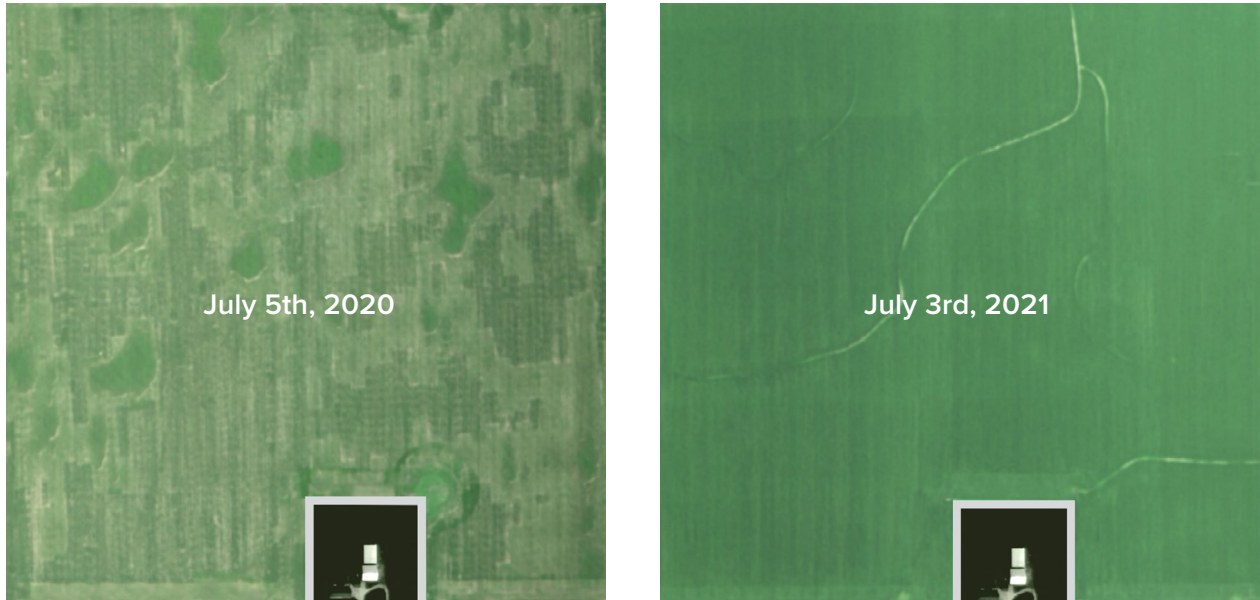


Image Credit: iStock.com/oticki.
Used with License

AGMRI provided all the necessary information for the farmer to engage with a precision ditching company. “Precision ditching” is a relatively new field in Ag, spearheaded by companies such as the Australia/US T3RRA and Canadian Northern Plains Drainage Solutions. It involves several steps that take out the guesswork and risk normally present in ditching operations.

Precision ditching companies will first build a detailed topographical map of a field using RTK GPS data, which is an ultra-precise form of geographic measurement that is accurate down to the centimeter. This map is then processed through an algorithm that determines where water will most effectively flow, and a ditching path is created. These paths can be directly loaded onto a tablet or onboard cab monitor, taking all the guesswork out for the farmer when they go to cut the ditches.

Many companies also provide accurate simulation data where they can show just how rainfall of various amounts will flow through the field once the ditching project is complete. This whole process only cost a few thousand dollars for this farmer’s field, whereas a tiling installation would have cost somewhere in the neighborhood of \$120,000. And the results speak for themselves.



Side-by-side aerial images of the field. The left was taken on July 5th, 2020, and the right on July 3rd, 2021. The difference in drainage is easy to see.

NEW DITCH, NEW FIELD

After the ditch was cut in the off season, the farmer used AGMRI to keep a close eye on the field. And he was amazed by what he saw. The field had next to no water pooling throughout the season. Even the torrential storms of late June and early July 2021, which crossed 100-year rain thresholds across the state of Illinois, had a barely noticeable impact on the field. But more important than that was the amount of replanting he had to do: **zero**. AGMRI detected excellent plant health across the field, and all the initial seed was able to last throughout the season. Yields are estimated to be 20-30% higher in the coming harvest, all because of a very simple ditching solution that is available to any farmer, large or small.

However, the efficacy of this solution was only properly visible because of the diagnostic power of AGMRI. Without the aerial images proving that no water pooling existed and the vegetative health analytics confirming that no replanting was needed, the full benefits of this ditching project would not have been seen until several harvests out. Now that this farmer is armed with the knowledge that precision ditching worked for him, he can roll it out across other fields with drainage issues with no more delays and reap the increased yields.

AGMRI DETECTED EXCELLENT PLANT HEALTH ACROSS THE FIELD, AND ALL THE INITIAL SEED WAS ABLE TO LAST THROUGHOUT THE SEASON. YIELDS ARE ESTIMATED TO BE 20-30% HIGHER IN THE COMING HARVEST

The world of Ag is changing, and AGMRI is the innovative AI platform that can provide accurate and consistent information to maximise the potential of your fields. Do you have “that” field? You may finally be able to fix it with the power of AGMRI and precision ditching.

ABOUT INTELINAIR

Intelinair is spearheading the digital Ag revolution through AI, focusing on improving in-season crop performance and providing off-season logistical insights through our innovative digital twin technology and AGMRI machine learning platform. We are committed to boosting efficiency, driving higher yields, and increasing productivity all while maintaining sustainable farming practices in the ever-changing world of Ag tech. You can find out more about our mission and how we can help you get the most out of your fields at www.intelinair.com or by calling 1-833-692-4674.

Branch, R. (2021) Weekend storms bring 100-year rainfall to central Illinois [online]. Available at: <https://brownfieldagnews.com/news/weekend-storms-bring-100-year-rainfall-to-central-illinois/>

Cornell University Cooperative Extension. (2011). Subsurface (tile) drainage benefits and installation guidance, electronic dataset. Available at: <http://nmsp.cals.cornell.edu/publications/factsheets/factsheet57.pdf>

Dietz, J. (2011) Precision field drainage comes of age [online]. Available at: <https://www.topcropmanager.com/precision-field-drainage-comes-of-age-5999/>

Dietz, J. (2012) 'One farmer's experience with Cellular GPS-RTK Field Drainage', Top Crop Manager West [online], October, p42-45. Available at: https://mydigitalpublication.com/publication/?i=128002&article_id=1190062&view=articleBrowser&ver=html5

