

CUSTOMER PROFILE

ACCESSIFLY

"Infrared Thermography & Integrated GIS Inc."

57 Peterborough Avenue, Toronto, ON, M6H2K9
 P: 647.802.2256
 E: info@accessifly.com
<https://accessifly.com>
<https://accessifly.maps.arcgis.com>

"As with any traditional GIS based Point Cloud imaging, there are always inherent risks with uneven topography due to occlusions caused by "line of sight" visualization. A NADIR based ('bird's eye') RPAS mission and precision 'grid' imaging methodology dramatically reduces any such possibility with careful planning and execution. The vantage point of the Draganflyer Guardian camera, paired with its consistency between calculated image overlap during such an 'Autonomous Grid' flight performed via the Draganfly Surveyor software affords the remarkable data density generated, which we then leverage as GIS professionals with software like *Pix4D & ESRI ArcGIS Pro/Online*.

To the same degree, as Certified Infrared Thermographers, we seek to harvest unique and rich data for our clients and integrate the two fields using what FLIR aptly characterizes as "the 6th Sense" (Thermal Infrared Imaging). The Draganflyer Guardian is the most reliable, responsive, consistent, and technologically advanced aircraft we have flown, and the deliverables we created for this study are the evidence we stand by, and we look forward to sharing them with everyone. We fly the best, it's that simple for us."

-Chris Gorczyński BA, MA, GIS Certified Infrared Thermographer, Chief Pilot, President ACCESSIFLY



Construction, Earthworks & NDST Research Industry

Thermal Infrared, Aggregates, GIS Study

Introduction:

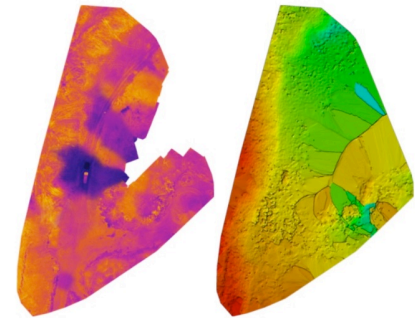
Accurate assessment of aggregates is a widely accepted time-consuming task, often requiring extreme expense to accomplish any degree of accuracy as well as encompassing considerable costs for the hiring of human resource capital for labour hours. Nonetheless, accurate data is required to ensure the integrity of the reporting process, which is used to measure finance, resource distribution, cut/fill volume replenishment, and ultimately ensure good business health.

Traditional surveying and manually-led measurement squads are still amongst the more accepted means useful to assess aggregates (including "drilling" into stockpiles for often agreed "unreliable" ultrasound); and LiDAR flights are often employed by townships disconnected or tethered unnecessarily to "legacy" contracts.

Background:

This paper seeks to examine the benefits and substantial R.O.I. seen in relation to prior expenditure disbursement for a client's customer through discussion of a full spectrum RGB and integrated Thermal Infrared Aerial Survey conducted by **ACCESSIFLY "Infrared Thermography & Integrated GIS Inc."** using the Draganflyer Guardian airframe.

As explored hereafter, this study demonstrates the multiple advantages of utilizing remotely piloted aircraft systems over the traditional analysis techniques/technologies noted in the introduction as applied to aggregate assessments and without question, assisted the client with transitioning and reporting therein.



In addition to mapping, high resolution Thermal Infrared was used for inspection

Additionally, this paper forms a piece of a much larger "Public Research" treatise currently under final summary for publication by **ACCESSIFLY "Infrared Thermography & Integrated GIS Inc."** wherein the flight data and planning was conceptualized to appropriately document and test/re-test methodologies for integrated GIS applications using remotely sensed and calculated radiometric imagery.

More specifically, the latter examines the use of high resolution radiometric thermal infrared-R.jpeg photo and radiometric-R.mpeg video taken with a 19mm FLIR Vue Pro R 30hz 640x512 thermal infrared RPAS camera combined with NADIR RGB photogrammetry & inspection video using the Draganflyer Guardian Sony QX100 camera.

The client's overall goal described in this publication was to help establish "Proof of Concept", protocols, explore findings, and methodologies to support others in reapplication of these practices across the industry.

Flight Summary:

The study involved four flights across two 150x100m public aggregate sites roughly 2 hours north of Toronto, ON (10+ flights total by conclusion) allowing for scholarly contrast. Flight 1 consisted of RGB NADIR photogrammetry taken with the powerful Guardian Sony QX100 camera, followed immediately by a 2nd flight along the same "grid", likewise using the same RGB camera to record NADIR inspection video. The payload was then exchanged for the 3rd flight and the Guardian thus equipped with a FLIR VUE Pro-R radiometric 30hz 19mm 640x512 thermal infrared camera.

A unique custom modification to the Draganfly Surveyor software allowed ACCESSiFLY to capture NADIR thermal infrared images (along the concept of "infrared photogrammetry") and repeat the Surveyor software grid for a 4th and final flight with the FLIR camera capturing thermal infrared radiometric inspection video of the site. This process was then replicated at the 2nd site.

On-site safety surveys, RTK point planning, and preliminary integration for GIS application, followed by multiple meetings where objectives were outlined and documented. ATS coordination commenced under the client's SFOC as a compliant operation/operator. An appropriate flight plan was established at the office moving seamlessly between ESRI ArcGIS environments and the Draganfly Surveyor software with planned output pathways into Pix4D and ArcGIS Pro/Online.

The extensive planning ensured that the safety and integrity of the environment was upheld as well as the safety of the participatory ground crew during flight. Staff were constrained to a spartan minimum for the purposes of supporting "smaller operations" as a tertiary evaluation component of this study. A complex decision requiring additional coordination allowed ACCESSiFLY to use the data graciously and openly without FIPPA risks by choosing to fly unrestricted public land.

The flight environment was extraordinarily technical and an AGL of 40m (131.234ft) was needed following altitude tests to clear "high vegetation". Despite the restrictions, ACCESSiFLY was able to achieve a remarkable .97mm GSD with an integrated thermal infrared & RGB radiometric mesh yielding "Proof of Concept".

On the flight days, RTK GCPs were acquired using two EMLID Reach RS+ RTK loggers & "fixed" acquisition points with AR ratios of flawless 999.99 each recorded in .txt X,Y,Z format and later imported into Pix4D in post-processing. The 8 GCP's were strategically placed to allow a coordinated and planned "flip" using the "Carson Technique" in the Draganfly Surveyor software so the flights would be seamless across the needed battery exchanges to achieve proper image overlap. Remote location connectivity issues were overcome via the "set point" approach to perimeter geofencing in the Draganfly Surveyor software by using the Guardian airframe's internal GNSS to manually fly or walk to a corner and "set a point" manually to build a geofence grid.

Aggregates Customer (ROI) Estimate

	Traditional Feet on the Ground	Draganflyer Aerial Data Collection
Data Collection and Processing:	70hrs Collection 50hrs Analysis	2hrs Collection 24hrs Analysis
One time Cost:	\$9,280 CAD	\$4,750 CAD
Number of Sites:	2 Sites (8 total)	2 Sites (8 total)
Annual Cost:	\$74,240 CAD	\$38,000 CAD
Cost savings per year:	\$36,240 CAD and 8X Faster	

*****The traditional method did not include the additional infrared imaging performed by ACCESSiFLY, which made the ROI much greater and a far wiser choice to use ACCESSiFLY**

DRAGANFLY CASE STUDY - ACCESSiFLY "INFRARED THERMOGRAPHY & INTEGRATED GIS SOLUTIONS INC."

Initial Conclusions ("In Development")

Additional data has already confirmed a correlation between soil and/or high vegetation with the presence of certain topology deposits visualized across the site through radiometric based thermal infrared imagery. As is known, this data has been shown elsewhere to successfully "look beyond" the electromagnetic spectrum to find "aggregates" that have different spectral signatures in other studies. The additional application described above showed a novel potential to detect variation in soil type not seen by the "naked eye" (RGB Camera), including "ground/bare earth", soil drainage in other areas of the survey sites, with clear distribution of heat/solar loading impacting "aggregate integrity", to name but a few. Although early, ACCESSiFLY believes additional observations of this type may form the basis for a new "image analysis approach", which they anticipate will have utility in determining the percentage by weight of the flat and elongated particles in aggregates using aerial thermal infrared radiometry and multispectral (NIR) cameras.

The implications for aggregates, product solvency, environmental prosperity, and cost savings are nothing short of extraordinary. The analysis was derived from a "collection" time-span of less than 120 minutes and covered a massive area, providing a wealth of information, which the client's customer had not expected and never seen before.

