SWIFT 2025

Drones on Deck: Managing UAV Operations at Airfields

CYEG - Edmonton International Airport
Our Journey

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Edmonton International Airport – CYEG

Overview

CYEG safe integration of RPAS usage into critical operational aspects of day-to-day activities both airside and groundside.

Our RPAS Journey

Drone Delivery, Wildlife Control, RPAS Operational Utilization, SMS Investigations, Advocacy and Promotion…

- ROBIRD / Wildlife Management
- Drone Delivery
- SMS Investigations
- High Resolution Imagery, Survey, Topographical Analysis
- Paint line Inspection
- Future…. Airports and Beyond

SAFETY – Safety Case / HIRA Process

- HIRA's – ***Hazard Identification Risk Analysis***, conducted for each proposed flight locations.
- Full stakeholder involvement;
- EA, NAV, Airlines, fixed wing, rotary stakeholders.

EDMONTON AIRPORTS: Safety Case / Hazard and Risk Assessment

Conducted	Feb 28 2025
Initially conducted by:	Dave Kuny YEG
Reviewed by:	Jason Jones YEG; Martin Calvez Westra NAV Matthew Holodinsky(Aerium)

RISK MATRIX
Low
Medium
High

Background

Using the ROBIRD Peregrine Falcon for wildlife control at YEG, The peregrine falcon is the world's most widespread bird of prey, its breeding grounds ranging from the Arctic tundra to the tropics. They are the fastest animals on Earth, capable of reaching speeds beyond 320 km/h while diving for prey. The peregrine falcon feeds almost exclusively on medium-sized birds such as gulls, pigeons, songbirds, waterfowl, etc. It is also known for hunting smaller birds of prey such as kestrels. The Robird version of the peregrine is just as intimidating to birds as the real deal. After a couple of flights, the bird population understands that they are living in a dangerous hunting territory, and will take their business elsewhere.

This HIRA is specific to the use of the Robird on controleld surfaces - Ruways and Taxiways at YEG.

CFS Robird - Key Mission Operational Details

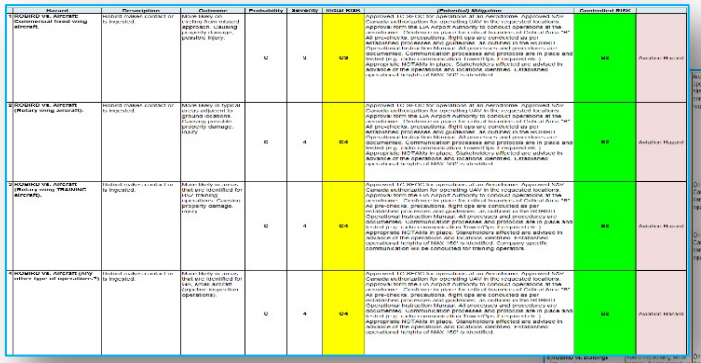
Key Mission Operational Details:

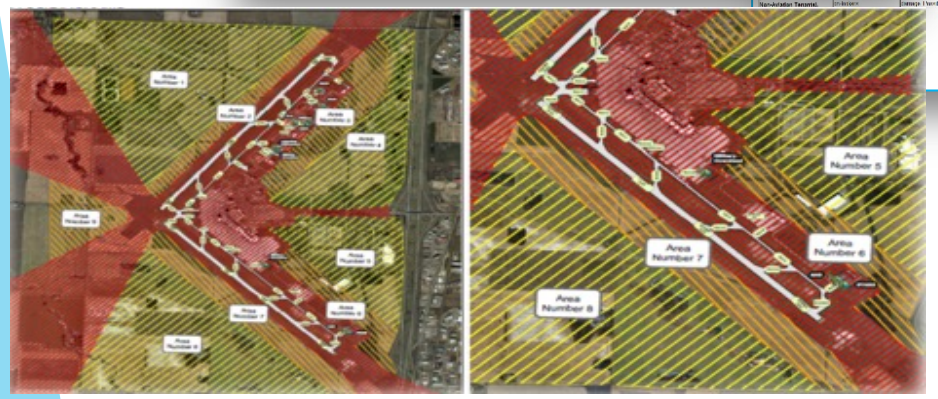
1. **Resolution**: NA
2. **Overlap**: NA
3. **Area**: Within 150m of Pilot
4. **Altitude**: <150ft
5. **Number of Photos**: NA
6. **Estimated Flight Time**: 5 minutes per flight
7. **Estimated Flight Distance**: Mission Dependent
8. **Working Area Radius:** Bound by Geofences
9. **Working Area Ceiling**: 45m (147 feet AGL)
10. **Communications**: Check in with Tower before launch and after landing.
10. **Security Actions**:
    a. Geofence breached
    b. GPS Loss – Robird circles for 5 seconds to regain GPS signal, if it cannot regain signal, the wings are automatically raised up to landing position and the Robird performs a linear landing insitu.
    c. C2 Loss - Transmitter signal loss of any length will send a command for the Robird to Return home.
    d. Low Battery
    e. Catastrophic Failure

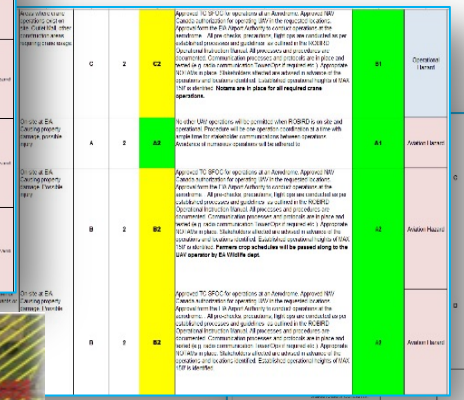
Likelihood		Plausible, but unlikely to occur	Not likely to happen, but could	May occur infrequently	Probably will occur, but not a persistent state	Likely to occur, perhaps frequently
Annualized Frequency		Every 10 to 25 years	Once every 5 to 10 years	Once every 1 to 5 years	1 to 2 times per year	3 to 12 times per year
Exposure		1 Person	2 to 5 People	6 to 10 People	10 to 20 People	>20 people
Descriptor		Improbable	Rare	Unlikely	Probable	Expected

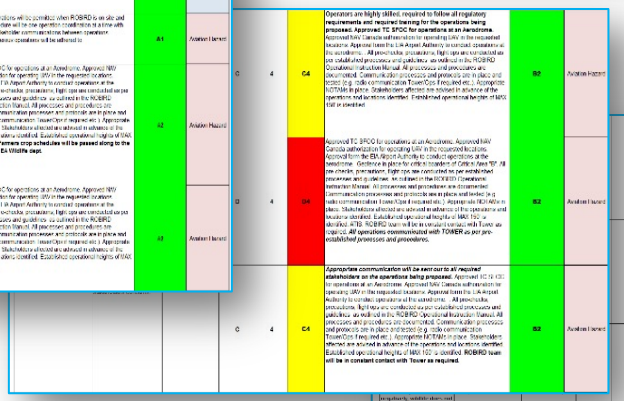
Severity	Health, Safety and Security	Regulatory/Environment	Productive Assets	Financial	Cybersecurity	Enterprise Risk Management		A	B	C	D	E
Catastrophic	* Loss of Life/Multiple loss of life. * An event with malicious intent that was not detected and/or prevented by protective layers	* Issue results in suspension and/or cancellation or permit, license or approval * Multiple impacted parties, on and off site, complex recovery	Unable to operate; loss of structure, equipment or aircraft. Long term closure of airport or major airport facilities.	>$50,000,000		Impact of the risk is fundamental to the mission or operations of Edmonton Airports	5	High	High	High	High	High
Critical	* Multiple persons injured or critical injury (hospital admittance). * A security event with malicious intent that was not detected or prevented by protective layers.	* Issue results in partial/full suspension of operations * Multiple impacted parties, on and off site, simple recovery	Operational delays; Technical delays resulting in relative substantial costs, substantial reduction in safety margins; Short term closure of airport or portion of terminal / Structure;	>$10,000,000 <$50,000,000	Critical business services unavailable; involves systems categorized as "Secret"; impacts large number of users	Edmonton Airports would suffer a material financial loss or significant operational impact	4	Med	Med	Med	High	High
Major	* Lost time injury, injury requiring medical treatment resulting in restricted or non-restricted work. * Intentional bypass of Security Mitigation that was detected by protective layers.	* Issue requires a formal senior management response * One or two impacted parties, on site only, complex recovery	Technical delays resulting in relative significant costs, significant reduction in safety margins, Violation of standard/regulation, multiple resources requires, aircraft movements impacted; Potential	>$1,000,000 <$10,000,000	Serious financial implications due to critical business services not operating at an optimal level; involves systems categorized as "Restricted", or impacts a significant number of users	Edmonton Airports would suffer a meaningful, but not material, financial loss or operational impact	3	Low	Med	Med	Med	High
Moderate	* No lost time injuries First aid attention only. * A security event with no intention to bypass and detected by protective layers.	* Issue requires a formal response and/or non-compliance * One or two impacted parties, on site only, simple recovery	Minimal effect to operations, minimal delays, technical delays resulting in minimal costs, minimal reduction in safety margins; guideline or policy exposure	>$25,000 <$1,000,000	Minimal financial implications due to critical business services not operating at an optimal level; involves systems that contain data categorized as	Edmonton Airports would suffer a minor financial loss or operational impact	2	Low	Low	Med	Med	Med
Minor	* Non or minor Injury No treatment required. * An event which was detected and had a response.	Only us impacted, on site only	Minor effect to operations, minor delays, minor reduction in safety margins;	<$25,000	Low importance, such as an enquiry or question or provide a service with minimal amount of urgency attached.	Risk would have virtually no financial or operational impact	1	Low	Low	Low	Med	Med

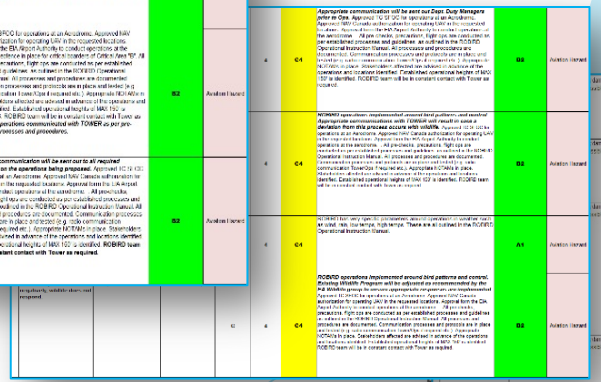
Risk Tolerance	Action Required
High	Stop operation, process, or change immediately. Unacceptable under existing circumstances. Sufficient control measures must be in place before operation, process, or change can continue. Accountable Executive approval of risk required
Med	Review existing mitigation in place. Business / program owner approval of the risk is required prior to commencement of the operation, process, or change.
Low	Considered acceptable as is. No risk mitigation is required. Review for continuous improvement.



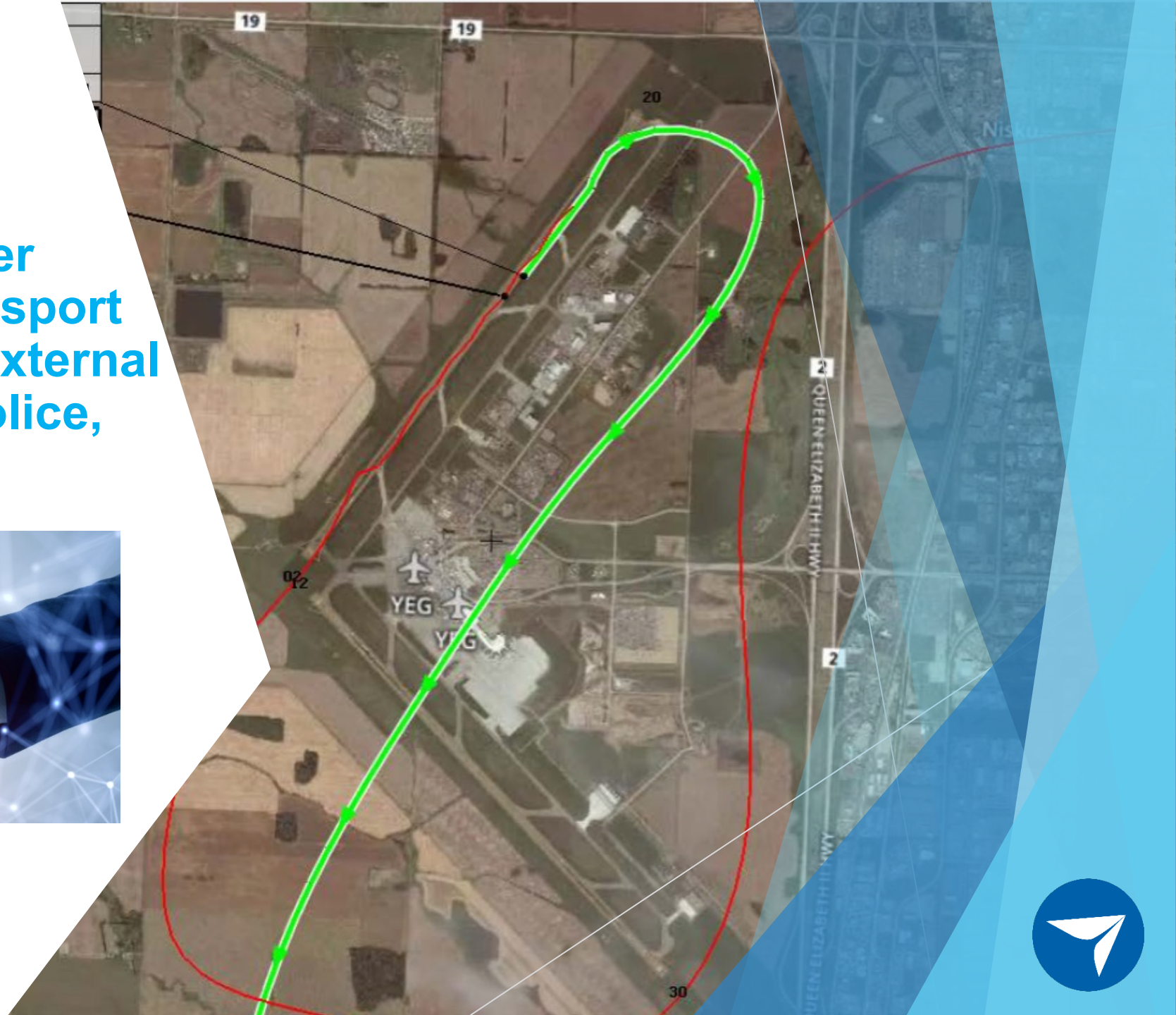








“Key” - Stakeholder Communication - Transport Canada, NAV Canada, External Partners, Security, Police, Municipalities…



Wildlife Management ROBIRD

- 9th Season of Program Implementation at CYEG
- 7000 plus missions to date.
- Excellent “tool” in our Wildlife Prevention toolbox.
- Fully integrated into our daily Wildlife Operations

Based on a female peregrine falcon

TOW: 800 grams

Max flight time: 12 minutes

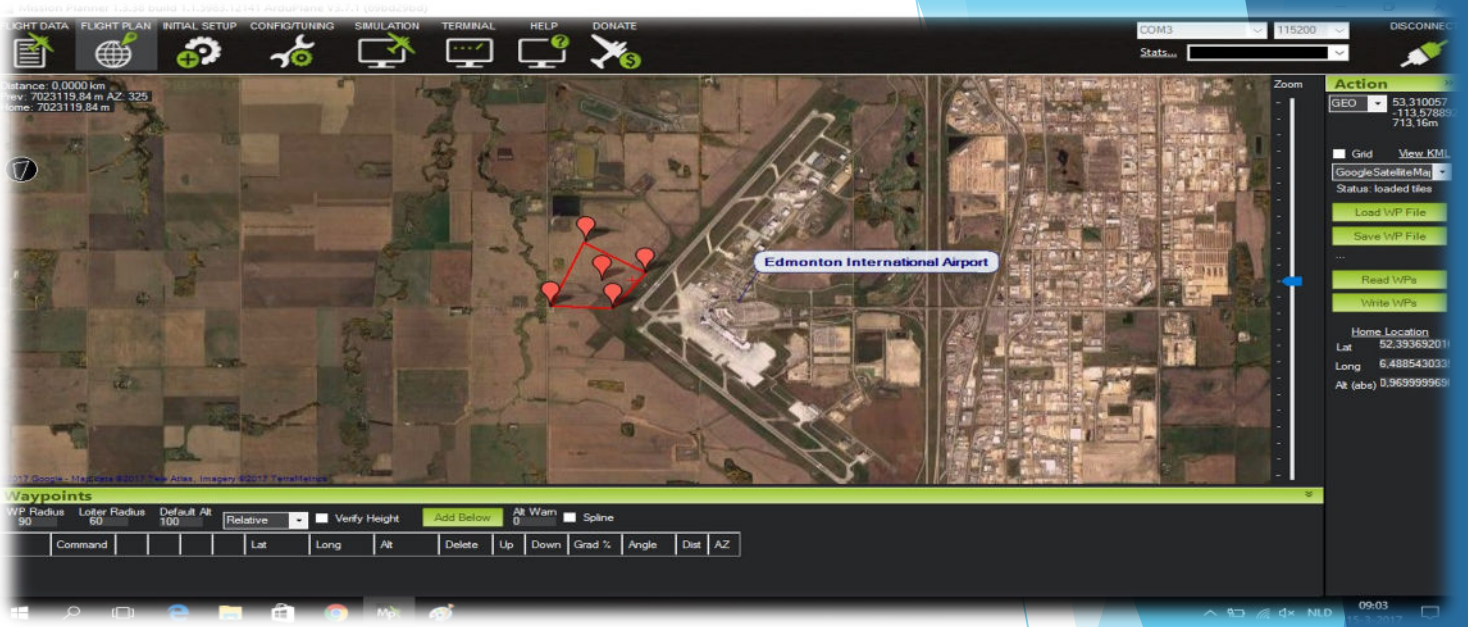
Propulsion Flapping wing

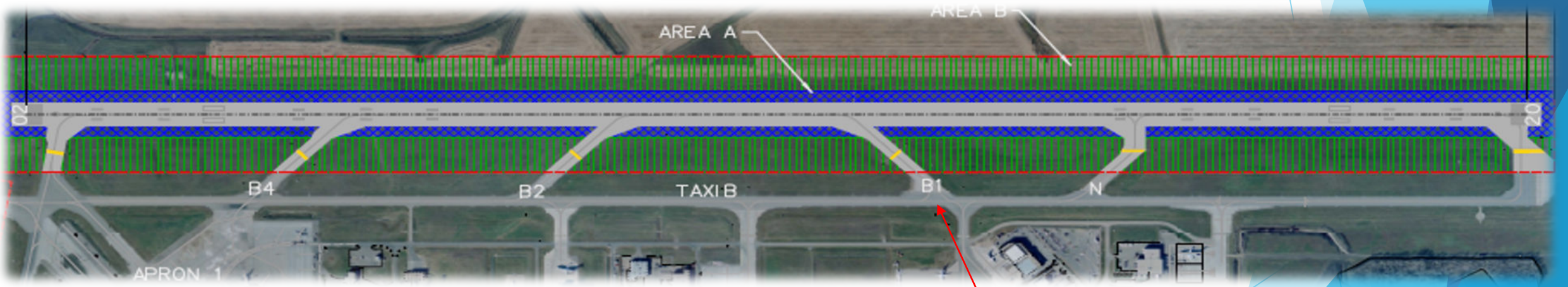
Max airspeed: 20 m/s; 38 kts

RPAS Safety

Automated fail-safe behaviours

- Geo-caging
- Return home
- Emergency stop
- Emergency landing





RUNWAY 02/20 AREAS A & B

Critical Area (Area A):

Equipment and personnel are not permitted within the Critical Portion of the strip (60m from Rwy centerline, 30 meters from Rwy pavement edge) during an aircraft operation, (landing and take-off) on that runway.

Runway Strip (Area B):

Maintenance Equipment and Personnel may be permitted within the Runway Strip portion of Area B (edge of Critical Area A to 150 m mark) during an aircraft operation, (landing and take-off) on that runway.

Wildlife Control - Robird

- Mimics the Peregrine Falson with cutting edge drone technology
- Employs ornithopter technology with wing-flapping mechanisms that mimic bird flight, generating lift and thrust.
- Provides a humane approach to bird control.

Reduction in Strikes of Target Species

Gulls

		Pre-Robird (2016)	AERIUM Ops (2018)	Reduction:
YEG*	Frist Round	8	4	50%
		2022	AERIUM Ops (2023)	Reduction:
YEG*	Second Round	10	6	40%
		Pre-Robird (2017)	AERIUM Ops (2023)	Reduction:
GFK**		15	1	93%

Songbirds

	Pre-Robird (2016)	AERIUM Ops (2023)	Reduction:
YEG*	6	2	66%

Raptors

	Pre-Robird (2016)	AERIUM Ops (2023)	Reduction:
YEG*	3	0	100%

Shorebirds

	Pre-Robird (2016)	AERIUM Ops (2023)	Reduction:
YEG*	4	0	100%

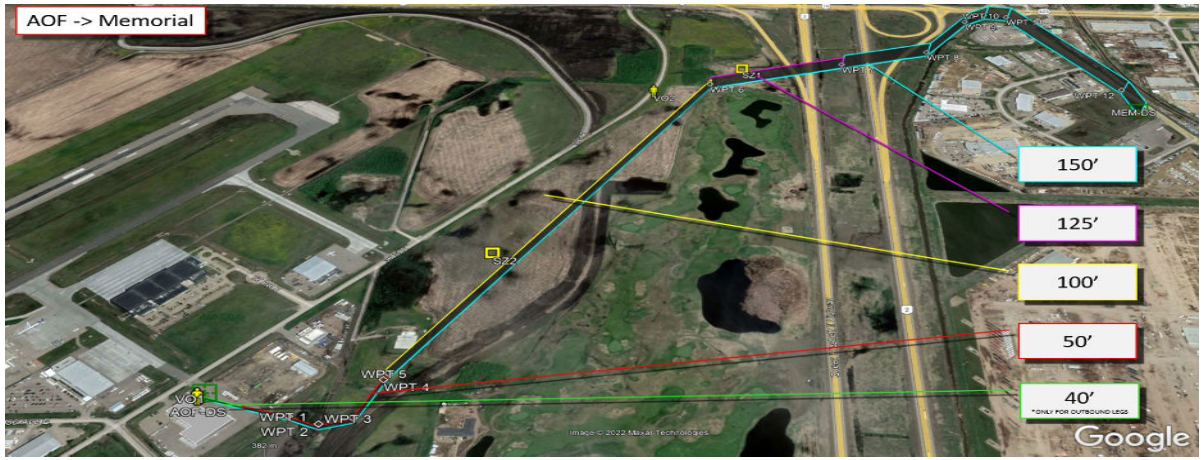
Bird Observations

Edmonton International Airport - CAN			
YEG	2017	2023	Reduction:
Duck	3,271	1,352	58%
Gulls	1,845	778	57%
Canada Goose	2,305	345	85%
American Crow	2,693	578	78%
All Species	12,461	9,592	23%

YEG Operations were established in 2017 and remain ongoing.

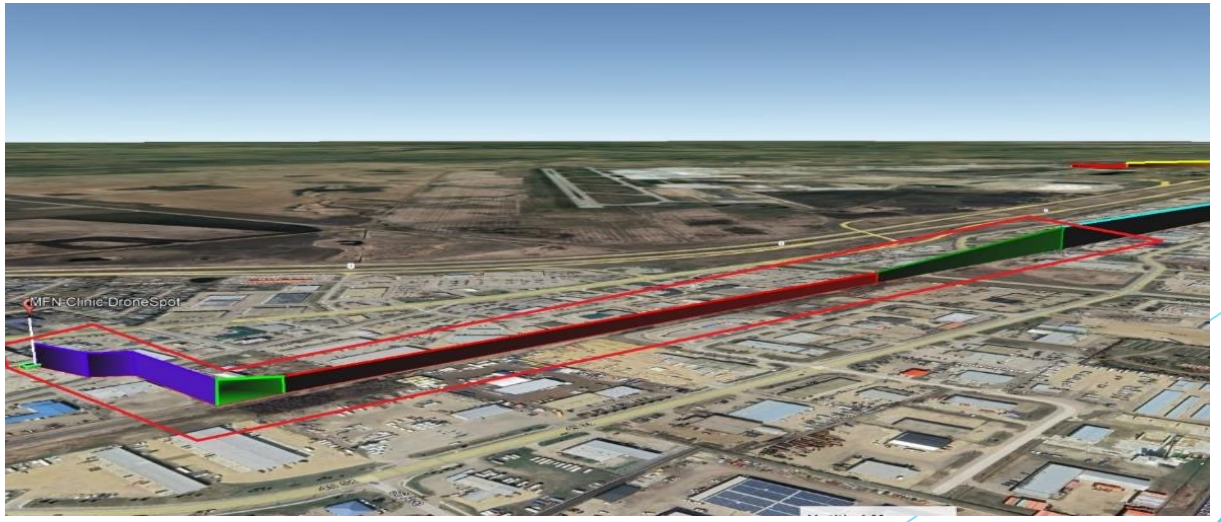
Drone Delivery Program - Phase I

- In December 2021, YEG became Canada's first airport to integrate drone logistics into its daily operation.



Drone Delivery Program - Phase II

- Existing route from YEG to Nisku Site – No Change. New route from Memorial Park to MFN Clinic



RWY Departure Path Crossing

Aviation Safety Management (SMS)

Using drones in Aviation SMS investigations provides faster, safer, and more comprehensive site assessments by capturing high-resolution aerial imagery, reducing investigator exposure to hazards, and enabling detailed documentation of inaccessible areas.

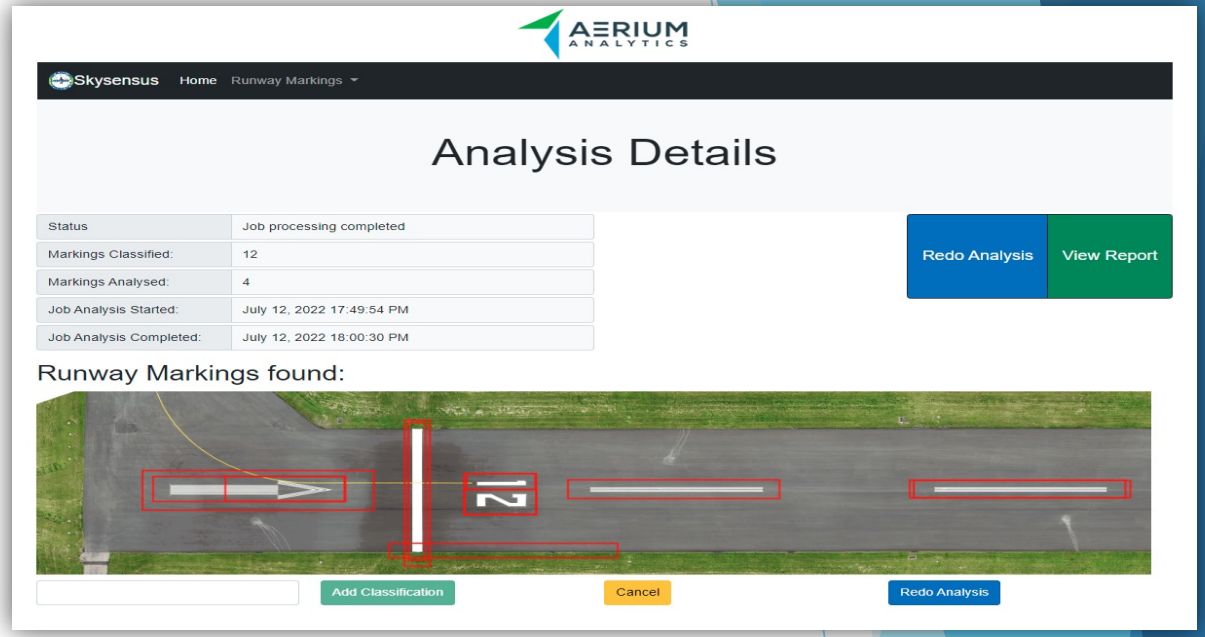
Aviation Safety Management (SMS)

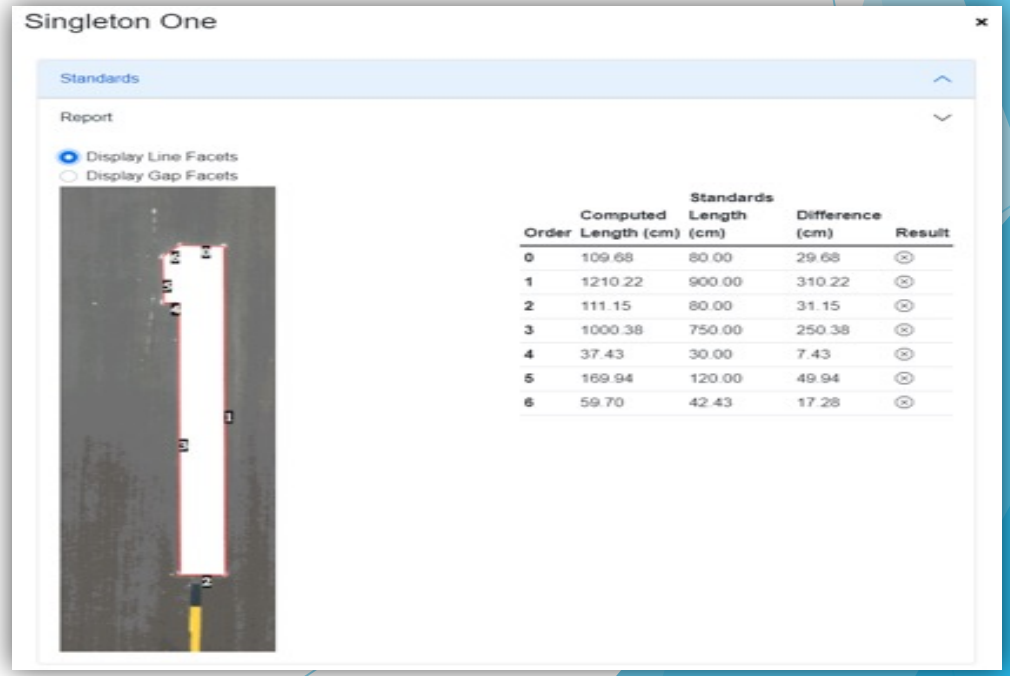
SMS occurrence raised…report of obstructed Runway Paint Marking

Runway Marking Analysis

- Runway Markings Report generated from:
  - Orthomosaic generated from drone photo data
  - Machine Learning based off TP312 Rules
- Automated Process

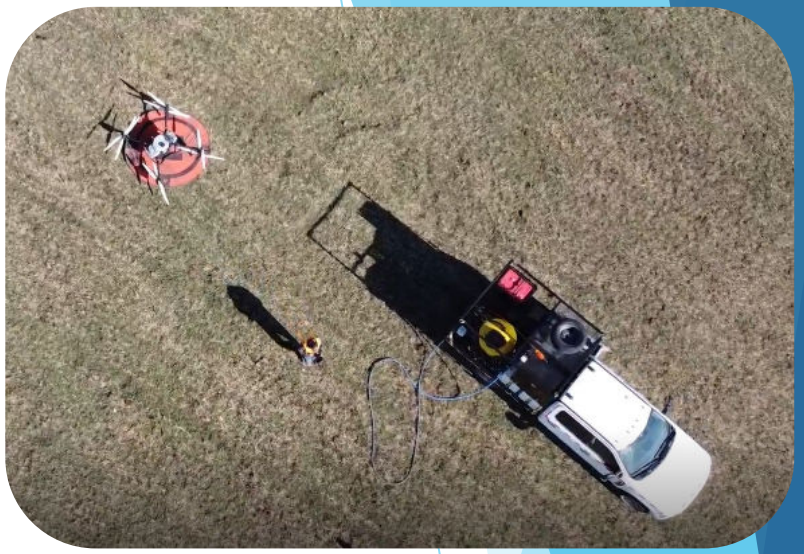
RunwayVue™
Powered By AERIUM ANALYTICS

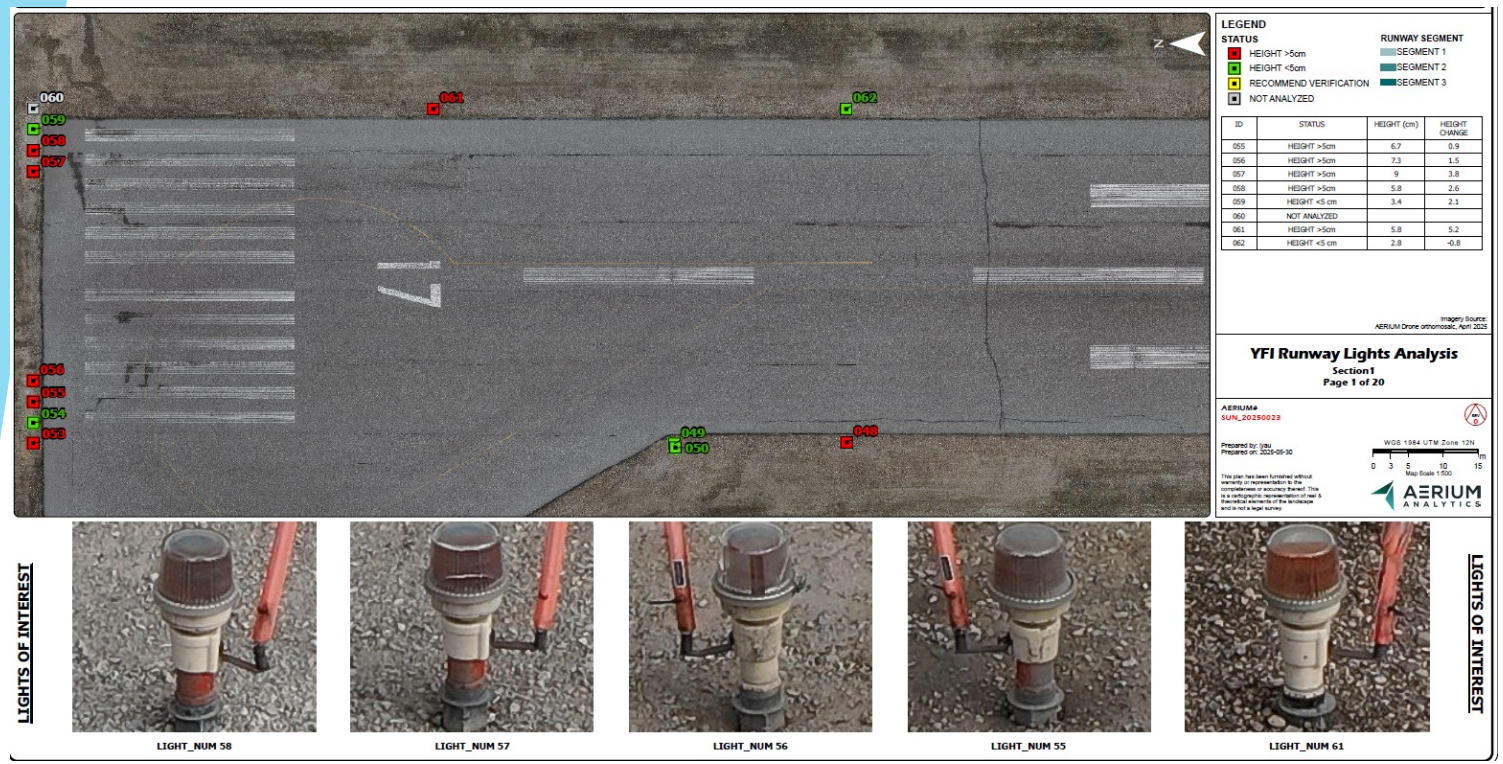




Next Steps for YEG

- Simultaneous Drone ops – RoBird + Delivery + Inspection
- Preparation traffic management integration
- Over Runway Operations without closure
- Coordination with ATC - Utilization of existing procedures (FOD Checks, Snow clearing)
- Vegetation Management / Insect Control
- Use of RPAS to spray hard to reach areas safely and more efficient



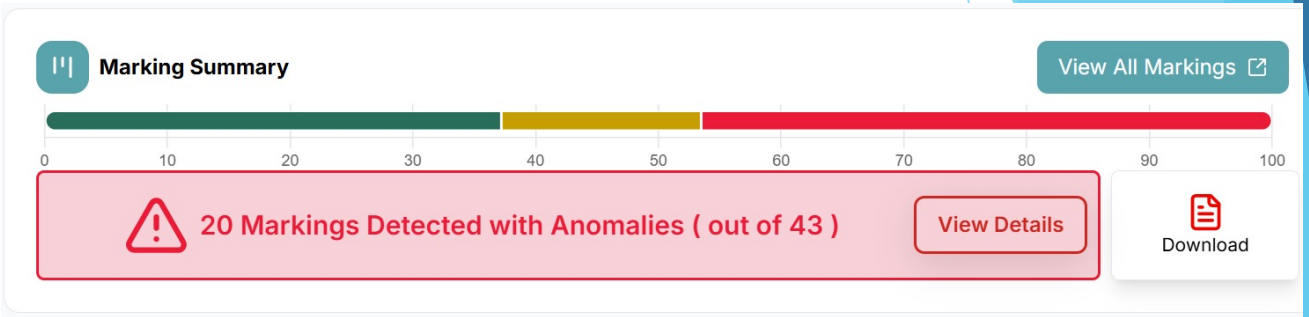


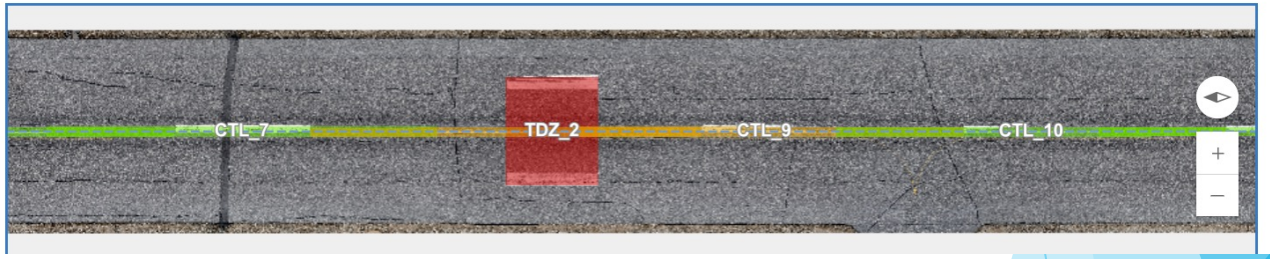
Future of Drones at Airports

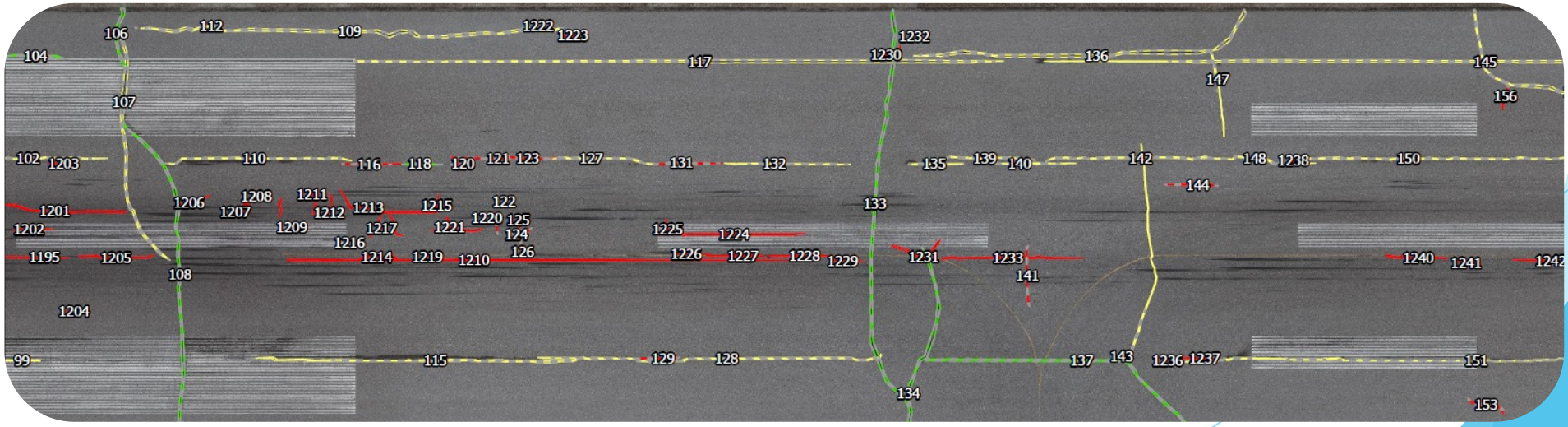
Today’s operations are building the procedures and safety cases for AAM (Advance Air Mobility) and Vertiports

Factors to consider:
- SIMOps
- Corridors
- Detect and Avoid Procedures

Automation of field operations via Drone:
- FOD Detection
- Perimeter & Security inspection
- Runway & Taxiway Lighting monitoring
- Autonomous Inspection Systems







In Conclusion

Success - Integration of technology into operational aspects of an airport environment is safely achievable and valuable. Vigilance in ensuring safe, regulatory approved operations at all times, internal, external communication of operations and support is a key factor.

Ensuring real value is being provided (removing the 'cool' or 'neat' factor and making this a practical solution) is essential to the program success.

Future… What's Next!