

2025



Aerial Survey | Laser Scanning | Data Fusion

Integrated Aerodrome Safeguarding Framework

Digital products and
consultancy services

Height zoning and aviation
compliance

Proactive risk management



04

MEET THE TEAM

We are an innovative, aviation focused geospatial consultancy

06

IASF CONCEPT

This is a structured, digital-first approach to managing airspace constraints and ensuring regulatory compliance for developments near airports.

08

HEIGHT ZONING

Regulation of vertical development near airports to ensure the safety of aircraft operations and long-term aerodrome viability.

10

LEGISLATION

Legal framework behind a height zoning in New Zealand and overseas.

12

FREQUENTLY ASKED QUESTIONS

A practical guide for urban planners, developers, councils, and infrastructure stakeholders dealing with aerodrome safeguarding regulations and height zoning constraints.

Table of Contents

Legal Disclaimer

The Integrated Aerodrome Safeguarding Framework (IASF) is a proprietary methodology developed by blackmaps geospatial to assist in assessing airspace constraints, height zoning, and compliance with aerodrome safeguarding requirements. IASF is not a statutory or regulatory framework, nor does it override any existing legal obligations under New Zealand law, including the Resource Management Act 1991 (RMA), Civil Aviation Act 2023, Civil Aviation Rules Part 77, Civil Aviation Rules Part 139 or District Plan designations.

IASF provides a structured risk assessment and decision-support tool, but all approvals for developments near aerodromes remain subject to the statutory requirements of local authorities, the Civil Aviation Authority of New Zealand (CAA), and relevant airport operators.

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"Surveying and aviation have traditionally operated in separate spheres but Blackmaps has seamlessly integrated the two, enabling data insights that were not previously possible. Their expertise has transformed our airport obstacle management programme, making it more effective than before."

Jayne Marsh, SMS and Aeronautical Manager, ROT



Meet the team

blackmaps is an innovative aviation focused geospatial consultancy dedicated to transforming how airspace and land-use planning intersect. We provide accurate, reliable, and accessible data, empowering planners, developers, councils, and airport operators to make informed decisions. Our goal is to bridge aviation and spatial planning, ensuring compliance, reducing risk, and future-proofing developments through smart, data-driven solutions.

Maksym Khovalko – Managing Director

With over 15 years of geospatial experience, Maksym leads blackmaps with expertise in digital solutions for aerodrome safeguarding, aerial mapping, and aviation compliance. His background in LiDAR, GNSS surveying, and GIS automation enables seamless integration of airspace constraints into regulatory processes. His vision for Integrated Aerodrome Safeguarding (IASF) is to replace outdated manual processes with an automated, GIS-driven framework that streamlines approvals and compliance.

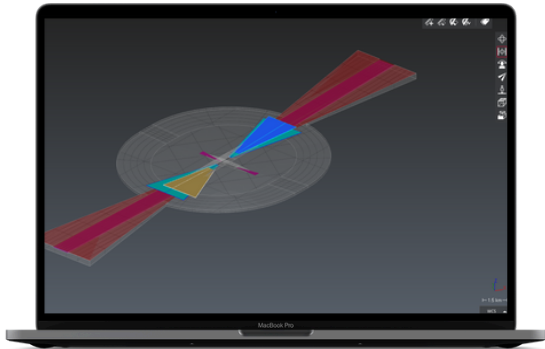
Bevan Lewell – Founding Director

A licensed aircraft engineer, airline captain, and aviation consultant, Bevan brings over 20 years of experience across commercial aviation, aircraft modification, and unmanned systems. He has designed and led aerial mapping system development, ensuring regulatory compliance and operational efficiency. As a CAA-certified flight examiner and airworthiness inspector, Bevan is instrumental in aligning IASF with real-world aviation operations, helping planners and regulators make informed airspace decisions.



Our digital products and services

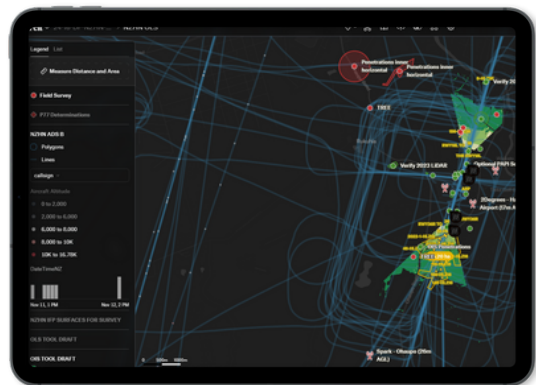
3D modelling of airspace



We use an aviation specialist software that features a toolset to generate ICAO¹, EASA², and FAA³ limitation surfaces, custom modeling of Civil Aviation Rules and PANS-OPS⁴ surfaces, visual aid protection surfaces, and more. We are preparing ourselves and our customers for the new Obstacle Limitation Surfaces (OLS) requirements, which will be classified either as Obstacle Free Surfaces (OFS) or Obstacle Evaluation Surfaces (OES).

Targeted field surveys

We use GNSS survey to establish accurate runway parameters, verify existing control, and conduct independent quality checks. We deploy terrestrial, vehicle-mounted and aerial LiDAR to collect accurate and detailed 3D data. Aerial Imagery and LiDAR using manned aircraft or drone to collect accurate point clouds and generate orthomosaics, digital surface models or reality meshes. We are CAR Part 102 certified for operations at night and over active runways and movement areas.



GIS dashboards

Over the last 12 months, we delivered the digital tool to more than 10 airports in New Zealand. Since July 2024, Aeropath received survey data from blackmaps for 8 international and regional airports to assist with instrument flight procedure maintenance. We work with various airport operators and consultants to further improve the platform.

1. ICAO (International Civil Aviation Organization) – A UN agency that sets global standards for aviation safety, air navigation, and airspace management.
2. EASA (European Union Aviation Safety Agency) – The EU's authority responsible for aviation safety, airworthiness, and regulatory compliance.
3. FAA (Federal Aviation Administration) – The U.S. regulatory agency overseeing civil aviation, airspace safety, and operational standards.
4. PANS-OPS (Procedures for Air Navigation Services – Aircraft Operations) – ICAO's standard for designing instrument flight procedures to ensure safe aircraft navigation.



IASF Concept

The Integrated Aerodrome Safeguarding Framework (IASF) is a structured, digital-first approach to managing airspace constraints and ensuring regulatory compliance for developments near airports. It integrates aviation safety requirements, geospatial intelligence, and automated risk assessment to streamline planning approvals, mitigate hazards, and support sustainable urban development. IASF simplifies complex safeguarding processes by automating height zoning checks, obstacle assessments, and compliance workflows, ensuring planners, developers, councils, airport operators and airlines have real-time insights into airspace constraints. The framework considers:

- CAR Part 139 OLS – ensuring natural features and man-made objects don't impact aircraft operations.
- CAR Part 173 PANS-OPS - safeguarding instrument flight procedures.
- CAR Part 77 Notification – automated identification of structures that penetrate notification surfaces.
- CAR Part 121 Air Operations – extended analysis beyond standard surfaces to include One Engine Inoperative (OEI) escape paths, enabling early detection of encroachments into airline-critical escape routes.
- CNS (Communication, Navigation and Surveillance) – protection of critical navigation systems.
- District Plans - integrating local planning rules such as height zoning, Runway End Protection Areas (REPA), height covenants, noise abatement and ground light restriction.
- Wildlife & Environmental Hazards – addressing risks from bird strike zones, light pollution, and noise.
- Temporary Structures & NOTAM Management – automating approvals for cranes and short-term obstacles.

By replacing manual assessments with GIS-powered automation, IASF enhances efficiency, compliance, and long-term airspace protection, creating a future-proofed, scalable safeguarding system for both aviation and urban planning sectors.

"blackmaps know what they are doing, and I would recommend them to any airports requiring survey work."

Randolph Zuniga, Team Leader Procedure Design, Aeropath



Aerodrome Safeguarding

At blackmaps, we deliver expert aerodrome safeguarding services to ensure the safe and sustainable integration of aviation and land development. Leveraging our in-house expertise in aviation, instrument procedure design, and land surveying, we develop comprehensive aerodrome safeguarding surfaces tailored to each region's needs. These include OLS, PANS-OPS instrument flight procedure surfaces, as well as navigation aid and visual aid protection zones, alongside other relevant aviation-protected areas. Our solutions provide clarity on airspace constraints, enabling council planners, property developers, and other stakeholders to optimise land use while maintaining compliance with aviation safety standards.

Site-specific Analysis

We specialise in delivering site-specific geospatial assessments that empower council planners, property developers, and infrastructure providers to navigate airspace constraints with confidence. Our expertise spans tall buildings, telecommunications towers, solar farms, wind farms, and other developments near aerodromes or in safeguarded zones where aviation restrictions may apply. By integrating our deep knowledge of aerodrome safeguarding with advanced surveying techniques and cutting-edge geospatial analysis, we provide accurate, reliable reports and insights into development feasibility. Our services include specialised assessments such as shielding studies, ensuring that projects align with both safety requirements and planning goals.



We pride ourselves on our holistic approach, combining technical precision with strategic partnerships to deliver comprehensive solutions. Our established relationships with expert partners enable us to support clients with aeronautical studies, addressing critical considerations like hazard lighting requirements, shielding assessments, and efflux impacts. Whether you're exploring the viability of a high-rise, or assessing infrastructure near aviation-protected areas, blackmaps offers the clarity and expertise needed to optimize land use while ensuring compliance and safety.

Airspace Impact Assessments for Master Planning

For large-scale urban or regional master plans we offer detailed airspace impact assessments that evaluate how aerodrome safeguarding surfaces intersect with proposed development zones. This service is valuable for early-stage feasibility insights, identifying height restrictions, no-build zones, or areas where mitigation strategies (like shielding) could unlock development potential.



Height Zoning

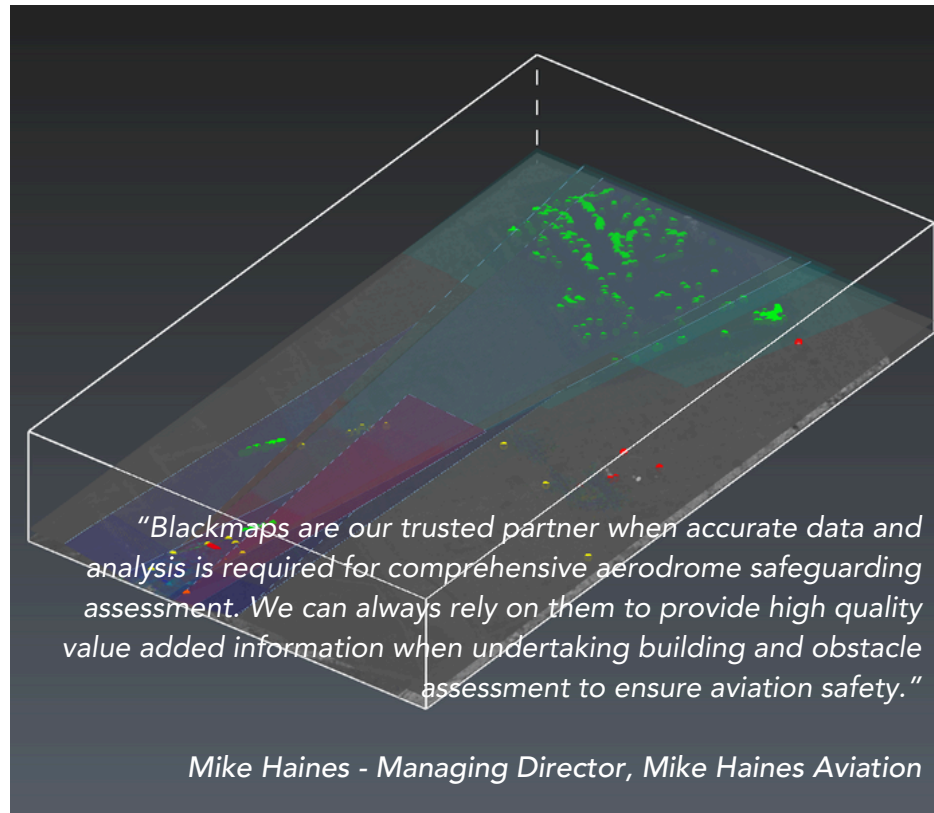
Using our advanced surveying and geospatial expertise, we can create precise height zoning maps or 3D development envelopes that visually define permissible building heights across a site. This will help developers maximise their project's scale while ensuring compliance with aviation constraints, offering a clear, actionable tool for planning applications or negotiations with councils.

Obstacle Risk Mitigation Consulting

Beyond identifying limitations, we also provide consulting on strategies to eliminate the risk for obstacles that infringe on safeguarded surfaces. This includes applying shielding principles, advising on structure placement to minimise impacts, or coordinating with aviation authorities to evaluate the risk within regulatory and operational tolerances - services that save developers time and money while keeping projects viable.

Construction Crane and Temporary Structure Assessments

Property developers frequently need temporary cranes or structures during construction, which can pose risks to aerodrome operations. We offer assessments to evaluate crane heights and locations against safeguarding surfaces, providing reports that ensure safety and compliance during the build phase - a practical service for fast-moving projects.



Regulatory Liaison and Compliance Support

Navigating aviation regulations can be daunting for developers and planners. In collaboration with our partners blackmaps can offer compliance support and assist with CAR Part 77 application, processing and review the CAA Determination, documentation support, facilitate aeronautical studies, and help develop evidence of compliance with safeguarding requirements in planning submissions - streamlining the approval process.

Future-Proofing Assessments for Aerodrome Changes

With aviation growth in mind and changes coming to ICAO safeguarding regulations, we can assess how potential aerodrome expansions and changes in flight procedures might impact nearby land. This forward-looking service can help councils and developers plan resilient projects that account for evolving airspace needs, protecting long-term investments.

Compliance Workflow

Height zoning is a critical first step in any development near an aerodrome. Before lodging a resource consent or building consent application, planners and developers must ensure their proposed structure complies with regulatory requirements.

To ensure smooth regulatory approvals and project viability, the following workflow outlines the step-by-step process for assessing height constraints, engaging stakeholders, and ensuring compliance with aerodrome safeguarding regulations.

Step 1: Site Selection & Project Concept

Developers identify whether their project site is near an airport. If the location falls within an airport's designated airspace, height zoning and noise constraints must be considered early in the planning process.

Step 2: Height Zoning & Compliance Review

The proposed structure is assessed against District Plan including but not limited to height restrictions, airport designations, and safeguarding surfaces, including Operational OLS, PANS-OPS, and other Civil Aviation Rule considerations including the emergency One Engine Out (OEI) take-off surfaces. If the project breaches these limits, consultation with the council, airport operator, airline, CAA, and Airways NZ is necessary to determine whether further mitigation is required.

Step 3: Airport Operator Engagement

The airport operator assesses the proposal against Operational OLS, long-term expansion plans, and airspace constraints to determine potential safety or operational impacts. If risks are identified, recommendations may include height adjustments, shielding measures, or alternative engineering solutions to mitigate effects. While the airport operator does not approve or authorize risks, they ensure operational requirements are met, and if a proposal cannot be mitigated to an acceptable level, it may require further regulatory assessment, such as an aeronautical study, or be declined outright.

Step 4: Resource Consent & Regulatory Approvals

If the proposal breaches District Plan designation or triggers other safeguarding concerns, a resource consent application must be lodged with the council. Supporting documentation, such as an aeronautical study or mitigation plan, may be required to ensure compliance.

Step 5: Decision & Implementation

Once approvals are granted, any conditions set by the council, CAA, or airport operator must be met before construction can proceed. This may include aviation lighting requirements, operational restrictions, or additional safety measures to ensure continued airspace protection.



Legislative Background

Height zoning refers to the regulation of vertical development near airports to ensure the safety of aircraft operations and long-term aerodrome viability. It establishes controlled airspace surfaces that dictate the maximum allowable height of structures, preventing obstructions that could interfere with safe takeoff, landing, or navigation.



Council Designations & District Plans (New Zealand)

In New Zealand, aerodrome height restrictions are typically embedded in District Plans through airport designations, height restriction overlays and noise constraints. These planning controls aim to:

- Protect airspace from encroachment, ensuring safe aircraft operations.
- Manage noise exposure through designated noise contours.
- Trigger the resource consent process if a proposed structure exceeds designated height restrictions or is located within a noise-sensitive zone, requiring an aeronautical or acoustic assessment and consultation with the airport operator.



New Zealand CAA Advisory Circulars (AC's)

AC's provide guidance on aerodrome planning, operations, and safeguarding to ensure compliance with Civil Aviation Rules:

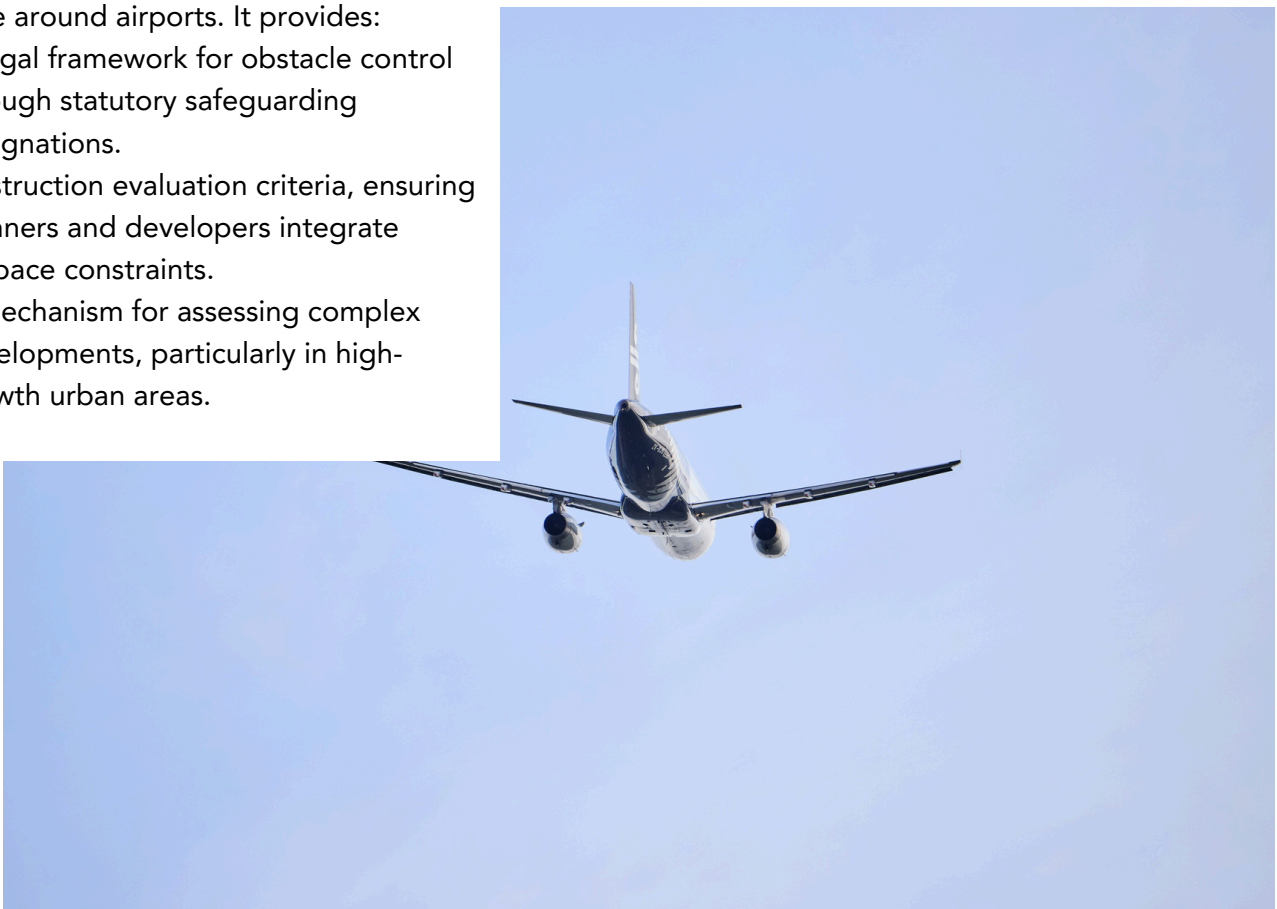
- AC139-6 & AC139-7 – Outlines aerodrome design requirements, focusing on physical characteristics such as runway and taxiway specifications, OLS, and infrastructure standards.
- AC139-10 – Provides guidelines on the control of obstacles, emphasizing the importance of safeguarding aerodrome operations by managing structures and natural features that could impact aircraft safety.
- AC139-11 – Focuses on the use of day-VFR aerodromes, offering guidance on the operational use of aerodromes under visual flight rules during daylight conditions to maintain safety standards.

National Airports Safeguarding Framework (NASF) – Australia

The NASF, developed by the Australian Government, provides a nationally consistent approach to protecting airspace near airports.

In the United Kingdom, height zoning is enforced through **CAA CAP 738**, which mandates safeguarding maps for protected airspace around airports. It provides:

- A legal framework for obstacle control through statutory safeguarding designations.
- Obstruction evaluation criteria, ensuring planners and developers integrate airspace constraints.
- A mechanism for assessing complex developments, particularly in high-growth urban areas.



FAQ

1. What is the difference between District Plan obstacle surface designation and Operational OLS?

District Plan designation is the legally enforceable height zoning set by councils, often more conservative to protect future airport expansion. Operational OLS, regulated under Civil Aviation Rules Part 139, reflects the current airport layout and flight operations but is not a statutory planning tool.

2. What is PANS-OPS, and Why is It Different from OLS?

ICAO Doc 8168 – Procedures for Air Navigation Services (PANS-OPS) provides design criteria for instrument flight procedures, ensuring no obstacles interfere with aircraft during low-visibility landings, departures, or missed approaches. OLS, on the other hand ensuring safe airspace for both Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) operations.

3. What is Aerodrome Safeguarding, and Why Is It Important?

Aerodrome safeguarding ensures that developments near airports do not pose a risk to aircraft operations, navigation systems, or long-term airport planning. It protects airspace by preventing obstructions, managing obstacle lighting and marking to avoid pilot distractions, and controlling land uses that could attract wildlife. It also safeguards critical infrastructure such as radar, communication, and navigation equipment from interference.

4. How Can a Proposed Development Impact Aviation and Airspace Users?

Structures that penetrate OLS, instrument flight procedure surfaces, or require notification under Civil Aviation Rules Part 77 can create serious risks for aircraft. Additionally, airline operational requirements such as One Engine Inoperative (OEI) procedures can significantly affect critical escape routes, which are not always protected by standard safeguarding surfaces. Tall buildings, cranes, solar farms and wind turbines can obstruct safe flight paths, while improperly placed lighting or reflective surfaces can reduce visibility for pilots. Changes in land use, such as wetlands or landfills, may attract birds and increase the likelihood of wildlife strikes. Developments that interfere with communication, navigation, and surveillance systems can disrupt air traffic control and in-flight operations, affecting airport efficiency and safety.

5. What Steps Should Be Taken If a Development Falls Within an Aerodrome's Safeguarded Zone?

Early engagement with the airport operator is essential to identify any potential impacts on protected airspace and agree on a path forward. If a proposed structure breaches a safeguarded surface, mitigation options may include lowering the height, redesigning the proposal, or applying valid shielding criteria. Where necessary, an aeronautical study may be required. Operational restrictions such as limiting activity to off-peak or night periods may be considered in exceptional cases, but are generally not accepted as long-term solutions.



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