FIREARC

HaloScout™

Pre-Ignition Wildfire Visibility for Decision-Makers
Community Wildfire Intelligence Assessment (CWIA)

HaloScout makes wildfire exposure visible early enough that communities can choose their actions—rather than discover their limits.

The Problem

Wildfire disasters do not happen because communities respond slowly. They happen because critical perimeter conditions remain unknown until fire forces clarity—when decisions must be made under pressure, with irreversible consequences.

Most wildfire tools answer two questions well: when fire might occur, and what fuels exist. Very few answer the question that actually governs loss:

> **How would wildfire most likely reach this community, and from which directions?**

When this question remains unresolved, mitigation gets mis-sequenced, evacuation planning becomes distorted, and response assumptions quietly fail. Communities invest effort and funding against assumptions that may not reflect how fire would actually arrive.

What HaloScout Will Show Your Community

Within 3–4 weeks you will know:

- The 2–3 most dangerous wildfire approach corridors
- What sits directly in those corridors
- Where ember transport could land inside town
- Which roads and evacuation routes intersect fire approach paths
- Where fuel continuity connects directly to your perimeter
- Where uncertainty remains and investigation is justified

What HaloScout Is

HaloScout™ is a Canadian-developed, satellite-based, pre-ignition wildfire visibility instrument built specifically for boreal fire environments and the governance realities of Canadian communities. It provides the minimum level of clarity required before wildfire mitigation, evacuation planning, or funding decisions can be responsibly sequenced.

Using recent satellite observation and terrain analysis, HaloScout identifies dominant approach corridors surrounding a community and structurally intersects those corridors with fuel continuity, human habitation concentration, infrastructure sensitivity, and access geometry within a defined Area of Interest.

The output is organized through a radial, cell-based spatial framework—dividing the landscape surrounding a community into directional sectors and distance rings, with each cell capturing a specific combination of exposure and consequence variables. This structure converts wildfire exposure from a generalized hazard condition into prioritized, directional mitigation logic that decision-makers can see, discuss, and act on.

HaloScout does not predict fire. It makes pre-ignition risk geometry visible so that disciplined decisions can happen before urgency collapses the decision space.

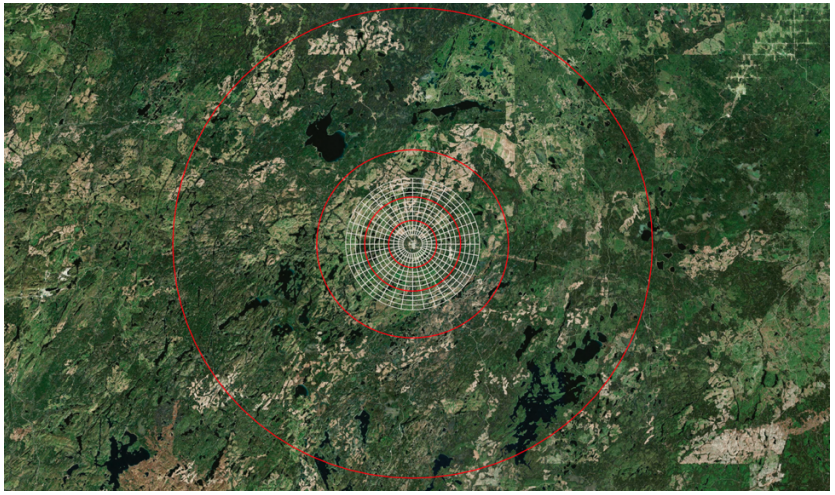
To understand the Nine Blindspots rationale please read the accompanying document.

The Nine BlindSpots Framework

HaloScout operates within the FireArc Nine BlindSpots framework—a structured methodology for identifying where wildfire risk persists due to unresolved uncertainty rather than lack of effort or intent.

The Nine BlindSpots represent the systemic failure points that repeatedly undermine wildfire preparedness, response, and recovery when they are addressed out of order or left implicit. HaloScout is designed resolve the foundational BlindSpots:

By anchoring analysis to the Nine BlindSpots framework, HaloScout ensures that risk is interpreted in the correct order, attention is focused on material uncertainty, and subsequent planning efforts are evidence-led rather than assumption-driven. This framework alignment allows HaloScout outputs to be translated directly into prioritized action, rather than remaining descriptive or advisory.



HaloScout and the FRIZ™ Framework

HaloScout's outputs are structured within FRIZ™ (Fire Risk Identification Zones)—FireArc's cell-based decision framework for wildfire risk, governance, and resilience.

FRIZ organizes wildfire intelligence into a radial grid of cells—each geospatially bounded, multi-layered, and composable into larger patterns. The grid extends outward from a community in concentric distance rings divided by directional sectors, creating a spatial language in which fuel, terrain, structures, infrastructure, and access coexist within the same unit of analysis without being flattened into a single score or averaged away.

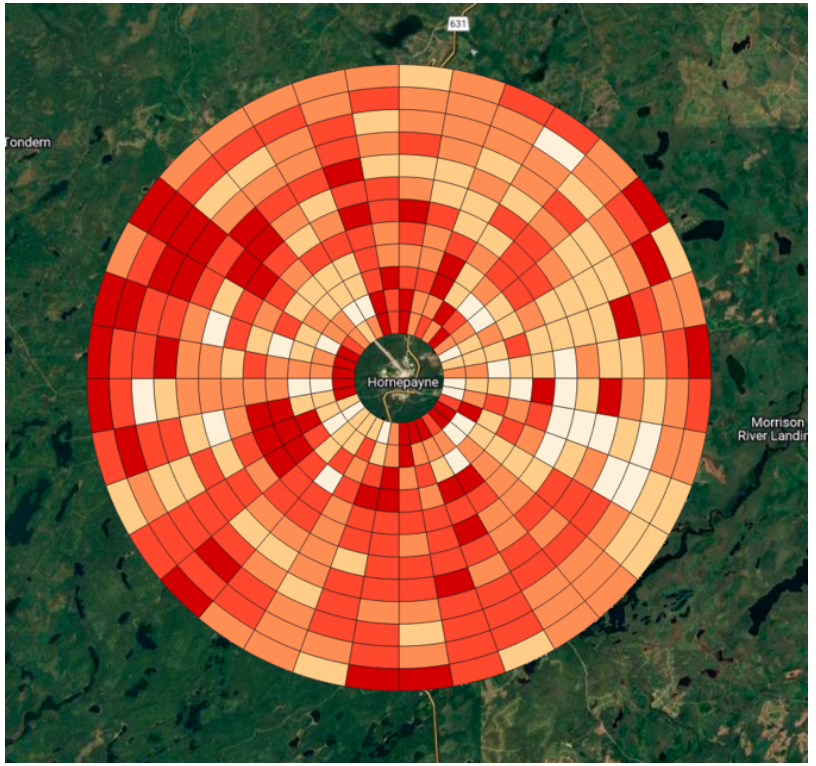
HaloScout is the entry point into the FRIZ system. It populates the initial cell-level exposure and consequence picture using satellite observation and terrain analysis. As a community moves through deeper phases of the FireArc system—HaloScan (aerial mission analysis), full FRIZ expansion, SmartMoat (landscape fuel break design)—each phase adds resolution and layers to the same cell structure HaloScout established. Insight compounds rather than fragments.

Traditional wildfire tools force a trade-off: maps preserve geography but resist synthesis; scores synthesize but erase place. FRIZ cells resolve this by anchoring every variable to the same spatial unit. Each cell explicitly separates exposure (fuels, ignition, fire behaviour drivers), consequence (structures, infrastructure, evacuation, cascading impacts), and mitigation potential (what can realistically be changed, where, and when). This allows decision-makers to ask not just “How flammable is this place?” but “How dangerous is it to lose this place—and what can we do about it?”

How It Works

Primary Analysis: Exposure Geometry

HaloScout begins with raw satellite observation — making the evidence visible before any interpretation is applied. True colour composites, vegetation indices, burn ratio analysis, and land cover classification are presented as standalone exhibits, establishing the observed foundation the entire analysis rests on. From this satellite intelligence layer, HaloScout maps fuel continuity and vegetation stress around the community, terrain slope and aspect that channel fire behaviour, directional run-up corridors, and distance from the community perimeter. The result is a directional picture of how fire could realistically approach from each sector of the compass, expressed within the FRIZ cell grid.



Sector-Based Exposure–Consequence Integration

HaloScout does not stop at mapping directional wildfire geometry. Exposure sectors are structurally intersected with what lies in their path. For each dominant approach sector, HaloScout evaluates:

- Fuel continuity and intensity within that sector
- Dwelling concentration and settlement patterns exposed to that approach
- Critical infrastructure and lifelines intersecting the exposure geometry
- Access and egress corridors positioned within projected run-up paths

This sector-based integration converts exposure mapping into exposure–consequence prioritization. Rather than presenting fire behaviour and community assets separately, HaloScout organizes both within the same directional framework—allowing mitigation, hardening, evacuation planning, and landscape fuel strategy to be sequenced with clarity.

Contextual Baseline: Consequence Recognition

HaloScout identifies—but does not prematurely solve—critical infrastructure and lifelines at risk, evacuation route exposure and potential bottlenecks, response access reality, and population sensitivity and economic exposure. This ensures decisions account for both fire behaviour and community consequence.

What Makes HaloScout Different

It establishes a shared, sector-organized exposure–consequence reality. HaloScout creates a single, discussable picture that councils, emergency managers, planners, insurers, and ministries can reason from together—organized directionally, by distance, and aligned with terrain. This shared geometry becomes the foundation for all deeper analysis. As aerial imagery, engineering studies, or planning tools are added, the spatial language HaloScout establishes gets refined, not replaced.

It governs escalation to evidence. HaloScout reveals where uncertainty matters most, forcing prioritization and showing where field surveys, aerial analysis, or engineering studies are justified next. Communities avoid premature commitments while ensuring resources go where they will have the greatest impact.

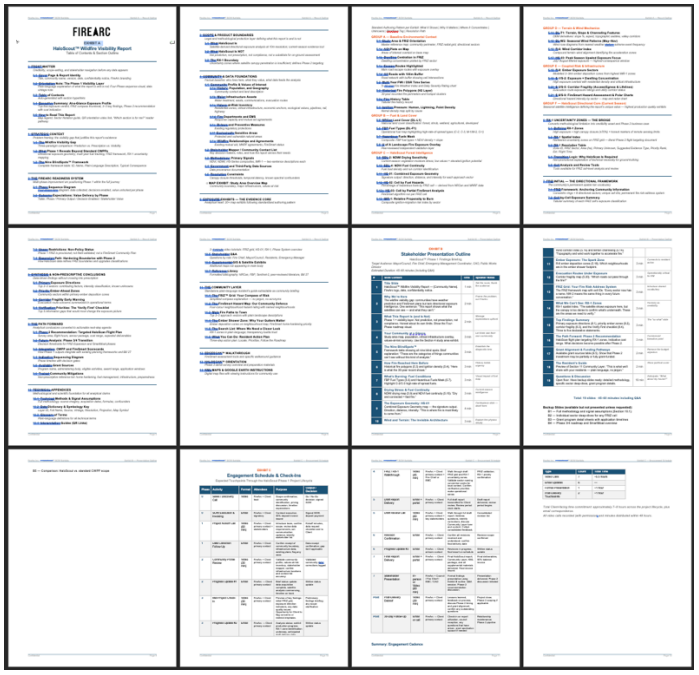
It speaks in a language governance can use. Because HaloScout outputs are structured within the FRIZ cell framework, they are readable by fire services, planners, councils, funders, and the public. The same map supports a council briefing, an interdepartmental coordination meeting, a funding application, and a community engagement session. Consistency builds trust.

It shows the evidence before drawing conclusions. HaloScout presents the raw satellite intelligence — true colour imagery, canopy density, vegetation stress, burn ratio, and land cover classification — as visible, client-facing exhibits before any analytical layer is applied. A council that can see the observed evidence and watch it transform into a prioritized sector picture understands why the conclusions are what they are. No other wildfire product makes this chain of evidence this transparent.

What You Receive

Each HaloScout deployment includes:

- Directional wildfire exposure maps organized by sector within the FRIZ cell grid
- Raw satellite intelligence exhibits — true colour composite, NDVI canopy density, vegetation stress, change detection, land cover classification, and seasonal stress comparison
- Critical infrastructure mapped by asset type — road and highway network, railway corridors, hydro and transmission infrastructure, and pipeline corridors — each routed through the FRIZ cell grid as a standalone exhibit for the responsible operator or authority
- Composite critical infrastructure convergence map identifying cells where multiple asset types overlap inside high-exposure sectors — catastrophic consequence zones
- Landscape-scale ember transport zone map showing downwind ember landing zones relative to settled areas
- Sector-based interpretation written in plain language for non-specialist audiences
- Identification of critical approach corridors with distance-based escalation geometry
- Explicit uncertainty flags showing where deeper investigation is warranted
- Sector exposure–consequence summary table with prioritization ratings
- Guidance on next steps and recommended escalation sequence — including explicit notation of which treatment recommendations require validation before commitment
- Constituent Friendly materials
- Briefing workshop for stakeholders



Report Outline including elements, engagements exhibits, models and structure available for discussion.

No black boxes. No single risk number. Outputs are designed to force prioritization and enable defensible decisions.

For a walkthrough of deliverable structure and how to read a HaloScout output, see Appendix A: Anatomy of a HaloScout Deliverable.

Deployment

HaloScout can be deployed for individual communities, regional preparedness initiatives across counties or provinces, and portfolio-level funding and prioritization programs.

Because it uses satellite observation already acquired, HaloScout typically delivers results in weeks, not months—providing early clarity before communities commit time, funding, and political capital to plans that may be misaligned with actual exposure.

Who HaloScout Serves

HaloScout serves decision-makers who must act before fire forces the issue:

- Municipal leaders responsible for community preparedness
- Emergency management and planning teams
- Communities at the wildland–urban interface
- Organizations that need decision-ready wildfire intelligence without building an internal geospatial team

HaloScout is especially valuable where budgets are limited, decisions must be scrutinized and defended, and early action determines outcome.

Relationship to Existing Planning

HaloScout does not replace Community Wildfire Protection Plans (CWPPs) or formal planning processes. It resolves the upstream perimeter uncertainty those processes depend on but cannot efficiently generate on their own.

By identifying directional exposure regimes and priority sectors before longer planning efforts begin, HaloScout helps CWPPs, emergency plans, and mitigation strategies start with evidence-based focus rather than assumption.

Position in the Wildfire Planning Sequence

Most wildfire planning frameworks begin with fuel inventories, hazard maps, or community mitigation planning. However, these processes often proceed without a clear understanding of directional fire approach regimes surrounding the community. HaloScout fills this upstream gap by establishing the perimeter exposure geometry before mitigation, evacuation planning, or CWPP development begins. In practical terms, HaloScout functions as the diagnostic stage of wildfire planning, allowing subsequent studies, investments, and mitigation programs to be focused on the sectors where wildfire is most likely to arrive and where consequences would be greatest.

Why HaloScout Matters

Most wildfire losses now result from ember exposure, directional fuel corridors, and terrain-driven escalation. Yet most existing tools were designed for suppression, weather monitoring, and post-fire analysis.

HaloScout fills the missing middle: satellite-enabled, pre-ignition visibility focused on community consequence. By turning abstract risk into depicted, discussable reality, HaloScout enables smarter mitigation sequencing, better use of limited funds, clearer conversations with councils, insurers, and ministries, and earlier, calmer, more disciplined decisions.

Investment

HaloScout starts at $25,000 per community. This reflects the cost required to establish a current, defensible, perimeter-scale wildfire intelligence baseline suitable for government decision-making — including recent satellite data acquisition, directional exposure analysis, disciplined contextual overlays, expert interpretation, and quality assurance.

For context: the average cost of a single wildfire suppression deployment in British Columbia exceeds $1 million, and structure losses in a single WUI event routinely reach tens of millions. HaloScout's investment represents a fraction of one percent of those costs, and ensures that subsequent mitigation, funding, and response decisions are grounded in shared, auditable reality rather than assumption.

HaloScout is the entry point into an upgradeable wildfire intelligence system. Each subsequent phase — EdgeScan, HaloScan, HaloSim, FRIZ Expansion, SmartMoat builds on the same spatial grid HaloScout establishes. Communities invest incrementally as clarity deepens and priorities confirm. The $25,000 investment is not simply the price of a report. It is the foundation of a system.

FireArc HaloScout™

Without early clarity, every downstream wildfire decision carries hidden risk.

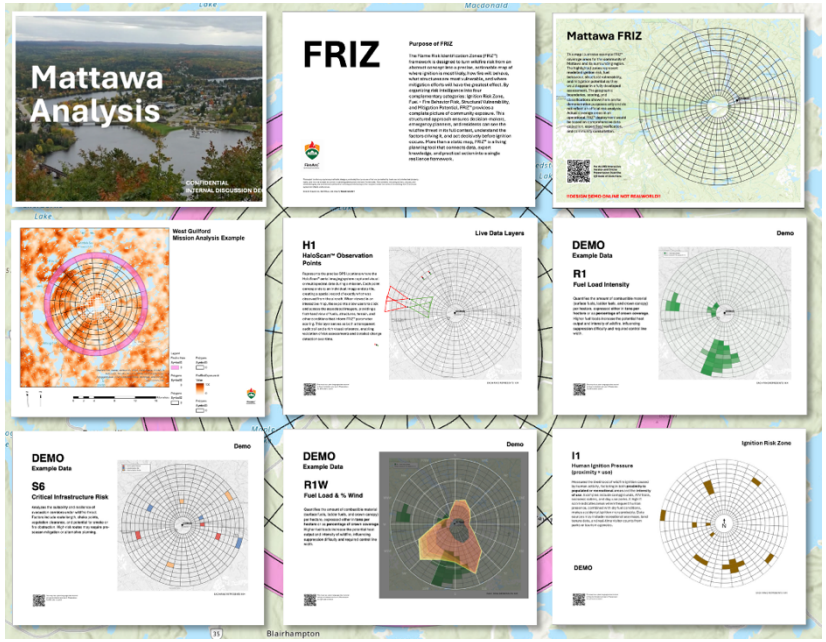
FIREARC INC.
WWW.FIREARC.CA

Brady Gilchrist
Founder & CEO
Brady.Gilchrist@Firearc.ca

Appendix A

Anatomy of a HaloScout™ Deliverable

This appendix describes the structure, components, and reading logic of a HaloScout deliverable. It is designed to show decision-makers what they will receive, how the outputs are organized, and how each component supports prioritized action.



1. The Spatial Framework: Radial Cell Grid

Every HaloScout deliverable is organized around a radial cell grid centred on the community. This grid is the visual and analytical backbone of the entire output.

Structure

The grid extends outward from the community centroid in concentric distance rings, typically spanning 10–15 km depending on landscape and fuel conditions. These rings are subdivided by directional sectors aligned to the compass, creating a matrix of cells—each representing a specific combination of direction and distance from the community.

This is the FRIZ™ (Fire Risk Identification Zones) cell structure. Each cell is geospatially bounded, independently assessable, and composable into larger patterns—sectors, arcs, corridors, or rings—depending on the question being asked.

How to Read the Grid

Direction tells you where fire would come from. Distance tells you how far that condition is from the community edge. Cell colour tells you the severity of the variable being displayed. Together, these three dimensions—direction, distance, and intensity—give you a complete spatial picture of wildfire exposure organized around the community that needs to be protected.

Why Radial?

Wildfire approaches from the landscape. It does not respect municipal boundaries, parcel lines, or administrative grids. The radial framework reflects how fire actually moves—along directional corridors shaped by wind, slope, and fuel—and organizes intelligence around the question that matters: from which direction, at what distance, and with what intensity could fire reach this community?

2. Data Layers Populated by HaloScout

HaloScout populates the cell grid with a series of data layers derived from satellite observation and terrain analysis. Each layer is presented as a separate map view of the same grid, allowing the reader to examine one variable at a time while understanding that all layers share the same spatial reference.

The primary layers included in a HaloScout deliverable are:

Layer	What It Shows
Fuel Continuity	The presence, type, and spatial continuity of combustible vegetation in each cell. Derived from satellite NDVI and land cover classification (ES2, ES5). Cells with unbroken fuel beds that connect to the community perimeter are highlighted as potential fire run corridors. Note: canopy layer confirmed by satellite; ladder and surface fuels require ground-level confirmation.
Fuel Load Intensity	Crown canopy density and vegetation mass within each cell, derived from satellite NBR and NDVI indices (ES2, ES3). Provides a canopy-level fuel loading estimate. Surface and ladder fuel loads are not confirmable at satellite resolution and are flagged explicitly as uncertainty — requiring ground investigation to resolve.
Terrain and Slope	Slope angle, aspect, and terrain features that channel or accelerate fire behaviour. Upslope cells aligned toward the community receive elevated exposure ratings due to the physics of fire-terrain interaction.
AOI Concentration	The density and distribution of residential structures and essential values within each cell of the Area of Interest. This layer identifies which sectors contain the highest concentrations values at risk.
Infrastructure Sensitivity	Critical infrastructure mapped as separate exhibits by asset type — road and highway network, railway corridors, hydro and transmission lines, and pipeline corridors — each routed through the FRIZ cell grid independently. A composite convergence map then identifies cells where multiple infrastructure types overlap inside high-exposure sectors. Each asset-type map is a standalone briefing tool for the responsible operator or authority.
Access and Egress	Road networks, evacuation routes, and response access corridors mapped against sector exposure geometry. Cells where evacuation routes intersect projected fire approach paths are flagged for vulnerability analysis.
Human Ignition Pressure	Proximity to human activity patterns that increase ignition likelihood—roads, rail corridors, recreation areas, industrial sites, seasonal use patterns. This layer distinguishes landscape exposure from ignition probability.
Ember Transport Zone	Dominant wind vectors projected forward through satellite canopy density to identify landscape-scale ember landing zones. Shows which settled areas sit downwind of continuous high-density fuel. Operates at landscape scale — structure-level vulnerability is EdgeScan territory.

Each layer is displayed on the same radial cell grid, using a consistent colour scale from low (light/cool) to high (dark/warm) severity. This allows any reader—regardless of technical background—to visually compare layers and identify where multiple risk factors converge in the same cells and sectors.

3. Sector Exposure–Consequence Summary

Following the individual layer maps, each HaloScout deliverable includes a sector summary table that integrates all layers into a single prioritization view. This table is the primary decision-support tool in the deliverable.

What the Table Contains

For each directional sector, the summary table presents:

- **Exposure Rating:** an integrated assessment of fuel continuity, fuel load, terrain channeling, and ignition pressure within that sector's cells.
- **Consequence Rating:** an integrated assessment of dwelling concentration, infrastructure sensitivity, and access corridor vulnerability within that sector.
- **Combined Priority:** the sector's overall ranking based on the intersection of exposure and consequence—reflecting not just how likely fire is to arrive from that direction, but what would be affected if it did.
- **Dominant Fuel Type:** the primary fuel class driving exposure in that sector.
- **Key Concern:** a plain-language statement of the most significant risk driver for that sector.

Priority ratings use a consistent scale: Critical, High, Moderate, Low, and Minimal. Sectors rated Critical or High are identified as dominant approach corridors requiring near-term attention.

Reading Principle

The sector summary does not collapse risk into a single community-wide number. It preserves directionality. A community with a Critical southwest sector and a Minimal east sector has a fundamentally different risk profile—and requires a fundamentally different mitigation strategy—than one with uniform moderate exposure. HaloScout makes this difference visible and actionable.

4. Sector Interpretations

For each sector rated Moderate or above, the HaloScout deliverable includes a plain-language interpretation covering three dimensions:

- **Exposure narrative:** what the satellite and terrain data reveal about how fire could approach from that direction—fuel type, continuity, slope alignment, and run-up distance.
- **Consequence narrative:** what lies in the path of that approach—dwellings, infrastructure, evacuation routes, and response access—and why it matters.
- **Uncertainty flags:** explicit statements of what the satellite-level analysis cannot confirm and where deeper investigation (aerial survey, field assessment, engineering study) is warranted.

These interpretations are written for non-specialist audiences. They are designed to be read aloud in a council meeting, included in a funding application, or shared with community members—without requiring translation or interpretation by a fire science professional.

5. Uncertainty Flags

A distinguishing feature of every HaloScout deliverable is the explicit identification of what is not known. HaloScout does not paper over analytical limits or present satellite-derived assessments as ground truth.

Typical uncertainty flags include:

- Satellite resolution limits that prevent confirmation of fine-scale fuel structure (e.g., ladder fuel continuity, understory density)
- Home hardening and structural vulnerability conditions that are invisible to satellite observation
- Recent land management activities (fuel treatments, logging, development) that may have altered conditions since the satellite acquisition date
- Seasonal variability in fuel moisture and curing that affects fire behaviour potential beyond what a single acquisition can capture
- Sub-canopy conditions such as terrain micro-features, drainage patterns, or structures obscured by tree cover

These flags are not limitations to be apologized for. They are the mechanism by which HaloScout governs escalation—showing decision-makers precisely where deeper investigation is justified, and where satellite-level clarity is sufficient for current planning purposes.

6. Recommended Escalation Sequence

Each HaloScout deliverable concludes with a recommended escalation sequence—a prioritized list of next steps organized by sector and urgency. This section translates the analytical findings into a decision pathway.

The escalation sequence is structured by priority tier:

- **Immediate Priority sectors:** where exposure and consequence are both high, and uncertainty flags indicate that ground-level or aerial investigation is urgently needed to confirm conditions and inform near-term mitigation.
- **Near-Term Priority sectors:** where significant exposure or consequence exists but conditions may allow a slightly longer planning horizon before field investigation.
- **Monitoring Priority sectors:** where exposure is moderate or seasonal, and ongoing observation is appropriate before committing resources.
- **Baseline Maintenance:** sectors with low exposure where community-wide measures (home hardening guidance, ember awareness) are sufficient.

This escalation logic connects HaloScout directly to the next phases of the FireArc system. Sectors flagged for aerial investigation naturally lead to HaloScan missions. Sectors requiring detailed fuel and structural analysis lead to full FRIZ expansion. Sectors where landscape-scale fuel breaks are identified as the most effective intervention lead to SmartMoat design.

7. From HaloScout to the Full FRIZ System

HaloScout is the entry point. It establishes the radial cell grid, populates the initial data layers, and identifies priority sectors. But the same grid that HaloScout creates becomes the spatial backbone for all subsequent analysis.

Phase	What It Adds	How It Uses the Grid
HaloScout	Satellite-derived exposure geometry, terrain analysis, contextual consequence overlays	Establishes the grid, populates initial layers, identifies priority sectors
EdgeScan	GPS-tagged perimeter photography and WUI edge condition capture; structure exposure assessment at the wildland-urban interface	Provides ground-level perimeter intelligence invisible to satellite and aerial observation; resolves the last-mile uncertainty flagged in HaloScout
HaloScan	Aerial mission analysis with high-resolution observation points, stand-level fuel validation	Adds resolution within priority sectors identified by HaloScout; validates or revises cell ratings
HaloSim	Simulation-based fire scenario modelling using confirmed fuel, terrain, and weather inputs; treatment efficacy validation by running proposed interventions against modelled fire behaviour	Tests fire scenarios within the established cell framework to quantify directional threat under realistic conditions; validates whether proposed treatments change outcomes before community resources are committed
FRIZ Expansion	Full cell-level integration of all risk, consequence, and mitigation variables; governance-ready documentation	Completes the cell framework across all layers; enables cell-by-cell prioritization and phased planning
SmartMoat	Landscape fuel break design, treatment geometry, engineering-level specifications	Uses the grid to identify optimal treatment locations based on sector exposure and fuel corridor geometry

The key principle is that HaloScout's spatial language is never discarded. Every subsequent phase refines the same cell structure, adding layers and resolution without requiring the community to start over. This is what makes the FRIZ system compounding rather than fragmented—and what ensures that the initial $25,000 HaloScout investment is not a standalone report, but the foundation of an evolving, upgradeable wildfire intelligence system.

8. Scope and Limitations

A HaloScout deliverable establishes the directional exposure–consequence baseline required to sequence subsequent analysis and action. It does not constitute a fire behaviour prediction, an engineering assessment of structural ignition vulnerability, a replacement for Community Wildfire Protection Plans, or a determination of acceptable risk.

HaloScout resolves BlindSpot 1 (Perimeter Exposure Regime and Directional Approach) within the FireArc Nine BlindSpots framework. Deeper resolution of fuel structure, mitigation effectiveness, evacuation reliability, and other downstream BlindSpots requires escalation to HaloScan, FRIZ expansion, and SmartMoat analysis phases as warranted by the HaloScout baseline assessment.