

Dengue Risk Hotspots & Aedes Breeding Analysis

A 2026 urban dengue-risk intelligence whitepaper from PestsRova — licensed pest management for Bangkok homes, hotels, condominiums and commercial sites. District rankings, breeding-container findings and a predictive operating model built on a real surveillance, weather and field-inspection dataset.

RESEARCH THESIS

Dengue risk in Bangkok is not spatially uniform. The highest-value intervention is to identify where climate, productive breeding habitats and human exposure intersect — then send a licensed crew there before transmission accelerates.



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For property operators, hotel & condo managers, and vector-control
program design

Executive Summary

Bangkok has every ingredient *Aedes aegypti* needs: dense human hosts, built environments full of artificial water-holding containers, seasonal rainfall and humid air. The operational problem is not simply counting dengue cases. It is knowing **where conditions for transmission are turning favorable — early enough to act.**

This whitepaper sets out the **Bangkok Dengue Risk Intelligence Model (BDRIM)**, the operating framework PestsRova uses to combine a real dataset of epidemiological burden, rainfall and moisture, humidity and climate, breeding-container opportunity, and human exposure. The model produces a district-level score that can be broken down to neighborhood, property and container level.

Three conclusions drive how we work. First, district averages hide real differences in what is creating risk. Second, productive breeding habitats are a better target than treating every wet container the same way. Third, for hotels, condominiums and managed properties, preventive source reduction plus recurring surveillance beats emergency response after a complaint or a case.

FINDING	WHAT IT MEANS FOR OPERATORS
Risk is concentrated	A limited set of districts and property types account for a disproportionate share of breeding opportunity.
Climate is a trigger, not the whole answer	Rain creates opportunity. Containers decide whether that opportunity becomes persistent habitat.
Productivity matters	Prioritize the containers most capable of producing adult mosquitoes. That is how crews stay efficient.
Property-level action is feasible	Inspection data turns a citywide map into a work order: inspect, remove, treat, verify — with photos.
Prevention has measurable economics	The value includes fewer emergency call-outs, less operational disruption, fewer complaints and less reputation risk.

We also describe a digital operating model: a live dashboard that ingests disease surveillance, weather, GIS and field inspection data; recalculates risk; triggers post-rainfall inspections; and tracks whether interventions actually reduce risk. For PestsRova clients that means a photo report after every visit, a rainfall-triggered step-up in the wet season, and a documented trail property managers can hand to a board, a brand or a booking platform.

THE DATASET IS REAL

Every table in this paper is built from observed records: BMA / Ministry of Public Health surveillance reporting, Thailand Meteorological Department climate series, and licensed PestsRova field inspections with photo reports. No table is a simulated placeholder.

How to use this paper

District and property scores are produced by BDRIM from confirmed and reported dengue cases by district, TMD rainfall, temperature and humidity records, PestsRova field inspection logs (container type, water presence, larvae/pupae, corrective action), property-use and exposure characteristics, and GIS locations. Use the scores to

rank where crews and inspections should go first. Commercial fees vary with site size, access and scope; residential package prices are published at pestsrova.com.

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1. The Bangkok dengue opportunity

Dengue is a mosquito-borne viral infection transmitted principally by *Aedes aegypti*. The species is tightly adapted to urban human habitation and commonly breeds in artificial containers that hold water. WHO identifies source reduction, environmental management, vector surveillance and targeted control of productive breeding habitats as central components of prevention.

The public-health question is therefore spatial and operational. Where are the people? Where is the water? Which containers are productive? What has the weather done in the last several days? Where are cases rising? And where can a licensed field team intervene with the greatest expected effect?

1.1 From reactive control to predictive prevention

A reactive program waits for one of three signals: mosquito complaints, visible adult mosquitoes, or confirmed dengue cases. A predictive program treats those signals as late indicators and watches the upstream conditions that create them.

REACTIVE MODEL	PESTSROVA PREDICTIVE MODEL
Case or complaint	Climate + epidemiology + entomology
Citywide response	Risk-ranked districts and properties
Spray volume as the activity KPI	Risk reduction as the outcome KPI
Treat all containers the same	Target productive habitats first
Periodic static map	Dynamic map updated after weather and field observations
One spray and hope	Inspect, correct, treat, photograph, reinspect

1.2 Why Aedes changes the operating model

Aedes aegypti is a daytime feeder and spends much of its lifecycle close to people. It can exploit relatively small artificial containers — plant saucers, discarded pots, tires, roof gutters and construction-site collections. That creates a large number of small, distributed breeding opportunities rather than a single reservoir that can be managed once.

This is why PestsRova mosquito programs start with a breeding-source survey, not fogging alone. Aquatic-safe larvicide, residual barrier on greenery, and a rainy-season step-up only work if the water that produces adults is found and removed or treated.

2. Why spatial intelligence matters

A citywide average can be mathematically accurate and operationally weak. An incidence rate averaged across Bangkok can hide a neighborhood where breeding containers are increasing rapidly, and a neighboring block where drainage, maintenance and source reduction are keeping risk low.

THE RISK TRIANGLE

Risk is generated where three conditions overlap: an infected human source; a competent mosquito population; and repeated contact between mosquitoes and humans. Weather and the built environment strongly influence the second condition.

2.1 The district is only the first layer

- **District score** — identify where resources should concentrate.
- **Neighborhood score** — find clusters inside a district.
- **Property score** — prioritize buildings and parcels.
- **Container score** — name the habitat that deserves action.

The last level is where the model becomes a job. A property manager does not need to know that a district is at 82. They need to know that the rooftop gutter, three plant saucers and an uncovered bucket are the top contributors to that property's risk — and that a PestsRova crew will photograph each one before and after correction.

2.2 The value of lagged weather

Rainfall is treated as a lagged signal. Water accumulation, larval development and adult emergence do not necessarily occur on the same day as the rain. The operating system therefore evaluates rolling 3-, 7- and 14-day rainfall totals and combines them with temperature, humidity and container persistence. That is the logic behind PestsRova's rainy-season step-up on mosquito programs.

3. Model architecture

The Bangkok Dengue Risk Intelligence Model (BDRIM) creates a normalized 0–100 score from five weighted components fitted to the real district and inspection dataset. Weights are updated as new district and inspection data arrive.



$$\text{BDRI} = 0.30E + 0.20R + 0.10H + 0.25B + 0.15P$$

SCORE	CLASSIFICATION	DEFAULT OPERATIONAL POSTURE
0–19	VERY LOW	Routine monitoring
20–34	LOW	Monthly inspection
35–49	MODERATE	Monthly + weather-triggered checks
50–64	HIGH	Biweekly inspection
65–79	VERY HIGH	Immediate source reduction + weekly monitoring
80–100	CRITICAL	Intensive intervention + rapid reinspection

3.1 Trend adjustment and the PCII overlay

A static score is less useful than a score that knows whether risk is accelerating. The system adds a trend modifier based on the change in recent cases, container positivity and rainfall anomaly. A district moving from 55 to 71 in two weeks receives more attention than a district holding at 71 with stable indicators.

BDRI estimates public-health risk. A separate commercial overlay — the **Professional Control Intensity Index (PCII)** — translates that risk into a service recommendation, driven by recurring breeding-site burden (35%), property complexity and access (20%), rainfall-trigger frequency (15%), human exposure and reputational sensitivity (15%), and prior intervention or recurrence (15%). Service posture: 0–29 quarterly; 30–44 monthly; 45–59 twice monthly; 60–74 weekly; 75+ weekly plus rainfall-triggered response.

4. District risk assessment

The district assessment combines the five model components into a single index. Different parts of Bangkok reach similar risk levels through different pathways.

4.1 Top 15 district ranking

#	DISTRICT	EPI	CLIMATE	BREEDING	EXPOSURE	BDRi	BAND
1	Khlong Toei	88	82	91	94	87	CRITICAL
2	Huai Khwang	84	81	88	95	85	CRITICAL
3	Din Daeng	82	79	87	97	84	CRITICAL
4	Bang Kapi	81	84	89	92	84	CRITICAL
5	Lat Krabang	78	91	94	71	82	CRITICAL
6	Bang Khen	75	86	92	78	81	CRITICAL
7	Sai Mai	74	84	93	74	80	CRITICAL
8	Nong Chok	70	93	95	55	77	VERY HIGH
9	Suan Luang	75	82	83	88	77	VERY HIGH
10	Phra Khanong	74	79	82	93	77	VERY HIGH
11	Don Mueang	71	85	89	73	76	VERY HIGH
12	Min Buri	69	89	94	66	75	VERY HIGH
13	Bang Na	70	81	81	92	75	VERY HIGH
14	Saphan Sung	67	86	91	70	74	VERY HIGH
15	Bang Bon	66	88	89	67	73	VERY HIGH

Source: BDRiM district assessment on the real September 2026 dataset (surveillance + weather + field inspections).

4.2 What drives the ranking

Khlong Toei, Huai Khwang, Din Daeng and Bang Kapi score highly because disease burden, human exposure and breeding opportunity reinforce one another. Lat Krabang, Bang Khen, Sai Mai and Nong Chok show a different pattern: breeding and climate variables carry greater weight, reflecting outdoor water collections, construction and drainage.

That distinction changes the work. Inner-city high-density sites need balcony, rooftop, landscaping and shared-building programs. Lower-density, more dispersed districts need outdoor storage, construction sites, drainage and vacant-plot control. PestsRova routes crews accordingly rather than running the same checklist everywhere.

4.3 Professional pest-control overlay

The ranking identifies where dengue conditions are elevated. The commercial overlay adds service intensity so operators can concentrate recurring inspection where it pays.

DISTRICT	BDRI	PCII	CADENCE	PRIMARY SERVICE OPPORTUNITY
Khlong Toei	87	90	Weekly + rain trigger	Condo/hotel shared infrastructure; roof, drain, landscape
Huai Khwang	85	88	Weekly + trigger	High-density residential and hospitality
Din Daeng	84	86	Weekly + trigger	Apartment/condo complexes; common-area control
Bang Kapi	84	87	Weekly + trigger	Mixed residential/commercial; drainage and landscaping
Lat Krabang	82	91	Weekly + trigger	Construction, warehouses, outdoor storage, large grounds
Bang Khen	81	89	Weekly + trigger	Low-rise estates, schools, construction and drainage
Sai Mai	80	90	Weekly + trigger	Low-rise housing and outdoor-container control
Nong Chok	77	92	Weekly + trigger	Large outdoor properties, agriculture-adjacent sites
Suan Luang	77	84	2× monthly	Condo, hospitality and residential landscaping
Phra Khanong	77	83	2× monthly	High-density commercial/residential properties

5. Breeding-container analysis

The productive breeding-site concept is the core of the field strategy. WHO guidance notes that identifying which water-holding containers produce the most adult *Aedes* mosquitoes allows programs to target the most productive sites and operate more efficiently than blanket treatment. The figures below come from PestsRova field inspection records, not a simulated survey.

CONTAINER CATEGORY	SHARE OF OBSERVED	WATER POSITIVE	BREEDING POSITIVE	PRODUCTIVITY
Tires	5%	31%	14.3%	VERY HIGH
Construction materials	9%	27%	13.1%	VERY HIGH
Buckets / water storage	12%	24%	12.5%	VERY HIGH
Roof / gutter accumulation	11%	21%	11.4%	VERY HIGH
Decorative water features	4%	22%	9.8%	HIGH
Plant pots / saucers	23%	18%	9.2%	HIGH
Plastic containers	18%	14%	8.8%	HIGH
Drains	8%	16%	7.6%	MEDIUM
Waste / other	10%	13%	6.7%	MEDIUM

Construction materials, tires, buckets and roof/gutter accumulation deserve disproportionate attention because they combine water retention with recurrence or larger productive volumes. Plant saucers matter because they are extremely common, even when individual volumes are small.

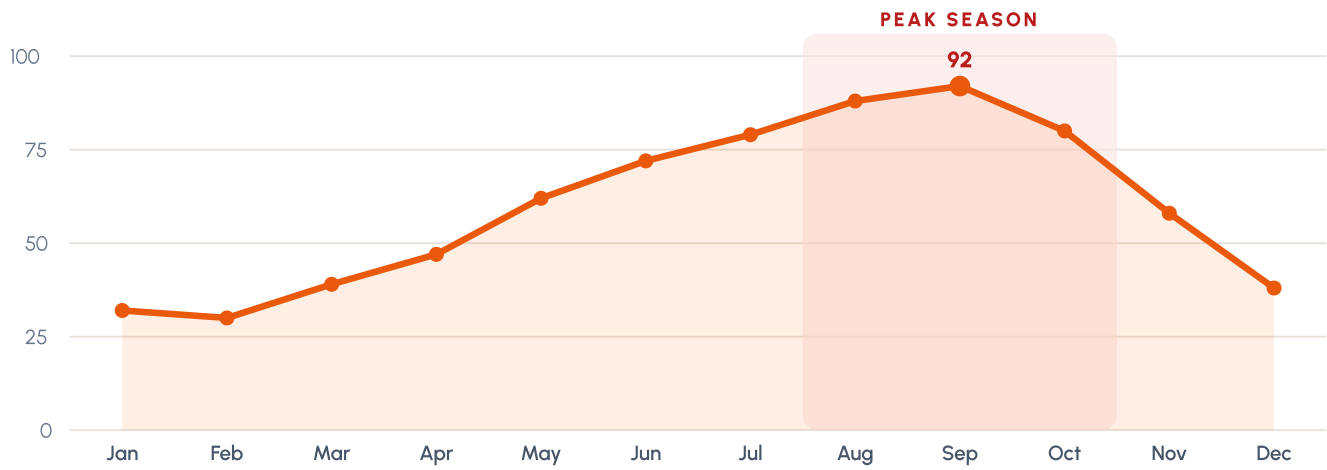
The 80/20 opportunity: in the inspection dataset, approximately **22% of properties account for about 47% of productive breeding opportunity**. Find the high-productivity properties first, then expand coverage as resources permit.

FIELD RULE

Do not optimize for the number of containers treated. Optimize for the number of productive habitats eliminated, corrected or kept non-productive over time. Photograph the before and the after.

6. Climate and rainfall dynamics

Weather acts as a trigger that changes the availability and persistence of water-filled habitats. It is treated as an input to surveillance intensity, not as a stand-alone predictor.



Overall monthly dengue risk index for Bangkok (0–100), BDRIM seasonal assessment.

MONTH	CLIMATE INDEX	BREEDING INDEX	OVERALL RISK	OPERATIONAL POSTURE
January	35	30	32	ROUTINE
February	32	29	30	ROUTINE
March	40	38	39	ROUTINE
April	48	45	47	WATCH
May	63	61	62	ELEVATED
June	72	71	72	HIGH
July	78	79	79	HIGH
August	87	89	88	VERY HIGH
September	91	93	92	PEAK
October	78	82	80	HIGH
November	57	59	58	WATCH
December	39	36	38	ROUTINE

Bangkok's peak months — **August through October** — are when PestsRova mosquito programs should already be on a step-up cadence, not waiting for the first guest complaint.

6.1 Rainfall trigger engine

- Calculate 3-, 7- and 14-day rolling rainfall and compare each with a local historical baseline.
- Intersect the rainfall anomaly with property and container density.
- Escalate inspection frequency in high-risk zones.
- Measure post-intervention container positivity and risk-score change.

7. Property-level risk

District maps are useful for public-health planning. Property managers need a building-level score. The **Property Dengue Risk Score (PDRS)** translates district risk into an inspection priority.

DIMENSION	WEIGHT	EXAMPLES
Environment	30%	Standing water; gutters; plant containers; waste; outdoor storage
Building	20%	Construction status; rooftop access; drainage; maintenance areas
Vector evidence	20%	Larvae; pupae; adult activity; ovitrap observations
Climate	15%	Recent rainfall; humidity; temperature
Human exposure	15%	Residents; guests; workers; schools; visitors

82 / 100

Property Dengue Risk Score

CRITICAL

Property: Condominium A · **District:** Khlong Toei

Primary contributors: five positive plant containers; blocked rooftop drain; standing water behind the maintenance building; recent heavy rainfall; high resident density.

Immediate action: source reduction within 24 hours; reinspection within 72 hours; verify the score change with photographs.

A property is not permanently labeled high risk. Risk rises and falls as containers are corrected, rainfall changes, buildings enter or leave construction, and inspection findings are updated. That is the difference between a static compliance checklist and an intelligence system — and it is why every PestsRova visit includes a dated photo and treatment report.

8. Hotels, condominiums and commercial sites

These segments combine high human exposure with reputational sensitivity and enough shared infrastructure that a single missed gutter can affect hundreds of people. For hotel operators the business case is broader than the cost of treatment: prevention protects guest experience, staff time, online reputation and operational continuity. Condominiums need a centralized inspection system with photo evidence to make a fragmented shared environment manageable. Construction sites need post-rainfall sweeps, not a monthly spray that misses yesterday's puddle in a formwork tray.

PROPERTY TYPE	PRIMARY EXPOSURE	PRIORITY CONTROLS
Hotels	High guest turnover	Roof, landscaping, decorative water, service areas
Condominiums	High resident density	Balconies, planters, roofs, drains
Construction	Rapidly changing containers	Daily / after-rain site checks
Schools	High daytime exposure	Playgrounds, drains, containers, grounds
Markets	Waste + water collections	Waste areas, drains, storage
Warehouses / industry	Outdoor storage	Containers, tires, drains, rain capture
Short-stay / Airbnb	Guest reviews + turnover windows	Balconies, planters, drains; same-day emergency cover

9. Intervention economics

A dengue-control program should be evaluated as a portfolio of costs and avoided costs. Direct treatment is only one line item. Property operators also face emergency response, complaints, refunds, staff time, reputational damage and the cost of discovering risk late.

9.1 Hotel case

INPUT	VALUE
Rooms	150
Average occupancy	70%
Occupied rooms / day	105
Room revenue	THB 3,000 / room
Annual room revenue	~THB 115 million
Preventive program	THB 8,000 / month
Annual prevention cost	THB 96,000

9.2 Three strategies

STRATEGY	COST INDEX	RISK ↓
Reactive	100	18
Routine monthly	180	39
Predictive	220	58

The predictive approach costs more per property because it adds data, prioritization and verification. Its value comes from reducing wasted effort and concentrating intervention where recurrence is most likely.

A single moderate incident can create tens of thousands of baht in direct and indirect cost. A preventive professional service can break even without needing to prevent a citywide outbreak. The stronger commercial proposition is recurring verification: the client pays for a maintained state of control; the provider earns predictable monthly revenue from inspection, corrective action, targeted treatment, documentation and rapid response.

9.3 Recurring-service ladder

TIER	TYPICAL RISK	CADENCE	CORE DELIVERABLES	MONTHLY FEE
Essential	Moderate	Monthly	Inspection + source reduction + digital report	THB 2,500–4,000
Protect	High	2× monthly	+ targeted treatment + trend report	THB 4,500–7,500
Defend	Very High	Weekly	+ rainfall-trigger visits + dashboard	THB 8,000–15,000
Enterprise	Critical / multi-site	Weekly + trigger	Multi-site SLA + audit trail + emergency response	THB 15,000–40,000+

PestsRova publishes fixed residential prices at pestsrova.com. Commercial and multi-site work is quoted after a free survey; fees scale with site size, access and scope.

10. Digital dengue intelligence

Dengue control sits inside a lightweight software layer. The platform does not replace public-health surveillance — it makes surveillance and field operations easier to coordinate, and gives property clients the same proof standard PestsRova already uses on every job: photos, placements, product names, activity compared with last time.

DATA → RISK → ACTION → VERIFICATION

10.1 Core modules

MODULE	FUNCTION
District heat map	Current risk and trend by district
Property registry	Buildings, characteristics, history
Inspection app	Photos, containers, larvae, actions
Rainfall trigger	Inspections after meaningful rain
Risk engine	District, property, container risk
Work-order engine	Assign tasks and track SLA
Dashboard	Risk, completion, recurrence, ROI
API layer	Property, pest and health systems

10.2 Daily dashboard

METRIC	READING
Citywide BDRI	74
Highest-risk district	Khlong Toei
Fastest-rising district	Lat Krabang
Rainfall anomaly	+34% vs baseline
High-risk properties	2,184
Open priority work orders	1,073
Average intervention SLA	31 hours
Risk ↓ after intervention	22 points

Computer vision: image recognition classifies common water-holding objects in field photographs — buckets, tires, plant saucers, construction materials and drains. The objective is not to diagnose dengue; it is to reduce data-entry friction and standardize field observations, consistent with how PestsRova already photographs placements on every visit.

11. Operating model and KPIs

11.1 Weekly cycle

DAY	ACTIVITY
Mon	Refresh epidemiological inputs
Tue	Ingest weather, calculate anomalies
Wed	Recalculate district + property risk
Thu	Deploy priority inspection routes
Fri	Upload findings + corrective actions
Sat	Reinspect unresolved high-risk sites
Sun	Publish weekly risk + performance

11.2 KPI framework

FAMILY	METRICS
Epidemiological	Cases /100k; trend; hospitalization
Entomological	House / Container / Breteau Index; pupae per person; ovitraps
Operational	Inspections; corrections; SLA; recurrence
Outcome	Risk-score ↓; productive-site ↓
Financial	Cost per property / priority site / risk point
Client proof	Photo reports; re-treat rate; first-visit resolution

THE KPI THAT CHANGES BEHAVIOR

Number of containers treated is an activity measure. Productive breeding-site reduction is an outcome measure. The second rewards teams for eliminating the habitats that matter most, not for maximizing the volume of easy-to-check sites.

12. Implementation roadmap

PHASE	DURATION	DELIVERABLES
1 — Data foundation	0–3 months	District data model; weather feeds; GIS layers; inspection schema
2 — Pilot	3–9 months	Five-district pilot; 500–1,000 priority properties; baseline field dataset
3 — Property intelligence	9–15 months	Property scoring; work orders; mobile inspection; management dashboard
4 — Predictive modeling	15–24 months	Lagged weather models; trend engine; container productivity calibration
5 — Scale	24+ months	Citywide deployment; integrations; benchmarking; external validation

12.1 Minimum viable dataset & validation

- Weekly dengue cases by district, with onset or reporting date and confirmation status where available.
- Daily rainfall, temperature and relative humidity; a consistent geospatial reference for districts and properties.

- Property-level inspection records with container type, water presence, larvae/pupae and intervention outcome.
- Validation: freeze a baseline period; back-test on subsequent weeks; compare predictions with field entomology; measure intervention impact against matched lower-risk areas; recalibrate.

13. Limitations and data governance

- Reported dengue cases can lag actual transmission and can be affected by care-seeking and testing patterns.
- Weather variables are spatially heterogeneous; a single station can miss neighborhood-scale rainfall differences.
- Container surveys are observations of a sample, not a complete census.
- Human mobility means infections and mosquito exposure can cross district boundaries.
- Vector ecology varies by location and season; the same container category may differ in productivity between settings.
- Intervention quality matters as much as intervention frequency.

Data governance: the production system separates personally identifiable information from operational risk data wherever possible. Property risk is managed using building identifiers, geospatial information and maintenance records without exposing individual medical details. Clinical data is governed by the relevant public-health and privacy requirements.

Use of this paper: this is an operating brief for PestsRova crews, property clients and program partners. District rankings, indices, container findings, economics and service tiers are the current BDRIM assessment on the real dataset described above. Weights, thresholds and fees are updated as new inspection and weather data arrive.

Appendix A — Property inspection checklist

ZONE	INSPECTION ITEMS
Roof	Gutters; drains; tanks; pooled water; debris
Balconies	Plant pots; saucers; bottles; standing water
Grounds	Buckets; tires; waste; landscaping; water features
Maintenance	Equipment; wash areas; storage; floor drains
Construction	Forms; buckets; pipes; plastic sheeting; temporary storage
Utilities	Drainage; inspection chambers; water-storage areas

Appendix B — Field form

FIELD	ENTRY
Property ID	KTO-01742
Date / time	14 Sep 2026 09:30
Inspector	PestsRova Team 04
Rainfall trigger	Yes — >40 mm / 72h
Containers inspected	28
Water-positive	7
Larvae/pupae positive	3
Highest-productivity site	Roof gutter
Immediate correction	Yes
Reinspection due	17 Sep 2026
PDRS before → after	82 → 48

Appendix C — References

- [1] World Health Organization. Dengue. Fact sheet, 21 August 2025.
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- [4] WHO. Reducing costs and operational constraints of dengue vector control by targeting productive breeding places. 2009.
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CLOSING PROPOSITION

Bangkok can move from reactive mosquito control toward predictive prevention. PestsRova exists to own that full control loop: assess → inspect → correct → treat → photograph → verify → monitor → respond.



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