National Geo AI Hackathon

Details:
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⚠ CURRENT SITUATION STATE OF UTTAR PRADESH

THE URGENT CRISIS | UP Drowns Every Monsoon

PRESENTED TO
Ministry of Panchayati Raj

Turning SVAMITVA's Data into Uttar Pradesh's Drainage Solution

THE REALITY

Annual Catastrophe

Floods and waterlogging are a constant disaster, destroying lives and property annually.

THE OPPORTUNITY

SVAMITVA's Drone Data

A treasure trove of high-resolution topographic data ready to engineer solutions.

WIDESPREAD IMPACT (2024)

700+

Villages severely impacted across 17 districts in a single monsoon season.

HUMAN COST (5 YEARS)

1,137

Lives lost to floods. Thousands of hectares of agricultural land submerged.

EXISTING ASSET

90,000+

Villages already drone-surveyed by SVAMITVA. No new surveys needed.

TECHNICAL METHODOLOGY

OUR 4-STEP AI PIPELINE | From Data to Design

Leveraging SVAMITVA's existing drone maps to solve the drainage crisis.

RAW DATA INPUT (.LAZ/.TIF)

01

Ground Classification

INPUT

77M+ drone points
(~5cm accuracy)

PROCESS

AI algorithm separates bare earth from buildings, trees, and vehicles.

Pure Terrain Model

02

Precision DTM Generation

PROCESS

Creation of a high-fidelity Digital Terrain Model from classified points.

VALIDATION

0.60m RMSE
Engineering Grade Accuracy

Validated Surface

03

Hydrological Diagnosis

PROCESS

AI maps natural flow paths, accumulation zones, and physical blockages.

ANALYSIS

Identifies **WHY** and **WHERE** water logging occurs.

Problem Map

04

Optimized Drainage Design

PROCESS

Auto-generation of cost-effective, terrain-aware drainage channels.

DELIVERABLES

- L-Sections
- Earthwork BOQ

Ready to Build

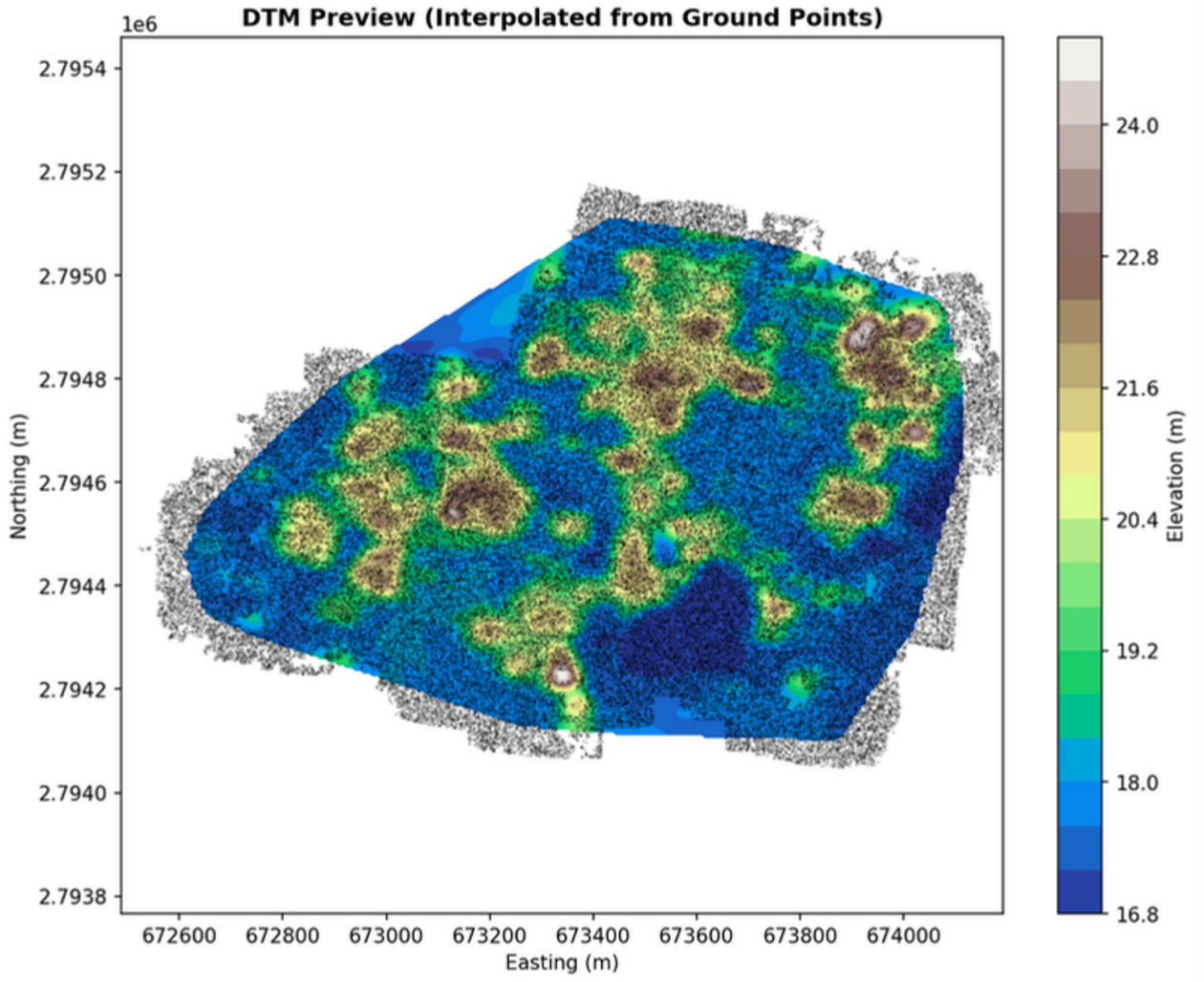
Core Value: We don't need new surveys. We transform existing property maps into life-saving drainage maps.

FIELD VALIDATED

ACCURACY VALIDATED | Engineering-Grade Precision

BENCHMARK METRIC
RMSE < 1.0m

From map to ground: Proving our model against SVAMITVA orthophotos.



DTM Preview of Pure Village

ACCURACY
0.60 m
RMSE

WHY ENGINEERS TRUST THIS DATA

Spatial Alignment Perfect
Our DTM aligns precisely with the official village revenue map boundaries.

Feature Correlation Accurate
Natural slopes and man-made structures (roads, bunds) match ground truth.

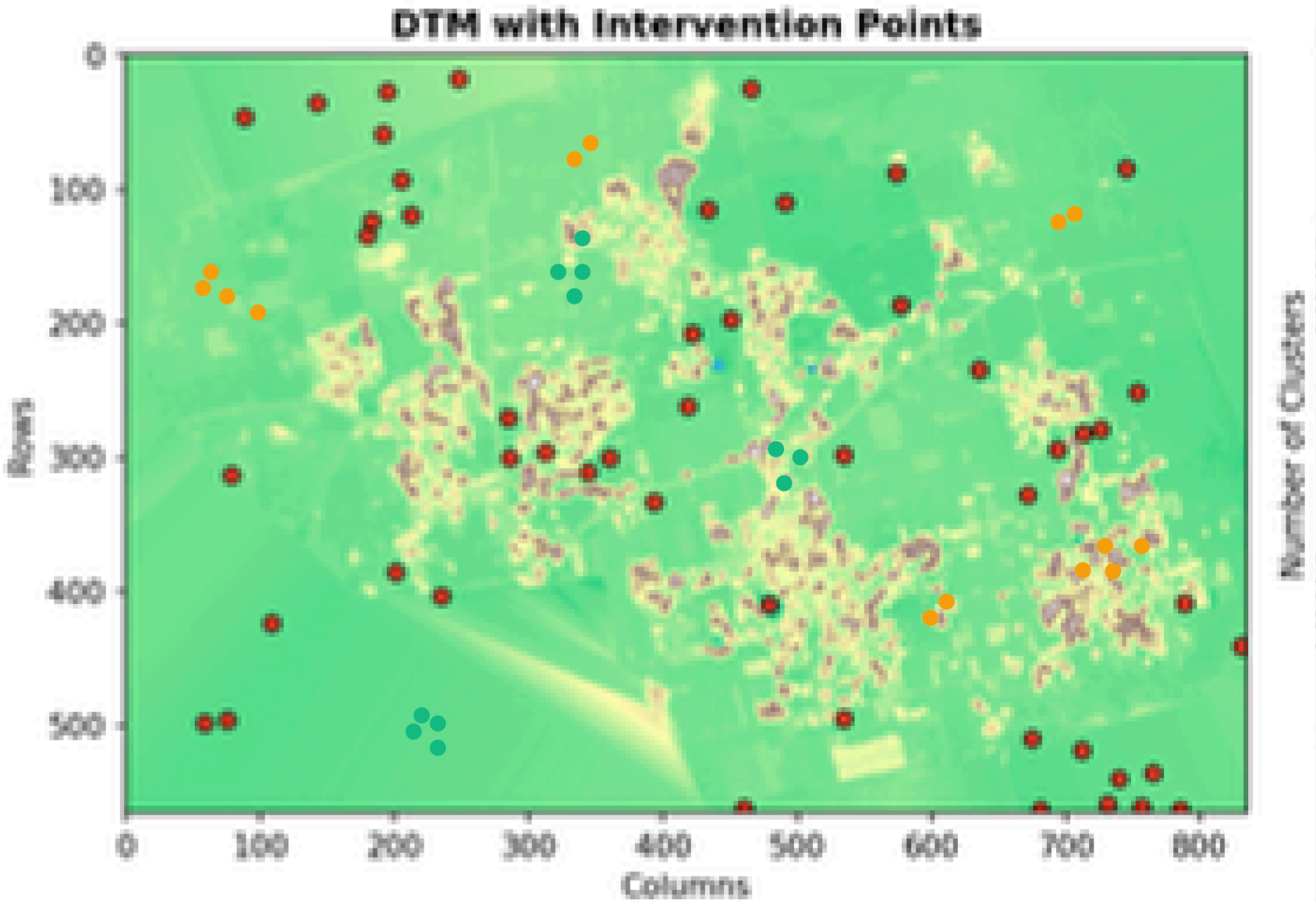
Actionable Confidence
~60cm precision is sufficient for channel design and earthwork BOQ.

RMSE = Root Mean Square Error

CASE STUDY VILLAGE-SPECIFIC INTERVENTION

THE DESIGN | Targeted Solution for Village Pure

SCALE OF IMPACT
1,432 Interventions

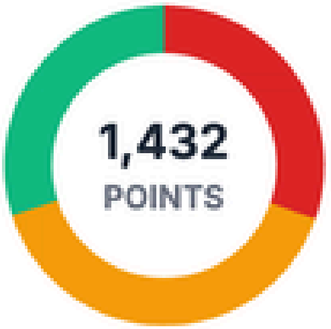


AI DIAGNOSIS

15% High Risk

254,050 cells identified as flood-prone hotspots requiring drainage.

PRIORITY ACTION PLAN



High Priority 435

Subsurface drains in critical residential zones.

Medium Priority 567

Grassed waterways for agricultural fields.

Low Priority 430

Check dams & de-silting for long-term health.

FISCAL RESPONSIBILITY

COST & SCALE | A Responsible Blueprint

Smart investment: ₹14.3 Lakhs per village vs. Crores in annual losses.

TOTAL COST
₹14.3 L
Per Village

BREAKDOWN

- Engineering Design (65%)
- Data Processing (25%)
- Validation & BOQ (10%)

Return on Investment Logic

COST OF INACTION

Crores/Year

Recurring losses to crops, infrastructure, and property.

ONE-TIME INVESTMENT

₹14.3 Lakhs

Permanent protection of SVAMITVA-recorded assets.

Scalable Vision for UP

From Pilot to State-Wide Rollout

Foundation Set

90,573 villages already mapped by SVAMITVA. Data is ready.

Proposed Pilot

- 10 High-Risk Districts
- 100 Villages (Phase 1)

Target Districts: Varanasi, Ballia, Gorakhpur

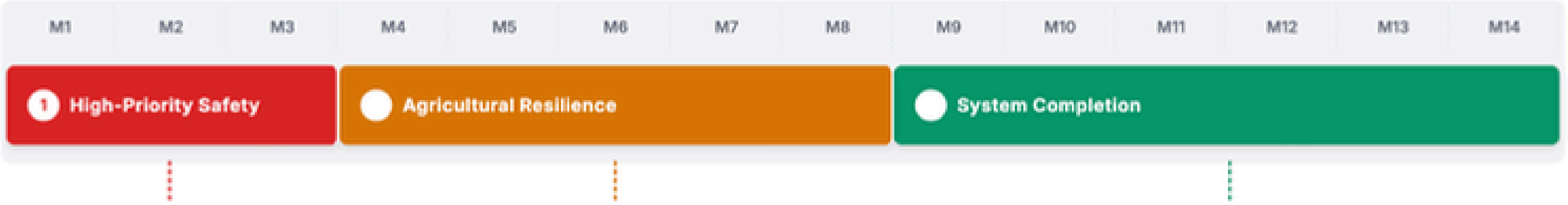
State-Wide Rollout

Replicable model for the entire state based on pilot success.

EXECUTION ROADMAP

14-MONTH TRANSFORMATION PLAN | From Data to Digging

A phased approach ensuring immediate safety while building long-term resilience.



PHASE 1

MONTHS 1-3

GOAL

Secure residential areas (abadi) before the next monsoon season.

KEY ACTIONS

- Construct top 435 AI-identified critical subsurface drains.
- Clear major blockages near settlements.

PHASE 2

MONTHS 4-8

GOAL

Protect agricultural livelihoods and ensure food security.

KEY ACTIONS

- Build field drainage networks & grassed waterways.
- Establish conveyance links between fields and canals.

PHASE 3

MONTHS 9-14

GOAL

Ensure long-term system sustainability and community ownership.

KEY ACTIONS

- Finalize network connections.
- Create O&M protocols & hand over to Gram Panchayat.

COMPETITIVE ADVANTAGE

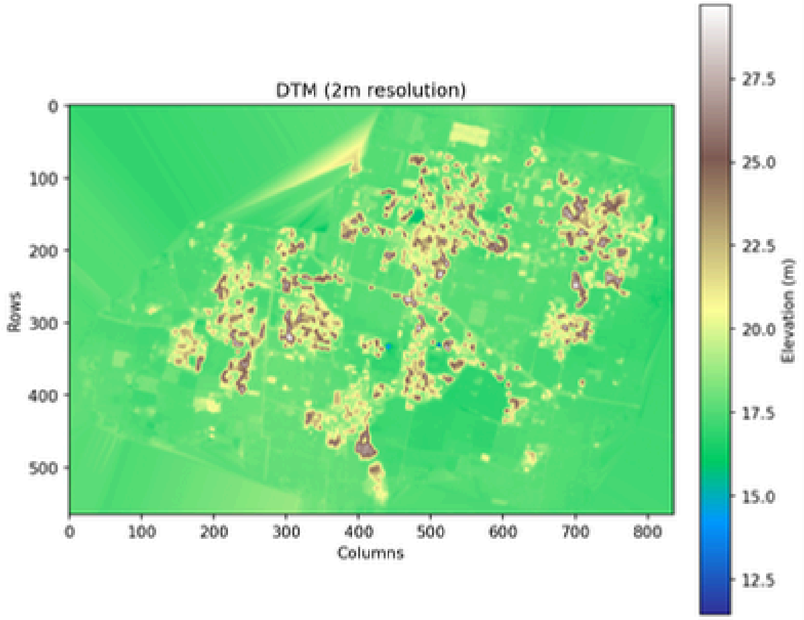
WHY OUR SOLUTION WINS | The Complete Package

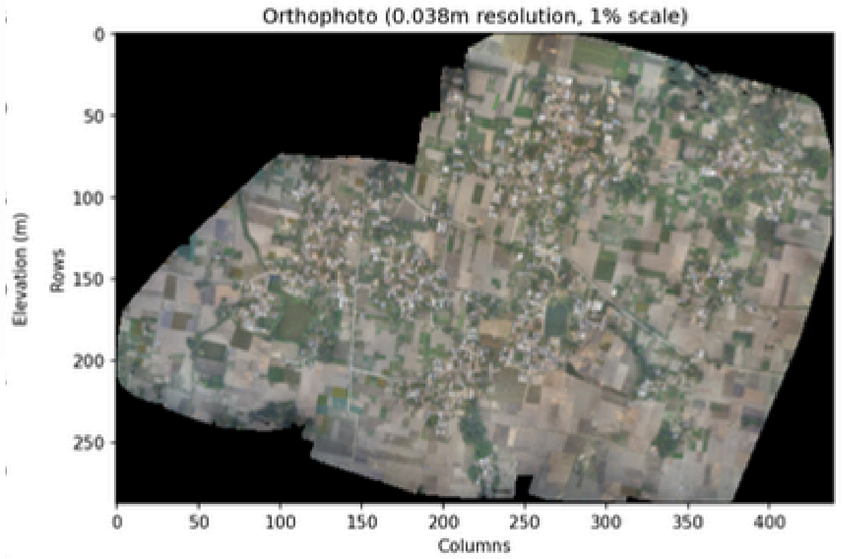
We solve the entire problem, not just a part—bridging data to infrastructure.

	TYPICAL PROJECTS	🔒 Our Model
Data Source	✕ New survey needed	✓ **Uses existing SVAMITVA data**
Output	— Report / Static Model	✓ **Construction-ready plans & BOQ**
Accuracy	? Theoretical / Unproven	✓ **0.60m RMSE (Field-Validated)**
Context	✕ Generic Algorithms	✓ **Terrain-aware for UP's plains**
Scale	— One-off demos	✓ **Pipeline proven on multiple villages**

IMPLEMENTATION READY NEXT STEPS

LET'S BUILD | Secure UP's Villages





IMMEDIATE NEXT STEPS

1 Approve Proof-of-Concept

Formally accept the drainage design for **Village 209183Pure** as the template for state-wide adoption.

2 Fund 10-Village Pilot

Allocate budget for a targeted pilot in a high-risk district (e.g., **Ballia or Varanasi**) to validate execution logistics.

3 Integrate Workflow

Embed the "Drainage Planning Module" into the official **SVAMITVA** post-survey process for all future mappings.