

A monitoring and enforcement system for mineral transit passes.

This document sets out the capabilities of a proposed monitoring system for the Directorate of Geology & Mining, Uttar Pradesh, illustrated through a working prototype, together with an assessment of what would be required before deployment.

GPS cross-verification of electronic Transit Passes (eTP), automated detection of route deviation and repeat-dispatch (double-trip) irregularities, and consolidated reporting of royalty at risk.

Prepared by PsyTech AI

Basis for the proposed system

Sand, stone and minor minerals are transported through the State's mining corridors under the electronic Transit Pass (eTP) framework. Given the volume of dispatches and the distances covered, confirming route adherence and pass utilisation in real time can be difficult from records alone. The capabilities below are intended to add a layer of real-time visibility and analysis on top of the Directorate's existing regulatory framework.

01 Live tracking & geofencing GPS positions of registered vehicles on a live map, with geofences around mines and approved corridors, raising an alert the moment a vehicle exits its zone.	02 eTP pass validation Cross-checks each electronic transit pass against GPS reality at issuance, flagging mismatches between the declared mine location and where the vehicle actually was.	03 Route & double-trip detection Flags route deviations against the approved path, and vehicles re-entering a mine shortly after a declared dispatch, a pattern worth a closer look for undeclared second loads.
04 Royalty & volume tracking District- and cluster-level view of dispatch volume against permitted volume, surfacing where utilisation is running over quota.	05 Case & audit trail Every flagged pass carries its GPS trip timeline and declared-vs-actual route, ready to hand to an enforcement officer.	06 Escalation workflow One-tap escalation to a Regional Enforcement Officer (roadside check, 15-min response target) or the Driver Support Control Room.

How the pieces connect

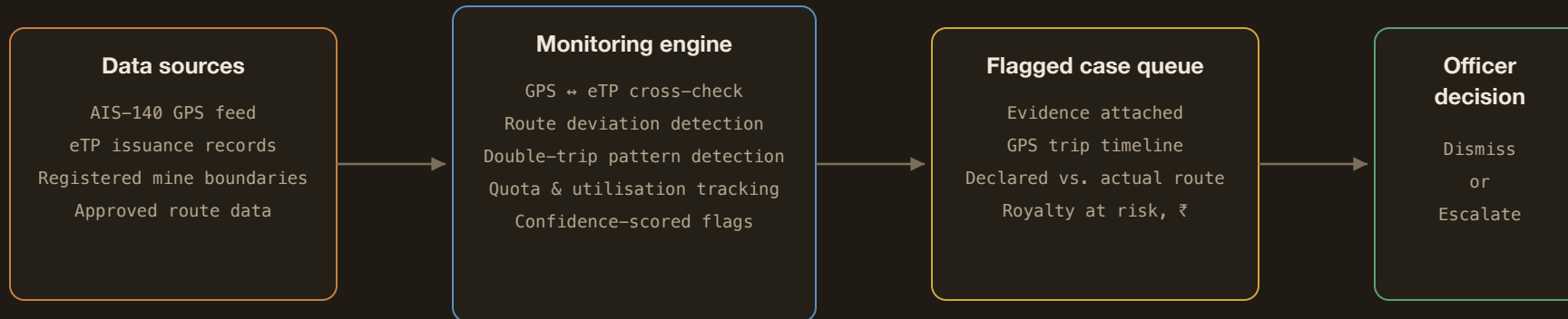


Figure 1. Data flow from source systems to a signed-off officer decision

— PROTOTYPE DEMONSTRATION

Mining Transit Pass Monitoring Dashboard

Prepared with reference to the Directorate of Geology & Mining, UP mandate.
This is a functional prototype, not a static mockup: the screens described below are interactive and demonstrated in person.

- Live map with geofence + heatmap overlays and a zone-breach log
- eTP audit table (All / Flagged) with per-pass GPS-at-issuance verification
- Royalty viewer by district and cluster, with volume-utilisation drilldowns
- Double-trip case view: actual vs. declared route and timing
- One-tap escalation to Regional Enforcement Officer or Driver Support Control Room

247	9	₹12.4L	28	107%
e-transit passes validated / day	flagged the same day	royalty at risk today	vehicles live on GPS	of permitted volume, Mahoba cluster

— PROTOTYPE DEMONSTRATION

Screens from the working prototype

UP MINING INTELLIGENCE

DIRECTORATE OF GEOLOGY & MINING, UP

LIVE

eTP Enforcement

30

trucks live

9

flagged passes

₹12.4L

at risk

3

clusters

ACTIVE ALERTS

UP86K1204 — GPS 4.2 km from mine at eTP issuance

UP86K1334 — GPS 6.1 km from mine at eTP issuance

UP86C3052 — GPS 8.3 km from mine at eTP issuance

UP86K1231 — Route deviation - ETA 3.1h vs 2.0h ap

9 flagged

PASSES VALIDATED TODAY

247

Transit passes verified

PASSES FLAGGED TODAY

9

Requires investigation

EST. ROYALTY AT RISK

₹12,40,000

Unverified dispatches

ACTIVE VEHICLES ON GPS

28

Live tracking

GEOFENCE BREACHES

0

Live zone violations

Updated 2s ago

CRITICAL

GPS mismatch — UP86K1204

eTP No: 2610401252 - 4.2 km from Prakash Bamhori Mine ...

Heatmap

Geofences

SCENARIOS

GPS Mismatch

Route Deviation

Double Trip

Over Quota

ETP AUDIT

ROYALTY VIEWER

ETP AUDIT LOG

Flagged

All (30)

ETP NO	VEHICLE	CLUSTER	QTY M³	GPS ✓	STATUS
2610401252	UP86K1204	Kabral	25	✗	FLAGGED
2610401269	UP86K1231	Kabral	35	✓	FLAGGED
2610401303	UP86K1267	Kabral	25	✓	FLAGGED
2610401371	UP86K1334	Kabral	32	✗	FLAGGED
2610402052	UP86M2062	Mahoba	38	✓	FLAGGED
2610402103	UP86M2113	Mahoba	35	✓	FLAGGED
2610403052	UP86C3052	Chitrakoot	20	✗	FLAGGED

Live map: registered vehicles, geofenced mine zones, active alert ticker

DOUBLE-TRIP FRAUD DETECTED

UP86K1267 — PRAKASH ROADWAYS

eTP No: 2610401303 - Boulder 25 m³ - 88 km approved

TRIP TIMELINE

eTP issued at 07:30 for trip from Prakash Bamhori Mine to Fatehpur Crusher (88 km)

Double-trip case: GPS timeline showing an undeclared repeat dispatch

From flagged pass to officer decision

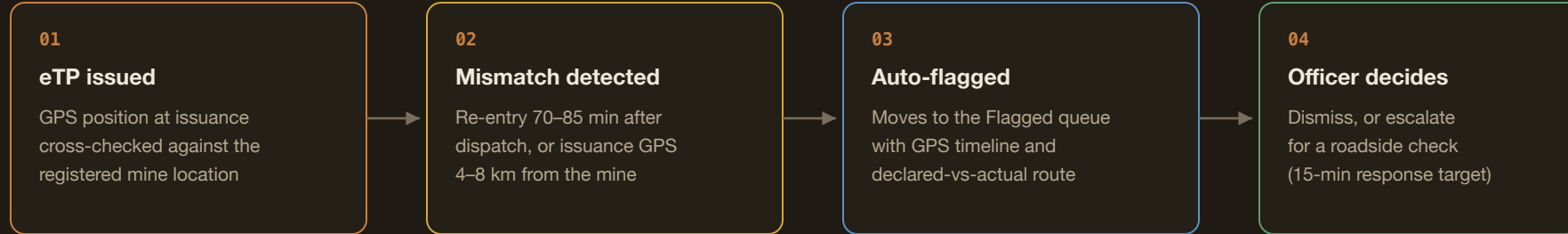
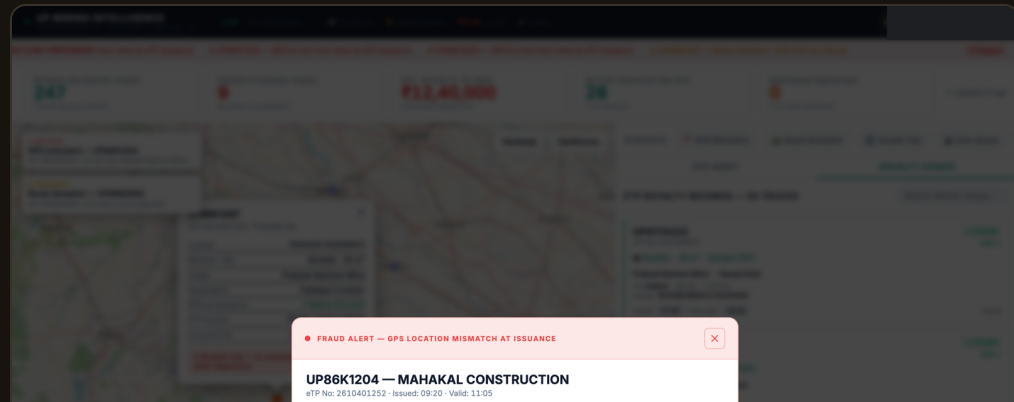


Figure 2. Case lifecycle, GPS mismatch example



Flagged queue: eTP audit log filtered to passes requiring review



Royalty viewer: dispatch volume against permitted quota, by cluster

— IMPLEMENTATION STATUS

Present state of the prototype and requirements for deployment

The prototype currently operates on illustrative data. Deployment for departmental use would require integration with the systems listed below.

CAPABILITY	STATUS	WHAT'S NEEDED FOR PRODUCTION
Live map, audit table, royalty viewer, case views, alert log	DEMO-READY	Re-skin with Directorate branding; connect to an officer login/directory.
Flagging & double-trip detection logic	TO BUILD	Tuned on historical eTP and GPS data; needs a data-sharing agreement.
Live GPS feed (AIS-140 / vehicle telematics)	NEEDS INTEGRATION	API access to the GPS/AIS-140 vendor or fleet telematics provider.
eTP / e-Way Bill systems	NEEDS INTEGRATION	API or DB access to the government transit-pass system of record.

— NEXT STEPS

Demonstration

The dashboard is available for a full walkthrough, including live map, a flagged transit pass, and the resulting escalation to an enforcement officer.

PREPARED BY PSYTECH AI • FOR OFFICIAL REVIEW