**NAL India –Module List**

**Module 1: Customer Input Module**

**Purpose:**  
Collect minimal but essential information from the customer to initiate the property verification process.

**How It Works:**  
The user accesses the verification page and enters basic property data (Survey No, Owner Name, Village, Google Pin). The form is responsive and validates each field dynamically. Location data is aided by Google Maps integration for pin-drop accuracy. Consent capture is mandatory for legal compliance.

**Key Features:**

* Minimal Input Fields
* Field-Level Validation
* GeoAutocomplete for Location
* Consent Checkbox & Logging

**Submodules:**

* Input Validation Engine
* Consent & Legal Agreement Handler
* Input Preprocessor

**Data Flow:**  
User → Form Submission → Validation → Consent Captured → Routed to Routing Engine

**Module 2: State & Portal Routing Engine**

**Purpose:**  
Route the validated data to the appropriate government portal based on state and district.

**How It Works:**  
Using the location fields, this module identifies which state-specific portals to query (e.g., Bhoomi for Karnataka, TNREGINET for Tamil Nadu). It maps inputs to the required parameters of that state portal and provides a URL or structured API request.

**Key Features:**

* State-to-Portal Dynamic Mapping
* Portal Directory Lookup
* Retry Logic on Failure

**Submodules:**

* State-to-Portal Mapper
* Portal Directory
* Retry & Fallback Handler

**Data Flow:**  
Input Data → Mapper → Portal URL Generator → Handed to Integration Module

**Module 3: Government System Integration Module**

**Purpose:**  
Interface with government portals to initiate search and extract documents.

**How It Works:**  
Simulated headless browsers (using Selenium/Puppeteer) fill search forms, handle captchas if required, and navigate to the results. For states with APIs, secure connections are used. Login credentials, cookies, and sessions are managed securely.

**Key Features:**

* Browser Simulation
* CAPTCHA Handling
* API Integration (where applicable)

**Submodules:**

* Browser Simulator/API Handler
* Search Form Generator
* Navigation Controller

**Data Flow:**  
Portal Access → Auto-Fill Form → Submit → Navigate to Result Page → Pass to Document Fetching Engine

**Module 4: Automated Document Fetching Engine**

**Purpose:**  
Automatically download property-related documents in PDF or HTML formats.

**How It Works:**  
After reaching the result page, this module downloads all available documents, handles multiple formats, and stores them in a secure temporary location for analysis. Metadata is also stored.

**Key Features:**

* Multi-Format Download (PDF/HTML)
* Metadata Capture
* Secure Storage & Versioning

**Submodules:**

* Download Handler
* File Storage System
* Fetch Status Tracker

**Data Flow:**  
Scraping Engine → Download Documents → Store Temporarily → Pass to Analyzer

**Module 5: Data Processing & Legal Validation Module**

**Purpose:**  
Analyze and extract key information from downloaded documents using OCR and NLP.

**How It Works:**  
OCR converts scanned documents to text. NLP identifies key data points like names, land use, mutation status, and legal mentions. Logic engines cross-check data across documents to confirm integrity.

**Key Features:**

* OCR Processing (Tesseract/Google Vision)
* NLP for Entity Extraction
* Legal Rule Matching

**Submodules:**

* OCR Engine
* NLP Parser
* Legal Rule Engine

**Data Flow:**  
Document → OCR → NLP → Legal Validation → Verified Output

**Module 6: Document Verification System**

**Purpose:**  
Compare extracted data with original user input and legal norms.

**How It Works:**  
Owner names are matched against EC/RTC. Mutation completion is checked. Zoning and green zone violations are validated against CDP and NGT databases.

**Key Features:**

* Owner Name Matching
* Zoning/Mutation Check
* Compliance Matrix

**Submodules:**

* Owner Match Validator
* Mutation Checker
* Zoning/Green Zone Validator

**Data Flow:**  
Parsed Data → Comparison Engine → Flag Issues/Warnings → Prepare Final Data for Report

**Module 7: Trust Report Generator**

**Purpose:**  
Create a user-friendly report summarizing all verification steps.

**How It Works:**  
Builds a templated PDF or web report using the processed results. Includes trust score, document summaries, zoning maps, and legal highlights. A versioned copy is stored for audit.

**Key Features:**

* Auto-Populated Sections
* Score Calculation & Visual Indicators
* PDF/Web Output

**Submodules:**

* Report Template Builder
* Section Generator
* PDF Renderer & Storage

**Data Flow:**  
Verified Output → Populate Report Template → Generate PDF/Web → Store & Make Accessible

**Module 8: AI Recommendations & Suggestions**

**Purpose:**  
Assist buyers with decision-making based on verified data.

**How It Works:**  
AI evaluates the trust score and flags, then recommends actions like legal consultation, direct contact, or avoidance. It also predicts possible issues or risks using historical patterns.

**Key Features:**

* AI-based Risk Scoring
* Dynamic Suggestions
* Actionable Next Steps

**Submodules:**

* AI Risk Analyzer
* Suggestion Engine
* Buyer Action Module

**Data Flow:**  
Report Data → AI Engine → Generate Suggestions → Notify Buyer