

Pathway Automated Due Diligence Engine (PADDE): Technical Architecture & Strategic Implementation Report

Executive Summary

The convergence of property investment and artificial intelligence represents a paradigm shift in how generational wealth is constructed, managed, and preserved. For Pathway Property, a firm distinguished by its rigorous "99 out of 100" rejection rate and its commitment to turning everyday Australians into astute asset owners¹, the development of a fully automated due diligence pipeline is not merely an operational upgrade—it is a strategic necessity. This report outlines the comprehensive architectural blueprint for the Pathway Automated Due Diligence Engine (PADDE), a system designed to ingest a singular address and autonomously execute a forensic analysis of the asset's physical, legal, financial, and regulatory standing.

The traditional due diligence process, as mandated by Consumer Affairs Victoria, involves a manual traversal of fragmented data silos—spanning title registries, council planning schemes, utility providers, and environmental authorities.³ This manual methodology is inherently slow, prone to human error, and lacks the scalability required to scrutinize the thousands of on-market and off-market opportunities available daily. PADDE addresses this by integrating live government spatial data streams (VicMap), real-time financial market intelligence (CoreLogic/PropTrack), and advanced predictive modeling into a cohesive decision-support system.

This report details the technical implementation of seven core modules: Geospatial & Legal Identity, Environmental Risk, Planning & Zoning Intelligence, Financial "Digital Twin" Modeling, Demographic & Infrastructure Analytics, Advanced Computer Vision/NLP, and the Strategic Scoring Engine. Particular emphasis is placed on Pathway's unique client avatars—specifically high-net-worth medical professionals seeking tax-efficient growth⁴ and investors requiring Sharia-compliant asset screening.² By automating the "deal-breaker" analysis—ranging from flood zone identification to complex rooming house feasibility studies—PADDE empowers Pathway's advisory team to focus their expertise solely on the top 1% of assets that pass the digital gauntlet, thereby securing the promise of passive income replacement and long-term capital appreciation.

1. Strategic Alignment and System Objectives

The foundational logic of the PADDE system is derived directly from the investment philosophy of Pathway Property. The system acts as the first line of defense, a digital

gatekeeper calibrated to reject mediocrity and highlight exceptionalism. Understanding the specific strategic drivers of Pathway's diverse client base is essential for defining the weighting algorithms that will drive the automated scoring engine.

1.1 The "99/100" Rejection Philosophy

Pathway Property explicitly states that they decline 99% of the properties presented to them.¹ This statistic defines the primary functional objective of the AI pipeline: it is a rejection engine first and a discovery engine second. The system must be engineered to "fail fast." In a manual workflow, an advisor might spend hours investigating a potential development site only to discover a restrictive covenant or a lethal easement at the final stage. PADDE reverses this workflow by front-loading the "killer" constraints.

The architecture prioritizes the retrieval of binary "Go/No-Go" data points immediately upon address ingestion. If a property lies within a Public Acquisition Overlay (PAO) or has a restrictive single-dwelling covenant on the title, the system terminates the analysis instantly, saving computational resources and advisor time. This efficiency allows the pipeline to scan entire suburbs or distinct markets—such as the "high-yield rooming house" corridor or "high-growth residential" zones—identifying the few assets that survive the rigorous filtering process.

1.2 Client Persona Calibration

The definition of a "good" property is relative to the investor's goals. PADDE distinguishes between Pathway's three primary client archetypes, adjusting its evaluation criteria dynamically for each.

Client Persona	Strategic Goal	Critical AI Evaluation Metrics
The "Time-Poor" Doctor	Tax Optimization & Growth	The system prioritizes Depreciation Estimates (identifying newer builds or renovation-ready assets) and Capital Growth Forecasts . It models the impact of "Professional Package" loans (LMI waivers) to calculate true Return on Equity. ⁴
The Passive Income Seeker	Cashflow Replacement	The focus shifts to Net Yield . The AI actively models Rooming House Feasibility (Class 1b compliance) to determine if a standard house can generate commercial-grade returns. It weights vacancy rates and

		tenant demand heavily. ²
The SMSF Investor	Security & Liquidity	Risk mitigation is paramount. The system applies stricter filters for Liquidity Risk (days on market) and Cashflow Stability , ensuring the asset remains positive even under stress-tested interest rate scenarios, as SMSFs have limited ability to inject capital. ⁵

1.3 The Sharia-Compliant Filter

A unique requirement for Pathway is supporting Muslim investors who require Halal investment pathways.² This necessitates a semantic and data-driven filter within the commercial property module. The AI must cross-reference commercial tenant lists against business activity codes (ANZSIC) to flag prohibited industries such as alcohol retail, gambling venues, or adult entertainment. Furthermore, the financial modeling module must be capable of simulating "profit-share" arrangements rather than standard interest-based loan structures to ensure the feasibility aligns with Islamic finance principles.

2. The Geospatial Core: Address Resolution and Legal Identity

The initiation of any due diligence process begins with the accurate identification of the subject property. In the digital realm, a street address is merely a label; the true "source of truth" is the legal land parcel. The Consumer Affairs checklist emphasizes checks on "Land boundaries" and measuring land precisely.³ PADDE achieves this through rigorous geospatial resolving.

2.1 From Address to Standard Parcel Identifier (SPI)

Standard text-based address lookups are insufficient for legal due diligence due to the ambiguity of sub-divisions and battle-axe blocks. The system utilizes the **Vicmap Address API** to resolve the input string into a Geocentric Datum of Australia 2020 (GDA2020) coordinate.⁶ However, the critical step is the transition from a coordinate point to a land polygon.

Using the **Vicmap Property Web Feature Service (WFS)**⁷, the system performs a spatial intersection query to retrieve the exact polygon representing the land boundaries. This polygon contains the unique descriptors required for all subsequent government queries: the **Standard Parcel Identifier (SPI)**, the **Persistent Feature Identifier (PFI)**, and the **Council Property Number**. The SPI (e.g., 1\TP123456) allows the system to query the Land Titles office

with precision, bypassing potential errors caused by inconsistent street numbering in rural or growth areas.⁸

2.2 Automated Title Search and Verification

A "clean title" is a prerequisite for any Pathway acquisition. Manual title searches via LANDATA or SERV are slow and costly if performed indiscriminately. PADDE automates this via the **SERV Verify** or **Landata XML API**⁹, fetching the digital Register Search Statement (RSS).

The parsing engine analyzes the RSS for specific keywords that trigger risk flags:

- "**Caveat**": Indicates a third-party claim on the land. The presence of a caveat halts the automated process and triggers a "Legal Review" flag, as it may prevent settlement.
- "**Covenant**": Restricts land use. For a client seeking a "Development Site Acquisition"², a covenant limiting the lot to a "single dwelling" renders the property useless. The AI extracts the covenant instrument number for human review.
- "**Section 173 Agreement**": Identifying agreements with the local council that may impose ongoing maintenance or usage obligations on the landowner.

2.3 Easement Mapping and Development Impact

The Consumer Affairs checklist explicitly warns buyers to check "easements and covenants".³ An easement—such as a sewerage pipe running through the backyard—can kill a subdivision project. PADDE visualizes this risk by overlaying the **Vicmap Admin** and **Water Authority Asset** layers onto the property polygon.

If an easement is detected, the AI calculates the "Sterilized Land Area"—the percentage of the block that cannot be built upon. For a development-focused client, a sterilization rate greater than 15% downgrades the property's score significantly. This spatial analysis ensures that the "huge propensities for upside" promised by Pathway¹ are based on buildable land, not just total land area.

3. Environmental and Physical Risk Engine

Pathway's philosophy includes minimizing the "chance of downside".¹ Physical risks such as flood, fire, and contamination represent the most significant threats to capital preservation. The PADDE system automates the environmental checks listed in the Consumer Affairs checklist³ with high-granularity data.

3.1 Advanced Flood Risk Modeling

The checklist advises buyers to investigate "Flood and fire risk" and "Floodplain management".³ Simple "Yes/No" checks are inadequate for professional investment. PADDE integrates the **Victorian Flood Data WFS** managed by the Department of Energy, Environment and Climate Action (DEECA).¹⁰

The system distinguishes between three tiers of water risk:

- Land Subject to Inundation Overlay (LSIO):** Indicates riverine flooding risk. The AI retrieves the "1-in-100-year Annual Exceedance Probability (AEP)" flood level.
- Special Building Overlay (SBO):** Indicates stormwater overland flow paths. This is critical for urban properties.
- Melbourne Water Assets:** Identifying underground drains that may act as implied easements.

Financial Impact Algorithm:

Upon detecting an LSIO or SBO, the system triggers a "Cost Impact" calculation. It estimates the additional construction cost required to raise the finished floor level (freeboard) above the flood level—often adding \$20,000–\$50,000 to development costs. Furthermore, it queries an insurance API (or uses a proxy table) to estimate the premium loading, subtracting this increased operating expense from the net yield projection. This ensures the "Cashflow Planning" service 2 reflects reality, not just optimism.

3.2 Bushfire Attack Level (BAL) and Construction Costs

For clients investing in "Growth areas" or rural fringes, bushfire risk is a primary determinant of feasibility. The system utilizes the **Designated Bushfire Prone Areas (BPA)** dataset.¹¹

The AI logic performs a containment check: Is Polygon IN BPA_Layer?.

If true, the property is flagged as requiring a Bushfire Attack Level (BAL) Assessment. The system goes a step further by analyzing the vegetation density in the surrounding 100 meters using satellite imagery or the Vicmap Vegetation layer. High density suggests a high BAL rating (e.g., BAL-29 or BAL-40), which mandates expensive glazing, non-combustible cladding, and gutter guards. The AI adds a "BPA Construction Premium" to the feasibility budget, preventing clients from underestimating build costs in high-risk zones.

3.3 Soil Contamination and Historical Land Use

The checklist warns of "Soil and groundwater contamination," particularly relevant for industrial-to-residential conversions or inner-city sites.³ PADDE queries the **EPA Victoria Priority Sites Register (PSR)**.¹²

The analysis uses a "Proximity Risk" model. It buffers the subject property by 500 meters and checks for any sites listed on the PSR (e.g., former landfills, petrol stations, industrial chemical storage). If a positive hit is found, the system flags a "Vapor Intrusion Risk" and recommends a Phase 1 Environmental Assessment. For Pathway's "Development Site Acquisition" service ², this is a crucial filter; purchasing a contaminated site can lead to remediation costs in the hundreds of thousands, destroying the project's profit margin.

4. Regulatory Intelligence: Planning, Zoning, and Rooming House Feasibility

The regulatory environment dictates the "highest and best use" of any asset. Pathway's ability

to execute complex strategies like "Rooming House Investing"² relies on a nuanced understanding of the Victoria Planning Provisions (VPP). PADDE automates the interpretation of these complex schemes.

4.1 Zoning and Overlay Analysis

Using the **Vicmap Planning WFS**¹⁴, the system extracts the exact Zoning (e.g., General Residential Zone - GRZ1) and all Overlays (e.g., Heritage Overlay - HO, Design and Development Overlay - DDO).

The AI interprets the implications of these codes:

- **Heritage Overlay (HO):** The system flags strictly against "Demolition" strategies. If the client's goal is "Development Site Acquisition" involving a knockdown-rebuild, an HO is an automatic "FAIL" in the scoring engine.
- **Neighborhood Residential Zone (NRZ):** Limits development to two stories and imposes mandatory garden area requirements. The system validates whether the client's yield expectations (e.g., 4 townhouses) are legally permissible within the zone's constraints.

4.2 The Class 1b Rooming House Engine

Rooming houses are a cornerstone of Pathway's high-yield strategy.² However, the regulatory distinction between a standard house (Class 1a) and a small boarding house (Class 1b) is strict. The system features a dedicated "Class 1b Feasibility Module."

Regulatory Logic:

According to the National Construction Code (NCC) and Victorian regulations, a Class 1b building must have a floor area of less than 300m² and accommodate no more than 12 persons.¹⁶ If it exceeds these limits, it becomes a Class 3 building, triggering expensive fire safety requirements like sprinkler systems, which can kill the feasibility of a conversion project.

Automated Check:

1. **Floor Area Calculation:** The system retrieves the building footprint from the **Vicmap Features of Interest** layer or estimates it via satellite imagery analysis. If the footprint > 280m² (allowing a buffer), it flags a "Class 3 Risk."
2. **Garden Area Compliance:** In the General Residential Zone, a minimum garden area (often 35%) is mandatory. The AI calculates the ratio of (Parcel Area - Building Footprint - Driveway) to Parcel Area. If this is < 35%, the property cannot be extended to add more rooms without violating planning conditions.¹⁸
3. **Layout Analysis:** Using computer vision on the floorplan (detailed in Section 6), the system counts potential bedrooms to ensure the "12 person" limit is optimized without being exceeded.

4.3 Growth Areas Infrastructure Contribution (GAIC)

For properties in Melbourne's growth corridors, the checklist notes the potential for "Growth Areas" levies.³ PADDE checks the property location against the State Revenue Office's GAIC maps. If the property is liable, the system calculates the potential liability (indexed annually)

and subtracts this from the acquisition budget. This ensures "No Surprises" for the client at settlement.

5. The Financial "Digital Twin": Modeling Wealth Generation

Once the physical and regulatory risks are cleared, PADDE transitions to financial validation. This module builds a 15-year cashflow simulation—a "Digital Twin" of the investment—to verify if it meets Pathway's wealth generation targets.

5.1 Automated Valuation and Market Value

To ensure Pathway buys "below market value"², PADDE requires an unbiased valuation anchor. It aggregates data from **CoreLogic RP Data**, **PropTrack**, and **Domain APIs**¹⁹ to triangulate value.

The Valuation Algorithm:

The system computes a weighted average of the Automated Valuation Model (AVM) estimates from these providers. It then performs a real-time Comparable Market Analysis (CMA):

1. Fetch sales of properties within 1km, sold in the last 6 months, with $\pm 10\%$ land size and identical bedroom counts.
2. Calculate the price per square meter of land and price per square meter of internal floor area.
3. Apply these metrics to the subject property.

Insight: If the vendor's asking price is $>10\%$ above the PADDE-calculated value, the system recommends a "Negotiation Strategy" or flags it as "Overpriced." Conversely, a price $<10\%$ below value triggers a "Hot Deal" alert.⁴

5.2 Yield Optimization and Rental Modeling

For the "Passive Income" persona, rental yield is the primary metric. The system queries **SQM Research** for vacancy rates and **Domain** for rental listings.²²

Rooming House Yield Modeling:

Standard AVMs only provide generic rental estimates (e.g., \$500/week for the whole house).

PADDE's Rooming House module models the per-room yield.

- *Input:* 5 Bedroom House.
- *Standard Rent:* \$600/week.
- *Rooming House Model:* 5 Rooms @ \$220/week/room = \$1,100/week.
- *Expenses:* Subtract utilities, internet, cleaner, and management fees (approx. 15-20%).
- *Net Result:* If the Rooming House Net Yield $> 9\%$ ², the property is endorsed for this strategy.

5.3 Tax Logic for the "Doctor" Persona

Pathway's medical professionals require sophisticated tax modeling.⁴ PADDE incorporates the Australian Taxation Office (ATO) individual tax rates into its cashflow engine.

Depreciation and Tax Shielding:

The AI estimates the "Capital Works Deduction" (Division 43) and "Plant and Equipment" (Division 40) depreciation based on the building's construction year (sourced from build permits or listing data) and renovation history.

- **Logic:** A newer property (post-1987) allows for 2.5% capital works deduction.
- **Outcome:** The system calculates the "After-Tax Cashflow." A property that is \$5,000 negative cashflow pre-tax might be \$2,000 positive post-tax for a doctor on the 47% tax bracket. This "phantom cashflow" is critical for the "Generational Wealth" pitch.

5.4 SMSF Liquidity Stress Testing

For Self-Managed Super Funds, liquidity is critical. The system runs a "Monte Carlo" simulation on interest rates.

- **Scenario:** What if interest rates rise by 2%?
- **Constraint:** SMSFs have capped contributions (\$30k/year concessional).
- **Flag:** If the projected negative gearing exceeds the maximum allowable contribution cap, the property is flagged as a "**Liquidity Trap**" and rejected for SMSF applicants.⁵

6. Advanced AI: Computer Vision and Natural Language Processing

To replicate the "expert insight" of Pathway's advisors², the system must process unstructured data—photos and legal texts—that traditional databases miss.

6.1 Computer Vision for Condition Assessment

Listing photos are a goldmine of data. PADDE utilizes models like **Restb.ai** or custom-trained Convolutional Neural Networks (CNNs)²⁴ to analyze visual evidence.

Condition Scoring:

The AI scans interior images for "Renovation Potential." It identifies:

- **Dated Finishes:** "Grandma" kitchens, old carpets (High potential for cosmetic uplift).
- **Defects:** Water stains on ceilings (Roof leak risk), major cracks in walls (Structural risk).
- **Value Add:** It identifies space for a "Granny Flat" or secondary dwelling by analyzing the backyard access width in satellite, aerial, and street-view imagery.

Rooming House Compliance Vision:

For Class 1b suitability, the AI checks window placement in bedrooms. A bedroom without a window is illegal. The vision model ensures every "habitable room" identified in the floorplan has corresponding natural light sources, validating the rental yield assumptions.

6.2 NLP for Legal Document Review

The "Contract of Sale" and "Section 32" contain the fine print that can ruin an investment.

PADDE employs Large Language Models (LLMs) via secure APIs (e.g., **Docusign AI** or **Spellbook**) to review these documents.²⁵

Automated Red Flag Report:

The NLP engine extracts:

- **Settlement Terms:** Is it a standard 30/60/90 days, or is there a strange "license to occupy" clause?
 - **Owners Corporation Rules:** Does the body corporate ban pets or short-term stays (Airbnb)? This is vital for "Urban Living" checks.³
 - **Special Conditions:** It highlights any non-standard clauses where the vendor seeks to avoid liability for defects ("Sold as is").
 - **Building Permits:** It scans the Section 32 for the history of building permits.³ If the visual analysis shows a new deck but the Section 32 shows no permit, the AI flags "Illegal Building Works" – a major negotiation lever or deal breaker.
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7. Operational Integration: The Advisory Workflow

The output of PADDE is not just a database row; it is a strategic asset integrated into Pathway's "Arche" investor portal.¹

7.1 The "Pathway Score" Algorithm

The system synthesizes the thousands of data points into a single "Pathway Score" (0-100), weighted dynamically by strategy.

Metric	Doctor Weighting	Cashflow/Retiree Weighting	Developer Weighting
Capital Growth Forecast	40%	15%	30%
Net Yield	15%	50%	10%
Land Content	25%	10%	40%
Tax Effectiveness	20%	5%	5%
Development Utility	0%	20%	15%

7.2 The Automated Investment Memo

Using Generative AI, the system drafts a "Human-Readable" Investment Memo. It mimics the professional tone of Pathway's advisors.

- **Narrative Generation:** Instead of a list of facts, it writes: "*While the property is located in a Bushfire Prone Area (BPA), the vegetation density is low, suggesting manageable BAL construction costs. The primary value driver is the proximity to the new rail infrastructure, which our predictive models suggest will outperform the wider suburb capital growth by 2% annually.*"
- **Visual Evidence:** It automatically inserts the Flood Overlay map, the School Zone

catchment map, and the Cashflow Simulation charts into the PDF report.

7.3 Integration with "Arche"

This report is pushed directly to the "Arche" portal, giving investors 24/7 access to the deep data behind their asset.¹ It transforms the client experience from "trusting the advisor" to "verifying the data," reinforcing Pathway's core value of transparency.⁵

Conclusion

The **Pathway Automated Due Diligence Engine (PADDE)** represents the cutting edge of PropTech innovation. By rigorously automating the statutory checks mandated by Consumer Affairs Victoria—checking every easement, overlay, and permit with algorithmic precision—and layering on the sophisticated financial modeling required for high-net-worth wealth creation, PADDE turns data into a competitive moat. It allows Pathway Property to scale its "99/100" filtering process to an industrial level, ensuring that every recommendation presented to a client is not just an opinion, but a mathematically verified opportunity for generational wealth.

Chapter 1: Strategic Alignment & System Objectives

The implementation of an automated due diligence pipeline for Pathway Property requires a deep understanding of the firm's specific market positioning, client base, and investment philosophy. Unlike a generic "property search" tool, this system must act as a fiduciary proxy, applying the same rigorous, conservative, and wealth-focused logic that Pathway's human advisors apply manually. This chapter explores the translation of Pathway's business goals into technical system requirements.

1.1 The Philosophy of "Generational Wealth"

Pathway Property distinguishes itself from transactional buyer's agents by focusing on "generational wealth" and "passive income replacement".² This strategic horizon—often spanning 10 to 20 years—dictates that the AI pipeline cannot be optimized solely for short-term gains or "flipping."

1.1.1 Long-Term Hold Metrics

The system must weigh **Capital Growth Potential** significantly higher than short-term metrics like "cosmetic appeal." Technical indicators for this include:

- **Infrastructure Lead Times:** Identify funded government infrastructure projects (train

lines, hospitals) using budget data and weigh properties in their catchment zones higher.

- **Supply Constraint Modeling:** The AI analyzes the volume of undeveloped land in the LGA. Suburbs with limited land release (land-locked) score higher for capital growth than new estates with endless supply.

1.1.2 The "Replace Active Income" Mandate

For clients seeking to replace salary with property income, the **Cashflow Reliability** metric is paramount. The system must filter out assets with "lumpy" cashflow risks, such as holiday rentals or student accommodation in oversupplied zones. Instead, it prioritizes assets with stable, long-term tenant appeal—such as family homes in school zones or rooming houses in medical precincts (targeting nurses/doctors).

1.2 Persona-Driven Algorithm Design

One size does not fit all. The PADDE system utilizes a "Persona Injection" model where the specific constraints of the client alter the acceptance thresholds of the due diligence engine.

1.2.1 The Medical Professional (The "Doctor")

As noted in Pathway's literature⁴, doctors are high-income earners often time-poor and tax-sensitive.

- **System Calibration:**
 - **Tax Sensitivity:** The financial model applies the top marginal tax rate (45% + Medicare Levy).
 - **Leverage Sensitivity:** It models "Professional Package" loans (90% LVR with no LMI) to show the magnified Return on Equity (ROE).
 - **Asset Class:** Bias towards "Blue Chip" residential and high-grade commercial assets.

1.2.2 The SMSF Investor

Self-Managed Super Funds are governed by strict compliance rules.

- **System Calibration:**
 - **Liquidity Buffer:** The system rejects properties that require immediate, heavy renovation (capital injection) which might be difficult within a super fund structure.
 - **Single Contract:** It prioritizes "Single Contract" purchases over "Split Contract" (House & Land) deals which are often complex or prohibited for SMSF borrowing (LRBA).
 - **Compliance:** Strictly filters out "Related Party" assets (e.g., buying a property a relative lives in).

1.2.3 The Sharia-Compliant Investor

Pathway actively markets to Muslim investors.² The system must include a dedicated "**Halal**

Filter" for commercial properties.

- **Mechanism:**

- **Tenant Screening:** The AI scrapes the business name of current commercial tenants. It uses the **Google Places API** to determine the "Place Type."
- **Exclusion Logic:** If Place Type includes "Liquor Store," "Bar," "Casino," "Adult Store," or "Pork Butcher," the property is flagged as "**Non-Compliant**".
- **Financial Structure:** The feasibility report suppresses "Interest" terminology, replacing it with "Profit Rate" or "Rental Rate" to align with Islamic Finance (Ijarah or Murabaha) terminology.

1.3 The "99/100" Operational Efficiency

The metric of turning down 99 properties to buy 1¹ implies a funnel efficiency problem. Manual due diligence on 100 properties is cost-prohibitive.

1.3.1 The "Fail Fast" Architecture

The system is architected as a series of cascading filters. A property must pass Filter 1 (Fatal Risks) to reach Filter 2 (Financials).

- **Tier 1 (The Guillotine):** Instant rejection based on Zoning, Floodways, and Title Covenants. Cost: <\$0.10 per property (API calls).
- **Tier 2 (The Calculator):** Financial feasibility, Yield, Demographics. Cost: ~\$1.00 per property.
- **Tier 3 (The Deep Dive):** Computer Vision, Contract Review, Paid Title Search. Cost: ~\$20.00 per property.

This tiered approach ensures that resources are not wasted on properties that are fundamentally flawed, allowing Pathway to scan the entire market daily.

Chapter 2: The Geospatial Core (VicMap & Land ID)

Data quality in property is determined by spatial accuracy. A "point" on a map is insufficient; a "polygon" defining legal boundaries is the gold standard. This chapter details the integration of the Victorian Government's Vicmap suite to establish the "Source of Truth" for every asset.

2.1 The Vicmap Data Ecosystem

Vicmap is the foundation of all spatial data in Victoria. Accessing it requires integration with the **DataVic** and **Land Use Victoria** infrastructure.

2.1.1 Vicmap Address API

The entry point is the **Vicmap Address API**.

- **Function:** Resolves a human-readable string (e.g., "10 Smith St, Collingwood") into a standardized GDA2020 coordinate and a generic persistent identifier (PFI).
- **Handling Ambiguity:** The system must handle "Unit" addresses. "Unit 1, 10 Smith St" and "1/10 Smith St" must resolve to the same parent parcel if individual strata titles aren't spatially defined, or distinct child parcels if they are.

2.1.2 Vicmap Property WFS (Web Feature Service)

This is the most critical API in the stack.⁷

- **Request:** A "GetFeature" request using the coordinate from the Address API.
- **Response:** A GeoJSON polygon representing the cadastral boundary.
- **Key Attributes Extracted:**
 - PFI (Persistent Feature Identifier): The unique key for the land.
 - SPI (Standard Parcel Identifier): The legal descriptor (e.g., 1LP12345).
 - LGA_CODE: The Local Government Area (Council) responsible for planning.
 - PROP_AREA: The exact area in square meters (used for price/sqm calculations).

2.1.3 Coordinate Systems: GDA94 vs. GDA2020

Victoria has transitioned to the Geocentric Datum of Australia 2020 (GDA2020).⁶ The system must ensure all spatial queries (e.g., to Google Maps which uses WGS84) are correctly transformed. A misalignment of 1.8 meters (the difference between GDA94 and GDA2020) could erroneously place a boundary fence inside a neighbor's land, triggering false "Adverse Possession" flags. PADDE includes a **Proj4** transformation library to handle these shifts seamlessly.

2.2 Title Verification and Legal Due Diligence

The Consumer Affairs checklist requires verification of "Land boundaries" and "Buyers' rights".³

2.2.1 Automated Register Search Statement (RSS)

Using the **Landata** or **SERV Verify API**⁹, the system uses the retrieved SPI to purchase a digital title search.

- **Cost Management:** This step is Tier 3 (Cost incurred). It is only triggered if the property passes environmental and zoning checks.
- **Data Parsing:** The system converts the returned PDF/XML into structured data.
 - **Owner Name:** Verified against the Vendor Name in the contract (Fraud check).
 - **Volume/Folio:** Cross-referenced with the map base.

2.2.2 Encumbrance Analysis

The AI scans the "Encumbrances, Caveats and Notices" section of the RSS.²⁶

- **Mortgage:** Standard. Ignored.

- **Caveat: CRITICAL FLAG.** A caveat prevents the registration of a transfer. The AI flags this as "Settlement Risk."
- **Covenant:** The AI uses NLP to read the covenant description.
 - **Keywords:** "Single dwelling," "Brick veneer only," "No quarrying."
 - **Impact:** If the client is a developer, a "Single dwelling" covenant triggers a "DO NOT BUY" recommendation.

2.3 Easement Visualization

Easements are rights for others to use the land (e.g., water, power).

- **Data Source:** Vicmap Admin (Easements layer) and Water Authority Asset Maps.
- **Visualization:** The system draws the easement polygons onto the property map in the "Arche" portal.
- **Development Impact:** The AI calculates the "Build Envelope".

$$\$\$ \text{Build Envelope} = \text{Land Area} - (\text{Easement Area} + \text{Setback Requirements}) \$\$$$

If the Build Envelope is too small or irregularly shaped, the property is downgraded for development potential.

Chapter 3: Environmental & Physical Risk Engine

The "downside protection" philosophy of Pathway¹ demands a forensic analysis of physical risks. Insurance premiums and construction costs can destroy the returns of an otherwise good asset.

3.1 Flood Risk: The Silent Profit Killer

Flooding is the most significant environmental variable in Victoria.

3.1.1 Data Sources & Granularity

The system connects to the **Victorian Flood Data** dataset via WFS.¹⁰

- **Layers Used:**
 - Floodway Overlay (FO): High velocity water. generally unbuildable. **Action: REJECT.**
 - Land Subject to Inundation (LSIO): Riverine flooding. Buildable with permits. **Action: CALC COST.**
 - Special Building Overlay (SBO): Urban stormwater. Common in inner Melbourne.

Action: CALC COST.

3.1.2 The "Cost to Cure" Algorithm

Instead of just flagging the risk, PADDE quantifies it.

- **Step 1:** Retrieve the **Declared Flood Level** (e.g., 12.5m AHD).
- **Step 2:** Retrieve the **Natural Surface Level** (NSL) from **Vicmap Elevation (LiDAR 1m DEM)**.²⁸
- **Step 3:** Calculate the Delta: $\text{Fill Depth} = \text{Flood Level} + 0.3m (\text{Freeboard}) - \text{NSL}$.
- Step 4: Estimate Cost.

$$\text{Extra Cost} = \text{Floor Area} \times \text{Fill Depth} \times (\$ \text{Earthworks Rate} + \text{Retaining Wall Costs})$$

This dollar figure is deducted from the property's valuation to determine the "Risk-Adjusted Value."

3.2 Bushfire Prone Areas (BPA) & BMO

Bushfire regulations impact both safety and build cost.

3.2.1 Regulatory Distinction

- **BPA (Bushfire Prone Area):** Covers most of regional Victoria and outer suburbs.¹¹ Triggers a BAL assessment.
- **BMO (Bushfire Management Overlay):** Much stricter. Requires planning permits, water tanks (10,000L static water supply), and CFA access roads.

3.2.2 Vegetation Analysis

The system performs a "Vegetation Proximity Check."

- **Method:** It draws a 100m buffer ring around the house.
- **Data:** **Vicmap Vegetation** or Satellite Imagery (NDVI - Normalized Difference Vegetation Index).
- **Logic:** High vegetation density in the buffer zone suggests a high BAL rating (BAL-29 or BAL-40).
- **Financial Impact:** The system adds a "**BAL Construction Loading**" (approx. 10-15% of build cost) to any renovation feasibility budgets.

3.3 Contamination & Priority Sites

Soil contamination is a legacy risk in gentrifying industrial suburbs (e.g., Brunswick, Footscray).

3.3.1 EPA Register Integration

The system queries the **EPA Victoria Priority Sites Register (PSR)**.¹²

- **Direct Hit:** If the property is on the register -> **REJECT**. (Unless the client is a specialist remediation developer).
 - **Indirect Hit:** If a property *within 200m* is on the register.
 - **Action:** Flag "Vapor Intrusion Risk." Check ground gradient (Vicmap Elevation) to see if groundwater flows from the source towards the subject property.
-

Chapter 4: Regulatory & Planning Intelligence

Understanding *what* can be built is as important as understanding what is there now. This chapter covers the integration of the Victoria Planning Provisions (VPP).

4.1 Zoning Intelligence

The **Vicmap Planning WFS**¹⁵ provides the zoning polygons.

4.1.1 Zone Logic

- **General Residential Zone (GRZ):** The sweet spot for Pathway's strategies. Allows moderate growth (3 stories).
- **Neighborhood Residential Zone (NRZ):** Restrictive. Limited to 2 stories. Good for "Capital Preservation," bad for "Development."
- **Commercial 1 Zone (C1Z):** Excellent for mixed-use.
- **Industrial Zone (INZ): Sharia Filter Check:** Ensure usage is compliant. Banks often lend lower LVRs (65-70%) on industrial; the Financial Module must adjust the loan inputs accordingly.

4.2 Rooming House (Class 1b) Feasibility Module

This is a proprietary strategic advantage for Pathway. Most buyers do not understand Class 1b rules. PADDE automates the compliance check.

4.2.1 The "Unlicensed" Rooming House Trap

Many properties are sold as "Boarding Houses" but are illegal. PADDE verifies compliance.

- **BCA Class 1b Definition:** < 300m² floor area, < 12 residents.¹⁶
- **Data Check:**
 - **Floor Area:** Calculated from building footprint. If > 300m², it requires a Class 3 occupancy permit (Fire Sprinklers, Hydrants). The cost to retrofit sprinklers (~\$100k) kills the deal. The AI flags this risk immediately.
 - **Disability Access:** Class 1b requires access for people with disabilities.¹⁷ The AI

analyzes the street view for steps at the entry. "Steps at entry" -> Flag "Ramp Installation Cost Required."

4.2.2 Minimum Garden Area Requirement

In GRZ and NRZ zones, a percentage of the block *must* be garden.¹⁸

- Algorithm:

$$\$ \$ \text{Garden \%} = \frac{\text{Parcel Area} - \text{Roof Area} - \text{Driveway Area}}{\text{Parcel Area}} \$ \$$$

If this is below 35% (or the specific schedule minimum), the property cannot be legally extended. This protects Pathway from buying "maxed out" sites with no upside.

Chapter 5: Financial "Digital Twin" Modeling

This module transforms physical data into financial insights, tailored to the persona.

5.1 Automated Valuation Models (AVM)

The system triangulates value to find "Under-Market" opportunities.

5.1.1 Data Aggregation

- **CoreLogic:** Best for historical sales data.
- **PropTrack:** Strong on market trends and listing volume.
- **Domain:** Excellent for real-time rental data.
- **Logic:** The "Pathway Valuation" is a weighted average, discarding outliers (e.g., family transfers sold for \$1).

5.1.2 The "Value-Add" Calculator

The AI identifies the gap between "Current State" and "Renovated State."

- **Method:** It finds comparable sales of "Renovated" properties in the same street.
- **Spread:** $\$ \text{Potential Value} - (\text{Purchase Price} + \text{Reno Cost}) = \text{Equity Uplift} \$$.
- If Equity Uplift > \$100,000, the property is tagged as a "Renovation Opportunity".²

5.2 The Doctor's Tax Engine

For the medical persona ⁴, the ROI is calculated *After-Tax*.

5.2.1 Depreciation Scheduling

- **Data:** Construction Year (from Listing or Council data).
- **Logic:**
 - **Division 43 (Capital Works):** 2.5% p.a. on construction cost for post-1987 builds.
 - **Division 40 (Plant & Equipment):** Accelerated depreciation on fixtures (ovens, carpets).
- **Simulation:** The system simulates a Quantity Surveyor report to estimate the annual tax deduction.
- Net Impact:

$$\text{\$\$Tax Refund} = (\text{Net Rental Loss} + \text{Depreciation}) \times \text{Marginal Tax Rate} (0.47)\$\$$$

This refund is added back to the cashflow to show the "True Cost to Hold."

5.3 SMSF Stress Testing

5.3.1 The "Liquidity Trap" Check

SMSFs cannot easily borrow more money if the property bleeds cash.

- **Stress Test:** The system models the cashflow at Current Rate + 2% and Vacancy Rate = 10%.
- **Threshold:** If the SMSF balance (input by user) is depleted within 5 years under these conditions, the property is **REJECTED**. This conservative logic aligns with Pathway's "Risk Protection" philosophy.⁵

Chapter 6: Advanced AI (Computer Vision & NLP)

6.1 Computer Vision: "Seeing" the Property

Photos provide data that text listings hide.

6.1.1 Condition Grading

Using a CNN trained on real estate interiors (e.g., **Restb.ai**), the system grades each room:

- **Condition Score (1-10):** Based on paint quality, flooring type, and fixture age.
- **Cosmetic Uplift Detection:** Identifies "Good Bones, Bad Skin" (e.g., hardwood floors covered by cheap carpet).
- **Damage Detection:** Flags black mold, water stains, or cracking.

6.1.2 Floorplan Digitization

The system uses OCR and vectorization to convert 2D floorplan images into data.

- **Room Counting:** Verifies bedroom count against the text listing (Agents often exaggerate).
- **Window Compliance:** Checks if bedrooms have external walls (Crucial for Class 1b legality).

6.2 NLP: The Automated Solicitor

6.2.1 Contract of Sale Analysis

- **Tool:** LLM (GPT-4o) via API.
- **Task:** Ingest the PDF contract.
- **Extraction:**
 - *Settlement Date:* Fixed or Flexible?
 - *Finance Clause:* Is it subject to finance?
 - *Goods Sold:* Are the dishwasher/curtains included?
- **Red Flags:** "Material Fact" disclosures (e.g., "A murder occurred on the property"). The LLM highlights these instantly.

Chapter 7: Operational Integration & Output

7.1 The "Pathway Score"

The final output is a single metric, allowing advisors to rank hundreds of properties instantly. The score is dynamic: A property might be a 95/100 for a Developer (big land, zoning) but a 40/100 for a Retiree (low yield, high maintenance).

7.2 The "Arche" Portal Feed

The data is not static; it lives in the **Arche** portal.¹

- **Live Updates:** If the zone changes or a new flood overlay is gazetted, the system updates the risk profile of the portfolio automatically.
- **Client Transparency:** The client sees exactly *why* a property was recommended, with the raw data (flood maps, tax calcs) available at a click.

7.3 Conclusion: The Future of Due Diligence

The PADDE system shifts Pathway Property from a service business to a technology-enabled platform. By codifying the expertise of the "A-Team" into algorithms, Pathway ensures that every client—from the junior doctor to the seasoned SMSF trustee—receives a level of due diligence that is exhaustive, consistent, and scientifically validated to produce generational wealth. This is the ultimate realization of the "99/100" promise: utilizing machine intelligence to find the needle in the haystack, every single time.

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