

settled.

WHITE PAPER · PLACE INTELLIGENCE

The Place- Evaluation Framework

*Restoration, belonging, and health
— the evidence and the method
behind the score.*

Version	Status	Scope
1.0 · June 2026	Living document	State → building

A Habitus product · [settled.habitus.place](#) — Habitus is the engine; Settled is the lens.

The attributes that most affect health are the ones conventional search ignores.

A place is a trajectory, not a snapshot. The attributes that most affect health — acoustic quiet, dark skies, clean air, nature access, and social connection — are precisely the ones conventional real-estate search (price, beds, baths, school ratings) leaves out. Settled is built as a weighted, multi-scale (state → building) multi-criteria engine that layers authoritative public data over commercial property feeds, and scores a place not as a single number but as a value, a direction of travel, and a watchlist of what is entitled nearby.

The evidence base is strong enough to act on. Combining seven longitudinal studies, the WHO review found road-traffic noise raises ischemic-heart-disease incidence with a relative risk of 1.08 (95% CI 1.01–1.15) per 10 dB L_{den} . White et al. (2019, n = 19,806) found that 120–179 minutes per week in nature was associated with markedly better self-reported health (OR 1.59, 95% CI 1.31–1.92) and wellbeing (OR 1.23, 95% CI 1.08–1.40). Green, quiet, and dark attributes are independently linked to mental, physical, and contemplative outcomes — and no mainstream real-estate tool measures any of them.

This paper sets out the rationale, the geographic-scale taxonomy, the health and environmental dimensions, the temporal and governance layers, the seek-side amenities, the decision method (MCDA / AHP / weighted overlay), the data sources, and the caveats. It is the *why* and the *what* behind the product, published openly because the research should be accessible, not proprietary.

Place is a health variable — and a measurable one.

*"Where you live shapes everything —
your sleep, your breath, your sense of
belonging."*

The restorative case is well-evidenced and under-served.

Attention Restoration Theory (Kaplan & Kaplan, 1989; Kaplan, 1995) holds that natural environments restore depleted directed attention through four properties — *being away*, *extent*, *fascination* (especially "soft fascination"), and *compatibility*. Stress Reduction Theory (Ulrich et al., 1991) shows physiological stress recovery — heart rate, blood pressure, skin conductance — from viewing nature within roughly four minutes. These are complementary pathways: ART is cognitive and attentional, SRT is affective and physiological. Both predict that low-stimulation, natural, quiet settings confer measurable health benefits — yet no mainstream real-estate tool measures acoustic, light, or restorative quality.

Environmental stressors cause measurable disease.

The WHO Environmental Noise Guidelines for the European Region (2018) recommend keeping road traffic below 53 dB L_{den} and night noise below 45 dB L_{night} ; the supporting systematic review (van Kempen et al., 2018) found a relative risk of 1.08 (95% CI 1.01–1.15) per 10 dB L_{den} for ischemic heart disease — rated high-quality evidence, with risk rising continuously from about 50 dB. A more recent umbrella review (Münzel et al., 2024) gives a more conservative combined cardiovascular risk of 3.2% (95% CI 1.1–5.2%) per 10 dB. The FAA uses DNL 65 dB as its residential land-use compatibility threshold for aircraft noise, with a 10 dB nighttime penalty, though most standards bodies treat 55 dB DNL as the threshold of impact in residential areas. Fine particulate matter (PM_{2.5}) is linked to higher depressive-symptom scores (≈ 0.07 SD per 10 $\mu\text{g}/\text{m}^3$ in one cohort) as well as cardiopulmonary mortality.

The sensitive-person rationale.

This is the project's ethical and practical core. Aron & Aron (1997), using their 27-item Highly Sensitive Person Scale, identified Sensory Processing Sensitivity in the top 15–20% of the population — a heritable trait characterized by deeper processing, greater emotional reactivity, and heightened sensitivity to subtle stimuli; fMRI work (Acevedo, Aron et al., 2014) shows stronger activation in attention and empathy regions. For highly sensitive people, environmental quality is not a preference but a determinant of functioning: noise, crowding, harsh light, and pollution impose genuine physiological and mental-health costs. Because conventional search tools are blind to these attributes, sensitive users are systematically mismatched to places — the precise gap Settled fills.

Existing location-scoring products optimize the wrong things.

Walk Score, AreaVibes, and Niche are useful but converge on amenity density, cost, crime, and schools. None measures acoustic refuge, dark skies, soundscape naturalness, circadian light exposure, hyperlocal air quality, or contemplative quality — exactly the dimensions sensitive people and restoration-seekers need. The data to measure them exists, mostly free and authoritative, but is fragmented across agencies and geographic scales. The core challenge is integration and normalization, not data scarcity.

Solitude ↔ Belonging is one tunable spectrum, not two products.

Settled treats Solitude/Restoration and Community/Belonging not as separate tools but as opposite poles of a tunable weight vector over one shared criteria taxonomy. A **solitude** profile up-weights acoustic quiet, dark skies, low density, nature proximity, and clean air, and may *down*-weight density-dependent amenities. A **belonging** profile up-weights social associations, civic engagement, walkable third places, contemplative-community presence, and residential stability. A balanced profile blends them.

Crucially, some criteria — clean air, green space, low pollution, healthcare access — are health-positive under *any* profile, and carry a **floor weight** that a user cannot zero out. The community case is as evidence-based as the solitude case but distinct: social capital, measured by Chetty et al.'s Social Capital Atlas (*Nature*, 2022, built from 21 billion Facebook friendships among 72.2 million U.S. users) predicts upward mobility — a one-SD increase in county economic connectedness is associated with an 8.2-percentile-rank increase in the adult income of children from low-income families — and correlates with health. A user weighting toward belonging wants high social infrastructure; a user weighting toward solitude may actively want low density. The engine must let these pull in opposite directions.

Eight geographic scales, from state to building.

Data resolution and the meaningful "unit of decision" change with scale. Health (mental / physical / contemplative), environment (human + animal), and time (current / historic / future) thread through each.

STATE

First-pass filtering on climate regime, regulatory environment, and broad cost / tax structure. Environmental and noise/lighting statutes, healthcare policy, air-quality attainment status; migration and development trajectories; state climate projections, water rights, and growth policy.

COUNTY

The richest scale for health and social data — many federal datasets resolve here. CDC PLACES (40 health measures incl. diagnosed depression), County Health Rankings social associations, the FEMA National Risk Index (18 hazards), and HRSA healthcare-shortage designations.

CITY / TOWN / PLACE

The scale of governance, zoning, and comprehensive plans — essential for the *future* dimension. Municipal general plans, zoning and rezoning pipelines, capital-improvement plans, development pipelines; local noise and lighting ordinances; walkability.

COMMUNITY / DISTRICT

Neighborhood-association and school-attendance scale; cultural identity, sense of place, contemplative-community presence. School ratings (with strong equity caveats), points of interest (places of worship, community centers, libraries), local civic data.

NEIGHBORHOOD (TRACT / BLOCK GROUP)

The workhorse scale for cumulative exposure. CDC PLACES at tract level; pollution proximity, tree canopy / NDVI, the 3-30-300 green-space rule; modeled road-traffic noise and airport noise contours.

BLOCK

Micro-variation in noise, traffic, light, and tree cover. Parcel-adjacent traffic counts, hyperlocal PM2.5 sensors, VIIRS night-lights at ~500 m, street-tree inventories.

PARCEL

The legal lot: zoning, lot size, setbacks, adjacency to stressors (highway, rail, industry, agriculture), solar orientation. County assessor / GIS parcel layers and commercial parcel records.

BUILDING

The dwelling: construction, window glazing (indoor noise and nature views), floor level (noise exposure varies by floor), indoor air. Assessor records, listing data, on-site assessment.

Mental, physical, and contemplative health.

Mental health

Chronic transportation noise drives sleep disruption, annoyance, stress hormones, and links to depression and anxiety; artificial light at night disrupts circadian rhythm; crowding and density add load. Against these, green-space access protects — meta-analyses link higher NDVI within 300 m of home to lower depressive symptoms — alongside soft fascination, social connection (versus isolation), and access to mental-health care.

Physical health

Air quality — PM2.5, ultrafine particulates, ozone, NO₂ — measured by the EPA regulatory network and hyperlocal sensors; water quality; walkability and active living; food access (USDA low-income / low-access tracts); proximity to pollution sources (highways, industry, agriculture); heat and climate exposure; healthcare access; and community morbidity patterns from CDC PLACES.

Contemplative health

This is where Settled differentiates. Access to nature and *awe* — in a field experiment (Piff et al., 2015, 5 studies, N = 2,078), participants who gazed up at a grove of towering eucalyptus for one minute subsequently picked up more dropped pens for a researcher than those who stared at a tall building — plus dark skies, quiet and contemplative space, contemplative-community presence, and a sense of place and rootedness (residential tenure, length of community history). Forest-bathing research provides the bridge to physical health: it raises natural-killer-cell activity, lowers cortisol, and shifts toward parasympathetic dominance.

Sound, light, air, water, life, and hazard.

Acoustic environment

Settled's signature dimension, and the hardest to source. *Road traffic* is modeled from state-DOT Annual Average Daily Traffic counts using standard noise-propagation logic, or taken from the US DOT National Transportation Noise Map (aviation + road + rail, modeled dB(A) L_{den} at ~30 m). *Aircraft*: FAA DNL contours; DNL 65 dB is the residential-incompatibility threshold. *Natural quiet*: the NPS Natural Sounds program measures ambient levels and the "noise-free interval"; soundscape ecology decomposes the environment into biophony, geophony, and anthrophony — high biophony and low anthrophony is both an ecological-health and a human-restoration indicator. A single jet at 38,000 ft can degrade roughly 1,000 square miles of natural quiet.

Light environment

Measured by the Bortle scale (Class 1 pristine → Class 9 inner city) and SQM sky brightness (mag/arcsec²), derived from VIIRS satellite night-lights (~500 m annual composites). Artificial light at night suppresses melatonin and disrupts sleep; it also disorients migrating birds, kills nocturnal insects, and deters sea-turtle nesting. Proximity to a certified International Dark Sky Place is a strong dark-sky proxy.

Air quality

EPA AQI and the regulatory monitoring network (attainment / nonattainment); AirNow for real-time AQI; the PurpleAir low-cost PM2.5 network for hyperlocal coverage (dense but requiring calibration — it over-reads PM2.5 by default and needs the EPA correction); traffic-related pollution near highways; and rising wildfire-smoke exposure, especially in the West.

Water

Drinking water from EPA SDWIS (public-water-system violations) and UCMR 5 PFAS occurrence — the 2024 PFAS rule set enforceable limits of 4.0 ppt for PFOA and PFOS; surface and groundwater from USGS NWIS and the Water Quality Portal; contamination proximity from EPA Superfund and Brownfields. Private wells, common in rural areas, are not in the federal database — Settled flags that and recommends local testing.

Ecology & biodiversity

Habitat connectivity and wildlife corridors; biodiversity as an environmental-health indicator; tree canopy (NLCD, NDVI); and proximity to protected lands (USGS PAD-US). The nature-dose literature (White et al., 2019) found benefits peaking around 200–300 minutes per week, with no further gain beyond.

Climate & natural hazards

FEMA National Risk Index (18 hazards — wildfire, flood, drought, heat, coastal flood, county + tract); the National Flood Hazard Layer; NOAA climate data and projections; and forward-looking multi-horizon flood / fire / heat models. Projections are modeled, not observed, and are labeled as such.

A place is a trajectory, not a snapshot.

Every incumbent sells a snapshot. Settled's defining claim is that two streets equally quiet *today* are not equal if one has grown louder every year and has an entitled subdivision behind the tree line. The temporal dimension maps onto three lenses.

Past — read the public record as a curve

Traffic-count history (a road on a rising curve predicts the next decade better than today's number), Census change over decades (densifying / aging / gentrifying / hollowing), building-permit history (the *rate* of nearby construction), and air-monitor and night-lights time series. Direction of travel is itself a criterion: a score is a value **plus a trend arrow**.

Present — the snapshot

What incumbents already sell. Necessary, but the least differentiated layer.

Future — two distinct kinds that must not be conflated

Planned change (governance data) — comprehensive plans, zoning and *pending* rezonings, capital-improvement plans, and the approved-but-unbuilt development pipeline. This is the gold nobody mines: the entitled townhomes behind the quiet field, the funded road-widening, the commercial rezoning across the street. It is public, local, and messy — which is exactly why no consumer product touches it, and why it is defensible once built.

Projected change (modeled futures) — 30-year climate projections, plus regional-transportation and demographic projections where published.

THE IMPLEMENTATION RULE

Every layer carries a value, a trend arrow, and a planned-change flag — not just a current value. A Settled score is a number, a direction, and a watchlist of what is entitled nearby.

What will owning here cost me — and what does the law let my neighbors do?

No consumer tool surfaces this, and that framing is the differentiator. The data is mostly public but text-heavy — state statute, county assessor methodology, municipal code — rather than clean API data, and the assembly cost is real.

State

Income-tax structure; property-tax methodology; homestead exemptions; capital-gains treatment on home sale; estate and inheritance tax; landlord-tenant balance; HOA-law strength; short-term-rental legality.

City / town

Local tax add-ons; zoning-code flexibility; and — important for sensitive buyers — local noise and lighting ordinances *and whether they are enforced*. A town with an enforced noise ordinance is structurally different from one without: the existence of an ordinance is a weak signal, enforcement is the strong one. Settled captures both — ordinance present? enforced? complaint process?

Section 8

— PARITY WITH THE AVOID-SIDE

Solitude is not just the absence of bad — it is the presence of good.

The *seek* bundle carries equal weight to the *avoid* bundle.

HEALTHY FOOD ACCESS

USDA Food Access Research Atlas (low-income / low-access structure) plus map points of actual grocers, co-ops, and specialty stores.

FARMERS MARKETS

The USDA National Farmers Market Directory — free and geocoded.

TRAILS & NATURE ACCESS

Trail networks plus USGS PAD-US protected lands and NDVI / 3-30-300, where physical exercise and contemplative restoration overlap.

These carry trend arrows too: a 15-year-old farmers market signals a different community than a one-season-old one; a just-passed dark-sky ordinance is a trajectory, not a static fact.

Combining weighted criteria — MCDA, transparently.

Multi-Criteria Decision Analysis is the governing framework. The core pipeline:

- 1 **Criteria taxonomy.** Organize criteria hierarchically — goal → categories (acoustic, light, air, water, nature, social, hazard, health, cost) → sub-criteria → measurable indicators with units.
- 2 **Weight elicitation.** The Analytic Hierarchy Process (Saaty) uses pairwise comparisons on a 1–9 scale, builds a comparison matrix, derives weights from its principal eigenvector, and checks a consistency ratio below 0.10 — letting a user express, e.g., "acoustic quiet is strongly more important than walkability."
- 3 **Normalization.** Convert heterogeneous indicators (dB, $\mu\text{g}/\text{m}^3$, mag/arcsec², percentiles) to a common 0–1 suitability scale via value functions. Threshold functions encode evidence-based breakpoints — a steep penalty above 53 dB L_{den} , a bonus below 45.
- 4 **Aggregation.** Weighted Linear Combination: suitability = $\sum(\text{weight}_i \times \text{normalized score}_i)$. Ordered Weighted Averaging allows risk-averse aggregation — appropriate for sensitive users, where one dealbreaker (a flight path) should be able to veto.
- 5 **Spatial overlay.** The McHarg "layer-cake" overlay tradition, implemented as raster algebra or vector zonal statistics.
- 6 **Accessibility.** Score proximity by travel time, not Euclidean distance, using isochrones for drive / walk / bike access to work, nature, healthcare, and third places.
- 7 **Multi-scale conflict resolution.** When a tract scores well but the specific parcel abuts a highway, the finer scale overrides for exposure criteria (worst-case local value) while coarser scales govern context criteria (social capital, climate). This precedence is documented explicitly.

The core data sources.

Most are free and authoritative; the engineering work is integration and normalization across scales and update cadences. Every value is labeled *measured* or *modeled*, with its source and retrieval date.

SOURCE	PROVIDES	RESOLUTION	UPDATE	NOTES
Census / ACS	Demographics, tenure, density, mobility	Nation → block group	Annual	Tenure = rootedness proxy
CDC PLACES	40 health measures incl. depression	County → tract	~Annual	Modeled; no composite ranking
County Health Rankings	Social associations, health factors	County	Annual	Membership orgs / 10,000
Social Capital Atlas	Economic connectedness	ZIP, county	Static (2022)	21B FB friendships
FEMA National Risk Index	18 hazards, expected annual loss	County, tract	Periodic	Web app retired; data downloadable
FEMA NFHL	Flood zones	Parcel-relevant	Continuous	For NFIP
FAA / DOT noise	Aircraft DNL; multimodal L_{den}	Contours; ~30 m	Periodic	DNL 65 dB threshold
VIIRS / night-lights	Sky brightness, Bortle	~500 m	Annual	Derive SQM / Bortle
AirNow / EPA AQS	Regulatory AQI, PM2.5, O ₃ , NO ₂	Monitor; county	Real-time	Sparse network
PurpleAir	Hyperlocal PM2.5	Sensor point	Real-time	Needs calibration
USDA Food Access Atlas	Low-income / low-access	Tract	Periodic	Food access
EPA SDWIS	Drinking-water violations	Public water system	Rolling	Excludes private wells
USGS NWIS / WQP	Surface / groundwater quality	Site (~1.5M)	Real-time + archive	—
OpenStreetMap / Wikidata	POIs, places of worship, parks	Point / polygon	Continuous	Open license
USGS PAD-US	Protected public lands	Polygon	Periodic	Authoritative
RentCast / ATTOM / Estated	Listings, records, AVM	Parcel	Near-real-time	API, not scraping
Mapbox	Maps, geocoding, isochrones	—	—	Isochrone ≤60 min

ON LISTINGS

Property data is ingested through licensed APIs (RentCast, ATTOM, Estated), never scraped from platforms that forbid it. As a compliant fallback, users can forward saved-search alert emails to a parser that extracts the address, geocodes it, and runs the same point-in-polygon scoring.

Caveats and ethics.

Modeled vs. measured. Several flagship datasets are modeled estimates, not direct observations — CDC PLACES uses regression / post-stratification (and warns against composite ranking or local time-trend use); FAA DNL and DOT noise maps are model outputs; VIIRS-derived Bortle is satellite-modeled; forward-looking climate scores are projections with uncertainty. Settled labels provenance and confidence rather than presenting modeled values as ground truth.

Data availability shifts. Public datasets move: EPA EJScreen was removed from public access in 2025; FEMA's National Risk Index web application was retired (data still downloadable); the 2024 PFAS limits are partially in flux. The pipeline is built for source substitution.

Low-cost sensor accuracy. PurpleAir over-reads PM2.5 by default and requires calibration; citizen-science coverage is uneven. Treated as directional and corroborated against the regulatory network.

Social-capital data is partial. The Social Capital Atlas and Social Connectedness Index are static and based on Facebook users (skewing ages 25–44); "social associations" omits informal networks. Belonging is intrinsically harder to quantify than noise or air, and combines quantitative proxies with user-reported signals.

Equity of inputs. School ratings and crime data carry well-documented bias and are used cautiously and transparently. Noise, air, and pollution burdens correlate with race and income — a "find me quiet, clean air" search can inadvertently steer toward exclusionary areas. Settled surfaces this honestly rather than hiding it behind a confident number.

Not medical advice. Settled informs relocation decisions; it does not diagnose or prescribe. Sensitive users should pair its outputs with on-site visits — ideally at night and during rush hour — before deciding.

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