

Centre for Affordable Housing Finance in Africa

SHOUT Sustainable Housing Technical Group

LINCOLN INSTITUTE OF LAND POLICY

CAN OUR CITIES BE RE-BUILT DIFFERENTLY?

Finding the algorithm to solve the urban tenement challenges. A case of Pipeline Estate, Nairobi, Kenya

A Multi-Stakeholder Urban Governance Game for Brownfield Intervention

AUHF Conference 2026 Masterclass | 11 Nov | 10:30 to 12:00 | Lusaka

About SHOUT

SHOUT is a housing research, design and development firm that provides the technical expertise to understand and tackle the delivery of sustainable and affordable housing in emerging markets.

We Build

Typology-centric Urban Housing

We Catalyse

A Better Built Environment

Kommunities

Center for Sustainable Housing Development

Target Affordability- Urban housing for lower & middle-class Kenyans

Katalyst

Center for Earth & Sustainable Housing Development

A sustainable construction research on earth and bio-based materials and circular infrastructure (Solar, Water, Power, Waste) with a holistic value chain approach through rigorous product development and technical workforce empowerment (TVET).

Supply

Informal Settlements

For ref. not within scope

Anza

Adult Co-living Apartments

Zima

Multi-Family Courtyard Apartments.

Klay

Single Family Earth Eco-Homes.

Demand

H.O.M.E

Home Ownership Made Equitable

Innovative Rent-to-Own End user Financing.

Type Area	Single room w/ Shared WC Sqm 9-16		Studio,1 & 2 bedroom Sqm 20, 30, 40,50	3, 4 & 5 Bedroom Sqm 80,100,160
Rent*	Ksh 2k- 6k $ 15 - 45	Ksh 6k -14k $ 45 -110	Ksh 14k -35k $ 110 -270	Ksh 35k -80k $ 310 -615
Own*	N/A-Rental	N/A-Rental	Ksh 1.3M - 6M $ 10K - 50K	Ksh 6M - 20M $ 50K - 150K

**Adjusted annually for inflation*
Assumed usd/kes129- rounded

Kalabash

Center for Advocacy, Incubation and Policy Development

Using a technical data driven and open-source approach to research, partnerships, advocacy, thought leadership and policy development, ensuring our work is accessible, visible, and able to truly reach and transform the wider market.

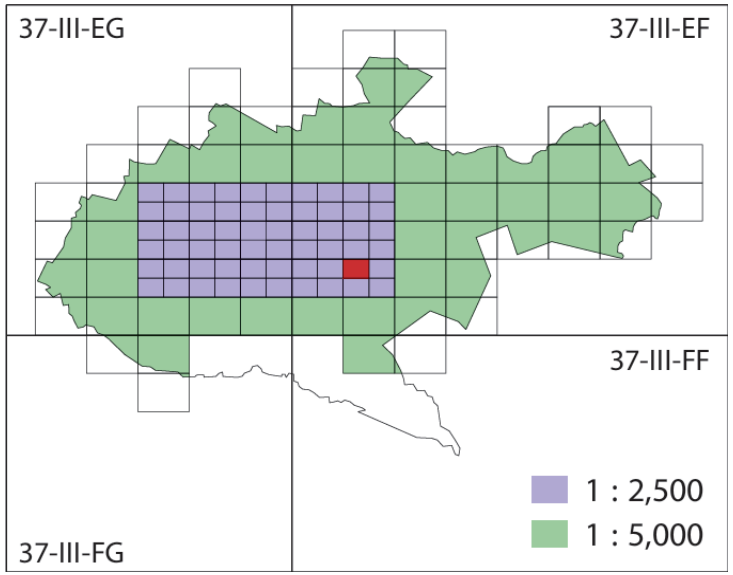


What To Expect…..

- An **overview** of the study and its approach into Pipelines' rental market – aligning incentives for good development
- Review of **study approach for technical multi-disciplinary, multi-media and multi-scale** mapping of Pipeline Estate
- **Emerging insights** from the tenement study and **proposed interventions** including; technical assessments, typification, economic models and the approach for classification of interventions and recommendations.
- What is **possible**?



Pipeline Estate, Nairobi, 2025 (Source: Pipeline Field study '25)



Map of Nairobi. Source: Pipeline Field study 2025



Map Showing the selected Pipeline Study area. Source: Pipeline Field study 2025

PIPELINE WORKS

It houses the urban workforce at KES 6,000 to 14,000 a month.

People build it this way because it pays and it lets. That is the starting point, not the problem.

Fully rented

Seven to ten storeys, no lifts

KES 6k to 14k

a month: the rent band for the urban workforce

5.8% to 10%

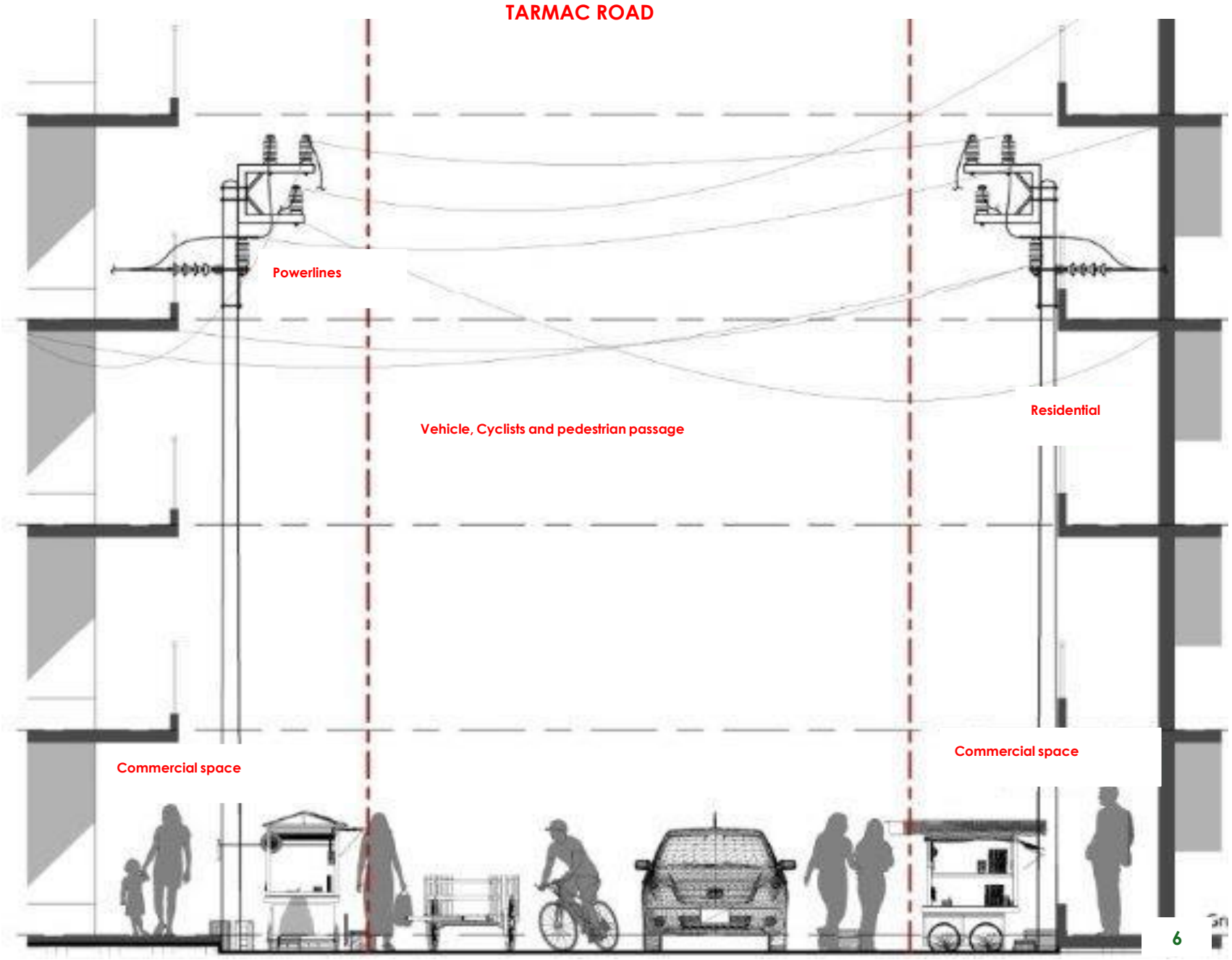
net yield on cost (live TEC): why it keeps being built

The question is not what is wrong with Pipeline. It is what becomes possible if the same floor plans had light, air, dry corridors and regular water.

Scan to open the CAHF Library with Pipeline Documentation.
housingfinanceafrica.org/cahf-library

Sources: Pipeline field study 2025

- Buildings are 7 to 10 storeys. No lifts. Fully rented.
- 74% of maintenance complaints go unresolved
- Plot ratios 7.1x to 7.6x against a regulation limit of 5x
- Ground coverage 90% to 99% vs regulation limit of 50%
- Roads not in the county road inventory therefore no maintenance obligation
- Caretaker resolves 81% of maintenance with no budget or mandate



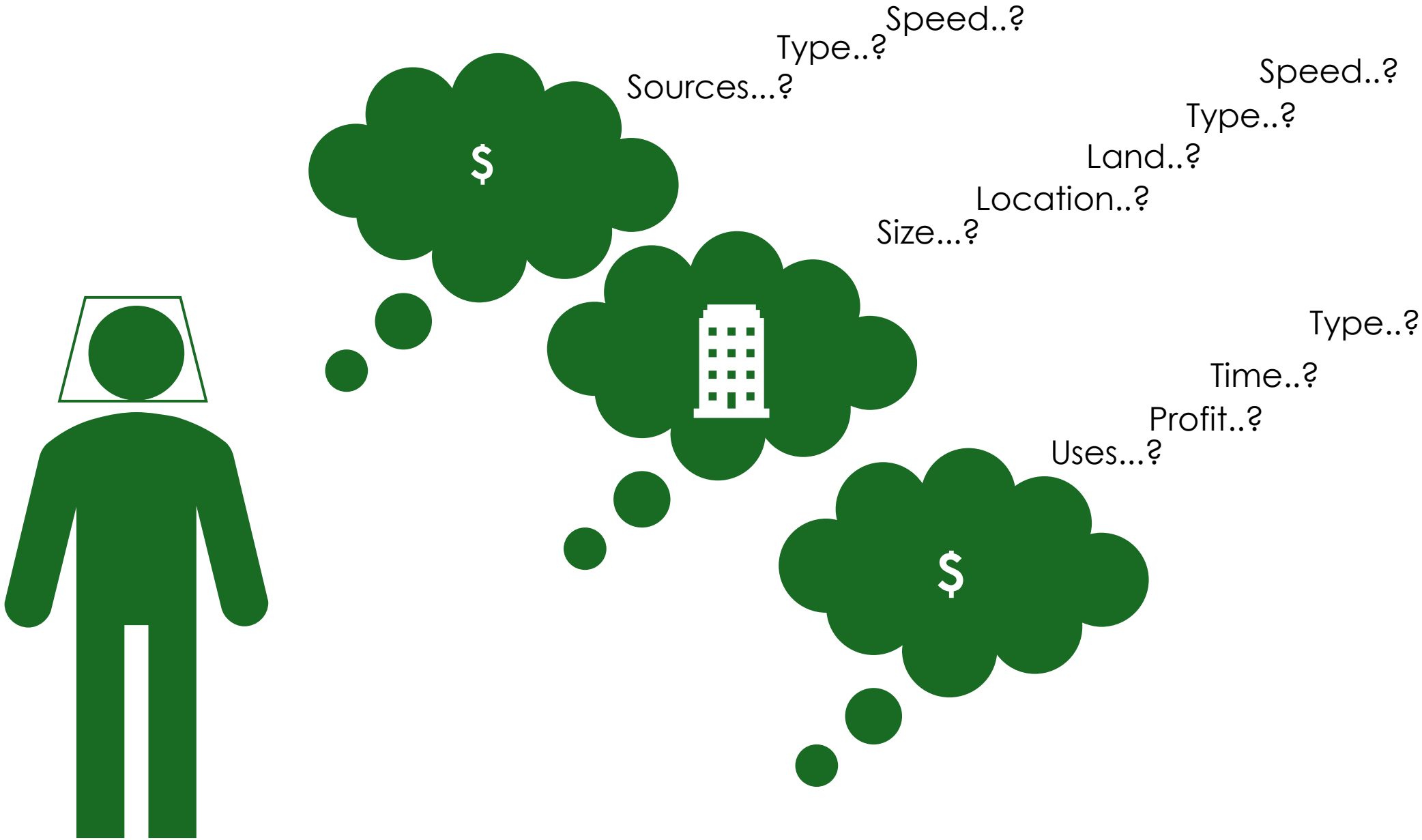
Street Layout. Source: Pipeline Field study 2025

ASSESS: MECHANICAL AND PLUMBING

Practice	Description	Cost Impact
Borehole Dependency	60% of landlords rely on boreholes due to unreliable municipal supply.	- High upfront cost: KSh 500K–1.5M (drilling + pump). - Ongoing electricity costs: KSh 3K–8K/month for pumping.
Overhead Tank Systems	Most apartments use gravity-fed systems (pump → rooftop tank → units).	- Maintenance: KSh 10K–20K/year for pump repairs. - Water waste: 15–25% loss from leaks/overflow.
Shared Metering	Single municipal water meter for the entire property; landlords bill tenants flat rates.	- Disputes: Tenants overuse water; landlord absorbs extra costs. - Non-compliance: Illegal under Water Act 2016.
No Water Recycling	Rare use of greywater systems (e.g., for irrigation/toilet flushing).	- Higher bills: 100% reliance on fresh water.
Poor Pipe Maintenance	Old galvanized/PVC pipes (leak-prone, especially in clay soil).	- Water loss: Up to 30% from undetected leaks. - Tenant complaints: Low pressure = rent defaults.



Residents fetching water. Source: Pipeline Field study 2025



They depend on each other: the lender needs the county, the tenant needs something in writing, the landlord needs both to say yes.

Tenant

SHAPES HOUSING BY

Shapes housing by what they will pay for, and whether they stay.

IN PIPELINE TODAY

44% have no written contract. 74% of maintenance complaints go unresolved.

"What are my options?"

Landlord

SHAPES HOUSING BY

Shapes housing by what gets built, and at what rent.

IN PIPELINE TODAY

Buildings cost KES 76M to 215M. Live net yields run 5.8% to 10%.

"What does it really cost?"

Lender

SHAPES HOUSING BY

Shapes housing by whether capital exists, and on what terms.

IN PIPELINE TODAY

Formal lenders are largely absent: share certificates, not title deeds.

"How is Pipeline financed?"

City official

SHAPES HOUSING BY

Shapes housing by regularising, granting rights, or enforcing.

IN PIPELINE TODAY

All five studied buildings exceed Zone 10K limits. About 200,000 people live in buildings like them.

"Where is the county in that equation?"

TDC seems too high...what could the realistic sum...

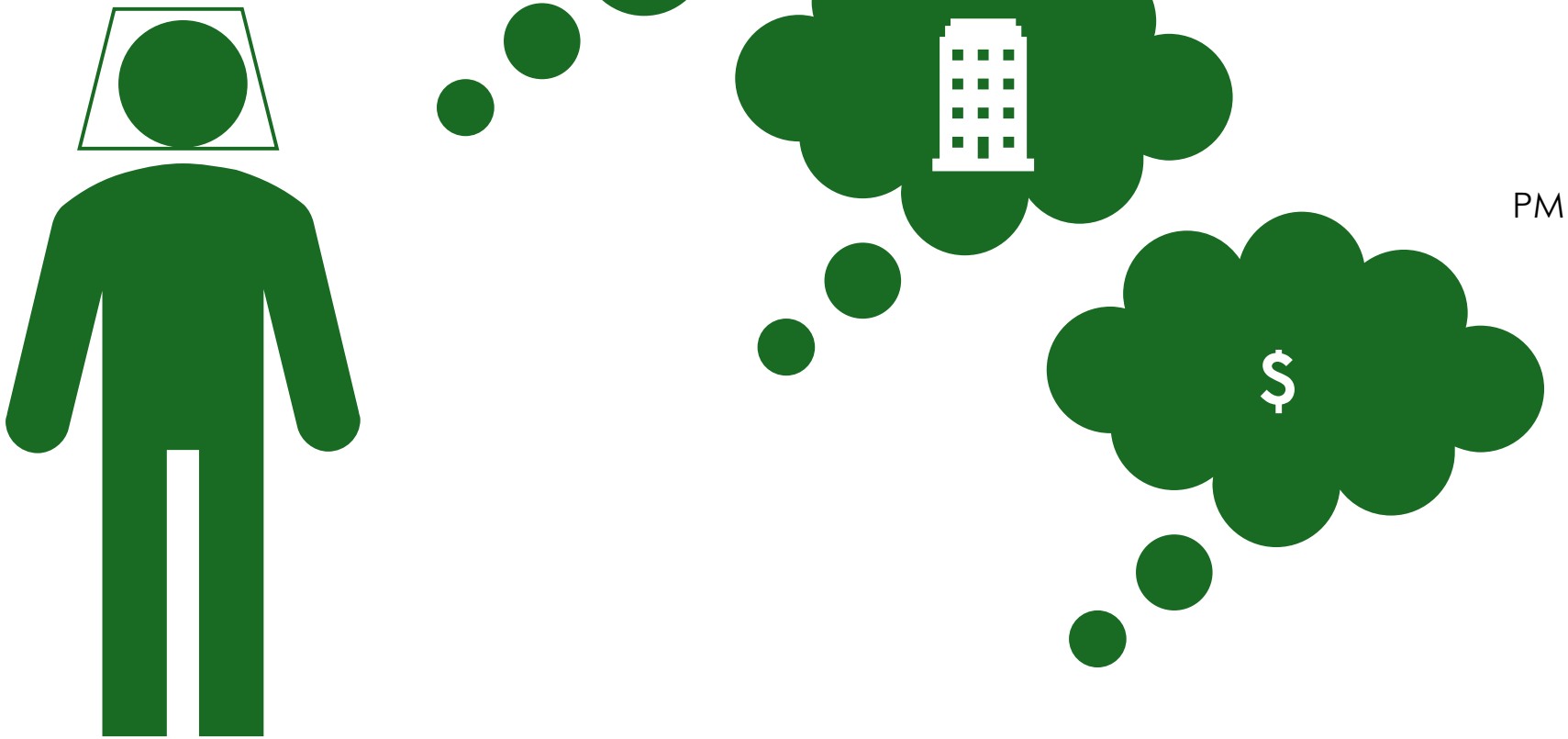
No/shifty tenure...why have a PBP over 10 years?

Why not build at maxi height limit?

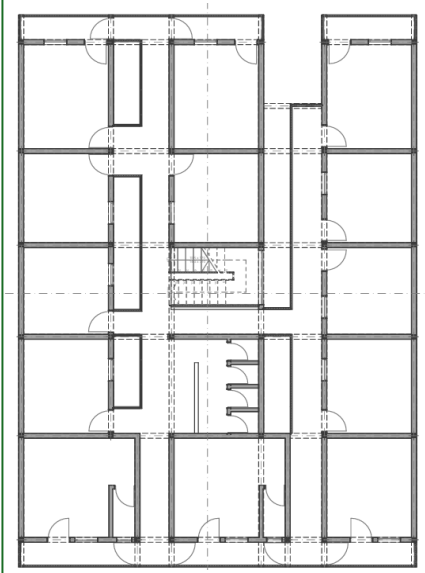
Efficiencies not max?

PM ratio seems too high

Rents as high at 18K for a 35SQM 1 bed....

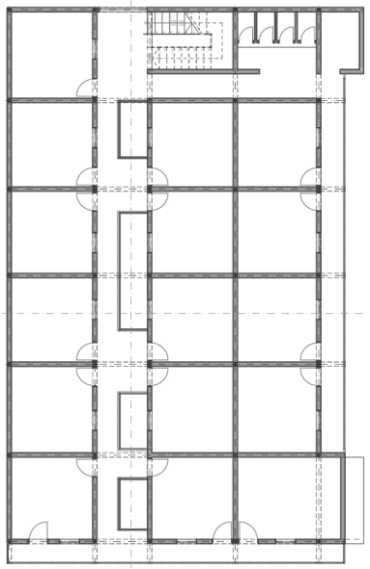


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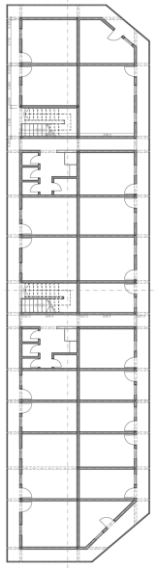


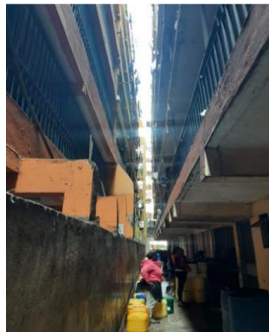
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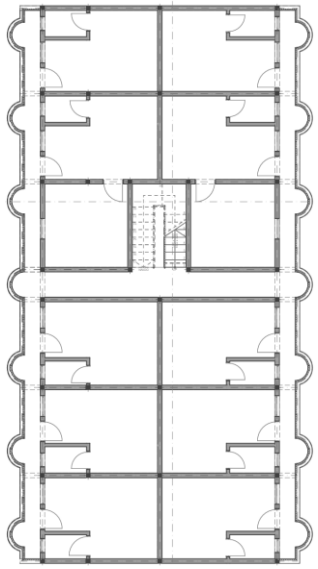


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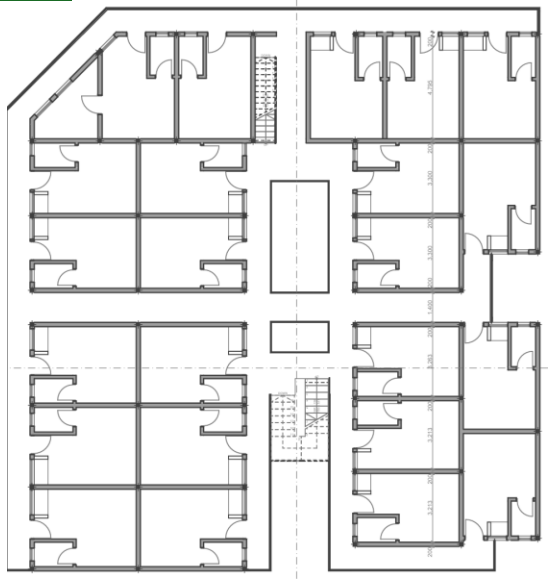


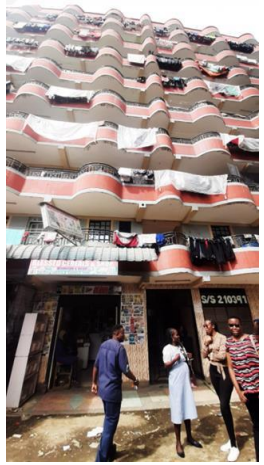
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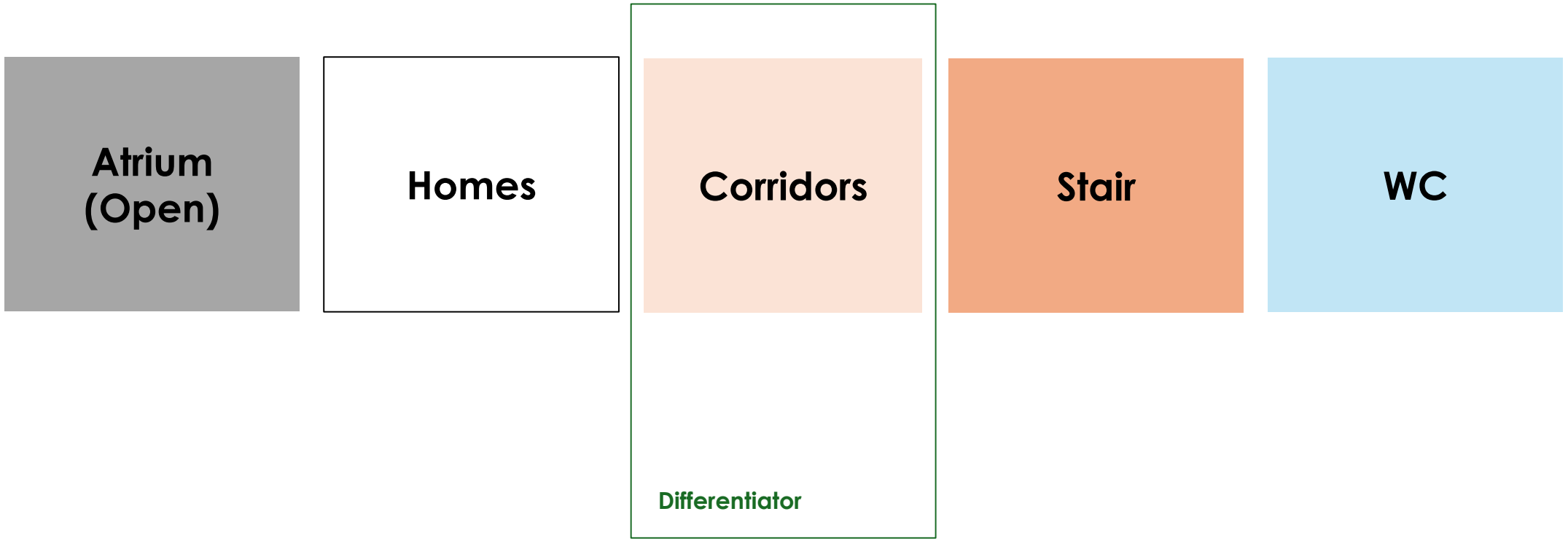
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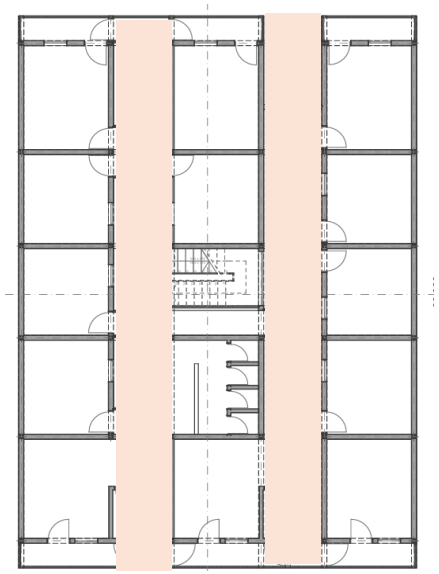


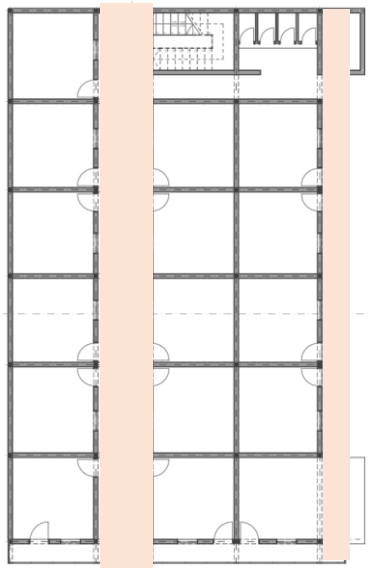
Building Profiles. Source: Pipeline Field study 2025

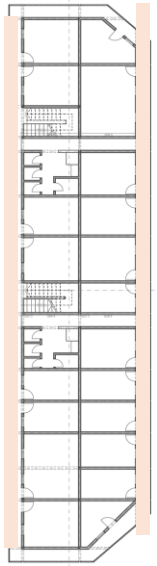
Spatial Morphology Drivers

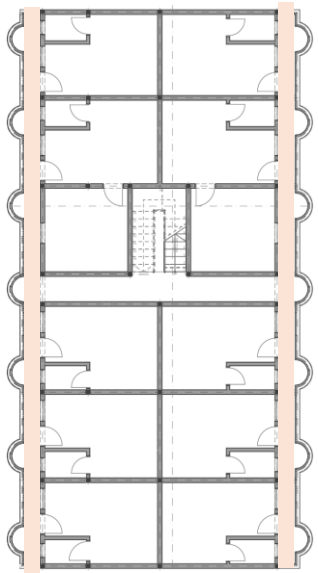


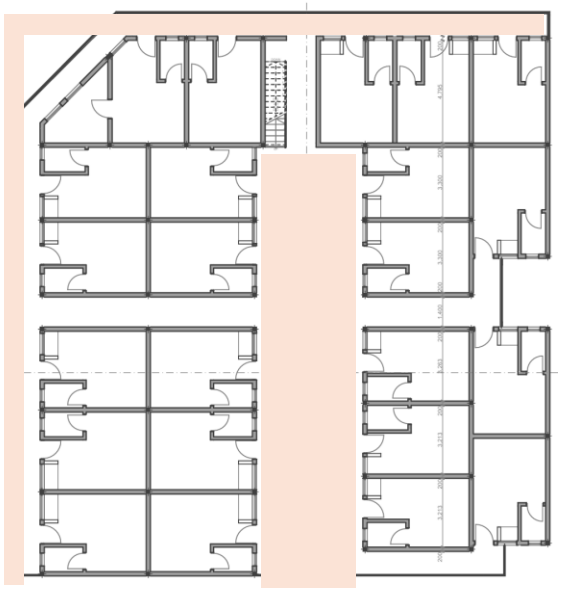
Atrium | Homes | Corridors | Stair | WC











In - In

In - Out

Out - Out

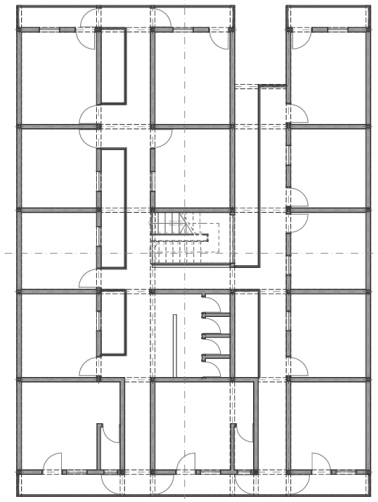
Out - Out

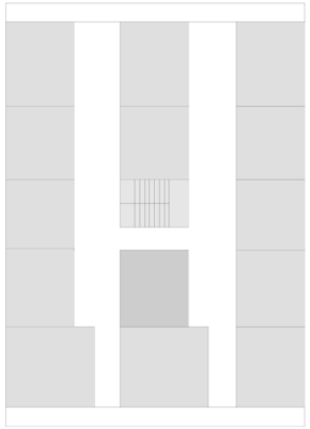
In - Out

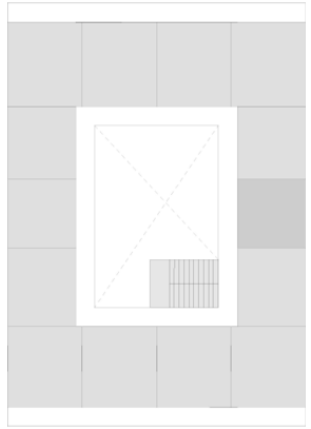
WHAT IF….

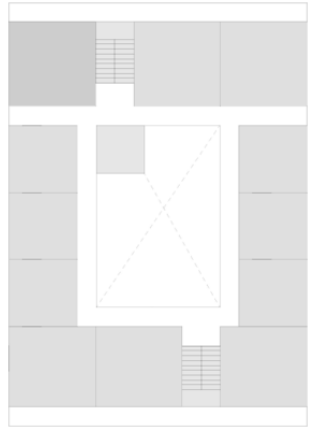
Same floor plan, but we built differently…..

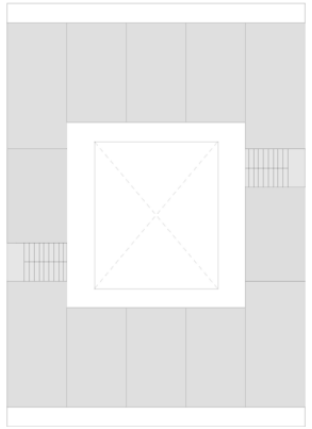
Building 1 at today's rents, costed with the live TEC. Each rung trades floor area for light, air or safety, and someone has to carry the cost.











Base

7 floors · 104 homes

Net yield 7.45% · IRR 9.4%

Today: a long central corridor, damp, with little light or air.

Better

6 floors · 91 homes

Net yield 8.03% · IRR 10.3%

Least change for a better outcome: a void for light and air.

Regulation

10 floors · 123 homes

Net yield 7.68% · IRR 9.8%

Built to standard: two stairs, a lift, gendered WCs, better atriums.

Aspirational

6 floors · 73 homes

Net yield 7.23% · IRR 9.0%

Towards co-living: shared space and a laundry solution.

What moves a building up.

- *Base to Better: competition, land tenure.*
- *Better to Regulation: a regularisation policy, favourable finance, enforcement, development rights.*
- *Regulation to Aspirational: a market shift in demand, supply and enforcement.*



Emerging Principles

C-Tenement Tiered Intervention Framework

Project

C1 Tenement Corridor Configuration
The biggest differentiator in Tenement Spatial Morphology

People

C4 Intervention mapping must be done at multiple scales;
Interests follow investment

Approach

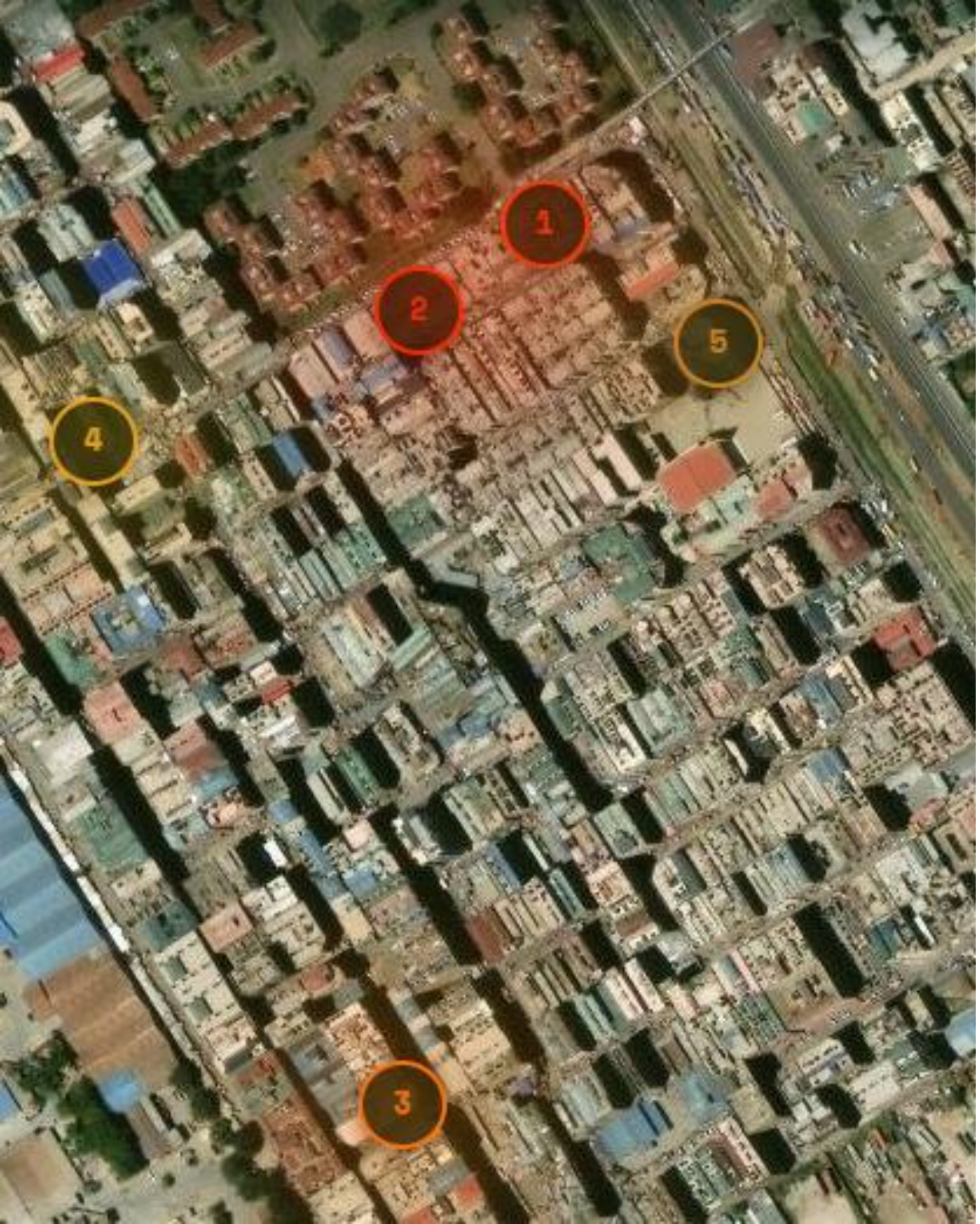
C2 Returns are King in the Absence of Enforcement.
Interventions Must Be Tiered

C3 'Why' comes before 'How' & Both are Necessary;
The role of Carrots, Sticks & Tools to Catalyze Change

Roles/ Seats

Everyone decides at once. Each seat has its own lever, its own information and its own test of success.

Seat	Their lever	In a flood, for example	They win when
Tenant	Demand: what you will pay for	Move out; report it to the caretaker and the landlord and share the cost; or mobilise the neighbours and petition the county	It is built, the rent rise is acceptable, enough homes are kept, and something is in writing
Landlord	Returns: what gets built	Pump and patch; or fix the drainage and build the next rung, keeping or raising the rent	The step earns today's yield plus the cost of capital
County official	Stick and carrot: regularise, grant rights, enforce	Hold; or put drains and roads on the record; or add development rights and enforce the standard	The building is on the record and keeps enough of its homes
Bank or lender	Money: whether, and on what terms	Stay out; a repair loan on standard terms; or an improvement loan on favourable terms (only against regularised buildings)	The loan clears its hurdle



How a session works

Select a building

Click a pin on the satellite map of Pipeline. Five buildings with real financials, plans and GIS data. Hover for the numbers.

Choose your seat

Tenant, landlord, county official or lender. Your private card shows only what your role would know.

Random event

Rains, a water failure, a rival building or county inspections. Each seat gets its own three responses.

Decide, all at once

Hold, step in or all in. Nobody sees another seat's choice until all four are locked.

See who wins, holds or loses

The step up the ladder happens if the landlord builds it. Each seat wins, holds or loses by its own test, and the people ledger counts households.

1

Solo

Only what that role would know.

2

Fitted to the event

A flood gives a tenant different choices from an inspection or move to a rival building.

3

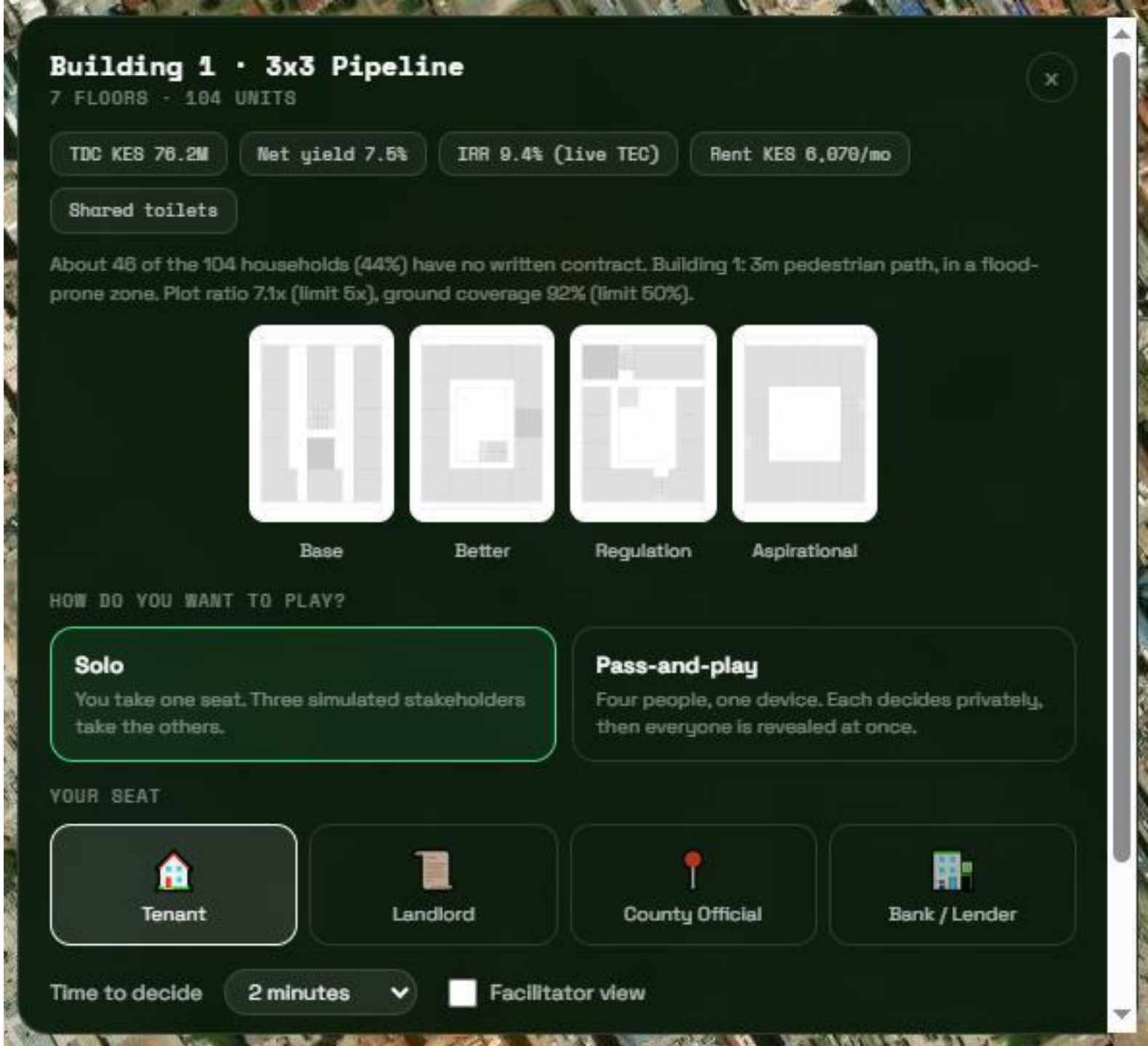
Honest about its effect

Every response says what it does in the game, before you commit.

4

All at once

Nobody sees another seat's choice until all four are locked.





Tenant

STEP IN | WIN

Rent +KES 227 a month for a 15.6 m2 home (was 15.0). Homes -13. Protected from the rains.

Landlord

STEP IN | WIN

Net yield 7.45% to 8.03%. Needed 7.95% to cover the cost of capital. Protected from the rains.

County official

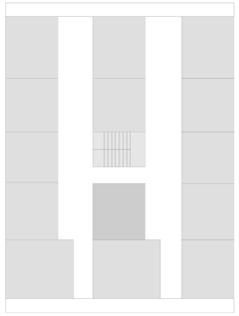
STEP IN | WIN

Homes -13 (-12.5%). On the record.

Bank or lender

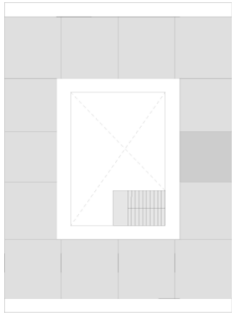
STEP IN | WIN

Lent against a regularised building. The loan clears the hurdle.



Base: 104 homes
7.45% · IRR 9.4%

to



Better: 91 homes
8.03% · IRR 10.3%

For the people. 13 households lost their homes (-12.5%). A typical home is now 15.6 m2 (was 15.0) and costs KES 5,880 a month. Rent per square metre did not change. Tenancy agreements were put in writing, so the roughly 46 households with no contract now have something to stand on.

A win-win that displaces 13 households. Is it a win?

Now you play

1

Form tables of four

Tenant, landlord, county official, lender. Sit opposite your own job.

2

Open the game

Scan the code. Choose Pass-and-play and a building: each table a different one.

3

Take your card

Decide privately, then pass the device. Nobody sees a choice until all four are locked.

4

Play three rounds

About 10 minutes a round. Each brings an event. Watch who wins, holds or loses.

5

Tell us what stood out

The last screen opens a short, anonymous feedback form.

plottingpipelinev3.lovable.app

Any phone or laptop. Needs an internet connection.

Debrief

1 Better can pay for itself

Building 1: net yield rises from 7.45% to 8.03% with no rent rise. With the county's rights, a coordinated table climbs to Regulation with nobody losing.

2 Light and air cost homes

Better gives up 34 of 129 homes in Building 2 (26%) and 32 of 160 in Building 3 (20%). Climbing there means someone accepts the loss.

3 Regulation can win homes back

Building 3 at Regulation: 220 homes against 160 today, for about 5% more rent (KES 216 a home a month).

4 Nothing moves without the county

Rights, a pathway and tenancy agreements let lenders and tenants say yes. In the model the county never offers them unprompted.

Who paid, and could they afford to?

How many homes is better light and air worth, and who should decide?

Where is the county in this equation, and what would it take for it to move first?

Who spoke for the households with no written contract?

What we still need to measure

The game assumes	The Rapid Assessment Tool should measure
Tenants accept up to 10% more rent for a better building	Willingness to pay, rents and vacancy, building by building
A building can lose up to 15% of its homes	Displacement and re-housing: where the households go
Finance terms change the return a step must clear	Real lender terms and informal credit, by building
The ground floor stays as it is; Building 2's common area	Measured plans, floor by floor
What each event exposes, and what protects	Flood history, water hours, tanks, drains and who responds
Running costs are one 25% fee	Itemized running costs per building

The Rapid Assessment Tool collects it. The digital twin holds it. The game stays the decision layer.


11 Nov 2026
AUHF masterclass, Lusaka
Play, debrief and collect feedback.
Dec 2026
Findings report
Sessions and feedback become one dataset and a report.
Jan 2027 (date to be confirmed)
Public webinar
Findings, a live demo and open access to the game.
Next
Rapid Assessment Tool
Collect the technical data the game had to assume. A digital twin follows.
Then
ANZA pilot in Pipeline
Adult co-living, with a cooperative in a joint venture, or bought and built.
From Apr 2027
UN Urban Lab
Applied. If accepted, test the method in partner cities.

Centre for Affordable Housing Finance in Africa

SHOUT Sustainable Housing Technical Group

LINCOLN INSTITUTE OF LAND POLICY

Thank you

Questions, comments, clarifications

Play it yourself: plottingpipelinev3.lovable.app