

Buildings For the Climate Crisis – A Halifax Case Study

Item 10.3.1

Buildings For the Climate Crisis - A Halifax Case Study

“The greenest building is...one that is
already built¹” – Carl Elefante, 2007

← Tweet



Lloyd Alter
@lloydalter

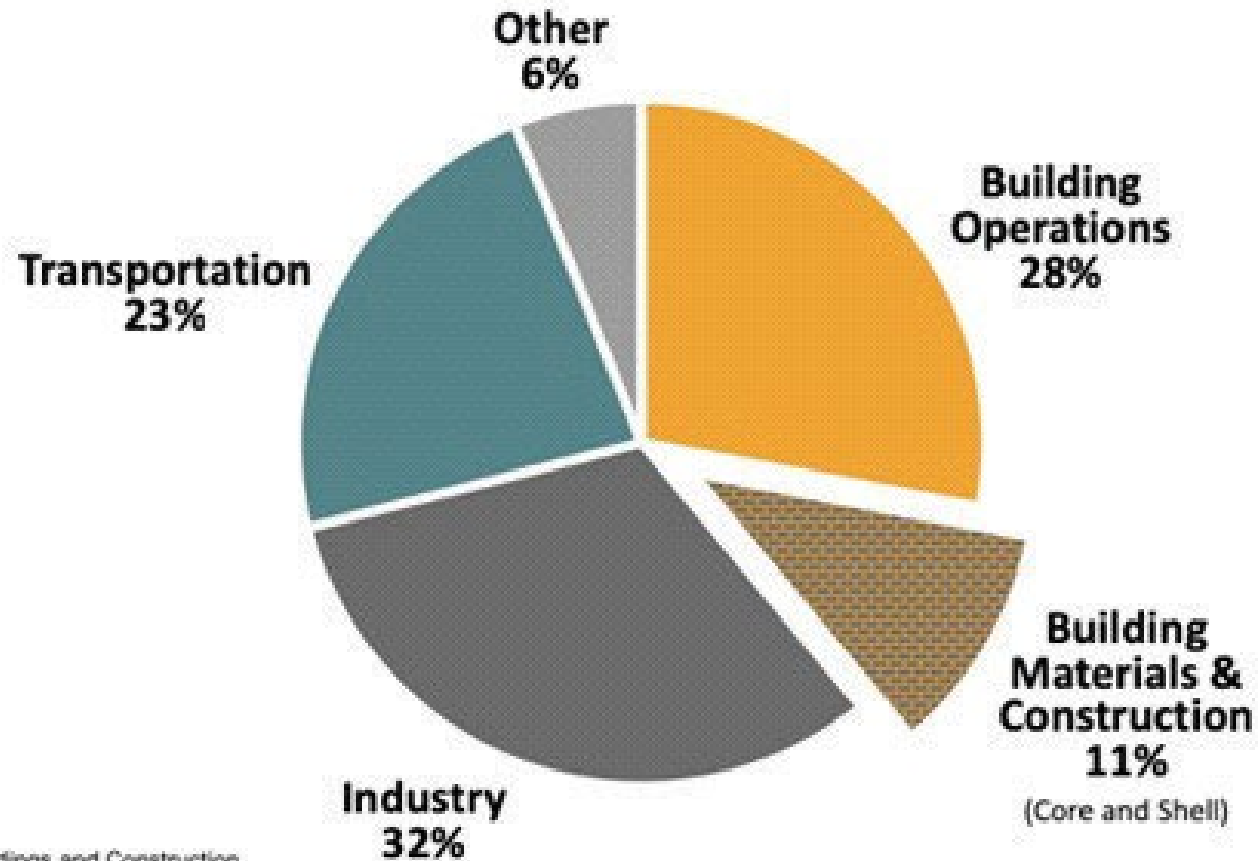
Groundbreaking study on embodied carbon comparing new build to retrofit and addition in Halifax Canada from [@FriendsHalifax](#), Ignored by city, author told to “stop making things up.” Should be studied closely, big implications. [treehugger.com/real-estate-de...](https://www.treehugger.com/real-estate-de...)



(Photo: Tim Krochak)

Carbon / GHG Footprint of Buildings is Hidden

Global CO₂ Emissions by Sector



Source:
Global Alliance for Buildings and Construction.
2018 GLOBAL STATUS REPORT.

Embodied Carbon / GHG Emissions vs. Operational Carbon / GHG Emissions



Embodied Carbon

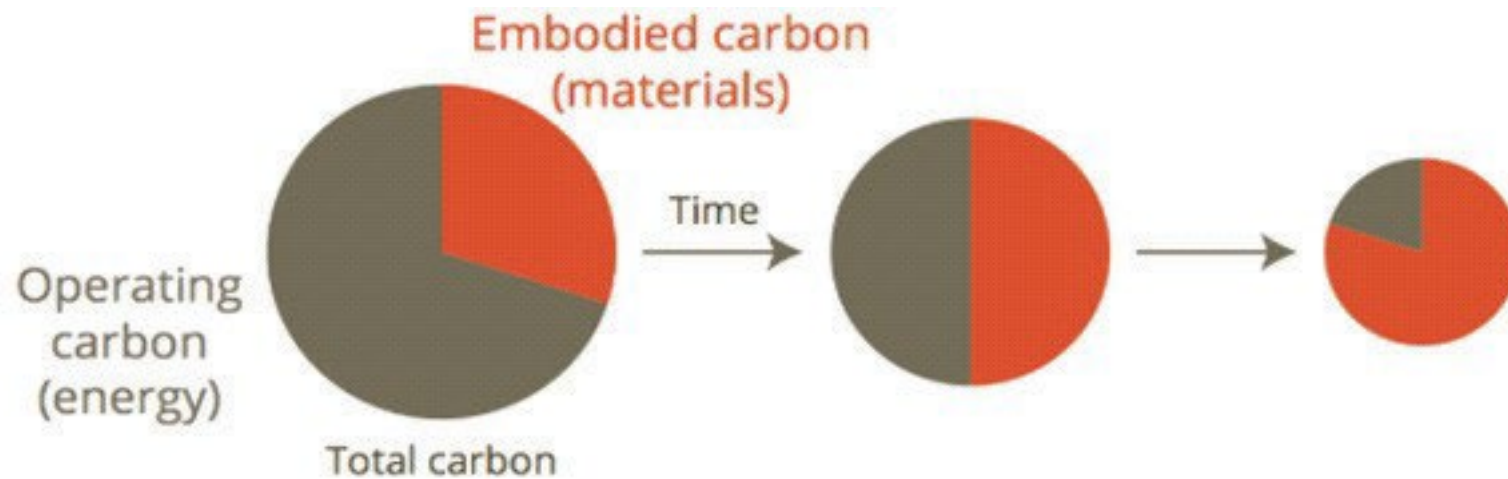
Manufacture, transport and installation of construction materials

Operational Carbon

Building Energy Consumption

Image: S. Smedley Skanska

Embodied Carbon Increases as Operating Carbon Decreases



(Pembina.org)

Case Study, Part 1



2016 HRM Centre Plan

Carlton Street area

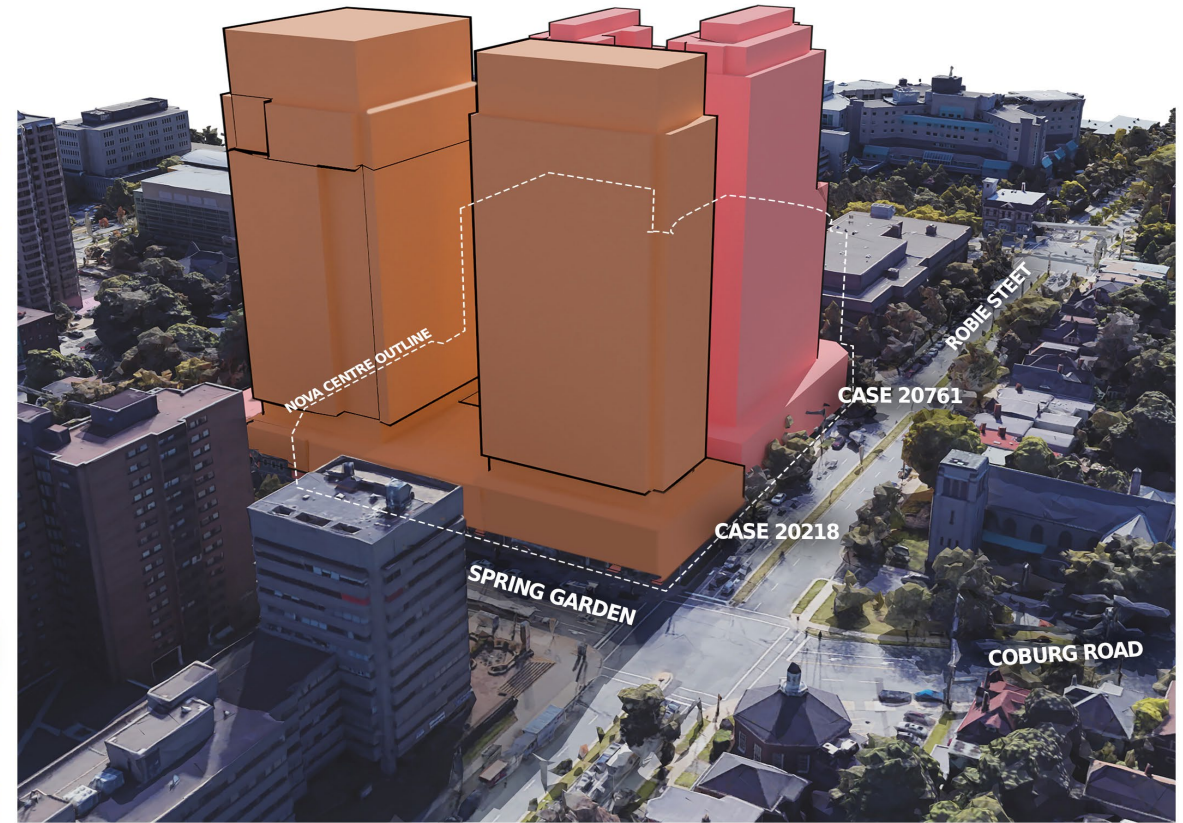
HRM Staff proposed:

- Add 400 residents
- Accommodate in two 10-storey buildings or one 10-storey & two 5-storey
- **Constrained Infrastructure**
- **Heritage Streetscape**
- **Halifax Common**
- **Ignored Killam Properties**
- 18-storey proposal (280)
- **No policy on demolition**





EXISTING SITE



PROPOSED DEVELOPMENT

Centre Plan Consultation: Two ten storey towers or...?

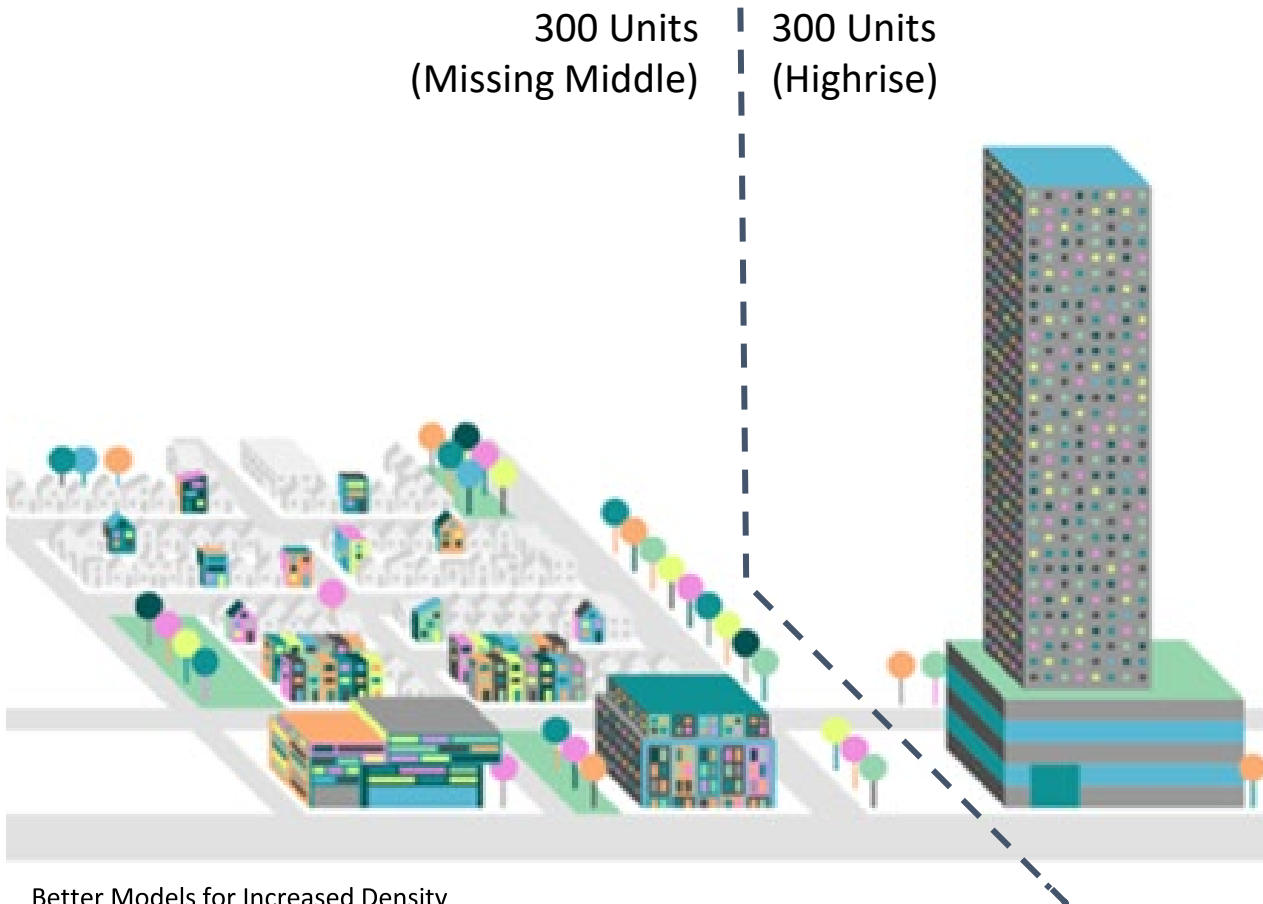
Next: Two Developers, Four Towers = 16, 22, 24, 26

Now: Two Developers, Four Towers X 30 Storeys each

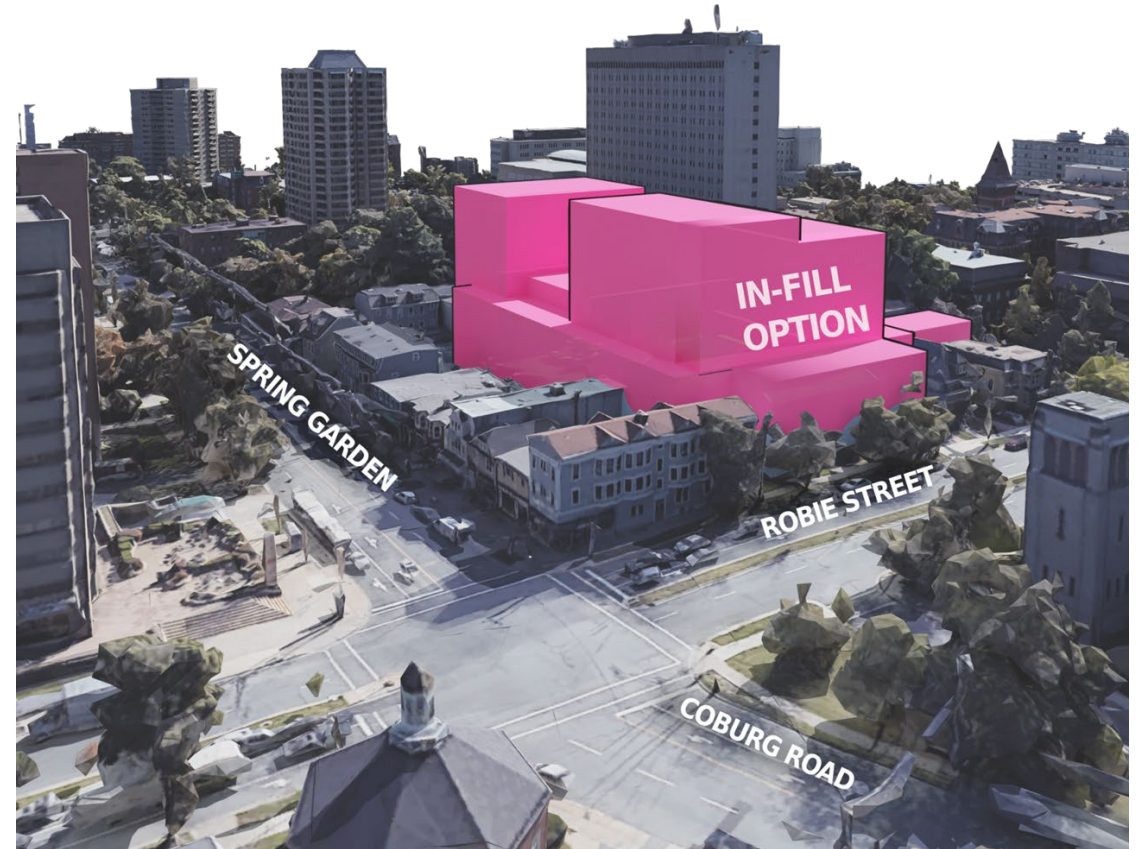
Better Options: Distributed Density vs Tall Sprawl

Towers = High GHGs– For both embodied & operational carbon

Towers ≠ Density



Better Models for Increased Density
Density Done Right (Ryerson)



DEVELOPMENT OPTIONS HALIFAX IN-FILL [PINK]

Comparing the Carbon Cost

| Activity | Invisible Embodied Carbon GHG Emissions (t CO2e) | Embodied Carbon Intensity (kg CO2e/m2) |
|--|--|---|
| Developers' towers— construction, demolition, relocation. | ~31,000 | ~360 - 490 |
| Citizens' in-fill option + retained with renovation. | ~18,000 | ~270 – 380 (or with careful planning zero) |
| GHGs to replace demolished area (~12-storey climate penalty) | ~2,214 | ~360-490 |

Summary of preliminary embodied carbon emissions of developers' towers, citizens' in-fill option (40% less carbon/unit of floor area), and replacement of demolished floor area.

Note: the 31,000T does not include ~160T associated with the demolition of 12-14 buildings.
(Mantle)

Embodied Carbon Database

| | |
|-----------------|---------------|
| BLDG_US | Multi-family |
| BLDG_LOC_REGION | North America |
| LCA_BLDG_SCOPE | (All) |

| Bldg height storeys | Average Embodied CO2e/m2 |
|----------------------------|---------------------------------|
| 1 to 6 | 94 |
| 15 to 25 | 373 |
| 7 to 14 | 344 |
| More than 25 | 431 |
| Overall average | 347 |

Keith Robertson, Solterre

<https://carbonleadershipforum.org/embodied-carbon-benchmark-study-data-visualization/>

Life Cycle GHG Emissions & Population Summary - 4 urban forms

| | LDLR | | LDHR | | HDLR | | HDHR | |
|----------------------------|---------|-----------|---------|-----------|---------|-----------|---------|-----------|
| | Average | Std. dev. | Average | Std. dev. | Average | Std. dev. | Average | Std. dev. |
| LCGE (MtCO ₂ e) | 7.11 | 0.60 | 15.10 | 3.02 | 8.79 | 1.16 | 24.98 | 2.69 |
| Population (thousands) | 21.04 | 5.19 | 42.69 | 12.70 | 46.66 | 12.65 | 57.80 | 18.98 |
| LCGE per capita | 0.34 | 0.12 | 0.35 | 0.24 | 0.19 | 0.09 | 0.43 | 0.14 |

Decoupling density from tallness in analysing the life cycle greenhouse gas emissions of cities

Urban Forms:

Low Density Low Rise (LDLR), every other North American city

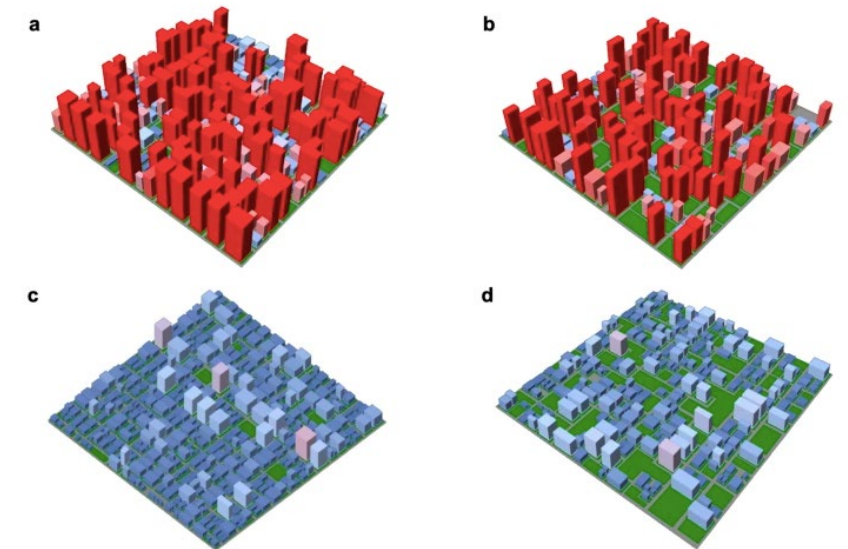
Low Density High Rise (LDHR), perhaps New York

High Density Low Rise (LDLR), perhaps Paris

High Density High Rise (HDHR), perhaps Hong Kong

Note: 60 year life cycle
npj Urban Sustainability

Fig. 1: Illustration of the different of urban typologies classified in the present analysis.



a HDHR, b LDHR, c HDLR, d LDLR. The height of each building is mapped to the colour with blue as low heights and red as high heights.

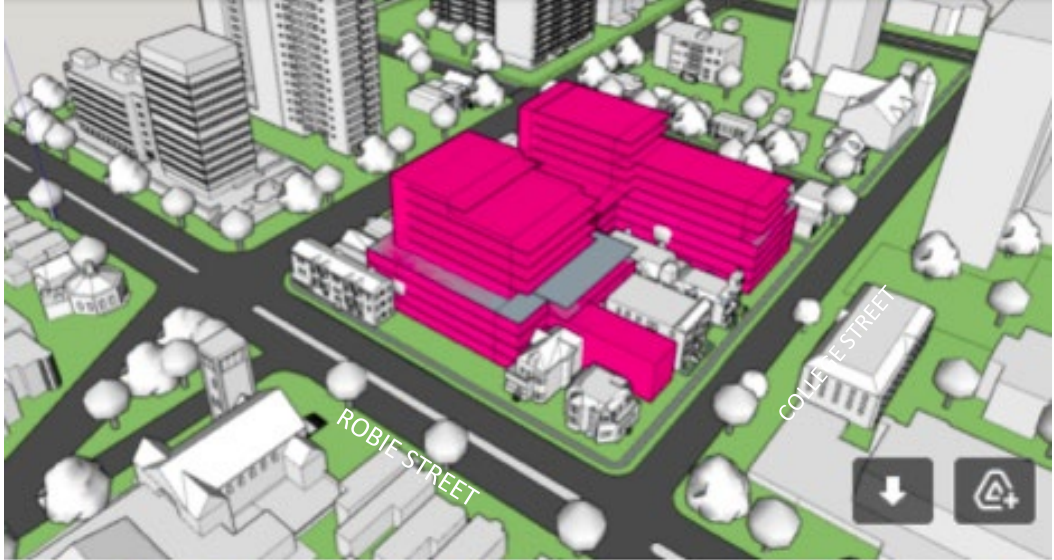
Better Development Options



QUEEN STREET, HALIFAX

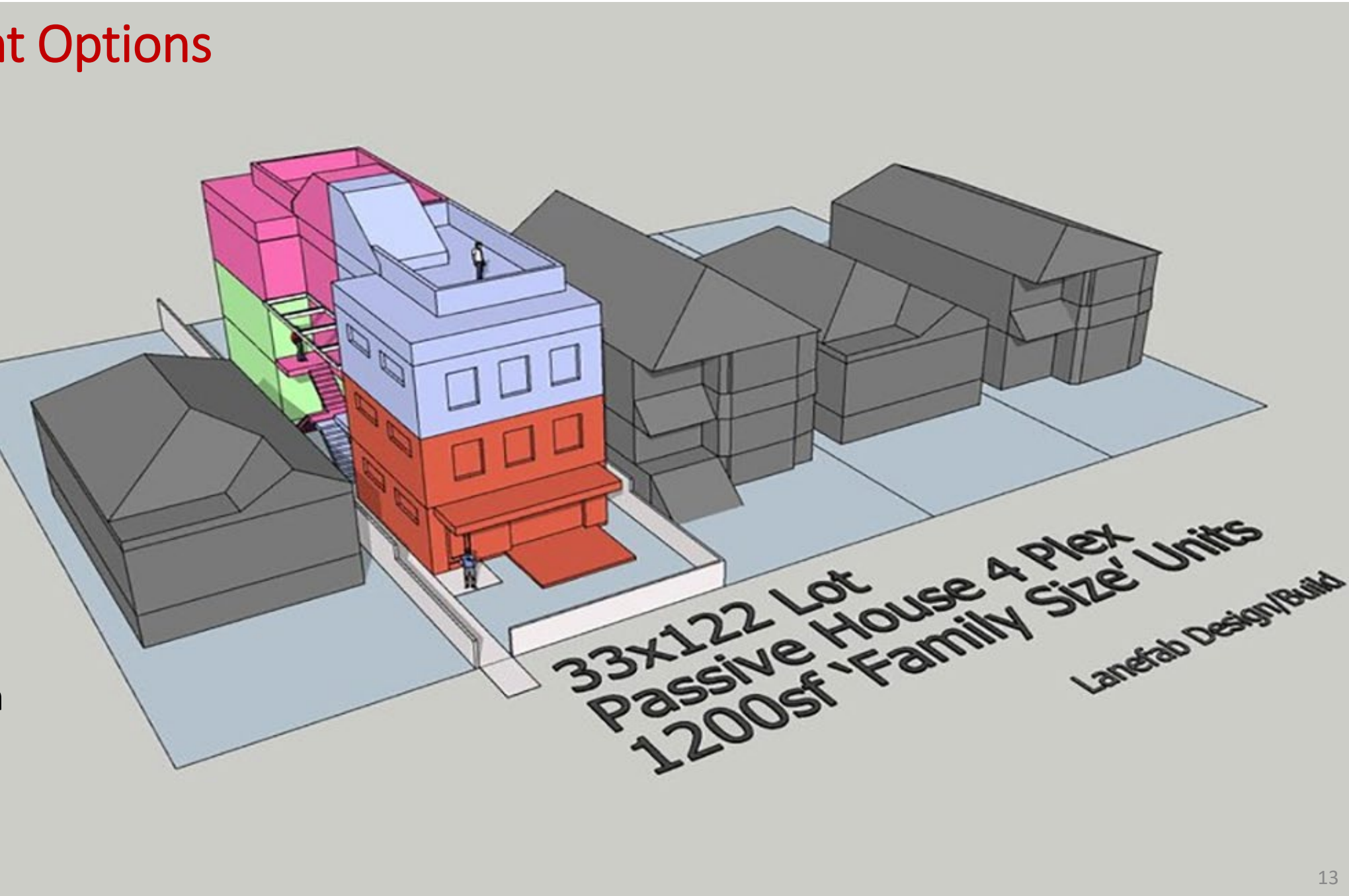


BARCELONA, SPAIN



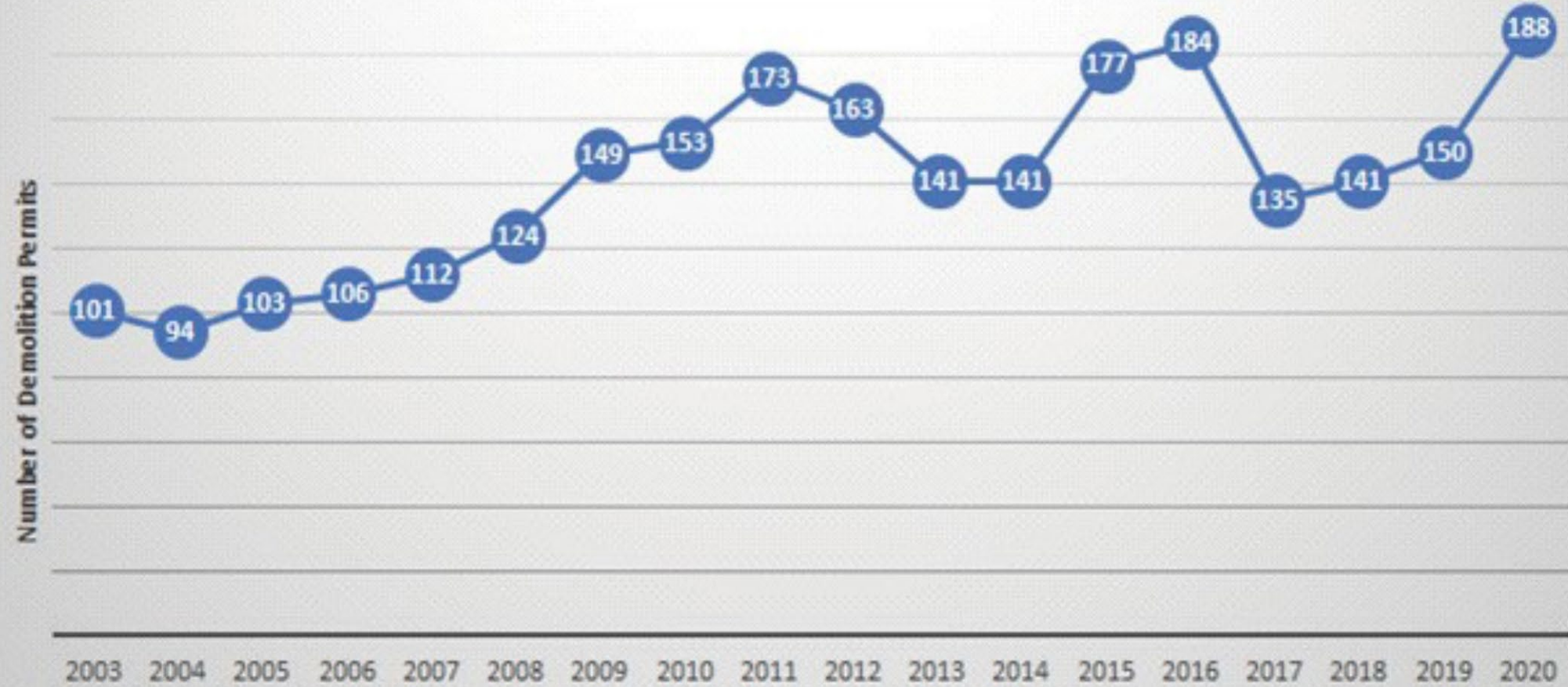
DEVELOPMENT OPTIONS HALIFAX IN-FILL [PINK]

Development Options



Four 3-bedroom homes (Lanefab Design)

HRM Demolition Permits (2003-2020)



Total Permits: 2535
Average: 141/year

Source: <https://www.halifax.ca/home/open-data>

Demolitions In HRM

Fuelling Affordability Crisis and Climate Crisis

Between 2003 - 2020
HRM issued 2,535
demolition permits

Average: 141 demolition
permits/year

Actual number is
increasing: 101 in 2003
to 188 in 2020

This is approximately
equal to 380,000 ft² or
17 city blocks

Quinpool Road

Jubilee Road

Robie Street

Vernon Street

Spring Garden

Coburg Road


20218

20761

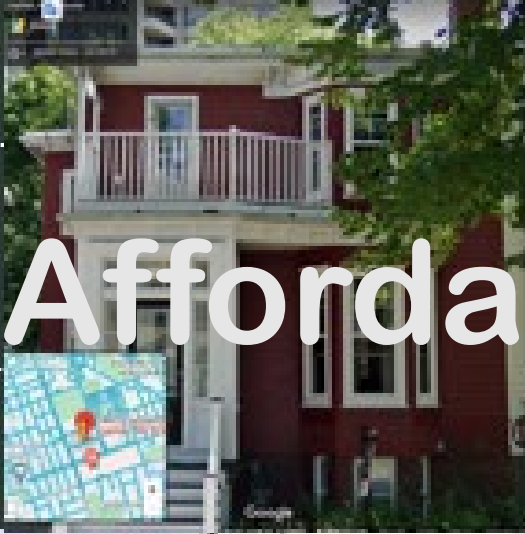
100m

This Was Affordable Housing



 SCAN ME

This Was Affordable Housing



 SCAN ME



This was affordable housing



demolitions map Feb 2023
~450 buildings Jan 2020-Feb 2023
Petition: short.url.at/cDJQZ





**3-storey 46 units
stone Ardmore
Hall:
Photo: Tim
Krochak, Herald,**

**3-storey 6 unit
wooden
Campbell House:
Photo: CBC**

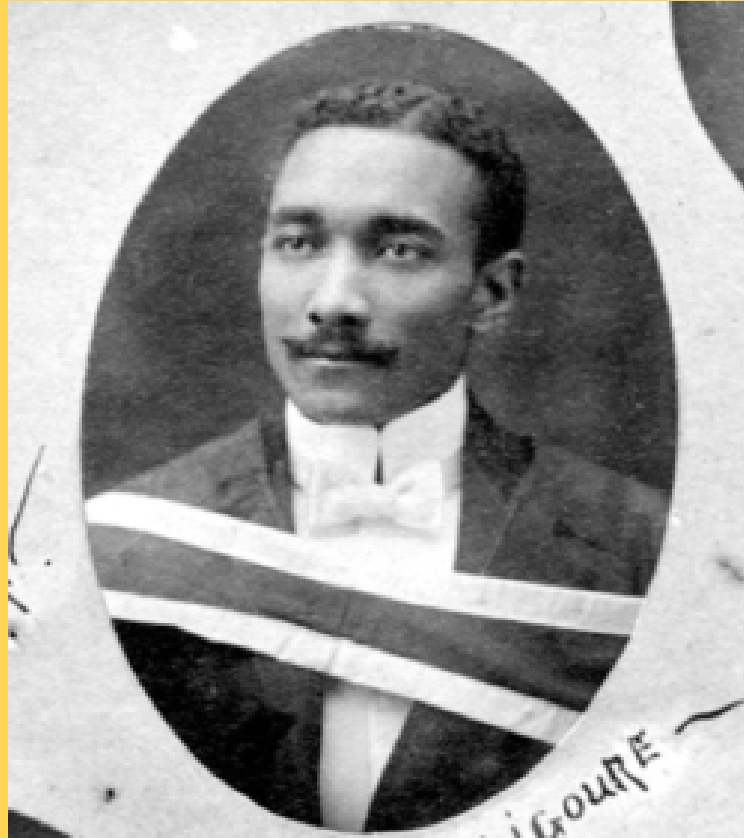


**8-storey brick
Dennis Building:
Photo: P Cameron**



SCAN ME

Dr Clement Ligoure's Home / Clinic



Dr Clement Ligoure – a man of many firsts

5812-14 North St, Dr. Ligoure's former home/clinic

Widening Robie St vs Reallocating Road Space

Planning is Thematic

Historic: 'Territory'

Colonial/Settler

Modern: Benevolence

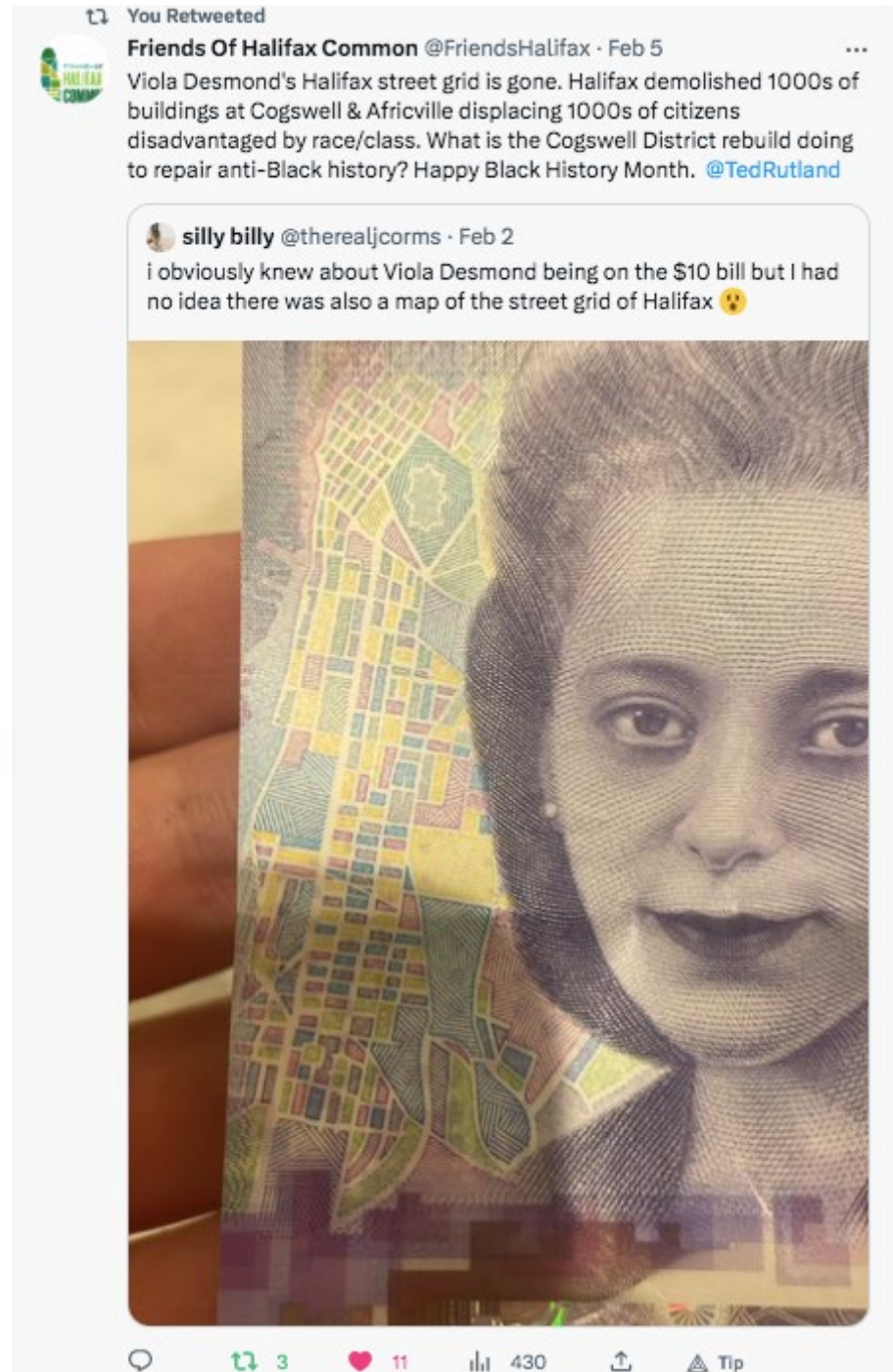
Public Health: land use zoning, building codes & inspections, water & sewage, land-use-zoning, transportation

Contentment/Convenience/Well-being: sidewalks, street lights, boulevards, parks

Efficient & Economic Use of Land: higher-taxes on unused land, zoning to protect property values, expropriation of lesser used
Racial conception, improvement of white not Black life; Africville, Cogswell Ted Rutland

<https://www.youtube.com/watch?v=vP-i9UeD8NA>

Anthropocene: Densification Benefits (rezoning, land, money) to Developers or Public Good?





Publicly owned land should be used for affordable housing, not sold to private developers

Published: January 30, 2023 4.05pm EST

When land is publicly owned, it can be used to build the kind of housing the market is unwilling, or unable, to build. (Shutterstock)

M&S Oxford St Demolition Refusal — Climate Crisis Turning Point? ~40,000 T CO2E



Findings / Recommendations

1. Demolitions have a huge carbon / GHG and social cost.

Work to Stop Demolitions – Royal Institute of British Architects

2. Building large-scale buildings has a largest carbon / GHG and social cost

Choice of Built Form- minimize carbon for *each* development.

3. Limits to Growth – we're in a crisis of climate change, waste, over-consumption and inequity. Work to create a circular economy as per Sustainable Development Goals Act.

Note: 1 & 2 affect Affordable Housing – We Have Better Options

Municipalities determine the size and location of housing through their planning and zoning decisions.

Municipalities own land/buildings -Cogswell, Memorial Library, Robie St / Bloomfield, St Pat's, St Pat's Alexandra.

Resources:

- Groundbreaking Study Highlights How Design and Development Decisions Affect Embodied Carbon: the lessons of a study from Halifax, Canada can be applied anywhere. <https://www.treehugger.com/real-estate-development-massive-upfront-carbon-emissions-5207549>
- The Key to Green Building Is to Use Less Stuff – renovate, repurpose, add-on and careful design, scale, materials choice. <https://www.treehugger.com/key-to-green-building-use-less-stuff-6944723>
- Public Land Should be used for affordable housing <https://theconversation.com/publicly-owned-land-should-be-used-for-affordable-housing-not-sold-to-private-developers-198654>
- <https://theconversation.com/public-land-is-being-sold-exactly-where-thousands-on-the-waiting-list-need-housing-139118>