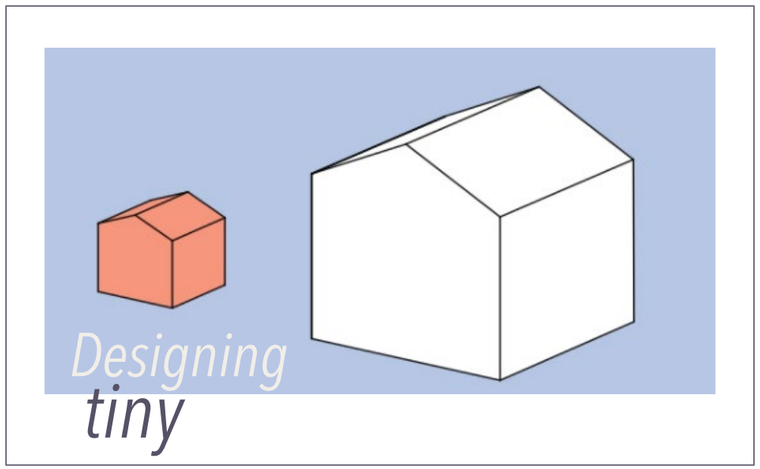


Produced by

BC tiny house collective

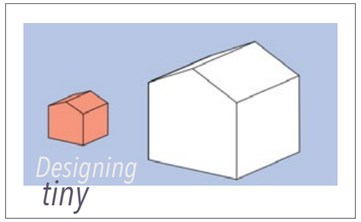
in partnership with
the City of North Vancouver

August 2017

This conceptual tiny house lookbook was prepared by the BC Tiny House Collective (BCTHC) in partnership with the City of North Vancouver. We would like to thank Emilie Adin, then Deputy Director of Community Development at the City for the opportunity to present this material, as well as her expertise and time. We'd also like to extend great gratitutde to the designers for their creativity and commitment to the project: Jasminka Miletic-Prelovac, Natradee Quek, Nicole Alden, Shanelle Currie, Callahan Tufts, Ben Garratt, Tracy Ly and Alexander Neff. A nod to the experts who advised us on alternative greywater and waste sytems specific to the site, we thank you. This includes Peter Christou, Ian Ralston and Geoff Hill. And last but not least, to the coordinators–Darcy Keester, Shanelle Currie, Anastasia Koutalianos and Samantha Gambling–for seeing this lookbook through to the end.

We hope these designs spark dialogue around new ways to live and build in the City of North Vancouver.

Should you have any questions about the *Designing tiny* project, please email Anastasia Koutalianos, co-founder of the BC Tiny House Collective at anastasia@nadatodo.com.



> **"To ensure there are diverse and appropriate housing options for current and future residents of all ages, incomes, and abilities."**
>
> –City of North Vancouver's vision statement Housing Action Plan, 2016

Housing crisis

A house is more than four walls and a door–it is part of a greater system, one that stretches beyond housing. It influences our work options and income potential. It impacts our health and the connection and vitality of our neighbourhoods. It is often seen separate but integral to our future city visions: complete communities that are thriving, dynamic and meeting the needs of our people.

Fast forward to today and we are in one of our nation's largest housing crisis. The prices for all housing forms in the City of North Vancouver have skyrocketed. The average price of a single family home in June 2017 was $1,683,500 (*North Shore Real Estate Market Review*, April-June 2017), putting buyers in search of new types of housing. Renters battle a near zero vacancy rate, often paying more than they can afford to live here.

Some blame this phenomenon on foreign investment, or stagnant wages and rising cost of living, while others discuss the legacy of suburban sprawl and our desperate need to explore the *missing middle* through new models of tenure and affordable homeownership–models that create complete and lasting communities that are walkable, liveable, close to amenities and transit, and that are sustainable on all levels: environmental, economic, health and social.

Tiny opportunity in North Vancouver

In May 2017, Emilie Adin, the then Deputy Director of Community Development at the City of North Vancouver was approached by Anastasia Koutalianos, co-founder of the BC Tiny House Collective (BCTHC).[1] Adin agreed to support the collective in leveraging its network to explore and create, as a design exercise, a model tiny house community. This was envisioned as multiple tiny homes temporarily on one site with a shared amenity space. A city-owned parcel of land in Moodyville was chosen as a good test site in discussions between the BCTHC and the City's Real Estate and Planning Divisions. The project was seen as an exploratory response to the *Housing Action Plan* endorsed by Council in May 2016.

The goal of the conceptual and high-level voluntary study was three-fold:

- To combine tiny community designs into a "lookbook" that can be shared internally, with stakeholders, and / or with City Council,
- To inform city staff on how a tiny house community could potentially function within existing neighbourhoods, and
- To encourage the potential development of the City of North Vancouver's first tiny house pilot project as a community model.

The tiny house community village is widely used in the US and in parts of Canada. It brings multiple homeowners or renters to a shared plot, where they can access communal amenities such as a garden plot or shared living space.

Generally, tiny home lots can be strata-titled, subdivided or follow a rental model; however, for this project, the pocket village would be a temporary site with a proposed 5 to 10 year-long lease.

This tiny house village concept aligns well with the City's latest *Official Community Plan* (*OCP*, 2014), which speaks to developing a compact complete community that meets the needs of its diverse residents (page 22) and pursuing attainable housing (page 24), while highlighting the increase in both non-family, lone parent and one-person households, to which tiny homes are well-suited (page 18).

The City's *Official Community Plan* and *Community Energy and Emissions Plan* (2010) also touch on the need for increased density, better access to transit to create fluid cities, and using our natural capital and urban agriculture as a way of reducing greenhouse gas emissions. This tiny house village could contribute to this, and execute the *10-minute neighbourhood*, where we can enhance the well-being and quality of life for all. Moreover, such a project takes positive steps towards the provincial and international climate marker of 2020 (*Community Energy and Emissions Plan*, City of North Vancouver, 2010, page 27). It's also an opportunity to put green building systems to the test, as outlined in the *Zoning Bylaw, 1995, no. 6700*, and create equipment that can convert, store and transfer energy from our waste, rainwater and greywater into recovered outputs, putting zero waste initiatives to work where they matter most: in our homes.

In October 2016, the City of North Vancouver published its *Housing Action Plan*. Eleven "big moves" were outlined to better house the city's current and future residents. They touched on attainable homeownership, partnerships and advocacy, and the desire to create a diversity of homeownership options in lower density neighbourhoods. This pilot proposal would do just that and would address two of the Plan's six overarching goals:

- To increase diversity of housing to meet the needs of various household types and income levels, and
- To support low-income households and those with unique needs to access affordable, accessible and suitable housing.

The Plan also featured groups most challenged in terms of housing: low and modern income families, seniors, at-risk youth and young adults, moderate-income earners, at-risk / homeless, and persons with disabilities–all of whom can be housed in a tiny village.

This lookbook was created in partnership with the BC Tiny House Collective and the City of North Vancouver as a call for the City to further explore tiny houses as part of its housing, character retention and sustainability strategies, and to further incorporate these concepts into existing neighbourhoods, including consideration of a tiny house settlement on a specific site of city-owned vacant lots.

So what is a tiny house?

A tiny house can have many definitions. According to the BC Tiny House Collective, a tiny house is:

- A dwelling with all the amenities of a permanent house, including a sleeping area, kitchen and bathroom,
- A self-contained detached or semi-attached unit,
- A single unit or part of a community development,
- Less than 500 square feet,
- On wheels or a temporary foundation,
- Customizable, to budget, needs and taste, and
- Built on the principles of affordability, sustainability and social inclusion.

This definition differentiates tiny homes from other small dwellings. With mobility comes greater flexibility, and together with ground orientation and build principles, these set tiny house construction apart from factory-built and off-gassing RVs and modular units–as well as from high-rise micro and lock-off suites.

Whether on wheels or not, tiny houses are not a new phenomenon. They were a reaction to economic lulls in the 1930s and

redevelopment post World War II, and now again in the late 1990s and early 2000s. They are found throughout the US, Australia and Europe. Portland has a tiny house hotel and communities. Seattle, a tiny home village for the homeless. The City of Fresno allows for units on wheels as backyard accessory dwellings units. Tiny homes are one of many solutions to our housing crisis, but also a product of a deliberate and conscious way of living—be that slower, with less, off-grid, closer to community and nature or simply in less space.

Anecdotal literature also suggests tiny houses offer several health benefits that are interrelated with other social determinants of health such as enabling deeper connections to nature, community and social inclusion and giving people greater autonomy and control over one's living space to meet one's unique needs. Tiny houses can lead to greater self-reliance and the development of personal skills and a greater sense of freedom (with mobility and financial resources to meet other needs such as food, transportation and engaging in meaningful life activities).[2]

They are also a tool for gentle densification of existing neighbourhoods where single family homes dominate—a way to link to established communities and build on well-rooted connections rather than build out along isolating peripheries of the city. Imagine entry-level backyard units that encourage intergenerational living, complementing the newly expanded secondary suite program.

Tiny houses can be contemplated when considering uses for vacant, irregular, or infill lands, particularly where lands are temporarily unused on city-owned or soon to be developed land. A pilot study of this nature could provide temporary shelter for those who need it and income to the City of North Vancouver. A temporary tiny house settlement could also act as a place to showcase how these homes could meet the city's sustainability goals through principles of closed-loop / circular economy, energy-saving and water conservation—goals outlined in the City's *Community Energy and Emissions Plan*; and how community villages can inspire interaction and neighbourliness associated with courtyard living and contribute to harmonious streetscapes and common outdoor space.

So how much does it cost to build tiny? That depends on labour, materials and the design; each house can cost anywhere from $20,000 to more than $100,000. But tiny houses are more than a small price tag. They are customizable homes. They are built to the owner's preferences and needs. They can be built on wheels and require no excavation or expensive foundation and infrastructure, thus maintaining its affordability and infill utility.

Designing tiny

Designing tiny is a design initiative led by Darcy Keester, Shanelle Currie, Samantha Gambling and Anastasia Koutalianos and organized by the BC Tiny House Collective.

In its original iteration, *Designing tiny* gathered volunteer local designers and architects to create conceptual tiny house designs that could be shared with the public to feature their forms and possible uses on various real lots in the City of Vancouver (lots were offered by several landowners for this case study). Its goal was to inform city staff, planners and councillors on what is a tiny house, its potential forms and typologies, and how they can be incorporated into existing neighbourhoods or used to create new communities in the City of Vancouver and beyond.

It is now being replicated with the City of North Vancouver to encourage the development of a tiny house pilot project, the first in an urban context within British Columbia, and in the Lower Mainland—a chance for the City of North Vancouver to take the lead on the tiny house movement and bring action to goals within its Community Energy and Emissions and Housing Action plans.

Designs have been set to BC Building Code, with any deviation to code outlined in a write-up to showcase potential new ways of approaching this housing stock in a city setting (*see Appendix for design guidelines*). They all speak to different layout, illustrating the diversity in how a tiny house village can be arranged, serviced and sustainable on all levels.

Proposed future

This lookbook is more than tiny house renderings and elevations. It's a looking piece into the role tiny houses can play in building a complete community—a community or city that is looking to the future and considering renewable energies, zero waste principles and sustainable reuse of black and greywater, and how it will house its diverse residents while building real complete communities.

We hope this document serves as a conversation starter on how tiny houses can be regulated and accepted in the City of North Vancouver as a means of affordable homeownership and rental.

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1 The BC Tiny House Collective is a Vancouver-based community-run advocacy group that supports the legalization and legitimization of tiny houses in Metro Vancouver and across British Columbia. See bctinyhousecollective.com.

2 Research findings care of Vancouver Community College bachelor of arts nursing program literature review, 2016.

Tiny house design and rendering by Callahan Tufts.

Site details 7

Map of the City of North Vancouver, depicting the Spirit Trail bike path.

Site indicated.

The site consists of several parcels at Alder Street and St. Davids Avenue (443-489 Alder Street).

Details

- Zone: RS1
- Holder: City-owned land
- Nodes: Proximity to city centre and SeaBus, along major greenways including separated bikeways
- Other features: There is a heritage structure temporarily placed at 449 Alder Street; the property at 475 Alder Street is privately-owned

Understandings & assumptions

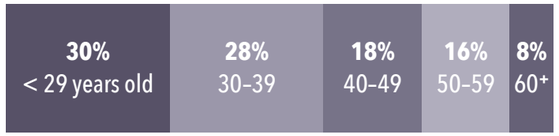
- This is a temporary site, land lease will be 5–10 years long
- Existing infrastructure exists on all lots for on-grid servicing, including water, waste and power
- Tiny homes will be CSA certified, and include hookups for servicing (water, waste, energy)
- Existing heritage building on site will be used as a shared amenity space and respect character retention guidelines
- Mature trees will be maintained on site
- Existing set-back from bike lane and property lines will be maintained
- Tiny house community will include a community garden
- Site can be used as a future testing ground for sustainable off-grid servicing, including grey water filtration, rain collection and biomass composting
- This site would be managed by a non-profit or housing cooperative, and / or a land trust
- Use of street parking over designated parking on site
- Garbage and recycling area will be incorporated onto the site at a later date

Tiny house demand 8

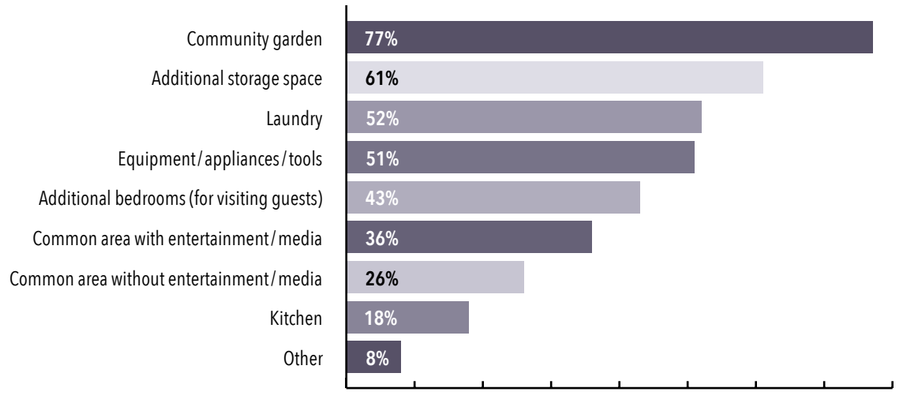
The BC Tiny House Collective carried out a survey over six months in 2016-2017 to investigate the demand and support of tiny houses in Metro Vancouver, and more generally across BC and Canada. Data was collected through an online questionnaire (FluidSurveys) and shared with media and through BCTHC's website and social media channels. In total, 1419 responses were collected from the Greater Vancouver Area and across BC more generally, 1013 of which were fully completed and used for analysis purposes. Data was analyzed by University of British Columbia (UBC) graduate students in the Masters and Food Resource Economics program in the summer of 2017. Here's what we found:

> "Greater connection to environment, potential to tuck dwellings into difficult (steep heavily forested) natural areas with much less impact than traditional Western housing."
>
> –Reason to go tiny, survey respondent

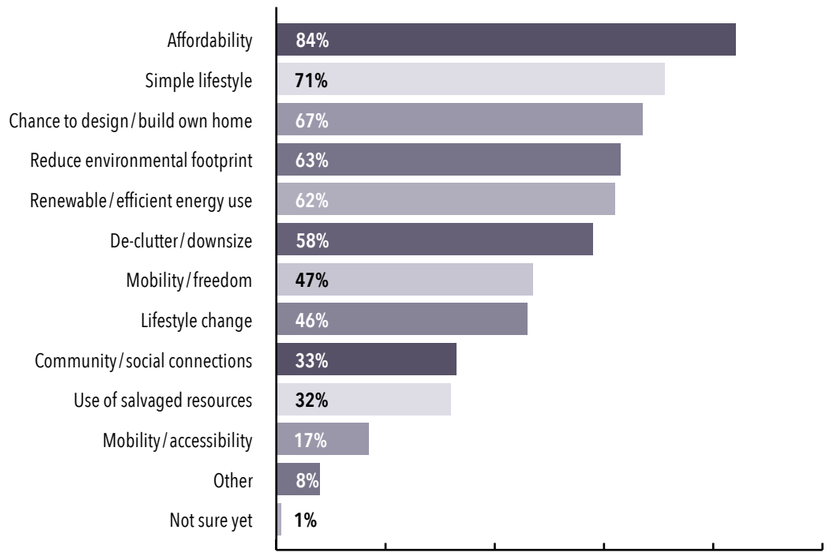
Respondents and their ages



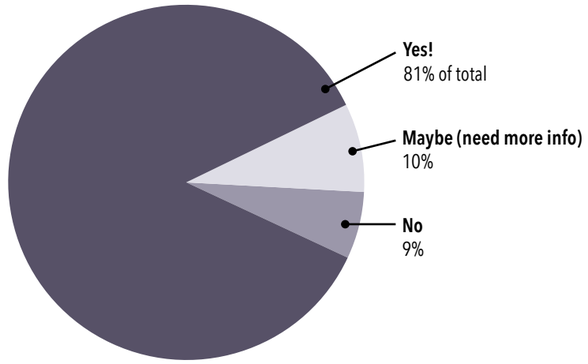
Preferred community ammenities



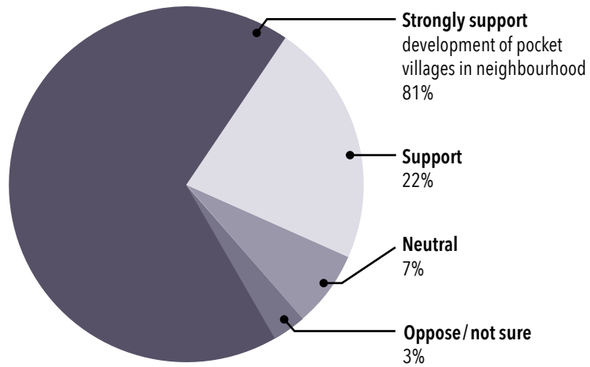
Reasons to go tiny



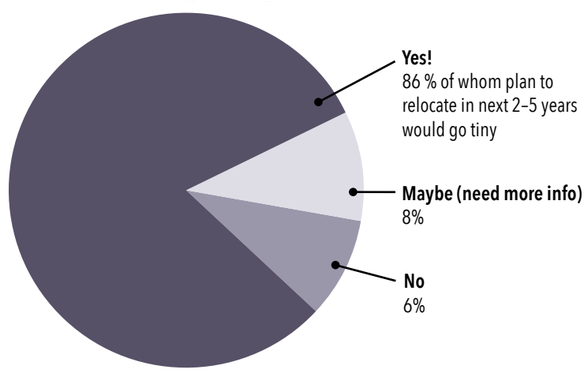
Go tiny or not



Support tiny or not



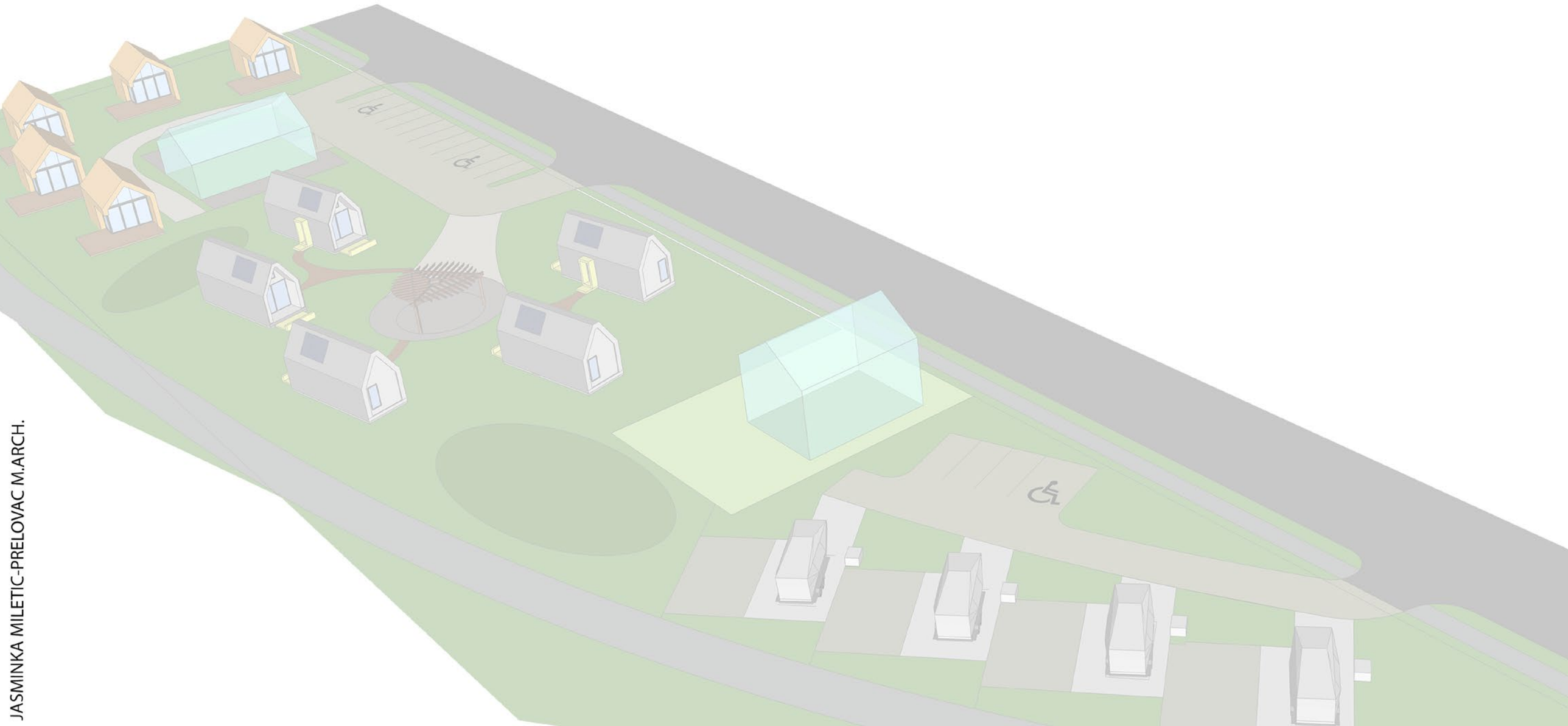
Plan to relocate, would go tiny



Jasminka Miletic-Prelovac 10

THE TINY VILLAGE

ALDER STREET NORTH VANCOUVER

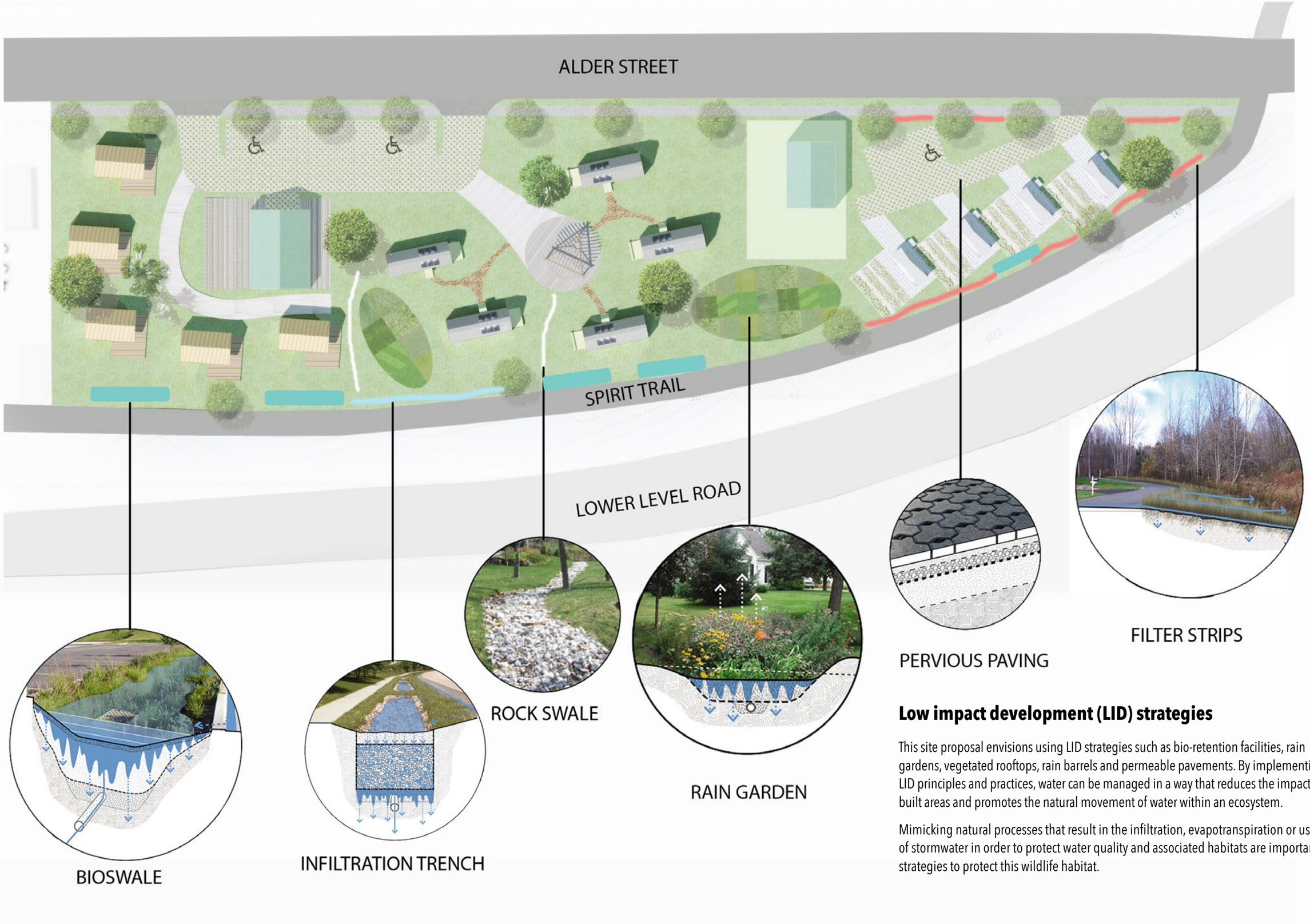


JASMINKA MILETIC-PRELOVAC M.ARCH.

The Tiny Village is envisioned as a pocket neighbourhood with three different clusters of houses with shared outdoor commons and infrastructure. The cluster of tiny houses on wheels is situated at the intersection of Alder Street and Spirit Trail with its own parking spaces and dotted with a small orchid. Between the house slots are small rain gardens.

The next cluster is conceived of modular tiny houses that could be adjusted to the needs of tenants. This particular cluster is imagined as a form of social housing.

The third type of housing is on temporary foundation, and in a more traditional setting.



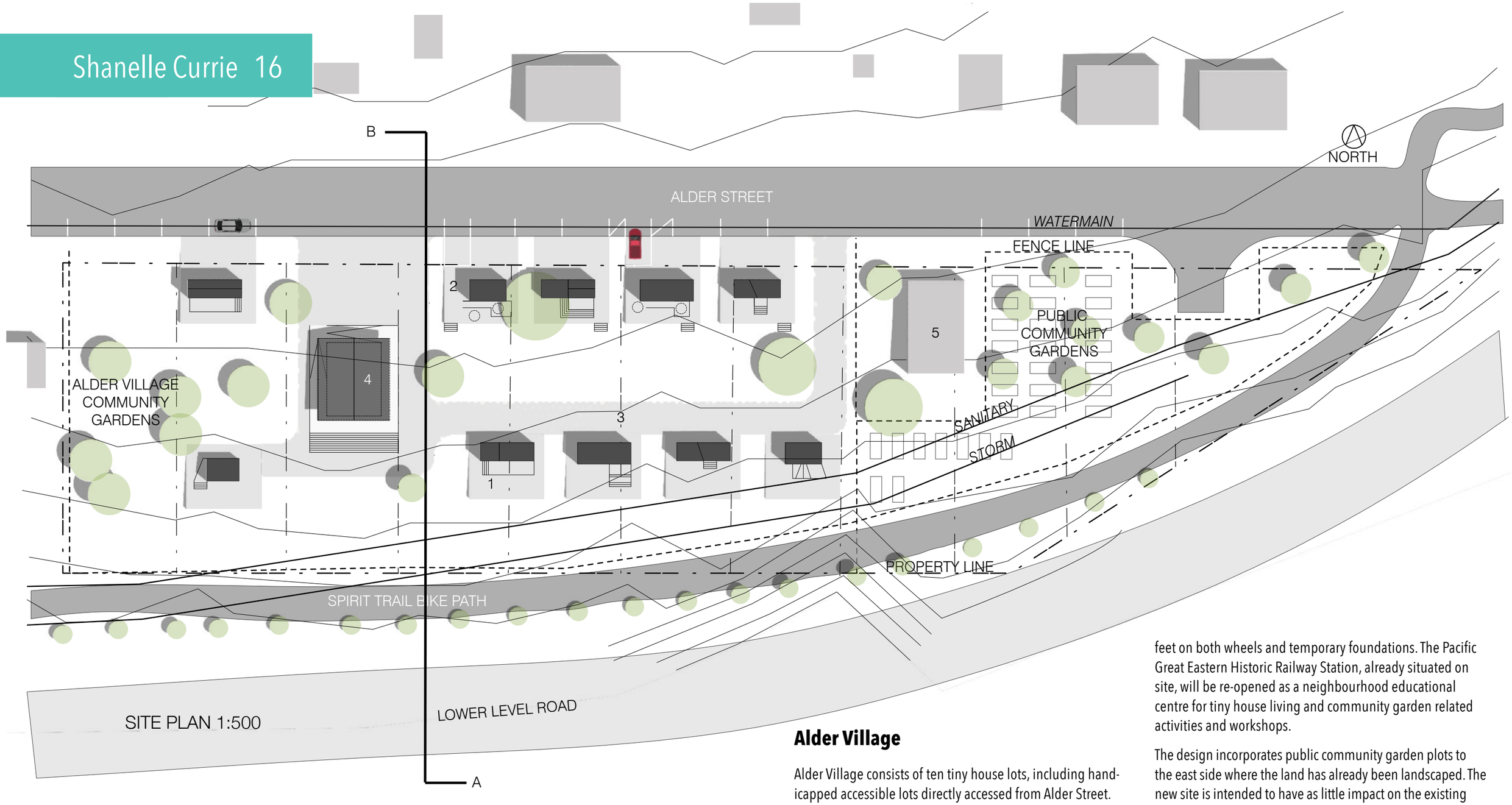
Low impact development (LID) strategies

This site proposal envisions using LID strategies such as bio-retention facilities, rain gardens, vegetated rooftops, rain barrels and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem.

Mimicking natural processes that result in the infiltration, evapotranspiration or use of stormwater in order to protect water quality and associated habitats are important strategies to protect this wildlife habitat.

“Build capacity for social change, towards living in more conscious and ethical connection with the human and non-human world.”

–On the benefit of tiny houses, survey respondent



SITE PLAN 1:500

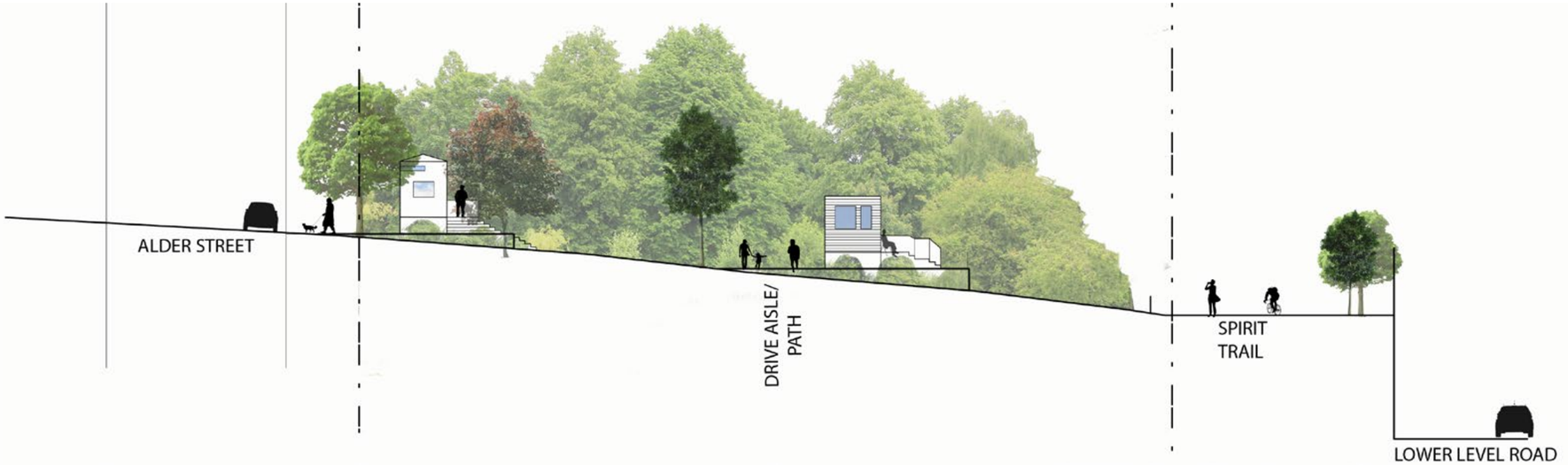
1 TYPICAL TINY HOUSE ON WHEELS ON PERMEABLE PAD
2 FIXED TINY HOUSE - HANDICAP ACCESSIBLE PAD
3 SHARED WALKWAY AND DRIVEWAY FOR TINY HOUSE ACCESS
4 EXISTING PACIFIC GREAT EATERN RAILWAY STATION - AMENITY BUILDING
5 EXISTING HOUSE ON NEIGHBOURING PROPERTY

Alder Village

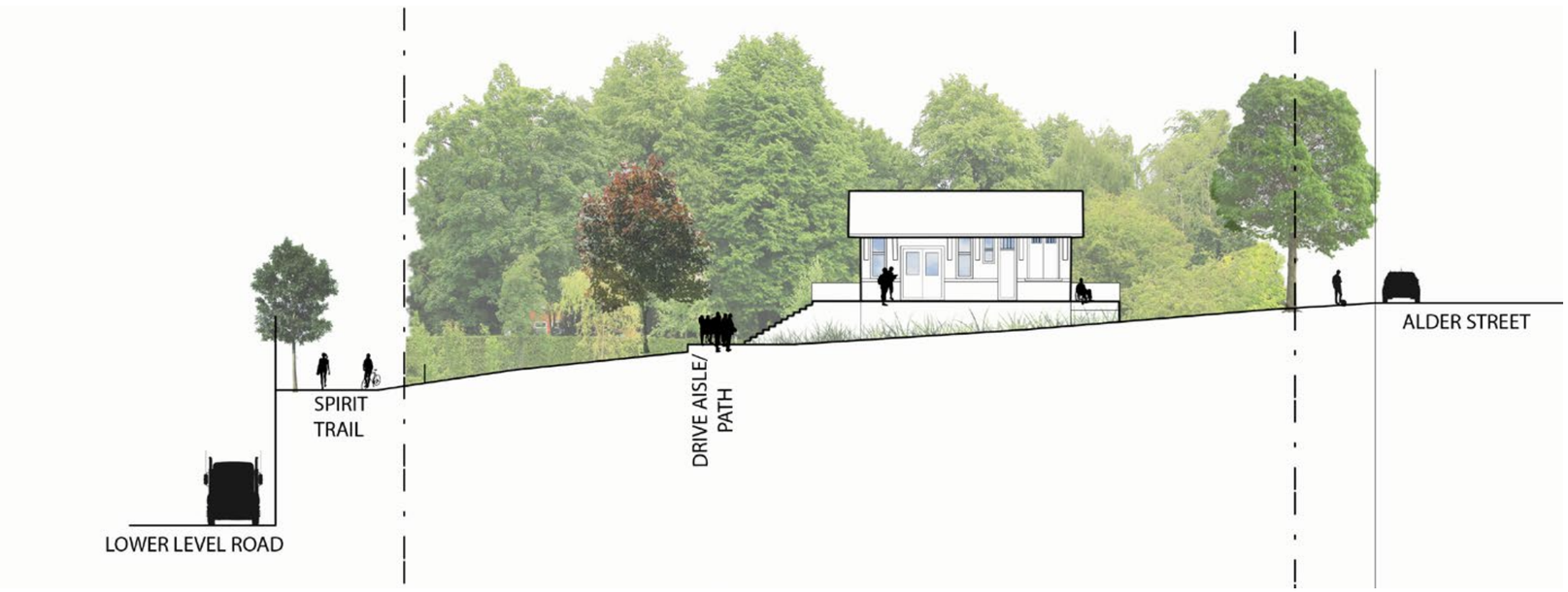
Alder Village consists of ten tiny house lots, including handicapped accessible lots directly accessed from Alder Street. The intent of this development is to provide precedent for how tiny house communities can work within existing city fabric cohesively, while reducing environmental impact and providing alternative housing solutions. The tiny house lots are sized to accommodate tiny houses less than 500 square feet on both wheels and temporary foundations. The Pacific Great Eastern Historic Railway Station, already situated on site, will be re-opened as a neighbourhood educational centre for tiny house living and community garden related activities and workshops.

The design incorporates public community garden plots to the east side where the land has already been landscaped. The new site is intended to have as little impact on the existing landscape and ecosystems as possible. Much of the existing foliage, plants and mature trees will be maintained around the plots to provide privacy and promote overall ecological sustainability–one of the fundamental beliefs of the tiny house movement.

Tiny house pathway, looking west



Site section 1:250



Site section 1:250

The tiny houses at Alder Village are envisioned to sit on gravel or other permeable substrate. For temporary foundations, tie-backs for tiny houses on trailers or additional structural support, concrete biscuits can be buried in the soil to provide temporary structural anchoring points without the need for pouring concrete foundations.

Overall, the site grading, existing landscaping and landscaping setbacks are maintained for minimal impact on the existing site and site feature. An access pathway is provided between the two rows (upper and lower) of tiny house pads. The pathway is wide enough for vehicle access to drop off or pick-up tiny houses but is otherwise not intended for vehicle use. This is the main path through the site connecting the lower level units to the amenity spaces.

Parallel parking is provided on Alder Street. Pull-in lots are provided at handicapped accessible pads for ease of access. The existing concrete curb on the street would need to be re-graded at each handicapped accessible site.

The railway building will be maintained and transformed into an educational centre and amenity meet-up space within the tiny house community. The intent is for the tiny house homeowners to host workshops and activities for the greater community as a part of being a member of the pilot project. Workshops might include tours of tiny houses, lessons on how to live tiny, off-grid systems, how to reduce environmental footprints and may also include workshops on community gardening and permaculture.

“Empowerment over my own space and the opportunity for community.”

–Why go tiny, survey respondent

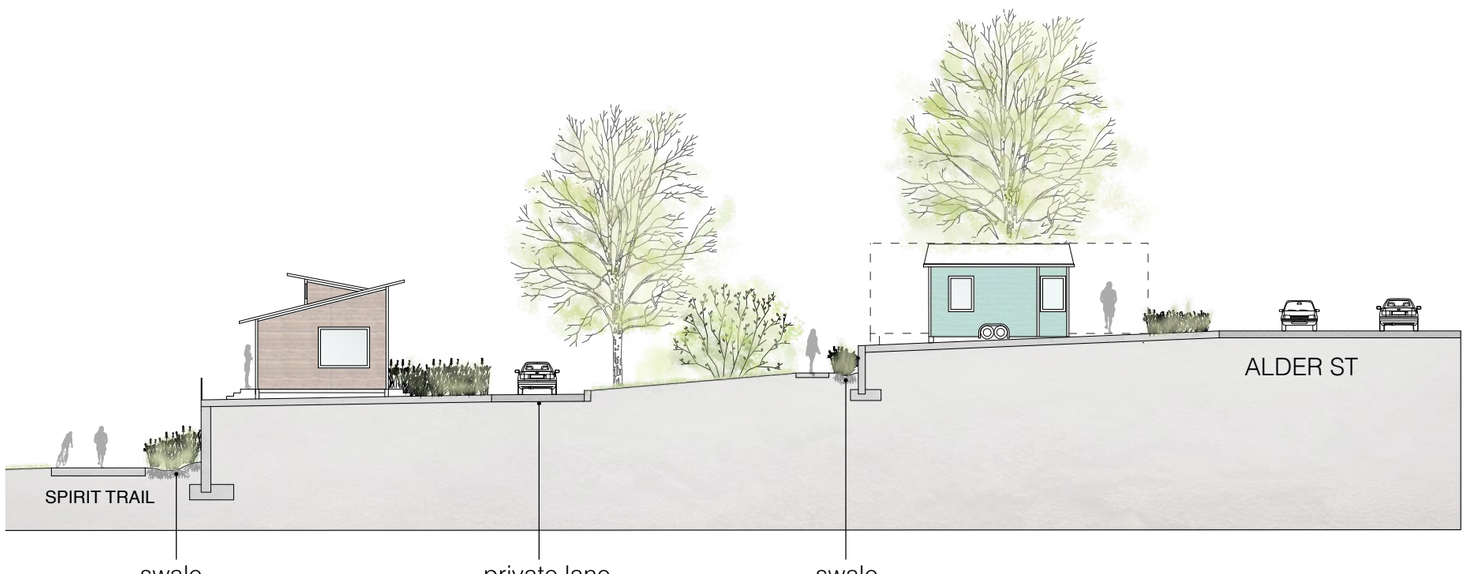
Spirit Trail, looking east

Natradee Quek & Nicole Alden 22

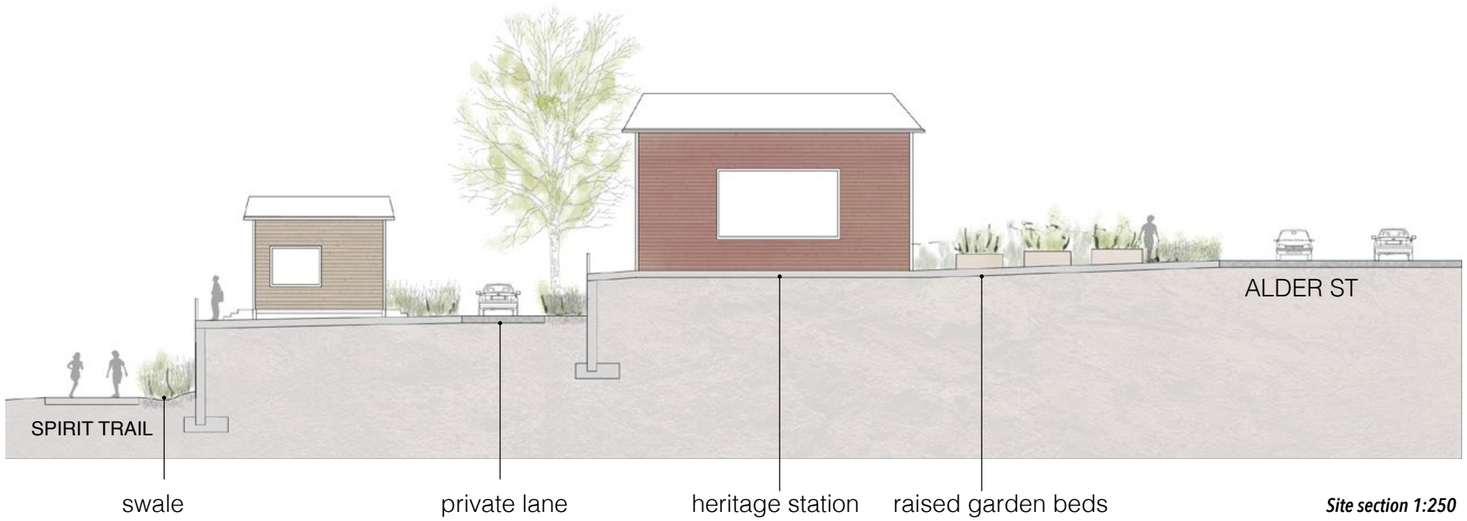
Woodland Edge Village

The Woodland Edge Village is conceived as a tiny home community where residents can reconnect with the natural environment. With small building footprints afforded by tiny homes, this concept strives to allow green space to drive the development, creating opportunities for both wildlife habitat and outdoor community spaces.

This site plan includes seven spaces for tiny houses on wheels and five for tiny houses on a temporary foundation. Houses are spaced sufficiently to allow for mature trees, rainwater management strategies, and spaces to gather.



Site section 1:250



Site section 1:250

Seven tiny houses on wheels are placed along Alder Street for easy movement in and out of the site. Five slots for houses on temporary foundation are placed facing the Spirit Trail. Included is a central minimum sized lane for car access, to add flexibility to the use of defined housing spaces. Each house has a dedicated concrete slab.

Rain gardens and swales are envisioned throughout the site to capture rainwater off paved surfaces, and perhaps even building roofs. These low impact development systems will also serve as a focal design element.

The heritage train station will remain on site and act as an amenity building for residents. A community garden is sited adjacent to the building, marking the space as a central hub for communal engagement.

Heritage Hub

Spirit Trail

“Transforming people’s ideas about what we ‘need’ to live.”

–On the impact of tiny houses, survey respondent

TINY HOUSE PLANS 27

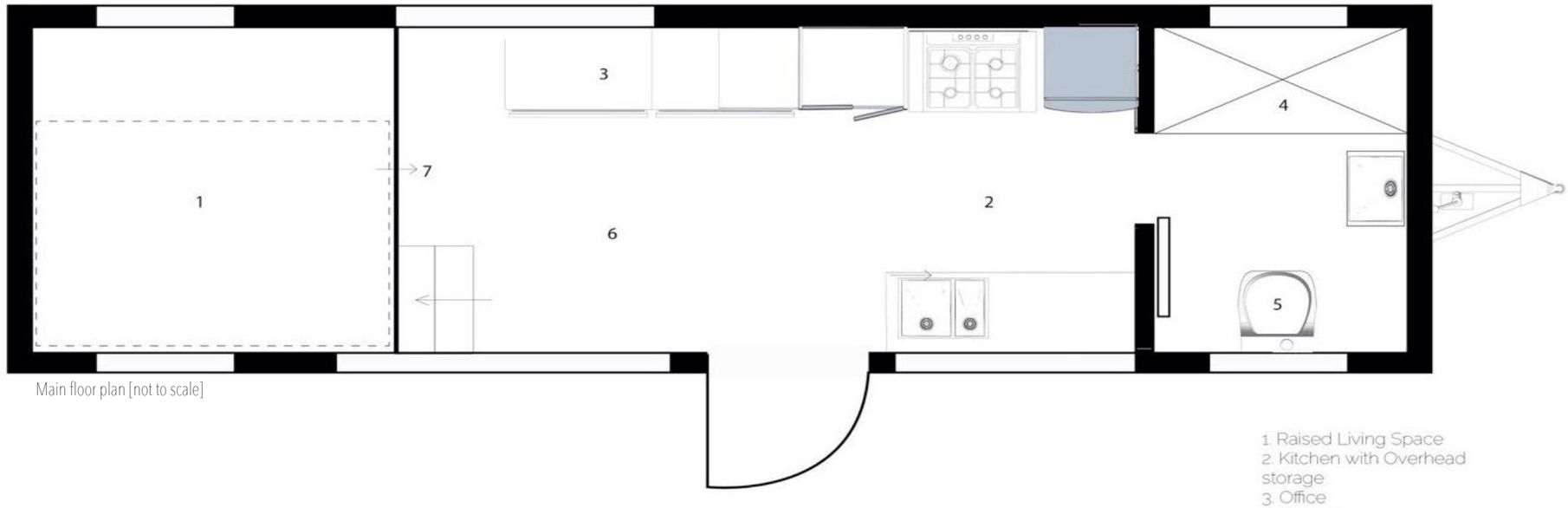
Callahan Tufts' tiny house 28

This single unit tiny home was designed and built as part of Callahan Tufts' graduation project from Emily Carr University. It is based on the idea of creating housing from discarded and excess building material waste. The building materials were sourced from local transfer stations, both private and public, across Metro Vancouver. In many cases, the materials were brand new, just never used. The unit was built as part of a joint event with the BC Tiny House Collective at Telus World of Science on May 20, 2017.

The hope of the project was to create new conversations around how we use resources in our waste streams.

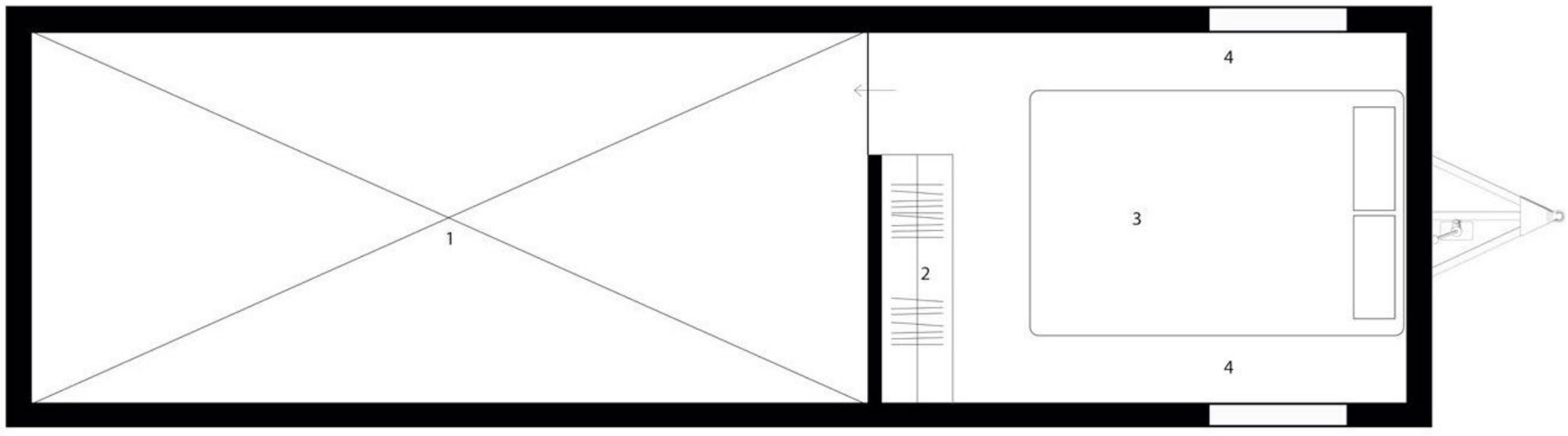
Tiny house details:

- Designed by & built by: Callahan Tufts
- Certification, if any: Not yet, still under construction
- Dimensions: 8.5′ (w) × 13.5′ (h) × 26′ (l), 225 square feet, loft included
- Power: 30 amp electrical
- Heating: TBD
- Water: Via standard hose hookup
- Greywater & waste: Greywater system
- Bathroom: Full tiled wet bathroom, shower with low-flow shower head, Seperte compost toilet
- Kitchen equipment & appliances: Double stainless sink, 24-inch European fridge, 4 propane burner stove, built-in convection / microwave oven
- Sleeping area: Loft and spare bed
- Other features: Low power LED lighting, roll-out dining table and chairs (seats 6), roll-out spare double bed, convertible office / entertainment area, standard size couch and coffee table, environmentally friendly finishes, unique Shugi Ban burnt cedar siding; all building materials are salvaged from construction sites
- Total build cost: $0 for materials, approximately $40,000



Main floor plan [not to scale]

1. Raised Living Space
2. Kitchen with Overhead storage
3. Office
4. Shower
5. Compost Toilet
6. Flex Space
7. Roll-out Spare Bed and Dining Table



Loft floor plan [not to scale]

1. Open to below
2. Closet
3. Queen Bed
4. In floor Strage

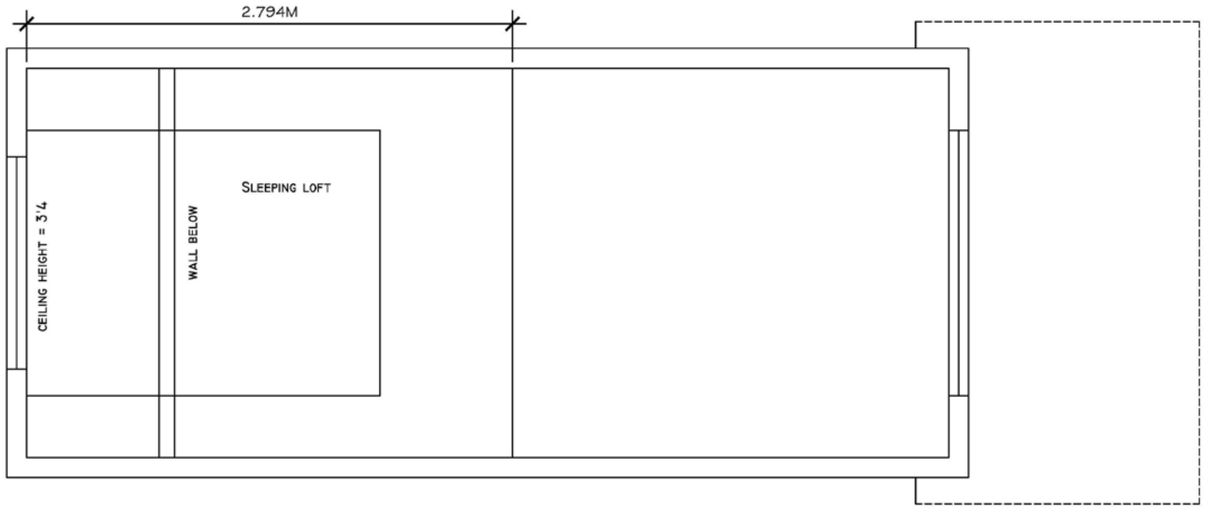
Samantha Gambling's tiny house 30

This single unit tiny home was built over a one-year period by Westcoast Outbuildings in North Vancouver. The homeowner is a recent graduate student from UBC and works in the non-profit sector on a contractual basis; her income varies each month and does not afford average Vancouver rental prices. Gambling saw the tiny house as her only option for housing security in the city, enabling her to live both within her means and in alignment with her values of sustainability, social justice and community engagement. Ultimately, her tiny house allows her to do good work in her community while simultaneously living a lifestyle that is conducive to good mental, social and ecological health.

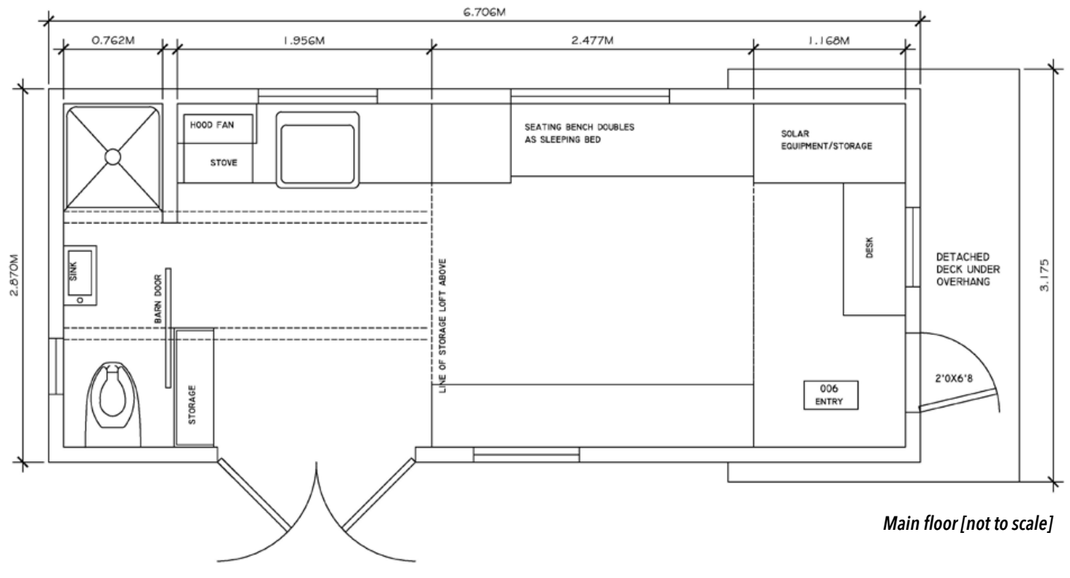
Tiny house details:

- Designed by: TinyTechture
- Built by: Westcoast Outbuildings
- Certification, if any: CSA-Z240
- Dimensions: 10′ (w) × 22′ (l) × 13.5′ (h) and includes a 10′×10′ loft, 320 SF total
- Power: Equipped for 30 amp electrical connection and gas fixtures
- Heating: Atwood LP gas 110 volt electric water heater; Envi convection heater
- Water: Water hookup through standard hose
- Greywater & waste: Sanitary greywater and solid waste storage for potential reuse
- Bathroom: Full bathroom equipped with shower, vanity and Ecodomeo waterless toilet
- Kitchen equipment & appliances: Fully equipped kitchen area with propane stove, hood fan, bar fridge and sink
- Sleeping area: Loft with ladder access
- Other features: Many recycled and wasted materials are integrated into the build including cedar siding, cedar trim, windows / doors, fridge, vanity and cork flooring
- Total build cost: approximately $70,000

Proposed site location at Main and 41st. Site rendering by Alexander Neff.



Upper loft [not to scale]



Main floor [not to scale]

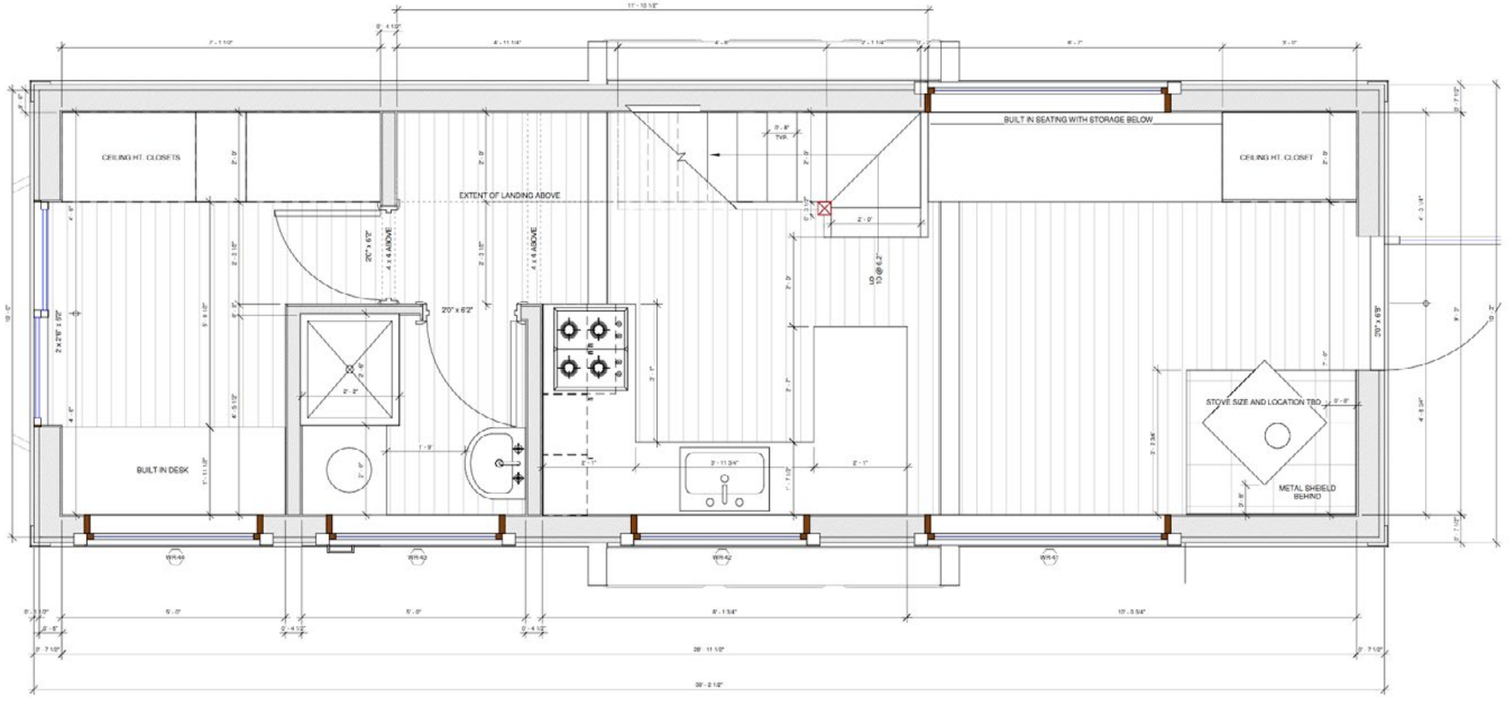
The Rochette tiny house 32

This tiny home was designed and built by Ben Garratt of Tiny Healthy Homes. Brooke and Damien, the clients, were committed to living in a non-toxic tiny home and approached Ben about building a home on wheels that would suit their family of four. Their vision was clear: The home would incorporate all of the natural wood elements of British Columbia and also include the technical aspects of a passive solar house. Designed as an off-grid oasis, this "not so tiny" tiny house was a pleasure to build for this amazing family.

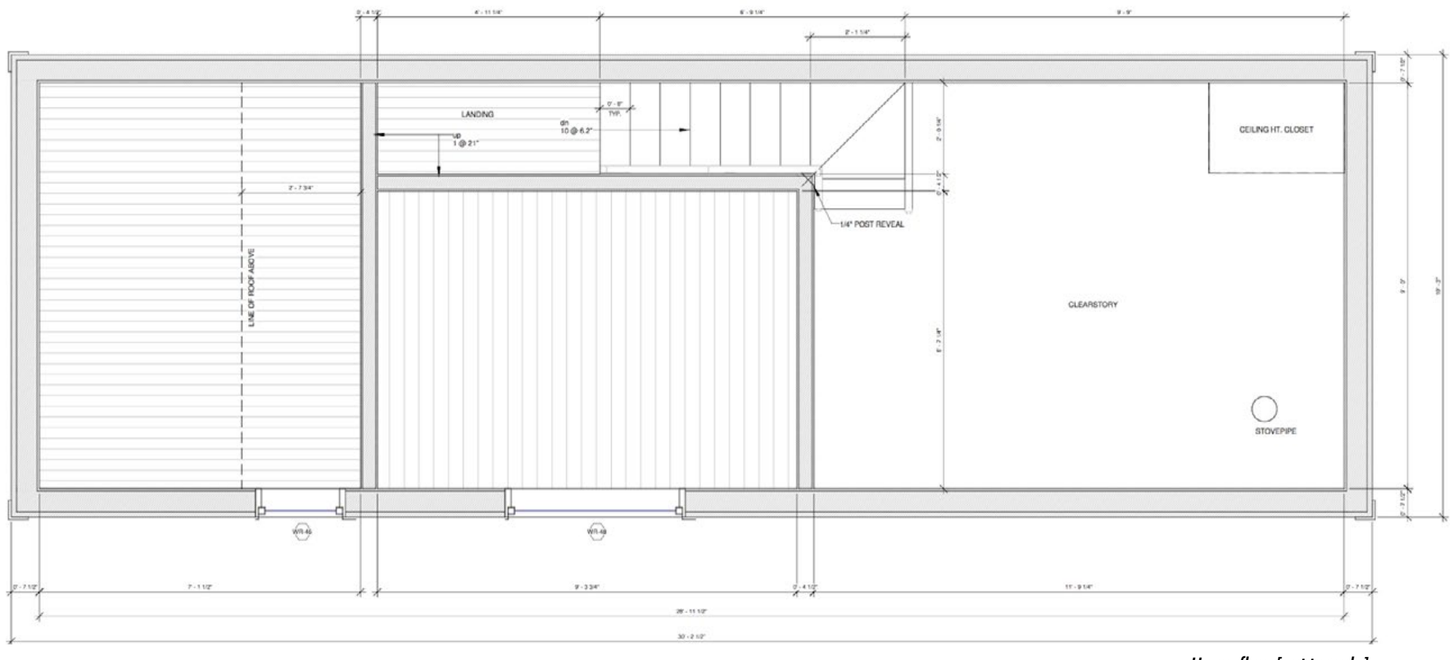
Tiny house details:

- Designed & built by: Tiny Healthy Homes
- Certification, if any: CSA-Z240
- Dimensions: 10′ (w) × 30′ (l) × 13.5′ (h) and includes a 16′×9′ loft, 400 SF total
- Power: Equipped for 30 amp electrical connection and gas fixtures, and low voltage lights
- Heating: Atwood LP gas 110 volt electric water heater, propane fireplace with thermostat; Lunos heat recovery ventilator for fresh air and circulation
- Water: Water hookup through standard hose
- Greywater & waste: Sanitary greywater and solid waste storage for potential reuse
- Bathroom: Full bathroom equipped with tiled shower/tub, vanity and waterless compost toilet
- Kitchen equipment & appliances: Fully equipped with sink, propane stove, hood fan and 12-volt propane fridge
- Sleeping area: Loft with permanent staircase access
- Other features: This is a high performance non-toxic building including passive house technology, all natural building products, 2×6″ R22 walls and triple-glazed windows
- Total cost: approximately $120,000

The Rochette tiny house and builder Ben Garratt of Tiny Healthy Homes.



Main floor [not to scale]



Upper floor [not to scale]

"The kitchen is the heart of this beautiful home. With oak countertops, a 'unique' propane stove, 12-volt propane fridge, hood fan, 12-volt lights with dimmers, ample storage and a movable peninsula, this kitchen has it all.

All walls are pine tongue and groove (including the ceiling). The floors are dark oak; reclaimed douglas fir was used for baseboards, trim, stairs and mezzanine, and the kitchen countertop is oak. The full bathroom is cedar and the office features a cool live-edge white oak desk.

Reclaimed 12-inch plank cedar walls give a warm natural feel to the sweet bathroom. The custom shower/tub combination has river stone features to complement the solid stone sink. A humanure toilet system (to complete the human nutrient cycle) is accessed from an exterior door. A space saving vanity shelf was installed behind the mirror. My favourite bathroom yet!"

–Ben Garrett, Tiny Healthy Homes


the future lives here.

CONCLUSION 35

Tiny homes are just *one* form of small housing. Beyond their size, they are dignified permanent dwellings providing affordable models of homeownership and rental to diverse populations.

There are also a variety of forms within the tiny movement. Some houses are prefabricated and draw similarities to mobile homes or modular units. Others are built on flat decks with wheels for ease of transport or as an alternative to a concrete foundation for those without land.

There is no doubt that tiny homes play a vital role in our housing and sustainability strategies. The latter, of course, requires more exploration through our servicing options, be that on-grid:

- independent grid-tied, similar to a laneway house,
- grid-tied via an existing main house or structure, like an accessory building, and/or
- temporary grid-tied system, like a construction office

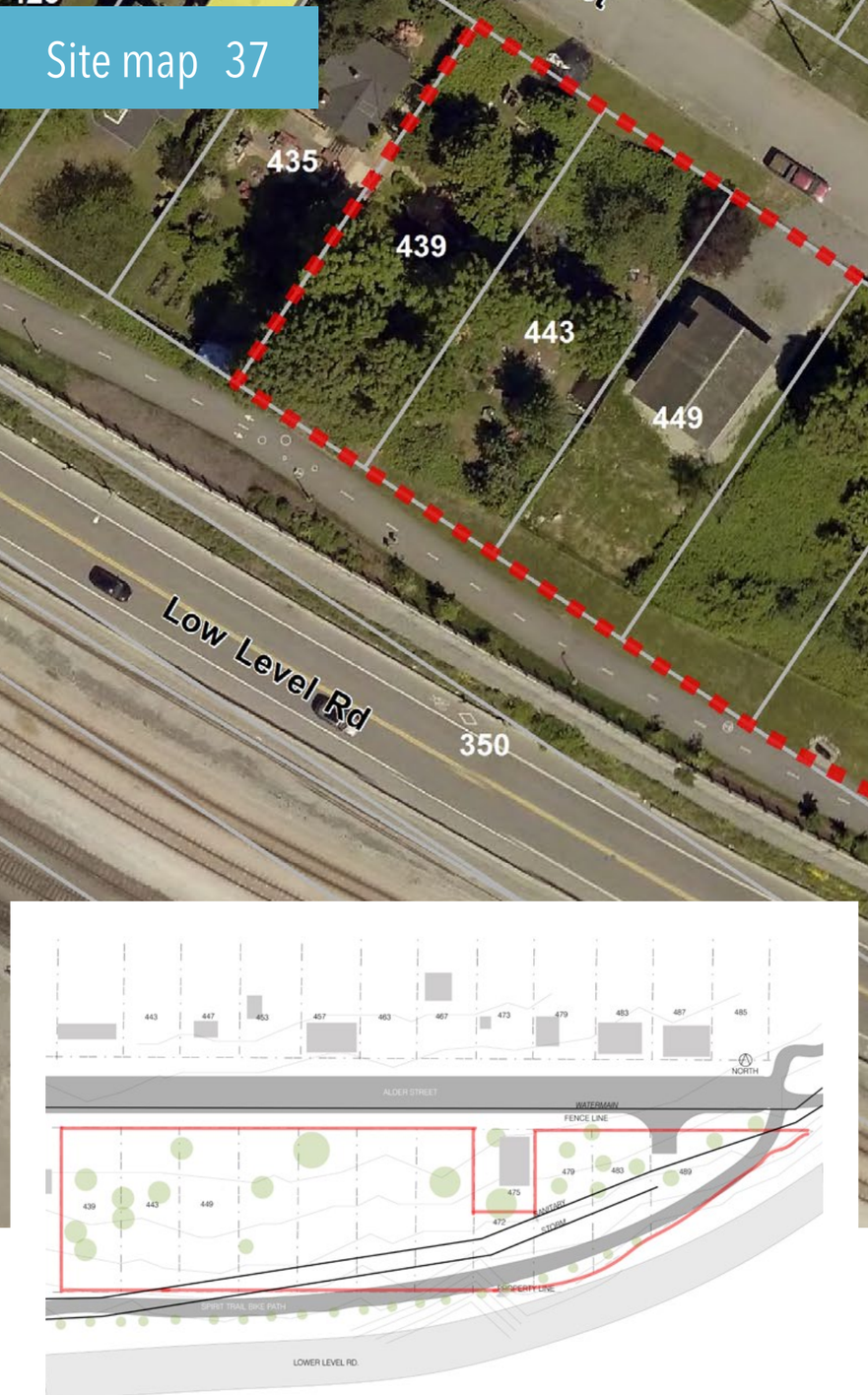
or off-grid:

- net-zero,
- greywater filtration system and harvesting, and
- urine and solid waste management through compost toilets.

This lookbook is just scratching the surface on the current potential tiny houses have in developing complete communities. A pilot project would certainly be a great starting point to discover how they can be best used temporarily on vacant lots, and more permanently as a densification tool.

APPENDICES 36

Site map 37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FENCE LINE
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SANITARY
STORM
PROPERTY LINE
SPIRIT TRAIL BIKE PATH
LOWER LEVEL RD.

In general

The site is currently serviced with a water-main running along Alder Street, and storm and sanitary lines at the base of the lots towards the Spirit Trail to the south.

Connecting to on-grid servicing will involve more demolition of the existing site to bury the pipes and conduits. If the City is in favour of servicing the lots to be fully on-grid, the system could work similar to an RV park with a 120-volt hookup, hose bib attachment for freshwater and a connection to sanitary at each individual site.

In addition to the required on-site infrastructure, the tiny houses would need to have on-grid options built into their design, as per CSA-Z240, Z241 and A277 standards.

Alternatively, off-grid solutions exist and are popular within the tiny house community. Less site infrastructure is required for off-grid servicing which may be favourable to the City given the site is intended for temporary use.

The site can incorporate a mix of on-grid and off-grid servicing methods, to showcase low carbon outputs through this pilot project.

This includes:

- Solar panels, on site or attached to the tiny house unit,
- Rainwater collection,
- Greywater filtration and harvesting, and
- Compost toilets, urine and solid waste management.

We have outlined systems to explore the two latter options in more detail.

Engineers and waste experts[1] recommend a combination of grid-tied and off-grid servicing systems specific to the site's natural discharge capacity. Having both on-grid and off-grid options enables the trialing of more sustainable and affordable waste management practices (often a key feature in tiny house living) in a low-risk environment. Practices should meet the guidelines outlined in the BC Ministry of Health's *Manual of Composting Toilet and Greywater Practice*.[2]

Greywater

Note: Development of a site-specific design for greywater and other waste management will depend on the site's soil composition. Through soil and water table information, we could assess the site's natural discharge capacity for an infiltration basin or wetland.

Many tiny houses parked on individual lots use an insulated, above ground filtration system (such as the Aqua2use treatment system) and re-use their greywater for irrigation of peripheral green spaces via subsurface drip dispersal.

In a tiny house community, our advisors recommend one greywater system servicing all sites. In this case, greywater from each tiny house would be gravity collected to a common collection point and then re-used for irrigation of shared green space areas. The collection point would be a subsurface infiltration basin, which could filter greywater through a bed of bark or biochar chips, or via a small treatment wetland. Wetlands naturally filter and treat greywater, and provide a long-lasting ecosystem service to the site.

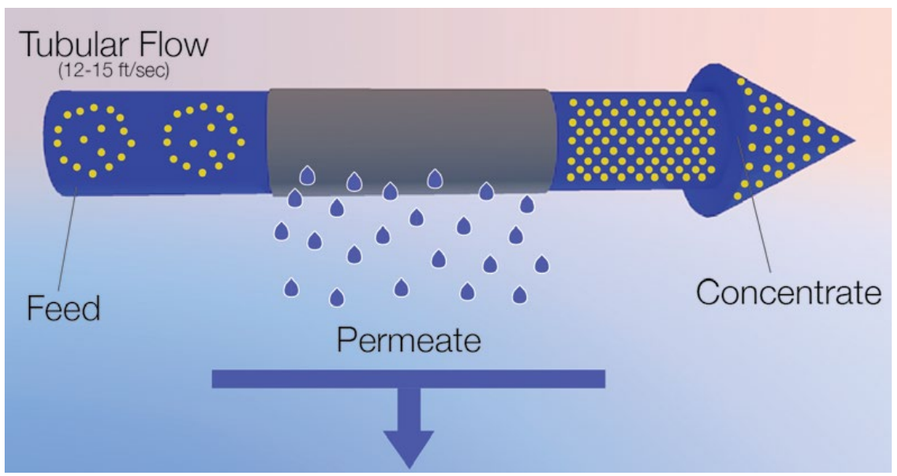
One option for a common collection point could be the south side of lot 472. The site would need to be clear of large trees; only plants with root systems that will not interfere with an infiltration field will be allowed on the site. That said, no trees or shrubs would need to be removed for subsurface drip irrigation.

Alternatively, buoyancy-based membrane filtration has been used for larger communities (for instance, in Concordia, Antarctica) where greywater is reused for bathing and cleaning. Here, the membrane is semi-permeable, allowing clean water through and solid and larger bacteria behind. The process manipulates the buoyancy of contaminates using air; when the liquid spins inside the membrane tube, the contaminates and air are channelled into the centre of the membrane and away from the membrane wall, creating higher efficiencies and less fouling.

Irrigation of filtered greywater would either take place via automated submersible pumps, specifically designed for low-pressure irrigation methods and a pyramid type sprinkler head, or via subsurface drip dispersal systems, which is very flexible and can be made to meet Living Building Challenge[3] standards. Filtered greywater should irrigate permanent, non-consumable perennial plantings. A surface irrigation system, however, could be problematic from a regulatory perspective.

All greywater systems would include a fail-safe *return to sewer* feature both as a protection from overflow, and / or if soils are unsuitable for year-round infiltration. This feature would also allow some tiny houses (especially site-built houses) to be

A greywater wetland, see wetpac.ca.



Swirltex's process of buoyancy-based membrane filtration.

on-grid, with others off-grid and perhaps some that are flexible to on- and off- grid use. If it is not possible to divert excess greywater off site during wet conditions (depending on the soils and the type of plantings) it may be necessary to either allocate a separate area to allow lower loading rate and diversion to the sewer in the wet season, or to size the system to allow for low loading rates and then add supplemental irrigation water in the summer. Still, a grid-tied approach would allow for several iterations or pilot testings, which may serve the project well.

Urine & solid waste

Some tiny houses rely on do-it-yourself compost toilets that involve the following process:

- Place toilet seat over a bucket,
- Urinate and defecate in the toilet, as usual,
- Place paper waste in the bin,
- After each use, sprinkle a handful of sawdust into the bucket covering the waste completely,
- When full, place waste into windrows to decompose,
- Turn over waste every few weeks and let settle for up to one year; place new waste into separate piles, and
- Use final compost as mulch on or around non-edible plants and trees.

While better suited for rural or off-grid areas such as on several of the BC Gulf Islands and within the Powell River Regional District, these toilets are an affordable and manageable option for tiny homeowners. Waterless and urine diverting composting toilets such as brands Ecodomeo, EcoDry and Nature's Head[4] would be suggested for ease of use in an urban context, while further maximazing safety and minimizing odour.

How they work: When urine mixes with fecal matter, excess ammonia creates odor and toxicity. When diverted, fecal matter can be consumed by various invertebrates, including worms, nematodes and mites. Separated from urine, fecal matter requires minimal maintenance and does not produce an offensive odour.

According to Geoff Hill, a waste expert with Toilet Tech Solutions, "urine diversion systems re-establish the natural diversion of urine away from fecal matter so that urine can fertilize local plants and soil, and invertebrates can consume fecal matter, naturally."

An Ecodomeo urine diverting compost toilet in a tiny house.

Urine collection and sterilization tanks.

Urine management

One approach to urine management is the common collection, storage and application of urine.

Urine will flow via gravity from the tiny houses to a communal treatment area on the site. This treatment area will include three 1000 litre tanks in a covered shed. The top of the first tank should be below the houses; pumps can manage the flow between the first, second and third tank.

The first two tanks are closed intermediate bulk containers which are intended to store and sanitize urine. In a community of ten tiny houses, it will take roughly 50 days to fill the first tote with urine. Urine will then pass into the second tote where it will be stored and sanitized for another 50 days. The last tank will remove nutrients from the sanitized urine via zeolite.[5] This tote is a fish tote with a top that opens. Zeolite will be added to the fish tote, and in the third phase of sterilization, urine will sit in the zeolite for 50 days. Zeolite can then be used as a fertilizer in communal gardens when diluted by greywater. Following 150 days of sterilizing, the urine can also be used via fertigation in the garden, orchard or other landscape plantings. Some thought would need to be given to the regulatory issues related to the use of zeolite on ground surfaces.

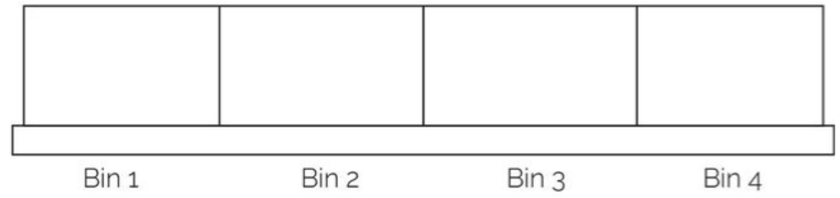
A community of ten tiny houses will produce roughly ten kilograms of waste per day. Given the size of the receptacle, this will provide enough time for each bin to undergo full decomposition, to the point where it can be disposed as inert soil to a landfill or composter.

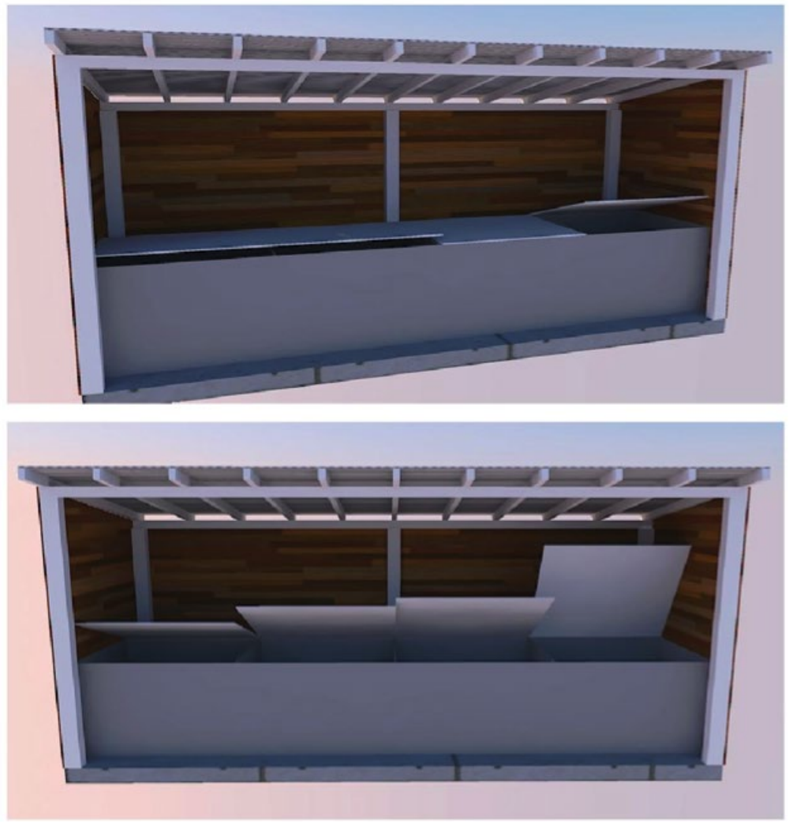
Solid waste management

One recommendation is to collect solid waste and treat it communally using a vermicompost process. A urine-diverting compost toilet should be installed in each tiny house, and used according to instructions from the toilet manufacturer. For example, the process of the Ecodomeo toilet is as follows:

- Urinate and defecate in the toilet, as usual,
- Place paper waste in the bin,
- Then pump foot pedal to divert urine prior to mixing with fecal matter,
- Liquids are gravity fed into a sewer or urine treatment area (as formerly described), and
- Fecal matter is fed along a conveyor belt into a sealed and vented containment chamber. This containment chamber should include a collection bin lined with Bag to Earth paper liners and worms to expedite decomposition.

Once individual collection bins are full, they should be wheeled to a central vermicomposting[6] receptacle that is built on a concrete pad and placed under the same roof covering the urine bins. This sealed aluminum receptacle (roughly 20′× 5′× 3′) will involve a four-bin system; each bin will have a lifting lid.





Vermicompost solid waste system.

Solid waste catchment container for the Ecodomeo compost toilet model on a tiny house exterior.

Renderings by Callahan Tufts (right).

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1 Consultants include engineer Ian Ralston of TRAX Developments, greywater expert Peter Christou of Swirltex and waste management expert Geoff Hill of Toilet Tech Solutions.

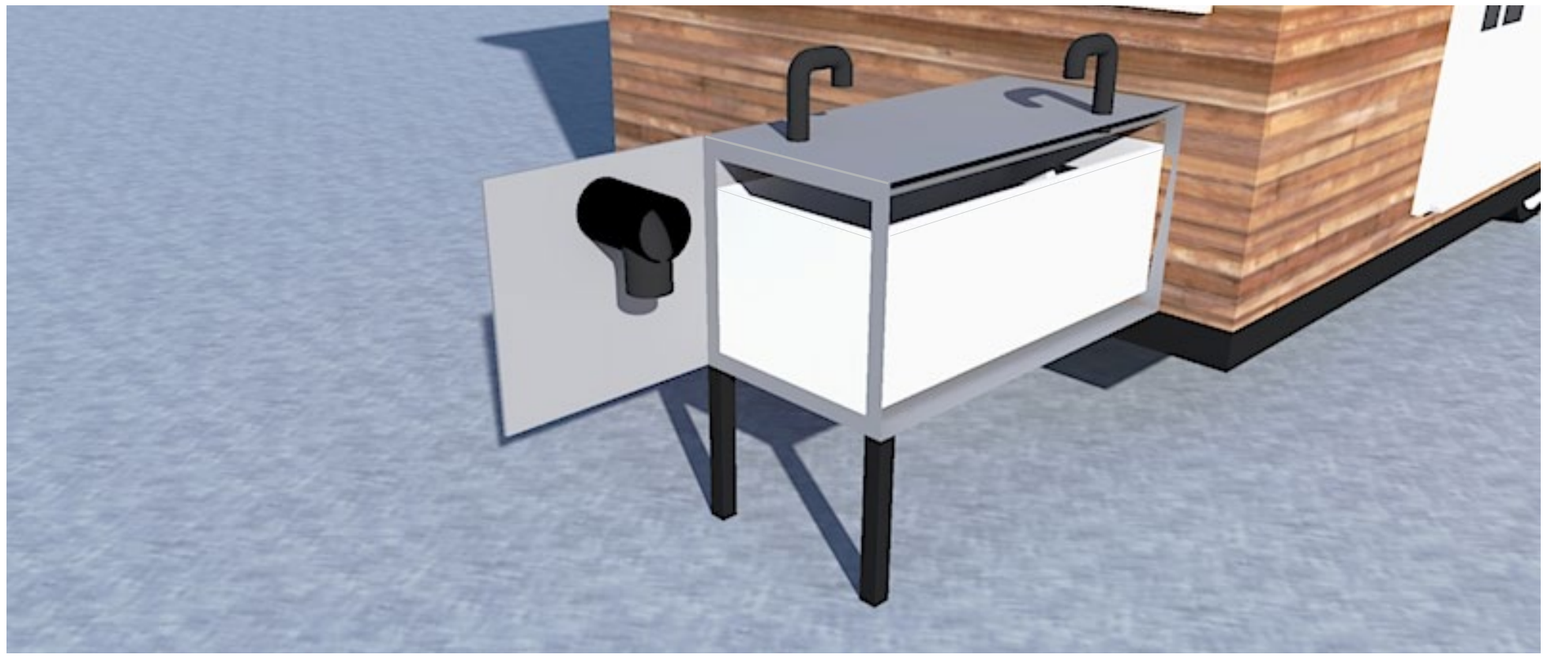
2 See www2.gov.bc.ca/assets/gov/environment/waste-management/sewage/provincial-composting-toilet-manual.pdf.

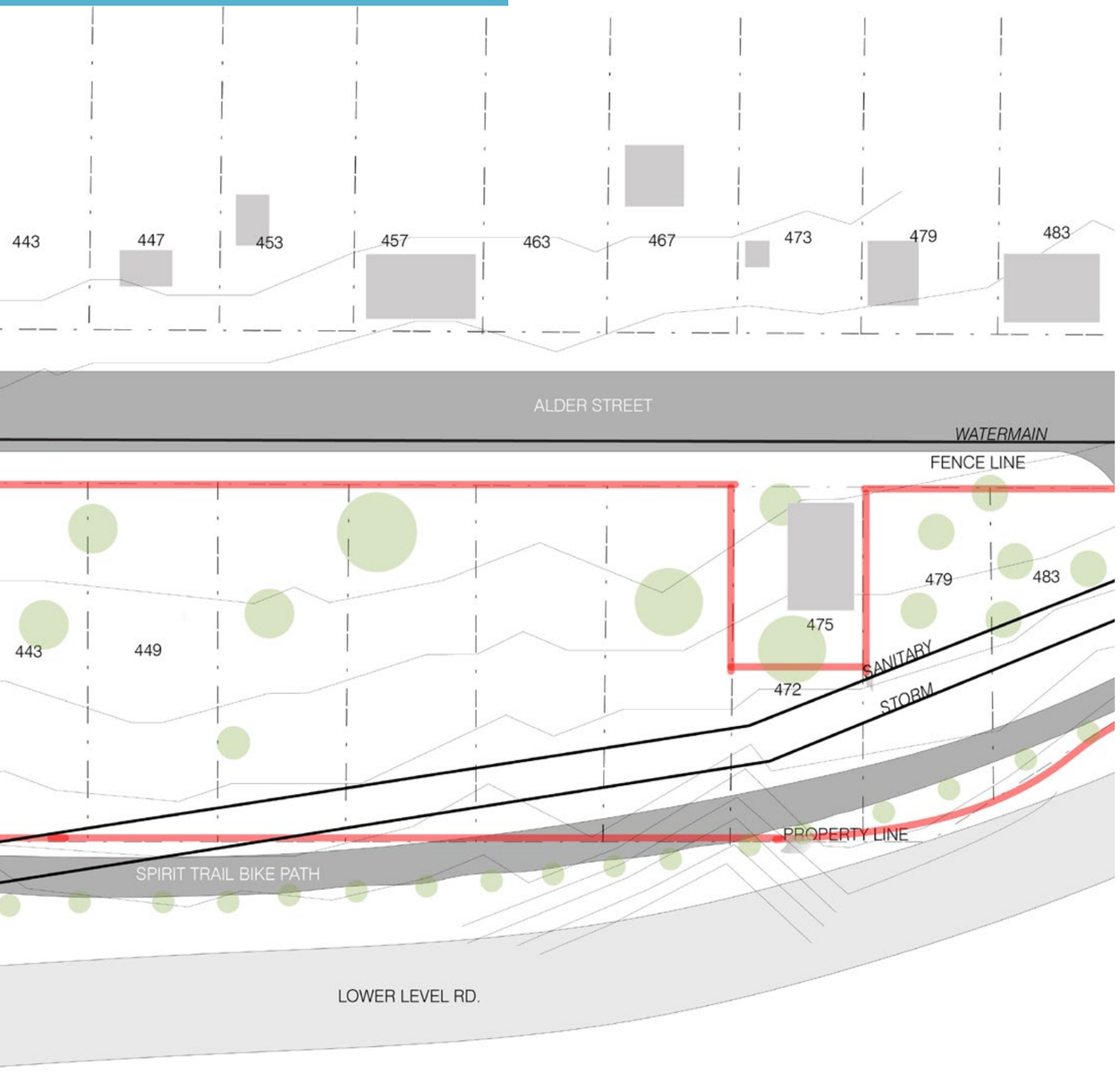
3 See https://www.bdcnetwork.com/blog/living-building-challenge-clarifies-net-zero-definitions-and-standards.

4 See ecodomeo.com, ecovita.net and natureshead.net.

5 Zeolite is a mineral commonly used as an absorbent or catalyst. See www.sciencedirect.com/science/article/pii/S0960852499901578 on the use of zeolite in urine sterilization.

6 Vermicomposting is the process of breaking down organic material, including human-produced solid waste, into high quality compost using various species of worms.





Designing tiny in North Vancouver

Overview. The City of North Vancouver (CNV) has offered designers an opportunity to create a vision for a plot of city-owned vacant lots in North Vancouver to accommodate a tiny house community. The intention of the vision is to explore parking CSA-certified tiny houses on the site for a period of approximately 5 to 10 years; this applies to tiny homes put on temporary foundations or pads but could also include new modular or built for site construction.

The lot consists several parcels at Alder Street and St. Davids Avenue.

Designs can include the existing heritage train station as an amenity facility. Consideration should be given to site servicing and different typologies of tiny houses that can be parked on site. See Site details.

Purpose and goal of this project:

- To combine designs into a lookbook that can then be shared with the City of North Vancouver in summer 2017,
- To inform city staff on how a tiny house community can function within existing neighbourhoods, and
- To encourage the City of North Vancouver to develop a tiny house pilot project as a community model.

Deadline. We will input your designs into a template and would like to share it with our City of North Vancouver in August 2017. Your designs and copy need to be submitted to the collective no later than June 30, 2017. This will give us time to format the package.

What is a tiny house. According to the BC Tiny House Collective's working definition, a tiny house is a single unit on wheels, temporary or permanent foundation that is less than 500 square feet, and has the amenities of a permanent home, including a kitchen, washroom and sleeping quarters. Tiny homes are built on principles of sustainability, affordability and social inclusion.

Tiny challenges. The collective held a stakeholder engagement session in August 2016 and identified three barriers to tiny homes in our cities: political, financial and cultural. These include: bylaws and building codes, servicing (waste, water, energy), tenure and land / unit value and appraisal, insurance and financing, and issues revolving around lack of understanding of what a tiny home is and not-in-my-backyard (NIMBYism) opposition.

Designing tiny in North Vancouver is a partnership with the City and the BC Tiny House Collective (BCTHC). The BCTHC is a community-run organization founded by Anastasia Koutalianos and Sam Gambling in July 2016. It advocates for the inclusion of tiny houses in new and existing neighbourhoods in Metro Vancouver and BC, and does this through outreach, research and pilots. For more info, visit bctinyhousecollective.com.

Designing tiny is co-led by Anastasia Koutalianos, Darcy Keester and Shanelle Currie. Questions? Anastasia at anastasia@nadatodo.com.

Design guidelines

Although CNV is not necessarily looking for specific floor plans of each tiny house designed on the lot, it is important to document and discuss the many types of tiny houses that can form the community. It would be beneficial to include different types of tiny houses as a part of the design. Some ideas to consider are:

1. Types of tiny houses
   1.1. Mobile, on wheels; consider how it will be secured on site*
   1.2. Temporary foundation; consider extents of foundation**

* Mobile tiny houses should be 8.5 or 10 feet wide, 13.6 tall from the ground to the highest point (consider upkick from hitch) and as long as a standard-sized trailer, see The Trailerman; tiny homes on permanent foundations can be any dimensions, so long as they meet setback/distance from main home regulations.

** Ensure both mobile and temporary homes are put on concrete pads that extend beyond the size of the tiny homes on all sides. Keep in mind a tiny house on wheels and/or temporary foundation may be skirted or put on cinder blocks. Consider units may come and go so allow pad to accommodate various size tiny houses (almost like an RV park set-up).

2. Size of tiny house:
   2.1. bedroom/loft
   2.2. 2 bedroom
   2.3. Consider exterior space on the roof and at the entrance

3. Servicing considerations
   3.1. Sewage
   3.2. Water and greywater management
   3.3. Electricity

4. Site development considerations
   4.1. Amenity space; consider using the existing heritage building on site
   4.2. Utilize views and exterior private space for tiny homeowners
   4.3. Maintain mature trees on site
   4.4. Maintain existing set-back from bike lane and zoning set-back from property lines
   4.5. Privacy of neighbouring lots
   4.6. Community gardens and existing gardens on lots
   4.7. Tiny homes can straddle lot lines and can be clustered; explore configurations on either site

Notes:

- CAD drawings will be shared with designers
- Can provide gas line, sanitary, stormwater, water main info separately
- Arborist report and land survey will not be made available to designers prior to deadline
- Site visit was conducted in May;
  if you have any questions, forward them to Shanelle Currie at shanellecurrie@gmail.com.

Standards

Currently there is no tiny house build code in Canada, or incorporated into any Canadian municipal building bylaws / regulations. As such, after discussion with CNV staff we are making the following assumption:

Only tiny houses that meet CSA-Z241 RV or CSA-Z240 Park Model standards (update: as well as CSA-A277 pre-fabricated housing standards), and BC building code will be accepted and approved by the City. It is our assumption that the City would have a process in place for permitting the tiny houses on site.

Tiny house size and features

We are using the BC Tiny House Collective's definition of a tiny house. Accordingly, tiny houses:

- are less than 500 square feet
- are moveable, detached, self-contained and include these functional areas: bathroom, kitchen and sleeping area

Site details

The city-owned lands are on Alder Street near the intersection with St. Davids Avenue, in proximity to the city centre and the SeaBus, and along major greenways, including separated bikeways. There is a heritage structure temporarily placed at 449 Alder Street; the property at 475 Alder Street is privately-owned. Note: Tiny homes can straddle lot lines and be clustered; explore configurations on either site.

Other considerations include:

- Servicing; how will the units be connected on-grid to sewage, water and greywater management, and electricity
- Amenity space; consider using the existing heritage building on site
- Utilize views and exterior private space for tiny homeowners
- Maintain mature trees on site
- Maintain existing set-back from bike lane and zoning set-back from property lines
- Privacy of neighbouring lots
- Community gardens and existing gardens on lots

Notes:

- CAD drawings will be shared with designers
- Can provide gas line, sanitary, stormwater, water main info separately
- Arborist report and land survey will not be made available to designers prior to deadline
- A site visit was conducted in May; questions regarding the site can be send to Shanelle Currie at shanellecurrie@gmail.com.

Design submission

Feel free to use your architectural style and any rendering techniques that you prefer or are most comfortable using. We hope that this will be a fun project to work on, with meaningful results for both yourself and city staff!

Please provide renderings in full-colour, and high-resolution imaging for print (300 dpi) and in metric scale; format and output scales to be confirmed.

What you'll provide:

- Designer and company name
- Your logo and website URL
- Specify various unit sizes, types and features
- Specify how units are serviced
- Detailed site plan with lot dimensions, site features
- Cross section(s) of site (1–2)
- Exterior renderings of site development (2+ is preferred)
- Some typical floor plans of different building typologies (or use of existing tiny house floor plans)
- Write-up highlighting your designs and approach (not to exceed 150 words)

Final layout and scales will be provided shortly. Questions on guidelines and submission should be sent to Shanelle Currie at shanellecurrie@gmail.com.