Reclaiming Absence:
Building collective futures in Ontario's Gravel Belt

by
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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.

ABSTRACT

Ontario's gravel mining belt stretches across vast swaths of land, leaving behind a fractured geography of extraction voids that scar ecosystems, disrupt fertile farmland, and give rise to monotonous suburban sprawl. Since the early 2000s, the Greater Toronto Horseshoe Area has welcomed nearly 100,000 new residents each year, with 86% of this growth shaped by low-density, car-centric development. This expansion continues to encroach on agricultural land, intensifying ecological imbalance and threatening long-term food security.

This extractive form of urbanism treats Ontario's rural terrain as a consumable resource to fuel the material needs of metropolitan expansion. These landscapes, often dismissed as post-industrial or peripheral, are the frontlines where the converging crises of climate change, land commodification, and environmental degradation manifest most visibly. Yet, architectural discourse remains largely silent on this issue, overlooking the spatial politics of gravel pits and the suburban paradigms they perpetuate. Increasingly subjected to gridded, cartesian systems of control, these territories are erased of their histories and stripped of their potential futures.

This project responds to a moment of heightened urgency, marked by a housing crisis along with global supply chain disruptions, resurgent push for domestic extraction, and deepening climate precarity. Scholars across architecture, geography, and environmental humanities, such as Pierre Bélanger's articulation of the "Extraction Empire"- have begun exposing the global entanglements of resource infrastructures. Within this critical discourse, this project will push for a growing momentum around design strategies that resist extraction and prioritize repair.

Envisioning a reclamation corridor across adjacent gravel pits. Structured as dense, reconfigured suburban fabrics centered around housing, food production, and ecological regeneration. This future oriented design reimagines the suburban ideal by coupling resilient infrastructure with regenerative land use, transforming extraction voids into productive terrain of renewal. Ultimately, it proposes a new kind of productive suburban belt that counters sprawl while fostering ecological stewardship and collective belonging through a shared sense of place.

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To my parents, Thank you for your constant support and for nurturing my curiosity about the world. For working tirelessly to make my life better, and for the conversations about everything and nothing that I now realize shaped the very heart of this thesis.

To Areeba, Without your unwavering support, I would not be here today. Thank you for standing beside me through every late night, every doubt, and every struggle. Your patience, kindness, and steady presence carried me through when I thought I couldn't go on. You are the reason I made it through this journey, and I am endlessly grateful to have shared it with you.

And to my friends - Yesh, for late-night conversations. Kenyo, Angeline, my desk mate Alan and all those at Waterloo who made me feel part of something larger. For every shared silence, conversation, and afternoon spent working side by side.

DEDICATION

I would like to dedicate this thesis to Dianne Long, whom I have the privilege of calling a friend. It was by chance that we stayed at your home, but it was your warmth and generosity that made me feel truly welcome. Thank you for our conversations about architecture, the thesis, and the gravel pits, for introducing me to the rural landscape of Ontario, and for sharing your life stories as we worked together in the backyard.

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INTRODUCTION

“Landscapes are projects - and they are never finished. They are built through everyday labor, institutional arrangements, aesthetic imaginaries, and the push and pull of multiple species and economies.”
Anna Tsing, Friction: An Ethnography of Global Connection, 172

“Design the in-between. Not the space itself, but the relationship. It is the job of architecture to provide this in-between realm by means of construction... a place where conflicting polarities can become twin phenomena. Space is not a neutral backdrop."
Aldo Van Eyck in The Child, the City and the Artist,1962

1.1 UNCOVERING THE HOLE HIDDEN

Ontario's gravel mining belt spans vast landscapes, leaving behind voids of extraction that scar ecosystems and disrupts fertile farmland paving the way for homogenous built environments. These voids left in the wake of extraction now shape the rapid suburban expansion of Ontario. Since the beginning of the 21st century, the Greater Toronto Horseshoe Area has absorbed nearly 100,000 new residents annually[1] , with an 86% increase in suburban populations[2], which has led to environmental challenges such as increased flooding, higher land surface temperatures, and reduced groundwater absorption[3]. Gravel, a key material in suburban development, is widely used for constructing roads, driveways, and building foundations due to its drainage and structural properties. The increased demand for gravel is a direct consequence of suburbanization, which has become the quintessential mode of urban expansion[4]. However, its extraction from riverbeds, quarries, and natural habitats disrupts ecosystems, reduces groundwater recharge, and contributes to carbon emissions through transportation and processing. The demand for gravel raises critical questions about the origins of these materials and their broader environmental impacts.

Gravel extraction, part of a global system of resource-based capitalism, often leaves behind "holes" that evolve into speculative development sites; an "edge condition" where urbanization meets nature. This thesis introduces the concept of "Ruin-nullius," to describe the abandoned extraction sites viewed as voids, ready for speculative transformation yet devoid of ecological consideration. Rather than perpetuating this cycle, the thesis proposes a shift toward using architecture as a tool for ecological restoration[5], fostering a collective memory of our extractive impact, and reshaping post-extraction sites into sustainable communities.

1 Neptis Geoweb, "Understanding and Visualizing Population Growth in the Toronto 'Region.'"
2 Burda et al., Density Done Right.
3 Rasool et al., "Evaluating the Relationship between Groundwater Quality and Land Use in an Urbanized Watershed."
4 Securing Access to Stone, Sand & Gravel: Ensuring Economic Growth and Future Greenspace in the Greater Golden Horseshoe, 2.
5 Landscape Architecture Foundation (U.S.), The New Landscape Declaration : A Call to Action for the Twenty-First Century.





Figure 1.1

Local signage declares "Fight for Farmland" amid continued land expropriation for highway infrastructure. (Author)

Figure 1.2

"Farmland for Sale" signs mark the active disappearance of Tier-1 farmland under pressure from suburban expansion. (Author)



Figure 1.3

Satellite image showing gravel pits in Cambridge, where sprawling suburbs encroach upon a shrinking countryside. (Google Earth)

Figure 1.4

Mapping vast network of active gravel extraction sites along HW 401 spanning Cambridge, Aberfoyle, Milton (Author)

340 acres
3,000,000 tonn
$$ 36 million

200 acres
1,800,000 tonn
$$ 30 million

95 acres
1,000,000 tonn
$$ 12 million

880 acres
Near Action

4,000,000 annual
max licensed tonn

$$ 48 million
annual turnover

81 acres
1,000,000 tonn
$$ 12 million

230 acres
Near Kitchener

5,000,000 annual
max licensed tonn

$$ 44 million
annual turnover

MILTON
Supersized type

1757 acres
11 active pits

5,000,000 annual
max licensed tonn

$$ 1.25 billion
annual turnover



CAMBRIDGE
Fragmented & patchy type

3619 acres
30 active pits

10,200,000 annual
max licensed tonn

$$ 2.55 billion
annual turnover

64 acres
1,000,000 tonn
$$ 7 million

ABERFOYLE
Clustered type

4,029 acres
37 active pits

11,400,000 annual
max licensed tonn

$$ 2.85 billion
annual turnover

EXTRACTION NETWORK

HW 401 corridor, active pit forms, future reserves

The perpetuated suburban expansion relies on architecture to reshape the land into flattened platforms, emphasizing form emphasizing form while forgoing enclosure. [6] While the flattened plinths have historically symbolized a subtle yet powerful means of defining space, they also serve as tools of ground manipulation, creating a dual nature in their function. On one hand, they enable architectural expression and spatial organization by elevating, anchoring, or delineating structures.[7] On the other hand, they restrict by imposing artificial boundaries, erasing natural contours, and homogenizing the landscape. As architectural critics like Keneth Frampton remind us, architecture must always be read critically against the territorial systems it occupies[8].

Space is reduced to surface; thresholds are dissolved, contours erased. Lot coverage becomes the measure of design, and the plinth replaces the section. What emerges is not an architecture of placement rather than inhabitation and spatial richness. This tension reflects the broader dynamics of suburban development, where plinth-like platforms prioritize construction efficiency and standardized form over ecological continuity and nuanced spatial interaction. This ambivalence underscores their role in suburban development, where vast expanses of land are levelled to create uniform subdivisions[9]. This thesis seeks to counter the narrative of flattening by adopting infrastructural opportunism[10], inspired by Dolores Hayden's critique of suburbia and Pierre Bélanger's concept of infrastructural landscapes. All these theoretical underpinnings lead to an understanding of urban growth as both disruptive to and conditioned by ecological systems. These shape and are themselves reshaped by metropolitan expansion[11] .

6 Aureli et al., Platforms.
7 Allan and McQuade, Landform Building : Architecture's New Terrain.
8 Frampton, Steven Holl Architect.
9 "Frontiers | Urban Expansion and Erosion Processes in an Area of Environmental Protection in Nova Lima, Minas Gerais State, Brazil."
10 Bhatia et al., Coupling : Strategies for Infrastructural Opportunism.
11 Waldheim, Landscape as Urbanism : A General Theory.



Figure 1.5

An aerial view of housing developments near Markham, Ontario (Wikicommons)

This thesis aims to transform sites of resource extraction into landscapes of ecological productivity, replacing suburban sprawl with spaces that foster stewardship, biodiversity, and multifunctional use. It also engages with a broader critique of how extraction-based infrastructures such as extraction-based infrastructures such as gravel pits, haul routes, and construction supply chains that make the built environment possible while remaining spatially distant and socially invisible. The simultaneity of being economically integrated yet spatially dissociated makes many large-scale issues such as climate change register as something over there but not here and not now[12]. This disconnection between consumption and extraction leads to environments that are obscured or hidden, rendering ecological consequences abstract. In response, this research will focus on making visible the ecological footprint of suburban growth and reconnecting communities with their post-extractive landscape than they create.

The research begins by mapping historical gravel extraction sites in Ontario and analysing current suburban development patterns with a focus on Southern Ontario and in its Niagara Escarpment, characterized by glacial soils of gravel, sand, and clay over limestone bedrock[13]. The study critiques inadequate policies that celebrate extraction "ruins" as legacy pits[14]. Through sectional studies and site-specific mapping, this thesis reimagines a suburban quarry rehabilitation prototype, exploring architecture's potential to engage with and restore the altered topography and geology of post-extraction landscapes.

12 *Neeraj Bhatia, "Collective Form / Forming a Collective."*
13 *Roots et al., Special Places.*
14 *Roots et al., Special Places.*



Figure 1.6

An aerial view of gravel pit landscape in Caledon next to the protected green belt. (Fowler Construction)

Existing rehabilitation practices for gravel pits, such as converting pits into artificial lakes or golf courses, often reduce arable land and require constant maintenance of the landscape. In order to challange this normative stratergy. This thesis envisions a suburban reclamation corridor across adjacent gravel pits, organized as dense concentric bands of housing, mixed-use live-work units, food production, and ecological restoration. This future-oriented design realigns the suburban dream with resilient infrastructure and regenerative land use, transforming extraction sites into landscapes of sustainable renewal. Ultimately, the thesis proposes a productive belt that counters sprawl while fostering ecological stewardship and collective belonging through a shared sense of place.



1.2 RESEARCH QUESTIONS

The project is guided by the following research question:

1. How can ruin-nullius landscapes, such as gravel pits in Southern Ontario be reimagined as a porous blue belt through reclamation?

2. How can adjacent gravel pits become catalysts for a new, productive sub-urbanism that counters sprawl?

By addressing these questions, this research aims to redefine suburban planning in ways that align with ecological restoration and promote social inclusivity.

1.3 METHODOLOGY FOR AN ANTI-FLATTENING PARADIGM

This research adopts a mixed-method approach[15] to transforming abandoned gravel pits into regenerative suburban environments, focusing on creating cohesive urban forms that integrate individual agency and collective identity. This thesis analyzes gravel extraction sites within the Greater Toronto and Hamilton Area (GTHA) through counter and speculative cartography[16]. The research begins by layering territorial maps of 20th century active gravel pit maps over 21st century suburban development patterns, identifying the extent and specific cases of suburban expansion into former extraction sites.

As the study progresses, this thesis proposes, and tests new housing typologies tailored to post-extraction landscapes. Through speculative drawings[17], it develops urban forms directly shaped by the process of land reclamation, responding to slopes, drainage, and material instability. These drawings do not only represent ideas; they serve as generative tools to design housing that is embedded in, and emerges from, the terrain. By doing so, it repositions architects and urban designers as systems thinkers, capable of addressing the intertwined ecological, social, and infrastructural challenges of post-industrial landscapes. Through sectional analysis and material investigation of extraction sites themselves.

15 Snyder, Architectural Research.
16 Smout et al., Augmented Landscapes.
17 Chard and Kulper, Fathoming the Unfathomable.

The thesis grounds architecture's role in responding to the conditions, products, and processes of gravel removal, and the possibilities of their rehabilitation. This research incorporates the voices and perspectives of local communities through secondary sources, public records, and site-walks and observations. It advocates for farmland protection over extractive practices, mapping these positions onto territorial maps of southern Ontario. Highlighting how both human and non-human actors, such as land use policy, ecosystems, and economies of food production, interact to influence the reclamation and redevelopment of gravel pits. Rather than viewing these sites as passive voids, the thesis situates them as active, contested terrains embedded within wider socio-material networks.



Figure 1.7

Panaromic view from an overburden mound in Cambridge.

Analyzing existing literature on gravel mining provides a foundational understanding of prevailing reclamation practices across Ontario. This is expanded through a focused study of the archives of the Ontario Aggregate Resource Corporation (TOARC), which reveals the limitations of current approaches. These approaches prioritize the technical closure of individual sites, such as minimal replanting over integrated long-term visions. This critique is explored through the layering of aggregate resource act and other provincial policies with imagined life cycle and intervention scenarios.

The thesis introduces the concept of a mutual-aid, reinterpreting spatialization through non-flattening approaches and temporal frameworks rooted in counter-capitalist principles. While acknowledging the colonial nature of extractive practices and the Plantationocene's role in radically simplifying ecologies, driving forced labor systems, global transformations, and wealth production that are inherently genocidal and extinction driven[18]. Recognizing existing research on the technical aspects of landscape reclamation within critical ecological networks like the green belt, and leveraging the author's educational background, the study focuses on sites near urban areas with speculative development potential

This thesis frames the post-extraction pit as *performative ground*, a space whose geologic memory and evolving form can be engaged through iterative, speculative design[19]. Gravel pits are reframed as critical interfaces where meteorological and geological processes converge, creating opportunities to transform these neglected landscapes into neighbourhoods of ecological vitality and community agency. This transformation is supported by secondary data collection, extensive literature reviews, and predictive modelling of ecological and topological patterns

18 Mitman, "Reflections on the Plantationocene: A Conversation with Donna Haraway and Anna Tsing."
19 Stephanie Carlisle and Nicholas Pevzner, "The Performative Ground."

Ultimately, the productive sub-urban programs proposed by this thesis aim to cultivate a new suburban cultural identity through shared rehabilitation efforts and the assemblage of interconnected micro-economies. These strategies not only promote ecological restoration and community empowerment but also envision sustainable and inclusive futures for post-industrial landscapes.





Figure 1.8

Ruin nullius ground of a gravel pit showing destabalised conditions (Author)

1.4 SCOPE

Across three cities along Highway 401, the GTA and Canada's largest higway, the thesis envisions a productive belt that mitigates suburban sprawl by fostering selectively dense, interconnected neighborhoods rooted in ecological renewal. It operates at three scales of intervention - hydrological, natural systems and, community spaces, and housing typologies - challenging the rigidity of conventional suburban planning with strategies that emphasize land responsiveness, climate resilience, and community stewardship. This approach is grounded in a mixed-method exploration of gravel pit sites, selecting three distinct locations in Cambridge, Aberfoyle, and Milton, Ontario. These sites were chosen based on their unique quarry typologies - patchy, clustered, and supersized abutting the Greenbelt, allowing for an analysis of different sectional and density conditions shaped by their proximity to settlements. Finally, selecting and working with a cluster of adjacent gravel pits in Cambridge in depth, the thesis establishes relationality between land use and built form, moving beyond predetermined solutions to instead uncover the latent opportunities embedded in these sites. Through speculative design, *Reclaiming Absence* offers a deeper understanding of the material and biological systems that define these landscapes, challenging conventional architectural practices and redefining our relationship with land in the context of contemporary environmental and urban challenges.

1.5 THESIS STRUCTURE

The thesis is structured in four parts, unfolding a critical spatial and temporal investigation of gravel extraction landscapes in Southern Ontario and their potential for ecological renewal and collective inhabitation. It begins by unravelling the material and infrastructural systems that define the gravel belt, focusing on the embedded geology of the Niagara Escarpment and the unique composition of glacial soils, limestone, and aggregate deposits. These geological formations have historically positioned the region as a resource frontier, exploited to meet the rapid growth of suburban development. Through sectional and timeline studies, the research charts the transformation of land over time, from ecologically rich farmland to extractive voids and speculative suburbs. The thesis situates these sites as unresolved, driven by the logics of economic gain and ecological erasure, interrogating the political economy that enables ongoing land commodification.

The second chapter foregrounds the tension between economy and ecology by studying the spatial consequences of extraction in relation to the socio-economic conditions of surrounding towns. This is explored through the three cases - Cambridge, Milton, and Aberfoyle, revealing how gravel pits operate at the intersection of local labor economies and regional development agendas. The thesis examines how ecological systems, such as groundwater recharge zones and biodiversity corridors, are fragmented by economic expansion. In doing so, it introduces the concept of labor and care, framing land rehabilitation not only as a technical or ecological necessity, but as a socio-political project. Alternate forms of labor and community-based care are explored, positioning stewardship as a collective responsibility rather than a postscript to extraction.

Building from this, the third chapter explores how these landscapes [20] might be reconditioned for new forms of collective living. Drawing on density studies and site conditioning methods, the thesis tests how extraction sites can be transformed into productive and inhabitable ground. These proposals challenge the traditional suburban grid by introducing local food production typologies- greenhouses, allotment gardens - capable of embedding food production back into previously exhausted terrains. By using speculative design, the thesis investigates how patterns of occupation and production can be recalibrated to support ecological resilience, and community autonomy. It also raises questions about how spatial forms can shape new narratives of collectivity rooted in care, memory, and cohabitation.

In its final section, the thesis moves toward a design application, proposing a new framework collectively driven stewardship. Here, the gravel pit is no longer a void, but a complex site of interdependence, one that holds the potential to anchor future-oriented infrastructures of regeneration. Through design experiments[21] across scales, the thesis outlines spatial strategies for transforming pits into activated commons, focusing on social housing, public resource hubs, and adaptive ecological systems. The thesis concludes by positioning gravel pits not as symbols of absence, but as opportunities for reinvention, sites where ecological futures can be imagined, negotiated, and sustained through architecture.

20 Waldheim, Landscape as Urbanism : A General Theory.
21 Koolhaas et al., Small, Medium, Large, Extra-Large : Office for Metropolitan Architecture, Rem Koolhaas, and Bruce Mau, Surrender, Pg 973.

1.6 POSITIONALITY

This thesis emerges from a deeply personal and critical engagement with the landscapes I have lived around through the virtue of the Master of Architecture programme - spaces marked by extraction, abandonment, and transformation. As someone trained in architecture and shaped by both suburban and agricultural geographies of Southern Ontario, I approach this research with a recognition of my own complicity in systems of land consumption and a desire to imagine alternatives. My positionality is informed by an awareness of the privileges that allow access to design discourse, and a commitment to unsettling the normalized relationships between development, ecology, and labour. This work is not neutral - it is rooted in a politics of care and ecological frameworks that challenge the flattening tendencies[22] of mainstream planning and architectural practices. Engaging with site visits, community stories, and the material histories of gravel pits, I position myself as both a researcher and a listener, seeking to amplify voices that are often overlooked in post-industrial contexts, and to foreground design as a tool for repair, stewardship, and collective possibility.



Figure 1.9

Site walks to gravel pits, agricultural fields and surrounding brooks in Cambridge (Author)

22 Byvanck and Superstudio (Group), Superstudio : The Middelburg Lectures.

CH 2 RECLAIMING ABSENCE

"These extrastate infrastructural imposition, infrastructures of segregation, and landscape transformation.[23]"

- Jane M. Jacobs in *Edge of Empire*

"Those who search into the very bowels of reality in order to know and assimilate its values and wretchedness; and those who desire to go beyond reality, who want to construct ex novo new realities, new values, and new public symbols.[24]"

- Manfred Tufuri

2.1 GEOLOGY OF SOUTHERN ONTARIO

Mining sites invite us to explore Canada's geological and material histories, weaving artifacts of deep time with human narratives of extraction. As the extraction pit is laid open, it reveals the pressures and patterns of glacial activity. Here in Southern Ontario, the material substrates of extraction were formed by the prehistoric movement of glaciers advancing southward. The minerals deposited during that period now form the critical materials underpinning today's technological and urban growth.

A colorful profile traces the geological cross section through Ontario's bedrock geology as shown in the image. These maps have been extensively produced by the Crown for material exploration and surveying. Along the Highway 401 corridor, shifts in colour, from light blue to yellow to green - reflect transitions in bedrock deposits, ranging from the Upper Ordovician to the Cambrian and Devonian periods. These correspond to the presence of shale, limestone, dolostone, and siltstone formations. Throughout this region is a vast network of quarry and pit operations continuously involved in extracting these minerals to fulfil the growing needs of development.

23 *Jacobs, Cities and the Wealth of Nations : Principles of Economic Life.*
24 *Tafuri, Architecture and Utopia.*

Mining activities vary depending on the type of mineral. Unlike dolostone or limestone, gravel is much shallower and but still might require blasting. Gravel itself is a unique material. It is not a specific type of rock, but is classification based on particle size and form. It can be composed of limestone, dolostone, quartz, or granite, and is defined by its small, loose particles ranging from 2 mm to 65 mm.

The region of Galt has been a key place for mining operations. Its older buildings are clad in local limestone and fieldstone. Fieldstone is a lesser known but naturally occurring material that lies close to the surface. Often a nuisance for farmers, it is removed from arable land to ease agricultural activity. Walking through the streets of Galt, these stones are easy to spot in the local architecture. Both the stones and the landscapes they come from reveal how ancient geological formations have shaped the cities of today.

As the depth at which these minerals occur directly influences their extractability. This makes gravel particularly accessible for easy mining. As a result, it is extensively extracted in rapidly urbanizing regions and used to construct highway networks that, in turn, fuel further growth. This buried materiality underpins the suburban expansion of the Golden Horseshoe, quietly enabling a housing boom rooted in invisible geological labour. However, this cycle of rapid urban expansion and resource extraction has intensified land use change[25], accelerated habitat destruction, and contributes significantly to carbon emissions.

Figure 2.1

Surfacial geological map of Southern Ontario. (Source - Ontario Geological Survey, 1991)

Figure 2.2

What happens to gravel pits at the end of life: Overlay of Suburban development on 1960's Active gravel sites. (Author)

25 *Andrew and Graham, Canada in Cities : The Politics and Policy of Federal-Local Governance.*

BEDROCK GEOLOGY OF ONTARIO

SOUTHERN SHEET

Scale 1:1 000 000

Kilometres 20 0 20 40 60 80 100 Kilometres

Miles 10 0 10 20 30 40 50 Miles

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This map is one of a set published to mark the 1991 centennial of the establishment of an Ontario Bureau of Mines. It was produced specifically to accompany *The Geology of Ontario*, Ontario Geological Survey, Special Volume 4.

Pour une version française de la légende et des notes marginales de cette carte, prière de se référer aux Notes explicatives et Légende (carte OGS 2545).

SOURCES OF INFORMATION

Geology compiled from published and unpublished maps and reports of the Ontario Geological Survey and the Geological Survey of Canada, and unpublished data on file with the Ontario Geological Survey. Data on the geology of immediately adjoining areas of adjacent provinces and states were provided by geologists of the government survey organizations of those jurisdictions, as noted in the Explanatory Notes and Legend (OGS Map 2545).

Base map assembled by the Ontario Geological Survey. Geographic information, derived from maps 21-6, 22-6, 23-6, 24-6, 25-6, 26-6, 27-6 and 28, by the Surveys and Mapping Branch, Ontario Ministry of Natural Resources, was compiled onto a Lambert Conformal Conic grid with standard parallels 49°N and 77°N, central meridian 92° W and grid origin 92° W 0° N provided by Datapitching Services, Markham, Ontario.

For information as to the status and extent of all restricted lands in Ontario, users are referred to the provincial or federal agency within whose jurisdiction the lands are administered.

Geology not tied to surveyed lines.

ACKNOWLEDGMENTS

Digital plots of colour separations produced by Environmental Information Systems Division, Environment Canada.

CREDITS

Compilation by staff of the Precambrian Geology and Engineering and Terrain Geology sections of the Ontario Geological Survey, as noted in the Explanatory Notes and Legend (OGS Map 2545).

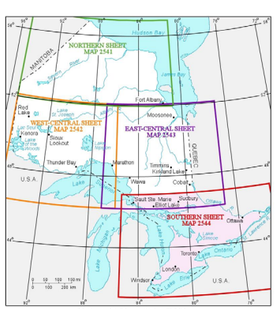
Cartographic production by staff of the Publication and Cartographic Services Unit of the Ontario Geological Survey, as noted in the Explanatory Notes and Legend (OGS Map 2545).

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ontario Ministry of Northern Development and Mines does not assume any liability for errors that may occur. Users may wish to verify critical information.

Issued 1991.

Information from this publication may be quoted if credit is given. It is recommended that reference to this map be made in the following form:

Ontario Geological Survey 1991. Bedrock geology of Ontario, southern sheet; Ontario Geological Survey, Map2544, scale 1:1 000 000.



Index to Geology of Ontario Maps

LEGEND[a]

PHANEROZOIC[b]

MESOZOIC

CRETACEOUS AND JURASSIC

LOWER CRETACEOUS AND MIDDLE JURASSIC

60 **Kaolinitic clay, clay, sand, lignite:** 60a Mattagami Fm.; Mistuskiwia Beds 60b Evans Strait Fm.

JURASSIC

59 ◊ **Alkalic dikes and intrusions:** kimberlite and lamprophyre

PALEOZOIC

MISSISSIPPIAN TO DEVONIAN[c]

58 **Shale:** Port Lambton Gp.

DEVONIAN

UPPER DEVONIAN

57 **Shale** 57a Kettle Point Fm. 57b Long Rapids Fm.

MIDDLE DEVONIAN

56 **Limestone, dolostone, shale** 56a Hamilton Gp. 56b Marcellus Fm. 56c Dundee Fm. 56d Detroit River Gp.; Onondaga Fm. 56e Williams Island Fm. 56f Murray Island Fm. 56g Moose River Fm. 56h Kwataboahegan Fm.

LOWER DEVONIAN

55 **Sandstone, dolostone, limestone** 55a Bois Blanc Fm.; Oriskany Fm. 55b Stooping River Fm. 55c Sextant Fm.

SILURIAN

UPPER SILURIAN

54 **Limestone, dolostone, shale, sandstone, gypsum, salt** 54a Bass Islands Fm. 54b Bertie Fm. 54c Salina Fm. 54d Kenogami River Fm. (Upper Silurian to Lower Devonian)

MIDDLE AND LOWER SILURIAN

53 **Sandstone, shale, dolostone, siltstone** 53a Guelph Fm. 53b Lockport Fm. 53c Amabel Fm. 53d Clinton Gp.; Cataract Gp. 53e Thorold Fm.; Earlton Fm. 53f Wabi Gp. 53g Attawapiskat Fm. 53h Ekwan River Fm. 53i Severn River Fm.

ORDOVICIAN

UPPER ORDOVICIAN

52 **Shale, limestone, dolostone, siltstone** 52a Queenston Fm. 52b Georgian Bay Fm.; Blue Mountain Fm.; Billings Fm.; Collingwood Mb.; Eastview Mb. 52c Liskeard Gp. 52d Red Head Rapids Fm. 52e Churchill River Gp. 52f Bad Cache Rapids Gp.

MIDDLE ORDOVICIAN

51 **Limestone, dolostone, shale, arkose, sandstone** 51a Ottawa Gp.; Simcoe Gp.; Shadow Lake Fm. 51b Chazy Gp., Rockcliffe Fm.

LOWER ORDOVICIAN

50 **Dolostone, sandstone:** Beekmantown Gp.

CAMBRIAN

49 **Conglomerate, sandstone, shale, dolostone:** Potsdam Gp.; Nepean Fm., Covey Hill Fm.

PRECAMBRIAN[d]

GRENVILLE PROVINCE[e]

PROTEROZOIC

NEO– TO MESOPROTEROZOIC (0.57 to 1.6 Ga)

48 **Tectonite unit:** tectonites, straight gneisses, porphyroclastic gneisses, unsubdivided gneisses in major deformation zones, myonites, protomylonites

CENTRAL METASEDIMENTARY BELT

47 **Late felsic plutonic rocks[f]:** granodiorite, granite, syenite, pegmatite, alkalic granite, migmatitic gneisses

46 **Matic to ultramatic plutonic rocks[f]:** diorite, gabbro, peridotite, pyroxenite, anorthosite, derived metamorphic rocks

45 **Alkalic plutonic rocks:** nepheline syenite, alkalic syenite, tenite; associated matic, ultramatic and carbonatitic rocks

44 **Early felsic plutonic rocks[f]:** granodiorite, tonalite, monzogranite, syenogranite; derived gneisses and migmatites

GRENVILLE SUPERGROUP AND FLINTON GROUP[g]

43 **Carbonate metasedimentary rocks:** marble, calc-silicate rocks, skarn, tectonic breccias

42 **Clastic metasedimentary rocks[f]:** conglomerate, wacke, quartz arenite, arkose, limestone, siltstone, chert, minor iron formation, minor metavolcanic rocks

41 **Matic to felsic metavolcanic rocks:** flows, tuffs, breccias, minor iron formation, minor metasedimentary rocks; includes reworked pyroclastic units, amphibolite

MESOPROTEROZOIC (0.9 to 1.6 Ga)

CENTRAL GNEISS BELT

40 **Felsic igneous rocks:** tonalite, granodiorite, monzonite, granite, syenite; derived gneisses

39 **Anorthosite and alkalic igneous rocks:** anorthosite, anorthositic gabbro, gabbro and related gneisses, nepheline syenite, alkalic syenite

38 **Migmatitic rocks and gneisses of undetermined protolith:** commonly layered biotite gneisses and migmatites; locally includes quartzofeldspathic gneisses, orthogneisses, paragneisses

37 **Matic rocks:** amphibolite, gabbro, diorite, matic gneisses

36 **Gneisses of metasedimentary origin:** quartzofeldspathic gneisses, pelitic to semi-pelitic gneisses, calc-silicate gneisses, minor quartzite, minor marble and marble breccia

SOUTHERN[h] AND SUPERIOR PROVINCES

EARLY PALEOZOIC TO NEOPROTEROZOIC (0.45 to 0.9 Ga)

35 **Carbonatite–alkalic intrusive suite (430 to 600 Ma):** carbonatite, nepheline syenite, alkalic syenite, jolite, tenite; associated matic and ultramatic intrusions

35a Intrusions of uncertain age

34 / **Matic intrusive rocks[i]**

34a *Grenville swarm (~575 Ma):* diabase dikes

34b *Frontenac swarm (850 to 900 Ma):* diabase dikes

34c Gabbro, diorite, ultramatic rocks, granophyre

PROTEROZOIC

MESOPROTEROZOIC (0.9 to 1.6 Ga)

UPPER KEWEENAWAN SUPERGROUP (~1090 Ma)

33 **Jacobsville Gp.; Oronto Gp.:** sandstone, shale, conglomerate

INTRUSIVE ROCKS

32 **Carbonatite–alkalic intrusive suite (1.0 to 1.2 Ga):** carbonatite, nepheline syenite, alkalic syenite, jolite, tenite; associated matic and ultramatic rocks

31 / **Matic and related intrusive rocks (Keweenawan age)[j]**

31a *Logan and Nipigon sills (1109 Ma):* diabase sills

31b *Pigeon River and Pukaskwa swarms:* diabase dikes

31c Ultramafic, gabbroic and granophyric intrusions

31d Felsic to intermediate intrusive rocks

31e *Abitibi swarm (1141 Ma):* diabase dikes

30 / **Matic intrusive rocks[j]**

30a *Mackenzie swarm (1267 Ma):* diabase dikes

30b *Sudbury swarm (1238 Ma):* diabase dikes

MIDDLE AND LOWER KEWEENAWAN SUPERGROUP (1086 to 1107 Ma)

29 **Osler Gp.; Mamainse Point Fm., Michipicoten Island Fm.**

29a Basalt and associated conglomerate and arkose

29b Rhyolite, quartz feldspar porphyry; associated conglomerate and arkose

28 **Sibley Gp.:** conglomerate, sandstone, shale

MESO– TO PALEOPROTEROZOIC (0.9 to 2.5 Ga)

27 **Felsic intrusive rocks**

27a Granite, alkali granite, granodiorite, quartz feldspar porphyry; minor related volcanic rocks[k] (1.4 to 1.5 Ga)

27b Killarney monzogranite and granitic rocks[k] (1.7 and 1.4 Ga)

27c Intermediate to felsic volcanic rocks[k] (1.8 to 1.9 Ga)

PALEOPROTEROZOIC (1.6 to 2.5 Ga)

26 **Sudbury Igneous Complex (1850 Ma):** norite, gabbro, granophyre

25 **Whitewater Gp.:** [l] fragmental rocks, mudstone, wacke

24 **Carbonatite–alkalic intrusive suite (ca. 1.9 Ga):** carbonatite, nepheline syenite, alkalic syenite, jolite, tenite; associated matic and ultramatic rocks

23 / **Matic intrusive rocks[l]**

23a *Molson swarm (1884 Ma)* diabase dikes; and *Sutton Inlier:* diabase sills

23b *Wabigoon swarm:* diabase dikes

23c *North Channel swarm:* diabase dikes

22 **Sedimentary rocks**

22a *Animikie Gp.*[m]: wacke, shale, iron formation, limestone, minor volcanic rocks

22b *Sutton Inlier:* dolostone, chert breccias, argillite, wacke, conglomerate, iron formation

21 / **Mafic and related intrusive rocks[l]**

21a *Preissac swarm:* diabase dikes

21b *Marathon swarm:* diabase dikes

21c *Kenora–Fort Frances swarm:* diabase dikes

21d *Nipissing sills (2219 Ma):* diabase sills, dikes and related granophyre

21e Matic dikes and plutons of uncertain age

20 **Felsic intrusive rocks (Murray Granite 2388 Ma, Creighton Granite 2333 Ma):** granite

HURONIAN SUPERGROUP (2.2 Ga to 2450 Ma)

19 **Cobalt Gp.**[n]: conglomerate, wacke, arkose, quartz arenite, argillite

18 **Quirke Lake Gp.; Hough Lake Gp.; Elliot Lake Gp.**

18a Conglomerate, wacke, arkose, quartz arenite, argillite, limestone, dolostone

18b Volcanic rocks of the Elliot Lake Gp.

INTRUSIVE ROCKS

17 / **Matic and ultramatic intrusive rocks**

17a *Matachewan and Hearst swarms (2454 Ma)*[o]: diabase dikes

17b Gabbro, anorthosite

SUPERIOR PROVINCE

ARCHEAN

NEOARCHEAN (2.5 to 2.9 Ga)

16 **Diorite–nepheline syenite suite**[p,h]: pyroxenite, diorite, monzonite, syenite, nepheline syenite (saturated to undersaturated suite)

NEO– TO MESOARCHEAN (2.5 to 3.4 Ga)[q][r][s]

INTRUSIVE ROCKS

15 **Massive granodiorite to granite:** massive to foliated granodiorite to granite

15a Potassium feldspar megacrystic units

14 **Diorite–monzonite–granodiorite suite:** diorite, tonalite, monzonite, granodiorite, syenite and hypabyssal equivalents (saturated to oversaturated suite)

13 **Muscovite-bearing granitic rocks:** muscovite-biotite and cordierite-biotite granite, granodiorite-tonalite

12 **Foliated tonalite suite:** tonalite to granodiorite—foliated to massive

11 **Gneissic tonalite suite:** tonalite to granodiorite—foliated to gneissic—with minor supracrustal inclusions

10 **Mafic and ultramatic rocks**[q]: gabbro, anorthosite, ultramatic rocks

SYMBOLS

Geological boundary

Fault (traceable on surface, concealed, or subsurface)

Iron formation

Granulite facies

International boundary

Interprovincial boundary

District, County boundary

Geographic township boundary (surveyed, unsurveyed)

Railway

Multilane highway

King's highway

Secondary highway

Elevation (land, water) 585m 184m

The positions of all boundaries and surveyed lines are approximate.

[a] *The letter "G" preceding a map unit number indicates lithologic information interpreted from geophysical data.*

[b] *Phanerozoic stratigraphic nomenclature varies in the level of detail to match the variable level of detail displayed on the map face.*

[c] *Unassigned.*

[d] *Subdivisions of Precambrian geologic time and units characterized by a range of ages are cited in terms of Ga. The subdivisions of geologic time correspond to international standards as described in the marginal notes. All ages of individual units cited in the legend are based on high precision U/Pb zircon ages, and are cited in terms of Ma.*

[e] *Granulite grade units are shown by screened overprint.*

[f] *The rocks of the Central Granulite Terrane in Quebec are coded in a lithologic sense only and represent units of ca. 1050 to 1150 Ma in age. Equivalents of these rocks are not known to be present in Ontario.*

[g] *Rocks in these groups are subdivided lithologically. The order does not imply age relationship within or among groups.*

[h] *This part of the legend describes Proterozoic units of the Southern Province, and those Proterozoic units within the Superior Province. Most diabase dikes and alkalic intrusive rock map units listed for the Grenville Province cut Grenville and Southern provinces; therefore, they are listed in the Southern Province part of the legend.*

[i] *A generalized distribution of diabase dikes is shown. Some individual swarms occur in more than one geological province.*

[j] *This unit has a geographic distribution from the west shore of Lake Nipigon to the north shore of Lake Huron, including the Cutler, Chief Lake, Croker Island, English Bay and Manitoulin granites.*

[k] *This unit includes the Killarney and related granitoids and equivalent metavolcanic units, as well as the Killarney area granitoids.*

[l] *This unit includes the Chelmsford, Onwatin and Chaping formations.*

[m] *This unit includes the Gunflint and Rove formations.*

[n] *This unit includes the Gowganda, Lorrain, Gordon Lake and Bar River formations.*

[o] *This unit was formerly classified as Algoman and/or Laurentian. Units 13, 14 and 15 are mainly Neoarchean except in areas of the Sachigo Subprovince, where some examples of Mesoarchean age occur.*

[p] *The intrusive rocks of Archean age range from approximately 2.65 Ga to 2.2 Ga.*

[q] *This unit was formerly classified as Haileyburian.*

[r] *This unit was formerly classified as Timiskaming. This unit comprises fluvial to marine metasedimentary rocks with minor, commonly alkalic, metavolcanic rocks which locally unconformably overlie units 1 to 6. They have generally only undergone the late deformation common in greenstone belts.*

[s] *These units are shown only in the English River and Quetico subprovinces.*

[t] *This unit was formerly classified as Keewatin. Most of these sequences range in age from 2.7 Ga to 2.8 Ga based on U/Pb zircon ages.*

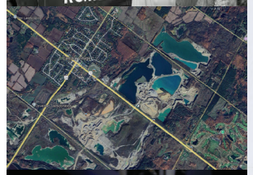
[u] *These units are large enough to show at the map scale only within the Abitibi Subprovince, forming the Blake River Group and units south of Lake Abitibi.*

[v] *The units under this heading include those greenstone belts which are older than 2.9 Ga based on U/Pb zircon chronology. All other Archean greenstones have been placed in the Neo– to Mesoarchean subdivision of the legend.*

[w] *This unit comprises those greenstone sequences in which shallow-water supermature sediments (quartz arenites, shallow water carbonates) have been identified. This type of unit unconformably overlies older greenstone rocks in the Shesprock Lake area, and older greenstones in the North Caribou Lake area.*

CONN SMYTHE GRAVEL COMPANY, CALEDON







ELLORA QUARRY ALORA



LAFARGE PIT PARIS



ONTARIO
DEPARTMENT OF MINES
HON. G. C. WARDROPE, *Minister of Mines*
D. P. Douglass, *Deputy Minister* M. E. Hurst, *Director, Geological Branch*

Map 2038

Sand and Gravel Pits in Southern Ontario

Scale 1:1,013,760 or 1 inch to 16 Miles

GLEN QUARRY OTTAWA



CHRISTIE PIT TORONTO



ROYAL BOTANICAL GARDEN



PARR LAKE BRAMPTON



PROF. LAKE BRAMPTON



CAPITAL PAVING PUSLINCH



VINELAND QUARY LINCOLN



LAFARGE PIT FONTHILL



LEGEND

Kame moraines.
Spillways.
Eskers.
Abandoned beaches and shorelines.

SOURCES OF INFORMATION

Compilation by D. F. Hewitt and P. F. Karrow, 1961, 1962.

Glacial features after L. J. Chapman and D. F. Putnam, "Physiography of Southern Ontario", University of Toronto Press, 1951.

Cartography by A. Sedlinieks, Ontario Department of Mines, 1962.

Base map derived from Map 1957A, Ontario Department of Mines.

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11. Clarkson Sand and Gravel Ltd. ..... R 14
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119. Lot 1, Con. V, Loughborough Township .. R 13
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155. Lorne Totten ..... U 12
156. G. M. Johnston ..... U 12
157. A. L. Gould ..... W 12
158. Moss pit, Coleman Munro Ltd. ..... W 12
159. NYC pit, Coleman Munro Ltd. ..... W 12
160. Cornwall Gravel Co. ..... W 12
161. Guelph Sand and Gravel Ltd. ..... Q 14
162. Marden Sand and Gravel ..... Q 14
163. Fenwell Ltd. ..... Q 14
164. Martlin Sand and Gravel Ltd. ..... Q 14
165. Preston Sand and Gravel Co. Ltd. ..... Q 14
166. Warren Bituminous Paving Co. Ltd. ..... Q 14
167. Durham Stone and Gravel Ltd. ..... P 13
168. Junior Excavating ..... P 13
169. F. C. King Contracting Ltd. ..... P 13
170. Frank King Ltd. ..... P 13
171. John H. McIlwain ..... P 14
172. Dennis pit ..... Q 14
173. Wight Sand and Gravel ..... Q 14
174. Consolidated Sand and Gravel Ltd. ..... Q 14
175. Consolidated Sand and Gravel Ltd. ..... Q 14
176. Telephone City Gravel Co. Ltd. ..... Q 14
177. Flintkote Co. of Canada Ltd. ..... Q 14
178. Brown Sand and Gravel ..... Q 14
179. Dalkeith Sand and Gravel Ltd. ..... Q 14
180. Burford Sand and Gravel ..... Q 14
181. Waterford Sand and Gravel ..... Q 14
182. Robertson Sand and Gravel Ltd. ..... Q 14
183. A. Walker ..... Q 14
184. Oxford Sand and Gravel Ltd. ..... Q 14
185. G. B. Thornton ..... Q 14
186. Tree Sand and Gravel ..... Q 14
187. Dunn's Haulage ..... Q 14
188. R. A. Shelton and Sons ..... Q 15
189. R. S. Clark and Son Ltd. ..... Q 14
190. E. and E. Seagmiller, Faye pit ..... Q 14
191. Glendale Sand and Stone Ltd. ..... Q 14
192. McLaws Gravel and Crushing Ltd. ..... P 15
193. Bannockburn Farms ..... Q 14
194. K. R. Axford ..... P 15
195. Lake Erie Sand and Gravel Co. ..... P 15
196. Doey Gravel and Construction Ltd. ..... N 15
197. C. F. Huffman ..... P 15
198. Johnson and Moulton ..... P 15
199. Thames Valley Greens Co. ..... P 15
200. Adams Sand and Gravel Ltd. ..... N 15
201. J. R. Nash and Son Ltd. ..... N 15
202. Chatham Sand and Gravel ..... P 15
203. Spinks Gravel Ltd. ..... P 15
204. Woolaet Industries Ltd. ..... P 15
205. Grayden Laing ..... P 14
206. Kemsley and Boyer Gravel ..... P 14
207. Edson Construction Ltd. ..... N 14
208. Edgewater Construction Co. Ltd. ..... N 14
209. Max. Campbell ..... P 14
210. A. Newbigging ..... P 15
211. W. Tunks ..... P 15
212. Fryer pit ..... P 15
213. J. F. Marshall and Sons Ltd. ..... P 14
214. Riverside Construction Co. Ltd. ..... P 14
215. Towland Construction Ltd. ..... P 14
216. McNamara Construction Hart pit ..... P 14
217. C. McRae Ltd. ..... P 15
218. Dibblee Construction Co. Ltd. ..... Y 12
219. Chas. Burnside Ltd. ..... V 13
220. South Mountain Construction Co. ..... V 12
221. Francheschini Brothers Construction Ltd. .. R 14
222. Mineral Industries Sand and Gravel Ltd. ... R 14
223. Mineral Industries Sand and Gravel Ltd. ... R 14
224. John B. Regan Co., Miller Paving ..... R 14
225. John B. Regan Co. ..... R 14
226. John B. Regan Co. Ltd. ..... R 14
227. Baxter Sand and Gravel ..... R 14
228. Ace Sand and Gravel ..... R 14
229. Consolidated Sand and Gravel Ltd. ..... R 14
230. W. R. Greeniey Construction Co. ..... R 14
231. Brooks pit ..... R 14
232. Sherman Sand and Gravel Ltd. ..... R 14
233. Highland Creek Sand and Gravel Ltd. ..... R 14
234. Crawford Sand and Gravel Ltd. ..... R 14
235. Highland Creek Sand and Gravel Ltd. ..... R 14
236. Gormley Sand and Gravel Ltd. ..... R 14
237. Lot 28, Con. VI, East Gwillimbury Township . R 14
238. Miller Paving Ltd. ..... R 14
239. Highland Creek Sand and Gravel Ltd. ..... R 14
240. Huron Concrete Supply Ltd. ..... R 14
241. Huron Concrete Supply Ltd. ..... P 14
242. Lavis Contracting Co. Ltd. ..... P 14
243. Francheschini Brothers Construction Ltd. .. R 14
244. Aiken Sand and Gravel ..... R 14
245. Gilbert Young ..... R 14
246. J. A. Thompson ..... R 12
247. G. A. Wilkinson ..... R 14
248. Armstrong Brothers Co. Ltd. ..... R 14
249. Livingston Sand and Gravel ..... R 14
250. R. H. Black ..... R 13
251. Lot 20, Con. II, Scott Township ..... R 13
252. Uxbridge Sand and Gravel ..... R 13
253. W. Finch and Sons ..... R 12
254. Fowler Construction Co. Ltd. ..... R 12
255. Fowler Construction Co. Ltd. ..... R 12
256. Fowler Construction Co. Ltd. ..... R 12
257. R. Buschleck ..... R 12
258. Hall's pit ..... Q 12
259. Bee Jay Sand and Gravel ..... R 14
260. Taylor pit ..... S 13
261. Pax Sand and Gravel ..... S 13
262. Harnden and King Construction Ltd. ..... S 13
263. Harnden and Grier Construction Ltd. ..... S 13
264. J. G. Eagleson ..... S 13
265. Frank Griffin Haulage ..... S 13
266. Coon Brothers ..... R 13
267. A. R. Ferguson ..... R 13
268. Alfred Parton ..... R 12
269. C. D. Lawrence ..... R 12
270. R. Hammell ..... R 12
271. Patterson pit ..... R 14
272. H. J. McFarland Construction Co. ..... R 14
273. Norton Sand and Gravel ..... R 13
274. W. Hargreaves ..... S 13
275. S. A. Price ..... S 13
276. Sharpe Brothers ..... S 13
277. Toyne and Son ..... S 13
278. R. Lightbody ..... S 13
279. Albert Strachen ..... R 13
280. Mel Browning ..... R 13
281. R. W. Meyers ..... S 13
282. Smith Construction Co. ..... V 13
283. Stewart and Broad Construction Co. ..... V 13
284. George A. Jackson ..... S 13
285. R. R. Foster and Sons Ltd. ..... R 15
286. Barnes Gravel Supplies ..... N 15
287. Carpenter Sand and Gravel ..... Q 13
288. Collingwood Sand and Gravel ..... Q 13
289. R. A. Conway ..... Q 13
290. Cookson Construction Ltd. ..... Q 13
291. Erie Sand and Gravel ..... Q 13
292. E. S. Hoffer and Sons ..... Q 14
293. Huron Construction Co. Ltd. ..... P 15
294. Huron Construction Co. Ltd. ..... P 15
295. Huron Construction Co. Ltd. ..... P 15
296. Cecil S. Keyes ..... Q 14
297. Angelstone Ltd. ..... Q 14
298. Harold Martin Construction Ltd. ..... Q 14
299. Patterson Brothers ..... P 14
300. Carl West Sand and Gravel ..... N 14
301. Gordon Wiseman Ltd. ..... Q 14
302. W. J. Wright ..... P 15
303. A. F. Hamilton ..... Q 14
304. Lasby Sand and Gravel ..... Q 14
305. John N. Corbett Gravel Supply ..... Q 15
306. Edwin Nichols Gravel Supply ..... Q 15
307. Joseph E. Kerr ..... Q 14
308. Jack Lake Construction Ltd. ..... P 14
309. Langdon Manufacturing Co. ..... P 14
310. B. McCue ..... P 14
311. Ridley Construction ..... P 15
312. Schneider Sand and Gravel ..... P 14
313. F. A. Stonehouse ..... P 15
314. R. L. Strickler ..... Q 14
315. L. H. Turnbull and Son ..... P 14

2.2 PAST AND PRESENT LIFE OF A GRAVEL PIT

The social and ecological dynamics of gravel mining become exceptionally evident, when one tracks the end-of-life transitions of gravel pits to understand their full life cycle. While enabling the suburban growth paradigm, these extraction sites themselves often become zones of urban expansion. Gravel mining disrupts local ecosystems and alters the natural balance of soil and water. When rehabilitation is insufficient, the land rarely regains its original productivity and is often relegated to unproductive pasture. This has prompted a growing call, echoed in national media, to repurpose these sites for housing. The proposed development at the Byron Pit in London, and the ensuing local backlash, underscores the intertwined ecological and affordability crises of conventional single-family suburban models. In cases where development has occurred, as in Professor Lake near in Brampton, it is often driven by profit models that result in homogeneous housing types clustered around large recreational lakes. These processes flatten the surface of the pit to conceal the scars of extraction, replacing ecological memory with multi-million-dollar private waterfront properties.

Figure 2.3

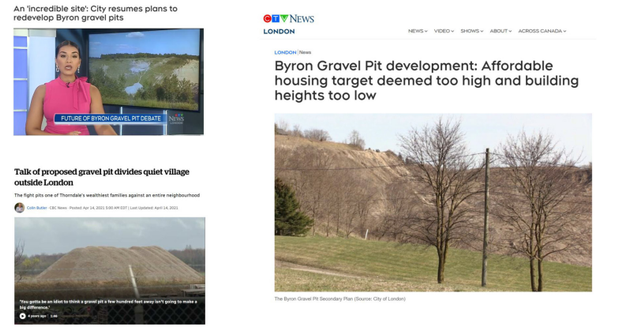
Municipality of London, Ontario proposes housing on the Byron gravel pit (CTV News)

Figure 2.3

Satelite view of Byron gravel pit, London, Ontairo

Figure 2.3

Proffesor pit already cnverted to suburban housing with a filling water into the pit to form a lake. (TOARC)







2.3 EXTRACTION LEGACIES

This thesis introduces the term *ruin nullius* to describe a specific condition found in post-extraction landscapes, such as gravel pits, quarries, and tailings sites. Where abandonment is not simply a matter of disuse, but a deliberate withdrawal of responsibility, value, and care. The term builds upon the colonial fictions of *terra nullius* – "land belonging to no one". A concept settlers used to justify the occupation of Indigenous territories in Canada by framing them as empty, unused, and therefore open for appropriation. This logic erased existing relationships between people, land, and more-than-human ecologies, casting dynamic and storied landscapes as blank slates[26]. Today, a similar mindset underlies how we treat resource-rich lands across the country: as extractive frontiers to be used until depleted, then left to deteriorate. *Ruin nullius* names this afterlife of exploitation. This is where sites shaped by intense use are subsequently abandoned or sit in a limbo awaiting land speculation. By extending the logic of terra nullius into the present, *ruin nulius* reveals how these mining landscapes continue to be disposed first of meaning, then of care. This reframing of mining landscapes resists the conventional tendency to view them as blank slates or '*tabula rasa*' - 'sites where anything is possible and history can be overwritten. Instead, it positions them as landscapes of responsibility, where the legacies of extraction must be confronted and future interventions are grounded in care, accountability, and ecological entanglement.

This shift in perspective also reveals the deeper structures that shape land-use change and post-extraction redevelopment, in Canada and globally. Systems of governance, policy, and power that determine how land is managed before, during, and after extraction.

26 Scott, Outlaw Territories : Environments of Insecurity/Architectures of Counterinsurgency.

These are deeply rooted in the country's colonial legacy and lineage of extractive statecraft. The change in land use and repurposing of these landscapes reveal a deeper structure of control, one that is shaped by Canada's colonial legacy and extractive statecraft. The annotated life cycle diagram shows the probabilities of gravel end use, based on the Aggregate resource Act of 1990. While it may appear to be a product of neutral administrative authority, it is rooted in centuries-old legacies of land seizure, religious sanction, and racial domination. What is framed as pragmatic development often masks a history of dispossession and urban planning designed to benefit the settler majority. These duplicitous natures and architectures have sustained influence for centuries now, in Canada and around the world. Cloaked in the white space of an extensive bureaucratic system of centralized state regime, racial supremacy, police enforcement, planned settlement, metropolitan concentration, Indigenous assimilation, and corporate transnationalism[27]. Though the figures of power may have changed, the machinery remains intact, now operated by corporate actors, planners, and policymakers who continue to shape land through financial and legal mechanisms.

To critique and unravel these Neo liberal extractive practices, Elizibeth Povinelli introduces the concept of Geontopower[28], which she contrasts with biopower. While biopower governs life and death, geontopower regulates the distinction between Life and Nonlife. By questioning this boundary between life and nonlife, gravel pits are often dismissed as inert, abandoned voids which can be reimagined as ecologically vital. Their ruinous condition often renders them invisible or undesirable, yet they hold the latent potential to shift paradigms. Like Povinelli's figure of the Desert, which dramatizes the space "where life was, is not now, but could be,"

27 Belanger, Extraction Empire, 24.
28 Povinelli, Geontologies.

LIFECYCLE OF GRAVEL PIT

FARMLAND:
Gravel pits in Ontario are increasingly being developed on some of the province's most fertile and productive farmland. This is a significant concern because Ontario's prime farmland, particularly in the southern part of the province, is a non-renewable resource.
Source:

1

EXCAVATION PHASE:
Gravel pits begin with the excavation of unconsolidated aggregates such as sand and gravel. This phase involves significant land modification, leading to the creation of a pit or quarry. The primary goal is to access and extract the resources. Amendment Reference: 1996, c. 30, s. 1 (R.S.O. 1990 c. A.8).

2

OPERATION AND MANAGEMENT:
During the operational phase, aggregate resources are continuously extracted, processed, and removed from the pit. This phase continues until the gravel pit is no longer economically viable or the resources are depleted.
Amendment Reference: 2017, c. 6, Sched. 1, s. 1.

3

IN-TERIM ACTIVITIES
- Concrete Batching Plant
- Warehouse + Parking
- Farmland

[As defined in the Siteplan submitted for review]

PROGRESSIVE REHABILITATION:
Rehabilitation starts during active extraction. As parts of the pit are no longer used, they are gradually restored to their natural state or a new use, like agriculture, recreation, or wildlife habitats, minimizing disturbed areas.
Amendment Reference: 1996, c. 30, s. 4 (R.S.O. 1990 c. A.8), 2017, c. 6

4

LACK OF OVERSIGHT
There are no stipulations for Progressive rehabilitation, it is denoted as Good industry practice.

If land left unrehabilitated, MNRF can undertake rehab and Liscence holder will foot the bill.

FINAL REHABILITATION:
Once all excavation and progressive rehabilitation activities are complete, final rehabilitation takes place.This phase seeks to fully restore the land to either its pre-excavation condition or to another compatible use in line with neighboring land functions, such as creating parks, wetlands, or forests.

5a

UNPRODUCTIVE LAND
The gravel extraction disrupt ecosystems and can alter the natural soil, water balance. Rehabilitation efforts, when insufficient, fail to return the land to its original productive state ending up as feeding pastures.

WATER FEATURE:
Filling a gravel pit with water for rehabilitation is problematic because it permanently changes the land, making it unusable for agriculture. This method leads to a loss of arable land, as ponds or lakes replace the productive farmland.
Awa, S. H., & Hadibarata, T. 2020

5b

REDUCED BIODIVERSITY
& PERMANENT ALTERATION
OF LAND STRUCTURE

GOLF COURSE:
Rehabilitating doesn't restore the ecology. Golf courses often require extensive landscaping, irrigation, and chemical use (fertilizers and pesticides), which can negatively affect the surrounding environment. This approach is often seen as a superficial fix.
Mulamoottil, G., & Farvolden, R. (1975)

5c

ARTIFICIAL LANDSCAPE
& LOSS OF ECOLOGY

Suburban development:
Gravel pits converted into housing developments are often unsustainable due to fully paved surfaces that block water infiltration and disrupt natural hydrology. This reduces groundwater recharge and limits biodiversity. Sustainable development requires green infrastructure, permeable surfaces, and designs focused on enhancing ecosystems.
Roots, B. I., Heidenreich, E., & Chant, (1999)

5d

1.Aggregate Resources Act, R.S.O. 1990, c. A.8
2.Awa, S. H., & Hadibarata, 2020. Revegetation and ecosystem reclamation of post-mined land, 11-19.
3.Mulamoottil, G., & Farvolden, (1975). Planning for the rehabilitation of gravel pits. 432-444.

These sites suggest that Life is always at risk from the slow creep of Nonlife. But what if these pits, by virtue of holding water, could reverse that logic? Rather than marking lifelessness, they could become sites of regeneration insted of rehabilitation.

The nuanced difference lies in how *regeneration*, unlike conventional *rehabilitation*, invites a deeper form of care. One that is not merely cosmetic or symbolic but materially entangled with ecological productivity and social reciprocity. Rather than covering over extraction scars with surface-level greenery, regeneration supports landscapes that are biodiverse, hydrologically responsive, and capable of contributing to food systems through naturalized, polycultural forms of farming attuned to present and future needs. It also differs from current suburban and landscape planning. Which often prioritizes control, uniformity, and aesthetic order over ecological complexity, permeability, and multifunctional use.

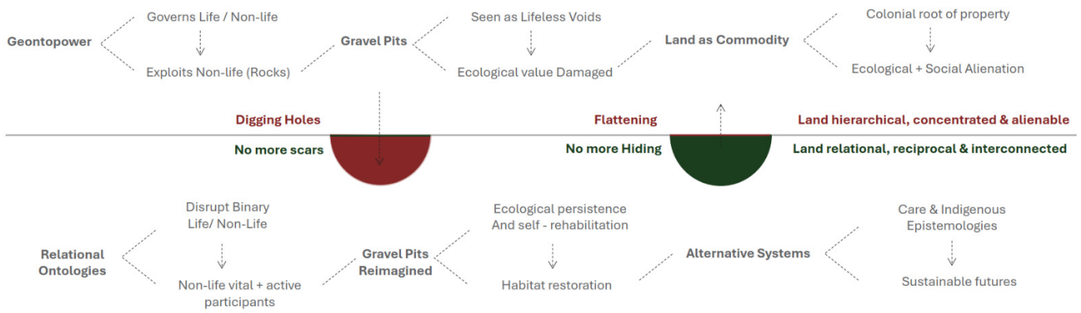


Figure 2.4

Annotated Life cycle of a gravel pit

Figure 2.5

Theoretical diagram to explain anti-flattening paradigmn as a counter-capitalist response.

2.4 TOWARDS A BLUE QUARRY BELT

Reframing here should not only ecological but also relational. If we refuse the binary that renders such landscapes inert, we open the possibility for us to form ethical and affective relationships with them. To see these pits as capable of vitality is also to recognize that they can be cared for, held, and restored. In this sense, people are not merely observers of environmental decline but co-actors in a process of repair. reconnecting with damaged land through acts of stewardship. Within this framework, extraction sites cease to be scars to be flattened or concealed, they become agents in a new urban ecology of care, contributing to a broader vision of Blue Belt urbanism grounded in reciprocity, ecological consciousness, and the collective protection of By layering historical and speculative timelines, we begin to see the pit not as an endpoint, but as a temporal fragment within a longer cycle of transformation.

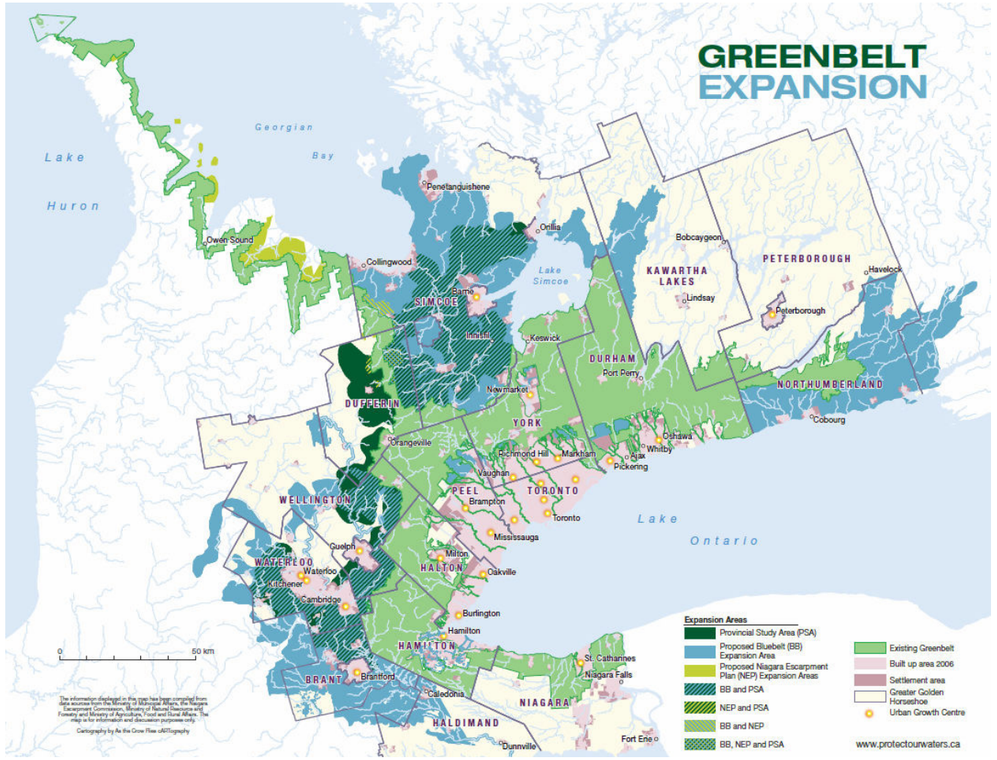


Figure 2.6

A proposed Greenbelt expansion, when viewed through the lens of Cambridge's gravel pits, can be interpreted as part of a broader Bluebelt landscape network
(Crow cartography)

CH 3 UNRAVELLING MINING & REHBABILITATION PRACTICES

It matters what thoughts think thoughts. It matters what knowledges know knowledges. It matters what relations relate relations. It matters what worlds world worlds. It matters what stories tell stories[29].

- Donna Haraway

3.1 MINE AS A SITE OF CONFLICT

From Caledon to Cambridge, one constant defines these extraction sites: conflict. News headlines frequently reflect the ongoing tension - “Aggregate giant taking Caledon to land tribunal over looming quarry battle” or “St. Marys CRM applies to expand the Dance Pit on Cedar Creek Road in Cambridge to within 200 feet of homes”, illustrating the friction between quarry operators pursuing expansion and communities striving to protect private property values, ecological integrity and public well-being.

These disputes are rooted not only in concerns over noise, air pollution, and environmental degradation, but also in the contested value of Ontario’s tier-1 farmland. Often the first to be sacrificed for gravel extraction or speculative development, this fertile land is vital to the province’s agricultural resilience. Local farmers emphasize its importance, contrasting Southern Ontario’s rich soils and long growing seasons with the limited agricultural potential further north. Public outcry intensifies when municipalities appear to disregard their own prior land-use designations, allowing new mega-blasting quarries on lands previously committed to conservation or agricultural use. The result is a landscape shaped as much by political contradiction and public resistance as by geological process, revealing the mine not just as a site of resource extraction, but as a contested terrain of conflicting futures.

29 *Haraway, Staying with the Trouble.*

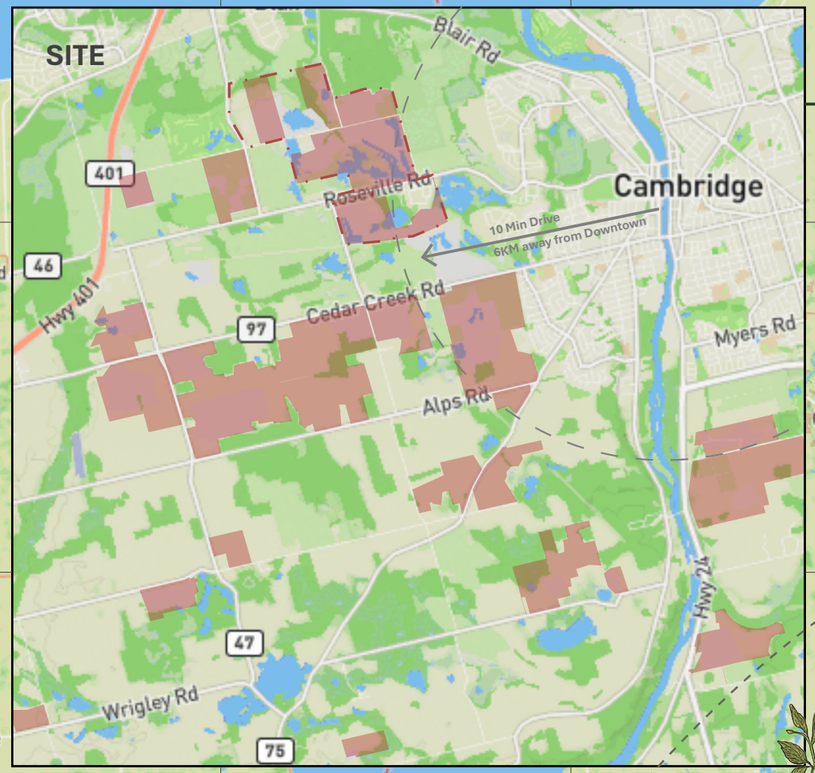
This growing pattern of land conversion raises deeper questions about long-term food sovereignty[30]. As farmland is incrementally lost to extraction, the capacity for local food production diminishes, undermining the resilience of regional food systems. While gravel is essential to urban growth, its extraction often displaces agricultural land that supports both livelihoods and sustenance. In areas like Chatham-Kent, known as Ontario’s “Vegetable Basket” for its high yields of tomatoes, peppers, and corn, or Norfolk County, a leading zone for orchards and tobacco farming, fertile land lies adjacent to expanding zones of extraction. Similarly, in Cambridge, Class 1 soils near Cedar Creek are quarried for aggregates used in road construction and urban development to fulfil the needs of growing megalopolis of greater Toronto area.

This trade off becomes even more precarious in the context of rising food insecurity across Canada, with one in five households now reporting some level of food insecurity[31], exacerbated by inflation and fragile global supply chains. Between 2016 and 2021, nearly 5,000 mid-sized farms (130,120 acres) disappeared across the country, while the number of very large farms continued to rise, signalling a steady hollowing out of the mid-scale family farm, long the backbone of rural communities[32]. The loss of this agricultural middle ground, coupled with the degradation of fertile land near urban centres, reflects not just an environmental crisis, but a systemic unravelling of food visible.

Figure 3.1

Spatializing tentions between Farmland & Gravel extraction in Southern Ontario. Showing imporatn farmlands overlapped with important gravel excavation zones. (Author)

30 *Andraos and Wood, Above the Pavement-- the Farm! : Architecture & Agriculture at P.F.1.*
31 *Statistics Canada, “Canadian Income Survey.”*
32 *Canada’s National Farmers Union, How a Corporate Farmland Buy-up, Rising Farm Debt, and Agribusiness Financing of Inputs Threaten Family Farms and Food Sovereignty.*



Bruce and Grey

Owen Sound, Durham, and Chatsworth
Extensive limestone and gravel deposits supporting regional construction

Simcoe County

Barrie, Oro-Medonte, and Essa Township
Strong deposits of sand and gravel from glacial outwash plains
Serves construction needs in Toronto and surrounding areas

Holland Marsh

Near Bradford, known for vegetable farming due to its rich organic muck soil

Kawartha lakes & Peterborough

Bethany, Lindsay, and Douro-Dummer Township
Contains glacial till and high-quality sand and gravel

Caledon

One of the largest gravel-producing regions in Ontario
Major operations by Lafarge, Dufferin Aggregates, and CBM

Peel and Halton Regions

Historically rich in agriculture, though under pressure from urban expansion.

Perth and Huron Counties

Known for livestock, particularly hog and dairy farming, and field crops.

Cambridge

Features high-quality limestone and gravel deposits
Key operations: Milton Limestone Quarry (Dufferin Aggregates)

Waterloo and Wellington

Strong in dairy farming, cash crops, and Mennonite agricultural practices.

Niagara Escarpment

Hamilton, Dundas, Niagara Region
Dundas Quarry (Lafarge) is one of the largest in Canada
Produces high-quality crushed stone for road construction

Middlesex and Oxford

Major producers of corn, soybeans, and livestock.

London

Notable for limestone and aggregate production
Key suppliers: Lafarge, St. Marys Cement

Norfolk County

A leading area for horticulture, tobacco, ginseng, and fruit farming.

Chatham-Kent

Known as the “Vegetable Basket” of Ontario, producing tomatoes, peppers, and soybeans.

Niagara Peninsula

Famous for vineyards, orchards, and wineries, benefiting from a unique microclimate.

Major suppliers: Dufferin Aggregates (Aberfoyle Pit), CBM Aggregates (Cambridge Pits)
Supplies gravel for infrastructure projects in the GGHA

SPATIALIZING TENTIONS

Greval extraction vs Farmland Souther Ontario

- Important Farmlands of Souther Ontario
- Important Gravel extraction zones

The scars of extraction across Southern Ontario are inseparable from the longer histories of settler colonialism and land transformation. Canadian settler state capitalism, through its industries and land policies, asserted economic dominance by occupying and restructuring the territories of the Neutral, Anishinaabeg, and Haudenosaunee peoples. Situated within the Haldimand Tract, land promised to the Six Nations. The region saw its landscapes reorganized through surveying and parcelization into concession grids, facilitating resource extraction and agricultural commodification. Wheat plantations quickly displaced Indigenous co-operative farming systems, which had long sustained corn, beans, squash (the Three Sisters), and tobacco through rotational and communal cultivation. Settler agriculture rerouted natural water systems, and practices such as deforestation, monoculture wheat farming, and overplowing led to soil erosion and nutrient depletion. In doing so, settlers ignored the polycultural, adaptive land stewardship that Indigenous communities had developed over generations. The result is not only ecological degradation, but a profound and ongoing displacement of food sovereignty, where the logic of extraction continues to overwrite practices of care, interdependence, and sustainability embedded in the land.



Figure 3.5

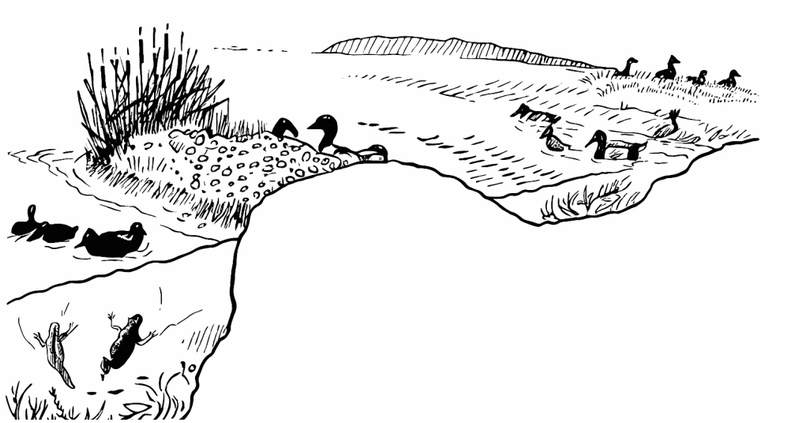
The image depicts the Minerals exhibit at the Great Exhibition of 1851
Source: David Carter

3.2 CASE STUDIES OF RADICAL REHABILITATION

The questions of land loss and agricultural displacement rarely reach the forefront of design thinking until after the extraction is complete. Often, it is only through the efforts of local residents, those who refuse to accept abandonment as a conclusion, or through government and philanthropic funding that a more radicle post-extraction rehabilitation begins to take shape. The Eden Project in Cornwall, UK, offers a notable precedent: situated in a clay pit mined for over 160 years, the site was transformed into a botanical and ecological education centre after the land was rendered unusable. Early construction faced major challenges, including severe flooding due to the pit lying 15 metres below the water table. An issue increasingly familiar in Ontario's decommissioned gravel pits. Arguably, to mitigate this it is better to allow for flooding to happen in a controlled way. That is the common practice due to which the only remnant of excavation – the lake is left behind.

Another project, which is local to Canada is developed by Williamson Chong architects. They speculated a more communityoriented and enterprising solution when they were approached with a reclamation project in Haliburton County, three hours north of Toronto. Though the project envisioned bold architectural pieces, like the modular greenhouse "Cradle," the towering "Food Spire," and a climateoptimized arc, to anchor a prototype village, its realized phase-to-date looks more modest and grounded in community agency. Since 2009, Abbey Gardens has transformed a former gravel pit into a 380acre environmental hub featuring a market garden, strawbale Food Hub with café and kitchen, Miyawaki miniforest restoration plots, heritage-breed animal programs, trails, and event facilities. What remains

unbuilt are the highconcept structures such as the Cradle and Food Spire described in the speculative master plan. Instead, the site's success lies in its incremental, communityled approach: reclaiming "carcass land" through modular foodgrowing infrastructure and social enterprise.









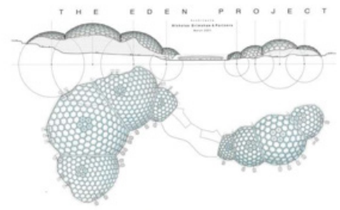






Figure 3.2

Case studies of gravel pit reclamation -
Eden Garden, Quarry in Cornwall, UK. (Left)

Figure 3.3

Quarry Park, community in Calgary, AB.

Figure 3.4

Abbey Gardens, gravel pit in Hilburn, ON.
(Bottom right)



3.3 QUARRY REHABILITATION STRATEGIES

Quarries, with their deep cuts and vertical voids, present not just spatial obstacles but territorial questions, how much should be reshaped, what deserves to remain exposed, and where interventions might seed new life. The investigative design process becomes a way of tracing over these wounds, laying bare both their violence and potential[33]. By mapping cases of global rehabilitation, from the vertical insertions of Quarry No.9 in China to the layered green roof of Nashan Geological Museum, the design process explores the spectrum between Remodelling (e.g., infill, transformation, insertion) and Not Remodelling (e.g., light interventions, integrations, ecological succession). These projects negotiate their terrain through differing intensities of terraforming: while some examples like Quarry Park in Calgary erase or camouflage the extraction scars other here emphasize them. The quarry becomes a stage where architectural decisions are inseparable from ecological and cultural stakes, demanding a reckoning with the scars[34], to find a way towards a healing process[35]. It is through this lens that I approached my own site, using drawing and modelling as tools to speculate on which parts to terraform, which to expose, and which to leave to time.

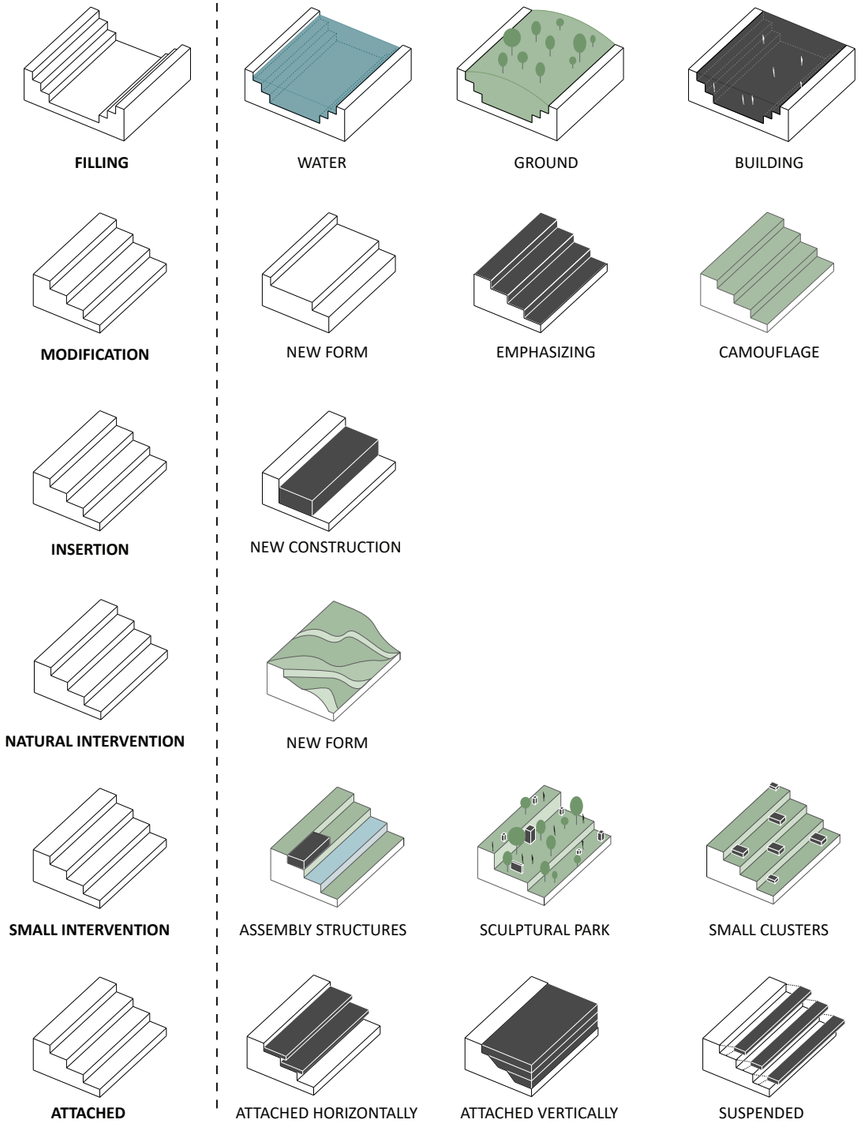


Figure 3.5

Typological Strategies for Quarry Rehabilitation
This section categorizes intervention approaches Remodelling - which transforms the quarry through filling, reshaping, or architectural insertion & Non-Remodelling - which emphasizes minimal alteration through natural regrowth, small structures, or edge attachments.

33 Berger, Designing the Reclaimed Landscape.
34 Przybylski and Sheppard, At Extremes.
35 Brugmans, Down to Earth : Designing for the Endgame : In View of the 9th Edition of the International Architecture Biennale Rotterdam September 2020 - August 2021.

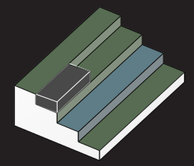
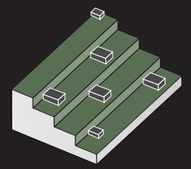
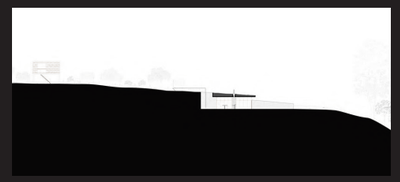
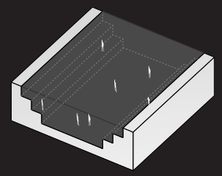
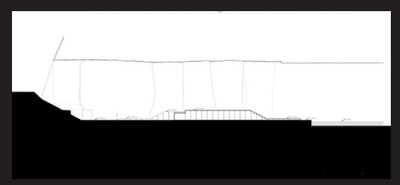
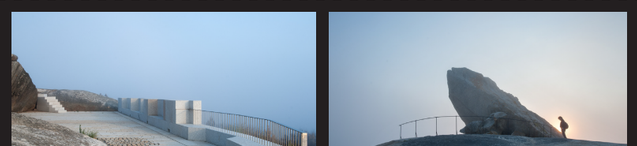
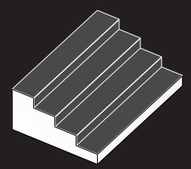
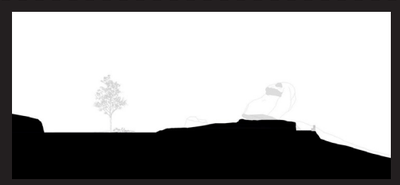
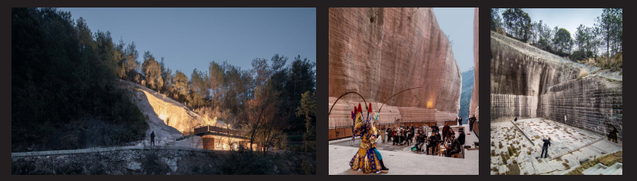
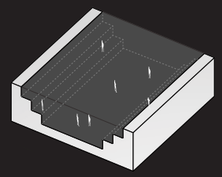
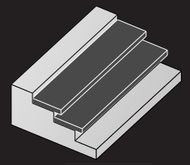
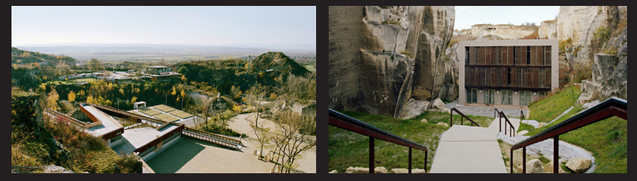
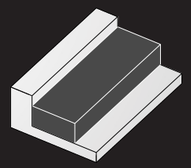
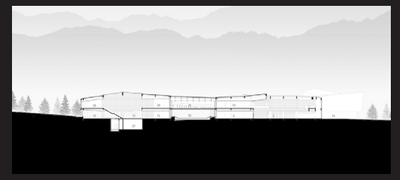
PROJECT INFORMATION	PHOTO	TYPOLOGY	SECTION
STONE NEST AMPHITHEATER Architect : 3andwich Design and He Wei Studio Area : Year : 2019 Location : China			
NASHAN GEOLOGICAL MUSEUM Architect : Xiamen Urban Environment Design & Engineering Area : Year : 2021 Location : China			
CAVE ARCARI Architect : David Chipperfield Architects Area : Year : 2018 Location : Italy			
PEDRA DA RA LOOKOUT Architect : Carlos Seoane Area : Year : 2016 Location : Spain			
QUARRY NO.9 Architect : DnA Area : Year : 2022 Location : China			
QUARRY NO.8 Architect : DnA Area : Year : 2022 Location : China			
ROMAN QUARRY Architect : AllesWirdGut Achitektur Area : Year : 2008 Location : Austria			

Figure 3.6

Built Case Studies Exemplifying Each Strategy
This section presents international case studies that embody the typologies shown on the left, including projects like Stone Nest Amphitheater (China), Cave Arcari (Italy), and Roman Quarry (Austria), illustrating how each design responds to the site's existing form through varied spatial, material, and architectural interventions.

3.4 DESIGN AS INQUIRY

This section begins from the premise that landscape are performative, more than aesthetic surfaces. They are shapd by layered, visible and invisible. processes over time. Drawing is positioned here not as a tool for imposing solutions, but as a method of inquiry[36]. Building on Ian McHarg's call in the 1970s for designers to respond to the dynamics of landscape systems, this approach departs from static design programs and embraces disturbance, flow, and change as generative forces. Contemporary practitioners such as Bas Smets extend this thinking through biospheric urbanism, reframing design as a speculative act in dialogue with climate, geology, and succession. Within this framework, the question becomes: *What remains of a landscape once it has been emptied*? - when the machines leave and the gravel is gone, we are left with a silence, a void stripped of soil, memory, and function. These section drawings trace a series of possible futures for such sites. They do not propose a definitive answer, but a provocation in what nature would do if left to regenerate. Some depict the slow return of life through natural processes: early signs of regrowth in a partially restored basin, or the full arc of ecological succession unfolding over four centuries. These are timelines beyond human planning, yet ones we must acknowledge. Complete self-restoration, while possible, proceeds at a geological pace. It invites patience but also raises the urgency of care. Left alone, these sites may heal, but incompletely, and not in time before they are devoured by market speculation.

Figure 3.7

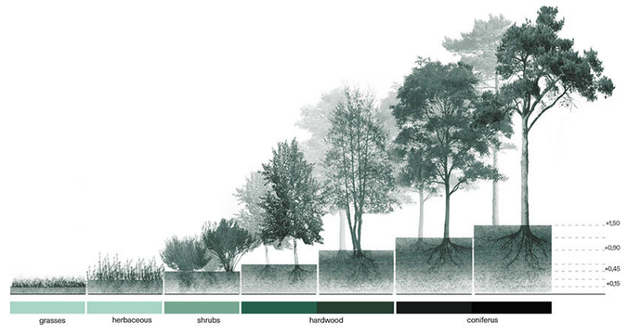
Ian McHarg, Dune Community Types, from Sea and Survival (1969) A sectional taxonomy of coastal vegetation, Maps plant communities adapted to shifting dune ecologies, illustrating how wind, salt, and topography determine patterns of resilience and succession.

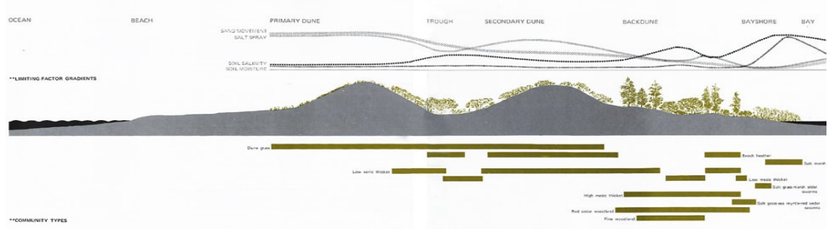
Figure 3.8

Bas Smets, Planting Section for Parc des Ateliers, Arles A contemporary strategy of ecological activation, Smets' section introduces a layered planting system over a desolate post-industrial landscape. Source: Bureau Bas Smets

36 *Mason and Sharr, Creative Practice Inquiry in Architecture.*

Other drawings reveal more immediate human responses, flattening the pit for agriculture or suburban housing. These interventions offer control, but often at the cost of further erasure. Rather than restore, they impose a new amnesia, sealing the scar without addressing its depth. But in the final scenario, a more attentive gesture emerges. Architecture is not imposed but embedded. Water is held rather than drained. Plant systems are guided rather than replaced. Here, human intervention becomes a form of ecological calibration, an attempt not to fix the land, but to listen to it, and to design with its memory in mind.





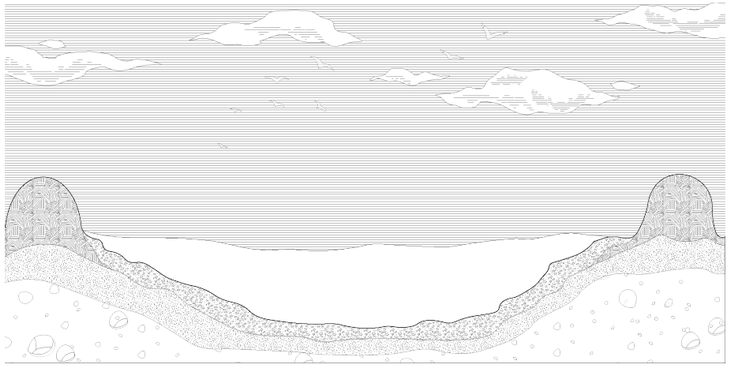


Figure 3.9

Initial extraction condition

A barren post-extraction landscape, the raw gravel pit remains exposed, lacking vegetation and ecological activity.

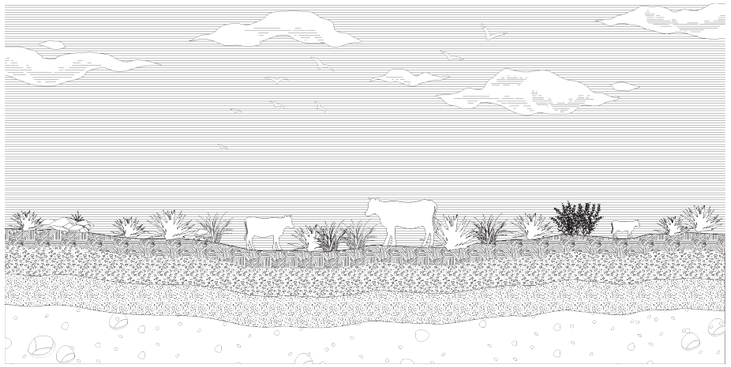


Figure 3.10

Graded Terrain

The gravel pit is flattened to enable future land uses, creating a neutral base for either ecological or built interventions.



Figure 3.11

Anthropogenic Reuse

The site is flattened and redeveloped into suburban housing, prioritizing human habitation over ecological regeneration.

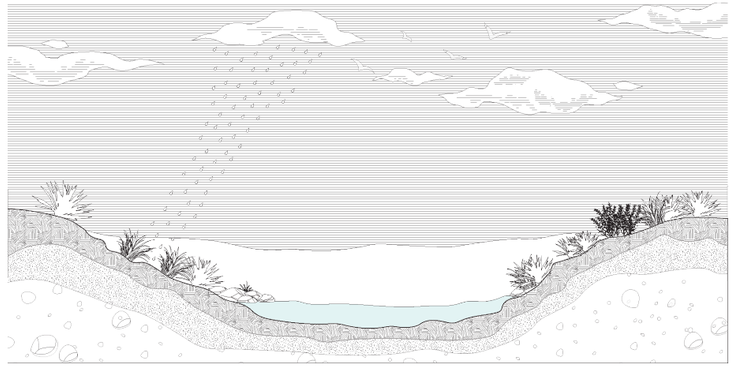


Figure 3.12

Passive Natural Recovery

Partial self-regeneration begins over several decades as wind, rain, and wildlife slowly introduce new growth and water accumulation.

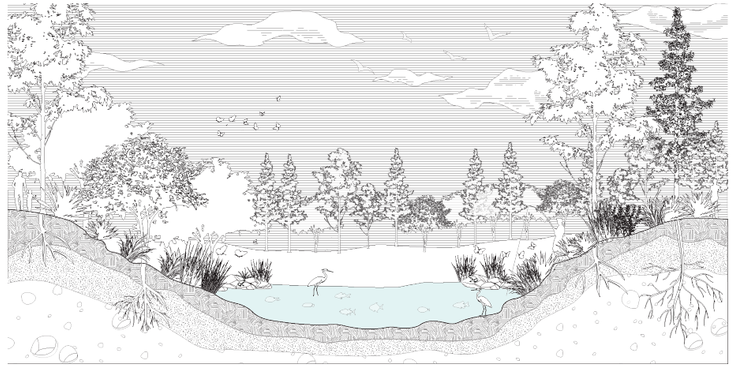


Figure 3.13

Long-Term Natural Succession Left untouched, the site undergoes complete ecological restoration, requiring up to 400 years for a fully re-established ecosystem.

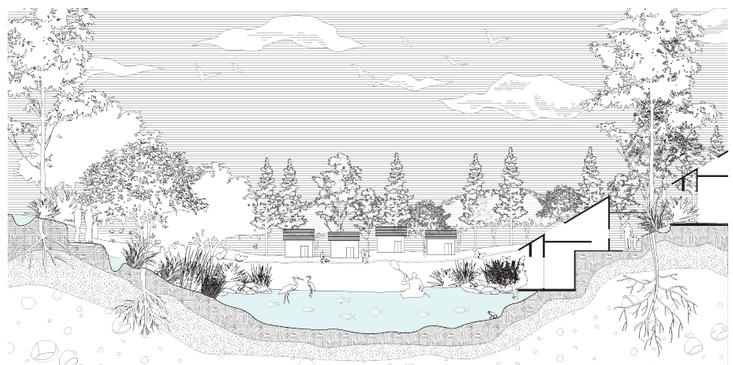


Figure 3.14

Hybrid Ecological Restoration

An integrated approach where human intervention supports accelerated ecosystem recovery, balancing development with biodiversity.

3.6 SITE OF INVESTIGATION

A wide range of site types exists along the stretch of Highway 401, from large parcels in Milton adjacent to the Greenbelt, to clustered quarries near Aberfoyle, and more fragmented, patchy sites in Cambridge. While sites bordering the Greenbelt offer greater ecological potential for reintegration into protected zones, doing so remains politically fraught in the current climate. This thesis focuses instead on the patchy sites of Cambridge, where the pressure of real estate speculation is higher. These sites offer fertile ground to investigate a new form of extraction urbanism, one that could seed alternative frameworks for rethinking the prevailing, homogenizing logics of suburban development.

The sites lie just beyond the municipal boundary of Cambridge, within the Township of North Dumfries, approximately four kilometres southeast of the city's downtown core. While urban expansion pushes north and northwest, pulled by infrastructure and speculative pressure, this landscape offers a counterpoint: an archipelago of extraction that fulfills the desires for land and transformation along the eastern edge of Cambridge.

Moreover, even this cluster is not a singular site, but part of a larger geography of subtraction. The pits form a mosaic, separated by one major road and a minor service route for dump trucks, discreetly embedded in a landscape of overlapping logics: agriculture, recreation, rural industry, and slow residential accretion. To the east lies a golf course and the Whistle Bare seasonal campground. To the west, a poultry farm and a stretch of large-lot rural homes, each on 2-to-4-acre parcels, many with private pools, a quiet performance of privacy and domestic autonomy. Interspersed among them are signs of soft entrepreneurialism: garages turned studios, sheds doubling as storefronts. Down the road from these, newer homogenous subdivisions emerge on the cities edge, with single-family homes compacted onto 600 square metre lots, standing beside older rural fragments, all stitched unevenly into agricultural fields that remain partially active.

But the most striking presence is absence[37]. Geologically, the terrain is a glacial moraine, once rich in gravel and sand, now deeply scarred. What remains is not landscape, but excavated ruin - emptied, exposed, and raw. These pits currently draw heavily on the water table for gravel processing. Yet, paradoxically, they also hold climatic potential: acting as thermal sinks, accumulating heat in summer, shedding wind protection year-round, and offering depressions where water can percolate, perhaps one day replenishing the very aquifer they now deplete.



Figure 3.15

Large gravel pits in Milton abutting the green belt, serving Toronto.



Figure 3.16

Clustered gravel pits in Aberfoyle, drawing local concern amid growing urban water scarcity.

Figure 3.17

Patchy gravel pits in Cambirdge chosen for their adjacency to sprawling subdivisions

37 *Seibert, Atlas of Material Worlds.*



SELECTED SITE

Patchy pits in Ex-urban cambridge

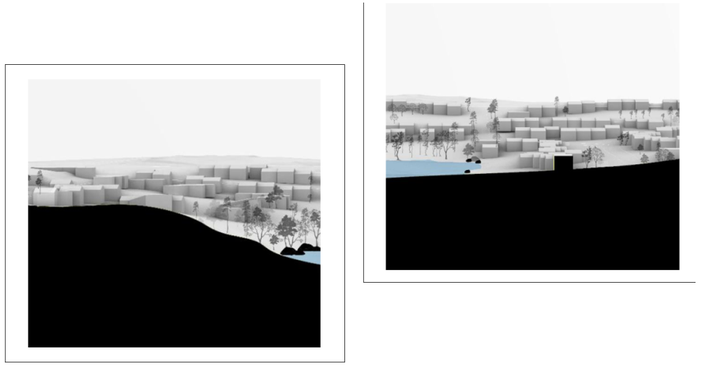


Figure 3.18

Initial Site Experimentation - Scheme 1

This early design test explores the reuse of the gravel pit through a courtyard layout. The experiment revealed the vast scale of the site and its strong topographic variation, highlighting the potential to move beyond conventional cul-de-sac planning toward a more responsive block structure shaped by the contours.

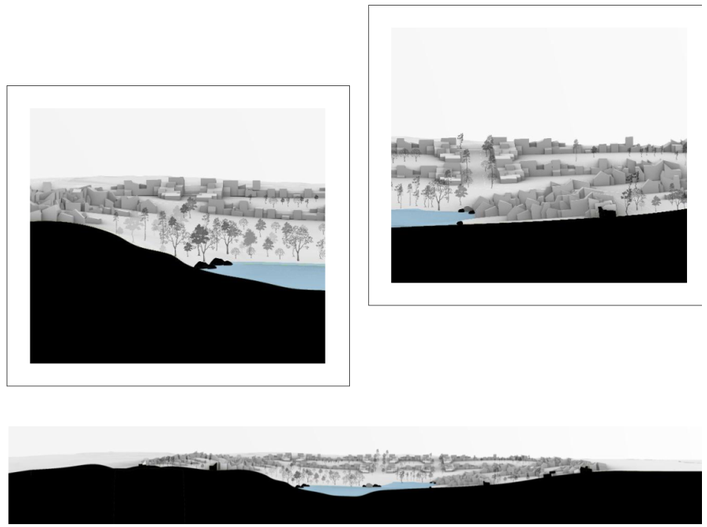
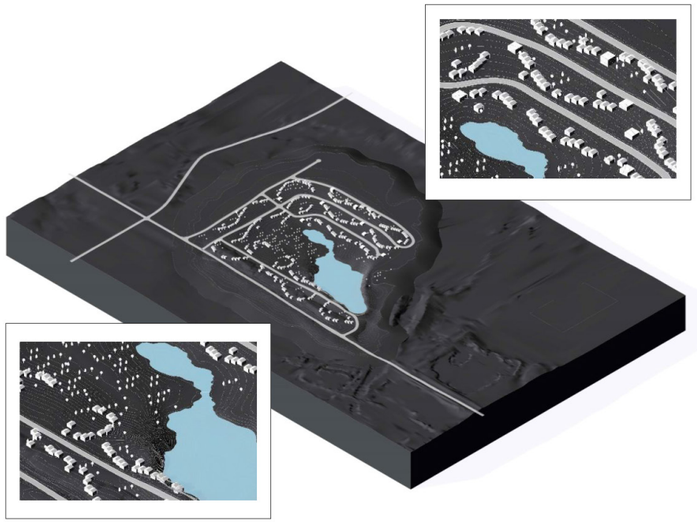


Figure 3.19

Initial Site Experimentation - Scheme 2

This iteration tests a linear urbanism strategy, organizing housing in concentric bands around the water body. Influenced by linear city principles, the scheme emphasizes continuous pedestrian routes and topographic alignment, yet revealed challenges in creating variation, shared centers, and spatial intimacy across the elongated layout.



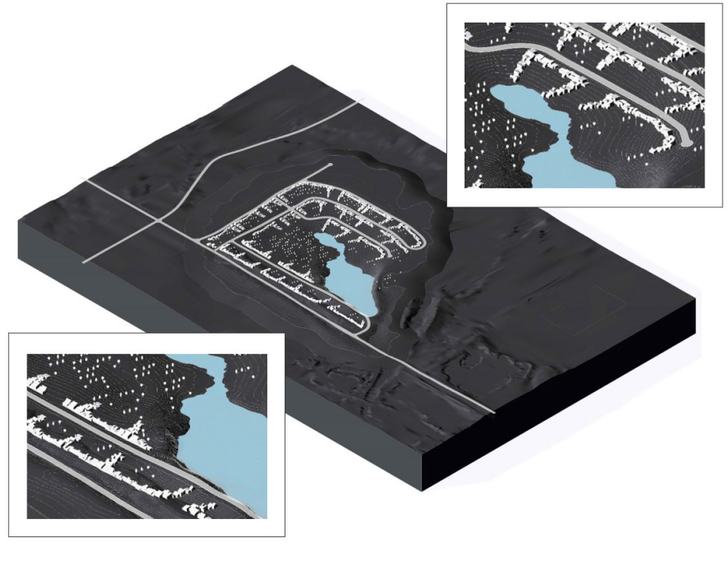
STRATERGIES

Courtyard
Central communal green space.

Topographic orientation
Adapts design to natural terrain.

Pedestrian streets
Prioritizes walkability and interaction.

Mixed density
Diverse housing types for inclusivity based on family types



STRATERGIES

Courtyard
Central communal green space.

Topographic orientation
Adapts design to natural terrain.

Pedestrian streets
Prioritizes walkability and interaction.

Mixed density
Diverse housing types for inclusivity based on family types

3.7 POST DIG: REMEMBERING EXTRACTION, REPAIRING EROSION

The proposed post-excavation landscape retains its extraction-era ramps, now reimagined as sloped access paths and terraced platforms for agricultural use. The spaces between stockpiles and former escarpments are reshaped into naturalized valleys. Escarpments, once degraded by wave action and soil erosion that stripped them of structure and prevented plant growth, have been regraded into low-angled, meandering forms. This transformation supports both revegetation and human settlement, aligning with best practices in restoration that emphasize erosion control, well-drained soils, and reduced compaction.

During and after excavation, soil must be treated as a living system, its biological, chemical, and structural integrity requires careful restoration. In response, the overburden and excess sand have been strategically regraded along the escarpment to form stable landform contours. Well-drained soils with adequate nutrients are also redistributed to support the regeneration of trees, herbs, and resilient plant communities in chosen places to enhance dense natural growth in specific regions[38].

This approach departs from conventional pit restoration strategies that often prioritize expedient grading of the basin into a uniform lake, typically with steep slopes and limited shoreline complexity. Offering few shallow zones, islands, or sheltered areas and ultimately constrain nesting, foraging, and breeding opportunities for wildlife, particularly bird species[39]. In contrast, the proposed intervention emphasizes ecological heterogeneity by regrading landforms to support varied moisture regimes, gradual slopes, and layered planting strategies.

38 John Andrews, and David Kinsman, Gravel Pit Restoration for Wildlife - A Practical Manual.
39 .Ibid

These elements align with TOARC's recommendations for progressive, soil-sensitive rehabilitation and help establish the structural conditions necessary for long-term ecological succession[40] . By focusing on topographic variety and soil vitality, the strategy not only enhances biodiversity but also opens pathways for adaptive, community-oriented reuse beyond regulatory compliance.

Figure 3.20

Typical vertical profile of sand and gravel
(Source - J. Andrews, D. Kinsman Gravel resoration for wildlife manual)

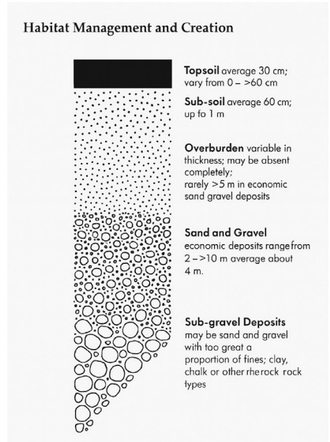
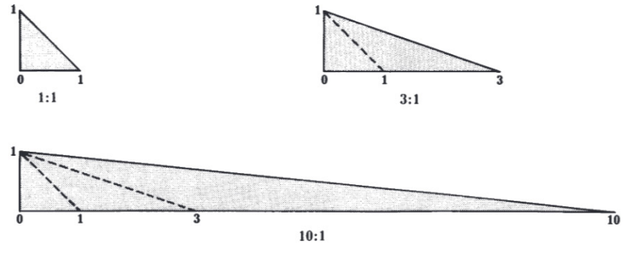


Figure 3.21

Slope gradients.

1:1 - Maximum final pit slope allowed under Section 8.1, 8.2, Ontario Regulation RR784/80, Pits and Quarries Control Act.
3:1 - Generally considered maximum gradient for safe access up and down slope.
10:1 - Satisfactory for rehabilitated agricultural use and erosion control.



40 TOARC, Best Practice Guidelines for Aggregate Rehabilitation Projects.

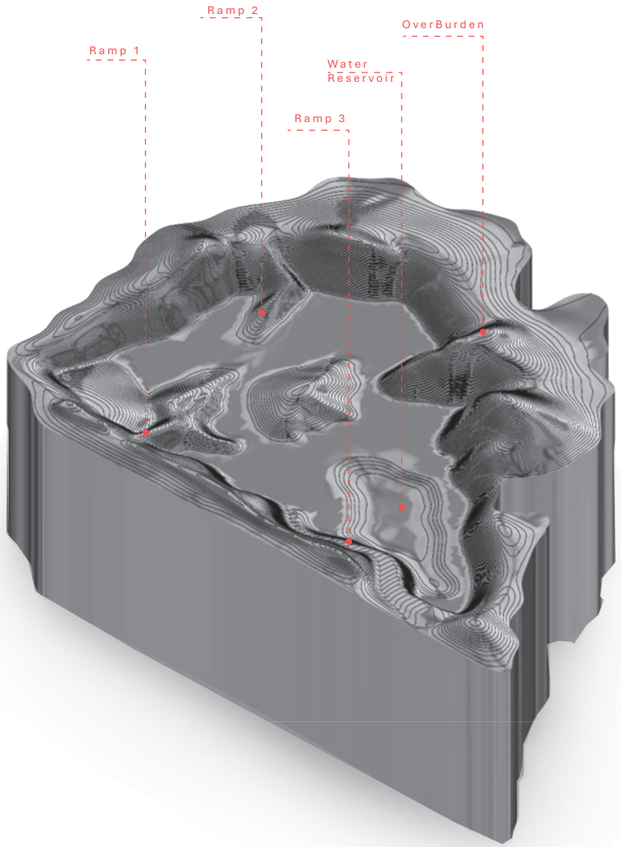


Figure 3.22

Gravel pit topography post-extraction condition

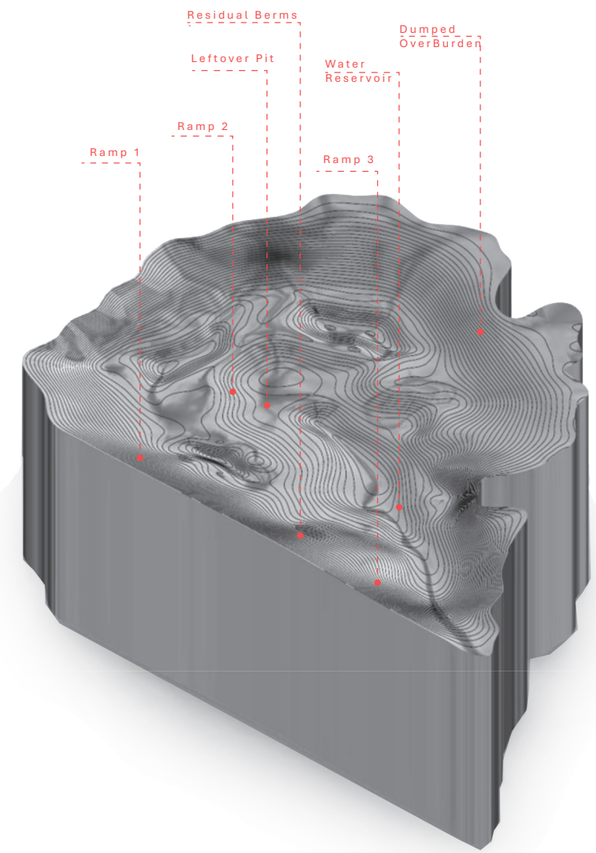


Figure 3.23

Proposed regraded slope for End-of life use.

CH 4 INVESTIGATING CONCEPTUAL COLLECTIVE FORMS

4.1 SUBURBAN AND RURAL HOUSEHOLDS

Gravel is not neutral. It is the material substrate of suburban expansion, dug from rural soil and poured into the frameworks of highways, cul-de-sacs. Every paved driveway and arterial road in Southern Ontario is underwritten by a displaced quarry, a wound in the landscape that quietly fuels the logics of dispersal. This chapter shifts from the scarred terrain of extraction to the built forms it facilitates. The suburban subdivisions and rural edges where architecture participates in a broader system of resource-based urbanism. These landscapes are shaped less by architectural invention than by infrastructural repetition.[41] Though, even in these sleepy suburbs some residents improvise to new rhythms[42]. Some longing others practicing a different way of life. This chapter investigates how spatial fragments, often overlooked may contain seeds of another form of living. A conceptual collective that emerges not through arbitrary design[43] intention but through suburban practices and shared reciprocity.

In suburban and rural Galt, the houses might appear typical, brick facades, wide driveways, hedges marking the lot lines, but behind those hedges, something is always unfolding. Gardens aren't just decorative; they're ongoing projects, slow experiments in living. My landlady's backyard, for instance, holds more than vegetables. There's a wire-frame raised bed I helped build to keep the squirrels out, wooden ramp we built for her dog Charlie from salvaged wood. On quiet mornings, she still checks the moisture in her raised tomato planter beds. A few doors down, her friend, a single mother planted thorny berry bushes along her fence, not just for fruit, but to feel buffered. Another neighbor lays out pollinator plants in curved rows, a soft form of resistance against turf grass monoculture.

41 Rappaport, Against the Grain.
42 Kira, "Suburban Large-Lot Tinkerscape."
43 Risselada et al., Team 10 : 1953-81, in Search of a Utopia of the Present, 10.
















You sense it in the details: solar lights angled just so, a lattice for peas made from broomsticks, or the hum of a grow light switched on in a cold window in early spring. Like archives of quiet effort. These spaces aren't designed for display; they're tuned for survival, stewardship, and care. I've met older homeowners whose yards read One couple asked me to help them install permeable pavers over their driveway. They grow sunflowers as a seasonal fence and collect rainwater in mismatched barrels rescued from the dump. Even the dining cart used to share produce with neighbors once wheeled books through the school library. Nothing here is wasted. Everything finds a second life.

And still, the houses hold the desire to retreat. The hedges remain. Many residents of houses on the rural parts around the gravel pits speak of not wanting to see another house when they wake up, only trees. But under the veil of privacy, an informal common is forming. Seeds are swapped in mailboxes; carrot cake slices appear on porches. Trips to the food bank or neighboring seed farms are shared in the backseat of a neighbor's car. One woman I met rewilded her whole yard after attending a school of architecture exhibition, she invited me home to see the garden and sent me back with cuttings. In Galt, both suburban and rural, the garden is more than a yard. It's a register of hopes, failures, inheritances, and the desire to leave something quietly better than it was found.





Figure 4.1

A small 1.5 Acre farm called Liberty, by its retired farmers who now grow only for leasure and feed their community. Using greenhouses and wild floweres to it increase their yeild per sqft and naturalize their land.

LIBERTY GARDENS HARVEST AND DISTRIBUTION WINDOWS

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Basil						x x	x x	x x	x x			
Beans							x x	x x	x x			
Beets						x x	x x		x x	x x		
Cabbage									x x	x x	x x	
Carrots										x x	x x	
Celery								x x	x x	x x		
Celery root									x x	x x	x x	
Chard						x x	x x	x x	x x	x x		
Chives				x x	x x	x x			x x	x x	x x	
Cucumbers							x x	x x				
Eggplant							x x	x x	x x			
Fennel					x x	x x						
Fingerling potatoes							x x	x x	x x	x x		
Garlic							x x	x x	x x	x x		
Garlic scapes						x x						
Green garlic					x x	x x						
Head lettuce			x	x x	x x	x x			x x	x x	x x	x x
Kale				x x	x x	x x			x x	x x	x x	x x
Kohlrabi										x x	x x	x x
Lovage					x x	x x						
Micro and baby greens, and salad mixes		x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x

Beyond the backyards, the land tells another story. While traveling through the countryside around the gravel pits, I spoke with farm owners preparing to retire, some selling off land parcel by parcel, others simply closing shop. The landscape was dotted with “For Sale” signs staked into soft shoulders and gravel drives. At the shuttered Gillaspy Farm, once known for its pick-your-own strawberries, the owners told me they wouldn’t be opening next season. Their daughter, who bakes the most delicious strawberry scones, wasn’t planning to take over the farm. She had been running a small-scale vegan baking operation from her rural home, supplying snacks to nearby communities. Further along the road, the Oakridge Acre food hub, where I once bought local produce, had also been sold. These closures are not merely economic, they signal the slow unravelling of a rural knowledge system rooted in seasonal labour, mutual exchange, and a deep, time-worn understanding of soil, weather, and yield.

But not all is lost. While some farms disappear, others are being reclaimed, often by retirees with time and care to give. During my research into gravel pit reuse, I came across the story of Betty and Dan Wilkens in Kanabec County, Minnesota, USA a retired couple who spent the past decade transforming the pit on their land into a mosaic of prairie, wetland, and oak savanna. Their project, recognized by the USDA’s Natural Resources Conservation Service, is as much a restoration of ecology as of culture. Betty walks the land with conviction, sharing her strategies for seeding native grasses, managing invasive species, and cultivating habitats for pollinators and migratory birds. Their work is quiet, persistent, and grounded in a form of land stewardship that resists spectacle.







Figure 4.2

Guillispy Farm, once cherished for its strawberry and blueberry picking, now faces closure as the next generation opts not to continue managing the expansive farmland.

Figure 4.3

Okridge Acre, a local food hub in North Dumfries known for selling regional produce, closed following similar generational challenges, as successors chose not to continue the farming enterprise. the expansive farmland.

These stories exist alongside broader structural issues that continue to shape the suburban condition[44]. North American suburbs remain dominated by a narrow set of housing typologies[45], typically designed for nuclear families, and wholly reliant on car-based commuting[46]. Newer subdivisions function as bedroom communities, often disconnected from civic cores and collective infrastructures. In response, many residents have turned to improvisation: retrofitting homes to accommodate multigenerational living, converting garages into workshops, or adding basement units in defiance of rigid zoning codes. These adaptations reveal a fundamental misfit between suburban form and the lived needs of its inhabitants. This thesis takes up that tension, building on the framework laid out in Retrofitting Suburbia by Ellen Dunham-Jones and June Williamson - a text that thoughtfully explores how to remake suburban landscapes within the constraints of existing codes and housing densities. This project extends that inquiry by speculating on what lies just outside those boundaries. It asks how we might retrofit not only buildings and blocks, but rethink systems of land use, care, and collective life. Using the gravel pit periphery as a lens, this work explores how places marked by extraction and transition, might become test beds for a mutually negotiated suburban imaginary.







Figure 4.4

Betty and Dan Wilkens restoring a former gravel pit into prairie and wetland through quiet, hands-on stewardship.

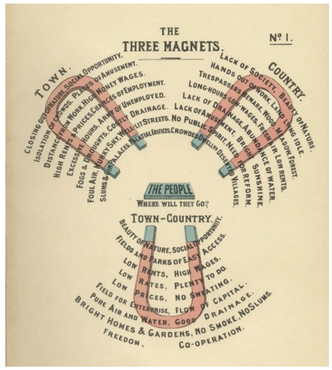
44 Bergdoll et al., Foreclosed : Rehousing the American Dream.
45 Holl, Rural & Urban House Types in North America.
46 Schoenauer, Cities, Suburbs, Dwellings in the Postwar Era.

4.2 LOST LEGACY OF VISIONARY URBANISM VS SUBURBAN IDEALS

Canada has had a largely forgotten history of cooperation and ambitious urban experimentation, which is just now being revealed. Grand Falls in Newfoundland was the first site outside the United Kingdom to implement Ebenezer Howard's Garden City principles[47]. It was not an isolated case. In Ontario, the company town established by the Bata Shoe Company was also shaped by Garden City ideals. Today, much of this legacy has faded[48].The rise of global capital and the removal of protective tariffs in Canada rendered the domestic shoe industry uncompetitive, unable to survive against the influx of cheaper imported products. What remains are fragments, physical and ideological, of a moment when collective urban vision and industrial purpose were once aligned.

In contrast, what took hold in the postwar decades was the idealized image of suburban domesticity: the detached single-family home, the primacy of the fireplace-lit living room, and the individuation of family roles through spatial separation. Government and institutional support further entrenched this model, promoting the private garden as both a domestic utility and a symbolic anchor of civic conformity, linking the home to the land while reinforcing suburban separation. These spatial ideals of privacy, control, and symbolic order discouraged denser, collective ways of living and working[49], displacing the cooperative urban imagination with the maintenance-heavy and conformity-driven rituals of suburban life. Today, the manicured garden remains a visible marker of this inherited logic, often signaling belonging, responsibility, or even morality through landscape grooming.

47 *Dustin Valen, "Orignal Town Site of Grand Falls."*
48 *Novakovic, "Bata-Ville."*
49 *Aureli and Tattara, Living and Working.*



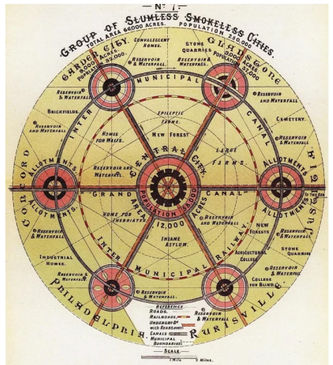


Figure 4.5

Ebenezer Howards greenbelt with Magnets of garden city and its centripetal layout of greenbelts.

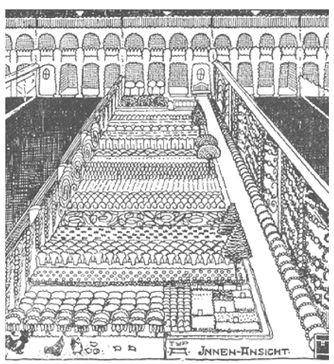


Figure 4.6

View of a vegetable garden situated behind the residential building as allotments.

4.3 FRAMEWORK: MUTUAL AID AS SPATIAL INFRASTRUCTURE

Mutual aid is the voluntary and reciprocal exchange of resources and services for mutual benefit. It is based upon an ethic of care, cooperation, and collective survival. First theorized by Peter Kropotkin as a counterpoint to the social Darwinist emphasis on competition, mutual aid was observed both in animal behavior and in the cooperative practices of pre-capitalist societies. For Kropotkin, it offered not just a moral argument but a political and spatial alternative to centralized industrial systems: one rooted in decentralization, local self-sufficiency, and the integration of living, working, and growing[50].

This thesis takes up mutual aid not only as a social ethic, but as a generative framework for spatial reorganization. Where 20th-century suburbia spatialized separation[51]. A divide between work and home, agriculture and domestic life, public and private. This project proposes an inversion: a terrain where collective production, ecological recovery, and domestic routines coalesce. Learning from Kropotkin's advocacy for agro-industrial cooperation and the design ethos of cooperative colonies like Clousden Hill, the gravel pit becomes a site for mutual interdependence[52].

50 *Kropotkin, Mutual Aid.*
51 *Leberecht, Siedlungs-Wirtschaft 1923.*
52 *Imbert, Food and the City, 21.*

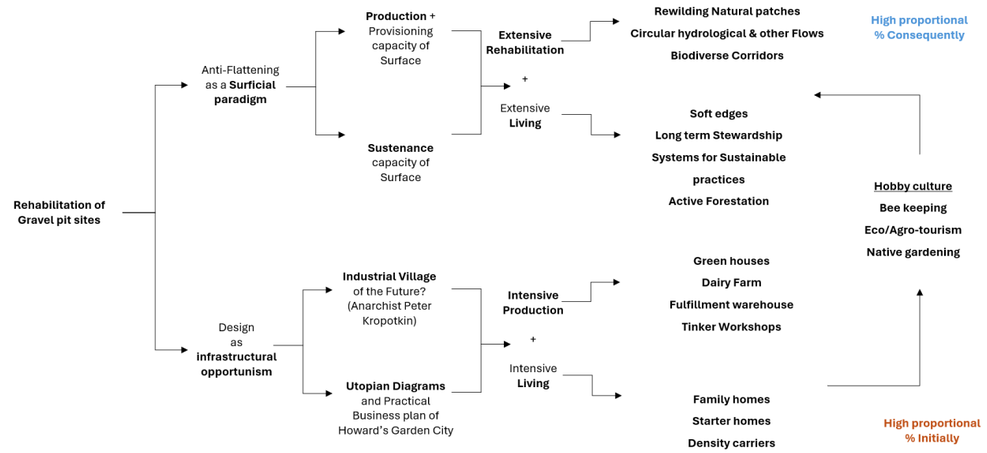


Figure 4.7

Betty and Dan Wilkens restoring a former gravel pit into prairie and wetland through quiet, hands-on stewardship.

4.4 REKINDLING A NEW VISION FOR GRAVEL URBANISM

The proposed community is structured around the inherited contours of the gravel pit, a terrain once extracted, now reinhabited. The organization follows a three-prong spatial system with branches designated to community recreation and wellbeing, food production, and Natural rehabilitation. Three valleys serve as the core of collective life and water percolation. Seasonally adapting in winter for snow storage allowing for local management. These valleys are surrounded by a gradient of residential typologies, from compact homes to live-work units and mixed-use buildings that line the escarpment. Terraced allotments[53], carved into the original extraction ramps, provide shared growing space between neighborhoods, fostering both food production and cooperation. All threads of community life converge at the central lake basin, a rehabilitated body of water framed by a cultural common. Here, memory and ecology intersect: the former gravel bed becomes a place of gathering, learning, and repair.

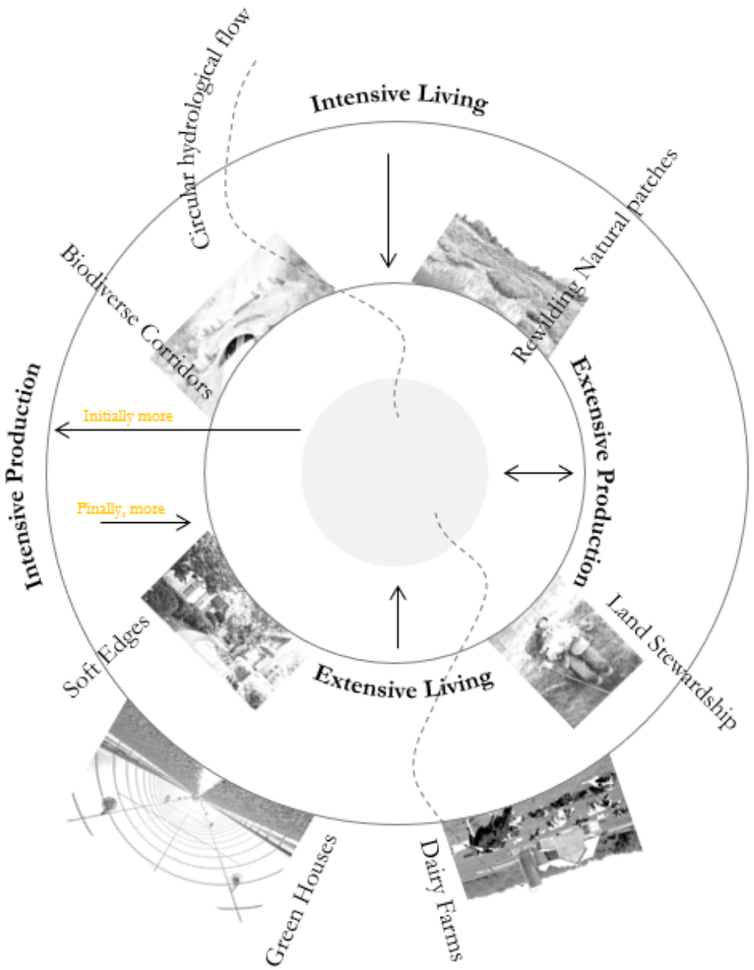


Figure 4.8

Diagram: Phasing Logics of Gravel Pit Rehabilitation Illustrates a gradual shift from ecological restoration toward extensive living and productive use, guided by soft edges, biodiversity, and long-term stewardship.

53 *Nowysz, "Modernist Projects of Community-Based Urban Farms in Residential Areas—A Review of Agrarian Cooperatives in the Context of Contemporary Urban Development."*

CH 5 DESIGN APPLICATION

“Let's not propose Utopias. Lets simply ask what architecture can do when it refuses to surrender"
DOGMA: 11 Projects

“Precarity is the condition of our time. It encourages noticing, waiting, and being in touch with the rhythms of landscapes."
Anna Tsing, Arts of living on a damaged planet

5.1 RECLAIMING ABSENCE

These gravel pits are too exposed to treat dismissively and the land surrounding it is too beautiful to surrender to the sprawl[54]. Even this void is not a blank slate but a terrain heavy with history, extraction, and ecological memory. To propose a future here is not a matter of optimism, but of responsibility. Rather than beginning with a vision of what to build, this thesis begins with an act of refusal: the refusal to flatten, to erase, to impose. The site is first understood through its wounds, not its potential. I began by tracing the pit's geological lineage, from scars that have been imposed by the process of mining the raw materials of the sparling growth of the city.

Tracing the scars of excavation: the site is composed of the void, with water reservoirs at the bottom, which was used for washing the aggregates and help split them into various categories based on size. Dotted with man made mountain piles of aggregates, soil in the process of being transitioned. To go to the bottom of the pit are the 4 Ramps for trucks hauling out the aggregates, 2 from main artery and 2 from access road created during the mining activities. Separating the two areas of different elevation are the walls of the void are composed of the escarpment; steepest slope formed due to the continuous removal of materials and prone to faulting or erosion. Surrounding the escarpment are hills of overburden which go beyond the crest line and meet the local slopes. Along with these is the berm wall, creating a region of hills of local slope as you would see on the edges of the highway.

Instead of projecting a design onto the landscape, this process began with a careful inventory and a speculative question: what would the land do if left to its own devices? This approach revealed the escarpment edge as the site's point of highest instability - a fault line destined to collapse inward. The rest of the pit, by contrast, holds the potential to undergo a slow process of reclamation.

54 *Fenton et al., Pamphlet Architecture 11-20.*

Thus, our architectural responsibility becomes clear: to intervene at the escarpment wall, while the rest of the landscape is structured to support long term, layered forms of reclamation. These areas are organized into differentiated zones, each offering opportunities for cultivation, restoration, habitation, and shared use. Rather than a singular design gesture, the proposal establishes a framework for incremental engagement. Where tenants, residents, and stewards participate in the ongoing work of ecological and social repair.

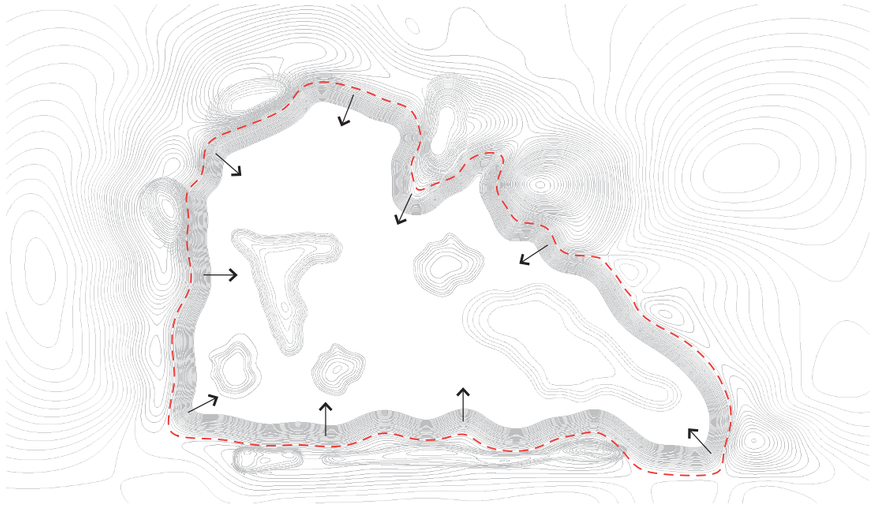






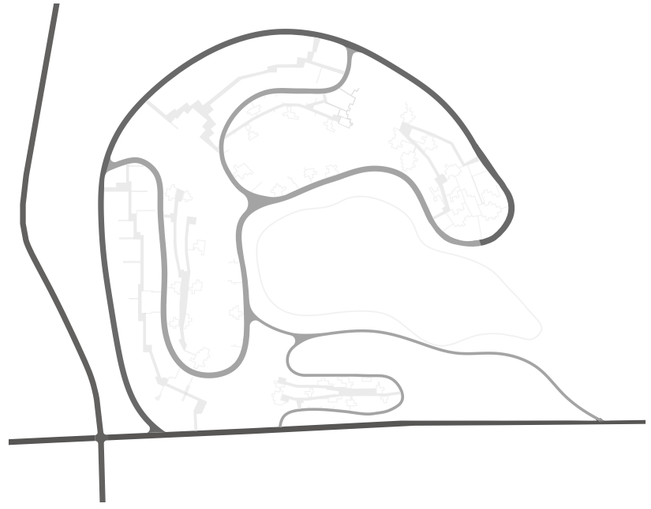
EXISTING RAMPS

Condition: Post-Extraction



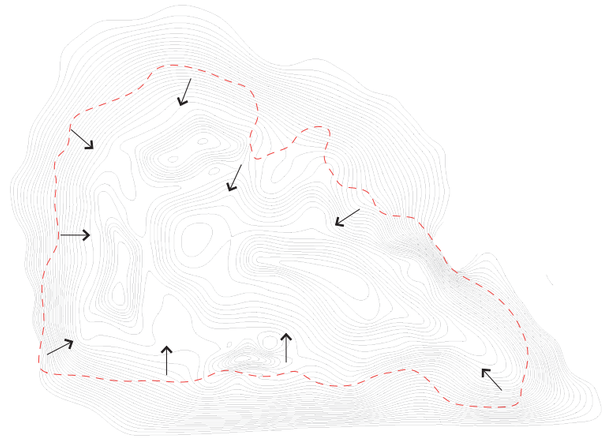
EXCAVATED GROUND & RESIDUAL HILLS

Condition: Post-Extraction



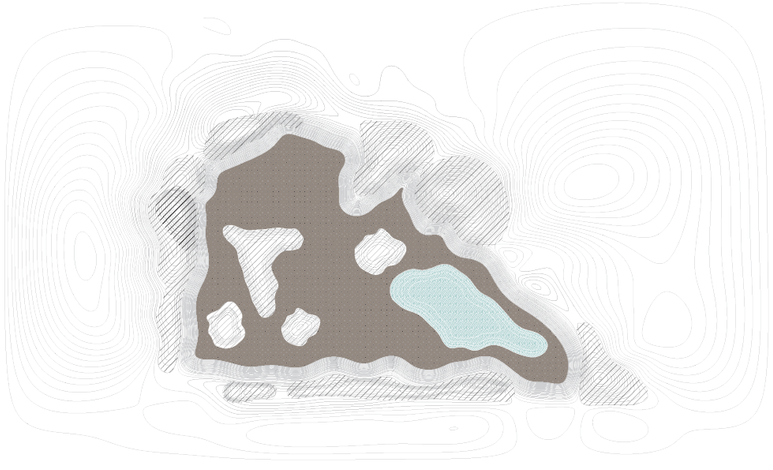
STREET HIRARCHY

Condition: Intervention



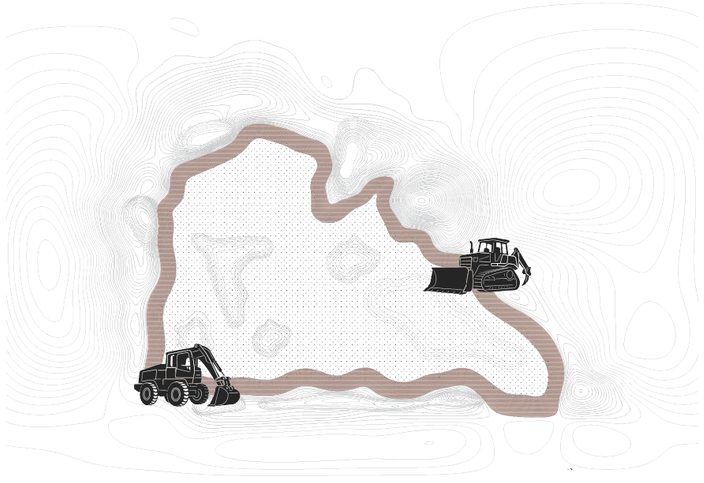
REFORMED VALLEYS

Condition: Post-Grading State



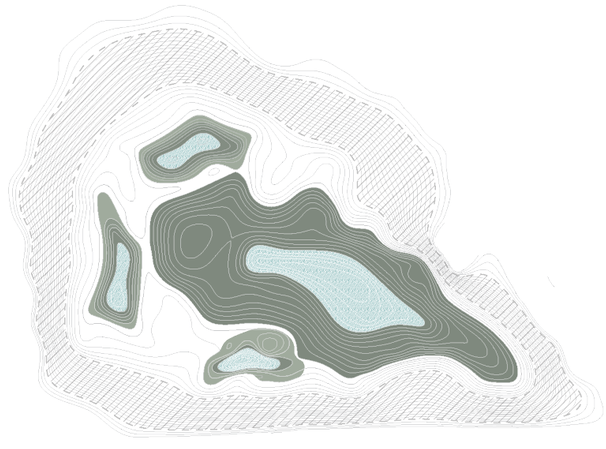
EXCAVATED GROUND & RESIDUAL HILLS

Condition: Post-Extraction



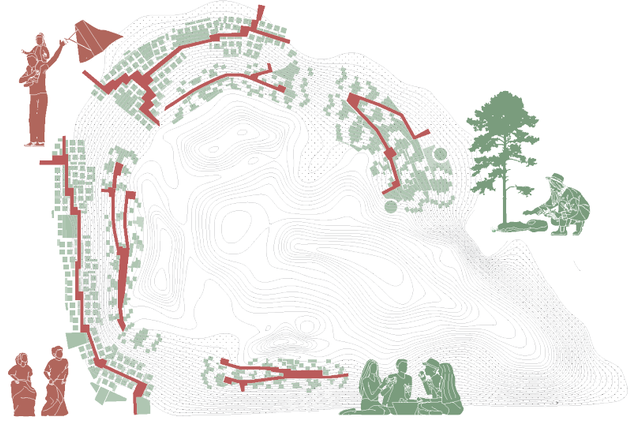
ERODED ESCARPEMENT

Condition: End of Extraction Life



REFORMED VALLEYS

Condition: Post-Grading State



SOCIAL SEAMS

Condition: Post Reclamation



SITEPLAN

Topographies of Repair and Belonging



BIRDS EYE VIEW

Embedded within the landscape

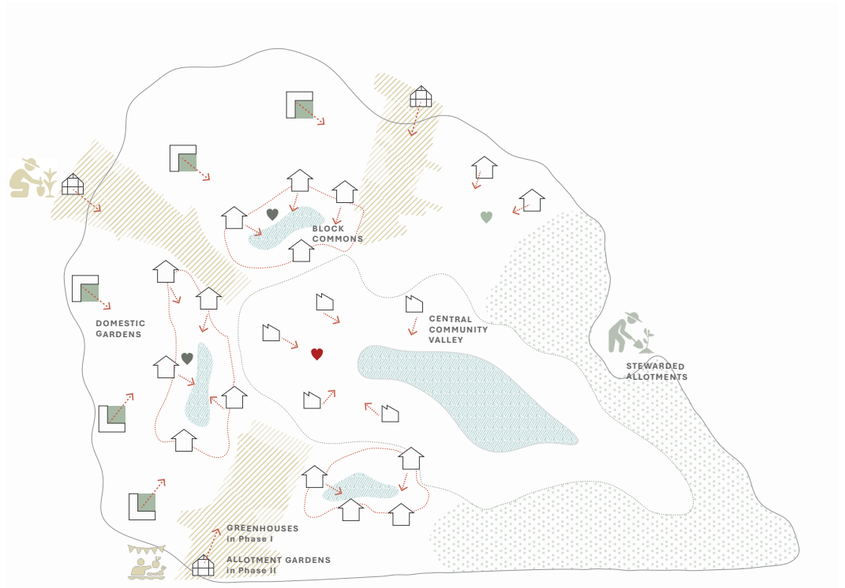
5.2 SYSTEMS OF ENGAGEMENT

Caring architecture moves beyond sustainability. It views interdependency as an inherent condition, the built environment cannot be isolated from the political, social, and cultural fabric[55].

Angelika Fitz and Elke Krasny

Today's we often approaches building and dwelling with suspicion, shaped by a long history of architectural visions that have failed. This work begins from a different place. It is rooted in trust rather than doubt, in a utopian belief in the inherent good within people, and in their capacity for care, cooperation, and altruism. It challenges the Darwinian idea that competition is the primary force behind survival. Instead, it aligns with Kropotkin's vision of mutual aid, where solidarity, rather than self-interest, forms the foundation of thriving communities[56]. This belief is spatialized through a framework of distributed care: not every resident must be a farmer or activist, but all are invited into relationship with the land. Allotments, balconies, and shared greenhouses offer points of entry for food cultivation at various scales. Woodland lots can be taken up by those interested in reforestation or quiet retreat. Some may contribute through craft, stewardship, or gathering in shared valleys. Others may simply inhabit attentively, sustaining the system through presence and care. While scepticism may be justified, it is only humanity that holds the capacity, urgency, and imagination to confront the crisis it has created. This must happen before the balance of ecological systems tips too far, rendering the planet uninhabitable for humans, even as other species adapt and endure.

55 *Fitz et al., Critical Care.*
56 *Kropotkin, Mutual Aid.*



STEWARDSHIP

Condition: Continued Rehabilitation

Woodland
Reclamation through tree planting on stable slopes

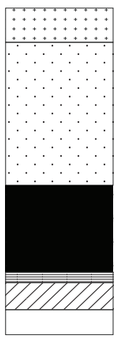
Wetlands
Constructed habitat for water retention and biodiversity.

Farmland
Terraced bands for community-scale food cultivation.

Collective Valleys
Landscapes for gathering, play, recreation, and pollinator-rich seasonal flowering.

Front & Back Yards
Semi-public and private domestic edges for shared upkeep, gardening, and quiet retreat.

110% FOOD SECURE
2500 Tn PRODUCE/ YEAR



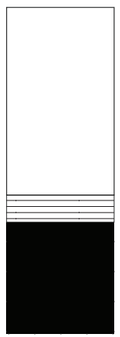
FARMABLE AREA -10%

REHABILITATED GREEN- 50%

HOUSING -25

GREENHOUSE -2
WATER -5
OTHERS -8

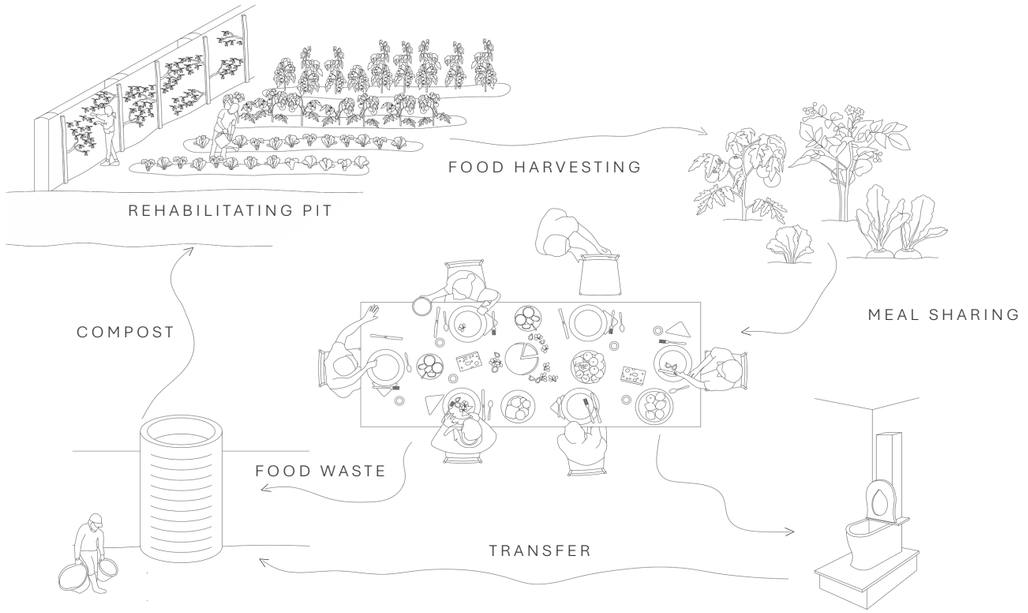
3X DENSITY OF
NORMATIVE SUBURB



OPEN- 60%

WATER -5%

BUILT -35%

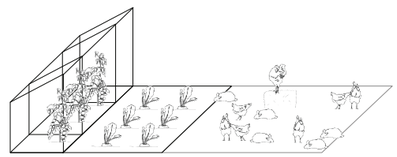


PRODUCTIVE DENSITIES

Condition: 100% SELF SUFFICENT

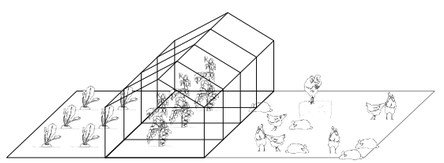


APARTMENT



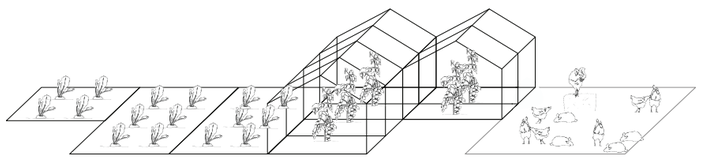


STARTER Homes

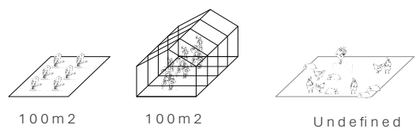




FAMILY Homes

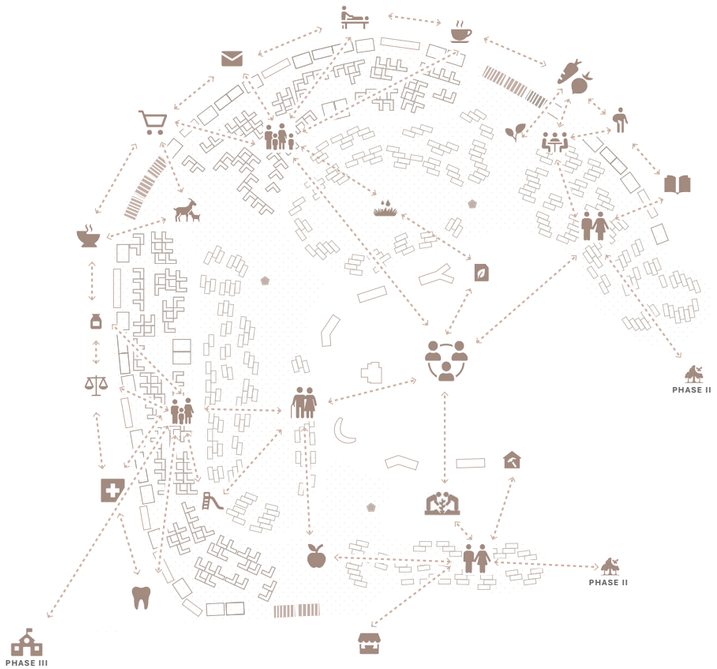


LEGEND:



PRODUCTIVE LANDSCAPE

Condition: 100% SELF SUFFICENT



PROGRAM

Condition: Built Intervention

Mixed-Use
Residential towers over commercial plinths at site edge.

Family Homes
Larger units with shared front yards and private backs.

Starter Homes
Compact dwellings embedded in sloped terrain.

Collective Infrastructure
Greenhouses, Shared kitchens, Seasonal pantry and Work sheds.



DAY IN LIFE

Condition: Built Intervention

Mixed-Use
Residential towers over commercial plinths at site edge.

Family Homes
Larger units with shared front yards and private backs.

Starter Homes
Compact dwellings embedded in sloped terrain.

Collective Infrastructure
Greenhouses, Shared kitchens, Seasonal pantry and Work sheds.

For a rapid recovery, the figure-ground becomes the site of investigation. Interstitial spaces are reimagined as shared front and back yards, positioned strategically along the resloped escarpment to support swift ecological remediation. These yards address degraded and compacted soils caused by extraction and slope disturbance, using planting, composting, and shallow-root systems to stabilize the ground and rebuild organic content. In contrast, the sweeping ramps carved into the pit are designated for industrial-scale food production, transformed into terraced allotment gardens. Private backyards are preserved as spaces of contemplative isolation, supporting the emergence of a new, productive suburban individual who engages with the land at a personal and reflective scale. Beyond these zones of activation, the remaining landscape is entrusted to a slower process of reclamation. This unfolds through a partnership between willing inhabitants and the self-directed rhythms of nature.

Building upon the logic of reclamation and engagement, the design introduces a system of linear seams and bands. Each concentric band (row of buildings) establishes a distinct spatial and social threshold. The outermost strip functions as a thickened edge, mediating between the terraced farmland and adjacent farmland or suburban programs. It includes greenhouses, commercial spaces, collective infrastructure, and parking zones, all strategically positioned to bridge the agricultural terraces and the residential fabric. Architectural typologies along this edge include bar buildings and point towers, rising up to six storeys above commercial plinths. Situated at the highest contours of the site, these structures offer panoramic views of the lake, farmland, and ecological belt, serving as visual anchors at the settlement's periphery.

Each seam (red pathway) follows the site's natural topography. These seams act as habitable thresholds, organizing alternating bands of built form and collective open space that structure the rhythms of communal life. Within each seam, a layered mix of shared front yards, productive commons, semi-public lanes, and courtyard parks replaces the atomized logic of the detached suburban parcel.

This pedestrian-prioritised networks weave in the form of seams, linking L-shaped family units, live-work dwellings, starter home clusters, terraced allotments[57], and community pavilions. The spacing between buildings is deliberately programmed to include edible gardens, outdoor kitchens, rain gardens, and gathering nodes. These spaces support domestic spillover into areas of shared activity, play, and reciprocal care. Serving as both formal and informal extensions of daily life, these environments accommodate a range of uses. Children play, elders rest, and neighbors come together for shared meals and community events[58]. The central commons remains visible and accessible from all sides, fully integrated into the rhythms of collective living and resisting enclosure.

Vehicular roads are minimized to preserve only essential connections[59]. Portions of the original truck ramps carved during the site's industrial phase are repurposed as gentle transitions across slopes, allowing service and emergency access without disrupting the pedestrian fabric. Roads follow the existing contours of the terrain, reinforcing the landscape's natural logic. In this way, the project replaces the conventional model of car-first suburban sprawl with a pedestrian-centered framework[60]. Domestic space is reimagined not as an isolated enclave[61], but as part of a continuous, adaptable system that integrates housing with collective food production and everyday social life.

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57 Nowysz, "Modernist Projects of Community-Based Urban Farms in Residential Areas—A Review of Agrarian Cooperatives in the Context of Contemporary Urban Development."
58 Sarkis and Tannir, Co-Habitats: How We Live Together in... Addis Ababa, Al Azraq Camp, Beirut, Hong Kong, India, Mexico/Egypt/Nigeria, New York, Prishtina, Rio de Janeiro, São Paulo, Venice.
59 Schmitz et al., Creating Walkable Places : Compact Mixed-Use Solutions.
60 Tachieva, Sprawl Repair Manual.
61 5468796 Architecture Inc., 5468796 Architecture : Platform.MIDDLE: Architecture for Housing the 99%.



OCCUPIED EDGES

Condition: During use

Mixed-Use
Residential towers over commercial plinths at site edge.

Family Homes
Larger units with shared front yards and private backs.

Starter Homes
Compact dwellings embedded in sloped terrain.

Collective Infrastructure
Greenhouses, Shared kitchens, Seasonal pantry and Work sheds.



OPEN CORES

Condition: Continued Rehabilitation

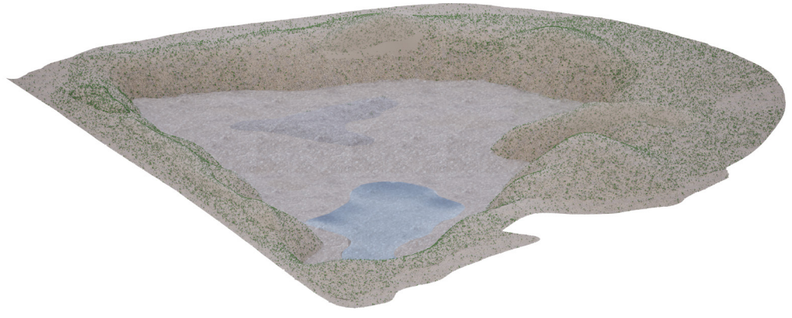
Woodland
Reclamation through tree planting on stable slopes

Wetlands
Constructed habitat for water retention and biodiversity.

Farmland
Terraced bands for community-scale food cultivation.

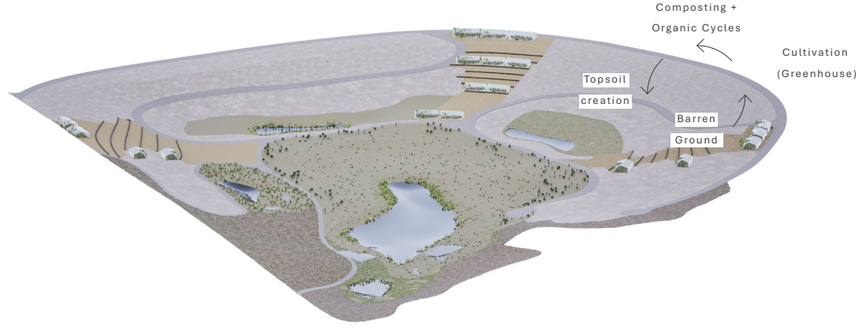
Collective Valleys
Landscapes for gathering, play, recreation, and pollinator-rich seasonal flowering.

Front & Back Yards
Semi-public and private domestic edges for shared upkeep, gardening, and quiet retreat.



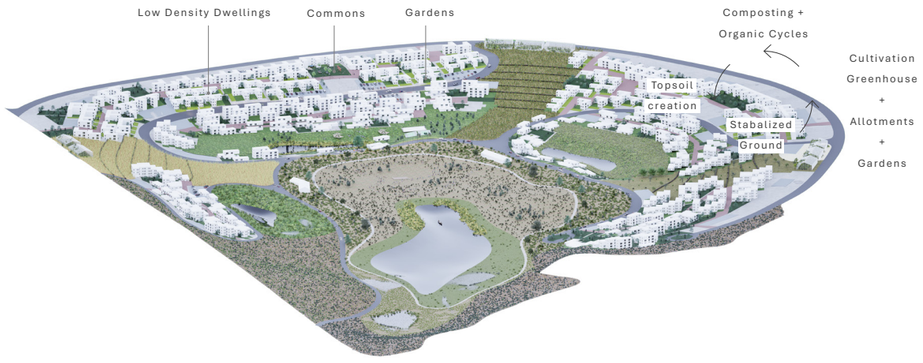
PHASE I

Condition: Post-Extraction



PHASE II

Condition: Post Grading



PHASE III

Condition: Low Density Habitation



PHASE IV

Condition: Continued rehabilitation, Density increased

5.3 PRODUCTIVE DOMESTICITY

The blocks are sited in response to the terrain, not imposed property lines or rigid planning grids. Instead of following linear logics, they settle where the topography allows, letting the interstitial space between them emerge as informal commons. This spatial strategy resists the isolating logic of suburban subdivision, replacing it with a field condition of adjacency, permeability, and negotiated boundaries.

These dynamics are especially visible in the starter home typologies, positioned along steeper slopes. Their compact footprint and shared thresholds make them more amenable to cooperative forms of ownership. Larger family-oriented dwellings, by contrast, take the form of L-shaped units arranged to frame intimate backyards shielded from view. No two homes face directly into another's private garden; instead, they share a common front yard oriented toward a pedestrian street, encouraging casual encounters and shared maintenance. These L-units introduce a rhythm of enclosure and openness, balancing privacy with co-presence.

Stepped rectangular units, meanwhile, descend the slope in staggered bands to maximize views toward the lake and valley below. Their offset arrangement reduces direct sightlines while enhancing access to light and air. The backyard of one unit becomes the terrace of the next, producing layered domestic thresholds and a vertical landscape of shared space.

Where housing meets the street, live-work units offer flexible zones for everyday production, neighborhood offices, repair workshops, or local storefronts. These hybrid spaces respond to the growing role of remote and immaterial labor, where the home becomes not a place of retreat but of continuous activation. By dissolving the historical divide between dwelling and economy, they create adaptable environ-





STARTER HOUSING

Embedded within food production landscape

STARTER HOUSING

Step out into a productive landscape

ments where domestic, productive, and communal life overlap[62]. They also address the growing demand for shared infrastructure among micro-enterprises which require spaces where square footage, tools, and utilities can be collectively accessed at minimal cost.

While most food cultivation remains concentrated in the terraced fields below, traces of cultivation and stewardship extend into the housing grain: balconies host herbs or tomatoes, porches support seed drying or fermentation, and shared courtyards accommodate composting, tool storage, and small planting beds. These elements reinsert growing and care into everyday life without burdening the domestic interior, forming a dispersed ecology of shared upkeep and self-reliance.

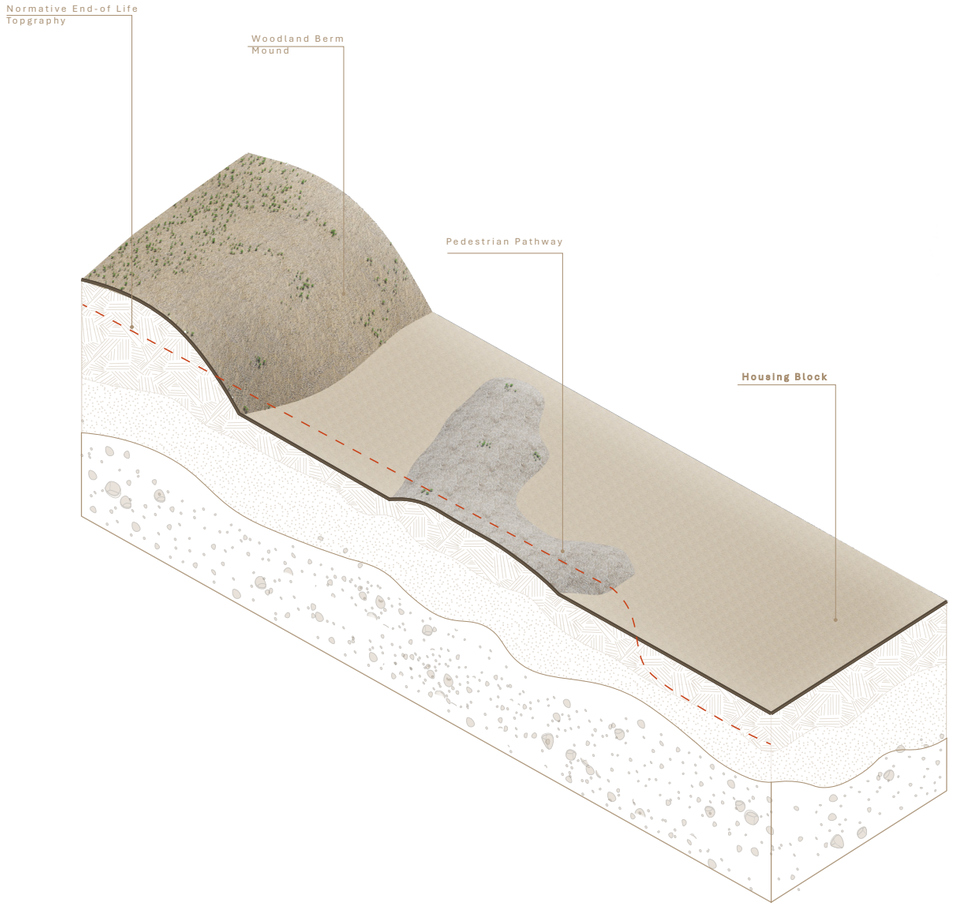
Apartment buildings, placed at higher contours, provide dense clusters that overlook the agricultural landscape, with shared balconies and terraces enabling gathering, leisure, and growing. Additional duplexes or infill units can be integrated wherever the terrain permits. Rather than treating the house as a fixed and autonomous object, each dwelling embeds itself within a larger ecological and social matrix. Together, they define a post-domestic terrain. One in which growing and dwelling, sharing and self-reliance, labor and care are reimagined in relation to landscape, labor, and collective care.

62 *Lewis et al., Architecture and Collective Life.*



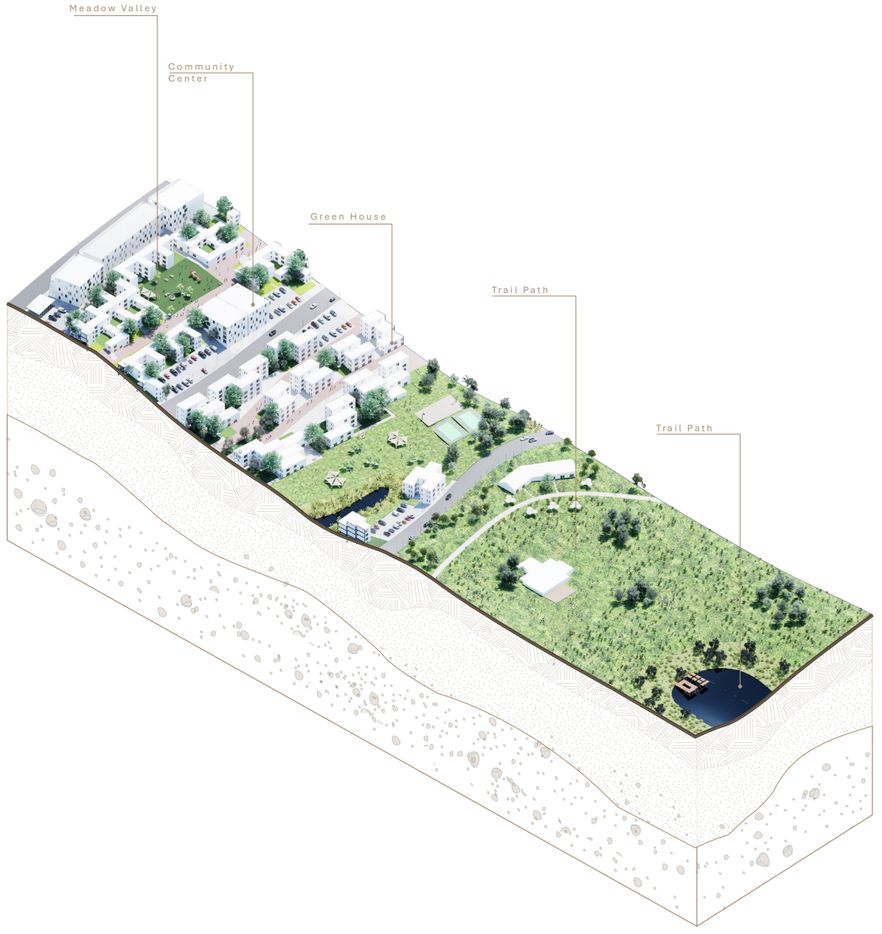
FAMILY HOMES

Thresholds of Care and Gathering



CUT AXONOMETRIC ESCARPMENT

Condition: End of Extraction



COMMONS AND CONTOUR VALLEY

Condition: Post intervention Family units

COMMUNITY STRIPS

Open spaces within [illegible] units

COMMUNITY STRIPS

Flexible program for community

BENEFITS OF BERM MOUND

Acts as a noise and visual buffer between housing and roads

Supports microclimates and wind protection for agriculture

Enables sectional differentiation and ecological edges

Reuses overburden soil to stabilize terrain and reduce erosion

BENEFITS OF GREENHOUSE

Provides year-round food production within walking distance

Enables community-based cultivation and workshops

Acts as thermal buffer zones in seasonal transitions

Supports seed exchange and hyper-local economies

BENEFITS OF AGRICULTURAL FIELD

Restores soil health and builds food resilience

Strengthens local food systems and self-reliance

Offers collective farming and multigenerational participation

Revives land once lost to extraction and sprawl

BENEFITS OF COMMUNITY SPACE

Fosters collective care, play, and seasonal gathering

Strengthens neighborhood identity and intergenerational ties

Provides shared infrastructure for events and education

Activates the commons with ecological and cultural programming

BENEFITS OF GREEN HOUSE

Provides year-round food production within walking distance

Enables community-based cultivation and workshops

Acts as thermal buffer zones in seasonal transitions

Supports seed exchange and hyper-local economies

BENEFITS OF APPARTMENT BALCONY

Extends domestic life outdoors for growing, resting, or socializing

Enhances passive surveillance and street activation

Offers private retreat with public connection

Enables vertical gardening and ecological awareness







CENTRAL VALLEY

Place of water retention and recreation

BENEFITS OF GREENHOUSE

Provides year-round food production within walking distance

Enables community-based cultivation and workshops

Acts as thermal buffer zones in seasonal transitions

Supports seed exchange and hyper-local economies



BENEFITS OF AGRICULTURAL FIELD

Restores soil health and builds food resilience

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BENEFITS OF APPARTMENT BALCONY

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Enhances passive surveillance and street activation

Offers private retreat with public connection

Enables vertical gardening and ecological awareness



BENEFITS OF COMMUNITY SPACE

Fosters collective care, play, and seasonal gathering

Strengthens neighborhood identity and intergenerational ties

Provides shared infrastructure for events and education

Activates the commons with ecological and cultural programming



BENEFITS OF ALLOTMENT

Invites residents to co-tend native plants and small trees.

Initiates soil healing through dense native planting clusters following Miyawaki technique

Builds biodiversity with multi-layered tree and shrub species.

Offers residents and retirees a sense of purpose and land connection through forest stewardship.



BENEFITS OF WOODLAND TRAIL

Offers quiet routes for walking and observing seasonal change.

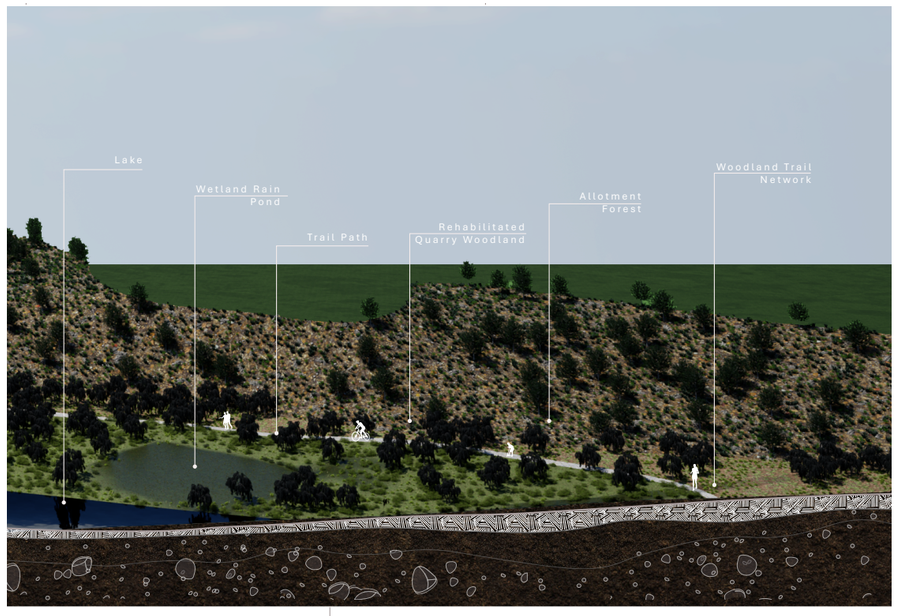
Supports birdwatching and connects residents with wildlife corridors.

Allows passive access to view ongoing ecological restoration.

Builds familiarity with the land, fostering care through repetition.



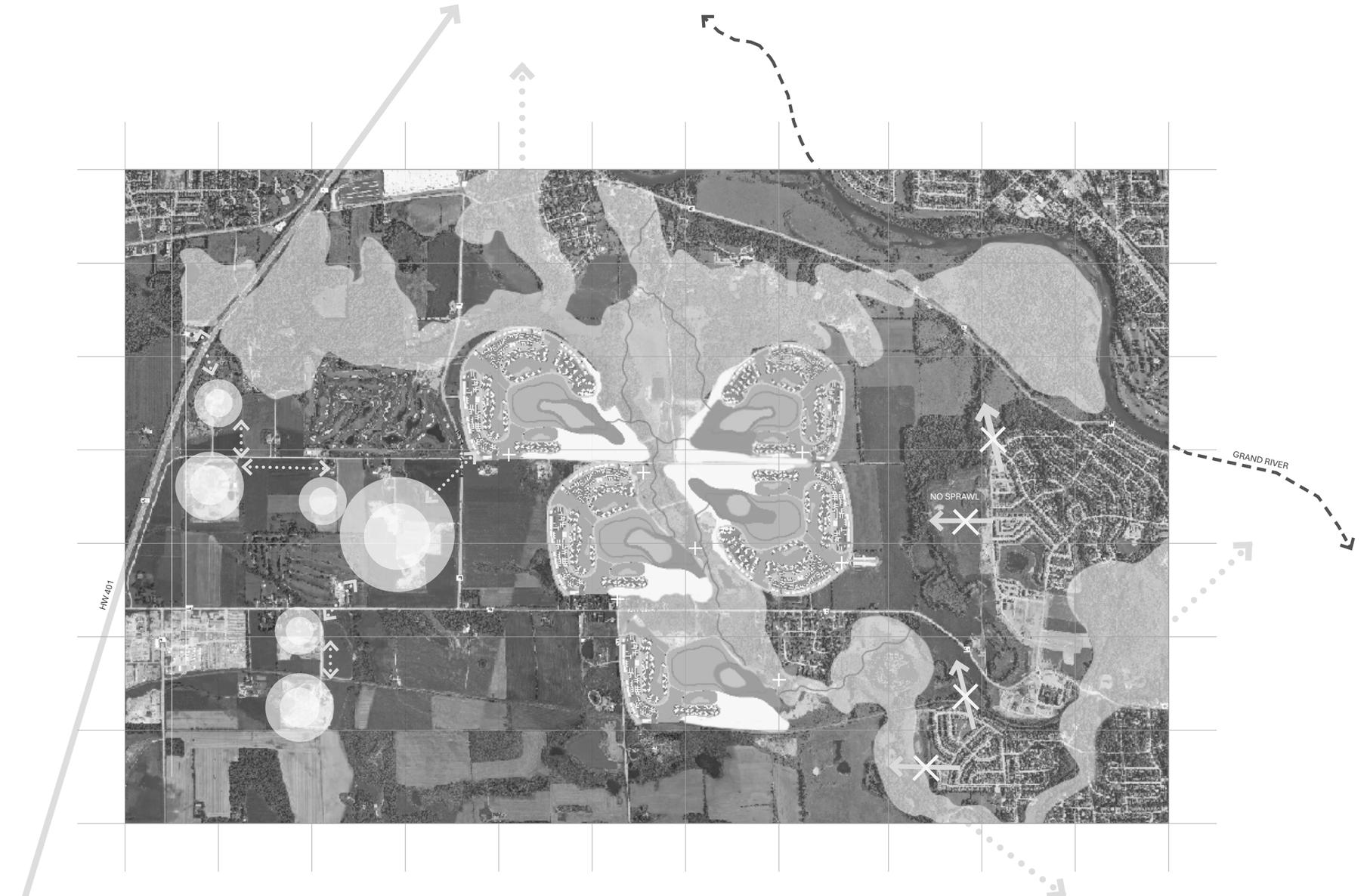






CENTRAL LAKE

Place of water retention and recreation



EXPANDED GRAVEL URBANISM

Linking adjacent pits for collective future & prevent sprawl

CH 6 CONCLUSION

We inherit the voids we refuse to acknowledge. Southern, Ontario's gravel pits are banal holes taken for granted. They are not just landscapes of absence but an infrastructure of forgetting. Dug out to supply the substrate of suburban desire, then discarded in plain sight. They reveal a society that builds by subtraction, erases by construction, and develops by displacing. In these ruptures of the Anthropocene[1], the suburbs appear not as habitat, but as habit. Repeated, normalized, and uncritically accepted. Here, the housing crisis[2] and the ecological crisis converge in silence. A flat lot, a poured slab on a normative plan. Leading to the relentless expansion of suburbia. The scare becomes a template.

What if these voids were not concealed, but confronted? Not flattened but inhabited in ways that are deliberate, collective, and generative. This thesis proposes no solution, no utopia[3], no illusion of closure. Instead, it unfolds a strategy of situated refusal. A refusal of the neoliberal masterplan[4] and fantasy of the tabula rasa. A refusal of the pristine pastoralism that continues to haunt our imaginaries of nature. In place of these, it offers a framework which is open ended, imperfect and insurgent. A spatial infrastructure for mutual aid in the form of a syntax of care which is etched into the previously exhausted ground.

The gravel pit is recast as commons, not through nostalgia, but through reorganization. Its terraces become housing. Ramps become agriculture. Berms and escarpment become the generator of suburban form. This is not a return to nature, but a pact with it. A recognition that design must content with what is already there. Engaging with the slow violence of extraction, the forgotten lakes of hydrological residue, displaced soils and disrupted metabolisms. Architecture then becomes a means of repair, not decorative, not spectacular, but infrastructural. A spatial practice of renewal.

1 Gadanho et al., Eco-Visionaries : Art, Architecture, and New Media after the Anthropocene.
2 MacDonald, Democratic Architecture : Practical Solutions to Today's Housing Crisis.
3 WorkAC, 49 Cities.
4 Firley and Grön, The Urban Masterplanning Handbook.

This renewal follows a design method rooted in ground conditions. Not the abstraction of a territorial plan, but the specificity of a single pit. At the scale of a neighbourhood, it works through topography, water retention, soil replenishment and phasing of dwelling to kick start ecological repair. Early attempts to map multiple sites at once collapsed into generalized diagrams. Producing pseudo-masterplans that flattened complexity. By focusing on one pit rather than the entire watershed, the design could work through its sectional qualities. This allowed for the escarpments, ramps, terraces, and hydrological scars which to become the drivers for the design. This scale mediates between ground conditions and collective life. It is precise enough through its details yet charged with systemic reach.

Time and phasing were central to the project. It unfolded as a temporal sequence rather than a fixed image of completion. Within this lies a hierarchy of priorities. The first task is stabilizing soil in conjunction with water, using slope regrading and retention to create habitable ground. Habitation follows, not as the end goal but as the catalyst that makes soil matter. Through food systems, greenhouses, collective gardens and terraced cultivation, dwelling produce topsoil and care at a small hand-based scale of each dwelling. This labor not only sustains the community but also provides the framework required for ecological succession to extend gradually across the rest of the pit.

Through it may sound utopian in its origins, in today's context of food insecurity, trade wars and climate change, it appears less like a fantasy and more like necessity. Yet, if these layers were stripped down to their essence. The skeleton that matters most is a counter suburbia: compact, affordable, rooted in mutual aid, where food production and ecological repair are inseparable from dwelling. These gravel pits are cheap lands shaped by extraction at the suburban edge.

They can prevent further sprawl and enable new commons while remaining viable for habitation. What matters most is not density or form alone, but a reorganization of suburbia. Away from sprawl and erasure, and towards a collective resilience that begins with soil, water and care.

If the suburb was built on denial of geology, labour and consequence. This project proposes a suburb that remembers. A productive domesticity where thresholds blur and the backyards become a political act. The house is no longer a castle, but a cell within a living tissue of collective resilience. Not isolated, but interdepended. Not sealed, but porous.

What we must take away is that the generic, is never neutral. As gravel belt proves to us that absence is never empty. These terrains of erasure hold within them the latent potential to imagine another order, not imposed but to assemble from within. A line traced, a seed sown, a shovel lifted, a scaffold raised, one act at a time.

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APPENDIX - DISCUSSION

At the conclusion of the defence, a discussion followed in the form of a question-and-answer session. The following section documents the questions posed by the committee and the detailed responses given.

Q1. Why did you choose to work at the scale of a single neighborhood within one pit, rather than at the scale of the watershed or a larger territorial system? You mention the gravel belt as a whole, but your drawings focus in closely. Could you explain why this scale made sense for your design exploration?

A1. In the beginning, I tried to work at the larger territorial scale. I drew diagrams connecting multiple gravel pits along Highway 401, trying to map how they might form a system of extraction and future occupation. But these drawings quickly became too generalized. They looked like pseudo-masterplans flattened abstractions that erased the complexity of each pit. Professor Mason's feedback was crucial here. He encouraged me to stop forcing connections at the wrong scale and instead focus on one pit in depth, to see what it could reveal in section.

Gravel pits are already huge, often 200 acres or more. So, the idea of overlaying a masterplan across them felt false. By narrowing in on a single pit, I could use its escarpments, ramps, terraces, and hydrological scars as design material. These features are not generic; they structure how you move, build, and inhabit. The neighborhood scale was deliberate because it allowed me to remain grounded in detail and lived inhabitation, showing how a community could realistically take root in a pit. At the same time, this scale pointed outward: while the work stays precise, it gestures toward the systemic implications of many pits across the gravel belt.

Q2. How does your project address time and phasing? Why do we only see the final state?

A2. Time is absolutely central to the project. Pits exist in different conditions active extraction, abandonment, partial rehabilitation and a single drawing of the "final state" can't capture that reality. My design unfolds as a temporal sequence rather than a fixed image of completion.

The first step is stabilizing the soil, in conjunction with water management, by regrading and retaining slopes to make them habitable. From there, pioneer plant species begin to colonize, binding loose ground and supporting soil health. Water is not separate from this process; it becomes the framework of repair. Hydrological residues. The pits, basins, and lowlands left behind by extraction are restructured into reservoirs and microclimates that slow erosion and nourish new growth.

Habitation enters as a catalyst, not an endpoint. Dwellers cultivate food through terraces, allotments, and greenhouses, and in doing so they produce topsoil. Small-scale, hand-based cultivation creates the soil and the social practices needed for longer repair. These acts are slow, but they generate the frameworks both ecological and communal. That allow the rest of the pit to regenerate over time. In my drawings, I hinted at this phasing through stewardship diagrams, but I admit I could have shown it more explicitly.

Q3. Your proposal balances many things at once: ecological rehabilitation, food systems, housing density, and collective space. If you were forced to strip the project down to its essence, what matters most? What is the one element without which the rest would not hold together?

A3. The essence of the project is proposing an alternative suburban model. Gravel pits are cheap lands, carved by extraction, and located at the suburban edge. They are precisely the kinds of voids that, if re-inhabited, could stop the relentless push of sprawl while enabling new commons to form.

If everything else were stripped away, what matters most is the skeleton: a counter-suburbia. Compact, contour-responsive housing tied directly to food production and ecological repair. Not suburban houses stretched endlessly across flattened farmland, but dwellings that work with slopes, terraces, and existing scars. Mutual aid becomes the logic here, collective resilience built not by erasing damage, but by inhabiting it carefully.

So, while ecological rehabilitation, food, and density are all important, the true priority is reorganizing suburbia itself: away from endless expansion and toward a compact, affordable, cooperative form of dwelling.

Q4. Why gravel pits specifically? Couldn't the same strategy apply to farmland, or other landscapes at the suburban edge? What makes pits the most appropriate or compelling ground for this kind of re-imagining?

A4. It's true that some aspects of this vision, like food production or collective dwelling could apply to farmland. But farmland is already productive, and it is expensive. To occupy it, you have to out-profit the farmer, which just fuels speculation and the very capitalist cycles the project critiques.

Gravel pits are different. They are degraded, undervalued, and often left behind after extraction. They are scars at the edge of suburbia, cheap land that society has already written off. That makes them viable grounds for experimenting with new forms of habitation and repair. By working with what is already damaged, the project avoids displacing productive farmland while redirecting extraction's aftermath toward collective life.

Gravel pits also hold a symbolic weight. They expose the material foundations of suburbia. Literally the gravel beneath highways and subdivisions and then leave behind voids once that desire has been satisfied. To inhabit pits is therefore not only practical but critical: it confronts the scars suburbia refuses to acknowledge and turns them into sites of new possibility.

Q5. By placing housing in these pits, are you not at risk of reinforcing the logics of suburban expansion, which leap frogs sprawl? Why build new at the edge instead of retrofitting the vast fabric of existing suburbs? What makes this a more viable or critical approach?

A5. This was an important tension in my research. At the start, I did look at retrofitting existing suburban fabric, rethinking cul-de-sacs, integrating food systems, or creating collective commons within subdivisions. But this path is already well researched, and while it is necessary, it didn't feel like the right ground for my thesis.

The gravel pits shifted the focus. If architecture's act is to build, then the question becomes: how do we build on damaged land? Not every pit should be urbanized. Many, especially those embedded in the greenbelt, should return to ecological use. But others especially those directly adjacent to highways and existing suburban infrastructure, are already tied into circulation networks. They are neither pristine nature nor productive farmland. In these cases, compact inhabitation can prevent sprawl from extending further outward, while transforming damaged ground into a collective resource.

So rather than reinforcing suburban expansion, the project proposes a different model of suburban growth. It is compact, contour-responsive, and ecological. It resists the flattening and parceling that define sprawl and instead treats the scars of extraction as a framework for renewal.

Q6. The project proposes food production as a central element of suburban life. But how do you ensure this does not fall into the trap of industrial monoculture? What mechanisms or design features allow the system to remain diverse, collective, and small-scale rather than exploitative?

A6. The terraced topography of gravel pits makes industrial monoculture impossible. Large-scale farming machinery simply cannot operate on steep or broken ground. Instead, the terrain forces cultivation at a smaller scale through hand labor, collective tending, and adaptable greenhouses.

Food systems therefore become integral to dwelling itself. Greenhouses, allotments, and community gardens are woven into housing clusters. Terracing prevents flattening and enforces diversity of crops, supporting vegetables, fruits, and herbs rather than industrial grains. Cultivation becomes a shared practice that sustains both soil and community.

This also reframes agriculture from being peripheral to being central to suburban life. In these pits, food is not just a supplement but an infrastructure of care, part of the ecological repair that supports soil health, and part of the social fabric that sustains collective resilience.

Q7. Finally, what would make this proposal feasible in practice? Are there existing policies or planning mechanisms in Ontario that could support the kinds of rehabilitation and re-inhabitation you're suggesting? How might your vision be implemented beyond the speculative realm of design?

A7. Ontario already has a policy framework that requires gravel pit operators to submit end-of-life rehabilitation plans when they apply for extraction permits. However, these plans often result in shallow outcomes: golf courses, artificial lakes, or minimal green cover. The mechanism exists, but it is underutilized.

My project argues that these rehabilitation requirements could be redirected. Instead of cosmetic afterlives, pits could be mandated to support productive futures, housing-commons, ecological repair, and food systems that benefit surrounding communities. This would align environmental rehabilitation with the urgent need for affordable housing and food security.

Moreover, many pits are located directly beside highways and existing suburban infrastructure. This makes them uniquely serviceable without consuming farmland. Redirecting rehabilitation policy could turn pits into leverage points places where the state demands more than minimal compliance and instead fosters collective renewal.

APPENDIX - CALCULATIONS

This appendix presents the spatial logic, food productivity calculations, and comparative performance metrics for a speculative neighborhood designed to exceed 110% food self-sufficiency. Rooted in the transformation of Ontario's gravel belt, the proposal demonstrates how regenerative land use and cooperative housing can support a closed-loop, community-scale food system.

Community Overview

Metric	Value
Total Residents	5,675 people
Total Homes	2,158 units
Community Density	~54 people/hectare
Total Housing Area	21.7 ha (built footprint)
Total Food-Growing Area	~43.6 ha
Food Self-Sufficiency	Over 110% (year-round)

A new kind of suburb which is productive, cooperative, resilient.

Who Lives Here?

Home Type	Units	People	Land per Unit	Food Area per Unit
Starter Homes	1,065	2,130	~150 m^2 (clustered)	Collective gardens only
Family Homes	325	1,625	225 m^2 (private plots)	Private and shared gardens
Apartments	768	1,920	~120 m^2 (mid-rise)	Greenhouse balconies & roof

Food-Producing Landscapes

Growing Zone	Area (m^2)	Strategy	Yield (kg/year)	Households Fed
Rooftops (Greenhouses + Balconies)	13,800	Intensive, year-round	188,928	~86
Housing Gardens	86,250	Mix of private and shared	485,000	~220
Woodlands (30% productive)	35,551	Foraged and wild food systems	142,000 – 177,755	~65–81
Wet Valleys (3 total)	7,240	Edible wetlands and recreation	36,200 – 43,440	~16–20
Central Wetland (50%)	26,275	Permaculture and agroecology	131,375 – 157,650	~60–72
Terrace Farms (3 total)	63,625	Full greenhouse production	954,375	~434
New Farming Lot (20–30% intensive)	72,780	Mixed natural and greenhouse	478,070–618,630	~217–281

Total Productive Area: ~ 305,521 m^2

Total Yield: ~ 2.45–2.59 million kg/year

Total Households Fed: ~ 1,098–1,179

Every square meter contributes, from balconies to valleys, terraces to trees.

Food Needs and Surplus

Metric	Value
Annual Veg Need per Person	400 kg/year
Total Community Need	2,270,000 kg/year
Total Food Produced On-Site	2.45–2.59 million kg/year
Food Self-Sufficiency	108–114% of needs met
Surplus Use	Food sharing, compost cycling

A closed-loop food ecosystem, no long-haul supply chains required.

My Community vs. a Typical Suburb

Metric	My Community	Typical Suburb
People per Hectare	~54	10–15
Units per Hectare	~20	3–5
Local Food Grown	110%+	0–2%
Land Productivity	Food, habitat, culture	Lawns, driveways
Car Dependency	Optional	Essential
Public Space Use	Edible commons	Decorative parks
Design Logic	Ecological, compact	Private, car-based

Why This Matters

- More people living well on less land
- More food grown within walking distance
- More community built through shared space
- More resilience through closed-loop design

A neighborhood that feeds itself.

110% food-secure. 2.5 × the density of a typical suburb.

More people. Less land. Zero food miles.

A suburb that doesn’t sprawl. It roots.

Suburbia reinvented, not for consumption, but cultivation.

Built for resilience. Designed to grow.