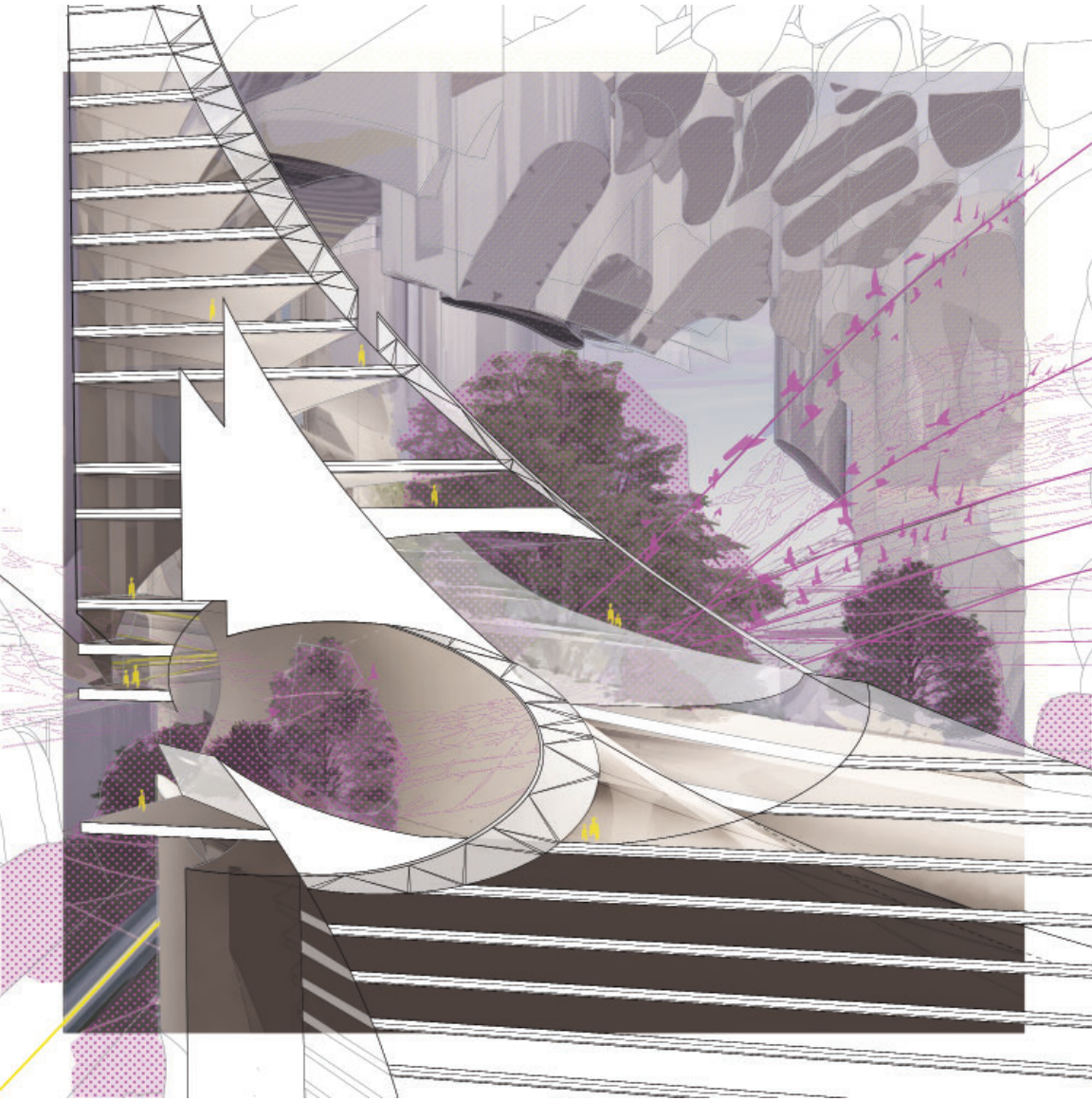
IMPACT!

//AN EXPLORATION OF URBAN ECOSYSTEMS//



SOPHIA SPOCK

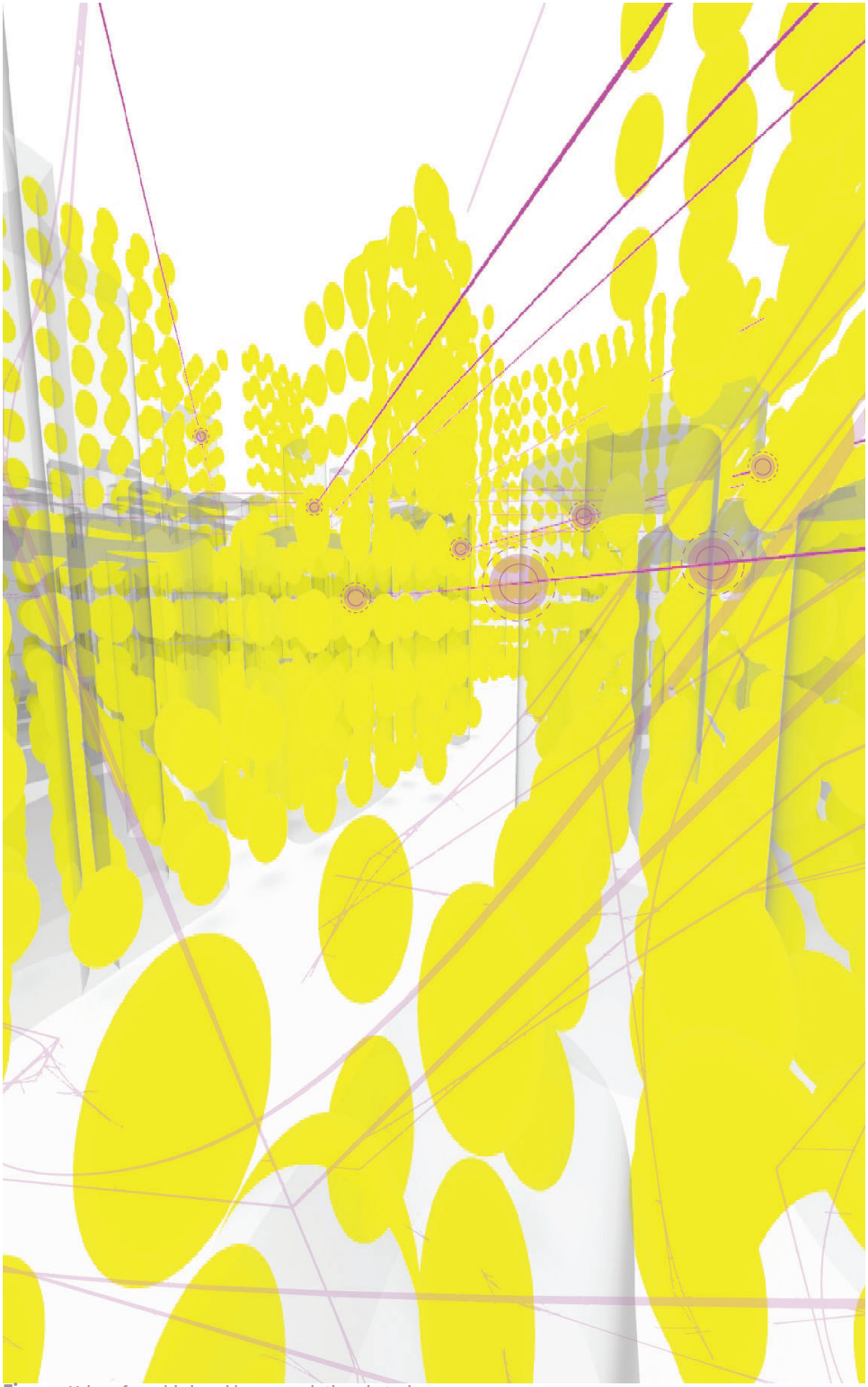
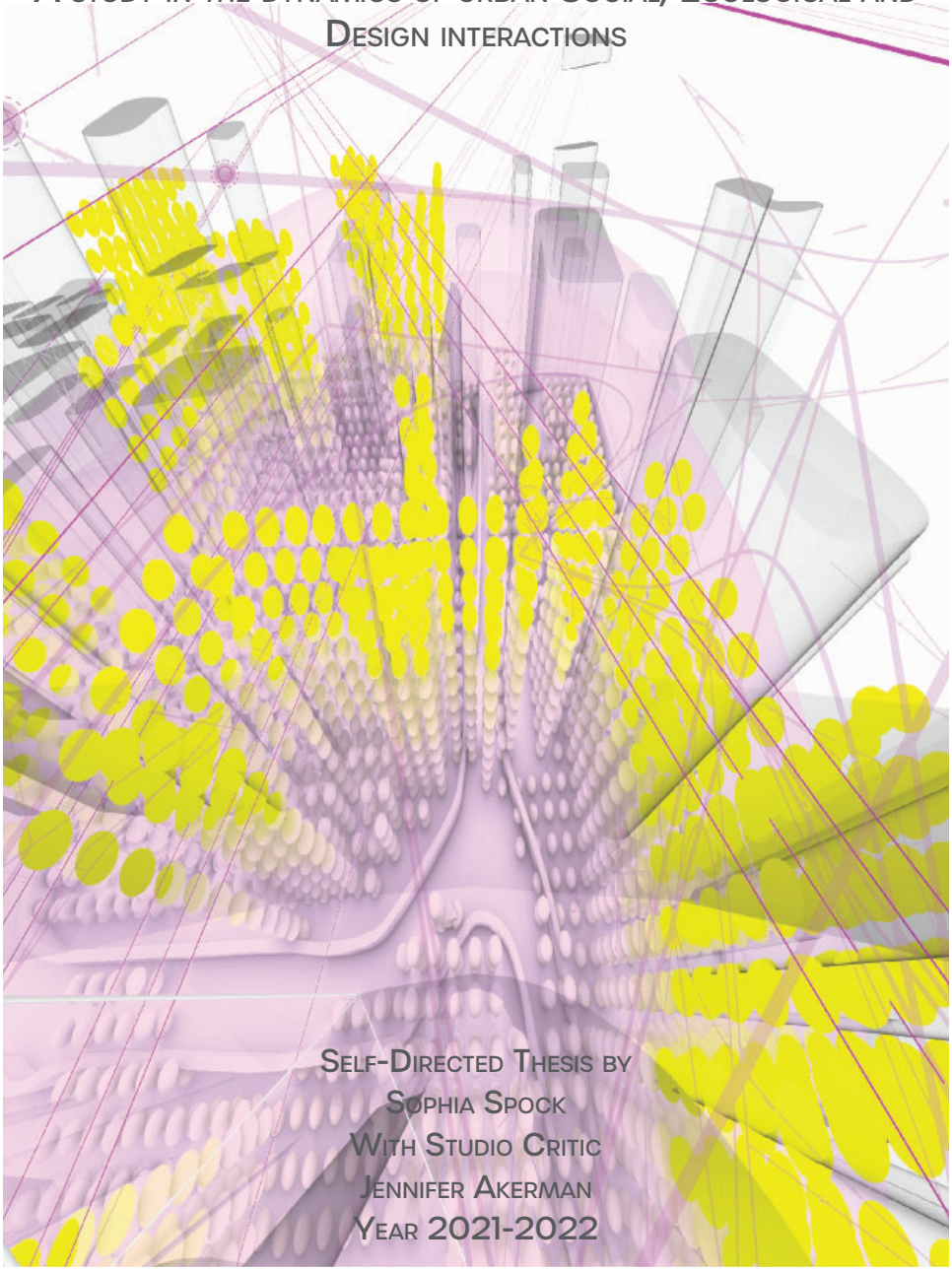


Figure: Urban form bird and human relational study.

IMPACT!

// AN EXPLORATION OF URBAN ECOSYSTEMS //

A study in the dynamics of urban Social, Ecological and Design interactions



Self-Directed Thesis by
Sophia Spock
With Studio Critic
Jennifer Akerman

Year 2021-2022

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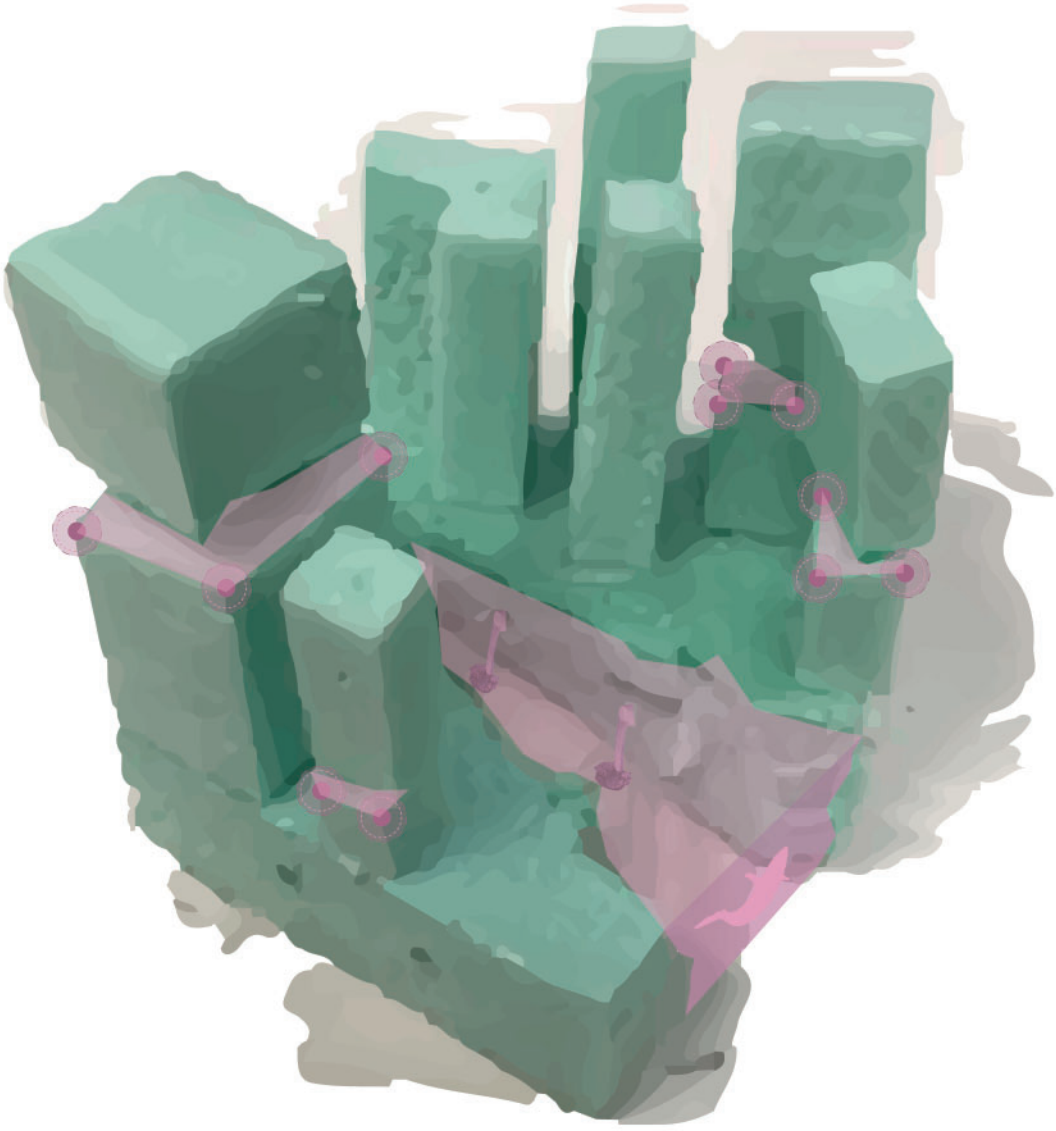


Figure: the city explored under ecological disturbances. The architecture, inspired by the ecological reshaping, is similarly and reflectively reformed, allowing moments of societal intervention to act as common resources to the evolving city.

//POSITIONING//

Impact! explores the evolving city and how it might be re-imagined to emphasize the ability of design to act as a mediator between urban social and ecological relationships. In doing so, its goal is to help our cities build resiliency so that they might be better adapted to changing environments. To be resilient we need to view urban systems as a whole, meaning we need to view them as a part of both social and ecological factors. As humans, we are uniquely attuned to and a part of the social system, but we rarely see the ecological perspective. Thus, there is an inherent bias in architecture to focus on the human condition that this project aims to expand upon by representing an alternative perspective.

Throughout, *Impact!* draws from speculative and analytical case studies, like the Book "Geostories" by Design Earth. In doing so, it aims to exist as a chapter on urban narrative scenarios that explores the question: *What forms would architecture need to take to integrate social and ecological factors in resilient ways?*

Specifically, the project exemplifies the temporal and spatial qualities of these relationships by exploring the system of disturbances between urban growth patterns and the ecology of migratory birds. For example, our cities are constantly growing, and in the age of the Anthropocene, where humans are the driving geological force of the planet, they are massively encroaching on traditional bird airspaces. However, migratory birds can adapt to skyscraper-ridden geographies and their new behaviors might begin to influence how we, as a society, interact with them. To best understand these relationships on a temporal and evolutionary scale, *the project speculates a 200-year timeline of events and architectural reactions through the view of migratory birds.*

Keywords

Speculation
Resiliency
Adaptation
Ballance
World-Building
Disruption
Design as Mediator
Design Process
Re-Use
Mapping

"In other words, we do not live in a kind of void, inside of which we could place individuals and things... we live inside a set of relations that delineates sites which are irreducible to one another and absolutely not superimposable on one another."

Michel Foucault, Of Other Spaces: Utopias and Heterotopias, Pg. 3

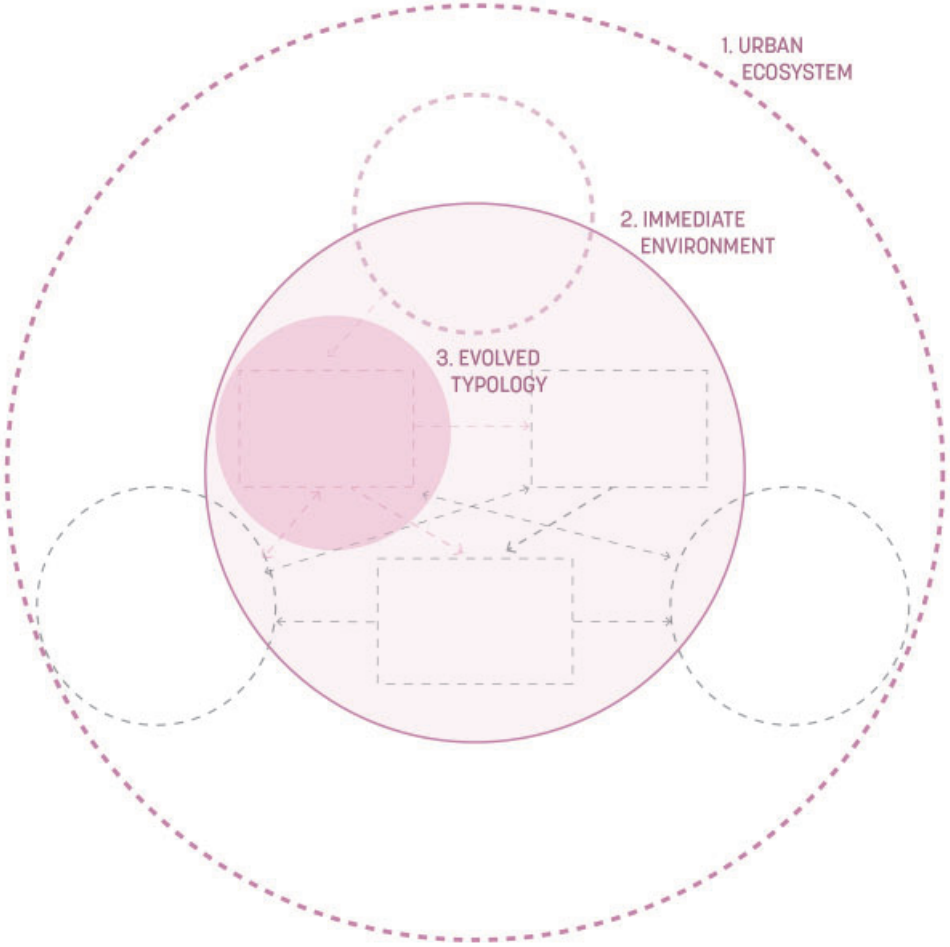


Figure: Diagram of Urban Ecosystem Scales

//FRAMEWORK//

In ecology the ecosystem is defined as a "system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment" (Merriam Webster). In a city, these interconnected elements are made up of buildings instead of organisms, but the sense of interconnected elements forming a larger sense of community is still the same.

DESIGN - The architectural or built environment of the city. This component represents the bridge between the other urban factors and the inhabitant, allowing them to meld together and create a new urban experience..

ECOLOGICAL - The environmental, green and resource elements of the city. This component represents the urban ecosystem's relationship with nature, and often acts upon the city due to changing climates and its dynamic nature.

SOCIAL - The societal, political, and infrastructure facets of the city. This component focuses on the changing needs of urban inhabitants and adjusts based on technological and political demands.

//THE ECOSYSTEM//

In Smout Allen's liquid kingdom, the island of Sheppy is re-imagined an ecosystem of its own. In doing so the island is recreated to showcase our human connection with nature, which involves the evolution of many of the island elements into curious artifacts in which people can see the and experience the conditions of the landscape around them. Like in an ecosystem, each of the artifacts are able to interact with their surroundings to create new features. For instance, a prominent artifact in the project combines the air and the sea around a boardwalk to allow visitors to visualize both conditions and see how they interact.

At the scale of a city, these interactions between typologies, or artifacts, and their surrounding buildings, or environment, also take place. At this scale it is not just the ecological elements of the air and the sea interacting, but also the social elements of population, energy and infrastructure that interacts between the architecture. Because of this, when considering the urban ecosystem as a whole it is important to remember how architecture exists; not in a void, but in tandem with its surroundings.

Thus, when designing, architects should be sure to acknowledge these impacts, and take advantage of them. Doing so will create buildings that are more resilient, as typologies will be able to evolve as resultants of their surroundings, allowing them to become adaptive and versatile.

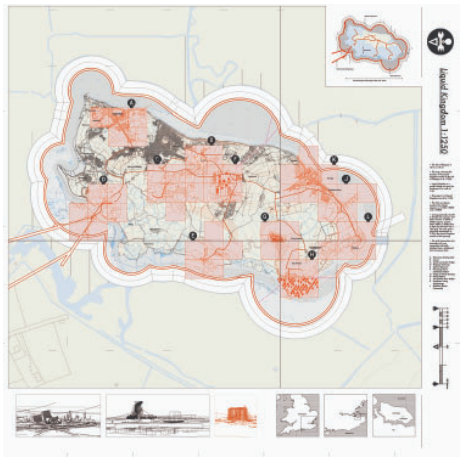


Figure: Image From Smout Allen's Liquid Kingdom: Speculative re-mapping of the Isle of Sheppey as an evolved ecosystem

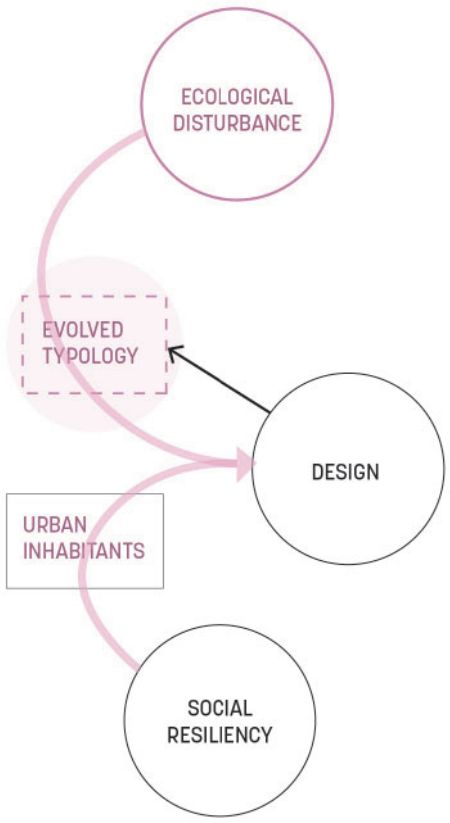


Figure: Diagram of Ecological, Social and Design relationship



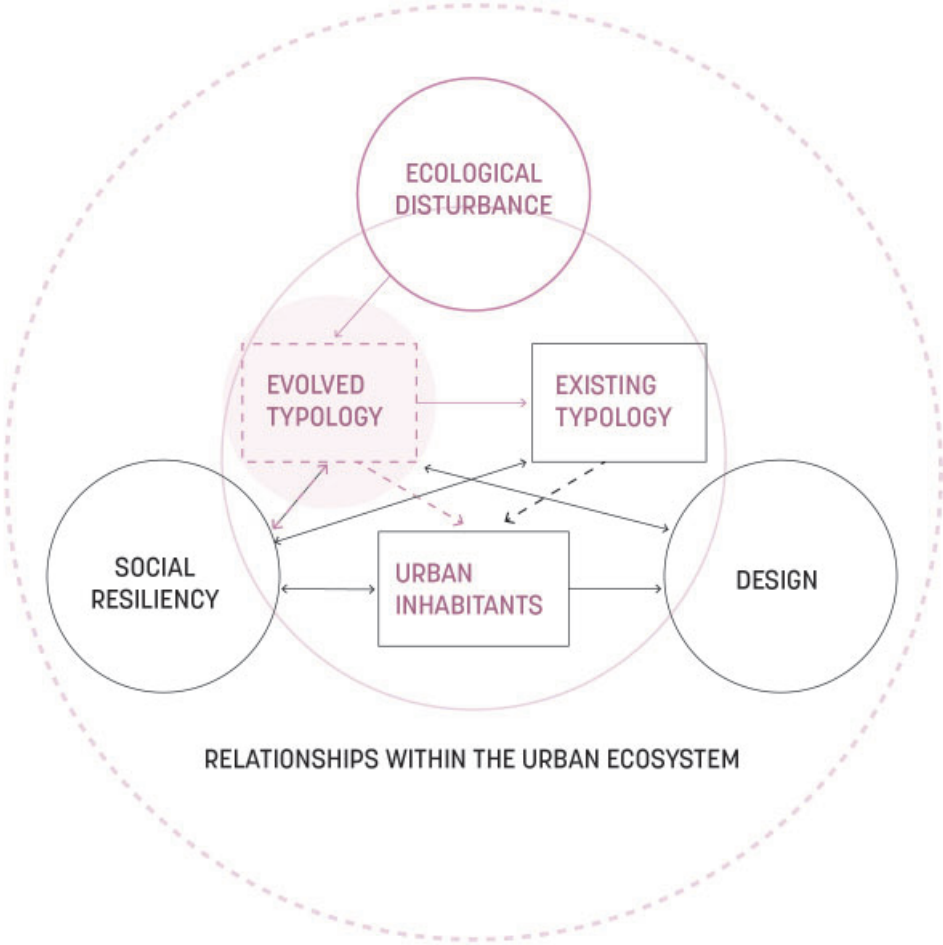


Figure: Diagram of Relationships within the Urban Ecosystem (note Socal and Ecological can be interchangably disturbances or resiliencies)

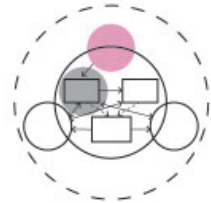
//THE DISTURBANCE//

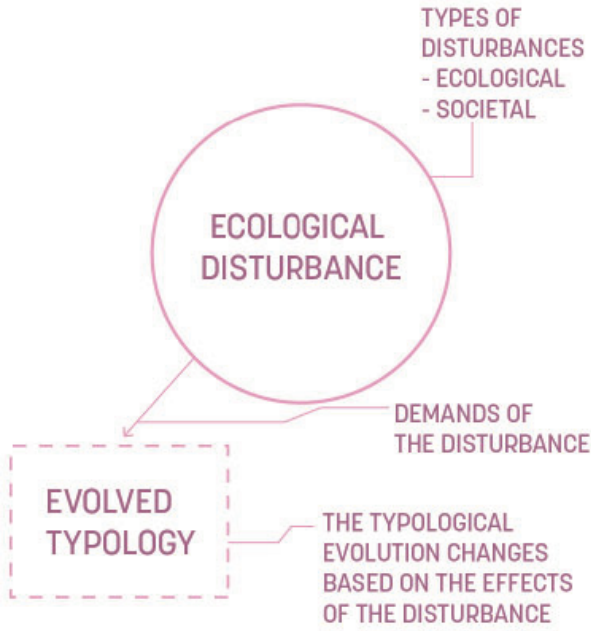
HOW DO OUTSIDE INFLUENCES IMPACT THE URBAN TYPOLOGIES?

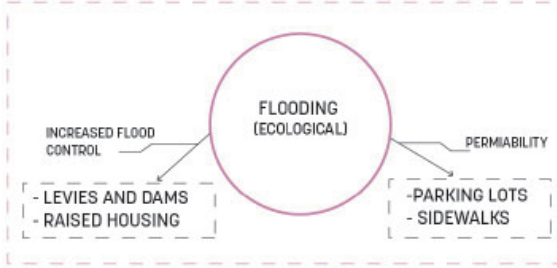
There are many factors that influence an urban ecosystem. As climate change continues to put pressure on our environmental conditions, and new technologies continue to develop, the pressures put upon cities and existing infrastructures to evolve continues to grow. Some catalysts, like natural disasters, happen suddenly, while others, like social advancement, happen more gradually over time. However, in both cases the existing infrastructure and typologies of a city must change or risk becoming obsolete.

For example, the National Risk Index lists 18 weather conditions as hazards that have the potential to strongly impact the urban ecosystem. These weather conditions show us how Ecological Disturbances can impact a regional area. Additionally, it seems likely that, as these risks continue, conditions in cities will need to evolve in order to better approach them. Likewise, evolving Social Scenarios and growth also put pressures on cities to evolve their infrastructure, from the invention of cell phones introducing cell towers, or the automobile itself bringing complex roadways throughout the country.

In doing so, the thesis considers how the needs of the Disturbance could be paired with the needs of the city in order to create new and resilient infrastructure.







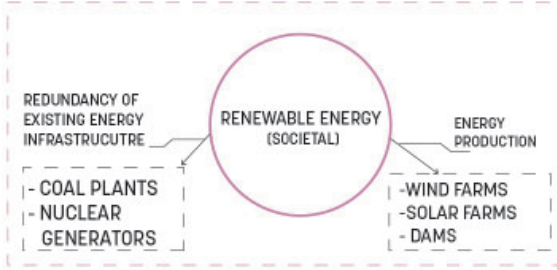


Figure:
Diagram of how Ecological Disturbances act upon the Urban Ecosystem

//THE RESILLIENCY//

HOW CAN OUR EXISTING INFRASTRUCTURE BE REIMAGINED AS A RESILIENT PIECE OF THE CHANGING URBAN FABRIC?

As Social and Ecological disturbances make new demands of our urban ecosystems, the typologies within them must evolve through design to meet the new standards. These evolutions have requirements they must meet to account for the catalyst but can also take advantage of their changing form to additionally incorporate the resiliency needs of their community. In this way, evolving typologies can act as assets to their urban ecosystems, as they create points of renewal that will encourage the growth of their environment as a whole.

Take Lateral office's Runways to Green ways as an example. In this project, the obsolete infrastructure of an abandoned airport runways has been re-imagined in order to address the needs of the surrounding community. In doing so three targeted areas are identified for growth within the community: production, recreation, and civic. Each of these areas were given a projected runway in the project, and the prescribed programs were thus able to interact with the evolving typology of the runway. The project was thus able to evolve the infrastructure into something new, and in doing so, provided a valuable resource for the strength of the community to come. This practice of incorporated evolution could be integrated throughout all evolving typologies, which, like the lateral office project, could begin by identifying a set of parameters to incorporate in its re-use.

Unlike the disturbance, which impacts the region, these parameters would be unique to the urban ecosystem and would be addressed in the immediate surroundings of the typology. In doing so, the concept of the evolving typology can become a more resilient moment in the urban fabric because it is able to meet the needs of the ecological disturbance transforming the ecosystem, as well as the identified social needs of its surrounding urban environment. This process will make the typology a more valuable asset in the urban ecosystem and, by addressing its needs, will help the ecosystem to become more resilient.



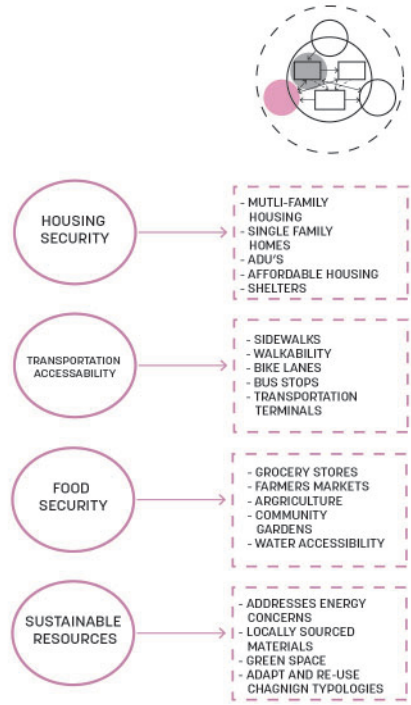


Figure: Image From Lateral office's Runways to Green ways: An overlay of how the projected greenways will begin shaping their urban region. Each greenway focuses on a significant area of need for the city's projected growth; ecology, recreation, and production..

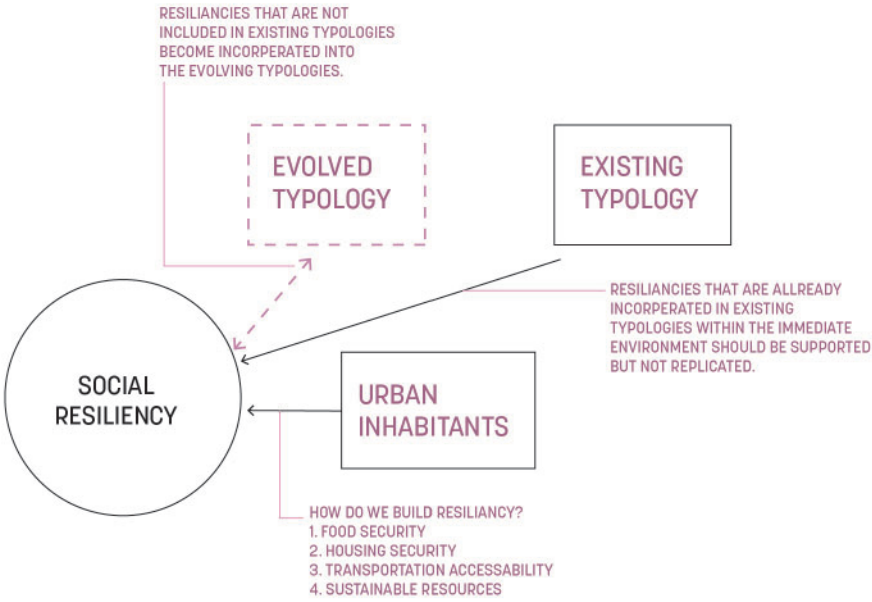
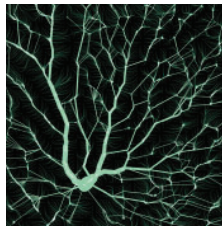


Figure: Diagram of how Social Resiliencies act upon the Urban Ecosystem

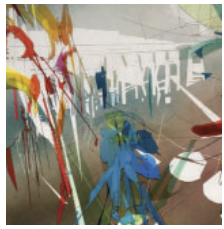
Projected

Sestemic Architecture



Deep Green runs data mapping systems through analysis to create scenarios of projected urban morphology.

Local Code



Tellurian Relics engages in speculative interaction between mapped elements to shape and study space.

The Agency of Mapping



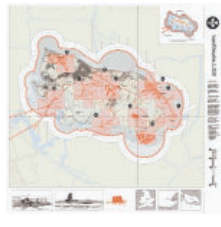
Great Lakes Mega-region uses mapping to track and speculate about areas of environmental and infrastructural interaction called nodes.



Runways to Greenways maps current and necessary urban conditions to identify areas of project overlap for future

Nostalgic For the Future

Geostories



Liquid Kingdom creates speculative work in order to represent the interaction of environmental factors on a site.

Speculation

//INTELLECTUAL ALLIES//

Each of the following projects and literature explore the idea of evolving and projecting space towards the future. In doing so many of them focus on relating environmental and other site conditions in order to better understand their impact on the site. Some of these are based on the idea of mapping and overlaying data sets to identify spaces, and in others, speculative work is created from the results of the data analysis. Through this, each of these projects shows how intertwined A site's factors are, and begin to build beyond our typical understanding of a map to help visually emphasize and shape the future of these relationships.

Seen to the right is an analysis of the projects and literature as they relate to the projection of mapped data or to futuristic speculation.

SESTEMIC ARCHITECTURE OPERATING MANUAL FOR THE SELF ORGANIZING CITY

ECOLOGICSTUDIO

POLETTO, MARCO., AND CLAUDIA. PASQUERO. *SYSTEMIC ARCHITECTURE : OPERATING MANUAL FOR THE SELF-ORGANIZING CITY* ABINGDON, OXON [ENGLAND] ;: ROUTLEDGE, 2012.

"Sestemic architecture...proposes to connect the digital world of mapping and simulation to the material world of sensing and actuating." pg vii

"Each [mapped] virtual plot of the city becomes therefore a unit of urban problem solving, within which multiple actors and agents are able to self organize, giving rise to novel local structures and prototypes ." pg 26

In connecting the digital worlds of mapping and simulation with the idea of physically manifesting a space, this book focuses on ways in which our mapped worlds might become a new reality. Through mapping, it is able to apply the idea of technology to the growth and development of the urban environment, a feat which allows us to better understand how and why our cities and architectures might develop moving forward. This context is particularly important for my process as it exemplifies ways in which the architect can recognize and work with mapped trends in order to aid the urban fabric with its development to create more sustainable solutions.

NOSTALGIC FOR THE FUTURE

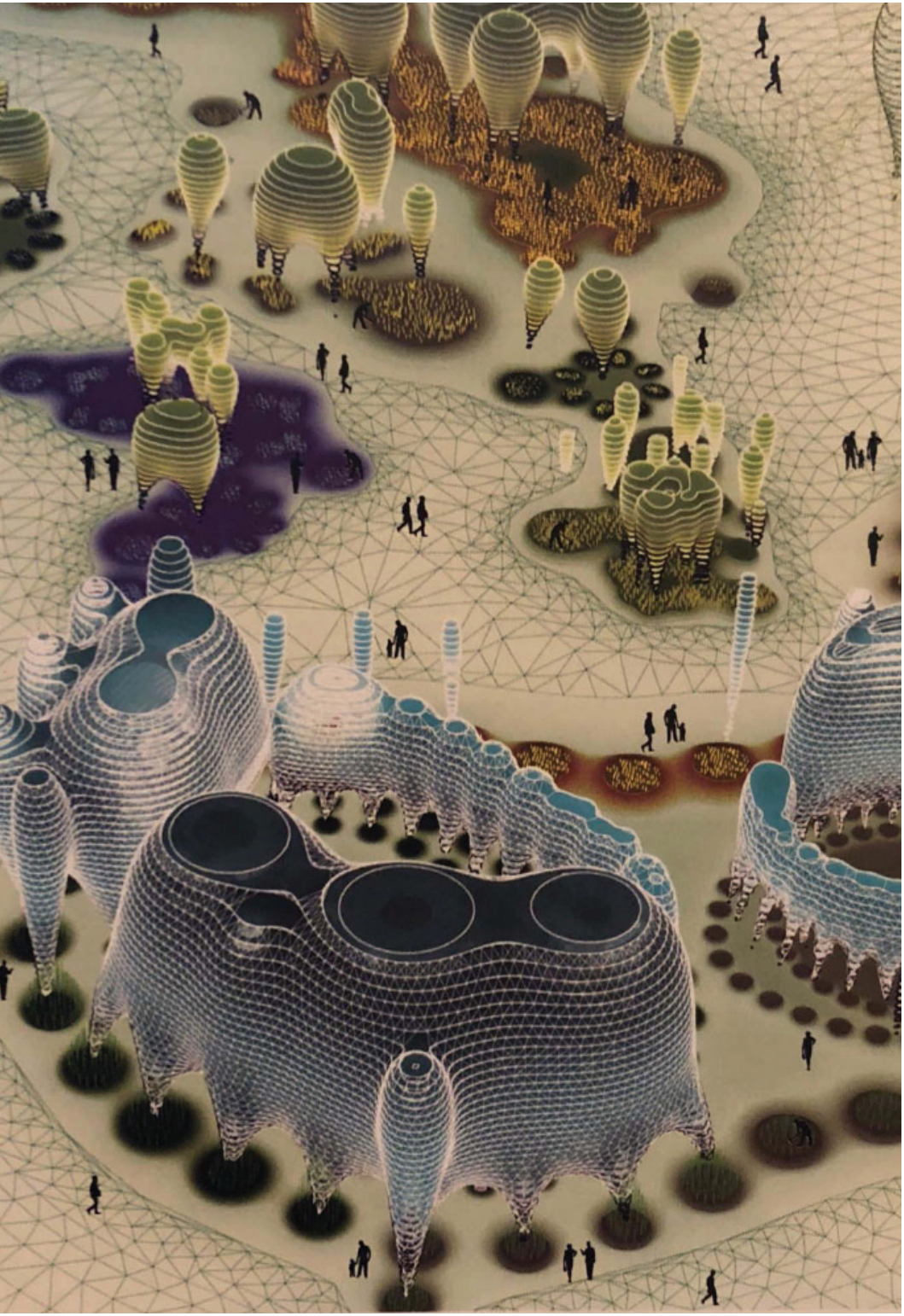
SEAN LALLY

LALLY, SEAN. "NOSTALGIC FOR THE FUTURE." *IN THE AIR FROM OTHER PLANETS*, 8–33. ZURICH: LARS MULLER, 2013.

"Recognizing the elastic nature of the environment around us, the architect does not physically trek to find scientific truths and define geographic certainties, but instead induces the potential futures layered within the existing environments..." pg 9

"Architecture is much more than the building of an object on a site: it is a reinvention of the site

This source considers first the architect's role in the future of design, and emphasizes the idea that they play a prominent role in the shaping and evolution of space. This role of the architect is important to consider, because it calls attention to our responsibilities when encountering and creating designs. As a shaper of the future, its is necessary to explore and understand the site in order to create realities that have yet to come.



FUN clouds by els 2009-2011. MAXdiv housing project: axonometric and planometric diagrams.

GEO-STORIES ANOTHER ARCHITECTURE FOR THE ENVIRONMENT

DESIGN EARTH

GHOSN, R. AND JAZAIRY, E., 2018. *GEOSTORIES: ANOTHER ARCHITECTURE FOR THE ENVIRONMENT*. ACTAR.

"The environmental crisis can be seen not only as a crisis of the physical and technological environments; it is also a crisis of the cultural environment - of the modes of representation through which society relates to the complexity of environmental systems."pg 11

"Climate change may be hard to grasp because its geo-graphic representation is overly abstracted and unapproachable..."pg 11

"The importance of wonder charged experience should not be overlooked when conceiving planetary relationships anew. After all, environmentalism is foremost a protest on behalf of values... "pg 11

This source calls attention to our [in]ability to understand and relate to environmental conditions because of our traditionally clinical, rather than explorative approach to the topic. It poses environmental topics as a speculative opportunity for the architectural activation of environmental factors and mapping techniques, and, in doing so, allows the viewer to better understand the narrative of climate change. As architects designing the future, these narratives, both realized and speculative, are important to understand because they embody the values we as humans establish to shape our urban environments.

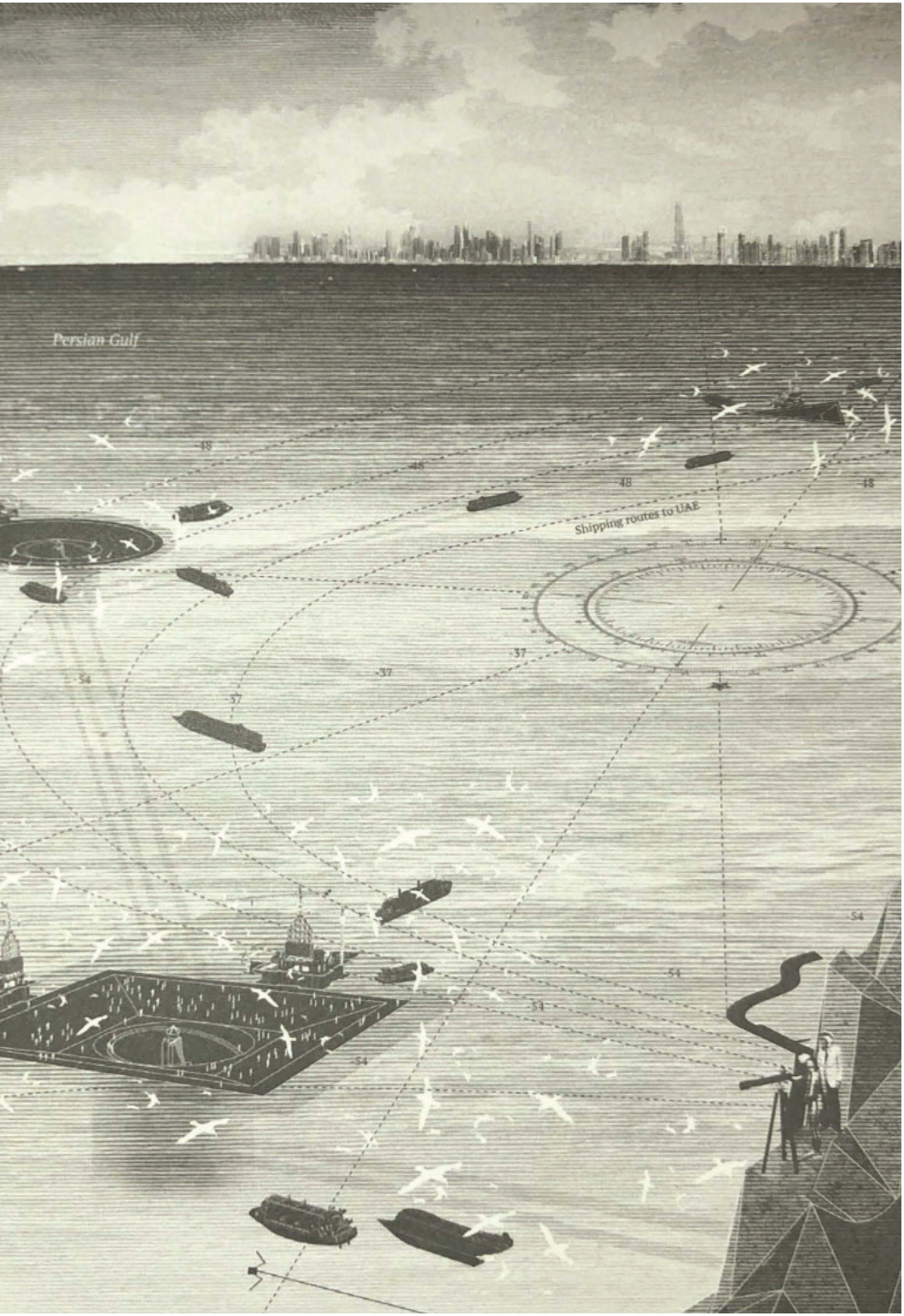
THE AGENCY OF MAPPING: SPECULATION, CRITIQUE AND INVENTION

JAMES CORNER-

CORNER, J., 1999. THE AGENCY OF MAPPING: SPECULATION, CRITIQUE AND INVENTION CITATION. MAPPINGS,.

"...mapping is particularly instrumental in the construing and constructing of lived space. In this active sense, the function of mapping is less to mirror reality than to engender the re-shaping of the worlds in which people live."pg 213

"The interrelationships amingst things in space, as well as the effects that are produced through such dynamic interactions, are becoming of greater significance for intervening in urban landscaped than the solely compositional arrangement of objects and surfaces.. " pg 227



After Oil, Das Island, Das Crude. The image of the city as seen from the offshore territory.

The agency of mapping describes the importance of mapping and its ability to reshape how we think about a space. In doing so, mapping is able to unfold the potential of a site or region, and is an invaluable tool for understanding how we see reality. In addressing our understanding of the environmental conditions that impact the sites we build on, this approach to mapping is important because it shows us how we can begin to better visualize and communicate the ways we shape the urban fabric.

LOCAL CODE -3659 PROPOSALS ABOUT DATA, DESIGN & THE NATURE OF CITIES

NICHOLAS DE MONCHAUX

DE MONCHAUX, NICHOLAS. *LOCAL CODE : 3,659 PROPOSALS ABOUT DATA, DESIGN & THE NATURE OF CITIES FIRST EDITION*. NEW YORK: PRINCETON ARCHITECTURAL PRESS, 2016.

"This book is an attempt to address the question of how information, cities, and resilience can be considered together, and how many different kinds of resilience - all interconnected and each one essential - can be imagined and created in concert." pg 9

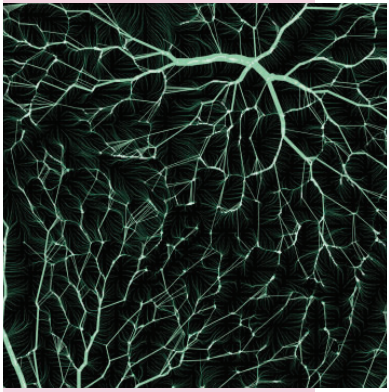
"It is hard, yet essential to devoid the practice of design from certainty. ...[the creation of] idealized, overly deterministic vision[s] of the operations of genetic systems... have served to mask the qualities of natural processes that are also inseparable from the reality of crafting buildings and landscapes: chance, contingency, complexity, and luck." pg 228

Like resilient organisms, Cities evolve, not all at once, but in organized and compartmentalized ways. This book uses mapping technology in order to identify areas of resiliency among the urban fabric. This mapping technique allows multiple facets of social and environmental conditions to be observed, and allows future developments for the sites to be more constructively considered in an uncertain landscape. In doing so, the mapping itself begins to take on a sense of space, allowing it to be better visualized and understood. This is important to consider, because it exemplifies ways in digital information can be displayed in order to show urban relationships.



Los Angeles Case Study. Flow Diagram.

//DEEP GREEN//

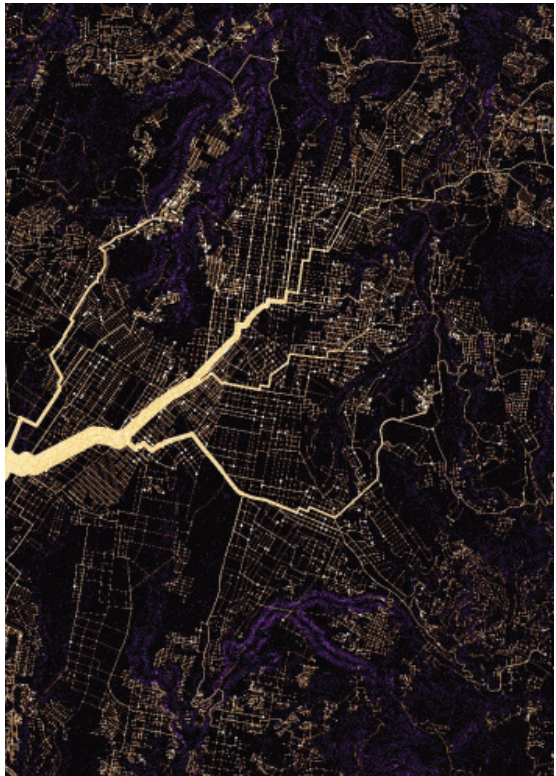


_ECOLOGICSTUDIO AND UNITED NATIONS DEVELOPMENT PROGRAM
_ 2019
_ GUATEMALA

In this project ideas of mapping existing data sets to create a "visual and morphological output", which allows us to better see and interact with the simulated forms. The features focused on in this experiment further the ideas looked at here, as they tie into the city's impact on ecological areas and the development of cities in order to better understand the relationships betweens humans, their footprints, and the environment. In doing so, it interestingly looks at crafted algorithms to analyze mapped data and urban planning as methods for creating simulated visuals of regional and local solutions that will allow the urban environment to evolve with its given challenges.

LEFT: *Rain water collection analysis for the City of Guatemala. The image is computed through a combination water flow simulation patters and minimal networks on the DEM mesh of Guatemala City topography*

BELOW: *Local to municipal waste collection networks in the city of Guatemala. Image algorithmically computed from GIS map, satellite map and DEM model analysis by means of minimal path algorithm. The analysis also takes into account the result of the local waste collection analysis*



Water Flow Pattern analysis of the territory surrounding the city of Guatemala. The image is a false color rendering of the mesh derived from NASA's



"Cities and city regions today are at the forefront in both feeling the effects and fighting to offset the potentially catastrophic effects of climate change"

- Ecologic Studio

AI simulation of a re-greening scenario in Guatemala City.

//TELLURIAN RELICS//



_ SHAUN MURRAY
_ 2017
_ RIVER THAMES

This project, presented in the Bartlet's Unmoored Cities symposium, explores architecture as a deployment of objects within a space. The objects themselves are described as determinate and morphing items, based on a multitude of environmental forms. This allows architects to be seen as editors, or prescribers of said environment, and uses Enia-drawings to layer ecological, notational, instructional and aesthetic elements. This method of mapping thus allows the spatial interactions of the site based on these determinants to be seen in more spatial ways, which influences the architecture to the architecture to evolve

LEFT: *Autochthonic Constructions within the Third Acupuncture: Butchering Openness and Vertical Digging*
View of the pier from Clove Hitch Quay in a northeasterly direction at Battersea Reach.

BELOW: *Shaun Murray,_Bathymetry drawing,_Tellurian Relics,_2017*
Plan of the two abandoned piers at Battersea Reach, on the River Thames in London, which are used as the context for this investigation revealing bathymetries and the archaeology of the autochthonic relics.



Shaun Murray,_Autochthonic Constructions within the Second Acupuncture:Ineffaceable Illumination with Fruiting Bodies,_Tellurian Relics,_2017
View of the pier from Clove Hitch Quay in a northerly direction at Battersea Reach.

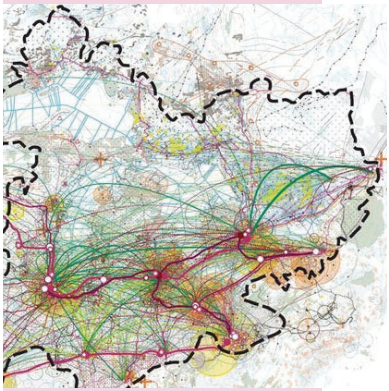


"Through an ecological model in architectural practice, it is possible to connect many fields and areas of expertise, and in so doing to illustrate holistic aspects of components and their relationships to one another within their spatial community"

- Shaun Murray

Autochthonic Relic: Cavity Resonator
Materials within materials – embedding and weaving multiple materials into complex patterns – going beyond shaping geometry, to shaping the internal structure of materials, with unprecedented fi delity through specifying microstructure with micrometre-scale precision.

//GREAT LAKES MEGA-REGION//

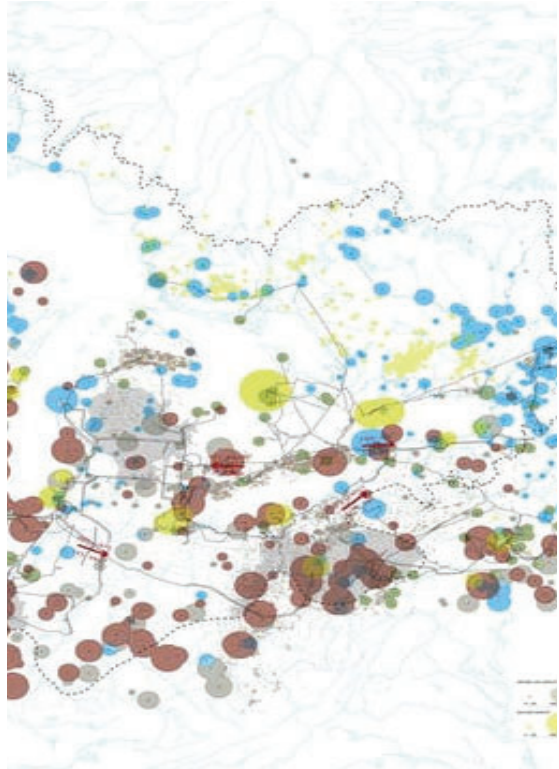


_ RVTR
_ 2008 - 2013
_ GREAT LAKES MEGA-REGION, NORTH AMERICA

In this project concepts of urban systems and networks were mapped in order to explore potential urban and architectural features in the Great Lakes Region. This is particularly relevant as it too uses mapping as a basis for understanding the urban and environmental interactions of a site, and is similarly proposing speculative projects that might begin existing in the space. In doing so, this project specifically begins looking into the idea of nodes as points in which these ideas and transfer between institutions might occur, which is helpful in locating significant areas in the work.

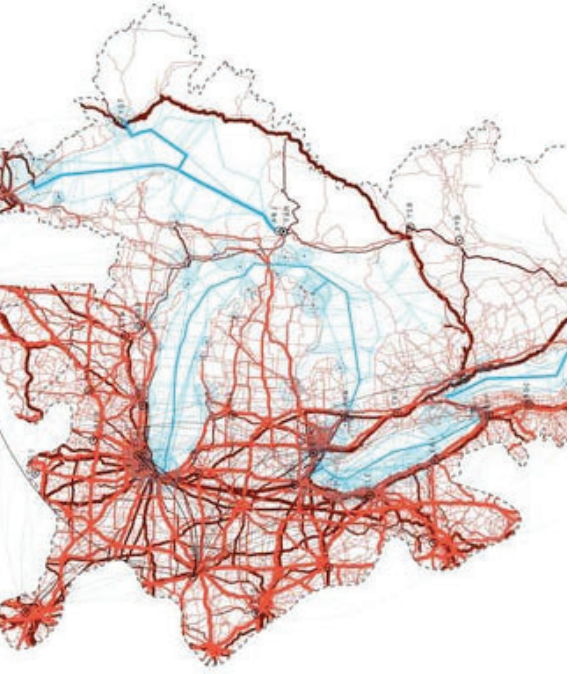
LEFT: *Mapping of Shipping Routes in the Great Lakes Region.*

BELOW: *Mapping of nodes, which become "points of transfer, congregation, exchange and also house new public mega-regional institutions".*





Speculative transportation center based on mapping and node identification



"Positioned within the lineage of speculative, visionary urban proposals, this work is situated within a critical analysis of networked agents, flows and ecologies"
- RVTR

Mapping of Roadway Infrastructure

//RUNWAYS TO GREENWAYS//

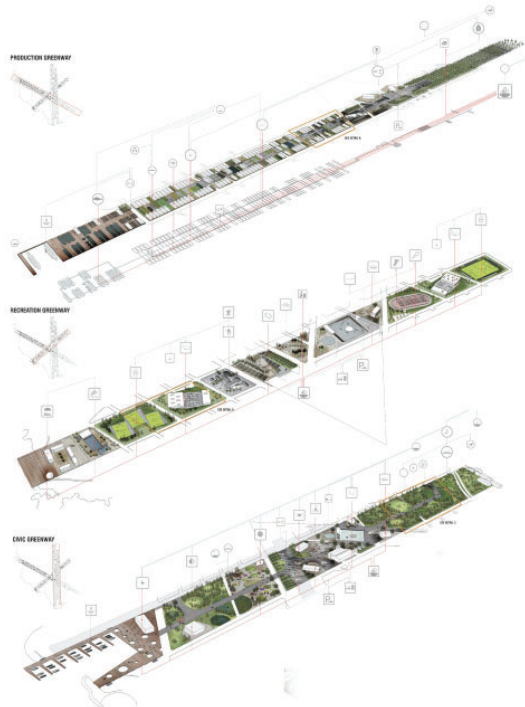


_ LATERAL OFFICE
_ 2007
_ REYKJAVÍK, ICELAND

This project honors both the historic city and the current city's needs for growth by projecting the maps of existing infrastructure and the current city's needs. In doing so, three areas of focus for were identified for the development; ecology, recreation, and production. This is significant because in mapping the future location and development of these factors, the project goes on to project how addressing these needs will create a future of development along the region, and shows how the urban environment will evolve in response tO said factors.

LEFT:*An overlay of how the projected greenways will begin shaping their urban region.*

BELOW: *Each greenway focuses on a significant area of need for the city's projected growth, ecology, recreation, and production..*



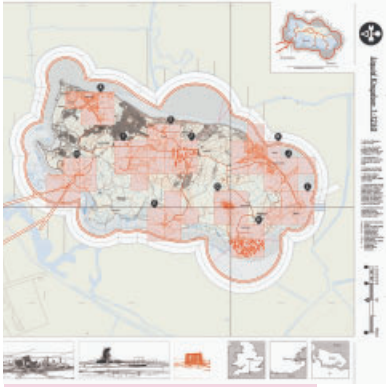
Speculative Urban Growth



"Runways to Greenways... seeks to simultaneously acknowledge the rich history of the site while looking forward to new economies and public realms"
- Lateral Office

Speculated street and housing developments based on relations to the greenways.

//LIQUID KINGDOM//

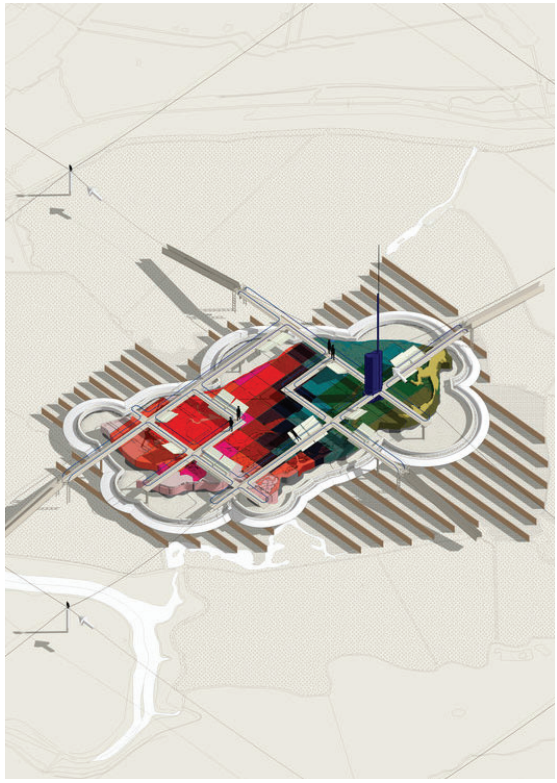


_ SMOUT ALLEN
_ 2017
_ ISLE OF SHEPPEY, THAMES ESTUARY

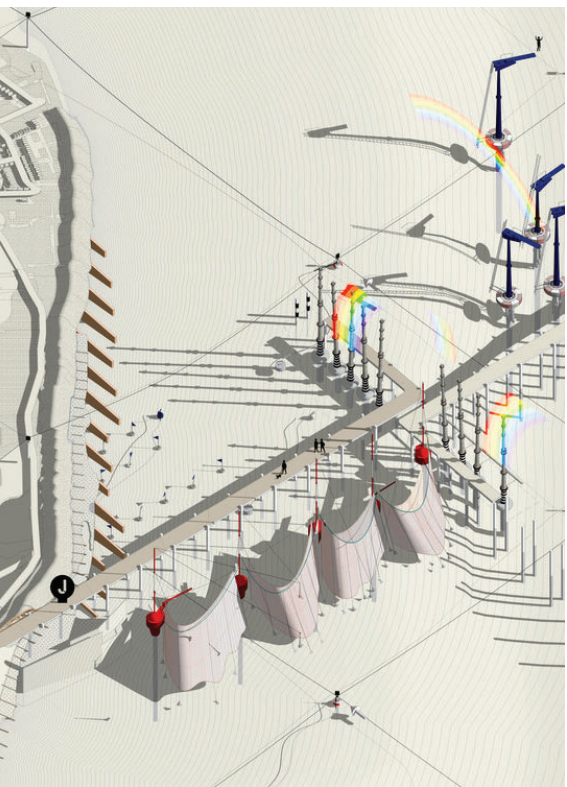
Liquid Kingdom speculates how a site can prepare itself for the future of climate change and societal development. In doing so it furthers the conversation about our relationship with nature and shows the interconnected roles these factors play. Liquid kingdom is further significant in the way is uses speculation to expand the field of mapping, allowing projects to form and grow off the face of the map in a three dimensional fashion. This process allows the viewer to see beyond the data and instead view the objects mapped in a new fashion; one that emphasizes the inevitable relationship between the island, the sea, and its inhabitant.

LEFT: *Speculative re-mapping of the Isle of Sheppey*

BELOW: *Engaging the speculative map in three dimensional form*



Images of the project depicting multiple regions of the re-mapped island displayed.



"This 'super-size miniature' provides a place to see, experience, measure, analyse and enjoy the landscape, bridging the gap between research and local user groups"
- Smout Allen

An interactive moment between air and sea in the speculative project. Creating this allows us to see how the two factors interact with one another.



Figure: Urban Block Typology Before Disturbances

//METHODOLOGIES//

There are many ways mapping can be used to explore the relationship between objects. As explored in the intellectual allies, mapping shows us the relationships between things in an otherwise limitless space and allows us to "re-shape the worlds in which people live" (James Corner, The Agency of Mapping). As urban evolution is primarily based upon the changing relationships between objects, this project proposes a series of mapped drawings in order to showcase these interactions.

In the following pages initial mapping studies of Ecological and Social disturbances have been explored in axon upon the typology of a standardized city block. This exercise is meant to visualize the Urban Ecosystem diagram by first showing how the mapped disturbances can begin to influence the design of the city. From here, the altered urban block has been collaged over, showing where the disturbance acted, and where moments of resiliency might be integrated in the re-developed typology

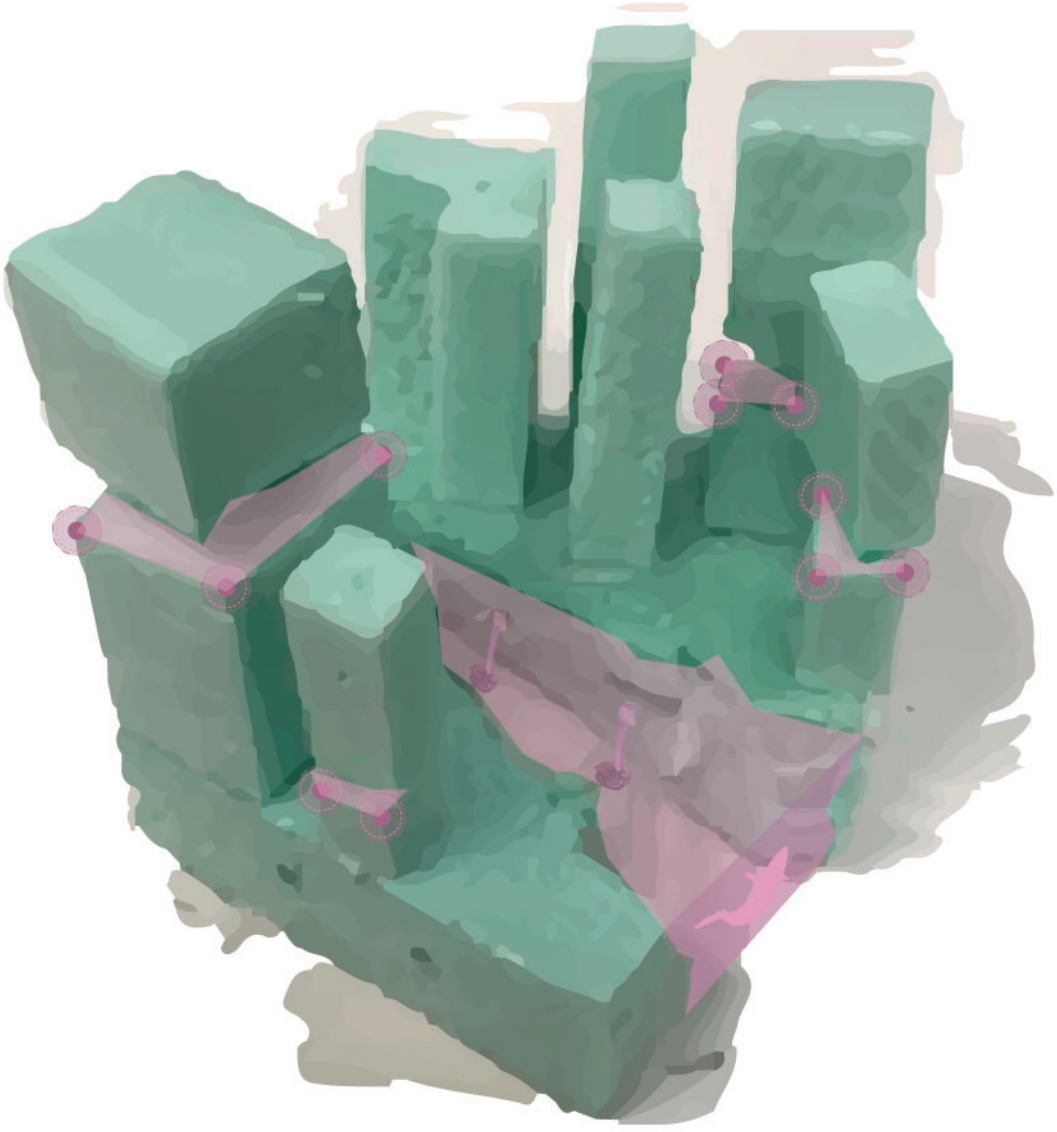
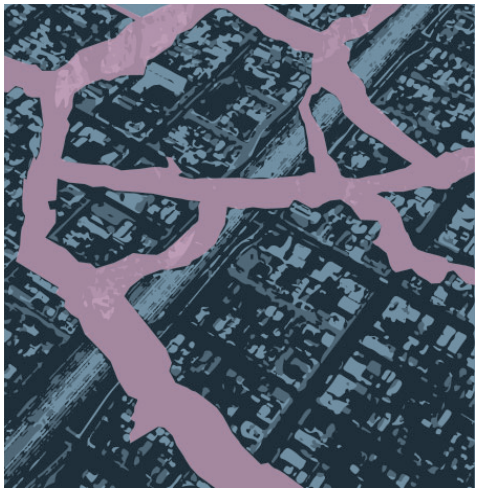


Figure: Urban Block Typology under Earthquake disturbance with hilighted moments of water accessibility to build resilliency.



Ecological Disturbance: Earthquake

Ecological pressures from shifting plates change the ground we stand and build on. This adaptation pulls the city apart and fills in the divide with new lakes and springs. This sense of pulling and twisting is also reflected in the adapted design of the typology to create new urban spaces.

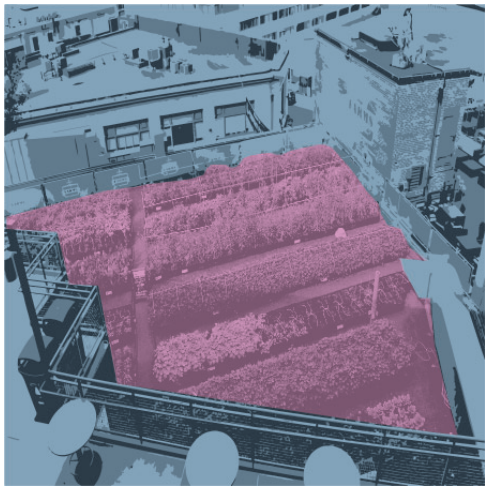


Social Resiliency: Food Security: Water Accessibility

Earthquakes often lead to destruction of water lines, making it hard to access clean water. Thus, the design identifies areas to be used for rainwater collection as a common urban resource.



Figure: Urban Block Typology under Urban heat island disturbance with hilighted moments of Urban agraculture to build resilliency by combatting food scarcity.



Social Disturbance: Urban Heat Island Effect

Urban roof tops often add to the heat island effect, due to their traditional heat reflective properties. However, roofing with new materials, like green roofs, can aid the city in minimizing the impact.



Ecological Resiliency: Food Security: Urban Agriculture

In embracing the urban green roof movement, what if the natural roofing went one step further, to become a food producing garden? Like traditional terraced farming, this action allows the area to be used agriculturally, and helps to combat food insecurity.

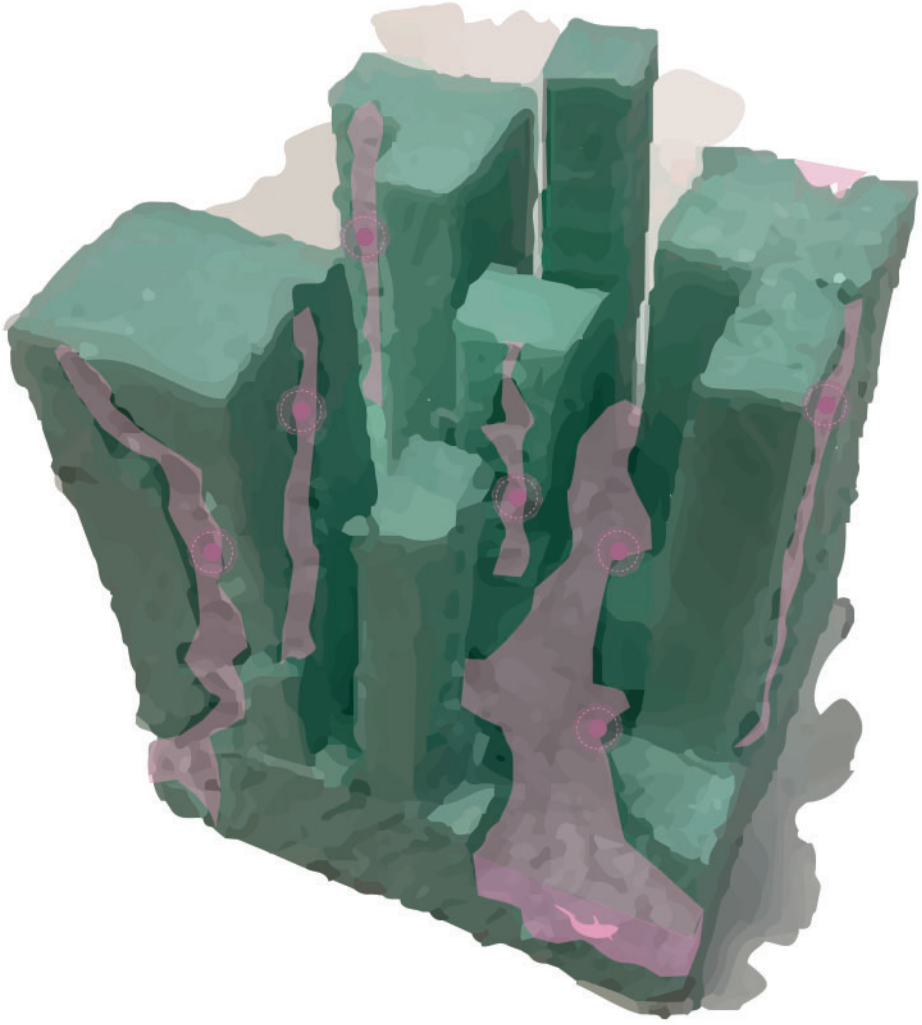


Figure: Urban Block Typology under Flooding disturbance with hilighted moments of water based renewable energy to build resilliency.



Ecological Disturbance: Flooding

As water levels rise the streets of cities become more likely to flood. But what if the sides of buildings did too; allowing for more flood control by manipulating the way the water moves throughout the city block.



Social Resiliency: Sustainable Resources: Renewable Energy

Manipulating the water to direct flooding also gives us the opportunity to use it for energy production. By using hydropower-based turbines and the waters natural downward movement, renewable energy can be built into the design and the urban resiliency.

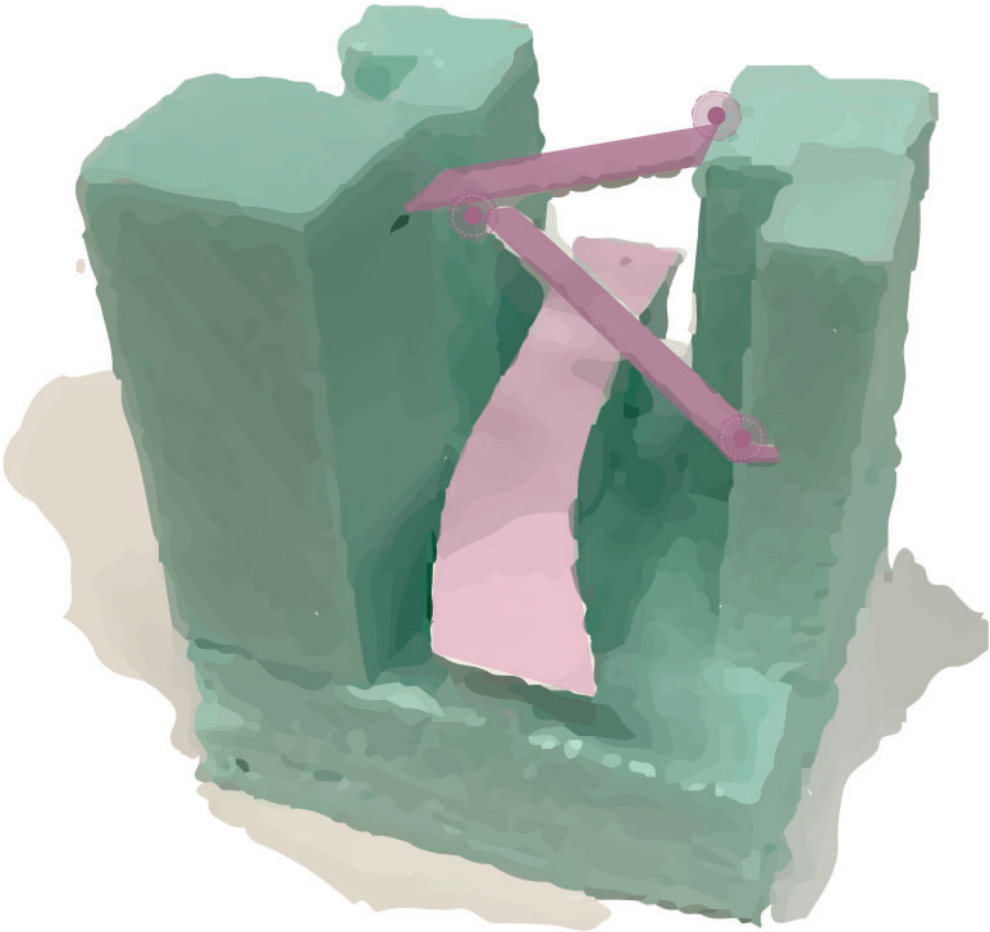


Figure: Urban Block Typology under Interstate disturbance with hilighted moments of Increased Walkability to build resilliency.



Social Disturbance: Interstate

Interstates and other large-scale infrastructures have historically cut through cities when they are formed. This action is seen as necessary for technological progress but creates divisions that weaken the urban ecosystem when not designed properly.

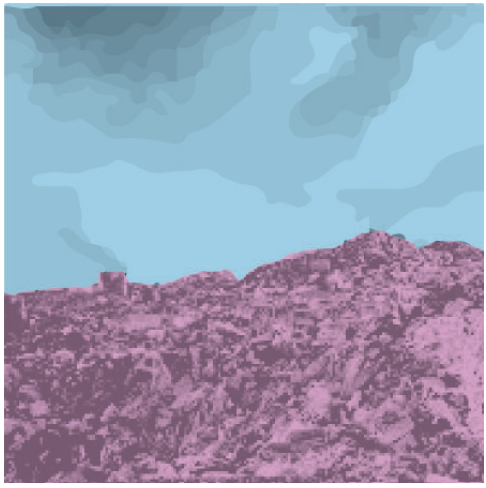


Ecological Resiliency: Transportation Accessibility: Walkability

In the process of instilling and maintaining streets for automobiles, many cities lose their walkability. By creating passes at the scale of the persona as well as the car this walkability is reinstated, which helps to reduce auto dependency.



Figure: Urban Block Typology under Landfill disturbance with hilighted moments of Urban Accessory Housing to build resilliency.



Ecological Disturbance: Landfills

As landfill space runs out but waste keeps accumulating, we need to find ways to repurpose it. How might these accumulations grow in and create new spaces in unoccupied areas of the city? How might they attach to the existing typology and create new spaces to inhabit?



Social Resiliency: Housing Security: Accessory Units

How can we use items that we would otherwise consider waste to add on to our urban dwellings? How might these materials be reclaimed as valuable tools to address continued demands for increasing housing space?

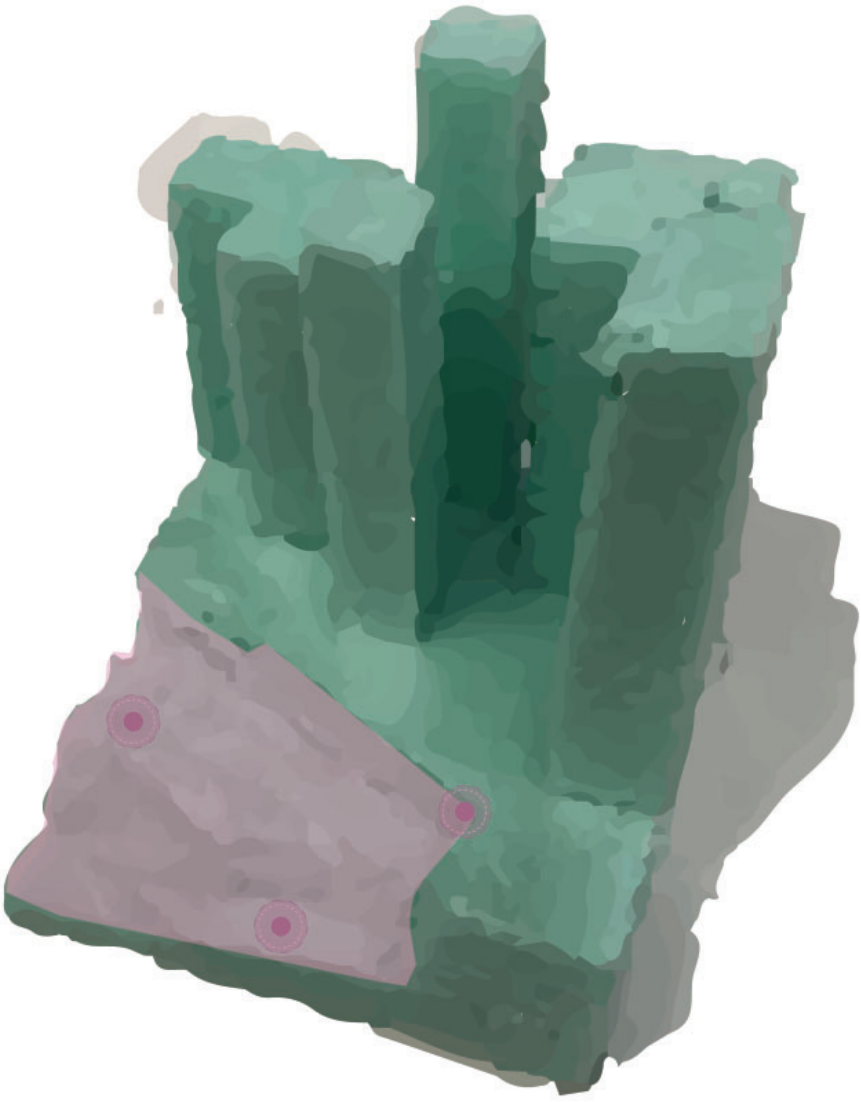
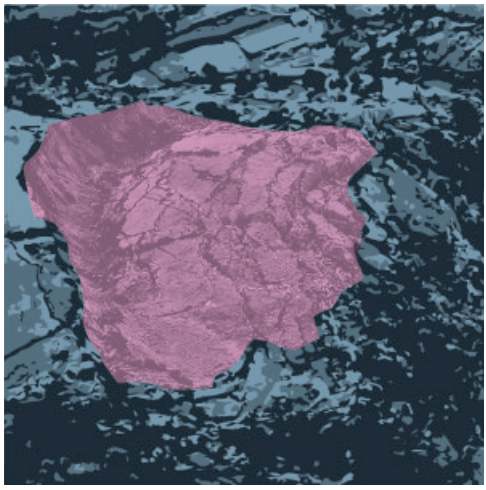


Figure: Urban Block Typology under Landslide disturbances with hilighted moments of created Greenways to build transportation and accessibility resilliency.



Ecological Disturbance: Landslide

Ecological pressures from shifting plates change the ground we stand and build on. This adaptation pulls part of the city development away, making it available for new resilient developments.

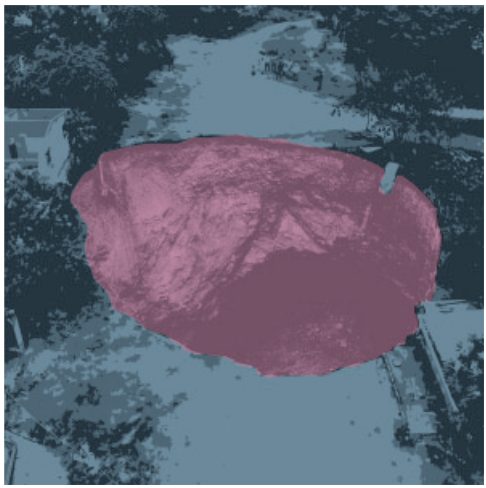


Social Resiliency: Transportation Accessibility: Greenways

Connecting the city's transportation network with elements like greenways helps to make it more accessible and helps to connect the city with the region's natural environments.



Figure: Urban Block Typology under Sinkhole disturbances with hilighted opportunities for Urban Multifamily Housing to build resilliency.



Ecological Disturbance: Sinkholes

Ecological pressures from shifting plates change the ground we stand and build on. This adaptation opens up new areas of the city underground, bringing light below the streetscape surface; an action that is similarly explored in the building typology.

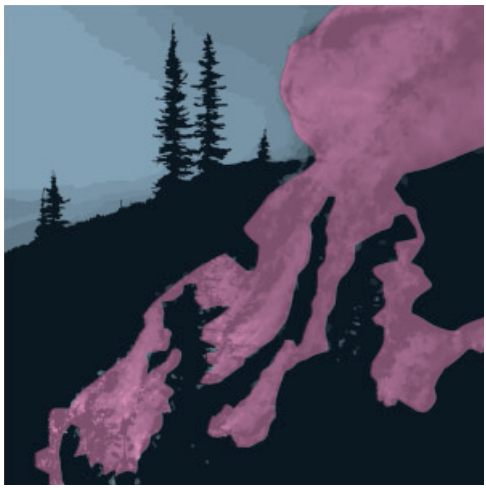


Social Resiliency: Housing Security: Multifamily Dwellings

Like the sinkhole in the ground, the forms sinking through the urban block typology bring light to previously contained locations. These dynamic courtyards provide more space for densified housing and helps to diversify housing opportunities in the Urban Block.



Figure: Urban Block Typology under Wildfire disturbance with hilighted moments of Urnab Green Space to build resilliency.



Social Disturbance: Wildfire

The fire moves through the forest, altering and stripping down the material in its path. Likewise in the city, a lone tall tower stands. The others have been shortened, and re-molded, awaiting new surfaces in the wake of the fire's destruction.



Ecological Resiliency: Sustainable Resources: Urban Greenspace

In the wake of fire, the forest re-grows. Slowly at first and full of soft foliage. In the city, these altered rooftops and landscapes become greenspace, allowing nature to reclaim the hardscapes of the city, just as it does the burned forest.

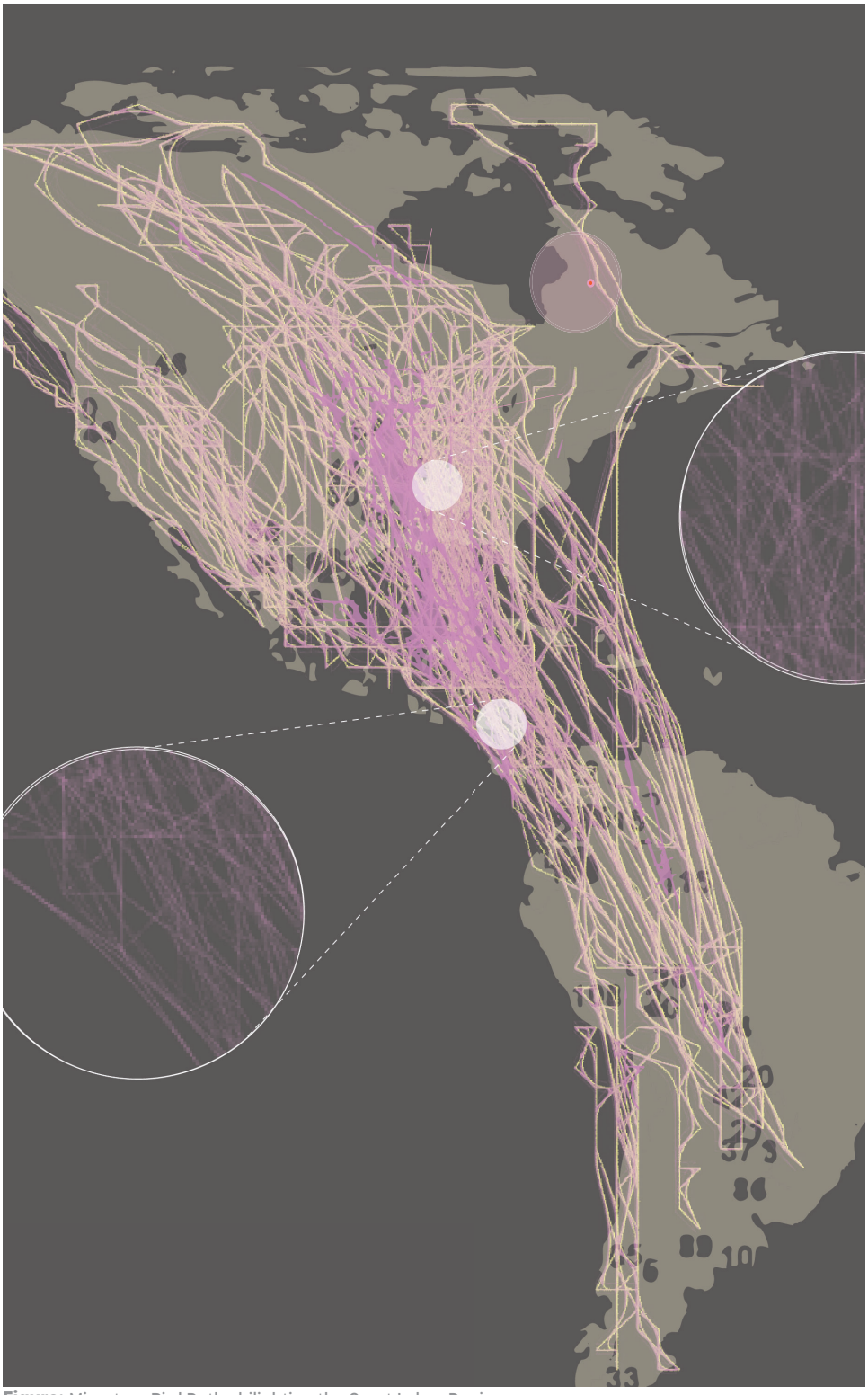


Figure: Migratory Bird Paths hilighting the Great Lakes Region

//LOCATING//

The concept of the urban ecosystem is universal, so it has been initially explored through the typology of a standardized urban block. However, as the design progresses beyond this scale to explore relationships, the impacts of disturbances on typologies and their ability to create resilience is dependent on the specific needs of urban ecosystems. Thus, in exploring these disturbances further I will be focusing on the Great Lakes region for the urban ecosystem being analyzed.

In doing so, I want to approach the urban ecosystem at three scales: the Urban Ecosystem, the Immediate Environment, and the design of the Evolved Typology. As seen in the Methodology section, the immediate environment includes the disturbance acting upon the urban ecosystem and shows how it begins to relate to the Ecological, Societal and Design dynamics.

The other two scales are meant to expand upon these conditions, by focusing in on a singular building typology from the scenario, and by implying the larger impacts the dynamics have to the scale of the region.

//URBAN ECOSYSTEM//

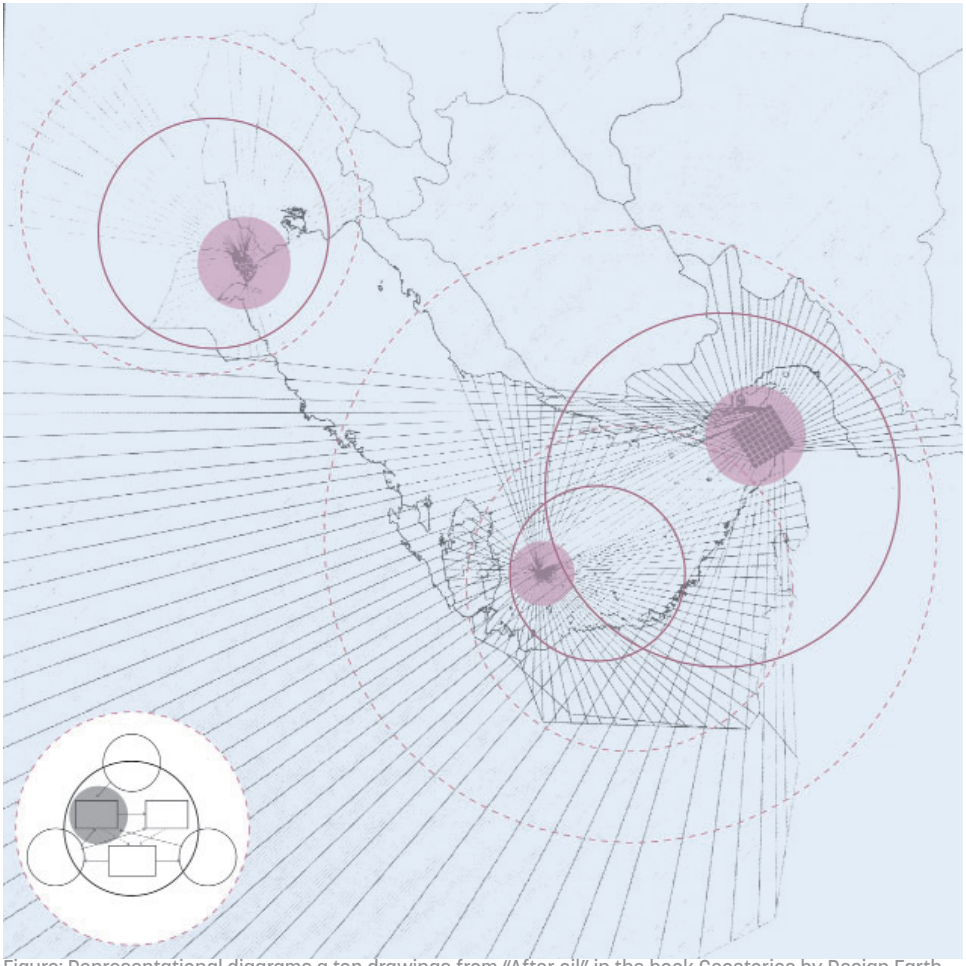


Figure: Representational diagrams a top drawings from "After oil" in the book Geostories by Design Earth.

This mapping takes place at a larger scale, implies the scale of impact that the disturbance might hold over the urban ecosystem. at this scale the relationship between the elements of the ecosystem can all be seen, as the mapping shows the larger impact of the changing typologies, the ecosystem's disturbances, and its surrounding resources. Doing so, and revisiting this map with each evolved typology, will allow us to see how the city is evolving in response to the disturbance.

//IMMEDIATE ENVIRONMENT//



Figure: Representational diagrams a top drawings from "After oil" in the book Geostories by Design Earth.

Next, is the mapped axon, which is to be explored at the scale of the immediate environment. The axon allows us to view the building and its surrounds wholistically, and by providing a mortally impossible view, makes the totality of interactions between the typologies more comprehensible for its viewers. (Geostories pg. 23) This is important as it allows us to understand the interactive relationship between the evolving typology designs, as well as how these changes impact inhabitants, their disturbances, and their surrounding resources.

//EVOLVED TYPOLOGY//



Figure: Representational diagrams a top drawings from "After oil" in the book Geostories by Design Earth.

Finally, at the scale of the evolving typology, section becomes equally important. In the words of Design Earth, the section "counteracts the abstract Earth of areal mappings, diagrammatic flows, and soft perspectives". In this way the section is uniquely positioned to provide us another angle on the relationship between the site typology and the buildings around it. Exploring this vertical territory will allow us to see how the typology might be shaped by/in order to respond to the context of its immediate environment.

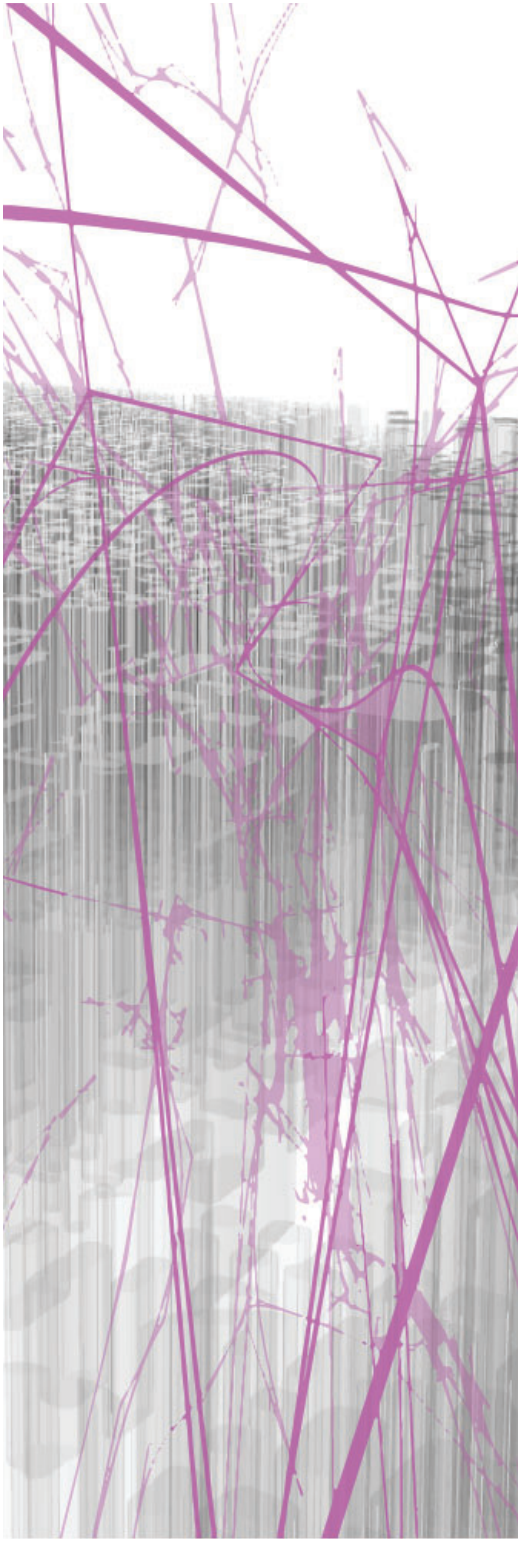


Figure: Representing mapped relational data of migratory birds in an urban setting.

At its core, this thesis imagines the world re-created by the actions of urban disturbances. In doing so, it views the urban environment as an ecosystem, and specifically calls to attention the relationship between the social, ecological, and designed elements. In expanding upon the scale of the disturbances mapped in the methodologies section, I can begin to see how the changing buildings will interact with differing levels of the city ecosystem. In creating these interactions, it is imperative to consider that the typologies evolve within their immediate environment, but also within the whole of the urban ecosystem. Doing so will aid me in understanding which resilient factors need to be focused upon to improve the conditions of the environment as a whole.

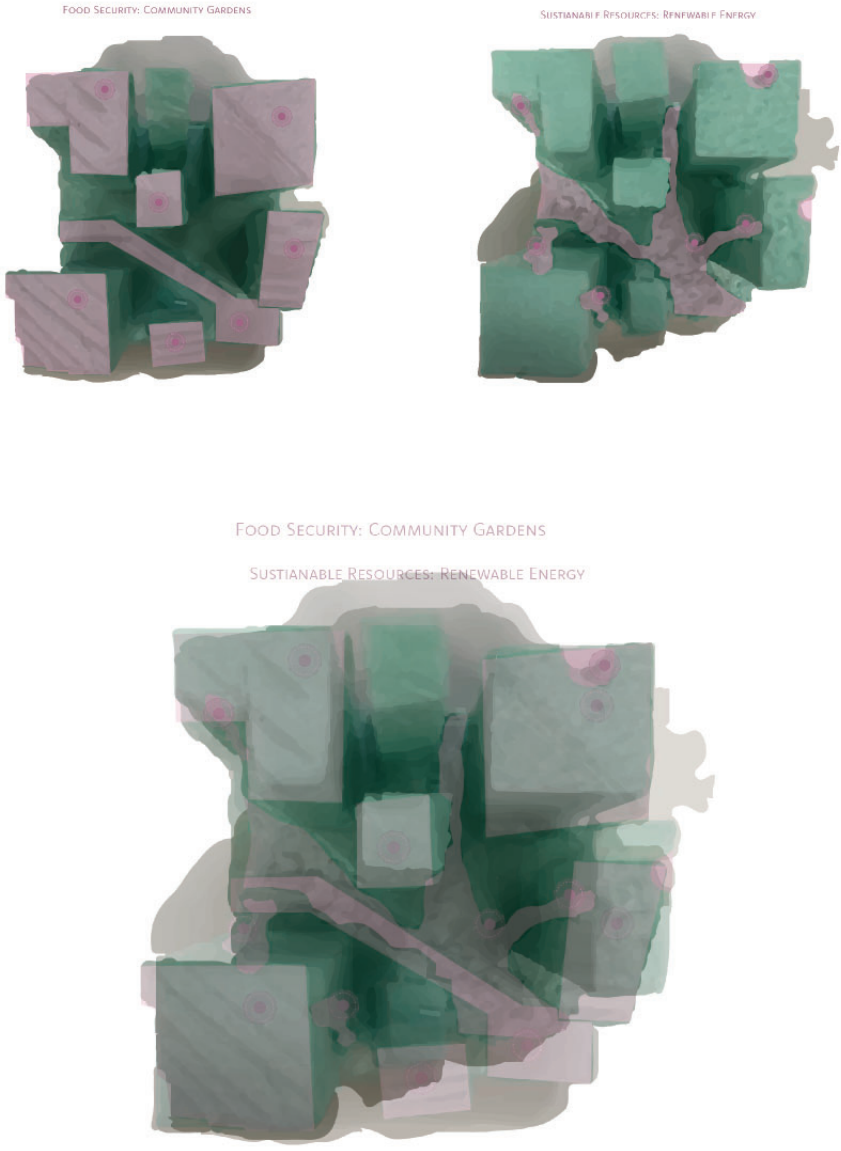


Figure: Diagram Mashup to explore future evolutions

Thus, the next step for each disturbance's typological evolution will be to map it with its surroundings as described in the locating section. Doing so will help to address the hierarchy of needs to be addressed within the ecosystem and the ability of the design to act as a connection between the societal and ecological factors. It will also create uniquely developed conditions for each typology and each site within the urban ecosystem, just as unique habitats are created for species in natural ecosystems.

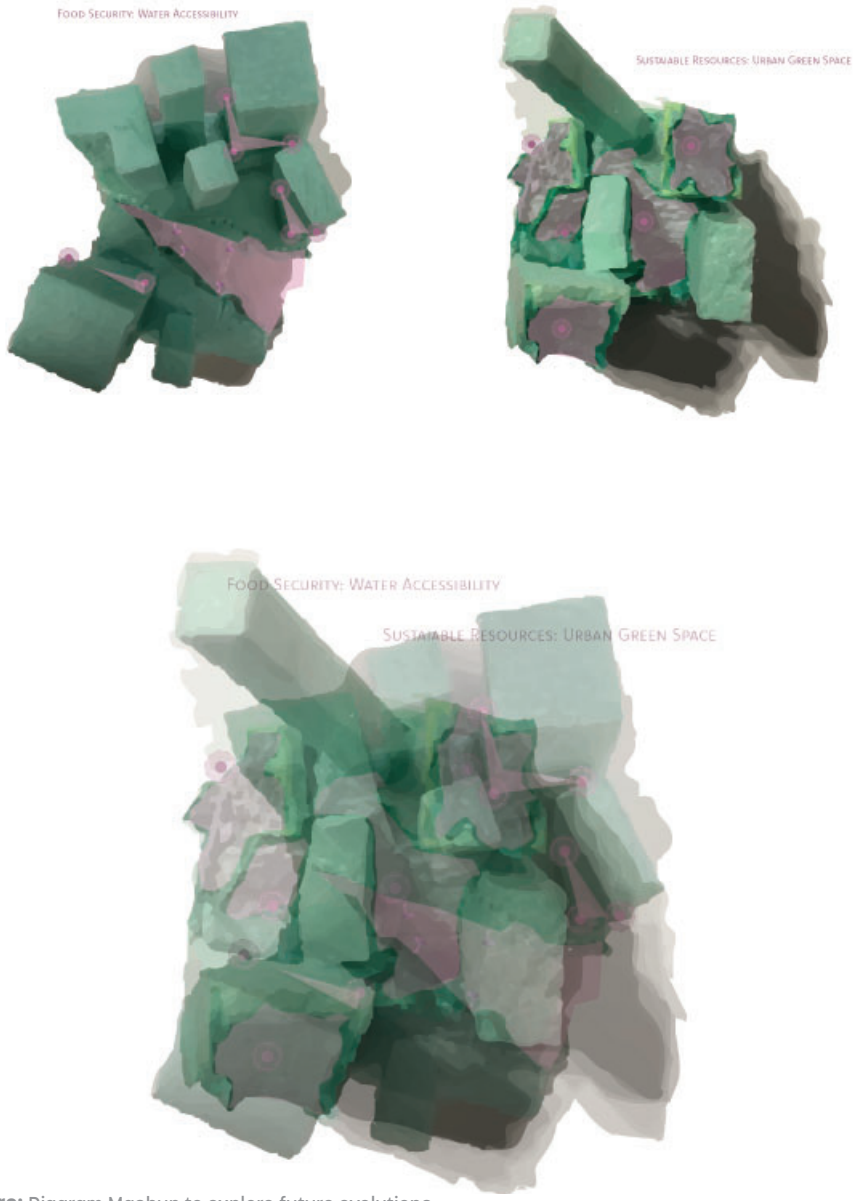


Figure: Diagram Mashup to explore future evolutions

Additionally, just as the ecosystem typologies change with introduced disturbances, they also continue to change over time as the design of the ecosystem continues to aid it in adapting to external forces. Because ecosystems are never static, this is a constant process, meaning the disturbances will continue to build up upon each other into one final system over time. Thus, each of the ecosystem mapping levels; the urban ecosystem plan, the immediate environment axon, and the evolved



Figure: Diagram Mashup to explore future evolutions

typology section will be recreated to ultimately create a mapped collage of every disturbance building off of each other at the given urban scale. This process is important to consider as will helps me to see the ability of design to act as a mediator between ecological and social conditions as they compound.



Figure: Diagram Mashup to explore future evolutions

Finally, by looking at the city mapped before and after these designed reactions, we will be able to see how it has evolved, and the influence the interpretation of a single disturbance can have in creating a larger movement of change in the urban fabric. Through this, the project will ultimately aim to show how the city evolves as a system of design, social and ecological interactions, to emphasize how no one building exists within a void, but rather as a part to a whole.

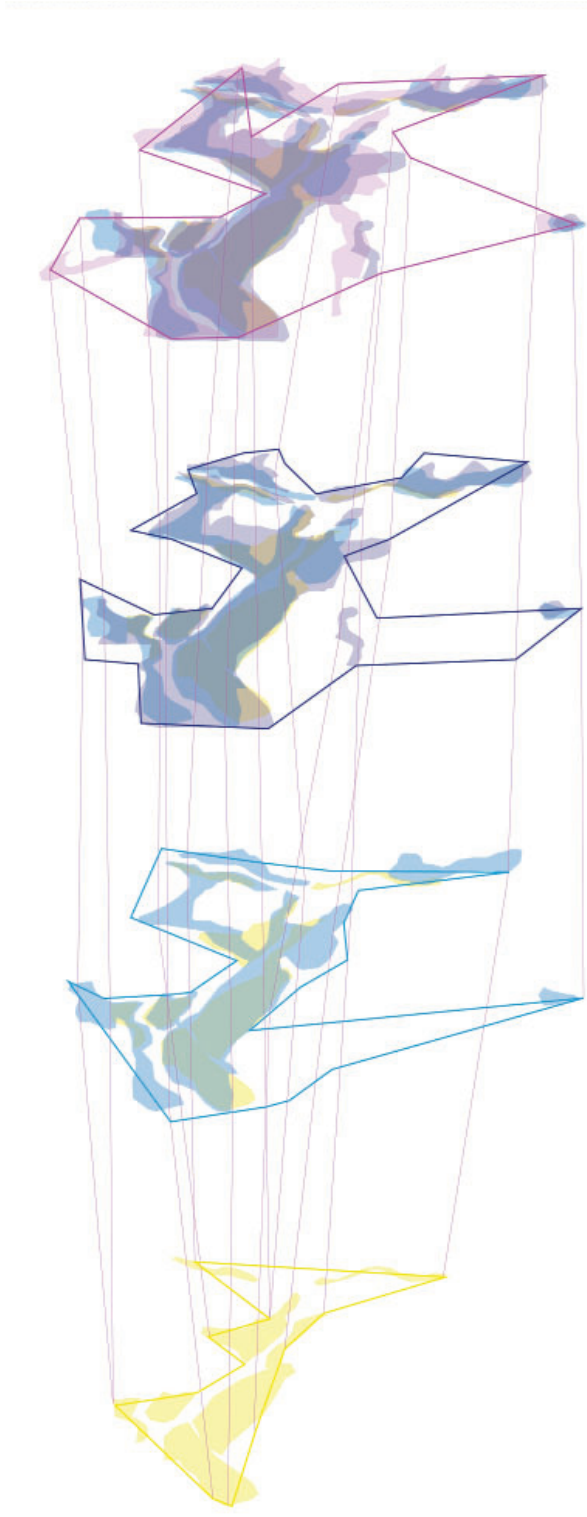


Figure: Diagram Urban Boundaries Evolving

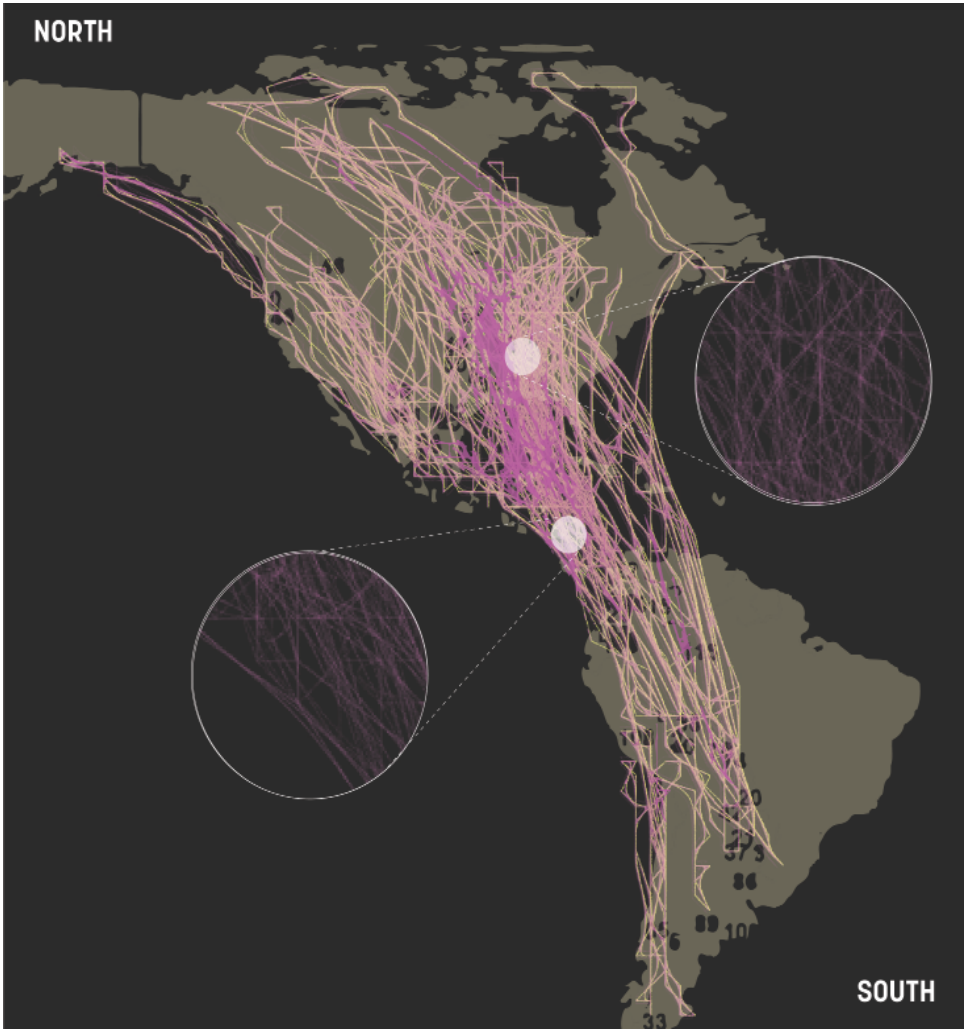
//PROJECT PORTFOLIO//

This project speculates the post human perspective over 200 years of biodiversity focused urban resilience throught the lens of migratory birds in the abstracted city. In doing so it explores the question: What forms, representations and processes would architecture need to integrate social and ecological factors in ways that build resiliency? In beginning to experiment with these forms, I was reminded how, in the age of the Anthropocene, the building itself can be thought of as a geographical feature and sought to create a project that challenges our views on the inhabitants and utility of architectural spaces.

How could viewing the city from the perspective of the bird give us new insights, new forms and new spatial typologies from these factors?

To understand these dynamics on a temporal and evolutionary scale, I developed a 200-year timeline, which projects and invents spaces through the responses of humans and migratory birds. The timeline now acts as the catalyst that requires the relationship between the humans and the birds to constantly shift, with events like sea level rise, urban smog clouds, and the creation of the urban sky garden typology to influence the human's occupational growth and the bird's changing migration paths and occupiable habitat.

In accumulation, the project imagines a time of Fragment, in which, the initial glare and visionary studies from the bird perspective are used to create lines, shapes, and eventually evolved occupiable spaces that chow the way the species interact and suggest they ways architecture might be able to adapt when operating on this system.



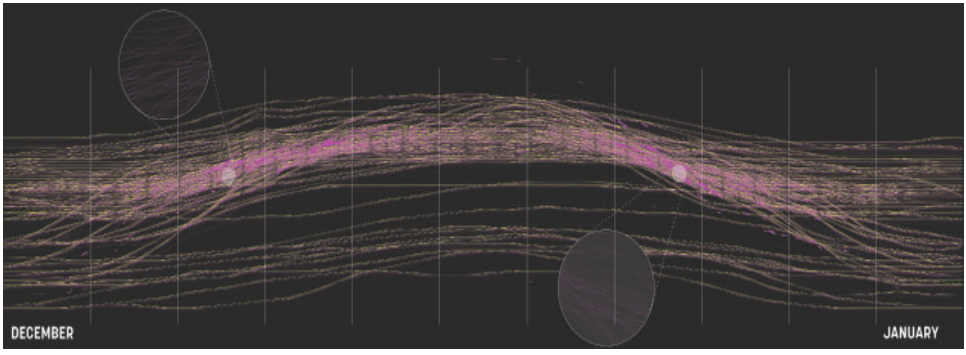
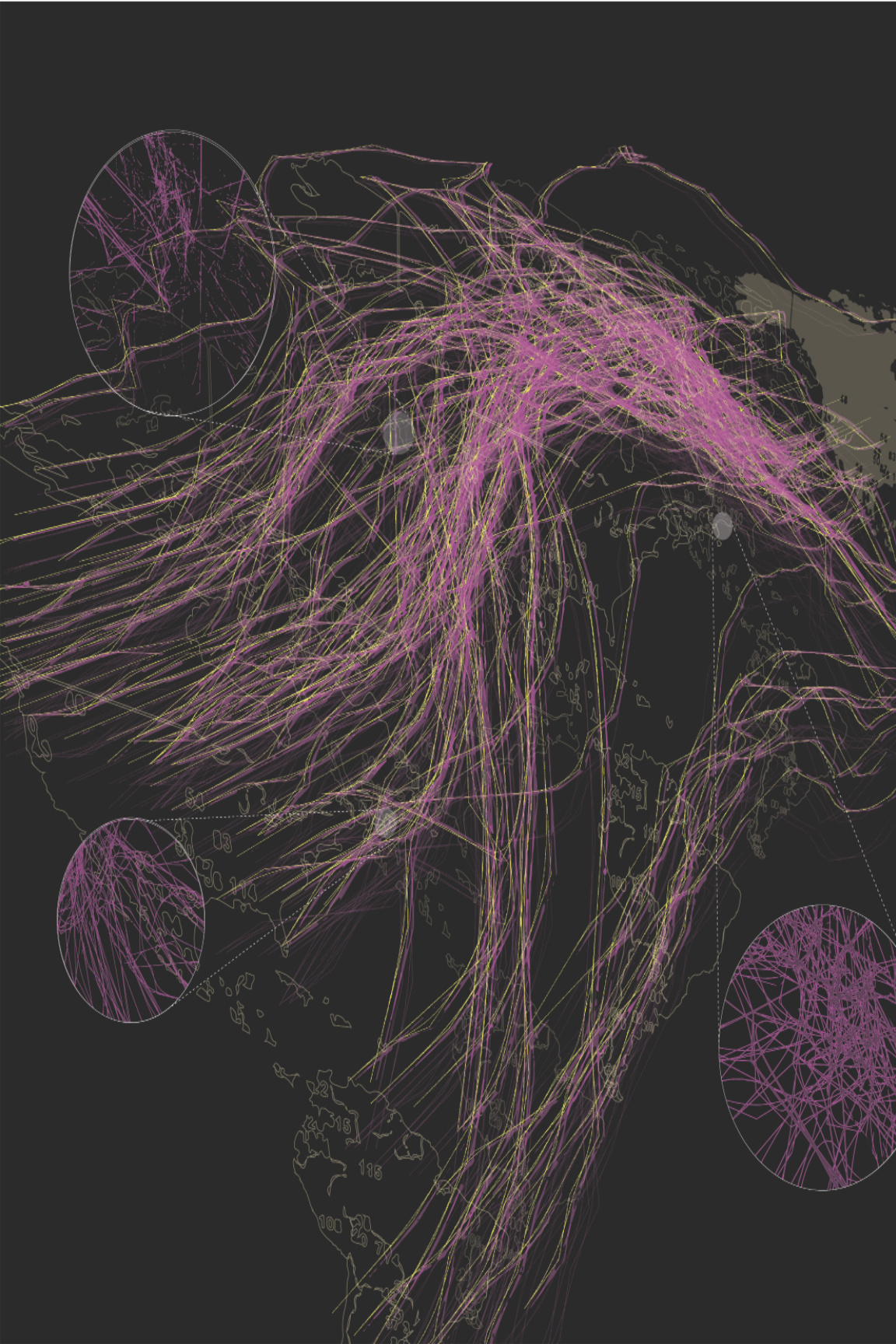


Figure: Airspace Graphics displaying North American Bird Migration Paths. Lines and points were extrapolated from migration data to create a three dimensional and spatial form of Bird occupied areas.



THE FOUR EPOCHS

AIR SPACE

Characterized by the desire to understand the occupation of the air. Inspired by human's ever upward growth and the influences it has on existing air occupation.

GLIDE - BY

Characterized by the changing urban form and increased bird presence in the urban landscapes.

SKY GARDEN

Characterized by the opening of urban forms and the presence of ecological relocation into the air territory.

FRAGMENT

Drawn from an ecological term for dispersed urban habitat, the Fragment now refers to a bi-yearly event in which the migratory paths of birds overwhelm and divide the city. In these instances of relative over population the human residents must learn to adapt to the presence of the birds.

**Descriptions must be two lines long or less. Birds aren't wordy or communicative. They are strictly observational of another species (the humans) in their natural habitat (urban geography).*



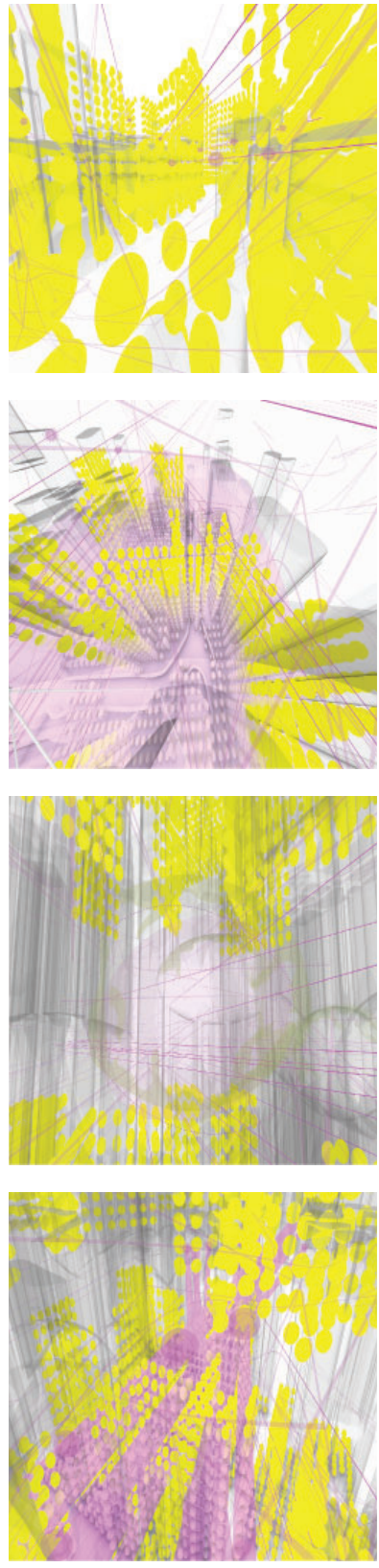


Figure: Urban form bird and human relational study.

FRAGMENT
2202
Water continue to rise, transforming territory. Humans become a trapped in the air territory as tower floors become un-occupable.
SKY GARDEN
2172
Acid rain erodes at the surface of the buildings, exposing new areas to be reclaimed by habitat.
2142
The urban sky garden is formed by activists and hobbists aiming to create new bird habitats. Renewable energy efforts double as the long term impacts of fossil fuels becomes clearer.
2122
The urban smog cloud is formed, separating the sky territory from the ground. Unable to penetrate the smog, birds invade local apartments and balconies.

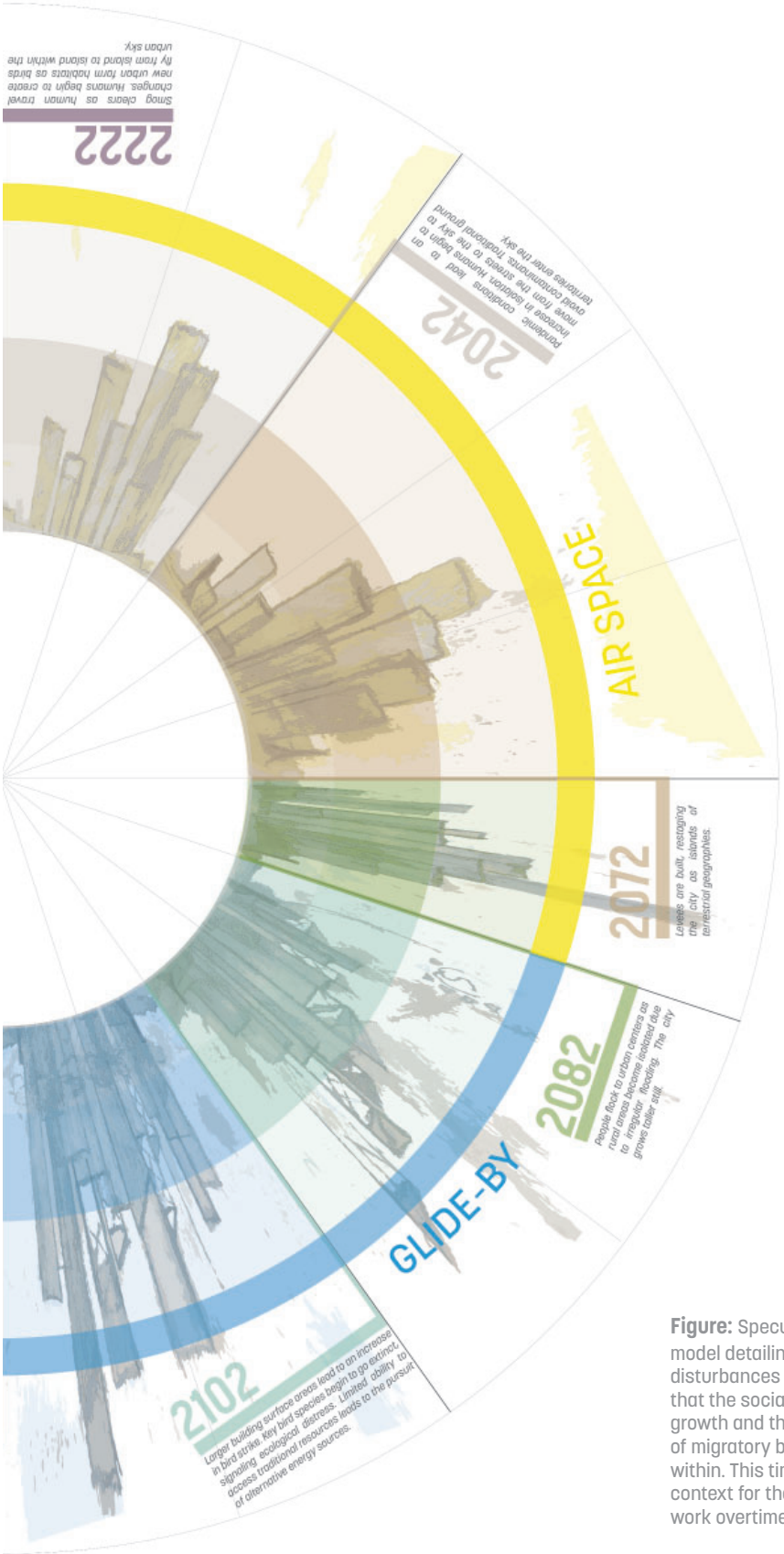


Figure: Speculative timeline model detailing the series of disturbances and reactions that the social factor of urban growth and the ecological factor of migratory birds are interacting within. This timeline sets the context for the shaping of the work overtime.

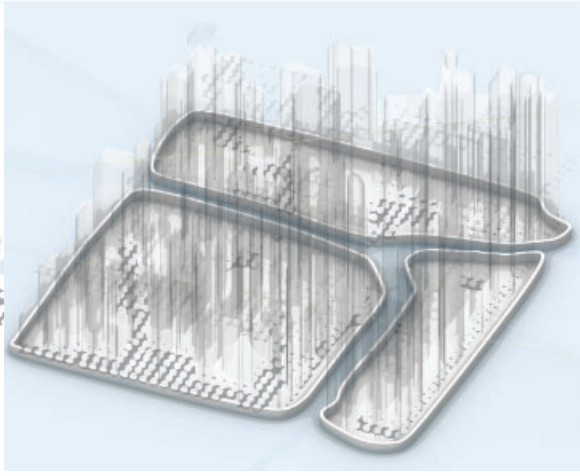




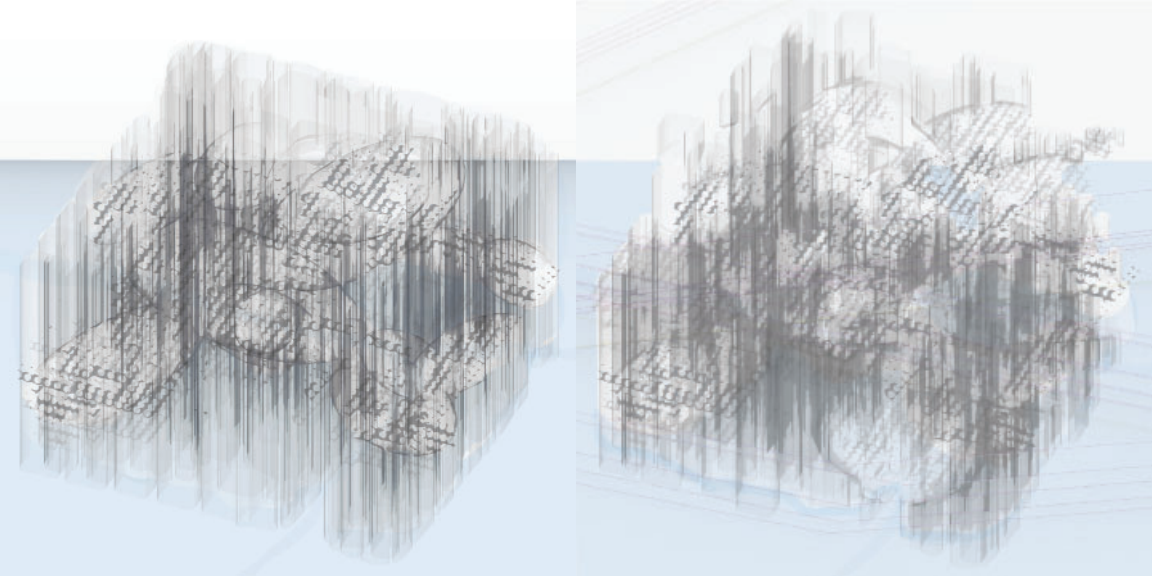


Figure: A series of drawn representations that explore the human perspective of the changing city while puling the different viewpoints of the birds forward onto an acrylic layer.









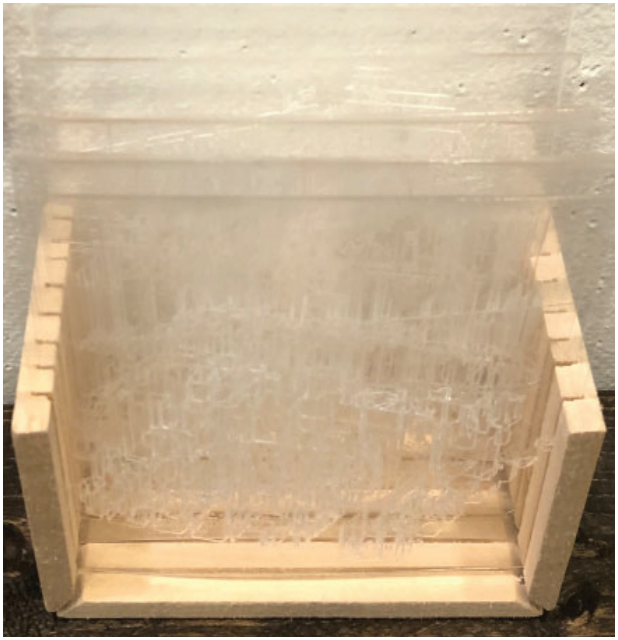


Figure: Axon Environmental Studies that combine ecological factors (migratory birds) social factors (human population movement) and the disturbance effect to create existing and altered urban shapes.

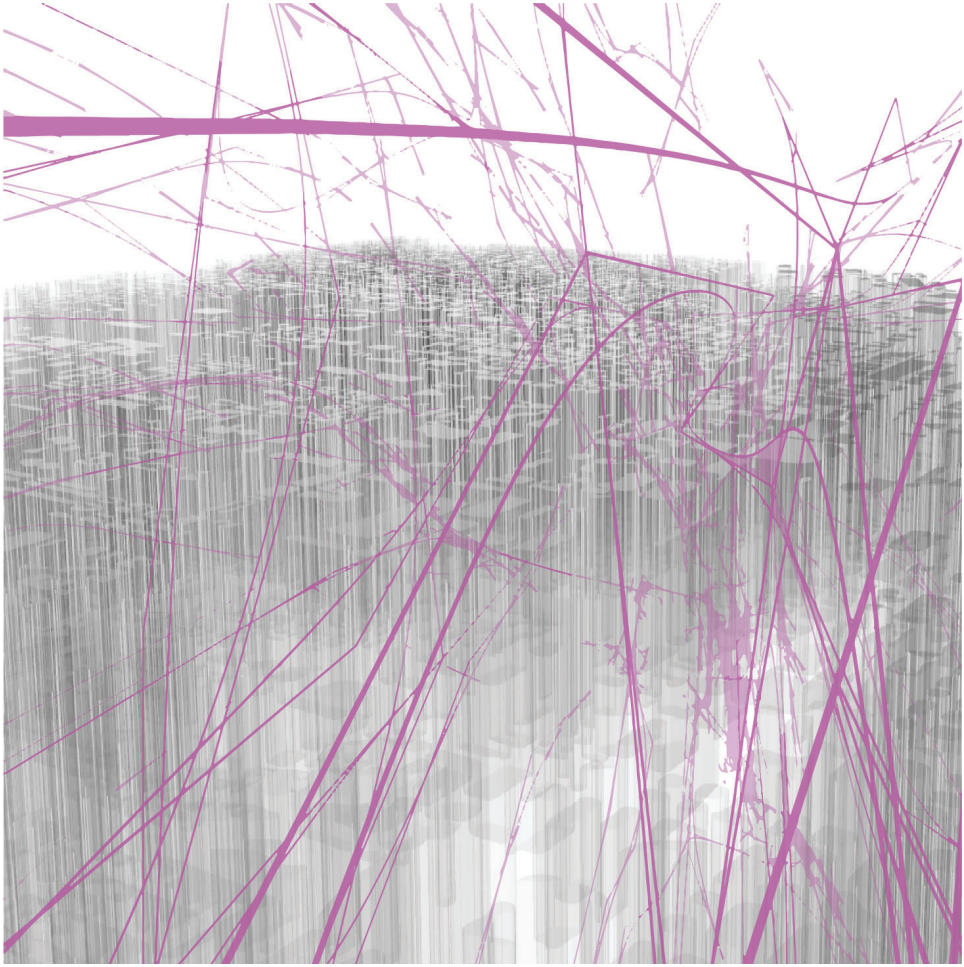


Figure: View of the city as a sea of glass. As it stands now from the bird's perspective.

AIR SPACE

2022

The city is a dangerous sea of glare and glass, growing out of the ground territory and encroaching on the air territory.



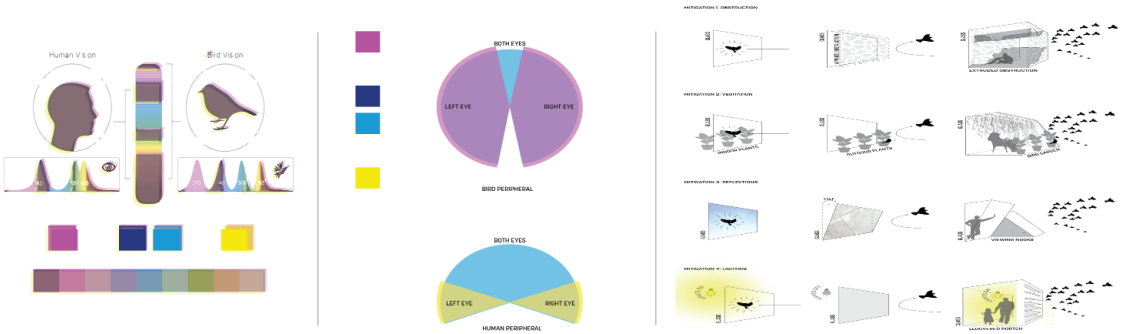


Figure: Diagrams of bird vs. human vision, including differences in field of view and color. Also an initial abstraction of bird strike mitigation techniques.

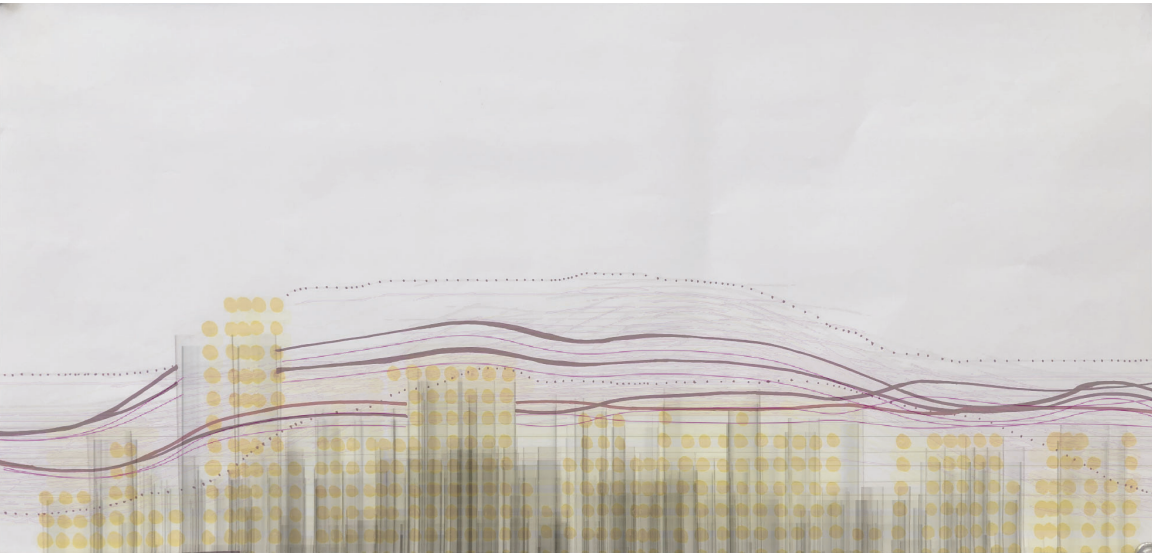


Figure: The city as it stands in elevation. Representation has been adjusted to show the materiality and abstraction of the city from the non-human perspective of the bird.

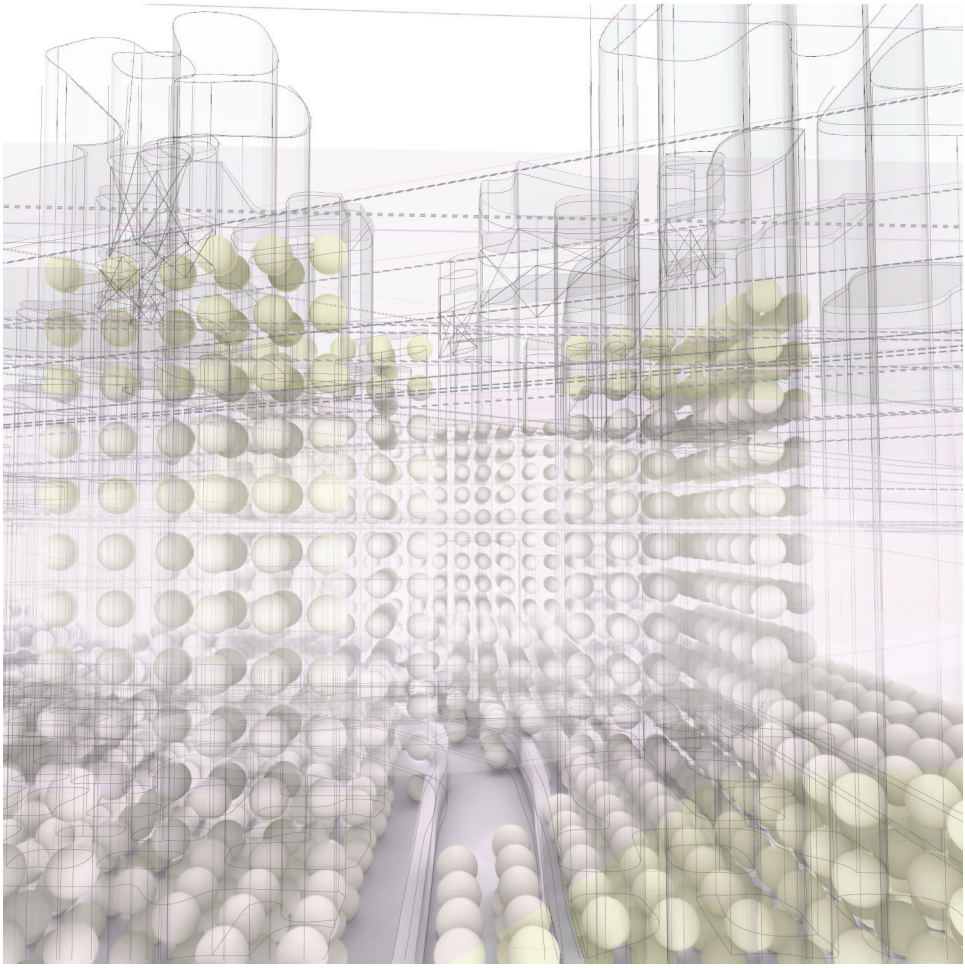
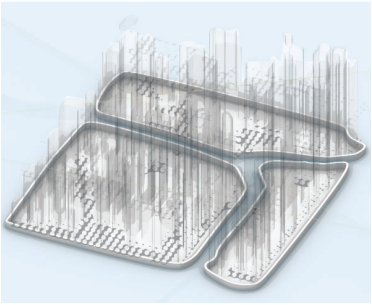


Figure: A representative perspective of the city occupied by smog. Humans (yellow dots) climb higher through the pink smog and interact further in the bird territory.

GLIDE-BYS

2102

The urban smog cloud is formed, separating the sky territory from the ground. Unable to penetrate the smog, birds invade local apartments and balconies.



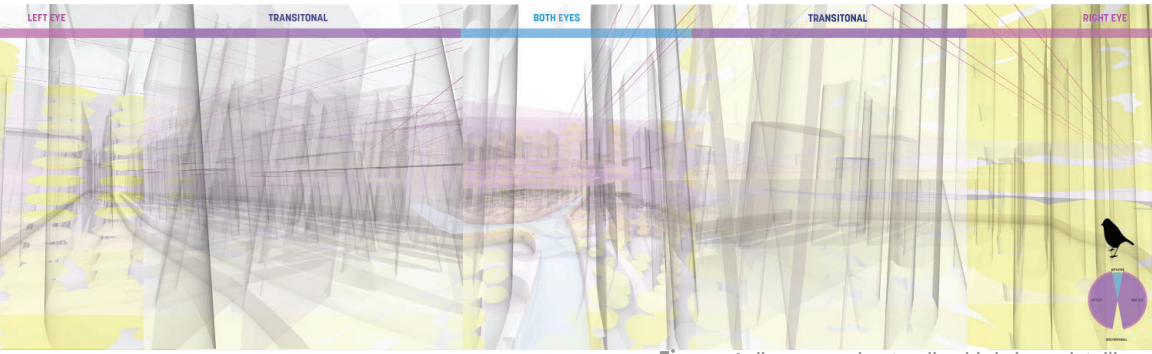


Figure: A diagram understanding bird vison, detailing the way their views distort what they're able to see.

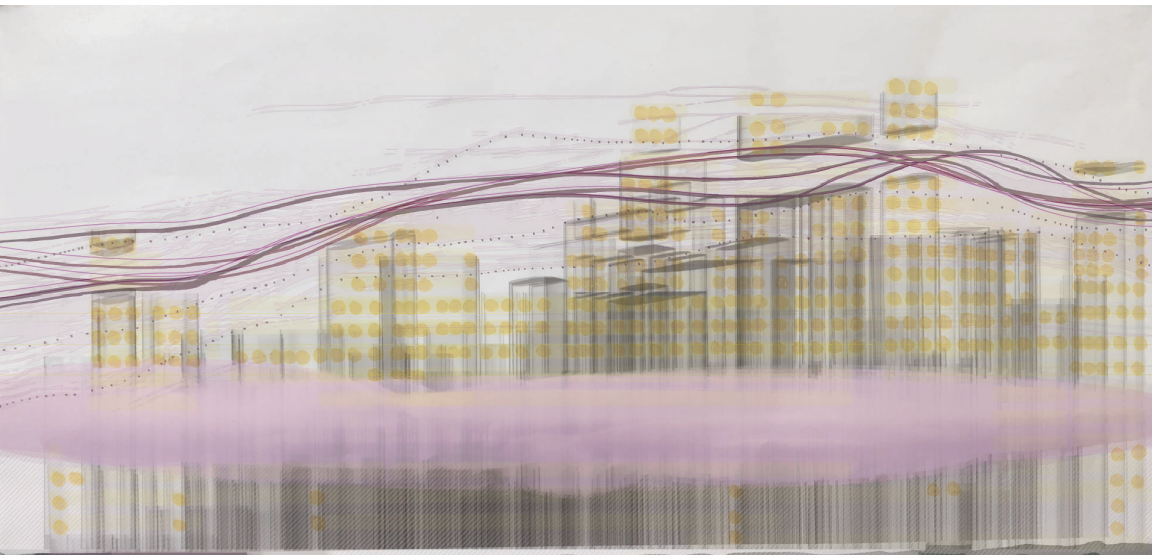


Figure: The city under the impacts of the Glide-by disturbances in Elevation. A cloud of smog has begun to separate occupants form the ground and increased flooding caused more bird and human interaction.

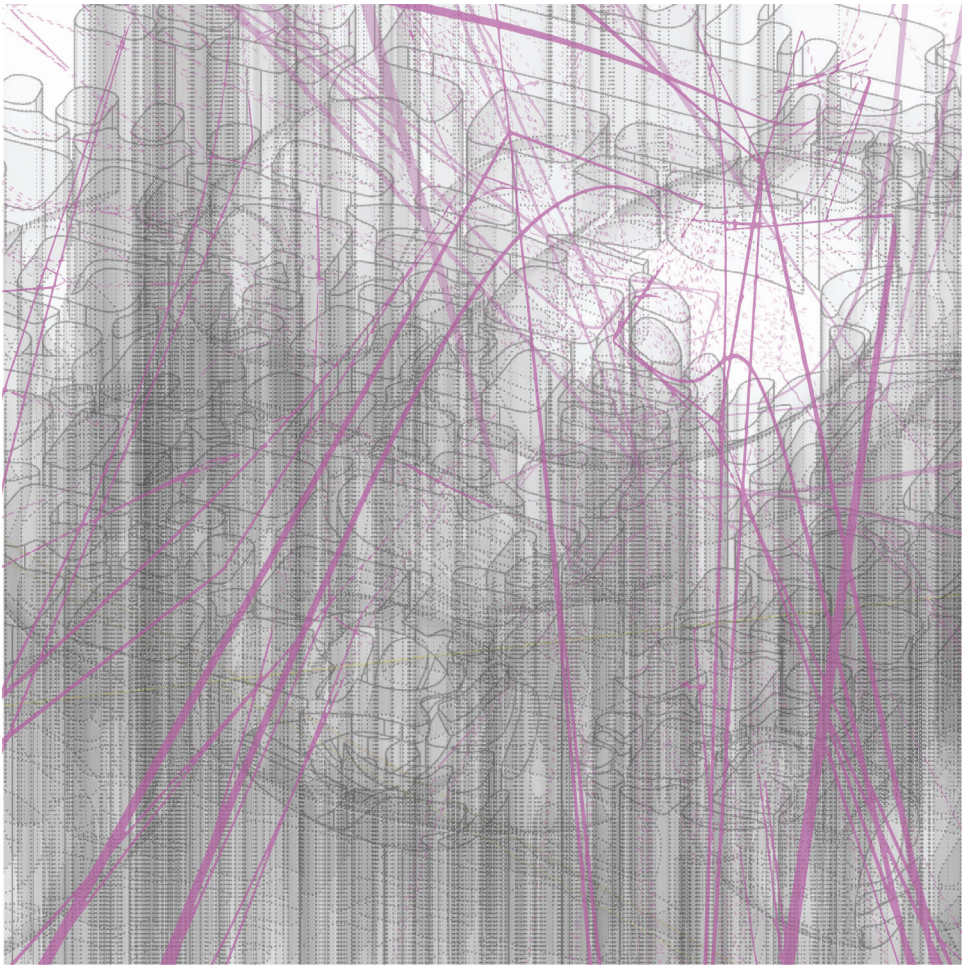
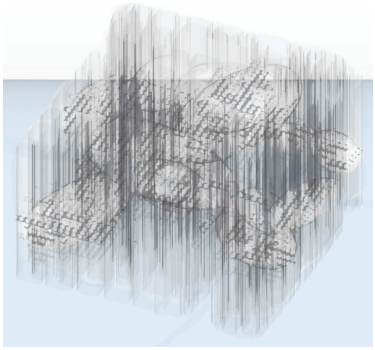


Figure: A view of the city as a sea of glass, abstracted from the disturbances. The city is denser and more imposing now, requiring ecological intervention. Lines are added to begin to create forms from the bird's spatial occupation.

SKY GARDEN 2172



Waters continue to rise, transforming the surface territory into the water territory. Humans become fully integrated in the air territory as lower floors become un-occupiable.



Figure: Diagram showing how the plan of the city has evolved, from a grid of streets to a more organic structure to represent how buildings are build geography in the age of the Anthropocene.

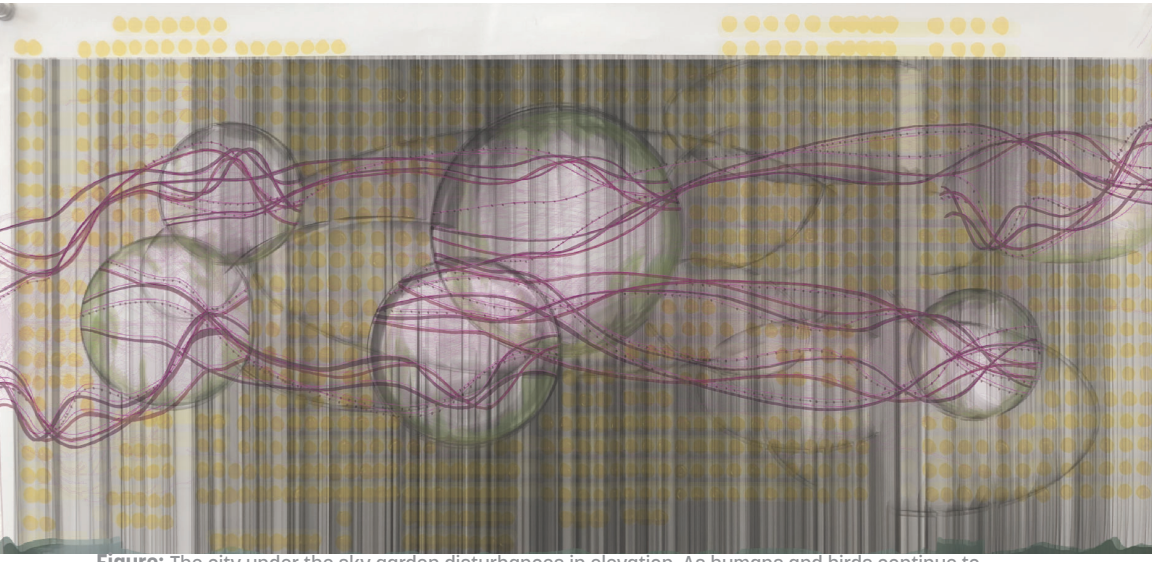


Figure: The city under the sky garden disturbances in elevation. As humans and birds continue to interact, established areas, or sky gardens of interactive habitat are formed in the densified city. This method of mitigation begins the pattern of coexistence.

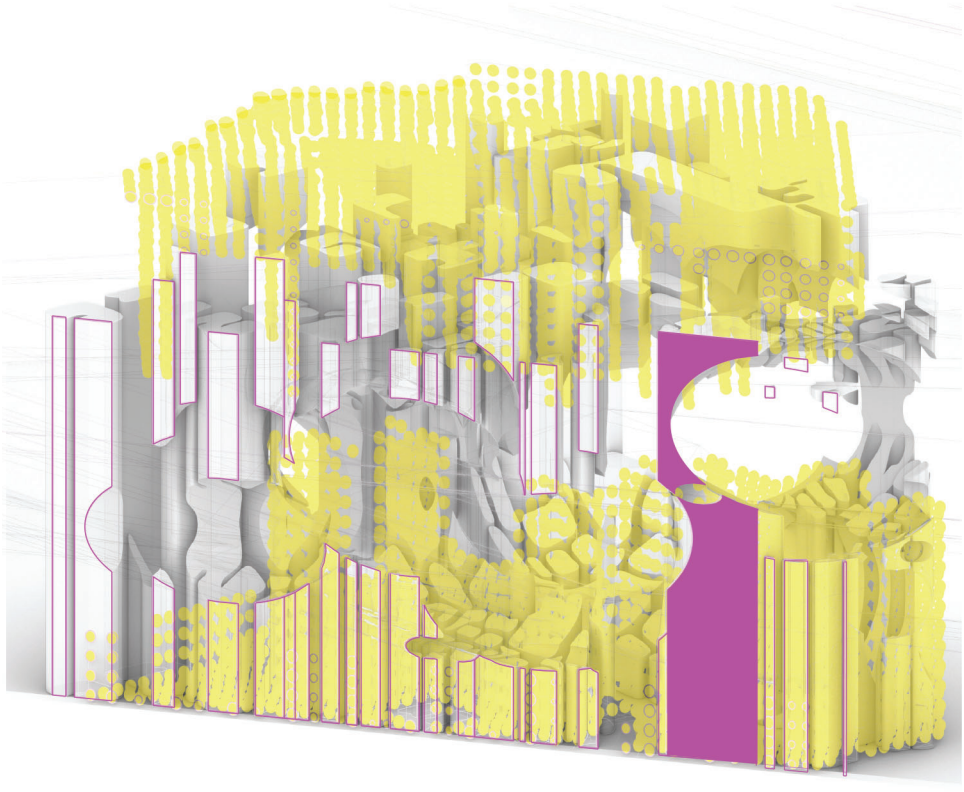
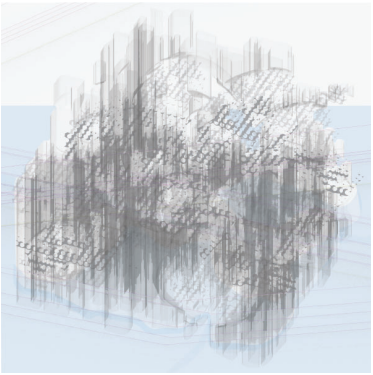


Figure: A representative section perspective of the city that is beginning to show the space that can be created from the combination of social, ecological and disturbance factors. In doing so, the design response begins to be established.

FRAGMENT 2222

Humans begin to create new urban habitats as birds fly from island to island within the urban sky.



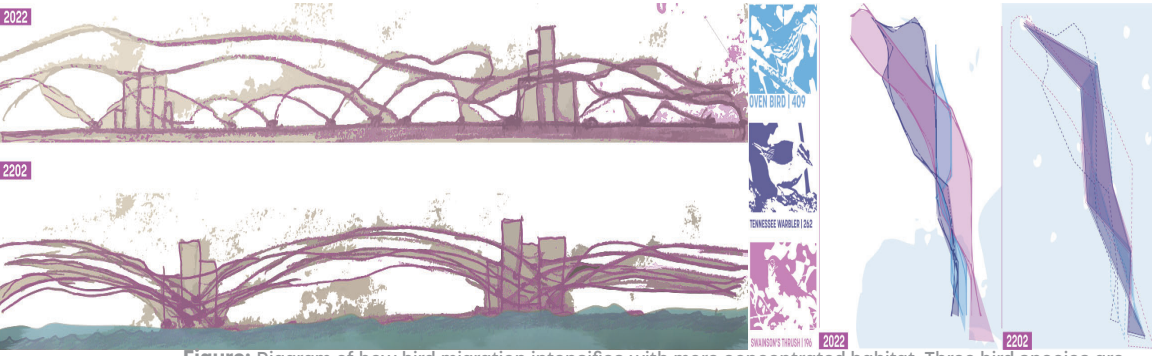


Figure: Diagram of how bird migration intensifies with more concentrated habitat. Three bird species are called out specifically and used to determine the undergrowth and vegetation supported in the habitat.

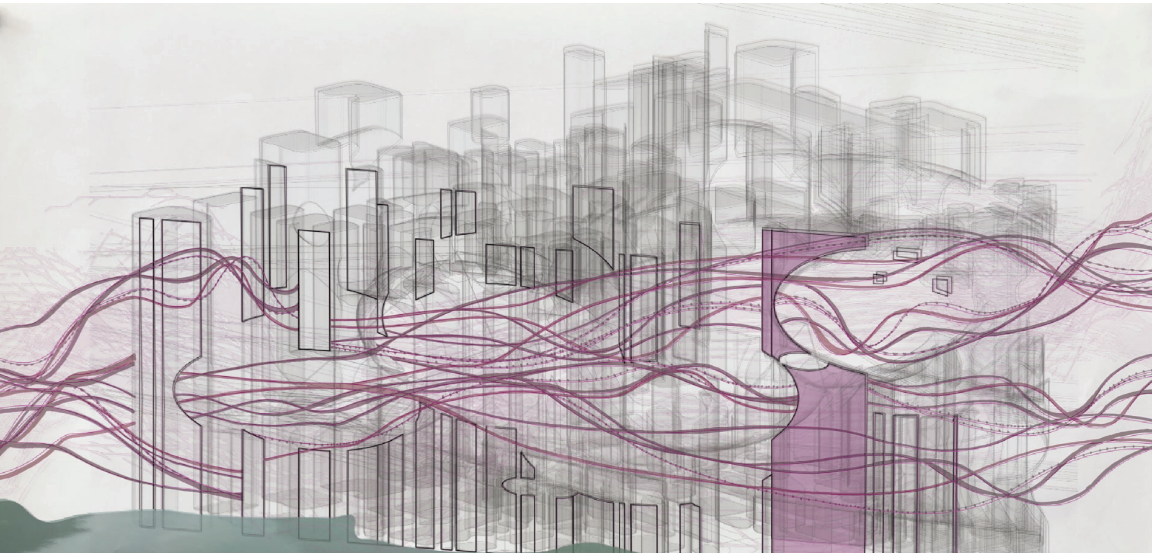
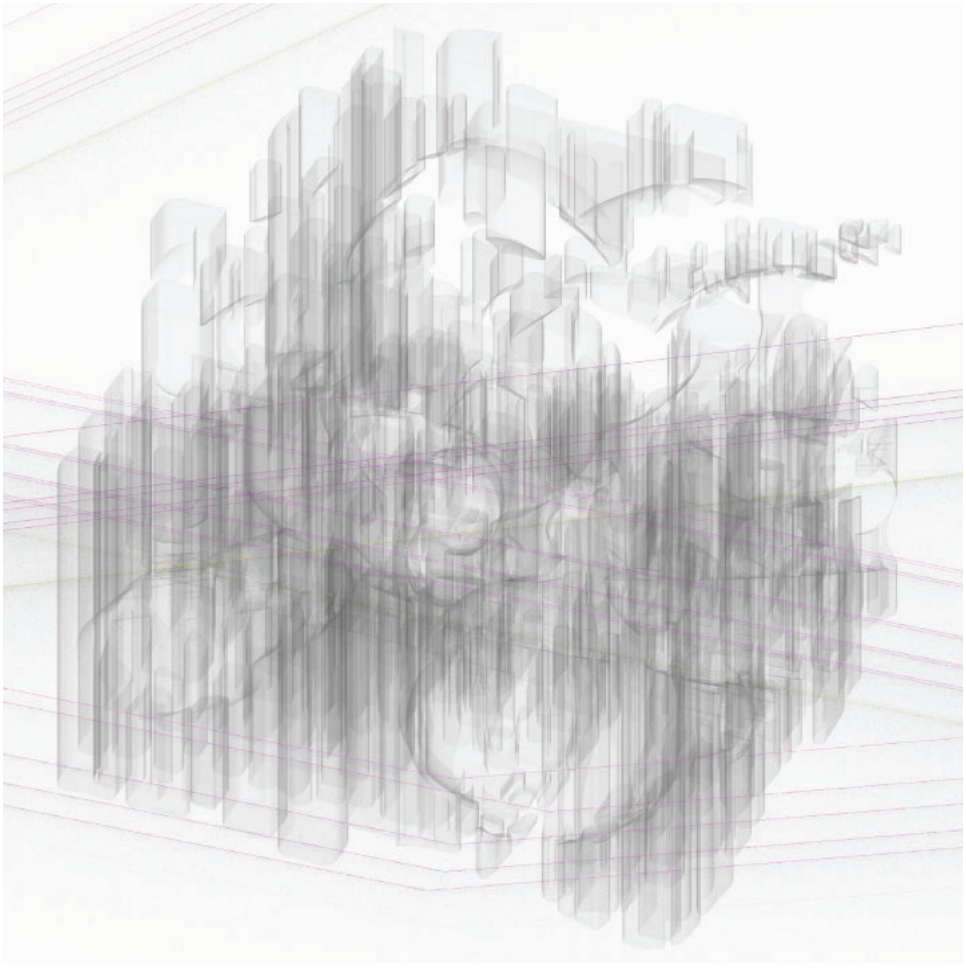


Figure: The city under the Fragment disturbances in section. The city features breaks for sky garden habitat, and bird occupation begins to shape the city as much as human occupation historically has; allowing the city to reach a post human driven state.



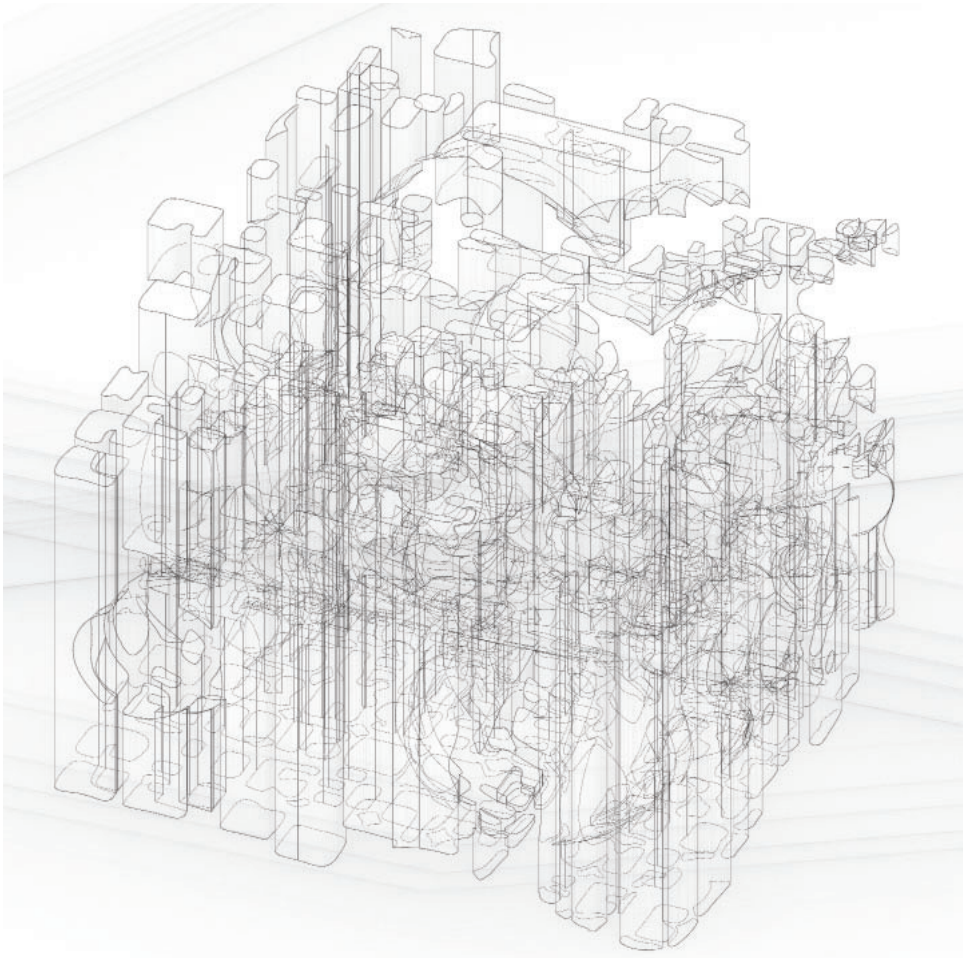


Figure: Enlarged urban Glare and Urban shape forms that are used to establish the changing shapes and forms of the city. Lines are added to the glare to begin establishing shapes, which can then evolve further into resilient spaces.

SPACE

SHAPE

EDGE

GLARE

AIR SPACE



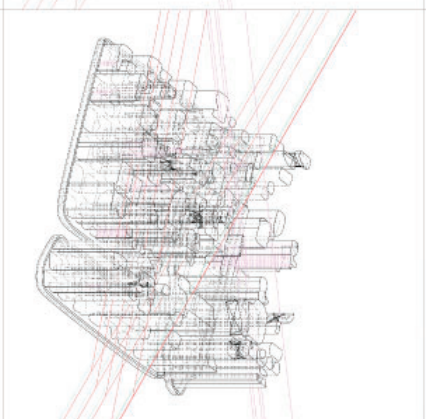


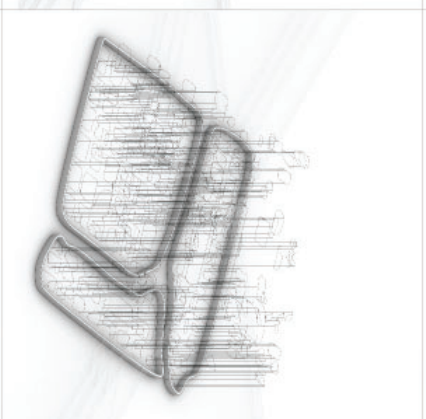


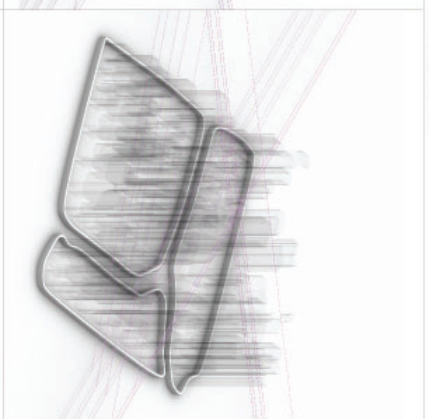


GLIDE-BYS









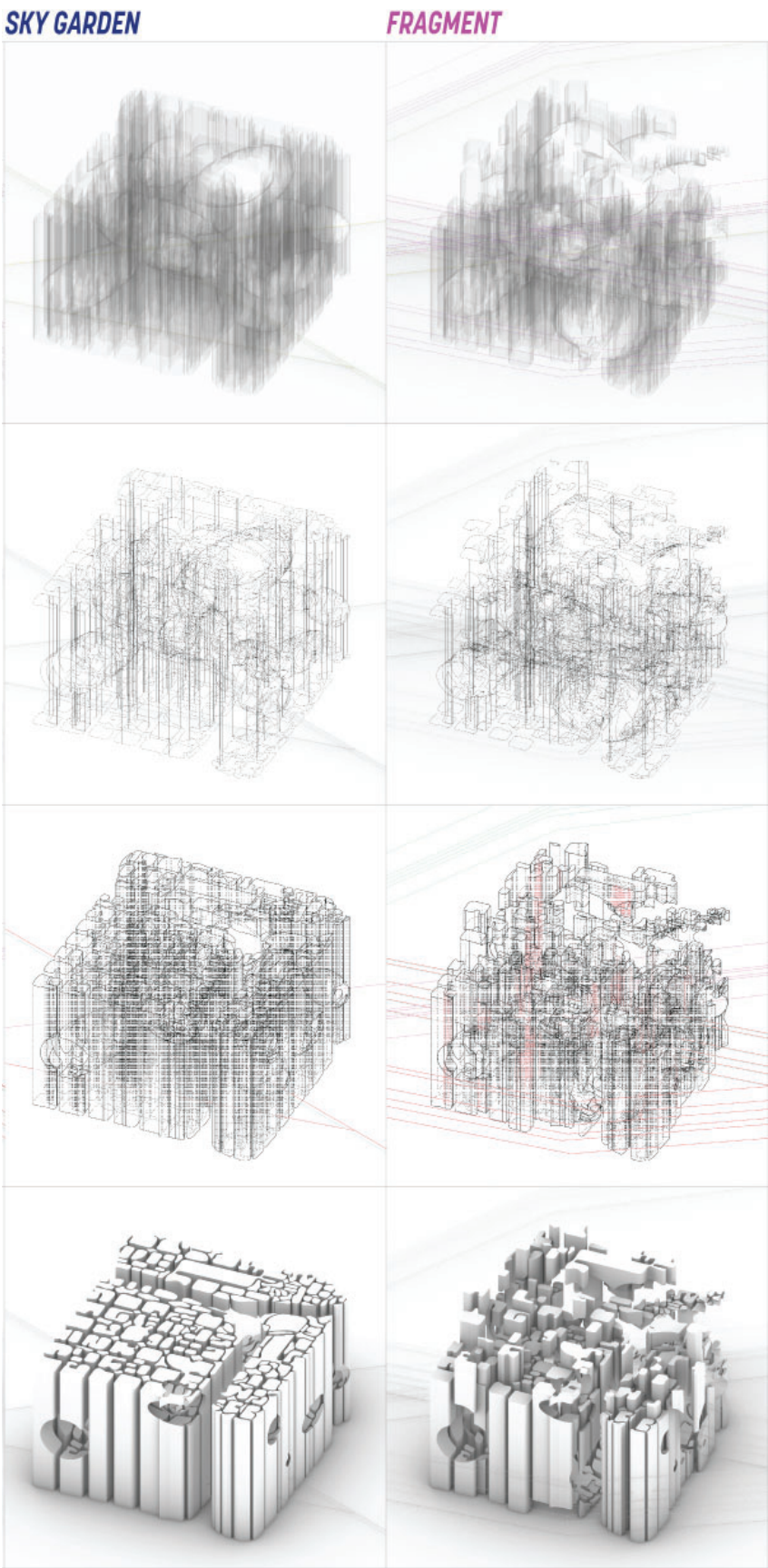
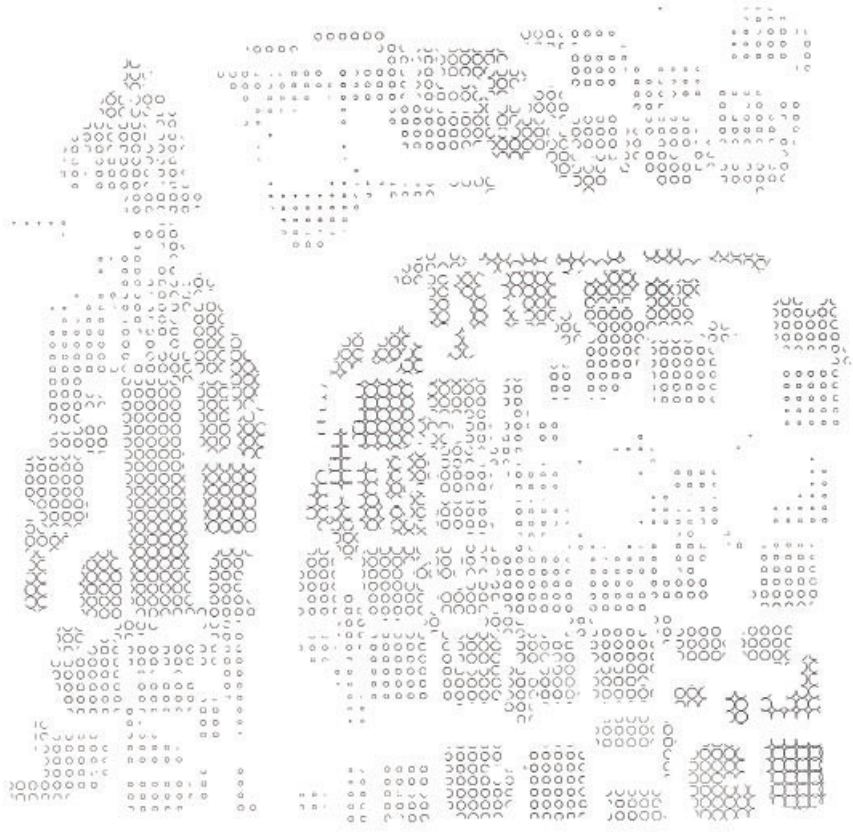


Figure: A series of transitional diagrams that show how the new resilient urban forms could be created from the investigation of the non-human perspective and its ability to evolve spaces.



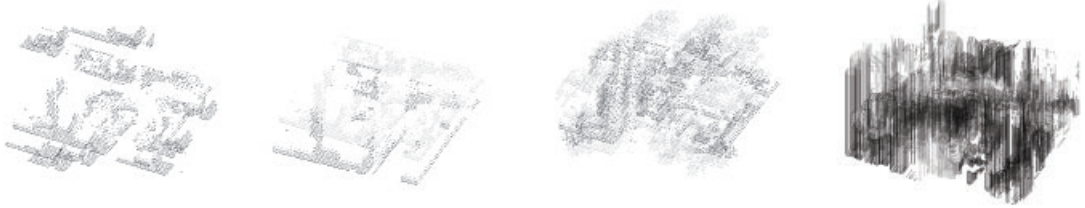


Figure: The location and establishment of ecological and social habitat, as seen in the bottom habitat plan.

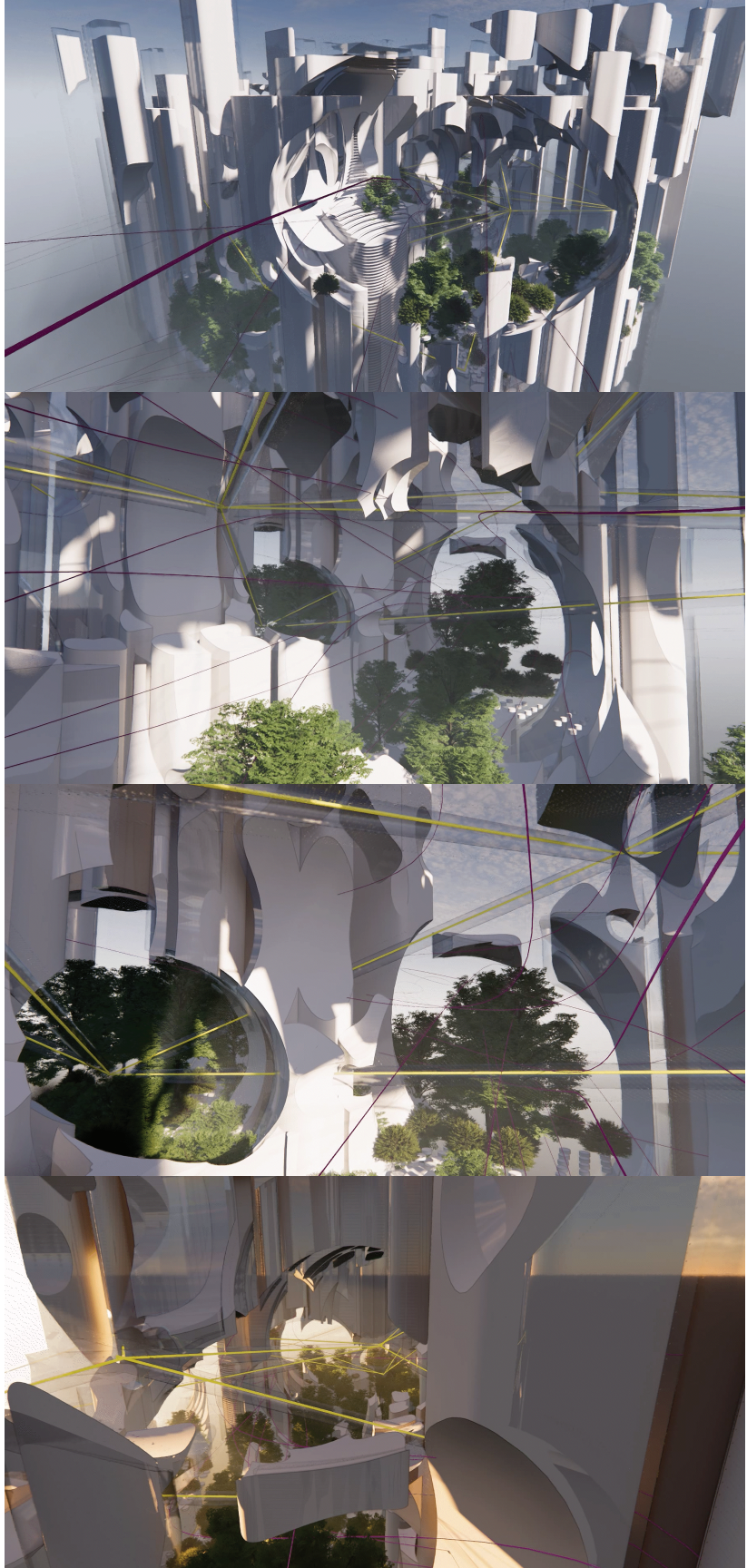


Figure: Bird Perspective flythrough of the adapted urban form.



Figure: Diagram of the city evolving in axon.

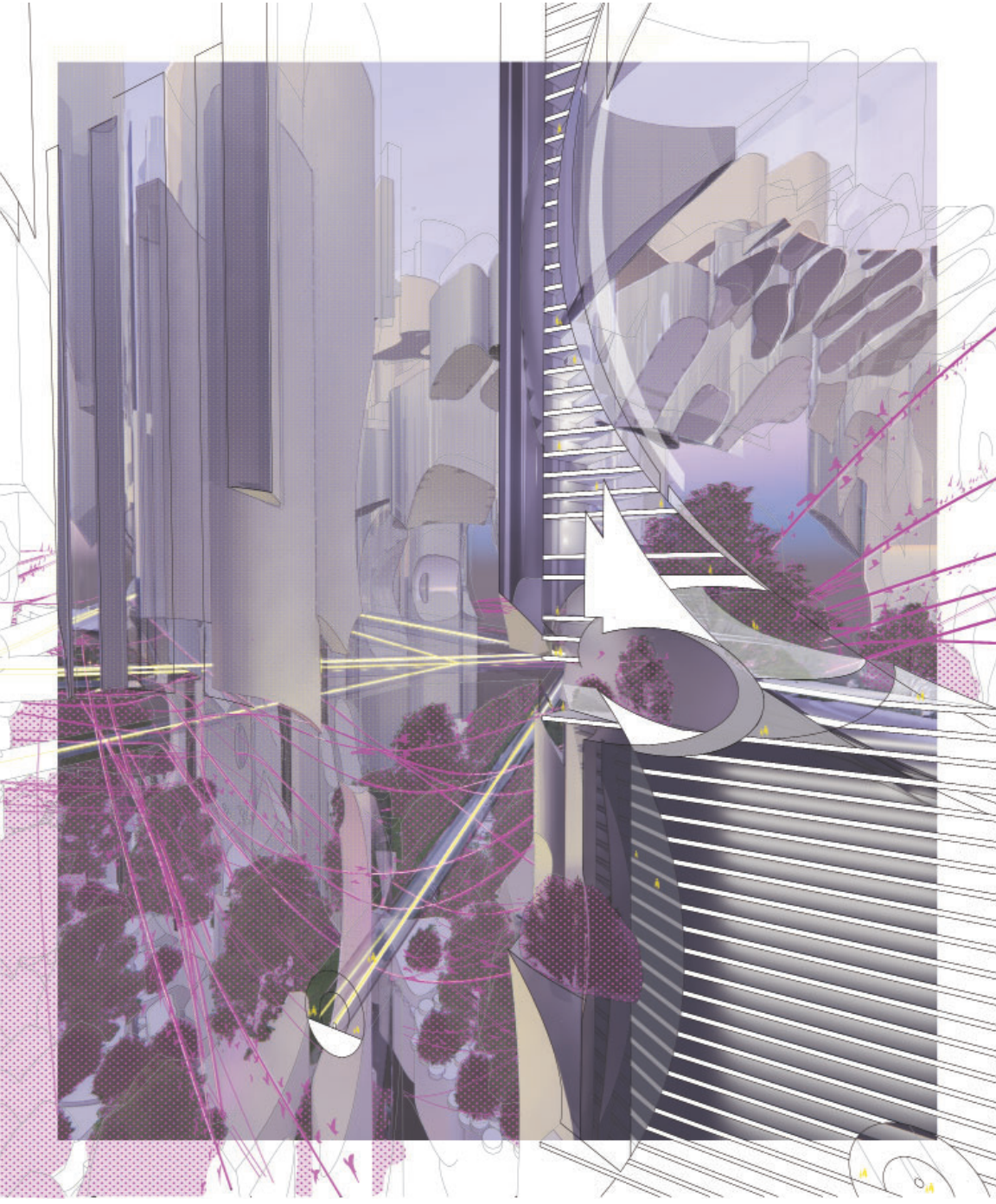


Figure: Sections showing the new architectural spaces and typologies created by the sky garden.

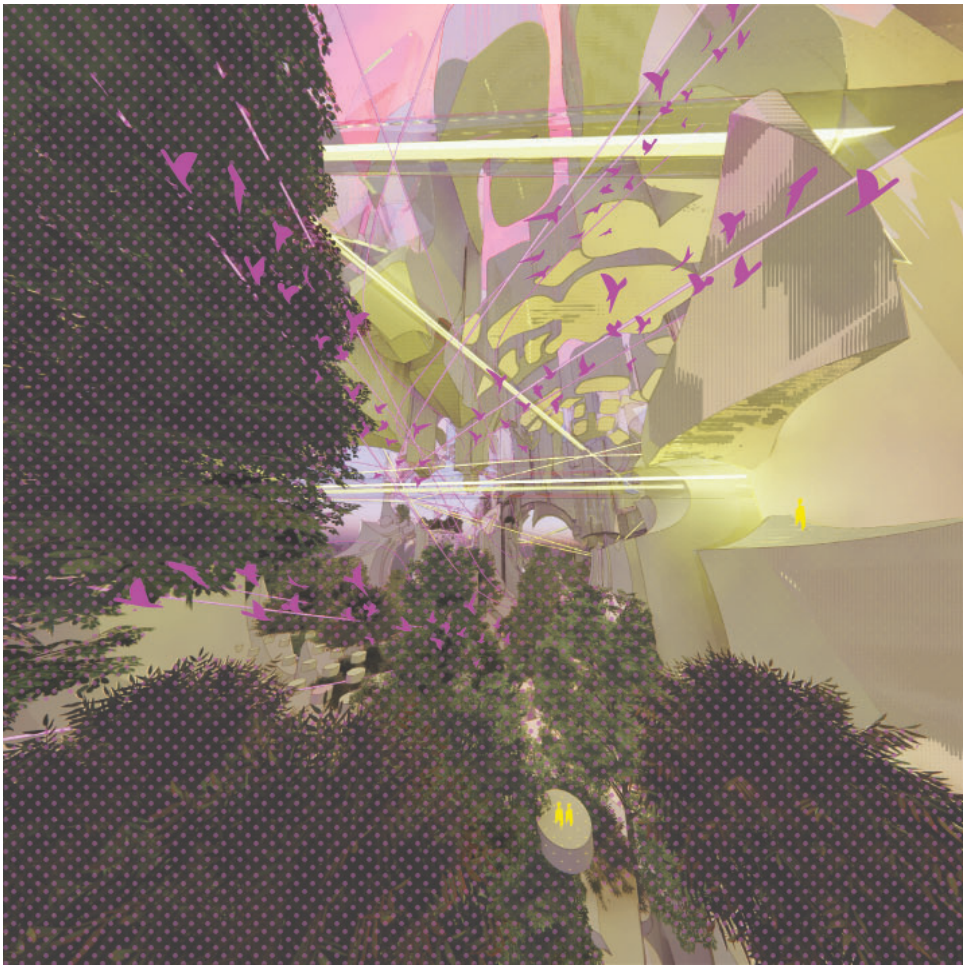


Figure: Perspective of the carved sky garden through the bird lens, featuring the migratory paths of birds through the space. Vegetation is emphasized with material to call the habitat space forward.

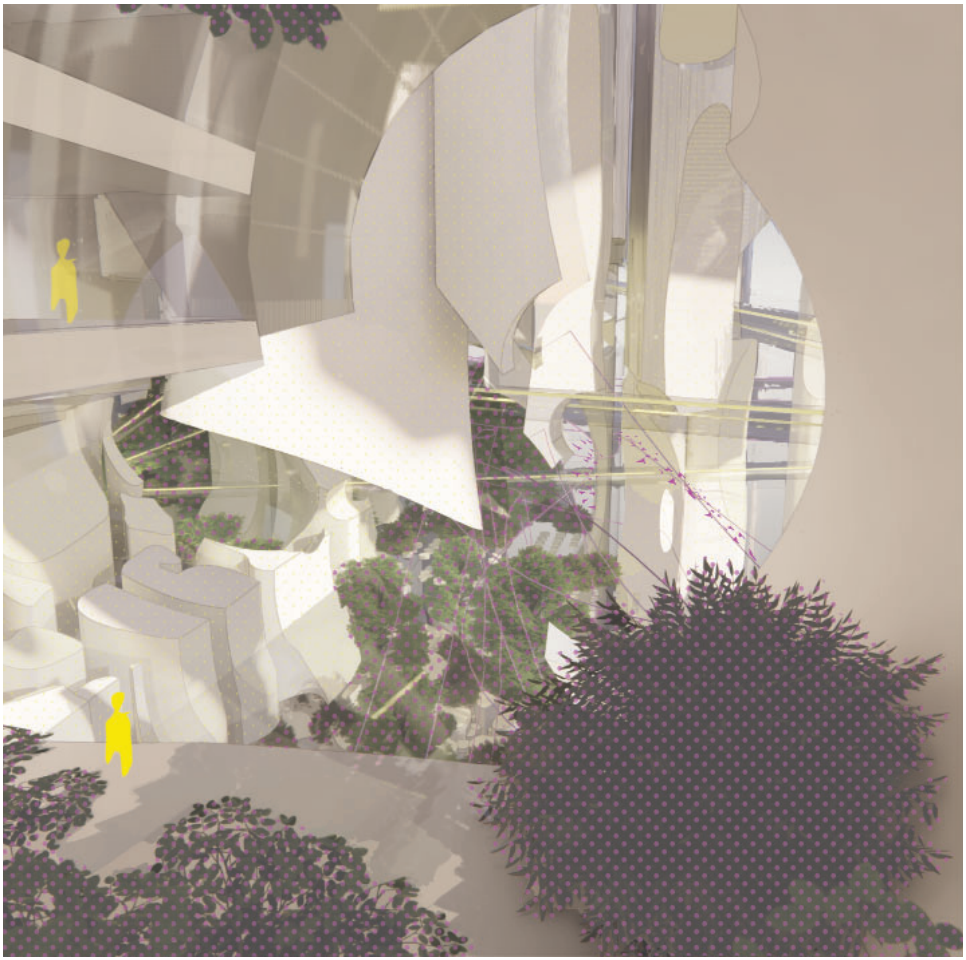
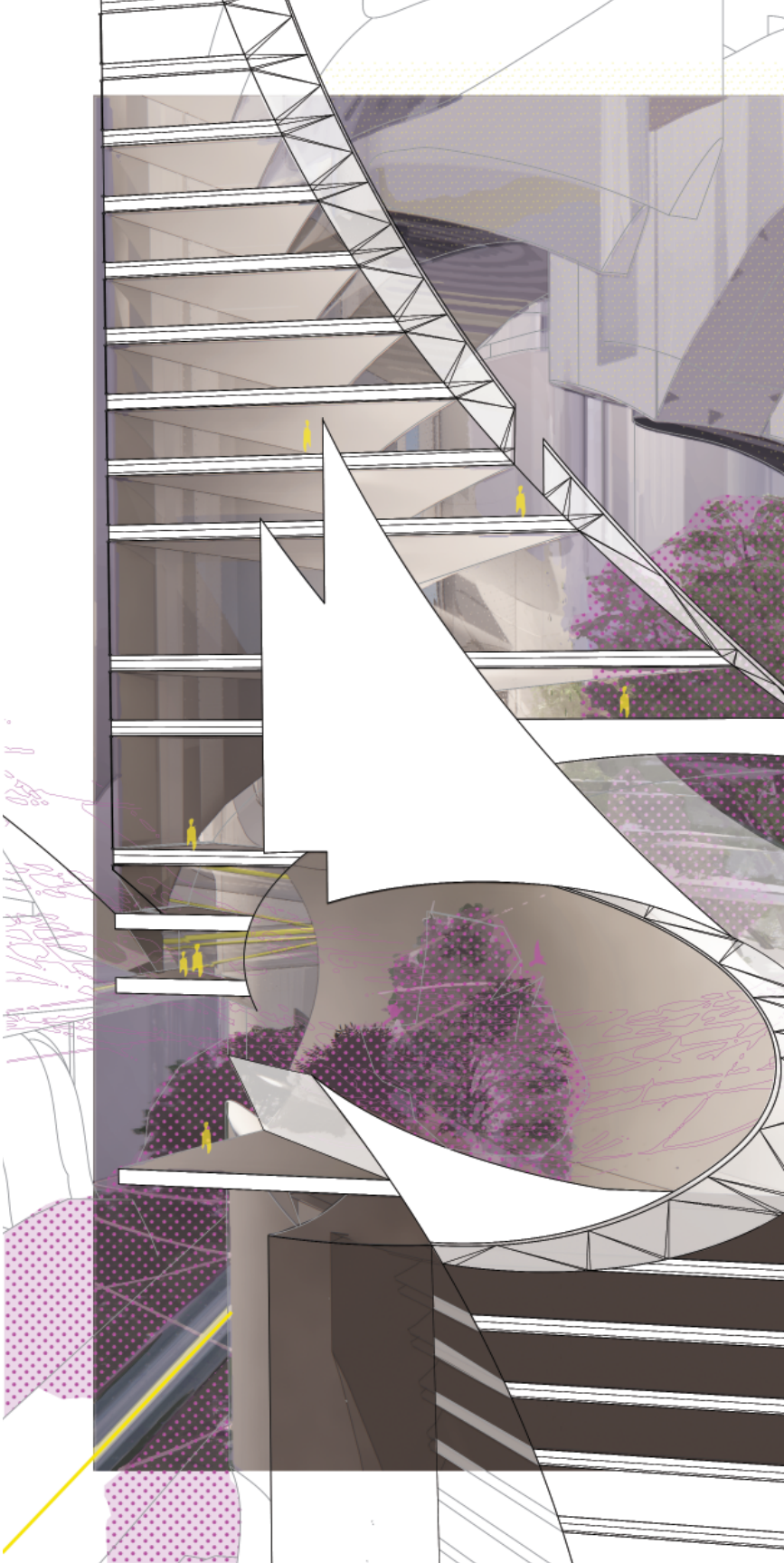


Figure: Perspective of the sky garden through the human lens, featuring human occupiable areas of the sky garden. Vegetation is emphasized with material to call the natural space forward.



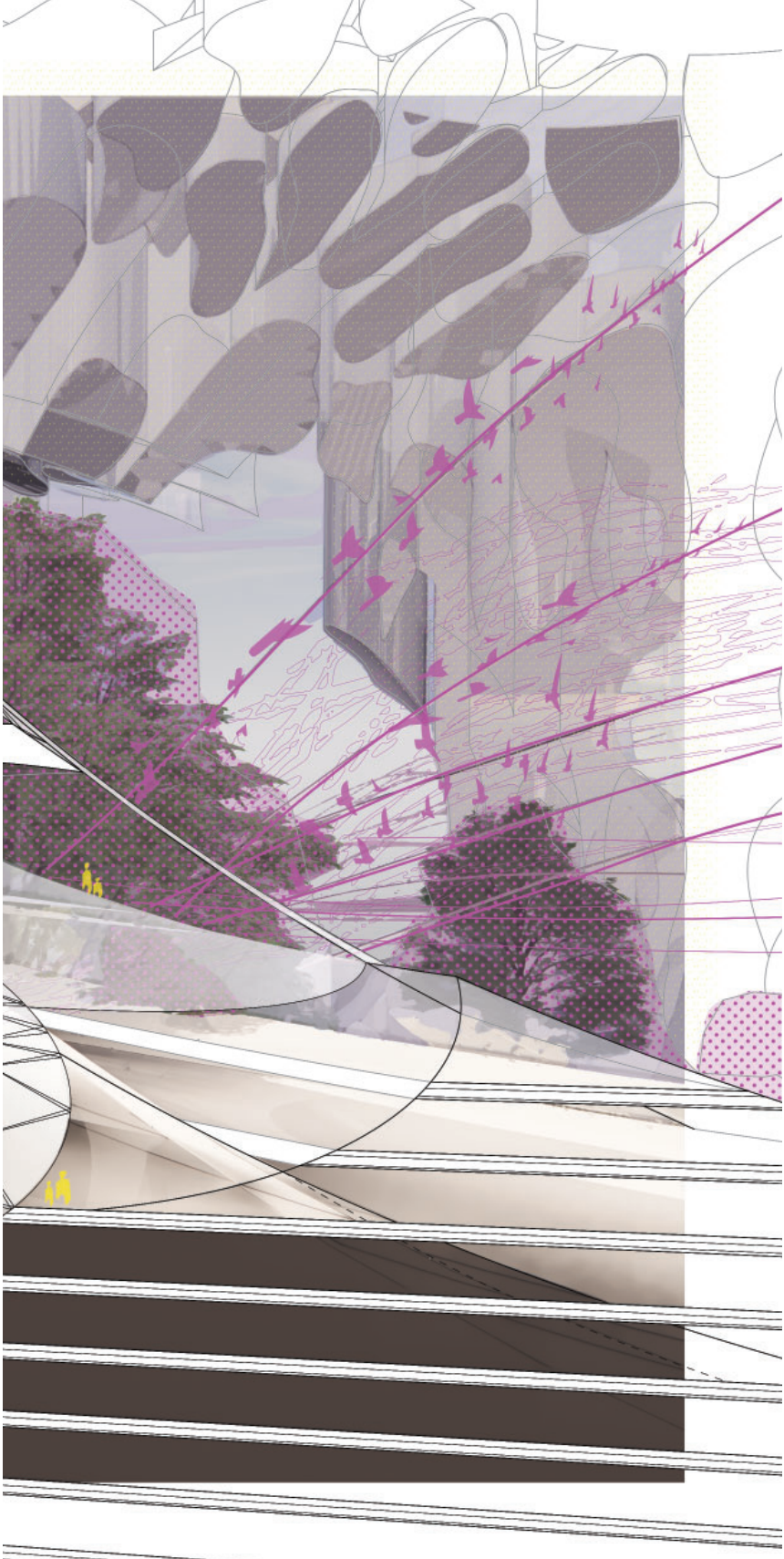


Figure: A closer section, detailing how the building itself might react to the sky gardens presence and where humans (yellow) and birds (magenta) might occupy the space.

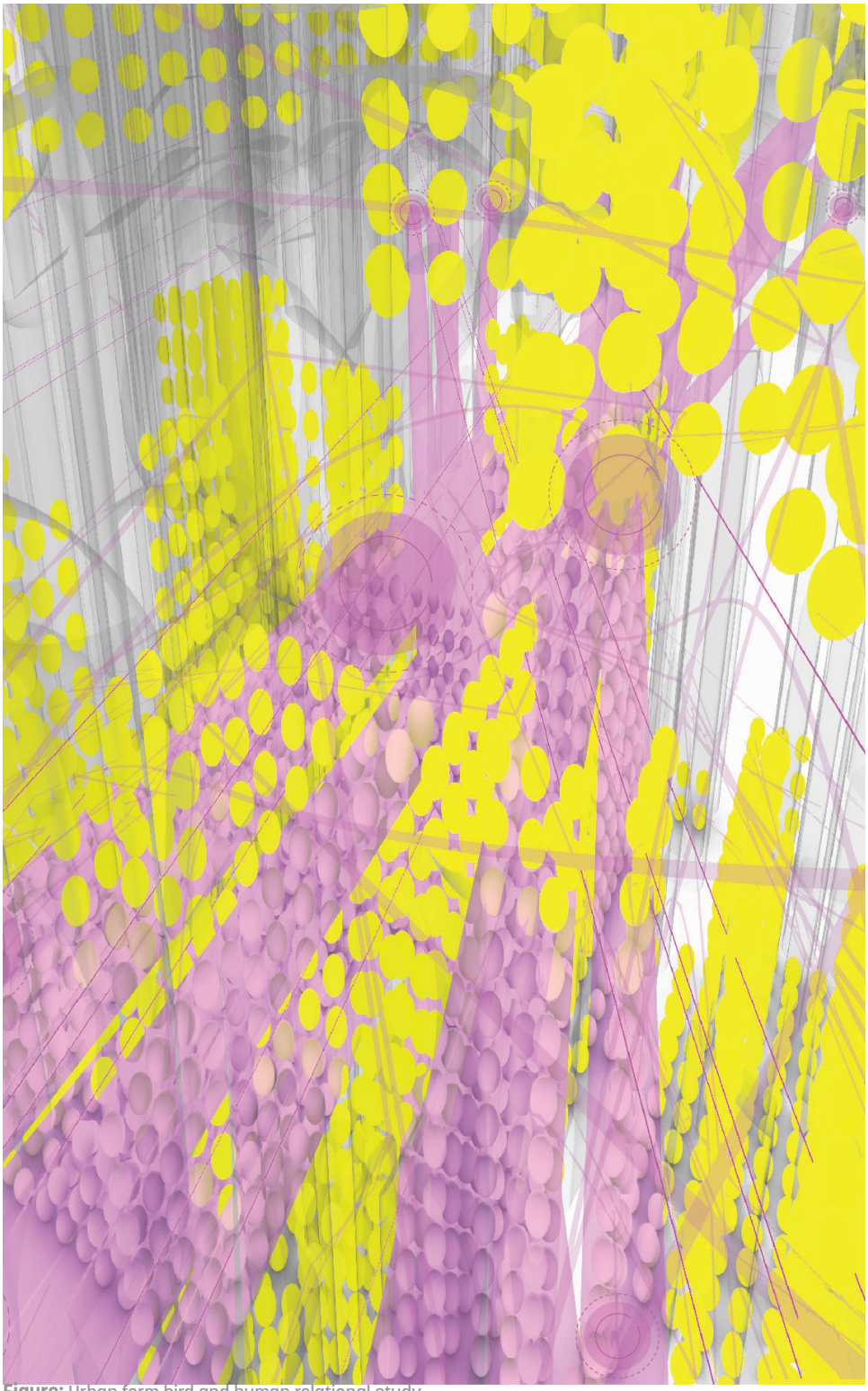


Figure: Urban form bird and human relational study.

//REFLECTION & CONCLUSIONS//

This thesis reads the city as an intersection of its social, ecological, and design conditions in order to investigate the complexity of urban dynamics and visualize how these factors act as both disturbances and opportunities for resilient evolution towards urban life. In doing so it speculatively views how design can operate as both a reflection and as a bridge between the social and ecological conditions of a city.

Because of this speculative nature, the thesis is prone to hyper exaggeration in order to best tell its story. This feature is important to express the relationship between the elements more clearly when they are being mapped, but it does serve to oversimplify the relationship being explored. For instance, there will always be some scenarios that struggle to fit within the three-category distribution, and it is likely that at least some disturbances will fail to respond to design as a moderator between the social and ecological factors. However, as this thesis aims to assess the effectiveness of design when operating in this method, these failures will serve to provide greater constraints and specificity to the results of the ultimate thesis.

Finally, it should be noted that the disturbances and contexts being explored in this thesis are not at all meant to be an exhaustive list of every possible urban disturbance. Instead, like many of the presidents I have explored, this thesis aims to re-imagine the relationship between the designed, social and ecological elements of the urban ecosystem in order to create new narratives about the expectations we can have for architecture in the urban system.

//APPENDIX//

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