Evaluation of a series of sustainable growth concepts to support affordability

A case study of the Metropolitan area of Portland, Oregon

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Abstract

Sprawling development of the urban structure leads to a decrease in the rural areas, and a shortage in land supply, which in turn leads to a lack of affordable housing. The Portland metropolitan area has implemented sustainable urban growth concepts to tackle these problems; the Urban Growth Boundary, 2040 Growth Concept, and Inclusionary Housing program. This thesis will analyze these sustainable growth concepts and aims to determine to what extent these long-term concepts succeeded in achieving sustainable affordable housing. The development of the Urban Growth Boundary has been observed, which established hat it has been successful in counteracting urban sprawl. However, limiting the supply of available land for housing has driven up housing costs. This led to a deficiency in affordable housing. So, the regional government, Metro Council, implemented the 2040 Growth Concept to encourage compact development and promote diverse affordable housing options. An increase in compact development has been observed after the introduction of this concept, as the population density has grown. Later on, the Inclusionary Housing program was executed to promote affordable housing. However, this program also falls short of providing sufficient affordable housing, as the average home price in Portland is significantly more expensive and the median multiple of Portland scores severely unaffordable. These sustainable growth concepts all failed to increase the number of affordable housing units. Future research could focus on what caused these sustainable growth management concepts to fail to achieve affordable housing.

Keywords: Urban Growth Boundary - Affordable Housing - Sustainability - Sprawl - Portland

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1. Introduction

1.1 Background

In recent years, sustainable development has gained more interest in the field of urban planning. Urban regions hold a variety of land uses, stakeholders, and interventions. They are dynamic landscape systems (Kirby et al., 2023). The distribution of people has shifted rapidly between urban and rural areas since the 1950s (United Nations, 2018). The UN estimates that the number of people living in urban regions globally overtook the number of people in rural areas in 2007 (Ritchie & Roser, 2019). While in the United States, the urban population exceeded the rural population as early as the 1920s (US Census Bureau, 2022). The growth of the urban structure often occupies rural spaces, which leads to a decrease in the rural hinterlands (Hersperger et al, 2018). Sustainable development can be utilized to protect rural land. Development is considered sustainable if the needs of the present are met without compromising the ability of future generations to meet their own needs (The World Commission on Environment and Development, 1987). Within urban growth, sustainable development is often associated with high density, proximity, and compact urban growth. However, despite rapid population growth in cities, urban density has declined. These developments contribute to urban sprawl. Urban sprawl is often cited as a driver behind the economic, environmental, and social challenges that cities are facing. Sprawling districts often have to deal with a lack of housing affordability, road congestion, and social exclusion (Tikoudis et al., 2018). Progressively more local authorities develop planning instruments and tools to support sustainable urban development. Several studies have discussed the significance of land use policies and spatial planning as a fundamental driver of many different land-use change processes (Jabareen, 2008; Menzori et al, 2021; Hersperger et al, 2018). Smart growth policies are a popular planning tool as opposed to urban sprawl (Ye et al., 2005). The goals for smart growth are to promote compact, mixed-use, and dense development, preserve open space, and stimulate public transport (Won & Jung, 2023). Smart Growth proponents claim smart growth can meet the needs for affordable housing, as it provides a greater density and variety of housing. Examples of these smart growth policies are urban containment policies, which include the urban growth boundary (UGB) (Aurand, 2010). The purpose of a UGB is to direct development in the assigned areas. This is done by promoting the density of the urban core, limiting sprawl in rural areas, and preserving the agricultural and natural landscapes. The boundary of an UGB is set by local, regional, or state government. The best-known example of an UGB in academic literature is the UGB of the Portland metropolitan area, which is governed by the regional government Metro Council. The functions of Metro include management of the UGB, regional land use

planning, transportation planning, and data management for Portland, Oregon, and all 23 other cities which are part of the UGB. Metro can require local governments to revise their plans and regulations if it finds that they do not serve regional goals (Song & Knaap, 2004). Regulation of urban sprawl by the UGB should lead to a higher population density. To support the UGB in controlling urban sprawl and to promote housing development Metro implemented the 2040 Growth Concept in 1995. In the same year, they set up the Metropolitan Housing Rule, which encouraged all jurisdictions within Metro's boundary to set aside land for a variety of housing types (Mildner, 2017). For a variety of housing units, there should be single-family along with multi-family housing, this is often found to be more affordable (Aurand, 2010). The Inclusionary Housing Program (IH) was put forward to compensate for the lack of different types of housing and to provide affordable housing (Portland Government, 2016). The academic relevance of this research is to increase knowledge about the effects of long-term, and subsequent planning concepts and policies concerning sufficient affordable housing (Bates, 2020). This brings us to the research gap of the policies that followed the UGB, what the objectives of these policies are, and how these have turned out. The societal contribution of this research is that it shows communities how the suburb can lead to exclusion and negatively affect the economy by driving up house prices, as research showed that 83 percent of respondents still preferred a detached single-family house in the suburbs (Ewing et al., 2014).

1.2 Problem statement

Firstly, this research will evaluate whether UGBs do reduce urban sprawl and thus increase the density of a city. Secondly, it will evaluate what effect urban containment policies have on housing affordability. Lastly, this research will determine whether other sustainable design principles can provide sufficient affordable housing within the limits of the urban containment concept. This will be evaluated by looking at the UGB of the metropolitan area of Portland, Oregon. It will focus on the outcomes of these sustainable design strategies and try to understand how effective these strategies have been. To investigate this, the following research question is proposed:
- To what extent have sustainable growth concepts succeeded in achieving affordable housing?

In order to answer this question, the following additional questions have been formulated;
- What is the purpose of the Urban Growth Boundary tool?;
- What are the main objectives of the 2040 Growth Concept?;
- What is the main objective of the Inclusionary Housing Program?
- How have these sustainable growth concepts influenced housing pricing?

1.3 Thesis Structure

After concluding this introductory chapter, the theoretical framework will address the current academic knowledge and essential concepts underlying this thesis. The phenomenon of urban sprawl is discussed followed by an explanation of the smart growth principle, the American zoning regulations, and the sustainable urban design principles implemented in the metropolitan area of Portland: the UGB, the 2040 Growth Concept, and the IH Program. Subsequently, the conceptual model and the hypothesis are elaborated. The conceptual model is incorporated to show the relationship between the concepts and theories that are reviewed in chapter two. This is followed by the methodology, where the data for this thesis will be evaluated. Thereafter, the results discuss the findings and provide statements about the research questions based on the analysis of the data and the theoretical framework. Lastly, in the conclusion, there will be an overview of all the main findings which are discussed throughout this research, and the recommendations for future research.

2. Theoretical Framework

2.1 Smart Growth

The term "Smart Growth" is a denomination for a range of alternative policies and concepts to traditional suburban development. It is a response to the undesirable effects of continued growth from "suburban expansion". Including open natural spaces converted into urban areas on a large scale and excessive low-density growth of cities, sprawl, which has transformed America into a 'suburban nation'. Sprawl tends to lead to a lack of diversity in housing types. Large investments are made in new suburban neighborhoods to provide roads, sewerage, and other infrastructures instead of repairing and using the existing ones. The land-use functions are isolated rather than mixed-used, which increases the need to travel (Downs, 2005; Shawly, 2022). At the core, there is a big overarching issue which is the fact that land is a finite resource. Smart growth was presented to deal with this issue. The principles of Smart growth are very diverse. The overarching theme of smart growth is that development should take place in the right place, at the right time, and using the right methods. The 'right place' means that new urban growth should take place within the existing urban area and preserve open spaces, which would create compact mixed-use neighborhoods, ensure pedestrian-friendly layouts, and promote public transport to minimize car usage. The 'right time' is achieved by postponing development in an area until that area is connected to adequate sewage, infrastructure, water, and schools. And finally, the 'right method' refers to development by encouraging or mandating changes to building codes

(Calandrillo et al., 2015). Growth management concepts are good examples of smart growth as these concepts involve understanding and effectively dealing with the growth process. It implies programs designed to influence the rate, type, location, and cost of growth, and focuses on measures designed to control as well as stimulate and forecast growth. Smart growth concepts could thus control sprawling developments (Poitras, 2002).

2.2 Urban Sprawl

Urban sprawl is generally characterized as the rapid, excessive, and discontinuous expansion of low-density areas. It can be recognized by its low-density residential housing, single-use zoning, and great reliance on private cars for transportation. In academic literature, sprawl has been criticized for being harmful to the environment, ecologically debilitating, and a socially unjust development. Among these negative impacts, urbanization contributes to housing segregation, the loss of wildlife and farmland, and an increase in infrastructure construction and maintenance (Brueckner, 2000; Rafferty, 2022; Won & Jung, 2023). It has also become well-known that sprawl leads to the gross consumption of land and the deterioration of the sense of community (Calandrillo et al., 2015). Different factors are often identified as the main drivers of urban sprawl. These factors are population growth, rise in household income, the progress in car manufacturing and the general decline of commuting costs, individual preferences, and complex historical processes that reinforced a preference for low-density development (Tikoudis et al., 2018). Urban sprawl is often associated with the 'American Dream' with the ideal American neighborhood often described as a quiet place with lots of open space and affordable land with a large lot home. In 1999 the National Association of Homebuilders conducted a survey, which found that 83 percent of the respondents preferred a detached single-family home in the outlying suburbs over a similarly priced house in the city center accessible to public transit and work (Ewing et al., 2014). The United States legal system has inadvertently encouraged sprawl through the passage of municipal zoning laws, which mandate land use practices for real estate within zoning districts (Calandrillo et al., 2015). Changing these zoning laws or introducing policies to discourage urban sprawl and the consumption of large amounts of land would affect the American lifestyle. Many Americans are willing to commute greater distances to live in affordable low-density areas that are near open spaces. This results in development in remote areas and a lowering in population density. The fragmentation and sprawling development of the urban area are therefore partly due to individual preferences (Brueckner, 2000; Tikoudis et al., 2018). The infrastructure reflects the cultural preference for using the private car as a mode of transport. The road network in the US has made it very attractive to live in the suburbs and commute to work in the city. The sprawling suburbs often lack

sufficient public transport and are blamed for the social isolation within the American communities (Calandrillo et al., 2015). The UGB of the Portland metropolitan area, Oregon has received a great amount of attention in academic literature for curbing sprawl.

2.3 The Urban Growth Boundary

The UGB is one of the most popular urban growth management tools in the United States since its origination in 1958. Nowadays, there are many growth management policies in place at local, regional, and state levels (Poitras, 2002). Growth management policies and tools are designed to diminish the effects of overconsumption of land, and uncontrolled sprawling development and to improve the quality of our physical, economic, and social environments (Kirby et al., 2023; Tikoudis et al., 2018). An UGB aims to preserve open space, rural areas, and agricultural land. Urban development outside of the UGB is highly disfavored (Calandrillo et al., 2015; Jalali et al., 2022). It is a regional border that tries to control urban sprawl by building high-density urban development within the border. UGBs are often no more than clear lines on a map that mark the boundary beyond which no further construction is allowed (Nelson & Sanchez, 2003; Kirby et al., 2023). The purpose of UGBs is to preserve open space and rural areas, control sprawl, increase urban density and minimize the use of land, facilitating development in ways that preserve public goods, reduce infrastructure costs by encouraging urban revitalization, infill, and compact development, clearly divide urban and rural areas, ensure the or deny transitions of land from rural to urban uses, and encourage a united community. The land within the boundary can be fully developed, while outside of the boundary the forest- and farmland will be protected (Xu & Zhu, 2018; Poitras, 2002).

2.4 The American Zoning Regulations

Zoning was one of the first forms of land-use regulation and was introduced because progressive spatial planners became concerned about the potential health effects of tall buildings. They implemented height limitations within residential areas which were rapidly adopted across the country, separating low from high-density, and residential neighborhoods from commercial districts. These events led to sprawling suburbs, low-density, and bigger housing lots (Ellickson, 2022). The larger plots generated higher housing prices and a decrease in housing affordability. This drove low- and middle-income households out of these suburban neighborhoods which some call 'exclusionary zoning' (Ikeda & Washington, 2015). Today, the United States is the only prosperous country to implement exclusionary zoning for detached single-family zoning (Whittemore & Curran-Groome, 2022). Around the 1970s, cities became aware of the impact of zoning regulations, excluding low- and

middle-income households, breaking up neighborhoods, and creating sprawling suburbs. The zoning regulations led to a decrease in housing supply, which in turn led to raising housing prices (Ikeda & Washington, 2015; Tikoudis et al., 2018). Smart growth was created in 1970 as a counter-reaction to traditional zoning. The principles of smart growth included compact and mixed-use neighborhoods in contrast to the suburbs. This development of the smart growth concept has led to new types of regulations (Ikeda & Washington, 2015, Calandrillo et al., 2015). Zoning plans are critically important for implementing plans, such as the UGB (Kirby et al., 2023). Mixed land use is encouraged in the UGB. Mixed land use is defined as a mix of commercial, residential, and industrial land use within a given geographic area. This is the opposite of traditional zoning which separates residential land use and non-residential use (Aurand, 2010).

2.5 Metro - Sustainable Design Concepts

2.5.1 Metro - Urban Growth Boundary

The UGB is often described as a long-term management tool that is used to protect farms and forests from urban sprawl and to promote the efficient use of land, public facilities, and services within the boundary (Abbott & Margheim, 2008). Metro Council implemented the UGB of Portland's metropolitan area in 1979. The UGB includes 24 cities and is part of three counties, the Clackamas, Multnomah, and Washington counties (Metro, 2000). Metro is responsible for governing the UGB of Portland based on a 20-year population forecast of the urban area. In this forecast, the needs for housing, employment, and other urban uses such as public facilities, streets and roads, schools, parks, and open spaces should be taken into account (Calandrillo et al., 2015; RLIS Discovery, 2012; Oregon Secretary of State, 2020a). Metro will study the capacity of the current UGB every six years to determine whether it can accommodate the 20-year population forecast (Metro, 2020). The state of Oregon implemented a set of 'Statewide Planning Goals' in the 1970s and has been upgrading these goals since then. Goal 14 of these Statewide Planning Goals focuses on urbanization. It states that all cities in the state of Oregon are required to estimate their future growth and the need for land. Goal 14 divides land into three possible categories: urban, land available for development, and rural. Urban land is contained within or adjacent to a city. Land deemed suitable for development will be located within a UGB. This is considered necessary for the accurate expansion of an urban area. Rural lands are located outside of a UGB and are generally agricultural, woodland, or open spaces. Based on their predictions the cities should plan and zone enough land within the UGB to meet those needs (Calandrillo et al., 2015; Oregon Planning, 2016). The metropolitan area of Portland experienced rapid growth in the late 1980s and early 1990s and Metro has since then developed new roads and light

rail lines, community colleges and hospitals, and neighborhoods and cities (Metro, 2008; Poitras, 2002). An urban containment tool such as the UGB influences land prices. Figure 1 illustrates the output of the implementation of an UGB. Only when within a certain distance from the city center do urban areas with containment have higher value, as the price is driven up artificially. Once outside of the boundary, a rapid decrease can be observed, because that land is not deemed suitable for development (Hartwich, 2016).
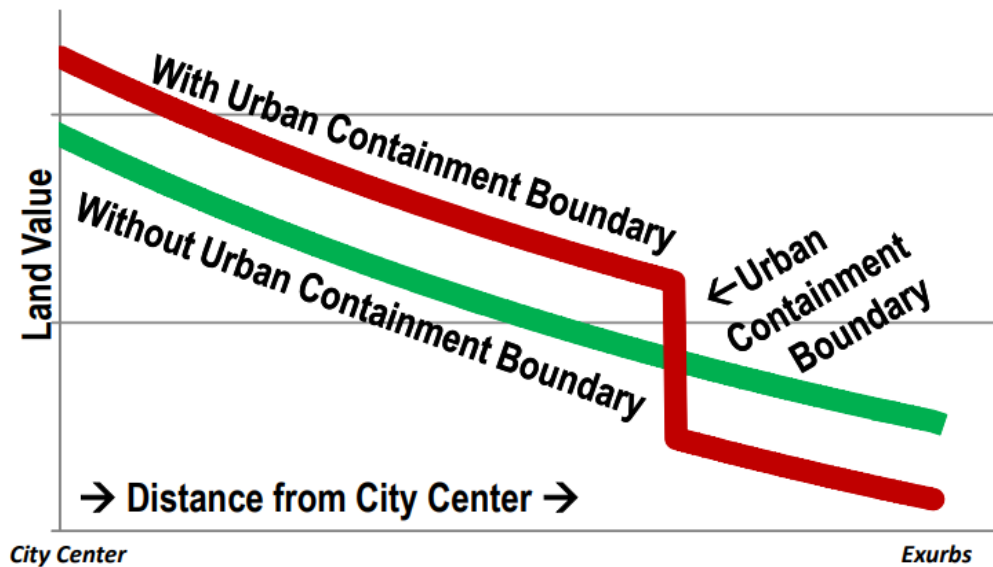

Figure 1. Comparison of Land Values in Cities with and without Urban Containment Tools (Hartwich, 2016).

Since its first establishment in 1979, Portland's boundary has been expanded about three dozen times. These expansions were often small parcels of land – 20 acres or less. In the years 1998, 1999, 2002, 2004, 2005, 2011, 2014, and 2018 there were larger expansions with a total of 30.042 acres. The expansions of 1998, 1999, 2002, 2011, 2014, and 2018 were reinforced to accommodate for housing and additional jobs, and in the years 2004 and 2005 land was added to address the need for industrial lands (Metro, 2020).

2.5.2 Metro - 2040 Growth Concept

Analysis from the early 1990s showed that if population growth continued at this rate, the area would require an additional 120,000 hectares of land by 2040 to accommodate this growth. The rapid population growth put political and economic pressure on housing and land prices (Metro, 2008; Poitras, 2002). Urban containment tools often limit the amount of available land for development. According to basic principles of economics, this is accompanied by higher land prices and, consequently, higher house prices. In 1995, Metro adopted a long-range plan to support this growth, the 2040 Growth Concept. The concept was discussed in public debate, citizens were told that the region faced a choice of 'growing

up or growing out'. Meaning respectively that the region could make large amounts of land available for low-density fringe development, or the region could minimize the need to expand into suburban farmland by allowing higher density within the UGB. The decision was made to ensure that future growth would occur within the existing UGB (Mildner, 2017). The 2040 Growth Concept would complement the UGB to curb the sprawl of suburbs, encourage compact development, and create housing for people of all incomes in every community (Metro, 2018b). The 2040 concept was conceived to accompany the redevelopment of the UGB over a period of 50 years without stimulating urban sprawl. The expectation was to welcome approximately 720,000 new residents and create 350,000 additional jobs during this period (Song & Knaap, 2004). The concept consists of multiple land use decisions that aim, among other things, to maximize growth developments within existing urban centers, encourage mixed-use development, collaborate with neighboring cities, and promote diverse affordable housing options for all residents of the region (Metro, 2000; Metro, 2018b). Affordable housing is indicated as housing units that do not exceed 80 percent of the area median income, adjusted for family size, as determined based on data from the United States Department of Housing and Urban Development, and in a manner so that no more than 30 percent of the household's gross income will be spent on rent and utilities (Oregon State of Secretary, 2017; Portland.gov, 2021). With these land-use decisions, Metro wants to locate 40 percent of new inhabitants into densified, mixed-use neighborhoods, reducing the size of housing lots, creating higher-density zoning, and increasing the share of multi-family housing from under 30 to 35 percent. Criticism that is often expressed towards the UGB and 2040 Growth Concept is how they negatively affect the housing costs in the metropolitan area of Portland, as the housing costs are increasing per square foot as land becomes more scarce (Poitras, 2002). Other researchers argue that urban containment policies are likely to change the distribution of housing types in the market because of higher land prices. A wider variety of housing types, especially if more multi-family housing were to emerge, is expected to increase the supply of affordable housing (Aurand, 2010).

2.5.3 Metro - Inclusionary Housing

Another goal of Oregon's Statewide Planning Goals is the 'Goal 10 Housing'. This goal proposes that each city is required to allocate sufficient land within the UBG that is suitable for residential use. This is largely determined by local zoning plans. The 'housing needs analyses' are performed to determine how much land is needed for the development of housing per city for the next 20 years. The analysis establishes whether a city's inventory of 'buildable land' is sufficient for the next 20 years. If not, the city should either expand its UGB, increase the number of residential units allowed on land already within the UGB, or combine these two alternatives (Oregon Planning, 1988). Metro implemented this policy to

secure a higher regional population density and mixed-use standards for cities and counties within the UGB to achieve 'Goal 10 Housing' while also achieving 'Goal 14 Urbanization' (Oregon Secretary of State, 2020b). However, housing and land costs began to rise in the early 1990s as development accelerated in the Portland metropolitan area. Economic perusals on the effects of the UGB on the supply of housing and land argue that limiting the supply of land increases the price of housing (Downs, 2005; Ball et al., 2014; Anthony, 2017). Metro created several policies to restrain the rise of costs. One of these policies is the 'Metropolitan Housing Rule' (MHR), implemented in 1995, which encouraged all jurisdictions within Metro's boundary to set aside land for a variety of housing types because the majority of the housing consisted of single-family homes. As a result, most jurisdictions would have residential zoning that can accommodate mid- and high-rise construction, providing a mix of single-family housing and multi-family housing (Mildner, 2017). Multi-family housing is often found to be more affordable, as it is typically smaller than single-family dwellings. Therefore, an increase in the variety of housing types, which would mean an increase in multi-family homes, is likely to lead to a rise in the number of affordable homes. This in turn could lead to a higher population density (Aurand, 2010). However, there was still a shortage of affordable housing for low-income households, as affordable housing was again the subject of great interest during discussions at the state legislative session in 2016. The outcome of these discussions was a zoning plan and local building tax for affordable housing, the IH Program. The purposes of the IH are to increase the housing availability for low-income households and to allocate resources to increase housing opportunities for families and individuals facing inequalities, create affordable housing options in high-opportunity neighborhoods, and promote a wide range of affordable housing options concerning size, amenities, and location (Portland Government, 2016). An objective of the IH devised to achieve more affordable housing is to include 20 percent of units that cost 80 percent or less of the Area Median Income (AMI) and another 10 percent of units that cost 60 percent or less of the AMI in any construction project that contains 20 or more houses (Portland Housing Bureau, 2021; Arac, 2018). A greater variety of housing types and, to a lesser extent, greater population density leads to more affordable housing, regardless of urban containment policies. So to avoid a shortage of affordable housing for low-income households, population density needs to increase, as does the supply of diverse housing types (Aurand, 2010).

2.6 Hypothesis

The literature that has been reviewed in the theoretical framework will help to answer to what extent sustainable growth concepts have succeeded in realizing affordable homes. Based on the literature, this thesis hypothesizes that the sustainable growth concepts implemented in

the Portland metropolitan area will reduce sprawling developments, create a compact urban fabric, produce more multi-family homes, and thus make housing more affordable.

2.7 Conceptual Model

The conceptual model is based on the theoretical framework. Figure 2 shows how the smart growth tool the UGB resists urbanization, which in turn affects zoning plans, leading to changes in land and housing costs. The 2040 Growth Concept comes into play to suppress urban sprawl, favor compact development, and promote affordable housing. The MHR supports the 2040 Growth Concept by making sure to set aside land for a variety of housing types, as multi-family homes are more affordable. Later, the IH program is imposed to create affordable housing options in high-potential neighborhoods, promoting a wide variety of affordable housing options in terms of size, amenities, and location by implementing zoning plans that support a variety of housing. All the sustainable growth management policies together aim to increase the amount of affordable housing.
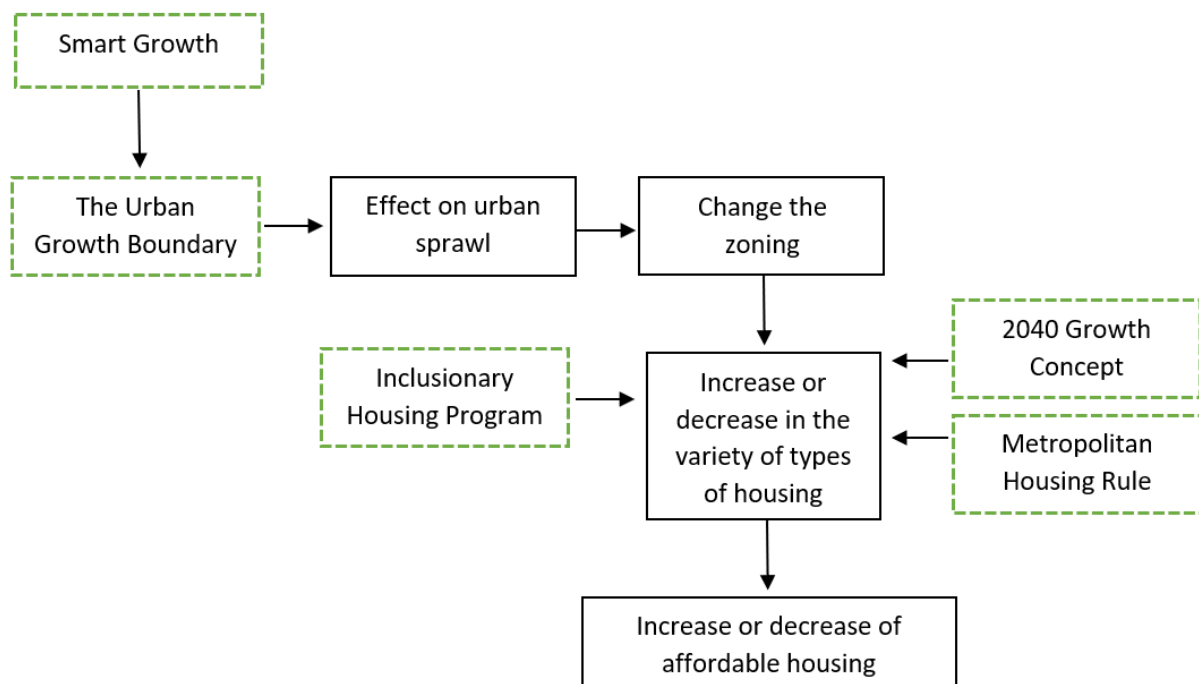
Figure 2. Conceptual model showing the connection between policies, concepts, and their effects.

3. Methodology

3.1 Case study

This research provides a review of some of the sustainable design concepts implemented in the Portland metropolitan area and a structured analysis of data on the population density, and amount of constructed housing. The UGB of Portland is one of the most discussed

smart growth strategies in the academic literature. As it has been implemented about 55 years ago it might be suitable to establish what the consequences and counter-reactions were of this planning tool. What is also taken into account are the concepts that have been introduced to achieve the goal of the UGB, which are the 2040 Growth Concept, the MHR, and the IH Program. These all aim to create a compact urban structure with enough affordable housing.

3.2 Data Collection

3.2.1 Literature Review

Firstly, a structured review process was conducted by systematically searching the Scopus database to set definitions and form the basis for the evaluation. The literature provided the information that was required to answer the four sub-questions and form the basis for what should be investigated with the data evaluation. Since this thesis consists only of secondary data and literature, there are no ethical considerations to be taken into account.

3.2.2 Datasets and Data Analyses

This thesis operates data from the open GIS data network of Metro Council, the Regional Land Information System, which was used to enumerate the size of the UGB and the population density. The data on the population density of the Portland metropolitan area was obtained from Macrotrends. Macrotrends is a research platform with a large number of datasets on stocks, commodities, precious metals, oil, gas, and global statistics, such as population trends. The metadata of the GIS dataset 'UGB History' was used to get an overview of the UGB's expansion per year. The Portland Housing Bureau reports provided data on the total amount of single- and multi-family housing units in Portland. They analyzed data from dozens of reports of the US Census Bureau and Portland Bureau of Development Services on the population, household income, homeownership, and racial composition. This data was analyzed and graphed. It elaborates on the increase in the total amount of single-family and multi-family housing and the difference in construction in recent years. The HSH, which is an American houses broker agency, was consulted for information on the average national housing prices and the housing prices of Portland. Whether housing is deemed affordable will be based on a comparison between the average home price in Portland and the national average. Housing affordability is analyzed based on the Median Multiple obtained from the Urban Reform Institute. The Median Multiple is calculated by taking the median house price and dividing that by the median household income of a region or city. The Median Multiple is deemed a suitable method of comparison according to the

World Bank and the United Nations. All of these datasets are considered to be of good quality, as the sources include policy documents provided by, or subdivision of, the Portland Regional Government, the US Central Bureau of Statistics, an official housing broker, and the Urban Reform Institute. This is an institute with a large dataset about the urban fabric and the associated statistics.

4. Results

4.1 Urban Sprawl

Multiple researchers have found that the UGB of the metropolitan area of Portland has been successful in limiting sprawling growth (Landis, 2021; Ewing et al., 2022; Jalali et al., 2022). The development of sprawl can be measured by the development of population density. An increase in population density implies that sprawling urbanization has come to a standstill or even decreased (Abbott & Margheim, 2008). Figure 3 shows steady rapid growth in population density in Portland since the implementation of the UGB in 1979. There can be seen a sudden drop in the graph around the turn of the century. This can be explained by expansions of the UGB in 1998 and 1999 of 3880 acres in total (Metro, 2020).
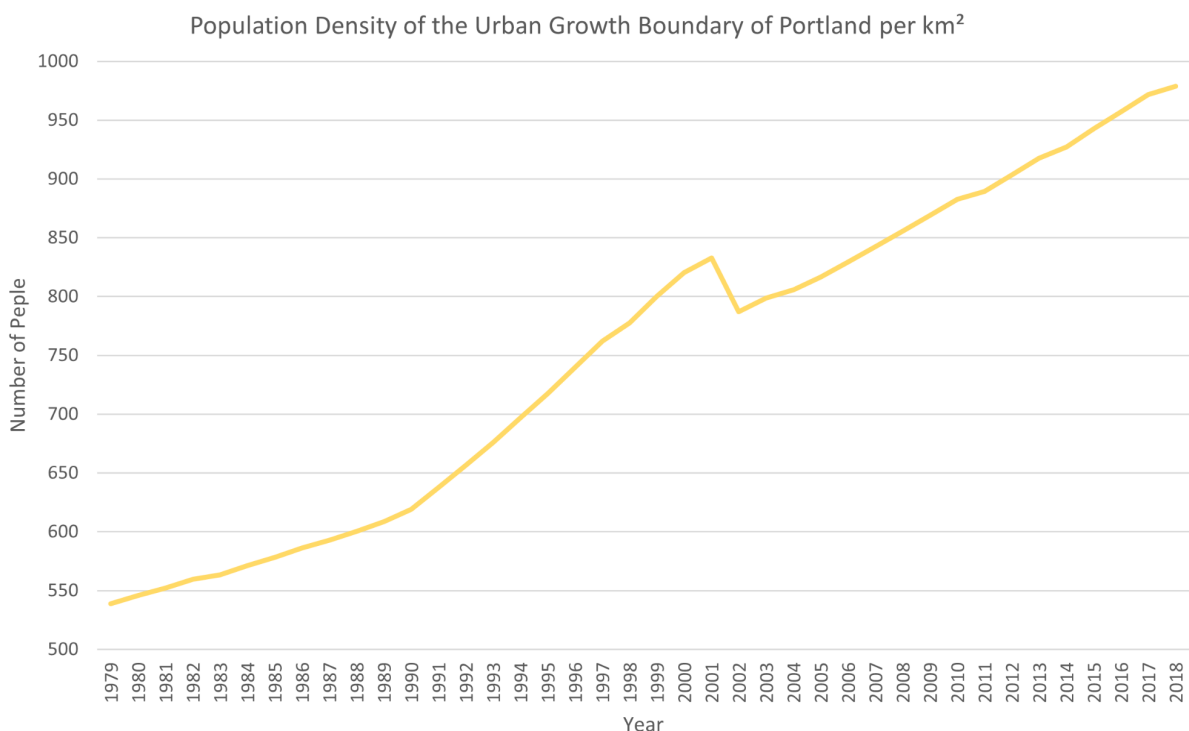

Figure 3. Population Density of the UGB in km² (Macrotrends, 2019).

Table 1 presents the growth of the UGB per km² and the absolute number of inhabitants of the UGB since it was implemented. The table shows that the area has expanded by 14,8

percent up until 2018, while the population of the area has grown by 99,6 percent in the same period. So the goal of the UGB and the 2040 Growth Concept to accommodate new residents without encouraging sprawl has been achieved as population density has increased.

Table 1. Percentual change in the size of the UGB and its amount of inhabitants (Macrotrends, 2023; Metro Data Resource Center, 2022a).

Period	Absolute size of the UGB in km²	Growth in percent change	Absolute amount of Inhabitants	Growth in percent change
1979 – 1990	1872,6	+ 1,9%	1009000	+ 17,1%
	1907,8		1181000	
1990 – 2000	1907,8	+ 1,5%	1181000	+ 34,5%
	1937,0		1589000	
2000 – 2010	1937,0	+ 8,6%	1589000	+ 16,9%
	2103,9		1857000	
2010 – 2018	2103,9	+ 2,2%	1857000	+ 8,5%
	2149,4		2014000	
Total percent change		+ 14,8%		+ 99,6%

4.2 Housing

4.2.1 Multi-family housing

Portland's iconic urban containment tools, such as the UGB and 2040 Growth Concept have promoted the development of densely populated areas and curbed sprawl, there are numerous studies on the negative effects of UGBs on urban development patterns and housing markets (Ball et al., 2014; Jalali et al., 2022; Kirby et al., 2023). Research has shown that sustainable growth management concepts could lead to a housing shortage and the inability to meet housing demand. Within an UGB, housing prices will increase for homeowners and tenants (Anthony, 2017; Mildner, 2017; Shawly, 2022). Metro realized as well that the cost of housing within the UGB had risen remarkedly. Average house prices have only increased rapidly since the early 1990s because when the UGB was first implemented it had a generous land supply and this initially did not significantly affect land and housing costs. In 1995 the housing costs in urban areas exceeded the national average for the first time (Mildner, 2017). The value of the land surrounding the UGB was excessively lower than the land within (Hartwich, 2016). A simple supply-and-demand argument establishes this expectation. The UGB has a significant influence on land values by artificially constraining the supply of land (Brueckner, 2000). The management of urban growth leads to a scarcity of land available for development, leading to increased

competition for land within the UGB, driving up land prices and thus reducing the elasticity of housing supply. Ultimately, the UGB drove up Portland home prices, decreasing housing affordability (Landis, 2021; Ikeda & Washington, 2015; Xu & Zhu, 2018). This price escalation could lead to consumers' reaction to reduce their consumption of living space, which in turn would lead to a decrease in the size of homes and housing plots. Therefore, reducing urban sprawl would ultimately lead to denser cities containing smaller dwellings (Brueckner, 2000). The Growth Concept 2040, the MHR and the IH Program were respectively adopted to meet a greater population density and encourage mixed-use development, contribute to a variety of housing types, and create affordable housing. It is assumed that neighborhoods with greater density and variety of housing types are more likely to have a greater quantity of affordable housing units than low-density neighborhoods consisting exclusively of single-family homes (Aurand, 2010). The data in Figures 4 and 5 show that there is an increase in the construction of multi-family houses compared to the construction of single-family houses. Figure 5 shows an increase in the construction of multi-family homes since 2017. This may be through the implementation of the IH program, which has been implemented at the beginning of 2017. However, after 2017 there has been a decline in the construction of multi-family homes. The construction intrusion in 2020 may be partly due to Covid-19, as the coronavirus brought the economy and construction companies to a halt. There is no clear explanation for the decreases in 2018 and 2019.
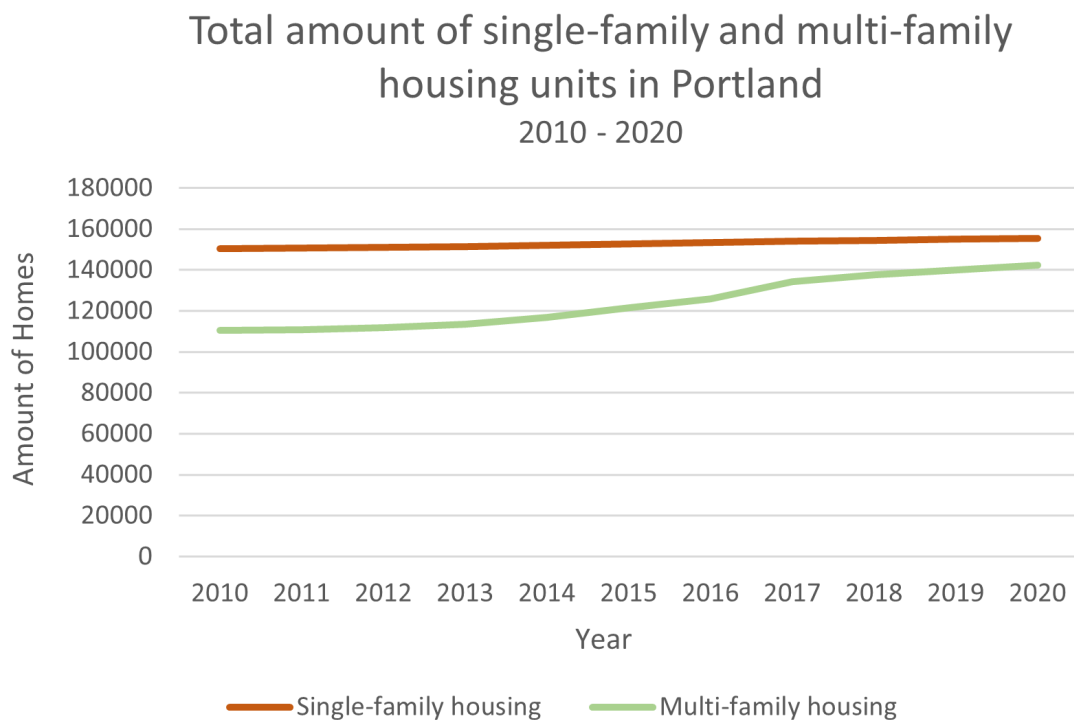

Figure 4. The total amount of single- and multi-family housing units (Portland Housing Bureau, 2020, 2021).
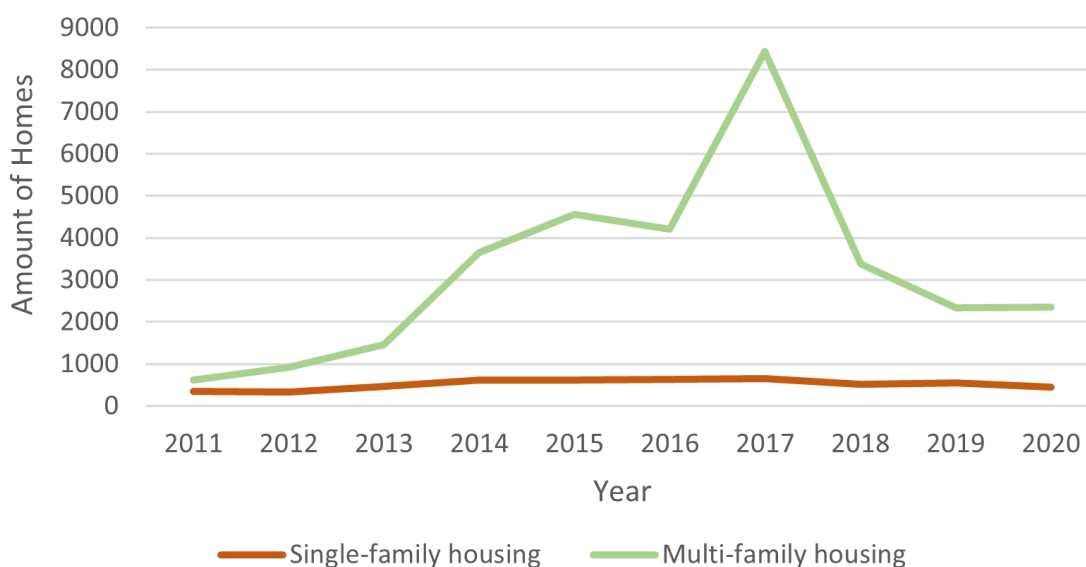
Figure 5. Difference between single- and multi-family housing constructed per year (Portland Housing Bureau, 2020, 2021).

4.2.2 Affordable Housing

Despite the efforts of the 2040 Growth Concept and the MHR, housing costs were still rising and a lack of affordable housing was still a problem. That is why Metro introduced the IH program in early 2017. When creating or updating growth management plans, counties and cities should explicitly promote a variety of housing types to address affordable housing rather than just focusing on density targets, as neighborhoods with a wider variety of housing are seen as more affordable (Aurand, 2010). The IH program objective was to create a wide range of affordable housing options concerning size, amenities, and location. By ensuring that for development projects involving 20 or more units, 20 percent of the units cost 80 percent or less of the AMI and another 10 percent must cost 60 percent or less. The IH program is a growth management policy that gives specific attention to the variety in type of housing. Figure 6 shows a comparison of the difference in median home prices between Portland and the national median. As the graph illustrates, there is no decrease in housing prices compared to the national median since the initiation of the IH project. The difference in the third quartile of 2022 is even greater than the difference in the first quartile of 2020 when the IH program was introduced. An possible explanation for this is the Covid-19 panadmic. Since construction and material costs have risen significantly during this period, as the supply chain of construction materials was disturbed (Iqbal et al., 2021). Other

research shows that Covid-19 affected affordable housing, especially the ability of low-income families to pay for housing (Nobari et al, 2022).
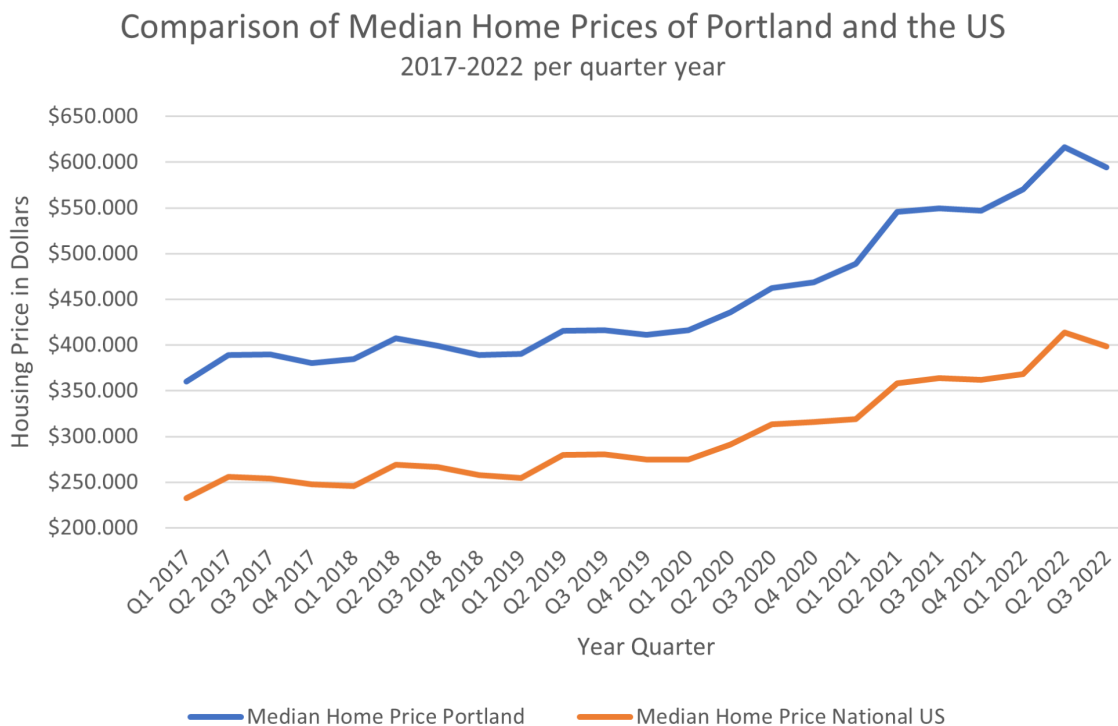

Figure 6. Comparison of the average national housing costs and the average housing costs of Portland (HSH, 2023).

Table 2 elaborates on the Median Multiple Rating. The Median Multiple is calculated by taking the average annual income of a household and dividing it by the average price of a house. A household pays more than 30 percent of its monthly income if it exceeds the score of three. 30 percent is the limit that is considered affordable by Metro (Urban Reform Institute, 2022).

Table 2. Rating of the Median Multiple (Hartwich, 2016; Urban Reform Institute, 2022).

Housing Affordability	Rating Median Multiple
Affordable	< 3.0
Moderately Unaffordable	3.1 – 4.0
Seriously Unaffordable	4.1 – 5.0
Severely Unaffordable	5.1 >

Figure 6 shows the development of the median multiple of Portland from 2005 up until 2022. The graph in Figure 7 shows a strong trend upward of the Median Multiple. This means that housing affordability in Portland has decreased. The Median Multiple of the Portland

metropolitan area has already surpassed the score of three since 2005, however since 2016, it has peaked in the 'severely unaffordable' zone. After the implementation of the IH program in 2017, there has been a slight improvement in housing affordability. However, an increase can again be observed in 2020. This can be attributed to the Covid-19 pandemic and the effects it has had on housing construction and the increase in the costs of building materials.
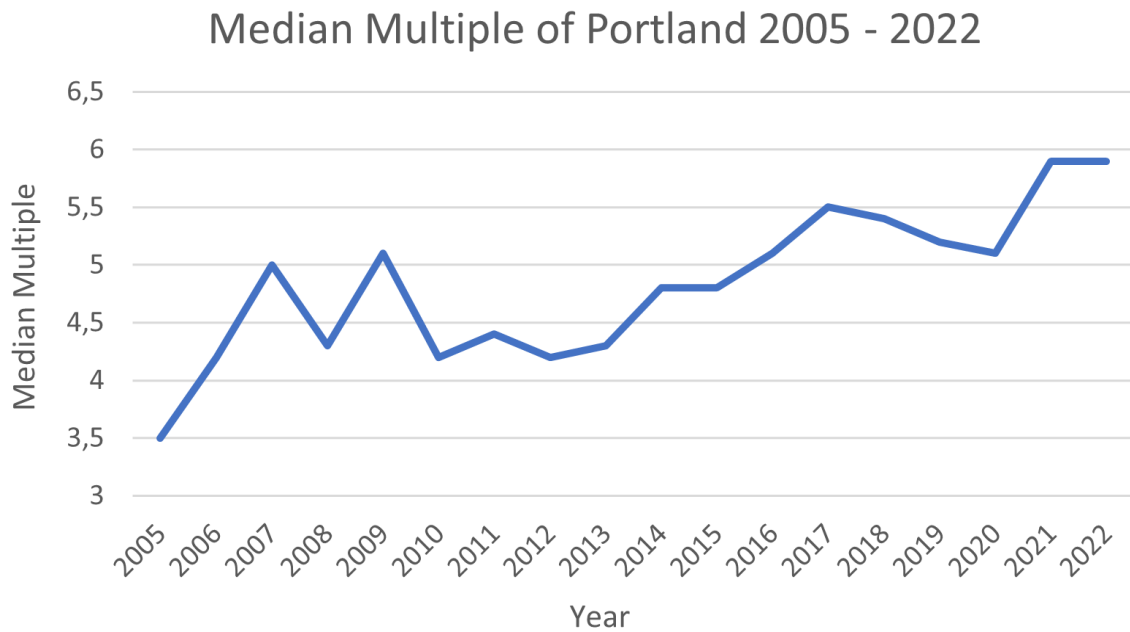

Figure 7. Median Multiple of Portland (Urban Reform Institute, 2022).

5. Conclusion

This thesis sought to understand the outcomes and functions of the sustainable urban growth concepts of the Portland metropolitan area, analyze the results, and determine whether they have been successful in achieving affordable housing in a sustainable matter. The UGB is a smart growth principle implemented to prevent urban sprawl and protect the surrounding rural areas. It has been successful to some degree. However, the UGB limits the supply of land available for housing construction, which has driven up land and housing costs. The objective of the 2040 Growth Concept was to structure the redevelopment of the UGB for a 50-year period without stimulating urban sprawl while accommodating diverse affordable housing, encouraging compact development, and constructing a variety of housing types. The 2040 Growth Concept has been successful concerning the increase of compact development. The population size has increased significantly while the size of the UGB has remained about the same, this results in increased population density. The aim of constructing diverse and affordable housing was not achieved yet, so in 2017, the IH program was created to promote the construction of affordable housing units. Since the introduction of the IH program, there has been a greater increase in the number of multi-family homes compared to single-family homes. However, it has not accommodated enough affordable housing, as the median multiple indicates that the housing in Portland is severely unaffordable. These sustainable growth concepts all intend to increase the supply of affordable, compact housing in a sustainable matter. The objective of increasing the number of affordable homes has not been achieved. However, providing compact, sustainable housing has been successful as there has been an increase in the construction of multi-family housing and increased population density. Future research could focus on what caused these sustainable growth management concepts to fail to achieve affordable housing and to which extent the Covid-19 pandemic has affected housing affordability.

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Appendix

Urban Growth Boundary
Expansion History