REINVENT PHOENIX

ASSESSMENT FOR SUSTAINABLE HOUSING IN THE DISTRICT OF MIDTOWN

Partners:

City of Phoenix

U.S. Department of Housing and Urban Development

St. Luke's Health Initiatives

ASU Global Institute of Sustainability, Arizona State University

Reinvent PHX

Assessing the Current State of Housing In the Midtown District, Phoenix Against Principles of Livability and Sustainability

Report submitted to the City of Phoenix Planning and Development Department by the ASU-SOS Team for the project grant "Reinvent Phoenix – Cultivating Equity, Engagement, Economic Development and Design Excellence with Transit-Oriented Development", funded by the U.S. Department of Housing and Urban Development (HUD)

Principal Investigators
Dr. Aaron Golub, Dr. Arnim Wiek

Faculty Affiliated to the Project
Dr. Deirdre Pfeiffer

Graduate Research Assistants
Tamsin Connell, John Harlow, Josh Schmidt, Adam Stranieri

Postdoctoral Researcher
Dr. Braden Kay

DRAFT
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School of Sustainability
Arizona State University

ASU SCHOOL of SUSTAINABILITY
ARIZONA STATE UNIVERSITY

Table of Contents

Executive Summary

The assessment presented in this report indicates that the current housing conditions in the Eastlake-Garfield District are poor overall. Based on the data collected for this report, residents' perspectives, and the mandate of the U.S. Department of Housing and Urban Development (HUD) there are emergent priorities. Of particular concern are high vacancy rates and low affordability (plus high overcrowding) driven by low District incomes with high transportation costs. The assessment is based on robust empirical data, despite minor quality issues (a few data gaps and low confidence levels).

Sustainable housing strives for diverse, healthy, affordable, socially inclusive, resource-efficient, and culturally sensitive housing. The current state assessment is based on five goals of sustainable housing, derived from sustainability and livability principles:

1. Meet demand with adequate housing options
2. Provide sufficient quality of housing and promote healthy housing conditions
3. Secure affordability of housing
4. Conserve natural resources in homes
5. Maintain valuable cultural and historical character

A small set of indicators and targets operationalize each goal (see the following summary table).

The Eastlake-Garfield District struggles with unsustainable states in four of the five goal domains, though there are positive aspects:

1. *Demand is not currently met with adequate housing options*. Vacancy rates for owned and rented units are above the sustainable threshold, which may result in blight, crime, and divestment. ADA visitability compliance is expected to be very low, in accordance with general building practices. The percentage of housing options in the District available to elderly residents is reasonably close to their share of the city's population.

2. *Current quality of housing is moderate and unhealthy housing conditions are observable*. Some units, spatially concentrated, lack basic electricity or other energy supply. District average housing fitness (roof, siding, landscape issues), could improve, but the number of housing units in urgent need of improvements is relatively small (6% = 213 units). Landscape quality (immediate surrounding of homes) and water quality is sufficient.

3. *Currently, the District struggles with several housing affordability challenges.* Although 72—97% of the housing stock is affordable for a family earning 80% of AMI, the average median income of Eastlake-Garfield residents is much lower, only 27.5% of AMI. This makes only 31—35% of District housing affordable to the average resident. There are other high-cost burdens for Eastlake-Garfield residents, who spend over 20% of their income on transportation and 6—19% on energy, which is likely due to the prevalence of driving commutes and lack of renewable energy and energy-efficient technologies in homes. For many households, housing size and high costs result in rates of overcrowding and severe overcrowding that clearly surpass sustainable thresholds.

4. *The assessment on the current state of conserving natural resources in homes is inconclusive*. There is not enough reliable information available to assess the current state of housing in Eastlake-Garfield in terms of its environmental performance. Water consumption is fairly low, while renewable energy use and LEED construction do not meet the sustainable levels.

5. *The current state of maintaining valuable cultural and historical character is sustainable*. Neighborhood stability is fairly high with more than 20% of families residing in the District for more than 10 years, and historical preservation well exceeds the sustainable target.

The detailed assessment results across the five goals are summarized in the table below.

In summary, the District is in need of affordable housing options of better quality with good environmental performance (energy efficiency). Thereby, tradeoffs between different housing features require special attention when crafting sustainable housing visions and strategies. For example, cooling homes improves health, but also increases energy costs. Similarly, high fitness housing is safer, but less affordable.

Data from stakeholder engagements in the District confirm that overcrowding and vacancy rates are high, and there are few specific areas with low housing fitness. Stakeholders expressed perceptions that more quality affordable housing is needed in the District. There is a common understanding that Garfield has inadequate affordable housing and inadequate housing options for

elderly people. Also, stakeholders communicated that the cultural and historic character of the neighborhoods in the District should be not only protected, but enhanced. Though conserving natural resources also poses challenges, stakeholder input has prioritized vacancy rates, fitness, and affordability above other challenges.

HUD has operationalized its mandate through *Livability Principles* (2009). Interpreting the assessment results in light of the livability principles indicates the following set of priorities:

Transportation costs, housing fitness, affordability indicators, renewable energy use, and LEED certification are indicators that have a high distance-to-target, and are closely tied to the principles.

- Livability Principle 1 aims at *providing more transportation options and reducing transportation costs.* The current state data suggests that there is a critical need to address transportation costs through increasing services and employment opportunities close to homes, and building housing near District employers.

- Livability Principle 2 aims at *supporting equitable and affordable housing.* The current state of affordability challenges indicates non-compliance with this principle, which suggests that there is a need for more housing units that are both affordable at the region and District scale. Low fitness in some specific areas does not meet HUD's goals of providing quality housing to all incomes, races and ages.

- Livability Principle 5 aims at *making smart energy choices.* Current state data on LEED certification and renewable energy show high distances-to-target.

Finally, the analysis of the driving forces behind the unsustainable states summarized above suggest a variety of economic, social, legal, and other promising intervention points. These insights were used to craft the Sustainable Housing Strategy Report for the Eastlake-Garfield District.

The assessment table below uses a color rating system. Red indicates that existing conditions fall short of the sustainable target. Orange and yellow indicate different levels of non-compliance. Green indicates that existing conditions either meet or exceed the sustainability target. Gray indicates that an explicit threshold is not available (NA), or there is no data for that indicator (ND).

Summary table of indicators, targets, current data, and assessments [For details see Chapters 3 & 4]

Indicator	Sustainability Target	Current Data	Distance-to-target	Assessment
Goal 1 – Current state of meeting demand with adequate housing options				
Vacancy rate (Owned) (Rented)	>1.5 and <4% >6 and <10%	11% 17%	7% / High 7% / High	
Options for elderly	Equal distrib.: 8.4% (PHX)	6.0%	High	
Visitability	100%	15%	Low	
Goal 2 – Current state of providing sufficient quality of housing and promoting healthy housing conditions				
Basic amenities				
Fitness				
Landscape quality			GD/HH)	
Indoor air quality	<0.1%	[Soil gas data in OU3]	Exceed SGHHSLs	
Water quality	<0.1%	Minimal	Fulfilled	
Noise	<0.1%	ND	ND	
Goal 3 – Current state of securing affordability of housing				
Overcrowding	<5% <0.1%	10.2% 4.1%	5.2% / High 4% / High	
Regional affordablity	Owned: 100% Rented: 100%	72% (50%) 97% (100%)	28% (50%) / High 3% (0%) / Low	
District affordability	Owned: 80% Rented: 80%	31% 34%	49% / High 46% / High	
Poverty affordability	57% 37%	Owned: 32% Rented: 50% Owned: 12% Rented: 15%	25% / High 7% / Low 25% / High 22% / High	
Housing costs	<30%	31.4%	1.4% / Low	
Transportation costs	<15%	22.1%	7.1% / High	
Energy costs	<6%	5 –19%	0 –13% / Medium	
Low-income housing cost burden	<0.1%	82%	81.9% / High	
Goal 4 – Current state of conserving natural resources				
Renewable energy	100%	<1%	99% / High	
Water consumption	<90 GPCD	50 GPCD	Fulfilled (-40 GPCD)	
Reused materials	>75%	ND		
Local materials	>25%	ND		
LEED certification	>25%	Minimal	High	
Energy-efficiency	>50%	ND		
Energy consumption	ND	ND		
Goal 5 – Current state of maintaining valuable cultural and historical character				
Neighborhood stability	>20%	24%	Fulfilled (+4%)	
Historical character	>2% >20%	2.4% 43.3%	Fulfilled (+.4%) Fulfilled (+23.3%)	

WRONG DATA TABLE.

Correspondence to Scope of Work

Scope-of-Work Items	Corresponding Report Chapter
Sub-Task 3.1.a: Data Collection	
Demographics (ages, incomes, family status, etc.)	Appendix
Occupations	Appendix
Consumer expenditures	Appendix
Household sizes	Appendix
Transportation costs	Chapters 3.3 and 4.3; Appendix
Car ownership	Appendix
VMT	In Progress
Housing conditions	Chapters 3.2 and 4.2; Figure 3; Appendix
Housing supply and categories	Chapters 3.1 and 4.1; Appendix
Housing costs and categories	Chapters 3.3 and 4.3; Table 10; Appendix
Renters	Chapters 3.1, 3.3, 4.1, and 4.3; Appendix
Owners	Chapters 3.1, 3.3, 4.1, and 4.3; Appendix
Housing vacancy	Chapters 3.1 and 4.1; Appendix
Foreclosures	In Progress
Housing construction pipeline	Strategy Report
Resident input	Vision Report
Sub-Task 3.1.b: Data Analysis	
Demographics	Appendix
Housing + transportation costs	Chapters 3.3 and 4.3; Appendix
Housing Diversity Index	Appendix
Housing conditions	Chapters 3.2 and 4.2; Appendix
Overcrowding	Chapters 3.3 and 4.3; Appendix
Resident input	Vision Report
Housing preservation candidates	Chapters 3.5 and 4.5, Appendix
Sub-Task 3.1.c: GIS Analysis	
Population density maps	Appendix
Housing density maps	Appendix
Housing type maps	Appendix
Household sizes maps	Appendix
Housing + transportation costs maps	Appendix
Housing conditions maps	Appendix

Chapter 1 – Introduction

1.1. Housing Challenges in the Midtown District

The Midtown District is just north of downtown Phoenix. It's bounded by 7th Avenue to the west, 7th Street to the east, Indian School Road to the north, and McDowell Road to the south. The parcels fronting onto the north side of McDowell, including the Phoenix Art Museum, are not included in the Reinvent Phoenix Midtown District because they are included in the Downtown District code.

Figure 1. Solano Transit District major streets and landmarks

Midtown is divisible – by Central Avenue and Thomas Road – into four distinct quadrants:

1. The northwest is Midtown's most commercial area, with high-rises on Osborn Road west of Central Avenue, and most residential closer to 7th Avenue.

2. The southwest has most of Midtown's residential area. It is nearly all single-family residential zoning, except for parcels on Central Avenue. Prominent historic neighborhoods, including Willo and Encanto, in this area are among the most desirable in the city and command market values upwards of $500,000. Multifamily housing in the southwest is closer to Central Avenue (e.g. Palm Lane and Encanto Boulevard), and prices tend to be high.

3. The southeast has diverse land uses, with single-family residential surrounded by multifamily housing and commercial. South of Palm Lane is high-density, multifamily housing. North of Palm Lane are historic neighborhoods, including Alvarado and Los Olivos, mixed with small, specialized services (e.g. legal, medical, etc.).

4. The northeast quadrant is mainly residential, with a mix of older single-family homes and newer (often upscale) multifamily units. Residential areas in the northeast of Midtown have more socioeconomic diversity than other parts of the District.

The Central Avenue Corridor (CAC) that runs through Midtown is one of the most important economic drivers and employment centers in Arizona, employing upwards of 60,000 people and having the highest concentration of office space in the region. It is also one of the most trafficked roadways in the City. Prior to the 1960s, Central Avenue was lined with mostly estate homes. During the 1950s, when the CAC began to boom, the downtown core of Phoenix was in decline as both people and development moved to areas outside of downtown. In the 1960's, high-density commercial projects defined Central Avenue development, with many of the corridor's signature buildings, such as the Phoenix Financial Center, completed during this period.

In 1971, Phoenix adopted the Central Phoenix Plan, which zoned for unlimited building heights along much of the CAC. But development during this period mostly stalled, and investors and developers refocused their resources in the downtown core. The 1980s and '90s saw a mix of real estate booms and slow-downs. The boom period in 1980 caused residents to organize in order to protect their neighborhoods from being overwhelmed by commercial towers. Many neighborhood associations were formed during this period and continue to be influential in the District today. In 1987, the City worked with residents to develop a conservation plan for parts of the Encanto and Willo neighborhoods.

During the engagements, the City found that residents were primarily concerned that rapidly expanding commerce in the area would negatively impact their neighborhoods' identities. Residents valued quality, family-oriented living throughout the neighborhoods, and did not want that character threatened by future developments. Neighborhood associations' strong sense of pride and preservation continue to be valuable assets for the District. In a 2002 workshop hosted by the City of Phoenix, Valley Metro, and the Phoenix Community Alliance, stakeholders in Midtown identified the following challenges in regards to housing across the District:

- A lack residential density and demographics to create market opportunities
- Overpriced land sites
- Fragmented property ownerships
- Institutional barriers to assembling appropriate sites for development
- Neighborhoods tend to oppose new development projects
- The complex nature of financing for mixed-use projects
- Institutional barriers, specifically lack of incentives, for public-private partnerships

Using the guiding concept of sustainable housing that strives for diverse, healthy, affordable, socially inclusive, resource-efficient, and culturally-sensitive housing (Edwards, 2000; Wheeler, 2009), the Midtown District is confronted with challenges. Many residents in the District have been concerned about the compatibility of new commercial developments with existing historic neighborhoods. Midtown's central challenge will be to balance increased commercial development, historic neighborhood associations that take pride in preservation, and development of affordable housing options.

From 1990—2010, District population increased from 6,961 to 8,512, with for a current housing unit mix of 37% owner-occupied and 63% rented. Only 2.4% of District (31 acres) land lies vacant, but of 6,267 housing units, 20.4% are vacant, which is above sustainable levels. High office and housing vacancies are due, in part, to prohibitive rental costs. Housing affordability is low in Midtown, with only rentals for 80% AMI meeting the sustainable target. A final challenge is that merely 0.7% of Midtown is parkland, only about half of the 1.3% for all of Phoenix.

This current state assessment report details the issues above and provides an overview of relevant intervention points for urgently needed policies and other types of improvement strategies. The report introduction continues with an overview of the Reinvent Phoenix planning process, the core definitions of sustainable housing, and the objectives of the assessment study. The next chapter describes the assessment methodology (Chapter 2). The following chapter spells out the sustainable housing goals used in the assessment (Chapter 3). The key results of the assessment are organized by the goals (Chapter 4). A set of causal maps articulates potential intervention points and system features for the strategy-building module (Chapter 5). The report finally summarizes conclusions for the strategy building process (Chapter 6).

1.2. Profile of the "Reinvent Phoenix" Grant

"Reinvent Phoenix" is a City of Phoenix project in collaboration with Arizona State University and other partners, and funded through HUD's Sustainable Communities program. This program is at the core of HUD's mission to "create strong, sustainable, inclusive communities and quality affordable homes for all." It specifically strives to "reduce transportation costs for families, improve housing affordability, save energy, and increase access to housing and employment opportunities" and to "nurture healthier, more inclusive communities" (Office of Sustainable Housing and Communities, 2012). The program explicitly incorporates principles and goals of sustainability/livability (HUD/DOT/EPA, 2009):

1. Enhance economic competitiveness
2. Provide more transportation choices
3. Promote equitable, affordable housing
4. Support existing communities
5. Coordinate and leverage federal policies and investment
6. Value communities and neighborhoods.

In this spirit, from 2012—2015, Reinvent Phoenix aims to create a new model for urban development in Phoenix. The goals for this new model are to improve quality of life, conserve natural resources, and maintain desirability and access for the entire spectrum of incomes, ages, family sizes, and physical and developmental abilities along the light rail corridor. Reinvent Phoenix aspires to eliminates physical and institutional barriers to transit-oriented development. To do so, the grant will work to catalyze livability and sustainability through capacity building, regulatory reform, affordable housing development, innovative infrastructure design, economic development incentives, and transformational research and planning.

Participatory research design ensures that a variety of stakeholder groups identify strategic improvements that enhance safe, convenient access to fresh food, healthcare services, quality affordable housing, good jobs, and education and training programs. Reinvent Phoenix focuses on six topical elements: economic development, green systems, health, housing, land use, and mobility (corresponding to the Livability Principles). These planning elements are investigated in five transit Districts (from east to west and south to north): Gateway, Eastlake-Garfield, Midtown, Uptown, and Solano. Planning for the Downtown District of the light rail corridor is excluded from Reinvent Phoenix because of previously completed planning efforts, partly using transt-oriented development ideas.

Reinvent Phoenix is structured into planning, design, and implementation phases. The project's planning phase involves building a collaborative environment among subcontracted partners, including Arizona State University, Saint Luke's Health Initiatives, Discovery Triangle, the Urban Land Institute, Local First Arizona, Duany Plater-Zyberk & Company, Sustainable Communities Collaborative, and others. While the City of Phoenix coordinates these partnerships, Arizona State University and Saint Luke's Health Initiatives are working with residents, business owners, landowners, and other relevant stakeholders in each of the grant's five transit Districts. This effort will assess the current state of each District, as well as facilitate stakeholder expression of each District's sustainable vision for the future. Finally, motivated actors in each District will co-create step-by-step strategies to move toward those visions. Transit District Steering Committees, formed in the planning phase, will host capacity building for their members, who will shepherd their Districts through the remaining Reinvent Phoenix phases.

City of Phoenix staff and Duany Plater-Zyberk & Company will lead the design phase. Designs for canal activation, complete streets, and form-based code will complement the compilation of a toolbox for public-private partnerships to stimulate economic development along the light rail corridor. The design phase will take its cues from the public participation in the planning phase, and maintain ongoing monthly contact with Transit District Steering Committees to ensure the visions of each District are accurately translated into policy and regulations. These steps will update zoning, codes, regulations, and city policies to leverage the new light rail system as a major asset. The design phase is crucial for preparing an attractive environment for investment and development around the light rail.

Finally, the implementation phase will use the city's partnerships with the Urban Land Institute, Local First Arizona, and Sustainable Communities Collaborative to usher in a new culture of development in Phoenix. With the help of all partners, transit-oriented development can be the vehicle to renew Phoenix's construction industry, take full advantage of the light rail as a transformative

amenity, and enrich Phoenix with a livable and dynamic urban fabric.

1.3. Sustainable Housing Research

One sub-project of Reinvent Phoenix in the Midtown District focuses on housing and aims to develop diverse, healthy, affordable, socially-inclusive, resource-efficient, and culturally-sensitive housing along the light rail in the District. The housing project fully aligns with HUD's Sustainable Communities program goals, as stated above (see Livability Principle No. 3, above).

Sustainable housing is specified in the following five goals (Bratt, 2002; Astleithner et al., 2004; Hack et al., 2009; Wheeler, 2009; Bolt et al., 2010):

1. Meet demand with adequate housing options
2. Provide sufficient quality of housing and promote healthy housing conditions
3. Secure affordability of housing
4. Conserve natural resources in homes
5. Maintain valuable cultural and historical character

In pursuit of these goals, we employ a transformational planning framework (Wiek, 2009; Johnson et al., 2011), conducting sustainable housing research in three linked modules. We start with a thorough assessment of the current state of housing in the Midtown District in 2010/2012 against principles of livability and sustainability (current state assessment); in parallel, create and craft a sustainable vision for housing in the Midtown District in 2040 (visioning); and finally develop strategies for changing or conserving the current state of housing towards the sustainable vision of housing in the Midtown District between 2012 and 2013 (strategy building). The framework is illustrated below.

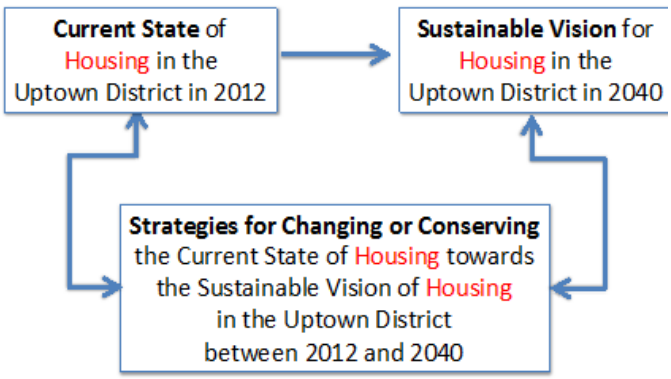


Figure 2. Transformational sustainability planning framework (Wiek, 2009)

Because of the close link between housing, land use, mobility, and other planning elements, the central meaning of housing often remains poorly defined in housing assessments. Even the U.S. Department of Housing and Urban Development (HUD) does not offer a clear definition of housing, despite providing various related definitions (affordable housing etc.). With the intent to avoid duplications, overlap, and confusion, we follow in this assessment report the following definition: *Housing refers to the structural and functional features of homes (residential buildings) in a given District*. Consequentially, features of a District that pertain to the connection and distribution of homes and other buildings, open spaces, infrastructures, services, etc. will be addressed under the *land use* planning element.[1]

1.4. Objectives of the Current State Assessment

The current state assessment is a structured procedure that creates a detailed and normative account of the existing conditions of housing in the District, informed by livability and sustainability principles. The assessment creates a solid foundation and reference point for the strategy building process to achieve sustainable housing in the District, which is documented in Wiek et al. (2013).

Unlike conventional housing assessments, which are largely descriptive and analytical, the research documented here is functionally linked to the strategy-building module. Conventional assessments often provide a large number of arbitrary data sets, with unclear reference to the main issues being analyzed. They also tend to lack a meaningful normative reference against which the data is being assessed. In this report, there are transparent indications and justifications of the degree of sustainability or unsustainability of the current state of housing. In accordance with the mandate of Reinvent Phoenix to contribute to sustainable community development, adapt to rising temperatures, increase resiliency to climate change, and improve energy- and water-efficiency of buildings and infrastructure, this report takes an explicit *normative* perspective on housing, based on sustainability and livability principles (Gibson, 2006; HUD/DOT/EPA, 2009).

Contrary to conventional assessment practice, this report only presents information that can directly be linked to the key guiding question of the housing assessment: How sustainable/unsustainable is the current state of housing in the District?

We have excluded from this *current state* assessment report all issues that pertain to future developments of housing in the District. The issue of housing growth trends and market forecasts will be addressed in our District housing strategy report, as it is chiefly concerned with steering that housing future in a more sustainable and

livable direction (Wiek et al., 2013).[1]

The core objectives of this current state assessment are:

1. A comprehensible set of goals for sustainable housing

2. A comprehensible set of performance indicators that operationalize the goals and facilitate detailed description of the current state of housing

3. Targets for all performance indicators that operationalize the goals and facilitate assessment of the sustainability/unsustainability of the current state of housing

4. Sustainability assessment of the current state of housing through comparison of indicators to their identified targets (distance-to-target)

5. Causal problem maps for the performance indicators that identify causal structures and drivers, and thereby suggest promising intervention points for change strategies

Additional objectives include:

1. To develop a process and content template for current state assessment research that can be reproduced in the other four transit Districts and thus guide the Reinvent Phoenix current state assessment activities over the coming years

2. To enhance capacity in current state assessment for planning professionals and collaborating partners to use in subsequent initiatives and projects.

3. To enhance capacity in current state assessment for students and faculty to use in other research, teaching programs, and projects.

[1]Example: future housing demand (e.g., based on development projects); anticipation of development conflicts because of preservation concerns related to clusters of historic residential properties; etc.

Chapter 2 – Research Design and Data Sources

Research Design

The methodological approach employed in this study is based on the transformational planning framework in Figure 2. Following specifications for the current state assessment module, this report pursues the aforementioned objectives through five research streams:

1. Development of an assessment framework composed of normative goals, performance indicators, and targets (Chapter 3)

    a. Identification of a comprehensible set of goals for sustainable housing. This research is based on reviewing scientific literature and reference documents (Edwards, 2000; Chiu, 2004; Winston & Pareja Eastaway, 2008; HUD/TOD/EPA, 2009; Wheeler, 2009). Based on this initial review, we synthesized a large number of goals into a smaller set through systematic comparison and integration.

    b. Identification of a cohesive set of performance indicators that operationalize the goals and facilitate detailed description of the current state of housing. The indicators are largely determined through literature that suggests a clear link between general goals and measurable indicators (Winston & Pareja Eastaway, 2008; Vehbi et al., 2010).

    c. Identification of a target (or range) for each performance indicator that operationalizes the goals and facilitates assessment of the sustainability/unsustainability of the current state of housing. Indicators facilitate description of the current state through data collection. Yet, they are insufficient for operationalizing the goals of sustainability/livability. This requires targets (one for each indicator) that are discrete (quantitative or qualitative) thresholds (or ranges) that define, all together, sustainable housing (Wiek & Binder, 2005; Rockström et al., 2009; Machler et al., 2012). Due to insufficient research, this is often tedious and challenging (Hoernig & Seasons, 2004). For indicators lacking firm targets or thresholds in the literature, we rely on our team's expert opinions to make reasonable estimates. Indicators without clear targets are labeled as "not available" (NA).

2. Assessment of the sustainability/unsustainability of the current state of housing based on comparison of current state data (for each indicator) to the identified targets (distance-to-target). This shows how sustainable/unsustainable the current state of housing is in specific (for each indicator) and overall (aggregated) (Chapter 4).

3. Identification of the causal structure (drivers) of performance indicators, which reveals promising intervention points for change strategies. Causal assumptions are based on expert input and scientific literature; and, a system analysis explores linkages among all the indicators (Vester, 2008; Wiek et al., 2008). The final step defines the linkages between housing indicators quantitatively (strength of impact) and qualitatively (type of impact). Causal structure analysis is critical for strategy building, because performance indicators cannot be directly changed. Sustainable housing strategies must change the upstream drivers of indicators, which requires detailed knowledge of causal linkages (Chapter 5).

Data Sources

Most of the current state data used in this assessment comes from the decennial census and the American Community Survey series for 2007—2011. Depending on the specific data needed, a combination of data from census tract and block geographies was used. All census geographies were matched to the District boundaries using GIS intersection and area prorating techniques.

Arizona State University's Energize Phoenix project provided electricity usage data, and the City of Phoenix Water Department provided water consumption data. We fit these data to the selected geographies using the same area prorating method. We calculated other derived measures such as averages, medians, diversity indexes, and cost burdens.

Some data comes from the HUD online Community Planning and Development (CPD) mapping tool (HUD, 2012). This tool groups data for all census tracts intersecting the Districts without area prorating, and therefore is not as accurate as the other data we provide. Data from this tool is labeled as "HUD tool."

Targets were developed using data and information from the literature on housing demographics, environmental performance, affordability, and other issues. In some cases where the literature was unclear and targets were not readily discernible, we used either the research team's expert opinions or declared that targets are not (yet) available (NA).

Phoenix's last housing fitness survey was conducted in 2004. We did not have the resources to do a complete survey. Instead, we used Google Street View to create rough fitness estimates for each District census tract. We sampled about 50 residential structures (single or multi-

family) per tract (totaling 100—200/District). This sample has an error rate of around 10%, meaning a rating of 3.5 in this sample indicates a rating of 3.15—3.85 in a complete sample.

For chosen properties, we made separate ratings for roof, siding, and landscape conditions on a 1—5 scale. Well-maintained roofs (no signs of damage or age), siding (fully intact, painted, etc.), and landscape (well maintained, watered, etc.) received a "5." A score of "1" would indicate significant visible damage or lack of maintenance. We rated each structure in the sample three times, averaged the ratings, and used them for their respective census tracts.

Chapter 3 – Sustainable Housing Goals, Indicators, and Targets

Livability and sustainability are core framing concepts for HUD's Sustainable Communities program, and therefore, the Reinvent Phoenix project. While this might be tangential for other housing studies, it is mandatory for the present housing assessment as part of the Reinvent Phoenix project. As stated in the introduction (Chapter 1), we follow in this assessment report the following definition of housing: Housing refers to the structural and functional features of homes (residential buildings) in a given area. Based on this definition, we define sustainable housing as follows (Edwards, 2000; Wheeler, 2009): *Sustainable housing is a state in which all residents in a given area can satisfy their needs for diverse, healthy, affordable, socially-inclusive, resource-efficient, and culturally-sensitive homes.* This chapter details the key features of sustainable housing, based on sustainability and livability literature.

In following sections, we define five sustainable housing goals, as well as related indicators and targets that have been articulated in various strands of the literature (e.g., Edwards, 2000; Chiu, 2004; Winston and Pareja Eastaway, 2008; Wheeler, 2009; Keall et al., 2010). These goals are:

1. Meet demand with adequate housing options
2. Provide sufficient quality housing and promote healthy housing conditions
3. Secure affordability of housing
4. Conserve natural resources in homes
5. Maintain valuable cultural and historical character

Recent research indicates that these goals are best pursued in concert, as they offer synergies among them (Kuholski et al., 2010; Garland et al., 2013).

We define the targets based on the literature, when such information is available. Where it is not, we rely on our team's expertise as well as consultations with other experts and stakeholders within our project. Accordingly, we include an assessment of our degree of confidence in the target; where there is clear expert opinion on sustainable targets, our confidence is high, while in those cases where we are relying on our judgment, we rate our confidence lower. We also must define the scope of application of these targets – some are tailored to the specific District, while others apply equally to all Districts.

3.1. Goal 1 – Meet demand with adequate housing options

The first goal of sustainable housing is to meet demand for housing with adequate options for all households. Families have housing needs that differ from those of singles, and children have different housing needs than the elderly, etc. (Braubach & Power, 2011). Sustainable housing offers diversity that matches the specific needs of relevant population groups (Wheeler, 2009). This goal pertains to unit sizes, occupancies, and home types, whereas subsequent goals address quality, affordability, etc.

Lifestyles and incomes change over time, affecting housing demand. A functioning housing market allows people to change housing as their needs change (Kendig, 1984; DiPasquale & Wheaton, 1996). On the one hand, a low vacancy rate makes it difficult to move, leading to rising prices, overcrowding, and unmet housing needs. On the other hand, high vacancy rates can lead to crime, deterioration, and sluggish production of new or renovated units. Thus, the acceptable level of "structural" vacancy is between 1.5% and 4% for owner occupied units, and between 6% and 10% for rental units (DiPasquale & Wheaton, 1996).

Adequate housing options for people with disabilities and the elderly should be near public transportation, because elderly and disabled people may be unable to drive. Similarly, housing for these populations should meet ADA (Americans with Disabilities Act) and other visitability standards to ensure safe and comfortable lives. To ensure people with disabilities and the elders have equal access to diverse housing, 100% of housing should be visitable (Reinvent Phoenix Benchmark).

Table 1. Indicators and targets of housing adequacy

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Vacancy rate	Percentage of unoccupied owner units Percentage of unoccupied renter units	High	1.5—4%[A] 6—10%[A]	High High
Options for elderly	Percentage of elderly residents (>65 years)	High	8.4%[B]	High
Visitability	Percentage of units meeting ADA[C] visitability standards	High	100%[D]	High

Notes and References:

A. DiPasquale & Wheaton (1996)

B. Reinvent Phoenix Grant Benchmark (Johnson et al., 2011)

C. Americans with Disabilities Act

3.2. Goal 2 – Provide sufficient housing quality and health

Table 2. Indicators and targets of housing quality and health

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Fitness	Average fitness[A] (1—5) Percentage of units with <2.01 fitness	High	4.5[B] <0.1%[C]	High High
Basic amenities	Percentage of units with no electricity or other energy supply	Med	<0.1%[C]	High
Landscape quality	Average outdoor summer water use	Med	50—150 GDHH[D]	Med
Indoor air quality	Percentage of units exceeding one or more indoor air quality thresholds[E]	Med	<0.1%[C]	High
Water quality	Percentage of units exceeding one or more water quality thresholds[F]	Low	<0.1%[C]	High
Noise	Percentage of units exceeding thresholds for noise	Low	<0.1%[C]	High

Notes and References:

A. <0.1% is used where "zero" would be the ideal target.

B. In the fitness survey, a sample of houses is rated for roof, siding and landscape conditions on a scale from 1—5 (best). Each house receives an average score from three ratings.

C. An average score of 4.5 would insure that few houses are in blight conditions.

D. 50 GD (gals/day) per household (HH) was estimated to be reasonable summer water consumption to maintain a ¼-acre lot with trees and minimal landscaping during the summer months.

E. Carbon monoxide, radon, volatile organic compounds, etc.

F. Lead, asbestos, etc.

The second goal of sustainable housing is to ensure that all housing has sufficient fitness to insure health and safety. Health is not only the absence of disease, and thus compliance with official environmental and health standards does not necessarily provide a healthy home environment. Natural light, vegetation, layout, and access to social and recreational spaces can affect indoor environments and the health of their residents (Lawrence & Hartig, 1998; Lawrence, 2004; Libman et al., 2012). Comprehensive housing fitness incorporates physical conditions with capacity to provide a healthy and safe environment to residents (Krieger, et al. 2000; Jacobs et al., 2009). Older structures (pre-1979) may be more susceptible to fitness and health problems, due to greater retrofitting and maintenance requirements (Wilson et al., 2010).

In addition to basic amenities (drinking water, sewage system, electricity, light, heat, air conditioning, etc.) and the absence of significant damage (e.g., foundational and roof integrity, mold, flood damages), sustainable housing requires compliance with all quality standards for noise, water (no lead, asbestos, etc.), and indoor air (no carbon monoxide, radon, volatile organic compounds etc. seeping from underground toxic groundwater plumes), at a minimum. Several decades of epidemiological studies show that all of these conditions cause health issues (Jacobs et al., 2009).

3.3. Goal 3 – Secure affordability of housing

Table 3. Indicators and targets of housing affordability

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Low-income housing cost burden	Percentage of very low-income[A] HH with housing cost burden and without appropriate subsidies	Med	<0.1%[B]	High
Overcrowding	1—1.5 occupants/room More than 1.5 occupants/room (severe)	High	<2%[C] <0.1%[B]	High High
Affordability	Percentage of units affordable to HH earning 80% of the HUD AMFI Percentage of units affordable to HH earning 50% of the HUD AMFI Percentage of units affordable to HH earning 30% of the HUD AMFI	High	78.6%[D] 59.7%[D] 36%[D]	High
Housing costs	Percentage of HH monthly income spent on housing	Low	<30%[E]	Low
Transportation costs	Percentage of HH monthly income spent on transportation	Med	<15%[E]	Low
Energy costs	Percentage of HH monthly income spent on energy in the summer	Med	<6%[F]	Low

Notes and References:

A. Based on United States average overcrowding of 2.2% (2010 Census).

B. <0.1% is used where "zero" would be the ideal target.

C. Housing and Urban Development Department (HUD) Area Median Family Income (AMFI)

D. Reinvent Phoenix Grant Benchmarks (Johnson et al., 2011)

E. District specific poverty rates

F. Poverty line income for household of four equals $23,550 per year.

G. Center for Neighborhood Technology (2011)

H. Fisher & Colton (2013)

The third goal of sustainable housing is to provide housing options that are affordable for all residents. Housing affordability reflects the availability of housing subsidies. Sustainable housing must include sufficient public housing and assistance programs to support disadvantaged residents with an equitable supply of safe and affordable options. If these programs are meeting their mandates, then few low-income households will have high cost burden.

Overcrowding is a function of housing affordability, indicating that many families cannot afford units appropriate to family size, leading to negative social and economic impacts (Bratt, 2002). Overcrowding drives poor child development, and increases fire safety risks, and respiratory infection and mortality rates (Evans et al., 2004). For this assessment, the sustainable threshold is below 2% for overcrowding and below 0.1% for severe overcrowding.

A standard measure of housing affordability is the percentage of household income dedicated to housing, transportation, and energy costs. Spending up to 30% of household income on housing costs (rent, mortgage, taxes, etc.), 15% on transportation costs, and 6% on energy, is considered affordable (Center for Neighborhood Technology, 2011; Fisher & Colton, 2013). HUD grant requirements specify the long-term goal of reducing combined housing and transportation spending by 5% from current District levels, an issue we address in the sustainable housing strategy study (Wiek et al., 2013).

3.4. Goal 4 – Conserve natural resources in homes

Table 4. Indicators and targets for conserving natural resources in homes

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Water consumption	Indoor and outdoor residential water use/person	Med	<90 GCD[A]	Low
Energy consumption	Grid electricity use/person	Med	NA	NA
Energy-efficiency	Percentage of homes with a major energy-efficient appliance	Med	>50%[B]	Med
Renewable energy	Percentage of homes generating 100% renewable energy on-site	Low	100%[B]	High
Reused materials	Percentage of recycled or reused materials in new construction	Low	>75%[B]	Med
Local materials	Percentage of locally produced materials[C]	Low	>25%[B]	Med
LEED certification	Percentage of LEED certified buildings	Low	>25%[B]	Med

Notes and References:

A. 90by20.org (2013); gallons per capita per day (GCD)

B. Authors' best estimates

C. Within a 50 mile radius

The fourth goal of sustainable housing is to conserve natural resources (energy, water, and materials) in homes. This pertains to constructing new homes, retrofitting existing ones, or upgrading particular devices (e.g., energy and water efficient appliances). Building new homes should reuse materials, integrate the most efficient appliances, windows, etc., and rely on the most current "green" building practices. LEED or similar certification (such as Energy Star) should be sought for new construction to insure that the most effective and efficient practices are used (Montoya, 2011).

Existing housing stock is responsible for about 17% of total U.S. greenhouse gas emissions from on-site fuel combustion (gas stoves, etc.) and electricity consumption (EPA, 2013a). Retrofits should bring existing buildings as close to the performance of new "green" construction as possible (Vergragt & Szejnwald Brown, 2012). Adding energy and water efficient appliances to current buildings should be part of periodic updates or retrofitting. Encouraging renewable energy in housing leads to lower energy bills, making housing more affordable for families. Water conservation is critical in the overextended, but growing, Colorado River Basin, especially in desert regions such as Phoenix, where the water supply is more variable (Gammage et al., 2011; Ruddell & Pasqualetti, 2011; 90by20.org, 2013).

On a large scale, renewable energy reduces our dependence on oil, thereby avoiding environmental disasters like the Deepwater Horizon accident and curtailing global warming and local emissions from energy production (The White House, 2011). Energize Phoenix is currently in the process of enhancing energy efficiency and reducing energy consumption of homes along Phoenix's light rail (Dalrymple & Bryck, 2012). Investing in renewable energy production in housing also helps to curb water consumption. Solar energy, for instance, requires almost no water to produce, whereas coal, oil, gas, and even nuclear energy require high quantities of water (Gammage et al., 2011). Nonetheless, it is difficult to define a firm electricity consumption threshold, because it would depend on other household activities, as well as the energy production "mix" of local utilities. Note that broader issues of temperature and energy consumption are addressed in the Green Systems Assessment Reports of this grant.

3.5. Goal 5 – Maintain valuable cultural and historical character

Table 5. Indicators and targets for the maintenance of valuable cultural and historical character

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Neighborhood stability	Percentage of families in the District for 10+ years	High	>20%[A]	Low
Historical character	Percentage of historically designated homes Percentage of District area with historical designation	Med	>2%[A] >20%[A]	Med Med

Notes and References:

A. Authors' best estimates

The fifth goal of sustainable housing is maintenance of cultural and historic features of homes. This character can be embodied in older buildings and neighborhood stability. Longer tenured residents are more likely to identify and preserve the character of their neighborhood. This does not imply a rigid conservationist agenda, rather a thoughtful, culturally sensitive, and historically aware process of modernization of homes and home features (Page & Mason, 2004; Tyler et al., 2009). There is no firm threshold for historical designations, as older neighborhoods will have higher numbers of eligible properties.

3.6. Summary

The following overarching questions, based on the sustainability goals above, guide the subsequent assessment of housing sustainability in the Midtown District (Chapter 4):

1. Is there a current supply of the housing types needed by different population groups and households types; or is there too much or too little housing vacancy?

2. Does all housing provide basic amenities and healthy indoor and outdoor environments; or, is there damage to foundations or roofs that could lead to mold or other structural issues?

3. Is housing affordable for all residents (i.e., is there overcrowding? do housing, transportation, and energy costs place too heavy a burden on households)?

4.

5. Does new construction use the latest energy and resource efficient techniques and indoor amenities?

6. Do residents stay in the neighborhood for a long time? Are homes that represent neighborhood character recognized and preserved?

This chapter concludes with an overview table that summarizes all relevant information presented in detail above. Table 6 could be used as a checklist for housing assessments.

Table 6. Summary table of indicators and targets

Indicator	Definition	Importance	Sustainability Target (Range)	Confidence Level T.
Goal 1 – Current state of meeting demand with adequate housing options				
Vacancy rate	Percentage of unoccupied owner units Percentage of unoccupied renter units	High	1.5—4% 6—10%	High High
Options for elderly	Percentage of elderly residents (>65 years)	High	8.4%	High
Visitability	Percentage of units meeting ADA visitability standards	High	100%	High
Goal 2 – Current state of providing sufficient quality of housing and promoting healthy housing conditions				
Fitness	Average fitness (1—5) Percentage of units with <2.01 fitness	High	4.5 <0.1%	High High
Basic amenities	Percentage of units with no electricity or other energy supply	Med	<0.1%	High
Landscape quality	Average outdoor summer water use	Med	>50 GDHH	Med
Indoor air quality	Percentage of units exceeding one or more indoor air quality thresholds	Med	<0.1%	High
Water quality	Percentage of units exceeding one or more water quality thresholds	Low	<0.1%	High
Noise	Percentage of units exceeding thresholds for noise	Low	<0.1%	High
Goal 3 – Current state of securing affordability of housing				
Low-income housing cost burden	Percentage of very low-income HH with housing cost burden and without appropriate subsidies	Med	<0.1%	High
Overcrowding	More than 1.0 occupants/room More than 1.5 occupants/room (severe)	High	<2% <0.1%	High High
Affordability	Percentage of units affordable to HH earning 80% of the HUD AMI Percentage of units affordable to HH earning 50% of the HUD AMI Percentage of units affordable to HH earning 30% of the HUD AMI	High	78.6% 59.7% 36%	High
Housing costs	Percentage of HH monthly income spent on housing	Low	<30%	Low
Transportation costs	Percentage of HH monthly income spent on transportation	Med	<15%	Low
Energy costs	Percentage of HH monthly income spent on energy in the summer	Med	<6%	Low
Goal 4 – Current state of conserving natural resources				
Water consumption	Indoor and outdoor residential water use/person	Med	<90 GCD	Low
Energy consumption	Grid electricity use/person	Med	NA	NA
Energy-efficiency	Percentage of homes with a major energy-efficient appliance	Med	>50%	Med
Renewable energy	Percentage of homes generating 100% renewable energy on-site	Low	100%	High
Reused materials	Percentage of recycled or reused materials in new construction	Low	>75%	Med
Local materials	Percentage of locally produced materials	Low	>25%	Med
LEED certification	Percentage of LEED certified buildings	Low	>25%	Med
Goal 5 – Current state of maintaining valuable cultural and historical character				
Neighborhood stability	Percentage of families in the District for 10+ years	High	>20%	Low
Historical character	Percentage of historically designated homes Percentage of District area with historical designation	Med	>2% >20%	Med Med

Chapter 4 – Sustainability of the Current State of Housing

In this chapter, we present the sustainability assessment of the current state of housing in the Midtown District, based on the goals, indicators, and targets presented in Chapter 3. Data was gathered from the most recent sources available, as discussed in Chapter 2. The assessment uses a color rating system. Red indicates that existing conditions fall short of the sustainable target. Green indicates that existing conditions either meet or exceed the sustainability target. Gray indicates that an explicit threshold is not available (NA), or there is no data available (NA) for that indicator

4.1. Goal 1 – Current state of meeting demand with adequate housing options

Table 7. Indicators, targets, data, and assessment of housing adequacy

Indicator	Importance	Current State Data	Confidence Level C. S. D.	Sustainability Target (Range)	Confidence Level T.	Distance-to-target	Assessment
Vacancy rate	High	8%	High	1.5—4%[A]	High	4—6.5% / Med	
		11.6%	High	6—10%[A]	High	1.6—5.6% / Low	
Options for elderly	High	41%	High	8.4%[B]	High	Fulfilled (+32.6%)	
Visitability	High	15%	Low	100%[C]	High	85% / High	

Notes and References:

A. DiPasquale & Wheaton (1996)
B. Reinvent Phoenix Grant Benchmark

Current State Data

As indicated in the previous chapter, this assessment approaches housing adequacy through the lenses of vacancy rates and visitability. Midtown has a variety of housing types and sizes among its 6,267 units. Based on tract data, studio and one-bedroom units are the predominant housing type (41%), which are most appropriate for the elderly, singles, and couples without children. About 32% of units are single-family detached homes or single-family attached homes, duplexes, triplexes, and quadplexes (Appendix,). About 16% of units have three or more bedrooms, making them suitable for large families. About 8% of owned houses and 12% of rental units are vacant. Visitability data are unattainable. Yet, it is likely that few of the housing units in the District are truly visitable, as only 12% were built after 2000.

Assessment

Given the diverse supply of housing types in the District, there is sufficient stock of available units that cater to varying housing needs. Vacancy rates, however, for owner-occupied and rental units are above the sustainability threshold. This may reflect recent construction of new, more expensive units, which are out of reach for many of the District's potential residents.

Compliance with ADA/visitability requirements could not be assessed because visitability data are unattainable, though it is likely very low in accordance with general building practices. However, units available for elderly populations easily exceed the sustainability threshold. In sum, the District's housing supply is diverse enough for current residents. However, vacancies are too high, which (if unchecked) may result in blight, crime, and divestment.

4.2. Goal 2 – Current state of providing sufficient housing quality and health

Table 8. Indicators, targets, data, and assessment of healthy housing conditions

Indicator	Importance	Current State Data	Confidence Level C. S. D.	Sustainability Target (Range)	Confidence Level T.	Distance-to-target	Assessment
Fitness[A]	High	4.3 2.7%	Med Med	4.5[B] <0.1%[C]	High High	0.2 / Low 2.6% / Low	
Basic amenities	Med	1.2%	High	<0.1%[C]	High	1.1% / Low	
Landscape quality	Med	124 GDHH	High	50—150 GDHH[D]	Med	Fulfilled	
Indoor air quality[E]	Med	NA	Med	<0.1%[C]	High	NA	
Water quality[F]	Low	Minimal	Med	<0.1%[C]	High	Fulfilled	
Noise	Low	NA	NA	<0.1%[C]	High	NA	

Notes and References:

A. In the fitness survey, a sample of houses is rated for roof, siding and landscape conditions on a scale from 1—5 (best). Each house receives an average score from three ratings.

B. An average score of 4.5 would insure that few houses are in blight conditions.

C. <0.1% is used where "zero" would be the ideal target.

D. 50 gals/day/household (HH) was estimated to be reasonable summer water consumption to maintain a ¼-acre lot with trees and minimal landscaping during the summer months.

E. Carbon monoxide, radon, volatile organic compounds, etc.

F. Lead, asbestos, etc.

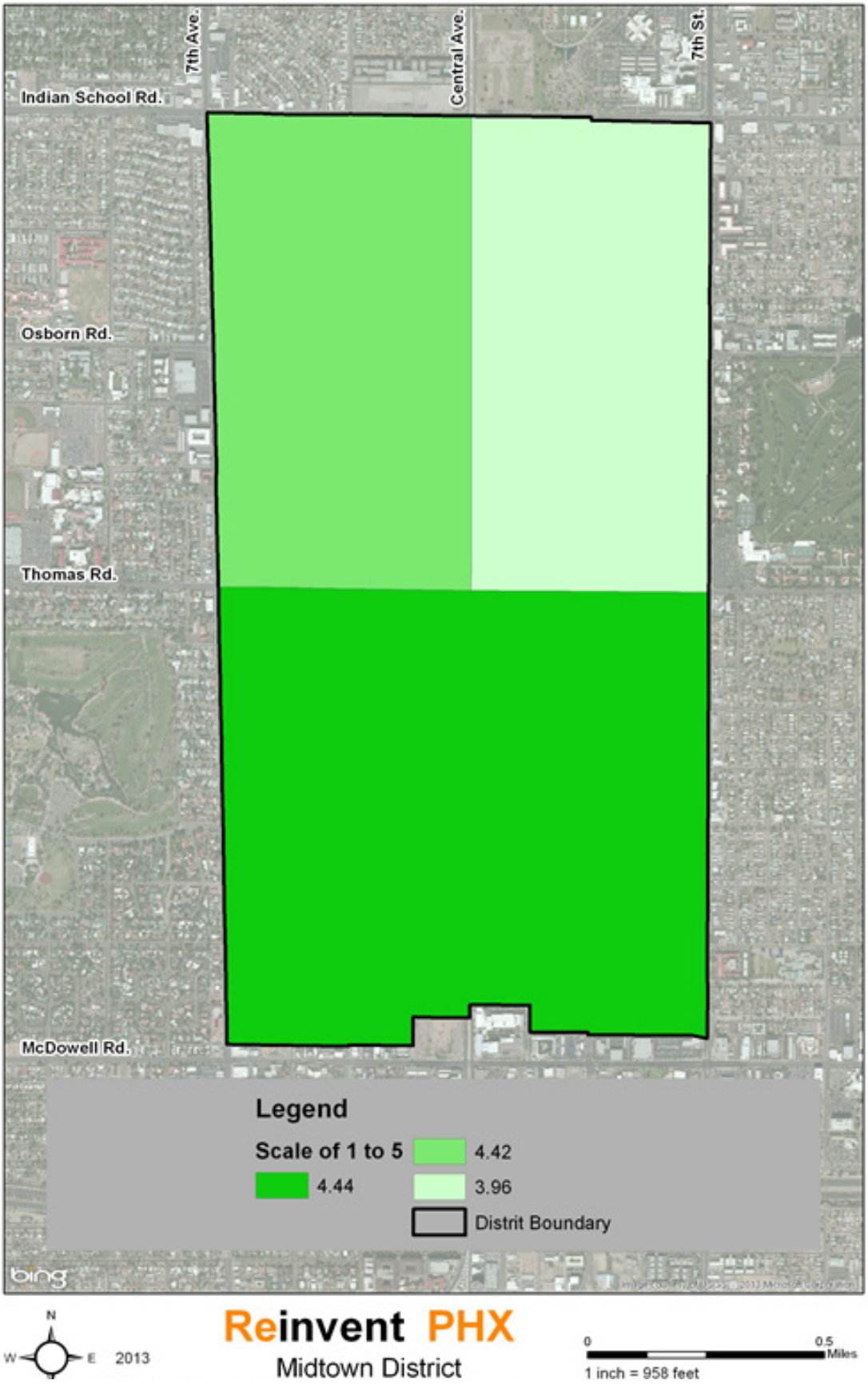
Current State Data

Fitness and basic amenities in Midtown have low distances-to-target and indicate proximity to their sustainability targets. Landscape quality well exceeds the sustainability target. Census data show that around 1.2% of units have no electricity or gas supply, meaning there is no air conditioning, heat, or working kitchen. Data for other indicators was not available. Figure 6 shows the distribution of fitness ratings throughout the District.

Assessment

Overall, housing quality and health in Midtown is near sustainable targets. Few housing units require fitness retrofitting and/or basic amenities, and some data was unattainable. Water use is sufficient for landscape quality.

Figure 3. Housing fitness ratings



4.3. Goal 3 – Current state of securing affordability of housing

Table 9. Indicators, targets, data, and assessment of housing affordability

Indicator	Importance	Current State Data	Confidence Level C. S. D.	Sustainability Target (Range)	Confidence Level T.	Distance-to-target	Assessment
Low-income housing cost burden	Med	88%	High	<0.1%[A]	High	88% / High	
Overcrowding							
(1—1.5/room)	High	0.8%	High	<2%[A]	High	Fulfilled (-1.2%)	
(>1.5/room)		1.0%	High	<0.1%[A]	High	0.9% / Low	
Affordability							
(Owned 80% AMI)	High	50%	High	>78.6%	High	28.6% / High	
(Rented 80% AMI)		88%		>78.6%	High	Fulfilled (9.4%)	
(Owned 50% AMI)		36%		>59.7%	High	23.7% / High	
(Rented 50% AMI)		54%		>59.7%	High	5.7% / Low	
(Owned 30% AMI)		31%		>36%	High	5% / Low	
(Rented 30% AMI)		13%		>36%	High	23% / High	
Housing costs	Low	26.8%	High	<30%[C]	Low	Fulfilled (-3.2%)	
Transportation costs	Med	21.9%	High	<15%[C]	Low	6.9% / Med	
Energy costs	Med	5.2—7.5%	Low	<6%[D]	Low	Fulfilled (-.08%)	

Notes and References:

A. Based on United States average overcrowding of 2.2% (2010 Census).

B. <0.1% is used where "zero" would be the ideal target.

C. Reinvent Phoenix Grant Benchmarks

D. District specific poverty rates

E. Center for Neighborhood Technology (2011)

F. Fisher & Colton (2013)

Current State Data

In Midtown, 88% of low-income residents are housing cost burdened. Overcrowding affects only 1.8% of District residents. Affordability data, except for renters at 80% of AMI, have distances-to-target ranging from 5%—28.6%. Housing costs are only 26.8% of income, but transportation costs nearly equal that at 22.9%.

Housing costs vary considerably between renters and homeowners, and among homeowners with and without mortgages (Table 10). Typical renters pay about $803/month, whereas typical owners with mortgages pay more than twice as much. Strikingly, 43% of District households spend over 30% of their income on housing costs, meaning they are housing cost burdened (detailed spatial distribution in Appendix). Residents also have high transportation costs, spending an average of 21.9% of their income on transportation, which is primarily for private automobiles. About 79% of households own at least one vehicle, 65% drive alone to work, and 10% carpool (more detail in the Appendix).

Table 10. Selected housing cost data

Indicator	Current
Percentage of HH with housing costs above 30% of income	43%
Percentage of residents below 50% of the poverty line Percentage of residents below 100% of the poverty line Percentage of residents below 200% of the poverty line	10% 17% 36%
Median annual household income Median annual household income (renter) Median annual household income (owner)	$43,925[A] $31,220 $59,792
Median monthly housing costs Median monthly housing costs (renter) Median monthly housing costs (owner)	$980 $803 $1,342
Median selected monthly costs for homes owned with a mortgage Median selected monthly costs for homes owned without a mortgage	$1,641 $494
Median value of an owner occupied unit	$219,004
Percentage of residents who are elderly (over 65 years old)	11.3%
Percentage of elderly HH spending >30% of income on housing (renter) Percentage of elderly HH spending >30% of income on housing (owner)	13.5% 21.4%

A. 73.5% of AMFI

Assessment

With 88% of low-income residents housing cost burdened, over 40% of households spending more than 30% of their income on housing, and average transportation costs nearing 22% of income, Midtown has serious housing affordability issues. Unfortunately, only renters making 80% of AMI have a sustainable level of housing available to them in the District. Transportation costs unaffordability is likely due to the prevalence of driving commutes (Appendix). For some households, energy costs are unaffordable as well, perhaps related to the lack of the use of renewable energy and energy-efficient appliances in homes.

However, for most households, housing size is appropriate for household size, as demonstrated by overcrowding rates that are near or meet sustainable thresholds. This is a strongpoint for the District and this housing diversity should be maintained in the future as development continues.

4.4. Goal 4 – Current state of conserving natural resources

Table 11. Indicators, targets, data, and assessment of environmental performance

Indicator	Impor-tance	Current State Data	Confidence Level C. S. D.	Sustainability Target (Range)	Confidence Level T.	Distance-to-target	Assessment
Water consumption	Med	153.4 GCD	High	<90 GCD[A]	Low	63.4 GCD / High	
Energy consumption	Med	NA	NA	NA	NA	NA	
Energy-efficiency	Med	NA	NA	>50%[B]	Med	NA	
Renewable energy	Low	<1%	Med	100%[B]	High	99% / High	
Reused materials	Low	NA	NA	>75%[B]	Med	NA	
Local[C] materials	Low	NA	NA	>25%[B]	Med	NA	
LEED certification	Low	Minimal	Med	>25%[B]	Med	~25%	

Notes and References:

A. 90by20.org (2013)

B. Authors' best estimates

C. Within a 50 mile radius

Current State Data

Environmental performance data are lacking in the Midtown District. The origins of building materials used for new construction are unattainable, as is data on the environmental performance of appliances and homes. We recommend that this data be collected in the future.

Assessment

In general, there is not enough information to assess the current state of housing in Midtown in terms of its environmental performance. However, for the data available, Midtown is far from sustainable in water consumption, renewable energy use, and LEED construction.

4.5. Goal 5 – Current state of maintaining valuable cultural and historical character

Table 12. Indicators, targets, data, and assessment of cultural preservation

Indicator	Importance	Current State Data	Confidence Level C. S. D.	Sustainability Target (Range)	Confidence Level T.	Distance-to-target	Assess ment
Neighborhood stability	High	21%	High	>20%[A]	Low	Fulfilled (1%)	
Historical character	Med	2.2%	High	>2%[A]	Med	Fulfilled (+0.2%)	
		33.9%	High	>20%[A]	Med	Fulfilled (+13.9%)	

Notes and References:

A. Authors' best estimates

Current State Data

More than a third of households have lived in Midtown for ten years or more. This points to community stability and resiliency. Historical protection of properties meets both sustainability targets.

Assessment

Cultural and historic character in Midtown meets sustainable targets.

4.6. Summary

We conclude this chapter with an overview table that summarizes all relevant information presented in detail above. Table 13 could be considered the checklist for Midtown's housing assessment.

Table 13. Summary table of indicators, importance, current state data, targets, and assessments

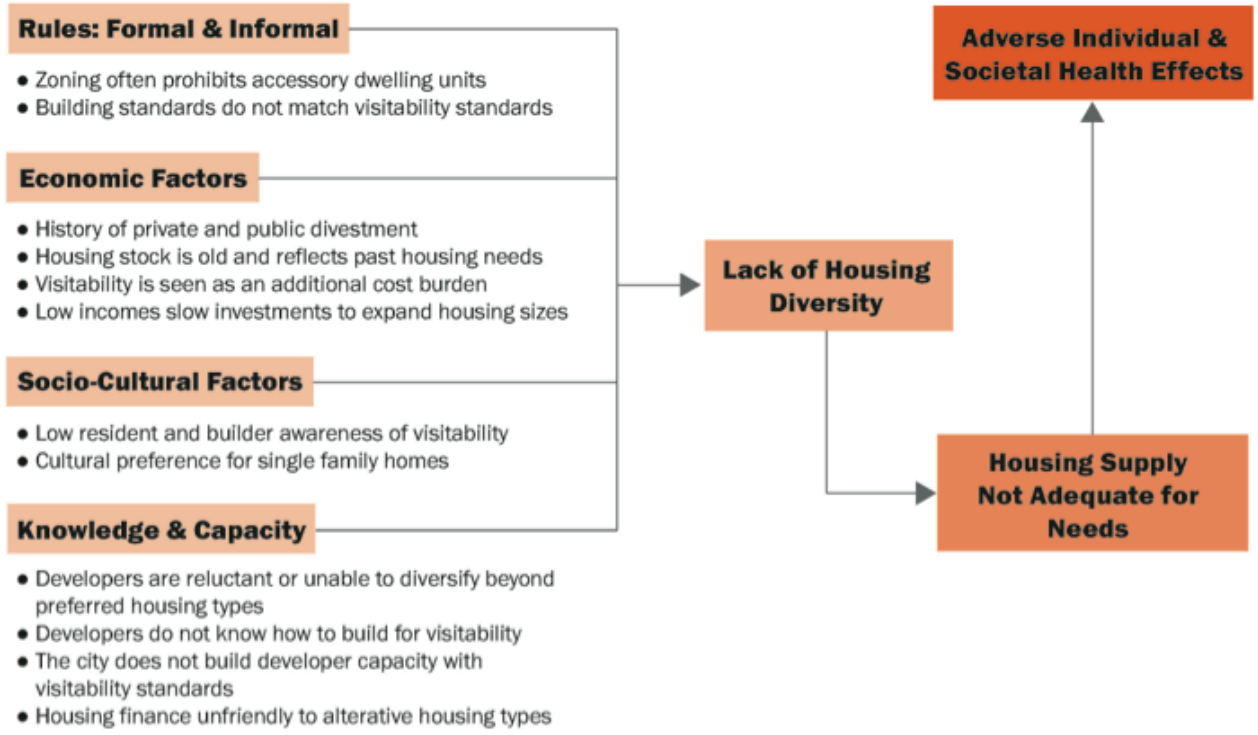
Indicator	Sustainability Target (Range)	Confidence Level T.	Current Data	Confidence Level C.D.	Distance-to-target	Assessment	Importance	Applies to
Goal 1 – Current state of meeting demand with adequate housing options								
Vacancy rate	>1.5 and <4%	High	11%	High	7% / High		High	All Dist.equally
	>6 and <10%	High	17%	High	7%/ High			
Options for elderly	+/- Equal distribution; currently: 8.4% (PHX)	High	6.0%	High	2.4% / Medium		High	All Dist.equally
Visitability	100%	High	15%	Low	85%		High	All Dist.equally
Goal 2 – Current state of providing sufficient quality of housing and promoting healthy housing conditions								
Basic amenities	<0.1%	High	2.6%	High	2.5% / High		Med	All Dist.equally
Fitness	4.5	High	3.4	Medium	1.1 / Medium		High	All Dist.equally
	<0.1%	High	6% (213 units)	Medium	5.9% / Low			
Landscape quality	>50 GD/HH	Medium	78 GD/HH	High	Fulfilled (+28 GD/ HH)		Med	All Dist.equally
Indoor air quality	<0.1%	High	Possible near M52	Medium	Significantly harmful to health		Med	All Dist.equally
Water quality	<0.1%	High	Minimal	Medium	Fulfilled		Low	All Dist.equally
Noise	<0.1%	High	ND	ND	ND		Low	All Dist.equally
Goal 3 – Current state of securing affordability of housing								
Overcrowding	<2%	High	10.2%	High	8.2% / High		High	All Dist.equally
	<0.1%	High	4.1%	High	4% / High			
Regional affordability	Owned: 100%	High	72% (50%)	High	28% (50%) / High		High	All Dist.equally
	Rented: 100%	High	97% (100%)	High	3% (0%) / Low			
District affordability	Owned: 80%	Medium	31%	High	49% / High		High	All Dist.equally
	Rented: 80%	Medium	34%	High	46% / High			
Poverty affordability		High	Owned: 32%	High	25% / High		High	District specific - according to poverty rate in District
		High	Rented: 50%	High	7% / Low			
		High	Owned: 12%	High	25% / High			
		High	Rented: 15%	High	22% / High			
Housing costs	<30%	Low	31.4%	High	1.4 % / Low		Low	All Dist.equally
Transportation costs	<15%	Low	22.1%	High	7.1% / High		Med	All Dist.equally
Energy costs	<6%	Low	6—19%	Low	0—13% / Medium		Med	All Dist.equally
Low-income housing cost burden	<0.1%	High	81.9%	High	81.9% / High		Med	All Dist.equally
Goal 4 – Current state of conserving natural resources								
Renewable energy	100%	High	<1%	Medium	99%		Low	All Dist.equally
Water consumption	<90 GPCD	Low	50 GPCD	High	Fulfilled (-40 GPCD)		Med	All Dist.equally
Reused materials	>75%	Medium	ND	ND	ND		Low	All Dist.equally
Local materials	>25%	Medium	ND	ND	ND		Low	All Dist.equally
LEED certification	>25%	Medium	Minimal	Medium	High		Low	All Dist.equally
Energy efficiency	>50%	Medium	ND	ND	ND		Med	All Dist.equally
Energy consumption	NA	ND	ND	ND	ND		Med	All Dist.equally
Goal 5 – Current state of maintaining valuable cultural and historical character								
Neighborhood stability	>20%	Low	24%	High	Fulfilled (+4%)		High	All Dist.equally
Historical character	>2%	Medium	2.4%	High	Fulfilled (+.4%)		Med	All Dist.equally
	>%20%	Medium	43.3%	High	Fulfilled (+23.3%)			

Chapter 5 – Housing Causal Problem Maps

In this chapter, we present the drivers (causal structures) for the problems identified in the sustainability assessment (Chapter 4). The problem maps are primarily defined through those performance indicators that do not meet their sustainability targets. All causal assumptions are based on expert input and scientific literature. Performance indicators themselves cannot be directly changed, because change requires addressing the upstream drivers of indicators. The causal problem maps identify those drivers, and thus they offer promising intervention points for strategies of change (Wiek et al., 2013).

5.1. Goal 1 – Problem map of meeting demand with adequate housing option

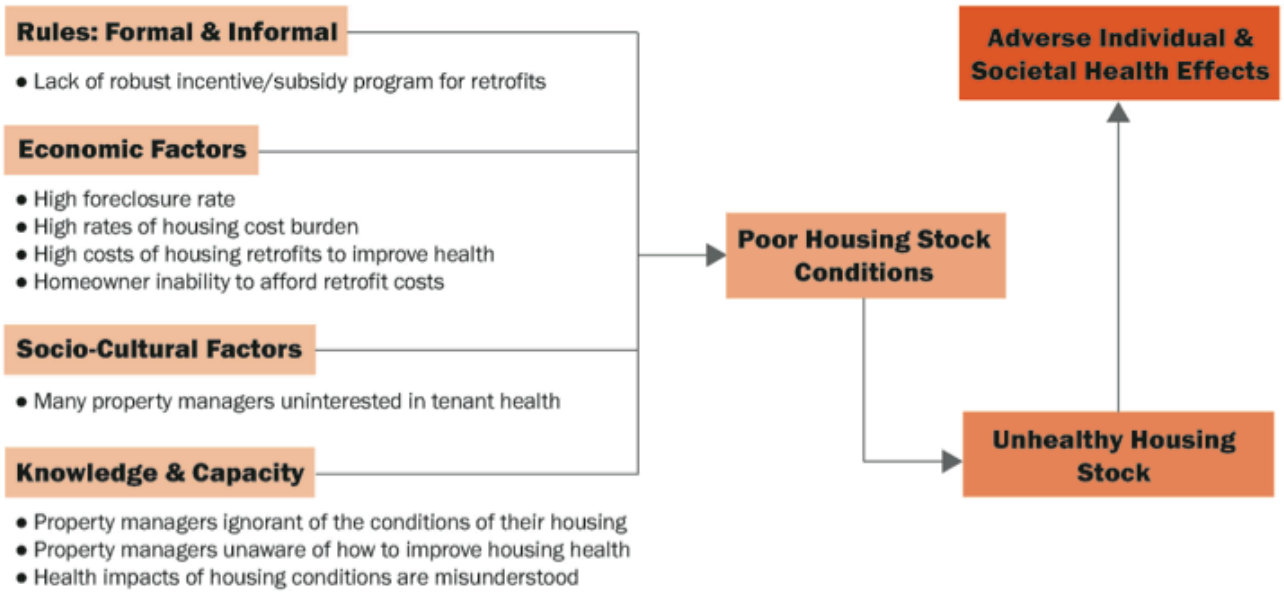
Figure 4. Housing adequacy causal problem map



This map illustrates that cultural preferences for single-family homes drive opposition to mixed-income, affordable housing. In concert, low public and private investment in adequate, affordable housing makes developers reluctant to diversify beyond status quo non-visitable and largely unaffordable housing. Low funding availability is worsened by low household economic capacity, developer knowledge gaps, and rules that fail to support the diversity of demand. Current zoning and the lack of visitability standards are some of those rules, and lead to housing inadequate and unaffordable for many Eastlake-Garfield residents. Families often find themselves overcrowded and emotionally burdened, dealing with noise pollution, poor air quality, and low to no visitability. Potential strategic intervention points include developer capacity building, retrofit programs to update housing for current needs, and new zoning for accessory dwelling units and visitability.

5.2. Goal 2 – Problem map of providing sufficient quality of housing and promoting healthy housing conditions

Figure 5. Housing quality and health causal problem map



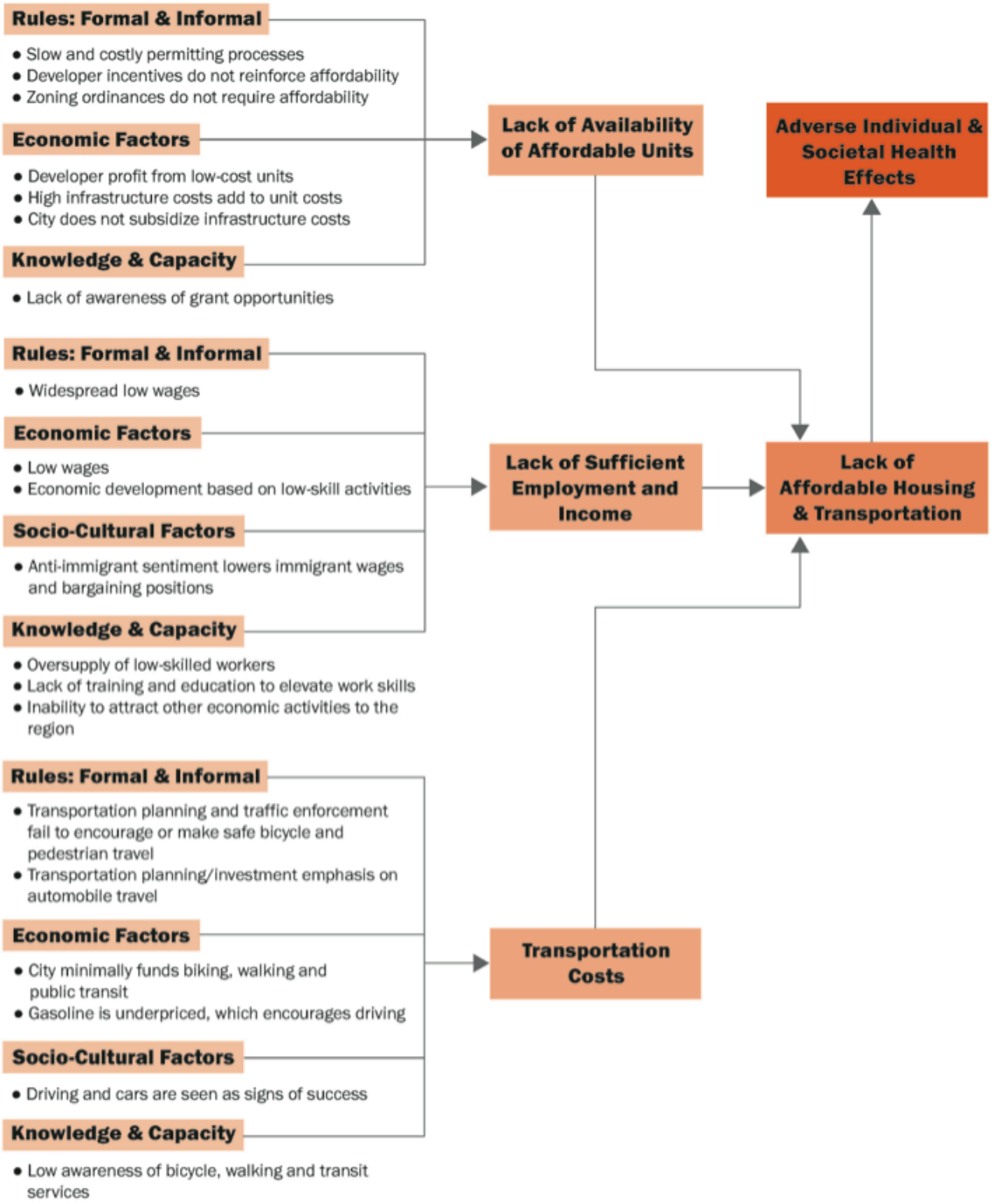
Absentee landlords, as well as high retrofit and housing cost burdens, prevent home maintenance and lead to low housing fitness with negative health impacts. With low knowledge and willingness, property managers lack incentives or accountability for improving the quality and health of housing in Eastlake-Garfield. In addition, foreclosures lead to abandoned properties that decline into disrepair, and reduce property values. Strategies to address quality and health of District housing will include better code enforcement, public assistance for retrofitting units to improve health, and outreach to improve knowledge and capacity about housing quality and health.

5.3. Goal 3 – Problem map of securing affordability of housing

Three main problem areas contribute to low housing affordability: availability, incomes, and transportation costs. A variety of complex cultural factors reinforce availability of affordable units, including zoning, permitting, and the culture of development. These issues are further complicated by higher profits from market-rate units, limited subsidies, and high infrastructure costs, which push developers away from low-cost unit development. Similarly, grants for affordable housing development are time consuming and not well publicized.

Economic and socio-cultural factors drive insufficient employment and income for residents to afford quality housing. Low wages and low-skill economic development perpetuate poverty, while weak job training and education keeps residents in low wage jobs, and unable to afford quality housing. Anti-immigrant sentiments only worsen these problems, making for lower wages and little chance for these populations to bargain for better income and benefits.

Figure 6. Housing affordability causal problem map

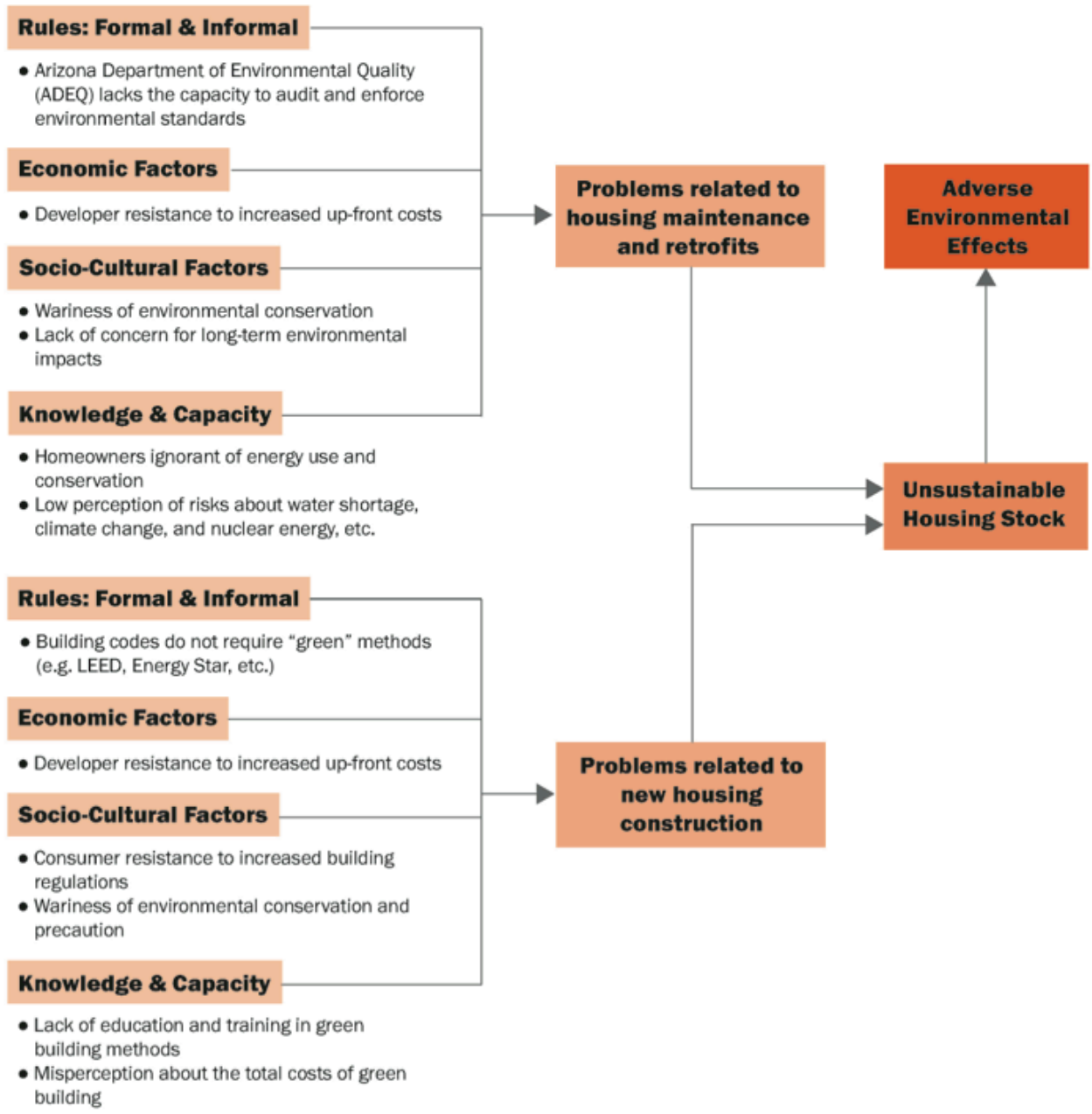


Finally, transportation costs have a major impact on housing affordability. These costs stem from infrastructure that fails to encourage transit use or pedestrian and bicyclist safety. The convenience and cultural normativity of driving, coupled with low awareness of alternate transportation, leads residents to depend on personal automobiles, which are seen as a sign of success.

Promising points of intervention in Eastlake-Garfield to increase housing affordability are requirements for affordability in new construction, better planning for housing near public transit, and reducing infrastructure costs for developers. Housing near transit incentivizes pedestrian and bicycle travel, helps lower transportation costs, and improves infrastructure efficiency. In addition, skill training programs and better employment opportunities in the District could drive economic development and help residents afford quality housing.

5.4. Goal 4 – Problem map of conserving natural resources

Figure 7. Conserving natural resources causal problem map

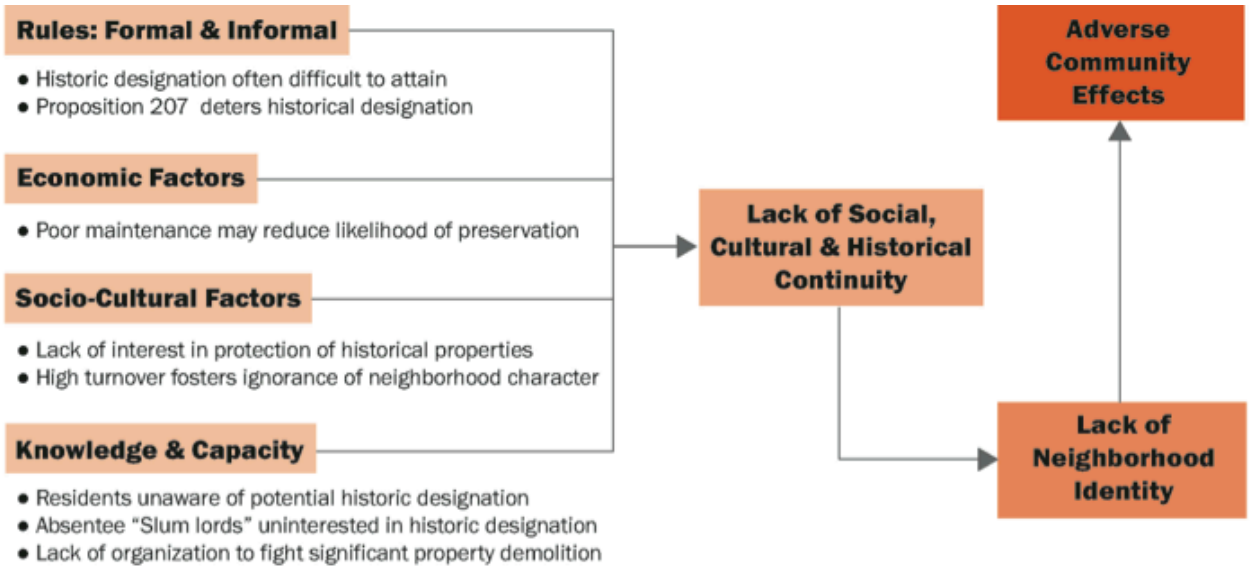


Housing should allow households to live comfortably with efficient energy and resource consumption. Resource inefficiency stems from unenforced environmental standards and the lack of subsidies for "green" retrofit and construction. Household and developer ignorance of energy costs and potential savings from "green" construction and retrofitting also drives inefficiencies and higher costs. Water and energy are underpriced, and residents do not connect their energy and water use to the effects that climate change and energy production have on the environment.

Developers are resistant to voluntary "green" standards (such as LEED or Energy Star) that have high upfront costs compared to conventional (non-"green") building codes. Additionally, residents and property managers often underestimate the long-term net savings of "green" building. Finally, the lack of "green" construction capacity building opportunities, and resistance to environmental precaution and new building regulations, combine to decrease resource conservation. Key points of intervention for resource conservation are stronger rules and codes for new construction, increased "green" building capacity and knowledge, and supplying subsidies and grants for energy efficient retrofits.

5.5. Goal 5 – Problem map of maintaining valuable cultural and historic character

Figure 8. Maintaining valuable cultural and historic character causal problem map



A neighborhood's culture and identity is in its buildings and homes. However, difficult historic designation processes and poor maintenance are barriers to preservation. Also, historical designation requires all property owners to sign zoning waivers for their neighborhood. This limits the development potential of properties, which in many cases, reduce property values. Many property owners are thus opposed to historical designation, and would be able to sue the city under Proposition 207 if property values decreased due to such a designation.

Expanding infrastructure that encourages personal vehicles, changes in employment opportunities, and high neighborhood turnover makes preservation of neighborhood culture and identity difficult. Low awareness of designation potential, lack of absentee landlord interest in designation, and weak neighborhood organization to combat demolition all degrade social, cultural and historic continuity. Promising areas of intervention to maintain neighborhood identity include better neighborhood organizations, improved community development tools, and increased awareness of iconic historic structures for preservation.

Chapter 6 – Discussion and Conclusions

6.1. Priority Areas

The current state of housing in the Eastlake-Garfield District is unsustainable across the majority of sustainable housing goals, particularly in providing adequate and affordable housing options for all residents that are of sufficient quality and conserve natural resources. Low incomes, in conjunction with high transportation costs, as well as inadequate housing subsidies result in overcrowding with adverse social and health impacts. In addition, vacancy rates for owner occupied units are above acceptable levels, and are very high for rental units. These factors drive property degradation and low historic preservation. "Green" construction is not observable, and its absence makes for high energy and water use.

In reviewing the results from the data-driven assessment, stakeholder inputs, and HUD's livability principles, there are two priority areas for the Eastlake-Garfield District to address in the process of achieving adequate, healthy, and affordable housing for all residents:

1. **Improve quality of housing and lower vacancy rates:** Eastlake-Garfield must ensure that all housing options increase their level of quality, which in return improves the value of units over time, avoids vacancy, strengthens neighborhood identity, and encourages connectivity between residents. The potentially negative impacts from industrial groundwater pollution and vapor intrusion are currently under investigation (ADEQ, 2013; EPA, 2013c). Better housing quality and healthfulness would make units more attractive to prospective residents and hopefully lower vacancy rates. The challenge of vacancy might not completely be mitigated by improved housing quality; more significant retrofitting or additional housing might be necessary to meet current and future housing demand with adequate housing options. Finally, quality improvements need to be made cautiously to avoid gentrification effects.

2. **Increase affordability and mitigate overcrowding driven by low incomes with high transportation and energy costs:** In Eastlake-Garfield, 10% of units suffer from overcrowding and 4% from severe overcrowding. This is in part due to very low income levels across the District. Although 72—97% of the housing stock is affordable for a family earning 80% of AMI, the average median income of Eastlake-Garfield residents is much lower, only 27.5% of AMI. This makes only 31—35% of District housing affordable to the average resident. There are other high-cost burdens for current Eastlake-Garfield residents, who spend over 20% of their income on transportation and 6—19% on energy, which is likely due to the prevalence of driving commutes and lack of renewable energy and energy-efficient technologies in homes. For many households, housing size and high costs result in rates of overcrowding and severe overcrowding that clearly surpass sustainable thresholds. While increasing affordability can be influenced by housing project, programs, and policies (including effective subsidies), the highest priority should be given to increasing income levels across the District. The persistently low income levels are directly or indirectly driving overcrowding, low housing quality, and vacancy rates. Yet, this priority area needs to be addressed in concert with other interventions, which primarily fall into the domains of economic development and education.

Though conserving natural resources and historical preservation also pose challenges and are prioritized by HUD (energy efficiency, LEED, etc.), stakeholder input prioritizes health (housing quality) and affordability above these challenges.

6.2. Promising Intervention Points

The aforementioned priority areas are best being addressed through three main interventions: new construction of multi-unit housing (adequate housing options, sufficient housing quality), rehabilitation (sufficient housing quality) and adaptive reuse (adequate housing options). All interventions need to be designed with special attentions paid to affordability of the housing options. These housing-specific intervention options need to be coordinated with more transformational interventions that directly address root causes for the pour housing situation, i.e., low income levels. The sustainability housing strategy report details the interventions and their coordination (Wiek et al., 2013).

6.3. Trade-Off Issues

Tradeoffs between assessment goals require additional interpretation of the assessment results. For example,

there are conflicts between water use, landscape quality, and energy use for cooling. Lower energy use is essential for natural resource conservation. However, to provide healthy and quality housing in a desert with high summer temperatures, housing units require cooling. Cooling consumes energy (air conditioning) and water (vegetation) in a trade-off with conservation. Additionally, the increase of energy costs for residents (owners and renters) reduces overall affordability of certain units.

Another trade-off exists between providing quality housing with high fitness levels and providing affordable housing. Older housing units require less upkeep, and are more affordable for residents. However, construction of new housing units and retrofitting of older units to meet sustainable fitness levels can compromise affordability with rising prices for both owners and renters. Similar concerns pertain to the investments necessary to achieve full compliance with ADA standards (visitability). This might have gentrification effects in the District.

Such tradeoffs will need to be explored further in the development of effective strategies for sustainable housing in Eastlake-Garfield (strategy report).

6.4. Improving Assessment Accuracy

More research is needed to provide evidence-based targets for indicators that operationalize the goals of sustainable housing. In concert, sufficient data to assess performance relative to those targets is also lacking in some areas. However, this rigorously arranged assessment, even with a few missing data and thresholds, sets the stage for research that fills gaps and results in comprehensive and robust housing assessments. Public agencies could support these efforts by collecting relevant data, making it accessible, and facilitating a better understanding of sustainability issues in housing. With evidence-based targets and sufficient data for sustainability assessments, interpretation of distances-to-target would be better linked to priorities expressed by researchers, stakeholders, and funding bodies

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Appendix

Housing and Population Density

Housing Types

Housing Examples

Housing Age

Overcrowding

Housing and Transportation Costs

Household Demographics

Zoning and Land Use

Historical Parcels

Affordable Housing Projects