Planning for Balanced Growth and Balanced Budgets: Exploring a Mixed Methods Framework to Assess Urban Infill Capacity and Value in Context

Jennifer Stromsten

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PLANNING FOR BALANCED GROWTH AND BALANCED BUDGETS: EXPLORING A MIXED METHODS FRAMEWORK TO ASSESS URBAN INFILL CAPACITY AND VALUE IN CONTEXT

A Thesis Presented

By

JENNIFER STROMSTEN

Submitted to the Graduate School of the University of Massachusetts in partial fulfillment of the requirements for the degree of

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PLANNING FOR BALANCED GROWTH AND BALANCED BUDGETS:
EXPLORING A MIXED METHODS FRAMEWORK TO ASSESS URBAN INFILL
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I am grateful for the love and patience of my husband and daughters. David, Vivian and Lucinda, thank you. Our friends, family and neighbors also deserve thanks for moral and logistical support.

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This research was inspired by a belief that one of this country’s greatest untapped resources lies within our historic towns, small cities and neighborhoods. Every person I met with affirmed this belief. It’s time to unleash that potential.
ABSTRACT

PLANNING FOR BALANCED GROWTH AND BALANCED BUDGETS: EXPLORING A MIXED METHODS FRAMEWORK TO ASSESS URBAN INFILL CAPACITY AND VALUE IN CONTEXT

MAY 2014

JENNIFER STROMSTEN, M.A., UNIVERSITY OF MASSACHUSETTS, AMHERST

Directed by: Professor Henry C. Renski

Established communities pursue revitalization to transform struggling downtowns into vibrant hubs and walkable neighborhoods. Vacant and underused parcels can help communities grow sustainably by using excess capacity in existing infrastructure. However, many communities experience limited urban infill activity due to persistent bias favoring low-density development at the community’s edges. In small communities perceptions and processes can favor low-density growth. Infill development can be complicated due to site conditions and neighborhood context, yet planners work with ad hoc techniques and limited staff time. There is a need for efficient ways to identify suitable sites and generate information to use for community decision-making around redevelopment.

The primary aim of this research is to develop an Urban Infill Assessment Framework (UIAF). It is organized around three questions: Can the framework assess infill’s potential in a small post-industrial downtown? Is it replicable? Does the framework change how local stakeholders perceive infill potential? To answer these
questions this study will develop and test a UIAF in Turners Falls, MA, then test resulting information through stakeholder interviews. The framework uses mixed-methods to integrate social values, fiscal efficiency, and spatial awareness through procedures organized in three Phases. Phase I examines quantitative and qualitative information (e.g., local planning documents, tax data, site visits, and consultations with local experts) to produce mapped context data, and local building typologies with corresponding tax yield per acre. In Phase II these components are used in scenario building, to calculate composite capacity of infill acreage and annual tax yield for defined areas. Finally, interviews with ten stakeholders test how the information influences perceptions of infill in Turners Falls.

As a result of this research, planners should be able to replicate the framework. Based on preliminary results, the relevance of an infill assessment tool to planning practice is threefold: It promotes strategic land-use planning by generating information to compare development projects across diverse locations, scales, and spatial configurations. It supports structured application of concepts uniquely suited to managing urban environments. Improved redevelopment tools and expertise can offset procedural and perceptual factors that favor low-density growth and sprawl.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>ix</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>1. INTRODUCTION AND RESEARCH DESIGN</td>
<td>1</td>
</tr>
<tr>
<td>2. LITERATURE REVIEW</td>
<td>20</td>
</tr>
<tr>
<td>3. METHODOLOGY</td>
<td>29</td>
</tr>
<tr>
<td>4. RESULTS</td>
<td>60</td>
</tr>
<tr>
<td>5. DISCUSSION AND CONCLUSION</td>
<td>104</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>123</td>
</tr>
<tr>
<td>A. IRB APPROVAL LETTER</td>
<td>123</td>
</tr>
<tr>
<td>B. BUILDING TYPOLOGIES FOR TURNERS FALLS</td>
<td>124</td>
</tr>
<tr>
<td>C. MAP OF TOTAL ASSESSED VALUES PER ACRE TURNERS FALLS</td>
<td>133</td>
</tr>
<tr>
<td>D. MAP OF TURNERS FALLS URBAN INFILL BOUNDARY</td>
<td>134</td>
</tr>
<tr>
<td>E. MAP OF IMPROVEMENT TO LAND (I/L) VALUES TURNERS FALLS</td>
<td>135</td>
</tr>
<tr>
<td>F. REPRODUCTIONS OF INTERVIEW MATERIALS</td>
<td>136</td>
</tr>
</tbody>
</table>
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Four Planning Stages for Urban Redevelopment</td>
<td>6</td>
</tr>
<tr>
<td>1.2 New Construction in Downtown Turners Falls Since 1999</td>
<td>18</td>
</tr>
<tr>
<td>3.1 Buildings Within Industrial Typologies with Sample Data Points</td>
<td>35</td>
</tr>
<tr>
<td>3.2 Scenarios Composite Capacity in Acreage and TYPA</td>
<td>55</td>
</tr>
<tr>
<td>4.1 The ten-step Urban Infill Assessment Framework</td>
<td>62</td>
</tr>
<tr>
<td>4.2 Scenario Areas with Total Acreage and Real Estate Values</td>
<td>83</td>
</tr>
<tr>
<td>4.3 Turners Falls Project Acreage: Study Scenarios and Existing Projects</td>
<td>84</td>
</tr>
<tr>
<td>4.4 Turners Fall Greenfield Development and Redevelopment Comparison</td>
<td>90</td>
</tr>
<tr>
<td>T5.1 Four Planning Stages</td>
<td>105</td>
</tr>
</tbody>
</table>
**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 and 1.2 Turners Fall Greenfields Development and Urban Infill Area</td>
<td>7</td>
</tr>
<tr>
<td>1.1 Turners Falls, Montague, Franklin County, Massachusetts</td>
<td>17</td>
</tr>
<tr>
<td>3.1: Sample Infill Sites Identified Using GIS</td>
<td>31</td>
</tr>
<tr>
<td>3.2: Property Tax Yield Per Acre by Development Type</td>
<td>32</td>
</tr>
<tr>
<td>3.3 Sample TYPA Range Within Residential Typologies</td>
<td>37</td>
</tr>
<tr>
<td>3.4: Sample TYPA Range Within Commercial Typologies</td>
<td>37</td>
</tr>
<tr>
<td>3.5 Map of Urban Infill Boundary Created for Turners Falls Study</td>
<td>41</td>
</tr>
<tr>
<td>3.6 Mapped Assets and Opportunities From Assessor's Data</td>
<td>44</td>
</tr>
<tr>
<td>3.7 Mapped Assets and Opportunities From Planning Documents</td>
<td>44</td>
</tr>
<tr>
<td>3.8 Mapped Opportunities From All Data Sources</td>
<td>45</td>
</tr>
<tr>
<td>3.9 Preliminary Scenario Areas Considered</td>
<td>45</td>
</tr>
<tr>
<td>3.10 and 3.11 Redevelopment Potential Avenue A and K Street Scenarios</td>
<td>46</td>
</tr>
<tr>
<td>3.12 First Avenue Scenario Area (view from behind Town Hall)</td>
<td>46</td>
</tr>
<tr>
<td>3.13 Final Scenario Sites (Left to right: Avenue A, K Street, First Avenue)</td>
<td>48</td>
</tr>
<tr>
<td>3.14 Nine Selected Building Forms Used in Scenario-Building with TYPA</td>
<td>51</td>
</tr>
<tr>
<td>3.15 Sample Map with Red Transect Line from K Street Scenario</td>
<td>51</td>
</tr>
<tr>
<td>3.16: Sample Map with Parcels Categorized from First Avenue Scenario</td>
<td>54</td>
</tr>
<tr>
<td>3.17 Side 1 Scenario Card for Avenue A</td>
<td>57</td>
</tr>
<tr>
<td>3.18 Side 2 scenario card for Avenue A</td>
<td>58</td>
</tr>
<tr>
<td>4.1 Tax Yield Per Acre for Turners Falls Residential Typologies</td>
<td>68</td>
</tr>
<tr>
<td>4.2 and 4.3 Residential and Commercial Redevelopment Potential</td>
<td>82</td>
</tr>
<tr>
<td>5.2 Turners Falls Interviewee #1 First and Second Map Drawings</td>
<td>106</td>
</tr>
</tbody>
</table>
CHAPTER 1
INTRODUCTION AND RESEARCH DESIGN

1.1 Introduction and Background

Massachusetts has dozens of historic village centers, towns and small cities that
never fully recovered from a shift towards auto-centric development. Some
municipalities have brought their urban areas back to life. But in many places massive
effort and investment have only resulted in modest progress, particularly where weak
real estate values or slow regional economy are a factor. The struggle is repeated
nationwide in former industrial towns and faded rural service centers.

This research addresses a need for planning methods to promote urban
redevelopment in smaller municipalities. The goal is to provide a tool to advance
sustainable redevelopment and revitalization of small-scale urban areas. In order to do
so, I first create a hypothetical framework based on adapted methods and conceptual
grounds. Then I test it in Turners Falls, MA, a former mill town with a strong
commitment to revitalizing its historic urban center. The result of this research is a
refined set of procedures based on adaptations from that testing; a 10-step Urban Infill
Assessment Framework to help planners realize infill goals for small-scale urban areas.
The overall purpose of this research is to create information that can promote
redevelopment by overcoming practical barriers of measurement, and conceptual
barriers of bias by changing how infill is viewed. Therefore, in order to observe the
effects of new information about urban redevelopment potential, I conduct interviews
with local stakeholders in Turners Falls.

The Urban Infill Assessment Framework is directed towards new infill
construction on vacant parcels and underutilized parcels. It uses qualitative and
quantitative methods to incorporate information specific to each locale. Insights and
recommendations based on applying the framework in Turners Falls are presented
along with and broader findings from the research. This documentation provides
sufficient detail to replicate the framework for future research and practice.

1.1.1 History and Context

During the second half of the twentieth century, suburban expansion was
accompanied by disinvestment from cities across the United States. An increasing share
of new infrastructure, services and investment moved outwards from urban centers.
Similar patterns and trends emerged not just around major cities, but also around small
towns and cities, leading to low-density and fragmented sprawl at multiple scales.

In Massachusetts, efforts to reverse this land use trend and its destructive
effects on farmlands, forest and open space led to growth management and “Smart
Growth” (Flint, 2011). While encouraging more efficient use of land in new development,
Smart Growth techniques also contributed knowledge about how to redevelop existing
communities (Massachusetts EOEEA, 2002). Redevelopment has been vigorous in the
Boston area where strong economic activity and demand for real estate supports infill.
Examples of rebounding urban centers, villages, and historic neighborhoods can be found across the state, their recipes for success as varied as their historic facades. Efforts to revitalize the state’s 24 smaller “Gateway” cities have applied a variety of strategies to promote urban infill (MassInc, 2013). But progress has been slow in many small cities and towns. Mixed results point to a need for tools and techniques, especially as lingering recession dampens hopes of market-driven revitalization.

Responding to a nation-wide concern about sluggish urban revitalization, a recent report compiles concepts and techniques into an approach called “Strategic Incrementalism” (Mallach and Brachman, 2013). It emphasizes the importance of using every opportunity, including daily decisions, affecting all facets of the urban environment, to make small steps towards large goals. To identify and seize opportunities, even when big solutions are not at hand, planners need the right information to strategically guide routine decisions.

Despite strong demand for the benefits that come from urban densities - transportation, walkability and affordability - outward growth continues. Local construction and planning expertise, real estate industry, zoning bylaws, infrastructure subsidies, and permitting processes can favor sprawl (Elliott, 2008; Leinberger, 2007). A structural bias against infill may be self-perpetuating, with weak knowledge of infill techniques creating an additional barrier for infill projects. Communities striving to add density must take extra steps to overcome barriers, but can lack resources to do so.
The U.S. population increasingly resides within sprawling metropolitan regions. Significant attention is focused on adapting cities and retrofitting sprawl in response to changing demand and demographics (Brookings, 2010). Cities continue to struggle with poverty and homelessness, and now suburbs do as well (Kneebone and Berube, 2013). A failure to help redevelopment in small cities and towns on a large scale may be accentuating migration towards cities and suburbs as people seek housing, services and jobs. This phenomenon inevitably drives demand for already unaffordable resources like workforce housing, leading to more sprawl as households struggle to meet their needs given their own limited resources. Using existing infrastructure and social capital more efficiently by adding density and amenities in small urban places can meet resident needs. In this context, a revitalized historic downtown can be seen as a potential regional asset, in addition to the localized benefit of attracting reinvestment.

1.1.2 Gaps Addressed by this Research

A small municipality may pursue infill to reduce development pressure on farmland, provide walkable neighborhoods for residents to age in place, create a transportation hub, and attract reinvestment to historic neighborhoods. To accomplish redevelopment goals, they draw on planning and design knowledge about how to create high-quality density. But in many places, planning for density has not produced density.

This research addresses the need to move successfully from plan to action, to go from articulating a need for infill to achieving specific goals. The authors of a state-wide
infill assessment for California identified this gap in local planning practice as a fundamental problem, finding that “for all the rhetoric and public policy interest, pro-infill development policies remain surprisingly ad hoc” and that “few municipalities have undertaken the background work to systematically understand potential infill development opportunities or the barriers to meeting them” (Landis et al, 2006, p 682; Ibid, p 684). Researchers focused on the post-industrial cities of America’s rust belt analyzed case studies to devise a holistic approach to sustainable planning, but also found few models to follow (Schilling and Vasudevan, 2013, p 245). To advance from “ad hoc” policies towards comprehensive practices, this study assembles concepts and methods specially suited to assessing urban redevelopment potential into a framework to bridge the gap between theory and practice.

In practice, redevelopment is more discursive than linear. But Table 1.1 presents it in four phases to illustrate how assessment, the focus of this research, fits within the overall process. First must come planning goals for the urban area (Fulton, 2001; Farris, 2001). Next, assessment identifies the capacity and value needed to meet those goals (Urban 3, 2013; Landis et al, 2006; McHarg, 2006). Decision-making determines a match between goals and capacity, or how and where can the best outcomes be achieved (Idaho Smart Growth and Urban Land Institute, 2013). Finally, step four involves site-preparation, to address barriers and achieve best outcomes (Fulton, 2001; Farris, 2001).

This research identifies ‘assessment’ as an area of acute weakness and outlines a process to improve measurement and comparison. Whether to conduct redevelopment,
how and why, should be a function of local goals. But information can improve decision-making; thus, resources can be directed at the final, critical step of site preparation.

**Table 1.1** Four Planning Stages for Urban Redevelopment

| GOALS: e.g. Vibrant downtown; walkable; less sprawl; population density to support public transit, local shops; re-use infrastructure. | ASSESSMENT: Assess spatial capacity, economic and social value; build scenarios to identify and explore urban infill potential. | DECISION-MAKING: Compare options in light of goals, weigh barriers and benefits, prioritize area(s) for site-preparation. | SITE-PREPARATION: Resolve specific barriers, prepare detailed plans and studies, attract public and/or private investment. |

Instances of successful urban revitalization have produced research and expertise about the benefits and barriers to downtown redevelopment (Idaho SmartGrowth and ULI, 2010; Ibid, no date). Even in high-value urban markets, site preparation is necessary to reduce the complexity of redevelopment projects and attract development (Farris, 2001; Fulton, 2001; Calthorpe and Fulton, 2001). Demolition, site-assembly, pre-permitting, and public-private financial partnerships are some strategies to reduce uncertainty.

Urban areas within small municipalities face the same challenges as large cities, along with unique disadvantages like reduced profit potential from fewer building sites and the height limits needed to preserve character. Also, weakened market demand from low regional population and incomes, and lower land values may be factors. It can be hard to justify allocating limited staff and technical capacity to promote redevelopment when, ironically, that extra work is most needed (Chapman, 2008). Small planning offices need to minimize resources needed for redevelopment. A framework
for assessment can reduce time and effort needed to move from goal-setting to decision-making, thereby reducing structural barriers to infill and balanced growth.

**Figures 1.1 and 1.2** Turners Fall Greenfields Development and Urban Infill Area

(Montague, 2012)

In addition to improving redevelopment process, infill-specific assessment addresses an information gap that has reinforced structural and cultural bias towards low-density and greenfields development. At a town-wide scale, zoning, permitting and infrastructure costing that favor sprawl can be fixed. Techniques like form-based code and design guidelines promote high-quality infill development to enhance community character and support property values. Whether these practices have led to more infill, or just more attractive infill, they appear to reduce objections to density (Litman, 2012). But decades of knowledge and experience in low-density growth have shaped the processes and outcomes that are best understood by local planning stakeholders. Weak infill knowledge and technique means outward growth may continue even where inward growth is a stated priority. This research argues that processes and information for urban infill can help to balance local expertise.
1.2 Research Goals, Questions and Objectives

1.2.1 Research Goals

In downtowns and village centers, dispersed parcels or variations in permitted height and density make it difficult to measure how much untapped potential is contained within a block, neighborhood, or any defined redevelopment target area. In contrast, the acreage, and potential tax revenue of a vacant and open field is relatively simple to calculate based on parcel data and simple build-out projections. Uneven information results in a development bias against infill. The research seeks to correct this measurement bias by creating a framework to assess urban infill, one that can measure spatial and fiscal capacity for complex redevelopment areas. The primary goal is for infill assessment that can reframe the view of urban redevelopment.

In a hypothetical scenario, a developer wants to build 100 residential units. A map of ‘developable land’ from the Open Space and Recreation Plan, or a call to local real estate agents, reveals large sites and available land. But a comparable inventory of developable infill parcels is uncommon, absent a detailed urban renewal or downtown master plan. Clear infill-related planning goals and a developer willing to work downtown may not suffice to translate redevelopment goals into action. Following the planner’s credo to ‘make the good things easy and the bad things hard,’ urban infill assessment can produce basic information about spatial and fiscal capacity to ensure complex urban areas were not overlooked for a lack of critical information.
1.2.2 Research Questions

To study whether an Urban Infill Assessment Framework change how redevelopment potential is perceived, three research questions guided creation and testing, adaptation and evaluation, and deployment of UIAF information for decision-making; Can the UIAF assess infill’s potential in a small post-industrial downtown? Is the framework a replicable method for planners to use in other communities? Does information generated by the framework change how local stakeholders perceive infill’s potential impact on municipal revenue and community development?

Addressing the first question “Can the UIAF assess infill’s potential in a small post-industrial downtown?” requires first determining what the framework should assess, and how. This study begins with research into methods and concepts uniquely suited to infill in order to create the Urban Infill Assessment Framework. Further questions about specific quantitative infill measurement techniques helped to select and refine methodology: What metrics convey the benefits and strengths of density and infill? Which methods are appropriate to small-scale urban environments? Additional research questions pertain to qualitative steps within the measurement methodology, and how the procedures come together in a framework: What is important to assess and measure, and why? How can measurement overcome or offset the spatial complexity of dispersed parcels? Are these methods replicable by low-resource planning offices? How can distinct techniques become steps within framework to yield simple, locally relevant, capacity and revenue data?
The second research question asks “Is the UIAF framework a replicable method for planners to use in other communities?” It guides framework testing in Turners Falls. This is necessary to validate and improve the framework in order to produce the study’s main result; a ten-step Urban Infill Assessment Framework for use by planners. A subset of questions structures evaluation of its efficacy and transferability in terms of three types of planning processes:

- How does the information improve decision-making? (The periodic activity of stakeholders, including municipal employees, board members, voters, residents, workers and business-owners, to guide investment and shape regulation).
- How does urban infill assessment information promote strategic planning? (Periodic assessments to accomplish big goals or make big decisions, usually involving a published study or sub-plan, often engaging outside expertise, involving significant investment and dramatic physical outcomes).
- How does the information support incremental practices? (The daily work of planners, ongoing analysis within a complex data environment, and integration of subjective and objective information).

Finally, ten stakeholder interviews are conducted to see whether information generated by the framework changes how local stakeholders perceive infill’s potential. If poor information is impeding urban infill, can generating information about capacity remove this impediment? Interview questions elicit information about the where do
stakeholders perceive existing redevelopment potential in the downtown area, and whether assessment information changes perceptions of infill potential.

Interviews are included to simulate how assessment might inform decision-making. Successful decision-making for sustainable development requires incorporating local values at every step, using locally-relevant subjective and objective information (Montenegro-Menezes, 2014(a), 2014(b)). Two final research questions are used to evaluate the interviews and the framework’s success in bridging the assessment gap between goal-setting and decision-making: Does the assessment information translate well for use by varied stakeholders? Does the information reflect local social values? To reframe the view of redevelopment, assessment needs strike a balance; reducing spatial and fiscal complexity, while reflecting the social complexity that creates urban vibrancy.

1.2.3 Objectives

Existing conditions, regulations and processes can make it harder to build downtown than anywhere else. The objective of this research is to make infill easier to realize by: (A) Generating fiscal and spatial metrics that facilitate comparison of potential development regardless of variability in location, scale or spatial characteristics, and (B) Generating scenarios to compare redevelopment options that are grounded in existing neighborhood character and social values.

Capacity and revenue data from the framework enable comparison across projects of varied scale and complexity. This, in turn, can improve land-use planning by
facilitating decision-making that produces actions to advance stated planning goals, regardless of variability in project location, size or site characteristics.

1.3 Scope

1.3.1 Delimitations and Limitations

Growth management and policies that promote higher density or subsidize sprawl have regional and national economic implications that are beyond the scope of this thesis (Downs, 2004). The framework was created for a municipality that has, through its own planning processes, identified an unmet need for infill. I focus exclusively on an urbanized area within a small municipality. This research does not ask whether density can be good for larger real estate markets, entire communities, or even specific neighborhoods.

This research also does not address specific barriers to infill, except to use measurement to put them in perspective. Barriers seem greater when benefits are underestimated. By measuring what is lost through inaction, scenarios confront a conceptual barrier arising from a perceived lack of value. In the past, a similar bias has tended to overemphasize the very real impediments to redeveloping brownfields without equal attention to the many potential benefits. Today it is common for communities to see an old factory as an opportunity, not a permanent problem. Funding and regulations have evolved alongside attitudes. Towns can do more to be ready to take advantage of new opportunities.
Finally, while focused on new infill construction, this work is intended to complement other important redevelopment techniques like brownfields, adaptive reuse, and historic preservation. If done well, all forms of redevelopment are mutually reinforcing. Assessment is proposed as a means to bring redevelopment on equal footing with other development projects, balancing inward with outward growth.

A great deal of data mapping and analysis were conducted using the proprietary ArcGIS Geographic Systems Software. Many smaller planning agencies and communities may not have access to or staff expertise in this software, presenting a practical barrier to implementation. However, most of the analytical methods used in this framework can be replicated with free software and public data sources. The proliferation of online mapping tools and evolving skill set of planning practitioners suggests possible convergence between technical ability and resources.

Due to time constraints most data came from electronically published planning documents and online mapping data, augmented by consultation with municipal employees. The “Methodology” chapter provides more detail on data limitations.

1.3.2 Assumptions

The study assumes redevelopment has many benefits that make it worth overcoming obstacles. The highlighted benefit is fiscal, based on the idea of the downtown as an “efficient generator of tax revenue” (Sonoran Institute and Urban3, 2012). In many cases we can expect lower infrastructure costs for projects that use
existing infrastructure and higher densities (Leinberger, 2008; Stanley, 2013; Calthorpe and Fulton, 2001). The report *Building Better Budgets: A National Examination of the Fiscal Benefits of Smart Growth Development* underscores the relationship between low-density development and over-stretched local budgets, touting infill development as a solution by generating revenue to upgrade and maintain existing infrastructure and services (Smart Growth America, 2013). In Massachusetts this has special significance since “Proposition 2 1/2” limits property tax increases, so budget growth relies heavily on finding new revenue sources.

It is assumed here that cost-based analysis and engineering studies will continue to be too cumbersome and expensive for use in preliminary assessment. Omitting direct consideration of costs limits the framework’s usefulness for detailed project planning. In practice, infill goal-setting and preliminary site discussions should at least incorporate awareness of local resource thresholds that might have major cost implications like school capacity, drinking water, and wastewater treatment (Kotval and Mullin, 2009).

A final assumption upon which this research is predicated is that there are persistent biases against infill built into routine planning practices, biases that need to be corrected. First is the legacy of Euclidean zoning and how auto-oriented, single-use planning continues to shape landscapes and expectations. Second, is a reliance on construction data and planning metrics developed for low-density growth. Finally, the tendency to focus on large parcels reveals to an unquestioned assumption that more
coterminous acreage translates directly to greater social and fiscal value. These biases are further explored in the literature review.

1.4 Research Outline

The Urban Infill Assessment Framework was developed around two core quantitative methods: parcel data analysis using Geographic Information Systems (GIS) and secondary analysis of tax assessor’s data. Two techniques were selected because they have been successfully used to measure spatially complex urban infill areas, and use mixed-methods processes to create contextualized information. The Literature Review and Methodology chapters outline the quantitative and qualitative techniques, and core concepts used to create the framework and apply it in Turners Falls.

This research proceeds in three phases. Phase I assesses context and creates the building blocks for measurement. It employs documentary analysis, GIS analysis of local parcel data layers, secondary analysis of local tax data, direct observation and expert consultation. The Phase I outputs are a defined urban infill area, an inventory of parcels for redevelopment, mapped local assets and opportunities, and a range of building typologies with tax revenue data for individual buildings. Phase II uses Phase I outputs to create hypothetical redevelopment scenarios for which spatial and fiscal revenue can be calculated. It begins with a process to identify scenario boundaries, and infill parcels within those boundaries, using qualitative and quantitative assessment considering spatial, fiscal, and social factors. The ‘building blocks’ (e.g. typologies and tax data) are
then used to generate composite capacity and tax revenue information for scenario areas. The results are spatially complex redevelopment scenarios for which potential is expressed using two simple metrics for composite capacity and tax yield per acre. The tested and refined 10-step framework is the result, a tool for planners to use to assess urban infill potential.

Phase III uses the assessment information in meetings with ten local stakeholders who reviewed the scenario information. They provided feedback through semi-structured interviews that simulated a decision-making process where the framework information would be used. Questions are designed to assess whether the new information about capacity and revenue is easy to grasp, facilitates comparison, and reduces bias against spatially complex urban infill areas.

1.5 Site Selection: Turners Falls, Massachusetts

Size and character were important for site selection. With a mixed-methods approach, my own direct knowledge of the study site was an important factor. The target site needed to feature a discernible area of village or downtown density with accompanying assets like a charming main street, walkable neighborhoods, or historic mixed-use buildings. Above all, the site needed to have a demonstrated commitment to urban infill and redevelopment, and the capacity for urban growth. Walter Ramsey, Montague’s Town Planner, supported this research by providing expertise and insight.
Turners Falls is located in Franklin County, in the northern Pioneer Valley of western Massachusetts. It is one of five villages in the town of Montague. Nearly half of the Montague’s 8,489 residents live within the Turners Falls Census Designated Place (CDP) which features a substantially preserved historic main street, solid residential neighborhoods, and outlying areas with suburban and rural character (US Census, 2010(a)). Once teeming with manufacturing and commercial activity, mill closings devastated this community. Downtown revitalization has been steady, but slow. Examples include low-income apartments created through adaptive reuse of historic buildings, excellent recreational amenities in its public parks and canalside paths, and sustained efforts to repurpose disused mills. Substantial public and private efforts have not offset a weak real estate market, legacy of disinvestment and limited local resources.

Figure 1.1 Turners Falls Census Designate Place (CDP), Town of Montague
Since the mid twentieth century the trend has been to grow outwards from the urban center. Market-rate residential construction occurs mainly in surrounding suburban and rural areas. The same is true for municipal facilities, educational institutions and industrial development. Since 1999, only ten new buildings have been constructed in the downtown (see table 1.2). This growth aligns with the town’s infill goals, evenly split between commercial development and owner-occupied residences. But the pace is disappointing.

Table 1.2 New Construction in Downtown Turners Falls Since 1999

<table>
<thead>
<tr>
<th>Year Built</th>
<th>Use</th>
<th>Stories</th>
<th>Parcel Acres</th>
<th>Total Assessed Value</th>
<th>Tax Yield Per Acre (TYPYA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>Convenience Store</td>
<td>1</td>
<td>0.35</td>
<td>$532,600</td>
<td>$38,819</td>
</tr>
<tr>
<td>2001</td>
<td>Convenience Store</td>
<td>1</td>
<td>0.63</td>
<td>$561,700</td>
<td>$22,744</td>
</tr>
<tr>
<td>2009</td>
<td>Bank</td>
<td>1</td>
<td>1.99</td>
<td>$1,417,300</td>
<td>$18,169</td>
</tr>
<tr>
<td>2002</td>
<td>Warehouse</td>
<td>1</td>
<td>0.75</td>
<td>$307,700</td>
<td>$10,466</td>
</tr>
<tr>
<td>2004</td>
<td>Car wash</td>
<td>1</td>
<td>0.75</td>
<td>$216,500</td>
<td>$7,364</td>
</tr>
<tr>
<td>2007</td>
<td>Residential - owner occupied</td>
<td>2</td>
<td>0.06</td>
<td>$147,200</td>
<td>$41,805</td>
</tr>
<tr>
<td>2006</td>
<td>Residential - owner occupied</td>
<td>2</td>
<td>0.07</td>
<td>$131,200</td>
<td>$31,938</td>
</tr>
<tr>
<td>2002</td>
<td>Residential - owner occupied</td>
<td>1</td>
<td>0.25</td>
<td>$209,700</td>
<td>$14,293</td>
</tr>
<tr>
<td>2001</td>
<td>Residential - owner occupied</td>
<td>1</td>
<td>0.25</td>
<td>$201,500</td>
<td>$13,734</td>
</tr>
<tr>
<td>2002</td>
<td>Residential - owner occupied</td>
<td>2</td>
<td>0.17</td>
<td>$103,400</td>
<td>$10,364</td>
</tr>
</tbody>
</table>

The Turner Falls downtown includes diverse development forms: historic main street buildings, mills ranging from ruin to active use, distinct residential neighborhoods with varying housing density, strip malls, brownfields, and extensive recreational facilities with direct access to open spaces. New construction has been low-density, and sometimes low quality. In Turners Falls, an abundance of parking, pavement, and storage buildings and underused buildings are interspersed with evidence of major
reinvestment. A variety of building forms, uses and zoning, and the dispersed nature of vacant parcels creates the kind of spatial complexity that stymies redevelopment. There is a sense of potential, though it is difficult to grasp.

1.5 Wayfinding

The next chapter provides further background on barriers to infill, as well as sources for concepts and methods used to develop and test the urban infill assessment framework. The “Methods” chapter described the framework as it was created and applied in Turners Falls. The “Results” chapter describes findings and feedback based on testing the validity of each procedure. Since the main result is an improved framework articulated in ten defined steps for planners to use, descriptions include key insights and recommendations for further adaptations and improvement. Key findings are presented at the end of the Results chapter. The final chapter addresses how information resulting from the framework can be used, examines the issue of the framework’s transferability, and presents recommendations for future research. It concludes with insights from the process of creating, adapting and testing the Urban Infill Assessment Framework.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to provide supporting knowledge for the main research questions: Can the Urban Infill Assessment Framework assess infill’s potential in a small post-industrial downtown? Is it a replicable method for other planners? Does the information generated change how local stakeholders perceive infill’s potential? First, I discuss the need to change negative perceptions of urban redevelopment. Then, I review land use practices that shape local conditions by favoring low-density and outward growth in communities like Turners Falls, MA. I present practices uniquely suited to infill, selected to create the framework. Their underlying concepts, along with other important redevelopment concepts, are presented. These were essential for testing and evaluation, and ultimately to the research findings.

2.2 Changing Visions of Good Growth: Urban Renewal, Sprawl, Density and Infill

America’s burgeoning mid-century suburbs evoked concern about high infrastructure costs and negative environmental impacts from sprawl (Real Estate Research Corporation, 1974). New Haven’s decline into urban blight epitomized how investment in highway infrastructure drove development into the countryside, aided by Federal Housing Authority policies excluding urban areas from mortgage financing and
investment (Rae, 2003). The failure of cities became inevitable as the practice of “planned abandonment” guided by “urban life-cycle theory” culminated in blight, demolition and urban renewal (Metzger, 2000). Jane Jacobs famously challenged urban renewal practices, and the accompanying devaluation of the urban forms intrinsically bound up with the social value of neighborhoods (1961). The roots of sprawl run deep, affecting policies, funding and attitudes towards urban infill.

Responding to rapid loss of open space and disinvestment from urban neighborhoods, the idea of ‘Growing Smart’ took shape in Massachusetts during the 1980s and continues to guide land use planning (Flint, 2011; Massachusetts, 2013). Planning practices supporting sustainable development evolved alongside design techniques to create high-quality, higher-density development (Roseland, 1998; Arendt, 1999 APA report; Calthorpe and Fulton, 2001; Condon, 2007). Benefits from increased density and mixed-use zoning, like walkable neighborhoods and transit-connectedness, have been substantially demonstrated and documented through case study and research from a wide range of disciplines.

Bias against infill stem from negative impacts of density, both real and perceived. The measures used to identify and codify ideal densities during the era of outward growth, like dwelling unit per acre and population density, expressed a desire to limit density and preserve suburban character (Churchman, 1999). Alternative models to low-density development have been developed to mitigate sprawl, and helped demonstrate density’s benefits for conservation and costs (Forsyth, 2002). Today, design and density
are being used to mitigate negative effects of sprawl through suburban retrofit, converting strip malls and massive intersections into pedestrian-friendly community hubs through infill and redevelopment (Dunham-Jones and Williamson, 2011).

2.3 Local Land Use: Adapting Practice to Evolving Views on Density and Infill

However, biases in regulation and finance continue to favor sprawl. Common practices like maximum building heights, parking requirements, single-use zoning and setbacks promote sprawl and prevent infill needed to restore and revitalize historic downtowns and neighborhoods (Elliott, 2008; Boudreaux, 2011; Smart Growth America, 2007). Calculations for infrastructure costs and preferential financing for certain real estate products actually incentivize low-density development (Leinberger, 2011) Lack of local information and academic research about life cycle costs for infrastructure confounds the relationship between infrastructure costs and density (Najafi, 2006, p 55). Absent rigorous methods for costing infrastructure, high-density development can pay much more than low-density (Gottlieb, 2011). A core challenge for Transit Oriented Development even during the real estate boom was convincing investors that higher-density development constituted a desirable “asset class”, but now this is changing as property values in transit-sheds have shown special resilience (CTOD, 2004, p. 9; Becker et al, 2013). Even small urban places are becoming regional transit hubs, or could be.

Strategies like model zoning ordinance and design standards have been disseminated by municipalities and states to promote high-quality infill in
neighborhoods (New Hampshire, 2008; Austin, 2012). Case studies of urban residential redevelopment projects provide lessons in mitigating the impacts of density including the need to preserve and add amenities, and the importance of quality and design that supports neighborhood character (Idaho Smart Growth and ULI, undated, 2010; Condon, 2007). Even when attitudes and regulatory barriers are resolved, infill demands special sensitivity to context and complicated site conditions, therefore special action like demolition, environmental cleanup and site-assembly to reduce its relative disadvantages for developers (Farris, 2001, p. 9).

Evolving preferences and demand bring new urgency for planners to bridge the infill gap. It can make existing places more attractive, augment local sustainability and build cultural vitality by adding housing, services and amenities to help meet increased demand for walkable, mixed use neighborhoods (Beatley, 2000; Roseland, 1998; Litman, 2012). Due to demographic factors such as aging baby boomers, a rise in single-adult households, and reduced pool of qualified home-buyers, the need for compact, affordable, transit-connected housing is growing (Nelson, 2013; Bratt et al, 2006).

2.4 Urban Infill: Unique Methods and Concepts

Indicators help translate measurement into progress towards infill goals. Some used for sustainable development, like percentage of paved surface, need to be adapted to suburban versus urban context while others, like “percent of infill versus periphery development” express a relationship between inward and outward growth (Hamin et al,
2007). Indicators can chart progress towards infill-related goals, like social equity through neighborhood reinvestment (Greer, 2009). Ventura, California’s “infill first” policy employs intensification indicators to track progress towards goals for increased density, and replacing low-density oriented metrics that once supported Euclidean zoning (Ventura, 2005; Ventura, 2013). Shifting attitudes and resolving barriers to infill requires measurement that translates infill-related goals into planning practice.

A bias towards large, contiguous building sites is special challenge for urban areas in a low-density regional context. Working at ‘landscape scale’, planners use map-layering techniques to identify areas where development will not conflict with environmental and social values – conservation and recreation (McHarg, 1969; Arendt, 1999). Massachusetts Open Space and Recreation Plans require municipalities to map these developable parcels, but have no similar requirement for comprehensive assessment of infill parcels within urban areas (Massachusetts, 2008). Reusing brownfields and ‘up-zoning’ are included as growth management techniques that create infill (Massachusetts, 2002). While small and dispersed redevelopment parcels, or an entire urbanized area, can be overlooked in slow-growth areas with ample undeveloped land, some states and regions have made an explicit connection between infill as a way to promote conservation (Harmon, 1992; Maryland, 2001).

Urban planning needs techniques uniquely suited to working with dispersed parcels, like assessments that do not assume or confer disadvantage based on small size. To identify the scope and scale of urban infill, assessments can use an additive process
rather than layered subtraction. The information needed may need to be compiled from multiple sources to identify a range of parcels (e.g. vacant, condemned, or abandoned) (FixitPhilly, 2011). But by doing so the costs of failure can be calculated, based on revenue that infill and refill parcels should be generating, coupled with analysis of negative impacts on value of neighboring properties and neighborhoods due to vacancy, blight, and disinvestment (Penn Institute for Urban Research, 2010). Reuse of vacant parcels, along with other forms of direct social investment, is a core practice of the regenerative urban planning approach (Schilling and Vasudevan, 2012; Bromley et. al., 2005). Robust analytical tools for urban infill assessment may adjust understanding of the value located in cities and towns to unlock opportunities.

While infill parcels may be dispersed, social investment or investment of any kind may require other forms of strategic targeting in order to be successful. Saint Louis’ revitalization was guided by a spatial “strategy for renewal” to concentrate development in nodes to achieve vitality with a “critical mass” of people, activity and revenue in what had been a shrinking city (Stanley, 2013; Stanley, 2007). Achieving sufficient density of riders for transit, customers for retail, and street-level activity for a sense of safety and vibrancy requires focused investment. Spatial targeting may also be crucial for investment in housing and community development to achieve social goals in struggling urban areas (Manning, 2013). Strategies for Massachusetts Gateway City renewal through creative economies growth encourage targeting a narrow section of downtown, in order to produce benefits for the broader community (MassInc, 2012 p 5).
“Strategic Incrementalism” proposes that despite weak economic activity, urban reinvestment can be accomplished through small-scale changes combined over time to achieve a broad scale vision (Mallach and Brachman, 2013). There is a growing recognition of the need to use resources like existing infrastructure efficiently, a perspective absent during the boom years (SmartGrowth America, 2013).

There is a need to simplify planning for complex urban systems, without destroying the diversity needed for vibrant places. Patterns from nature illustrate processes of transformation - how different spatial configurations nurture or constrain ecological function (Forman, 1995). These ideas can be applied to the complex spatial urban environment that has emerged over time. Planners have used form-based code to translates technical information (zoning and planning metrics) through visual language so that diverse stakeholders can better understand desired outcomes (CNU and Crawford, 2004). In planning for complex urban environments, special visualization and mapping techniques may be particularly important to translate technical information and enhance stakeholder participation to achieve social goals (Al-Kodmany, 2001).

2.5 Urban Infill Assessment Framework: Components and Connecting Concepts

An effective urban infill assessment would address the unique spatial, fiscal and social characteristics that embody the challenges, and benefits, of urban infill. Three experimental assessment frameworks were identified that consider all three, using both
quantitative and qualitative context-specific information. Overcoming spatial complexity through additive processes to measure capacity and value contained within an urban area, a methodology developed in California used GIS to identify infill parcels sufficient to meet the state’s housing needs for twenty years, with no outward growth (Landis, et al, 2006). Honing tax efficiency as an expression of untapped resources to overcome urban infill barriers, Urban3 uses parcel tax yield for and scenario-building to show how small land-use decisions scale up to big impacts on local budgets (Personal communication, May 22, 2013). This approach also emphasizes additive processes, and the context-sensitive decision-making especially critical to small communities (Sonoran Institute, 2012; Sonoran, undated; Urban3, 2012).

Quantitative spatial and fiscal measurement methods can be deployed within a larger framework to integrate information about social value in order to improve decision-making that supports sustainable planning practices. A culturally-based “inclusive information collection and dissemination system ... translates local- and expert-based knowledge between disciplines and major stakeholder groups – i.e. community members, practitioners, researchers and policy-makers.” (Montenegro-Menezes, 2014(b)) Such an approach can start with collecting local subjective and objective information gathered through multiple qualitative and quantitative assessment methods, then co-locating that data through mapping to form a basis for analysis and decision-making (Hawkes, 2001; Montenegro-Menezes, 2014(a)).
2.6 Summary

This study’s main research objective is to improve land-use planning in order to balance growth. Bias against infill, perceptual and procedural, continues to upset this balance, leading to more sprawl and disappointing urban places. How infill is perceived can be connected, in part, with how it is measured. Therefore, improving procedures to measure infill becomes one means to balance growth by changing perceptions, or changing the vision of urban redevelopment. Discrete changes to land use practice have failed to generate substantial infill activity in many small urban places. A framework may advance efforts more than ad hoc adjustments to planning practice, by assembling a critical mass of infill-appropriate method applied using infill-appropriate concepts, in a way that can be replicated. Whether the UIAF ‘works’ to measure infill potential in Turners Falls, is a question of measurement, as well as perception. Therefore, this study tests the UIAF in terms of both.
CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter presents the urban infill assessment framework created based on conceptual grounds in order to conduct an infill assessment. It documents the methodology of the Urban Infill Assessment Framework, based on one experimental application in Turners Falls of Phases I and II. To test how assessment information resulting from that application might change the vision of redevelopment, interviews with local stakeholders were also conducted. Interview methodology is presented here as Phase III of the research.

The process of testing produced infill potential assessment for Turners Falls expressed in terms of composite capacity and revenue (TYPA) figures for three potential redevelopment sites. This infill data is not the study result, it is simply information used to test the framework’s ability to assess potential urban infill, and to evaluate whether that assessment changes stakeholders’ vision of redevelopment. The outcome of this study is the development of an Urban Infill Assessment Framework.

The result of this thesis is an improved framework. The next chapter, “Results”, presents this global finding as a ten-step Urban Infill Assessment Framework for planners to measure infill potential. While this chapter includes detail sufficient to replicate each step, the following chapter elaborates on findings from testing the
framework, with recommendations to apply the refined ten-step procedures with improved methods applied using key concepts.

3.2.1 Quantitative Methods to Measure Capacity and Revenue: The Metrics

To answer the question “what should be assessed and how?” two measurement-oriented mixed methods approaches are identified and adapted for the framework. I begin with an explanation of these methods as a foundation for understanding the UIAF methodology description that follows. The first approach from *The Future of Infill Housing in California: Opportunities, potential, and feasibility* uses Geographic Information Systems software for an additive assessment of redevelopment parcels. It was used to measure capacity for housing growth within California’s developed areas as an alternative to sprawl (Landis et al, 2006). The other approach, used by Urban3 Consulting, was developed based on the revitalization of Asheville, North Carolina’s historic downtown. It applies parcel-based tax analysis to help communities pursuing new infill construction to add density to historic downtowns and low-density suburbs (Sonoran Institute and Urban3, 2012).

The California study identifies vacant parcels for infill using GIS parcel data. It includes relatively small vacant sites, those over 2,500 square feet or .057 acres. In addition, a distinct methodology is used to determine which infill sites currently featuring buildings are ready for redevelopment. These “refill” sites are identified using
data from parcel tax assessment data (Landis et al., 2006). The calculated cumulative area of infill and refill parcels equals the composite capacity for future redevelopment.

The California study calculates future redevelopment potential by using building densities selected to fit with “neighborhood and community character” (Landis et al., 2006, p 713). It uses context-based assessment to complement parcel data analysis in order to enhance sensitivity to social equity. But the authors cite lingering concerns about gentrification and displacement, emphasizing the need to enhance methods to bring social values into the equation when measuring infill capacity (Landis et al., 2006).

**Figure 3.1:** Sample Infill Sites Identified Using GIS

![Sample Infill Sites Identified Using GIS](California HCD, 2014)

The second approach creates a specific metric to facilitate comparison across sites, one that highlights the fiscal advantages of density from efficient use of limited land and infrastructure. A focus on tax efficiency helped Montgomery County, Virginia increase density. This generated the property tax revenue needed to underwrite
spiraling costs from maintaining infrastructure built through decades of sprawl (Stanley, 2013). To measure potential gains from a redevelopment scenario, Tax Yield Per Acre (TYPA) rates (based on existing nearby properties) are applied to infill parcels. These simple revenue projections translate spatial measure of capacity into a fiscal measure, the basis to compare disparate parcels and sites (Minicozzi, 2013(b); Sonoran Institute and Urban3, 2012; SmartGrowth America, 2013).

Figure 3.2: Property Tax Yield Per Acre by Development Type

TYPA is the total assessed value of a parcel (land + building + improvements) divided by the parcel acreage (J. Minicozzi, personal communication, May 22, 2013). The scale of acres is used, rather than smaller units, for two reasons. First, acres translates into a scale that facilitates comparison with larger parcels. Using acreage the composite capacity of complex, dispersed sites is easily compared to a greenfields project. Second, it promotes a form of process efficiency, instead of looking at individual infill parcels,
thinking on a scale that is appropriate to neighborhood-scale assessment and site-
assembly.

3.2.2 Qualitative Methods: Contextualizing the Metrics

The components within the framework combine quantitative and qualitative
data. Methods to measure spatial capacity and fiscal efficiency also rely upon certain
qualitative procedures (e.g. identifying building forms and neighborhood character,
selecting infill parcels for which to calculate composite capacity and TYPA). To create
context-sensitive scenarios in which these components can be applied, I use a culturally-
based planning approach that combines data points representing social and fiscal value
(both subjective and objective data) through mapping. To analyze mapped data points, I
follow a discursive process moving between information and consultation (with Town
Planner and Tax Assessor), site visits for direct-observation, and more extensive map-
making to visualize data.

The framework uses mixed-methods for individual framework components. The
overall framework is composed of interconnected procedures. This chapter focuses on
the mechanics of the quantitative and qualitative steps necessary to replicate the Urban
Infill Assessment Framework. Chapter Four highlights how, when, and why conceptual
elements make sense of quantitative and qualitative information, and guide analytical
processes that enable the user to proceed from one step to the next.
3.3 Phase I

The outcomes of Phase I are the components (i.e. inputs) needed for Phase II. This includes a map of the urban infill area, and mapped context information for that area. Phase I produces parcels designated for infill, and multi-parcel areas for use in Phase II scenario-building. It creates the components for measuring scenario capacity and revenue – a range of local development typologies, and tax yield per acre (TYPA) for each building included.

3.3.1 Local Development Typologies

The first step in the framework identifies a range of typical, and desirable, forms of development. In Phase II, a subset of these buildings will build scenarios, using their tax yield as a metric for comparison. I use qualitative assessment to identify nearly thirty buildings (valued by local residents) in order to build a collection of typical forms or typologies. I conduct documentary analysis to identify specific buildings valued by the community, with sources dating from the 1999 Comprehensive Plan, up to the most recent Downtown Turners Falls: Livability Plan (Montague, 1999; Montague, 2013(b)), and every planning document currently hosted on the Montague Planning Department web pages. I searched for specific buildings cited for existing value, or potential expressed in financial, historic, aesthetic, and social terms. I also gathered information about possible selection criteria based on community goals and concerns. For instance, based on local concern for the low rate of owner-occupied housing in the downtown, I
was careful to include some owner-occupied residences as valued forms (Montague, 2004). This research was augmented by my own place-based knowledge as a local resident observing redevelopment in Turners Falls for a decade.

I selected nearly thirty Turners Falls buildings, across three categories (residential, commercial and industrial). They were drawn from a range of local development contexts (semi-rural, suburban, and small-scale urban densities). I visited each property to photograph, documented characteristics, and observed neighborhood character to clarify context. Table 3.1 shows a sample with some of the data points collected. By organizing these data points for the selected buildings I ascertained whether the selected development types are representative of the Turners Falls context. Data points include: general description of use and type, zoning, tax assessment and acreage (see Appendix B “Building Typologies for Turners Falls”).

**Table 3.1** Buildings Within Industrial Typologies with Sample Data Points

<table>
<thead>
<tr>
<th>TYPE DETAIL</th>
<th>DENSITY</th>
<th>RURAL</th>
<th>SUBURBAN</th>
<th>URBAN</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property address</td>
<td></td>
<td>Airport Industrial Park</td>
<td>Energy Industrial Park</td>
<td>Industrial – Historic Mill</td>
<td>Industrial Downtown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>130 Industrial Blvd</td>
<td>124 Turnpike Road</td>
<td>36 Canal Road</td>
<td>400 Avenue A</td>
</tr>
<tr>
<td>PHOTO</td>
<td></td>
<td><img src="image.jpg" alt="Industrial Typologies" /></td>
<td><img src="image.jpg" alt="Energy Typologies" /></td>
<td><img src="image.jpg" alt="Historic Mill Typologies" /></td>
<td><img src="image.jpg" alt="Industrial Downtown Typologies" /></td>
</tr>
<tr>
<td>Commercial Value</td>
<td>$5,122,100</td>
<td>$10,990,100</td>
<td>$840,300</td>
<td>$294,000</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>$5,301</td>
<td>$21,315</td>
<td>$15,273</td>
<td>$10,054</td>
<td></td>
</tr>
<tr>
<td>ANNUAL TAX</td>
<td>$130,665</td>
<td>$280,357</td>
<td>$21,436</td>
<td>$7,500</td>
<td></td>
</tr>
<tr>
<td>Parcel Acreage</td>
<td>24.65038</td>
<td>13.153</td>
<td>1.40349</td>
<td>0.746</td>
<td></td>
</tr>
<tr>
<td>TYPA</td>
<td>$21,315</td>
<td>$15,273</td>
<td>$10,054</td>
<td>$9,054</td>
<td></td>
</tr>
</tbody>
</table>
I then translated typologies into a measure of tax ‘efficiency’, or how much annual property tax comes from a particular property, expressing it as tax yield per acre (TYPA). The Montague tax assessors’ online database provided total assessed value for each parcel. The current tax rate is applied, either commercial or residential to calculate annual tax yield. To calculate TYPA, this annual tax yield was divided by parcel acreage. The result is a range within the typologies from $1,484 to $60,435. Figures 3.3 and 3.4 show sample residential and commercial with their TYPA to illustrate. All TYPA are calculated individually using parcel tax data from the town web site in order to ensure proper measurement of the split tax rate.\(^1\)

The typologies were selected primarily based on exemplary social value, not fiscal value. In this way the scenario-building process reflect community values. Of course much of this value was expressed financially, by investment in these buildings. Investment then manifests as aesthetic value, civic pride, perceived fiscal benefit. A qualitative selection method has two potential weaknesses that had to be addressed. First, a concern that property-selection might be construed as ‘cherry-picking’ to find high-value outliers. Second, given the wide range of TYPA it was important to ensure

\(^1\) TYPA calculations use 2013 data for all properties except those affected by split-rate. For those 2012 data is can only be accessed online under “Previous Assessments”. The tax rates change from year to year because proposition 2 ½ necessitates redistribution depending on the total tax base of the town valuation changes and tax rates have constant interplay (Barbara described it as a ‘see saw’). The changes are minor, hence a decision to use most recent data available although it incorporates a minor discrepancy. Mapping of assessed values uses most recent MassGIS data available as of October 2013.
that the very low and high TYPA values were not exceptional. Therefore, the selected properties were compared with other properties to ensure they are not outliers in valuation or tax yield. The range of property values in Turners Falls was limited. This narrow range of property values also limited the assessment, and therefore TYPA range.

**Figure 3.3** Sample TYPA Range Within Residential Typologies

<table>
<thead>
<tr>
<th>Property Size</th>
<th>TYPA</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 acres</td>
<td>$1,484</td>
<td>1 family</td>
</tr>
<tr>
<td>.38 acres</td>
<td>$8,417</td>
<td>1 family</td>
</tr>
<tr>
<td>.32 acres</td>
<td>$7,750</td>
<td>1 family</td>
</tr>
<tr>
<td>.1 acres</td>
<td>$22,851</td>
<td>2-family</td>
</tr>
</tbody>
</table>

**Figures 3.4:** Sample TYPA Range Within Commercial Typologies

<table>
<thead>
<tr>
<th>Property Size</th>
<th>TYPA</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.65 acres</td>
<td>$5,301</td>
<td>Industrial</td>
</tr>
<tr>
<td>1.99 acres</td>
<td>$17,894</td>
<td>Commercial</td>
</tr>
<tr>
<td>.07 acres</td>
<td>$55,010</td>
<td>Mixed Use</td>
</tr>
<tr>
<td>.06 acres</td>
<td>$58,808</td>
<td>Mixed Use</td>
</tr>
</tbody>
</table>

The preliminary building list was reviewed with the Town Planner to ensure it includes options for residential, industrial and commercial redevelopment that are
representative of community values. The Town Planner validated the typologies, making additional suggestions. Based on the Minicozzi methodology, I included buildings from the broader Turners Falls area, not just downtown, in order to have a sufficient range of building forms representing a range of uses and densities.

Before proceeding to scenario-building, I confirmed that both context and typologies were consistent with an assumption that tax density would rise with development density. The scenario-building process will be used to illustrate the relationship between development density and tax density (that is, higher density development yields more property tax per acre). First, to look at context, I mapped total assessed values per acre using GIS parcel data to confirm a positive relationship; higher building density (smaller lots, taller buildings) generally led to higher tax yield density (see Appendix B “Building Typologies for Turners Falls”). The map also illustrated a high degree overall of variation in tax density. The second analysis is conducted for typologies, organized by categories (residential, commercial, industrial). Histograms illustrated the relationship between building TYPA and development density as expressed by parcel acreage (see Appendix B, “Building Typologies for Turners Falls”).

Montague deploys a split tax. In 2013 the residential tax rate was $17.04 and the commercial rate was $25.51. That difference was applied to entire buildings, or parts thereof. A mixed-use building typical of the Turners Falls historic downtown would have some portion of its assessed value (based on floor are ratio devoted to residential or commercial) taxed at one rate, the remainder taxed at the other. I met with the
Montague Tax Assessor to ensure my calculations for annual tax yield are accurate. But this also means the map of tax density using total assessment, not annual tax yield, was not exactly correlated with TYPA. The need to calculate TYPA by hand for buildings affected by split tax prevents me from creating a context map that more accurately corresponds to the typologies.

The output of this step in the framework is a set of buildings to use in Phase II along with their associated metrics (acreage and TYPA).

3.3.2 Urban Infill Boundary

The goal for this step is to define the urban infill area. Determining the boundaries of the study area defines from the outset not just the scope of analysis, but also who the stakeholders are and what the appropriate redevelopment options will be based on the context. To reflect both physical and social attributes, I used a mixed-methods approach inspired by cultural heritage planning to devise an urban infill boundary through three methods: direct observation, documentary research, and expert consultation with the Town Planner (Montenegro-Menezes, 2014(a)).

As is often the case in a town or small city, the Town of Montague includes areas with a wide range of land use characteristics: conservation areas, agricultural, industrial, suburban residential, and mixed-use. Turners Falls is the most densely populated of the five villages comprising Montague. But even Turners Falls contains a range of densities and development types. My knowledge of Turners Falls came from living in the adjacent
town, visiting Turners Falls downtown several times a month for errands or recreation, and discussions with friends who grew up in or reside in the downtown area. While some edges are defined by the Connecticut River, no complete boundary for the Turners Falls downtown is obvious. Many official maps, like census tracts, have no relation to massive physical boundaries like steep wooded hills and canals.

Documentary research confirmed a lack of congruence or commonly accepted boundaries defining the Turners Falls Downtown. The first documents I examined were census maps. The Montague Census Designated Place (CDP) encompasses the Turners downtown, and the Community Development Strategy outlines “Target Areas” for use in allocating CDBG funding and other planning efforts (Montague, 2013(a)). Locally generated conceptualizations of possible downtown boundaries include the zoning map, and the Montague Villages Map on display at the planning office (Montague, 2013(e); undated). Tourist-oriented maps like the River Culture walking tour maps made available at City Hall and online were reviewed along with boundaries for the visitor wayfinding plan (Montague, 2013(c)). Most recently, the Downtown Turners Falls: Livability Plan produced maps and plans defining the downtown (Montague, 2013(b)).

Another important boundary to consider is the service area for public water and sewer. An underlying assumption with infill is the reuse of existing infrastructure to promote fiscal sustainability. A map of was not available, but the Town Planner confirmed that the entire downtown area was served by public infrastructure. This is
particularly important to establish in Turners Falls, because millions of dollars have recently been invested to separate combined sewer overflow (CSO).

After reviewing the available information and maps, I created a draft urban infill area boundary map and met with the Town Planner. He validated the sources considered, but suggested an adjustment to include more residential uphill neighborhoods near the largest park (Unity), and so a final boundary adjustment was made to reflect local perspectives. The output of this step was a defined urban infill area within which infill and refill scenarios will be devised figure 3.5 below (see also Appendix D, “Map of Turners Falls Infill Boundary”).

**Figure 3.5** Map of Urban Infill Boundary Created for Turners Falls Study
3.3.3 Selecting Scenario Areas

The goal is to define multi-parcel areas as three redevelopment scenarios for which capacity and revenue can be calculated. To find areas with sufficient regenerative capacity, I look for some combination of existing assets and capacity for redevelopment in order to produce a return on past or future investment. Areas have to be large enough to contain multiple infill parcels.

This process involved gathering information about Turners Falls from multiple sources. This information was categorized as ‘assets’ and ‘opportunities’. This context data was mapped using an iterative process. I catalogued the information so that assets and opportunities in two basic categories were tracked: fiscal value from tax data, and social value from planning documents and other sources.

To obtain a wide variety of data points within the urban infill area I used a mixed-methods process to gather information relating to Turners Falls downtown. Some was uncovered during the process of defining the urban infill boundary. This included large-scale investments like the CSO upgrade, and Community Development Block Grant (CDBG) and transportation funding. Other assets and opportunities are identified using tax and parcel data, such as new construction and town-owned properties. Secondary analysis of local assessor’s data using (GIS) produces an objective fiscal measure of value for every parcel in Turners Falls. Parcels were categorized as either above or below median property value, above or below median total assessed value per acre.
I included subjective and objective data points from maps of redevelopment target sites, historic structures, cultural assets and open space. Data came from a housing sub-plan, development studies, and town meeting documents (Montague 1999, 2004, 2012, 2011, 2013(d)). The 2010 Community Needs Survey and Livability Plan were particularly useful because they contained detailed, direct input from community members (Montague, 2010(a), 2013(b)). A list of recent projects and current budget priorities was provided by the Town Planner. Recent Community Development plans identified where investment has occurred (assets), and where investment is still needed (opportunities).

After the information was catalogued and categorized, it was mapped in GIS. Separate layers for assets and opportunities, and for each of the data sources (assessors data and planning documents), were created. Some data was difficult to map due to lack of location detail. Nonetheless, this information was tracked for future reference. The local asset and opportunity information was mapped to show the places in which the community has invested financially, and emotionally. Using different shading and emphasizing layers allowed for different sources to be given more or less weight. It also permitted parcels to be categorized as both asset and opportunity, as was the case for several redevelopment parcels and historic buildings. Figures 3.6 through 3.9 illustrate some ways in which opportunities and assets were mapped, together and separately.
Figure 3.6 Mapped Assets and Opportunities From Assessors Data

Figure 3.7 Mapped Assets and Opportunities From Planning Documents
Mapping the data was followed by a process of examining these layers to seek congruence (overlap and spatial coincidence) where existing investment occurs.
alongside some capacity for infill. The goal was to select scenarios that could be redevelopment areas with a balance of asset and opportunity. The presence of recent or planned investment and assets indicated social value to the community. Capacity ensured a potential for physical and revenue growth, or return on investment that could be achieved by building on the assets (see Appendix G “Sample of Maps Examined for Congruence”).

**Figures 3.10 and 3.11** Redevelopment Potential Avenue A and K Street Scenarios

**Figure 3.12** First Avenue Scenario Area (view from behind Town Hall)
Some areas were considered and rejected because they had tremendous investment, but too little capacity. Boundaries to delineate preliminary scenario areas (collections of parcels) were devised by considering congruence as well as context (see Figure 3.9). I reviewed these ideas with the Town Planner, who questioned the exclusion of an area where the town is currently targeting funds (lack of spatial capacity). He also suggested a few more. I then revisited each site. First, I conducted a ‘Windshield Analysis’ seeking assets and opportunities overlooked by only examining planning documents and tax data. Second, I examined the context to identify boundaries and connections defining these areas in order to refine the scenario sites.

Next, I reviewed the detailed assets and opportunities data along with new observations to analyze the balance. I then conducted a final qualitative analysis to define potential scenario areas, guided by three concepts. Areas required sufficient composite capacity overall for change to be sufficient to achieve “critical mass” (Stanley, 2007). An area with dispersed infill and refill parcels would support regeneration through reinvestment (FixitPhilly, 2011). Opportunity sites massed together, or adjacent to existing assets, can benefit from resource targeting to create urban vitality (Schilling and Vasudevan, 2013). Based on this analysis and site observation, I adjusted scenario boundaries to balance the mix of assets and opportunities and respond to each neighborhood’s legible edges.

For the purposes of this research, I selected three scenario areas that were as divergent as possible in configuration and use, to illustrate the value of the framework.
across various site conditions. The scenario areas featured multiple uses that could be loosely characterized as industrial, downtown residential and civic. I met with the planner one last time to finalize the boundaries and parcels to include within each scenario area. The final outputs of this step were defined scenario areas employed in Phase II.

**Figure 3.13** Final Scenario Sites (Left to right: Avenue A, K Street, First Avenue)

3.4 Phase II

Phase II of the infill assessment framework uses components from Phase I to build scenarios in Turners Falls. The scenario sites defined areas for measuring spatial capacity (acreage to consider for redevelopment) and revenue (TYPA). Local building forms were selected from the typologies, and applied to specific parcels using
information mapped in Phase I. Key concepts like “Neighborhood-Consistent Density”
guide analysis and selection ensured that the selected form would enhance, not
undermine, site character (Landis et al, 2006, p. 703).

3.4.1 Scenario Levels

Scenario-building needs specific redevelopment parcels within each area where
appropriate building types can be applied to ‘fill’ those parcels. Each building type’s
corresponding TYPA metric is used to calculate potential tax yield per acre. Applying
different building forms – lower versus higher density, or commercial versus residential
use – changes that tax yield per acre.

Phase I mapping produced preliminary parcel information, with ‘opportunities’
representing parcels where infill might occur. These parcels may or may not have
buildings. One key impediment to changing the view of redevelopment is how difficult it
is to perceive the potential capacity in neighborhoods with a range of vacant, underused,
and well-used sites. Therefore, the scenarios distinguish between infill of vacant sites
and refill, or redevelopment of non-vacant sites. This demarcation also corresponds to
unique challenges in assessing non-vacant parcels for redevelopment.

In order to test how the resulting information could change the vision of
redevelopment in Turners Falls, the scenarios will be tested in interviews. Therefore
information resulting from the scenarios needs to make comparison across all three
sites easy to understand. The process of determining these levels will be described more
fully in the following chapter, because it led to several key findings. For each scenario site, all three levels were applied. I selected three levels with single-variable change from one to the next, as follows:

- Level 1: Infill parcels, low density redevelopment
- Level 2: Infill and refill parcels, low density redevelopment
- Level 3: Infill and refill parcels, higher density redevelopment

### 3.4.2 Assessing Neighborhood Character to Select Typologies

Building scenario levels required finding a fit between existing neighborhood character and potential building types, using the local typologies as a menu of options. Appropriate form is a question of density, massing, use, and aesthetics. To complete the three scenarios for Turners Falls, two sets of buildings need to be selected for each scenario. One set will be used for low-density, and one for higher-density.

Figure 3.14 shows the final buildings selected and applied to all scenarios. This was done for every scenario (see Appendix F “Reproductions of Interview Materials”). The core challenge was to respect context without making the process too hard to replicate, or the resulting information too hard to grasp. Therefore, I selected a minimum of forms for each scenario, then further reduced the number overall. This was done through an iterative process. I first identified all possible appropriate building forms for each scenario from the typologies created in Phase I. I then experimented
with combinations to reduce the number of forms while still respecting the historic layering of architectural forms in Turners Falls.

**Figure 3.14** Nine Selected Building Forms Used in Scenario-Building with TYPA

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential - Single Family Home</td>
<td>$14,056</td>
<td></td>
</tr>
<tr>
<td>Residential - Multi-Family 4+ Units</td>
<td>$23,263</td>
<td></td>
</tr>
<tr>
<td>Residential - Multi-Family 4+ Units</td>
<td>$29,543</td>
<td></td>
</tr>
<tr>
<td>Commercial - One Story Fast Food</td>
<td>$32,789</td>
<td></td>
</tr>
<tr>
<td>Commercial – Main Street One Story</td>
<td>$17,894</td>
<td></td>
</tr>
<tr>
<td>Commercial – Multi-story</td>
<td>$60,435</td>
<td></td>
</tr>
<tr>
<td>Industrial – Rural Office Park</td>
<td>$5,301</td>
<td></td>
</tr>
<tr>
<td>Industrial – Suburban Office Park</td>
<td>$21,315</td>
<td></td>
</tr>
<tr>
<td>Commercial/Mixed Use Historic</td>
<td>$58,808</td>
<td></td>
</tr>
</tbody>
</table>

The scenario areas were sub-divided into smaller zones for which a single form can be selected, in keeping with the neighborhood character. Only one building type was selected for each zone for low-density scenarios. Then, a second set of higher-
density building types were selected. In Figure 3.15 a red line shows division between a commercial zone and a residential zone. This map also illustrates the low-density forms used (see Appendix J “IRUN Maps: Transect Lines and Baseline Scenario Selections”).

**Figure 3.15** Sample Map with Red Transect Line from K Street Scenario

3.4.3 Parcels Categorized

Specific parcels within scenario areas need to be categorized to identify which parcels can be redeveloped. These parcels became the basis for an additive assessment from which each scenario’s composite capacity was calculated, a sum of redevelopment parcel areas. Categorizing each parcel within scenario boundaries involved several steps, starting with the asset and opportunity information from Phase I. This information was pared down just to include the scenario sites. Observations from site visits were added.
In practice, categorizing parcels is an iterative process. For simplicity, it is described here broken into the distinct actions, which were then repeated. All final category selections were tracked on a spreadsheet of parcel data so that it could be re-mapped, and so that metrics could be calculated from parcel acreage.

The mapped data from Phase I was analyzed to find parcels that should be off limits to redevelopment because they are community assets. The categories ‘Upgrade’ and ‘No Change’ were used for parcels not considered for redevelopment. For instance, a community garden in a vacant lot was marked ‘No Change’. Historic sites and buildings were also marked ‘No Change’, or ‘Upgrade’ if categorized as an asset, indicating that rehabilitation or adaptive reuse are desired. Due to concerns about gentrification and residential displacement expressed in local planning documents, occupied residences were made off-limits to redevelopment. Homes with below-median assessment (based on the urban infill boundary area) were marked ‘Upgrade’ indicating investment is desirable, but not replacement of the structure. Homes with above-median assessments were marked ‘No Change’.

Next, vacant parcels were identified, confirmed and tagged as ‘Infill’. In Turners Falls, many vacant parcels are currently used for storage or parking. A critical source was a map from the Livability Plan, fortuitously providing baseline information on opportunity parcels (Montague, 2013(b)) (See Appendix L “Turners Falls Livability Plan Vacant and Underused Land”). Observations from site visits were discussed with the Town Planner to reconcile conflicts between available data and observations.
Similarly, mapping and site visits identified non-vacant parcels with buildings ready for replacement due to condition and value. Some structures were in use, but observations indicate instances where redevelopment could add significant social and fiscal value. Recall that asset parcels are already categorized ‘No Change’. What remains are those not suitable to be adapted for future use due to condition or type. Possible redevelopment parcels were then checked against tax assessments below median (for the urban infill boundary area) to select only low value parcels. This was to ensure redevelopment could actually improve value. The remaining parcels with buildings appropriate to replace in the next 10-20 years for are categorized for ‘Refill’. While ‘Refill’ is really a sub-category of infill development, in Chapter Four I discuss why the distinction is important.

Figure 3.16: Sample Map with Parcels Categorized from First Avenue Scenario
After assigning a category to every scenario parcel, they were mapped. These maps were reviewed with the Town Planner who helped to resolve instances where there was conflicting information about whether a parcel could or should be redeveloped. The final infill and refill parcels were the outputs used in the following steps.

3.4.4 Calculate Metrics

Composite capacity and TYPA were calculated for infill and refill parcels within each scenario. This involved applying TYPA values, for the building types selected for each scenario zone, to specific infill and refill parcels. For instance, in scenario 1, TYPAs from the low-density building [selected to match each zone] were applied to the acreage of the infill areas within that zone. In scenario 2, the same low-density building TYPAs are applied to both infill and refill areas, yielding a larger gain for that redevelopment scenario. In scenario 3, higher-density buildings and their TYPAs were applied to both infill and refill areas.

**Table 3.2 Scenarios Composite Capacity in Acreage and TYPA**

<table>
<thead>
<tr>
<th>Scenario Levels</th>
<th>Level 1. Low Density Infill parcels only</th>
<th>Level 2. Low Density Infill + Refill</th>
<th>Level 3. Higher Density Infill + Refill</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avenue A Scenario</td>
<td>3.87/$25,804</td>
<td>12.72/$106,190</td>
<td>12.72/$387,369</td>
</tr>
<tr>
<td>K Street Scenario</td>
<td>.21/$6,886</td>
<td>2.20/$34,338</td>
<td>2.20/$66,800</td>
</tr>
<tr>
<td>First Avenue Scenario</td>
<td>1.8/$59,020</td>
<td>5.22/$141,013</td>
<td>5.22/$215,803</td>
</tr>
</tbody>
</table>
The resulting metrics for each scenario are shown in Table 3.2. The result is a set of simple metrics to show the composite capacity or developable acreage, and the potential revenue or TYPA, from low and moderate density redevelopment (see Appendix F “Reproductions of Interview Materials”).

3.5 Phase III Stakeholder Interviews

With scenario information in hand, Phase III investigates whether framework information changes the vision of redevelopment potential for Turners Falls’ stakeholders. Interviews were used to mimic the deployment of scenario information among stakeholders in order to test the framework’s effect on decision-making. Research questions oriented interviews in terms of three functions; to promote strategic planning, support incremental practice, and improve decision-making. In practice this might occur through informal meetings, public meeting or hearings, or design charrette.

Interview materials consisted of 11” X 17” cards with orthoimagery (MassGIS) maps of the Urban Infill Boundary, or scenario areas. Three more cards presented scenarios, with existing conditions, typologies, and capacity and revenue figures for different scenario levels. Interview materials were printed and laminated in large format to ensure all users could see and manipulate the information easily (see Appendix F, “Reproductions of Interview Materials”). The interview process was first tested with two Turners Falls residents whose familiarity with the study area allowed them to identify
problems with question phrasing and visual materials. Figure 3.17 shows a sample of one scenario card. This side shows only existing site conditions at the top. At the bottom scenario levels were defined along with the building types used to construct each level. Figure 3.18, the reverse side, revealed capacity and revenue for each level.

**Figure 3.17 Side 1 Scenario Card for Avenue A**

Stakeholders were selected from municipal staff, Planning Board and Select Board, as well as Advisory Groups from three recent planning studies: The *Livability Plan*, *Energy Industrial Park: Turnpike Road Master Plan*, and the *Strathmore Mill Complex Redevelopment* (Montague 2013(b), 2012, 2011). The Town Planner identified several key stakeholders with long-term involvement. Others were added to broaden the range of perspectives. The final group represented commercial real estate, property owners,
local banking institutions, business owners, non-profit and municipal employees, 
longtime residents, and recent transplants. Fourteen stakeholders were contacted by 
email and telephone. Ten responded and agreed to participate.

**Figure 3.18** Side 2 scenario card for Avenue A

Interviews were conducted in participant offices or at Town Hall, each lasting 30 
to 60 minutes. In addition to recording responses on an Interview Form, extensive notes 
on observations and discussion were recorded on a laptop and maps were 
photographed. Participants responded to questions and prompts by drawing on the 
laminated materials. All responses were photographed for later analysis. I transcribed 
oral responses and narrative commentary onto individual response sheets. Each 
participant response sheet included a complete record of visual and narrative data.
In the first step respondents were asked to circle 5-6 areas on a map of the Urban Infill Area, and to show places where they thought investment should occur. Next, on maps showing the three scenario areas, they rated scenarios 1-10 (low to high). Then the three detailed cards showing scenario areas were arrayed before them. I provided explanation as needed. First, they were asked to select a favorite to turn over first. On the reverse side was the capacity and revenue data. Then they turned over the other two scenario cards. Having seen the metrics, they were asked to repeat step two, and then step one. A final step asked respondents to share their expertise about the barriers and benefits for each scenario area. This created an opportunity for information-gathering in a semi-structured interview format.

To study the effect of simple information about complex urban redevelopment, I analyzed drawings, numerical assessments, and comments. To assess how data impacted participants’ perception of where potential infill redevelopment value could be found, I compared participant responses before, and after, receiving scenario information. I compared changes in numerical ratings of the scenarios. I conducted comparative visual analysis of maps drawn by interview participants to look for changes in perception of value location. Content analysis of narrative responses from semi-structured interviews about benefits and barriers provided further insight as to how the framework information can bridge a gap between redevelopment goals and problem-solving. The results of this analysis are presented in Chapter 4, as part of the final step in the improved ten-step Urban Infill Assessment Framework.
CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents study results in the form of an improved ten-step Urban Infill Assessment Framework. Procedures within each step were improved based on testing in Turners Falls in order to produce a replicable tool that a planner can use to change perceptions of infill potential. This chapter includes for each step an overview of operationalizing the procedures in Turners Falls, evidence of validity, along with key insights and recommendations for future use.

The 10-step format helps clarify the intrinsic value of each step, its function within the framework, and the underlying concepts used to apply and evaluate the UIAF. I consider the validity of each step in the process not just in terms of quantitative and qualitative outputs, but also in light of the concepts used to create the framework. I highlight ways in which the UIAF did not work as expected, and adaptations either made or recommended. The previous chapter reflects the original focus of the research design, using mixed methods to generate highly quantitative measures of infill potential. In testing, qualitative processes, concepts and outputs were more essential than anticipated, both to the UIAF working in Turners Falls, and to its validity overall. Therefore, in this chapter I reframe the tool into more specificity.
The value of the UIAF as a planning tool rests on being replicable by low-resource planning offices. Adaptations and recommendations presented here were guided by a need to simplify quantitative and qualitative procedures within each step. Additionally, the overall framework structure needs to function as a tool for strategy, day-to-day planning activities, and decision-making relating to redevelopment. Uptake into practice is a precondition for replication.

To test whether the framework could be communicated to a practitioner, I visited a city that participates in Connecticut’s *Come Home to Downtown* program promoting small-scale urban redevelopment (Connecticut Main Street Center, 2013). I presented goals, actions and outcomes of each step to the City Planner using a twenty-minute Powerpoint. We discussed each step, and all indications were that it was well understood. But his opinion was that while the economic development office would be interested in the UIAF, his role in redevelopment is reactive, largely based on the city’s resource limitations. Other professionals with whom I discussed this research echoed this viewpoint, questioning whether the framework’s assessment and scenario-building falls realistically within the purview of a municipal planner, rather than economic development or private developers. These perspectives affirmed my concerns that limited resources limit perspectives. I used this feedback to expand my recommendations for use, for instance to use the UIAF as an evaluative tool.
4.2 The 10 Step Urban Infill Assessment Framework

In the following sections I present the ten steps that make up the Urban Infill Assessment Framework (see Table 4.1). Detailed outputs relating to Turners Falls illustrate how each step was operationalized. These outputs are not results themselves, but are essential to determining the validity of framework processes. I evaluate validity both theoretically, in terms of conceptual underpinnings of the framework, and in practice, based on feedback from the Town Planner and interview participants. I present insights from creating and testing the framework, including limitations. Major adaptations made to strengthen each step are included along with recommendations to guide the UIAF’s future use by planners in new locations.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Define the Urban Infill Area</td>
</tr>
<tr>
<td>Step 2</td>
<td>Identify Local Typologies</td>
</tr>
<tr>
<td>Step 3</td>
<td>Asset Mapping</td>
</tr>
<tr>
<td>Step 4</td>
<td>Opportunity Mapping</td>
</tr>
<tr>
<td>Step 5</td>
<td>Find Congruence</td>
</tr>
<tr>
<td>Step 6</td>
<td>Define Scenario Sites</td>
</tr>
<tr>
<td>Step 7</td>
<td>Categorize Parcels</td>
</tr>
<tr>
<td>Step 8</td>
<td>Match Components</td>
</tr>
<tr>
<td>Step 9</td>
<td>Run Scenario Levels</td>
</tr>
<tr>
<td>Step 10</td>
<td>Deploy Information in Decision-making (Interviews)</td>
</tr>
</tbody>
</table>

4.2.1 Step One: Define the Urban Infill Area

The Urban Infill Boundary Area for Turners Falls was defined using mixed methods to analyze existing maps, planning documents and local knowledge. As
designed, this step was not first. In hindsight it seems obvious any planning process begins with defining boundaries. In Turners Falls the adjustment important for two reasons. First, the framework would need to find some urban infill potential to assess. Boundaries needed to include parcels sufficient to ensure some capacity to build and therefore to increase tax revenue. Second, I discovered this was not a process of selecting an existing maps, as originally thought. Rather I needed to make choices based on local values and perceived potential from the outset. A cultural planning approach was used to assess the visual, observed, and documentary information, co-considering both objective and subjective information. Based on that approach, I adopted a resident-oriented focus placing the local services (i.e. grocery and pharmacy) at the spatial center of a downtown defined in terms of walkability (half-mile pedestrian shed) with a 1-mile spine accentuating the historic main street (see figure 3.5). This translated social values into a “spatial concept” (Ahern, 2007).

Even in this first step there were choices to make, and the validity of each step was understood in terms of the same concepts used to make choices. For instance, in Turners Falls the aging strip mall is car-oriented and unattractive. But if social value, defined locally, is central to the framework so a choice to place local services at the center of the defined downtown is consistent. Design-oriented processes, on the other hand, place the Historic main street district at the center. Each is equally valid.

Using a rigorous cultural planning approach to consider diverse subjective and objective information sources gives conceptual validity. Turners Falls maps focused on
demographics, tourism, history, zoning, infrastructure, culture or streetscape and natural resources were not suited to use for redevelopment planning but important sources of information. Since financial investment and social value are often invisible or not mapped, other sources were used including site visits, consultation with the Town Planner, and planning documents. An important example of unmapped information identified through other sources was the Combined Sewer Overflow upgrade, a major infrastructure investment that is not visible.

A spatial concept translated local goals or values of “Livability” in terms of amenities and walkability. A draft of the map was reviewed with the Town Planner, who made adjustments to ensure it reflected local conceptions of ‘downtown’. Furthermore, by translating a range of physical and social attributes into a place-based definition of the urban area, the map achieved acceptance among stakeholders interviewed.

In terms of the UIAF, re-mapping is actually critical to reframing the view of local redevelopment. In Turners Falls, the attempt to reconcile existing maps turned into a process of challenging inherited spatial constructs. Zoning, census and CDBG maps, historic and tourism-oriented plans encode certain values and judgments. By defining new boundaries a new theoretical framework is used to enhance sociological function. Operationalized for testing in Turners Falls, this emphasized amenities valued by local residents, like canal paths, library, groceries. It de-emphasized buildings defined by use, or people defined by income. A new urban infill boundary defines a range of users and perspectives relevant to redevelopment. In Turners Falls, the one-mile spine defining
the downtown includes activities ranging from civic and cultural, to commercial, housing, and employment and so a wide range of users.

To apply the UIAF in other locations, a new urban infill boundary map must be made at the outset. This was the first of several instances where a step envisioned as an insignificant prelude to quantitative steps turned out to be more qualitative, and more significant. Conceptually, mapping starts the UIAF with a spatial process to integrate social and fiscal value from the outset.

If used for iterative processes, the map should still be reevaluated in terms of evolving infill goals and opportunities. Moreover, the process of creating this map was a process of discovery for the user, of encoding local planning goals and questioning assumptions. For that reason, even iterative application of the UIAF should begin with step one. In future use, this step could include an explicit spatial and design-based analysis to identify edges, centers, and nodes. It could incorporate public participation processes like interactive online mapping or mental mapping.

4.2.2 Step Two: Identify Local Typologies

The typologies technique adapted from Urban3 involves selecting a range of local properties to illustrate the fiscal attributes of locally valued development types. In Turners Falls, this resulted in 22 buildings illustrating commercial, residential and industrial typologies. These buildings are components used for scenario-building to
illustrate how design and density, and therefore redevelopment decisions, affect the urban tax base.

As with step one, testing in Turners Falls involved research using both qualitative, and quantitative information that was more detailed than originally expected. It was first necessary to select a range of properties. Adjustments were made based on consultation with town officials early on. I conducted ongoing analysis to determine whether selected properties were the right building blocks for scenarios. While originally focused on the acreage and tax yield, this analysis expanded to include detail about development context, building (number of stories, age), with description of social and economic relevance from planning documentation. Since the primary goal was to find a strong match between building form and neighborhood context, this step was only truly complete once scenario-building was complete (in step 8).

The Urban3 method was used to ensure the framework had validity among stakeholders, based on a core sustainability concept that sustainable planning requires information reflecting local values. I adjusted this step to more fully align with these values, thereby enhancing the conceptual validity of the typologies. For instance, each building can be associated with social values expressed in planning documents, like the importance of jobs and the local economy, civic or historic pride, housing affordability and home-ownership. In response, Turners Falls typologies include such buildings as Montague’s largest employer (Heat Fab), a new high-quality facility for a local bank, exemplary historic buildings, apartments and owner-occupied homes.
Based on interviews, scenario information grounded in local values (from components, to scenarios and metrics) should exhibit validity in three ways. First, deploying reference points common to all local stakeholders enhances likelihood that all will understand. Second, considering scenarios grounded in realistic possibility helps show this represents achievable potential outcomes. Third, increasing likelihood that options considered will reflect and respect existing neighborhood character can increase acceptance for redevelopment. Overall understanding and acceptance of scenarios by stakeholders presented with this information in the interviews demonstrated the validity of such an approach.

Typologies were tested with town officials in terms of accuracy, both quantitative and qualitative. First, I reviewed selections with the Town planner and made adjustments to better local values. Second, I reviewed the analyzed parcel data with the Montague Tax Assessor. I plotted typologies parcel data, along with photographs, to visualize the range of forms, development density and revenue to further refine the typologies (see Appendix B). The qualitative processes used to select components for building scenarios do not affect the UIAF metrics for capacity and TYPA. Tax yield is normalized to acres, to adapt to any scale or configuration.

Additional research and consultation to learn more about assessments suggested the fundamental basis for validity comes from the rigor of assessment practices themselves. Tax valuation is based on market sales of comparable properties. Factors affecting TYPA variation are really about big differences between building
volume and density. A qualitative process to select exemplary buildings is bounded by the range of values for similar structures.

**Figure 4.1** Tax Yield Per Acre for Turners Falls Residential Typologies
*Ordered from lowest density rural to highest density urban, left to right*

This study assumed that once buildings were selected and analyzed, it would confirm that low-density development corresponded to low tax density in general (see Appendix “Map of Total Assessed Values Per Acre in Turners Falls”). The surprise in Turners Falls was the extent of the TYPA range, despite a very narrow range of real estate values. These are illustrated using residential typologies in figure 4.1. The high revenue ‘efficiency’ value for local buildings already esteemed for historic, aesthetic and
cultural value demonstrated a dramatic connection between subjective and objective, social and fiscal, value (for all typologies histograms see Appendix B).

One limitation to understanding TYPA in Turners Falls resulted from split tax, making it difficult to conduct further tax analysis. It introduces a use-determined component, so that a building’s tax yield changes when all or some of it shifts between residential to commercial. This made Turners Falls slightly more difficult to study but led to no important changes. The map of total assessed values per acre showed that higher density properties produce more tax per acre. Split tax data needed to be calculated and coded by hand so it was not mapped in GIS for this research. However, in a downtown area where commercial and industrial properties about, the split tax enhances the tax density difference in comparison with surrounding suburban and rural areas.

Reviewing this information with the Town Planner illustrated the inherent value of conducting a step that translates design and density into dollars. In Turners Falls, the effect was to validate existing investments in infrastructure, adaptive reuse, and historic properties (Appendix B includes images of each property with descriptions and data). Aside from its role in the framework, this step has promise as a way to enhance local knowledge about the urban environment. Understanding what each building ‘does’ in terms of TYPA can integrate social with fiscal value. Translated into design guidelines, local forms can become starting point for redevelopment. UIAF information translates qualitative impacts of urban disinvestment into metrics that express the positive value of redevelopment in social and fiscal terms.
Step two produces an array of exemplary building typologies to illustrate potential capacity and revenue. Applied elsewhere, this step can incorporate processes to find a fit between building and site, and for typologies to reflect community values and goals. In Turners Falls it was difficult to match form with site until scenario areas were defined. The rest of this process is described in later steps.

4.2.3 Step Three: Asset Mapping

In step three I catalogued information about assets and investment for the entire urban infill area, then mapped it in GIS to display ‘subjective’ and ‘objective’ information together (see figures 3.6 - 3.8). The output showed where investment has occurred, is ongoing or is planned in Turners Falls to incorporate detailed local knowledge into the framework. This included evidence of local, state and federal spending, sweat equity, private investment, preservation, and construction. Places where local stakeholders have already determined investment is warranted encode a range of fiscal and social, individual and collective values. In Turners Falls this included a community garden, private social clubs, a new bridge, several parks and civic buildings. The process went as envisioned, although some investment information could not be mapped. I revisited the initial list in later steps, but this practice needs further improvement.

As a stand-alone practice, asset mapping has tremendous value for community planning. Here, this step is crucial to scenario-building for two reasons. It uses these assets or investments as indicators of existing support for redevelopment, general or in
a specific area. It also locates where there is some existing value that can support future return on investment through urban infill.

The procedures within this step employ cultural heritage planning techniques to integrate social and fiscal, physical and emotional information. As with the previous steps, information was catalogued and mapped through analysis of planning documents, discussion with planner, maps. Feedback during interviews validated the selections because every asset pointed out by participants had been included. For local stakeholders, the existing assets and investments clearly bestowed value on nearby infill parcels, and so were as important to their perception of redevelopment potential as the infill parcels themselves.

While compiling the list of assets to map I recognized that while the process was cumbersome, much of the information changes slowly. Future iterations of would require minimal effort to update. Furthermore, having mapped, co-locating subjective and objective data, financial and anecdotal, natural resources and economic development, a town might find it useful in ways unrelated to the framework. I also experimented with using free online mapping. There are excellent tools that can make UIAF use less technology and resource intensive, and support broader user interface.

The information-gathering process can always be improved. In the process of compiling data other possible sources of information continued to emerge. Some would be easy to obtain, like more Town Meeting documents (I used only the current fiscal year), or several years of building permits to show rehabilitation and additions. Other
data points important to this mapping were unavailable due to privacy concerns, such as public funds and non-profit invested in energy upgrades or home construction. Future use should certainly incorporate building permits for additions and improvements, and state or national historic registry information.

Since an overarching redevelopment goal is to ensure valued community assets are not destroyed, sharing the asset maps with stakeholders might improve participant confidence. I gave verbal assurance to stakeholders during interviews but the underlying knowledge could be made visible to all community members. It would respond to lingering fears that neighborhoods would be destroyed, based on urban renewal practices of the past. Finally, this process could be further improved based on growing expertise in community asset mapping.

4.2.4 Step Four: Opportunity Mapping

This step repeats procedures from the previous step, this time to catalogue and map capacity. Data points representing disinvestment and disappointment become an additive assessment of ‘opportunity’ sites. In Turners Falls this included vacant and underused parcels, as well as brownfields and possible adaptive reuse. In order to remove some of the perceptual barriers, for myself and town officials, I reframed queries in terms of a twenty-year planning horizon to expand the sense of potential.

This step was originally designed to rely upon a quantitative technique deployed in the California Infill study which uses low improvement-to-land (I/L) ratio (assessed
improvements divided by assessed land values) to identify these ‘refill’ parcels. The logic of this simple metric is that when a building’s value is low in relation to the land beneath it, the parcel is ready for redevelopment. In the California study non-residential parcels with an I/L value of 1.0 or less, and residential parcels with an I/L value of 0.5 or less, are ripe for change (Landis, 2006, p. 716). In Turners Falls, I calculated ratios, intending to select a locally-relevant threshold expressing the point at which local buildings have outlived their use. I mapped the I/L values to conduct analysis that would help select this ration, and found problems. For instance, the highly valued residential areas just beyond the urban infill boundary had extremely low (poor) I/L ratios in comparison with neighborhoods with lower housing values (see Appendix E, “Map of Improvement to Land (I/L) Values Turners Falls”). Once again, a UIAF step designed to rely heavily upon quantitative methods required a shift towards rigorous mixed methods processes.

The mapped I/L values showed poor association between that data and site conditions based on my local knowledge and observations (see Appendix E). In addition, mapping I/L ratios alongside the assets and opportunities data revealed conflicts. Discussion with the Tax Assessor revealed the logic of I/L ratios may have limited validity based on the locally relevant tax assessment methodology governed by professional standards, state law, and municipal policies. The resulting distribution of value between parcel and building may not produce a meaningful indicator for redevelopment.

The opportunity data is somewhat subjective, and accuracy a moving target. Once the list was compiled, I met with the Town Planner to identify which infill parcels
were truly developable. Some had problems with site conditions (Turners Falls has
abundant rock ledge). Other parcels were perceived as unavailable due to issues of
ownership, past failures, site condition or current use like free parking. I kept these on
the list of potential infill, unless the parcel was already an asset. The validity of this
categorization was tested in interviews as well. In several instances, information
indicating a parcel had no potential for redevelopment was contravened by a key
stakeholder, or vice versa.

In terms of the framework, the primary validity of opportunity mapping is
conceptual, based on its ability to expand the vision of urban infill potential. Dispersed
infill parcels of any size are compiled through an additive assessment to provide an
initial vision of developable land in the downtown, individual parcels of any shape and
size representing dispersed urban infill potential. This vision is refined in steps eight and
nine. A contrast between the short list of vacant parcels in Turners Falls, and the
extensive infill opportunities revealed with a more inclusive (and long-term) view,
underscores the distinct goals of the UIAF and therefore the conceptual importance of
this step within the entire framework (see Appendix L “Downtown Turners Falls:
Livability Plan Map of Vacant and Underused Land”). This highlights the importance of
additive assessment. Furthermore, abundant conflicting information underscored the
importance of questioning assumptions that have previously limited views of urban infill
potential. This insight mirrors findings from step one, creating the urban infill boundary.
From the failed I/L value methodology comes a caution. In the absence of local knowledge or corroborating data, fiscal analysis for redevelopment can undermine social goals. The California study used extensive GIS analysis to consider social context based on real estate values and development types. However, the failure of this core method to correspond with other measures of value and opportunity in Turners Falls raises a concern about using any decontextualized data analysis. This, in turn, supports a general finding that the framework as an interconnected set of procedures is just as important as the information generated, testing and contextualizing the information in ways that standalone measurement does not. This step would be improved by customization at the local level, to identify sources of information and processes to reconcile conflicts.

4.2.5 Step Five: Find Congruence

To find congruence I conducted analysis to find redevelopment locations with the physical capacity for change, the social capacity and assets to support and sustain positive change, and the potential for a good return in terms for the community and municipal budget. The Turners Falls assets and opportunities data were mapped together so I could look for co-location of assets alongside opportunity, possibly good conditions for redevelopment. I conducted an iterative process of analysis, feedback, and information gathering. Colors, shading and emphasis were altered to look for areas where value (public, private, civic, cultural, historic, commercial, infrastructural) and
opportunity (infill, refill, improvement, growth) coexist (see Appendix G, “Samples of Maps Examined for Congruence”). I selected several preliminary areas, then revised that map with the Town Planner. I revisited each site on foot with parcel maps in hand, and a camera. This added procedure helped reconcile information from the constructed data environment (maps) with the real physical environment (sites).

Information was added from site visits like specific assets and opportunities missed in mapping, as well as clues to better define an area in which congruence would be established. This step was originally designed as a visual qualitative analysis of the mapped data before moving on to site selection, a quick transition from mapping to scenario-building. But it was changed to become a distinct step in the UIAF based on testing in Turners Falls. To help interpret mapped information I applied two concepts. First, from Urban3 the concept of return on investment (ROI) dictates that existing investment alongside capacity provides favorable conditions for return. In Turners Falls this concept was applied broadly to mean colocation of existing investment (fiscal and social) and infill potential (spatial). It could be more fiscally driven, or adhere to a specific formula such as natural assets near room for housing. The second concept is spatially targeting reinvestment. Adding infill where there is already investment can build critical mass for urban vitality. Or, infill can target investment where it has been lacking. In Turners Falls I selected areas based on the study goals, looking for significant potential for physical and revenue growth alongside assets valued by the community.
When I met with the Town Planner to review several possible congruence areas he added two more (see Appendix H, “Maps of Turners Falls Sites Considered for Scenario-building”). He questioned the conspicuous omission of the historic main street (Avenue A), a focus of ongoing investment in design and streetscape improvements. The high value of these blocks notwithstanding, low infill and refill capacity mean low opportunity potential. However, portions of this streetscape were included in two final scenario areas because of their important assets.

One limitation is that some key data could not be mapped, like the massive CSO investment, some of this data was critical to accurately apply concepts of targeting and ROI. To compensate, I revisited selected materials to factor in some natural assets like views (map of “Scenic Resources and Unique Environments” (Open Space Recreation Plan, 2010), and to be mindful of vulnerable populations and neighborhoods (Community Development Plan, 2010).

This step was difficult because it was technology heavy, with six layers of GIS data (assets and opportunities based on planning documents, assessed property values and I/L ratios). From planning documents and consultation there were forty individually mapped data points, and an almost equal number of extra maps and individual assets or opportunities that could not be mapped to still consider. While labor-intensive, this step is at the same time highly conceptual. Despite abundant information, the core challenge in this step comes back to spatial complexity, and how to grapple without resorting to urban renewal’s clean slate, or subtracting layers. These procedures need much more
testing and improvement. Yet the process itself was highly successful in terms of the research goals. Conducting this analysis radically changed my perceptions of urban infill potential in Turners Falls. While the output of step five congruence analysis is needed to proceed with the UIAF, its true value may be that it changes the planner’s vision.

This step requires further refinement to make it more reliable, simple, and transferrable, but it can’t be skipped. It is the connecting point in the framework between creating components, and building scenarios, integrating all forms of information about capacity (infill opportunity) and context (assets). Improved use of spatial analysis in GIS would add a quantitative notion of congruence, such as bounded areas with a defined percentage of asset and opportunity parcels. Additionally, improved map design would improve analysis and feedback. It was difficult to convey to Town Planner the detail necessary to identify congruence areas. At the time of testing I was not sufficiently aware that these observations provide information and analysis vital to all remaining steps. In other places, planners should structure site observation procedures in terms of upcoming steps to document neighborhood character and uses, define final scenario boundaries, and categorize parcels for scenarios.

A final recommendation for future iterations is to consider how this step might be guided by a concept that embodies specific community values. For instance, Cleveland’s redevelopment vision proposes a specific blend of local assets and opportunities: “New urban landscapes that better serve communities...sustainable, distinctive neighborhoods with more distinctive and valuable housing surrounded by
**repurposed land** providing community benefit.” [emphasis in original] (Mallach and Brachman, 2013, p 51). Embedded in this vision are spatial concepts – walking connections, neighborhoods surrounded by recreational opportunity - that can guide a search for congruence.

### 4.2.6 Step Six: Define Scenario Sites

This step defines scenario areas for which infill potential can be measured in terms of capacity and TYPA. For the purpose of testing the UIAF in Turners Falls, I needed to select three scenario site areas. Generally, the same concepts applied in step five were used to shape potential scenario areas. Here it is applied at a finer scale. Possible sites with loosely defined boundaries were evaluated in detail using parcel-level and context information. To complete the final selection, I created a comprehensive list of attributes for each area to evaluate and compare like residential character, dominant uses, streetscape and density. The scenarios were chosen to fulfill research goals, to demonstrate methods to assess spatially complex urban areas. I selected three highly distinct areas to illustrate how UIAF metrics can overcome complexity to understand an individual site, and to compare across varied projects. Each includes a balance of assets and opportunities, but more importantly consists of multiple parcels with infill sites interspersed among features including historic buildings, commercially active sites, and natural resources.
I excluded two large urban redevelopment parcels from scenarios because of size and context; the Railroad Salvage and Strathmore Mil properties are large, uniform, and not situated within a spatially complex context. It turned out that redevelopment of these parcels had recently stalled again based on problems with abutters. Since they have received major investment in stabilization and study they are mapped as assets. These sites were important to the study as uniform sites with which to compare data from the three UIAF scenarios (see step seven), and as large sites to test for participant bias against spatial complexity in interviews (see step ten).

While concepts have been important to the previous steps, this is a critical point in the framework where place-based redevelopment goals provide the criteria to define scenarios. In Turners Falls this meant the research goals. Alternatively, the scenario building might be used to consider the tax tradeoff on various sites for civic uses (library or senior center) versus private development, or to compare where the town might get the most TYPA ROI from public infrastructure investment. The importance of goals to make sense of the scenarios highlights that the Urban Infill Assessment Framework was not created to measure abstract fiscal value.

For this study, it was important that sites dramatically manifest distinct use and character so interview subjects could perceive the divergence. This was intended to highlight the ability of capacity and revenue data to facilitate comparison across divergent types of projects. In the same way, it seemed important to include at least one conspicuous opportunity parcel, something that Turners Falls residents had
expressed a desire to see change. To apply the UIAF in other sites, criteria based on specific redevelopment goals would be useful to set priorities among a large numbers of scenarios. This goal-setting provides conceptual guidance, but goals will also be tested and refined through the UIAF procedures.

Given the research focus on spatial bias and configuration, the question of scale should be more explicit in the framework. In Turners Falls the hypothetical site-assembly to create scenarios was an opportunity to encode social value in terms of appropriate neighborhood scale. Primary influences were the overall size of the urban infill area, and the scale of locally-defined neighborhoods within it. This step needs better procedure to improve scenario definition, ideally locally defined. Practices from neighborhood-based planning could help ensure that the social importance of scale is not eclipsed by spatial and fiscal approaches driven by design and profitability.

4.2.7 Step Seven: Categorize Parcels

With final scenarios defined, step seven assigns a new category to each parcel with each scenario; infill, refill, upgrade, or no change. The infill and refill parcels are used to calculate acreage for the redevelopment. Adaptive reuse, property upgrade and intensification of use are critical complementary activities to infill and refill. These are outside the scope of this work. However, since redevelopment can spur reinvestment into historic and underutilized structures ‘upgrade’ or ‘no change’ data was retained to permit future analysis in Turners Falls on benefits that redevelopment might confer.
To compensate for the failed validity of I/L data, I relied on assessors data mapped earlier as the quantitative data on identify opportunities and assets. Upgrade parcels generally had total assessed values below average, or some observable characteristics indicate a need for investment. ‘No change’ parcels included mapped assets, parcels with total assessed value above median, or with observable characteristics indicating investment activity. Conflicting data was resolved parcel by parcel. If step five is driven by spatial concepts, and step six by local goals, then this step was primarily guided by place-based detail. Before the ‘final’ parcel categories were assigned, social values like social justice, local economies, and historic preservation are revisited to avoid negative outcomes of redevelopment like displacement and loss of physical assets. This was possible because cultural planning approach brought this information into the framework early on.

**Figures 4.2 and 4.3** Residential and Commercial Redevelopment Potential

The California Infill study uses contextual analysis of real estate values to avoid areas where promoting infill would hasten gentrification and displacement (2006, p. 82).
In Turners Falls, a recent planning process documented similar fears that redevelopment of undervalued residential properties will negatively impact affordable housing and vulnerable residents (Montague, 2013(b)). This must be reconciled with a need for strategies to improve aging housing stock, and to increase options overall. Unfortunately, with no housing replacement strategy at the local, regional or state level, I chose to exclude most residential properties from final scenarios used in this study.

<table>
<thead>
<tr>
<th>Site</th>
<th>Median Value Per Acre</th>
<th>Mean Value Per Acre</th>
<th>Lowest Value Per Acre</th>
<th>Highest Value Per Acre</th>
<th>Total Acres</th>
<th>Overall Value Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avenue A</td>
<td>168,831</td>
<td>276,335</td>
<td>23,636</td>
<td>891,587</td>
<td>15.72</td>
<td>255,381</td>
</tr>
<tr>
<td>K Street</td>
<td>1,342,808</td>
<td>1,311,808</td>
<td>50,000</td>
<td>5,485,000</td>
<td>7.82</td>
<td>1,242,608</td>
</tr>
<tr>
<td>First Street</td>
<td>1,092,596</td>
<td>1,109,278</td>
<td>1,481</td>
<td>3,206,666</td>
<td>13.86</td>
<td>665,663</td>
</tr>
</tbody>
</table>

That simple choice had an unexpected benefit for the interview process. Some participants echoed concern about redevelopment impacts on downtown residents. They were relieved that residences were excluded from consideration. The specific parcel designations were not presented to interview participants because the level of detail would be overwhelming, and discussion of parcel detail distracting. However, all final parcel designations were reviewed with the Town Planner.

\(^2\) All figures use Total Assessed Value, which includes buildings, improvements and land.
The parcel-by-parcel categorization and mapping is similar in detail to a completed urban renewal plan (Massachusetts DHCD, 2013). However, this redevelopment parcel identification is hypothetical, not a final output. The distinction seems important, because some interviewees expressed a desire for accuracy and detail that is inappropriate for preliminary assessment. The most precise project study can be rendered inaccurate by changing circumstances. Two large Turners Falls projects just encountered new barriers. The value of using scenarios to generate simple information, fast and frequently, may need to be demonstrated by common use. This relates back to the four-step development processes, and why assessment is a distinct phase that precedes detailed decision-making and site preparation (table 1.1). But it also points to the UIAF as a tool for planners to re-engage with forecasting (Isserman, 1984).

Table 4.3 Turners Falls Project Acreage: Study Scenarios and Existing Projects

<table>
<thead>
<tr>
<th>Potential Redevelopment Sites</th>
<th>Infill Acres</th>
<th>Refill Acres</th>
<th>Infill + Refill Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avenue A Site: Industrial zone</td>
<td>3.87</td>
<td>8.85</td>
<td>12.72</td>
</tr>
<tr>
<td>K Street Site: Residential</td>
<td>0.21</td>
<td>1.99</td>
<td>2.20</td>
</tr>
<tr>
<td>First Street Site: Civic &amp; cultural</td>
<td>1.8</td>
<td>3.42</td>
<td>5.22</td>
</tr>
<tr>
<td>Strathmore Mill Complex: Adaptive Reuse</td>
<td></td>
<td>1.93</td>
<td>1.93</td>
</tr>
<tr>
<td>Railroad Salvage: Brownfield and Historic Mill Ruins</td>
<td>2.91</td>
<td></td>
<td>2.91</td>
</tr>
<tr>
<td>St Ann’s Church &amp; Rectory: Adaptive Reuse</td>
<td>0.2</td>
<td></td>
<td>0.2</td>
</tr>
</tbody>
</table>

While redevelopment of refill proceeds the same as a vacant parcel once the old building is cleared, the process of identifying infill potential for built sites makes refill
different in two ways. There are special considerations, like potential for adaptive reuse, that can involve different steps like consulting local historic preservation experts. Moreover, refill must overcome a perception that the parcels are not available for redevelopment. It is difficult for people to envision something new where there is nothing. It is even harder to see change where there is a structure. This perceptual barrier must be breached to change the vision of redevelopment.

The significance of translating complex scenario areas into numbers cannot be overstated. This step makes it possible to measure capacity for scenario areas containing varied uses and forms, and dispersed infill parcels (table 1.1) in Turners Falls, this means that spatially complex infill areas can be compared with brownfields, adaptive reuse or other uniform redevelopment sites (see table 4.3).

Procedures to identify refill should be refined and attuned to local conditions. Subjective ‘filters’ applied to evaluate parcel categories would differ from place to place. In Turners Falls removing residential parcels solved some problems. It caused others, not the least of which is failure to address housing quality and making areas in need of reinvestment largely off-limits. Redeveloping some parcels can have negative real or political outcomes, but excluding too many properties based on accumulated negative perception undermines redevelopment options. Very low value and abandoned residential properties could be vetted in collaboration with town officials, residents and property owners. Ideally, this step would include procedures to revisit assumptions.
about individual parcels. Urban infill sites may be burdened with negative perceptions accumulated over decades. This step reframes the view, parcel by parcel.

4.2.8 Step Eight: Match Components

The previous steps produced outputs that contribute to scenario-building. This step matches the two main components, infill parcels and buildings. The pre-selected typologies provide an array of building forms endogenous to Turners Falls. These ensure redevelopment scenarios will fit with the character of the urban infill study area. Despite the small scale of these scenario areas, the mix of architecture and uses made it difficult to match buildings to infill parcels. I used an iterative process that started by choosing a few buildings for each scenario area. Then I evaluated the fit, and adjusted building selection. The need to simplify was substantially aided by a decision to apply the transect concept (see Appendix J, “IRUN Maps: Transect Lines and Baseline Scenario Selections”). With information from site visits and orthoimagery I delineated ‘subzones’ honoring transitions in character based on uses and development forms (CNU and Crawford, 2004). Each subzone was easier to match with just one building form.

Applying different forms to subzones showed how choices could reinforce, or change, neighborhood character. Final selections included two sets of building types representing low, and moderate density options. The low-density forms that would typically be allowed ‘by right’ - low-density single-family homes and cheap single story commercial structures - illustrate development that is likely to occur. Once I determined
that low-density scenario, it became a baseline against which change was measured. The higher density scenario buildings featured compact footprints and more stories, still within the limited ‘urban’ forms endogenous to Turners Falls (see Appendix F).³

I ran test scenarios with the highest density forms to look at more dramatic revenue figures. They were not used because they emphasized persuasion, rather than comparison. Scenarios used for interviews did not challenge uses or neighborhood character, but some interview participants wondered aloud where the numbers would go if, for instance, an industrial area became more like the adjacent residential area. Comparison sparked creative thinking for many stakeholders, beyond what was presented to them.

Originally, this step was going employ a quantitative method adapted from the California study to define context by identifying “neighborhood-consistent density” in target neighborhoods using parcel data (Landis et al, 2006, p 703). But qualitative methods were able to incorporate consideration of density and use to produce a context-sensitive fit. This makes the step easy to replicate with little technology.

Using endogenous forms for infill promotes consistency with community values. In Turners Falls the typologies were previously validated with the planner. When presented in stakeholder interviews the building forms were accepted, often affirmed. The use of endogenous forms is also consistent with other important redevelopment

³ Floor Area Ratio (FAR), or total building areas divided by the site area, is more commonly used but can be confusing for non-experts and translates poorly across development types.
strategies like historic preservation, adaptive reuse, and design guidelines. In Turners Falls widespread investment in historic preservation and rehabilitation demonstrate commitment to these values. This approach provides an alternative to development proposals featuring real estate products that fulfill the goals of external investors but not communities (Leinberger, 2008).

The clumsiness of my initial efforts to match building and parcel highlighted a core redevelopment challenge; bridging the gap between problems affecting individual parcels, and broader redevelopment goals and solutions. It requires processes to build up to a scale that has impact, while focusing in to solve problems. Like step six, this step works in the gap between detailed specificity, and the larger scale needed for redevelopment to succeed.

The Scenario I baseline amounted to a simple forecast. Interviews revealed an unintended benefit in this approach. Using buildings that produced low numbers and likely changes helped establish validity for the scenarios, and thus for the resulting metrics. Unforeseen during research design was how this might relate to the larger question of the planner’s role. Starting with ‘do nothing’ scenarios shows what is likely with no intervention, no redevelopment planning. It incorporates another form of comparison - comparing what happens when planning is reactive versus proactive.

The UIAF was applied in Turners Falls to test research questions. When used elsewhere, these questions need to be clarified. For instance, if the goal is to evaluate tradeoff from a proposed high-density development, then that is a baseline scenario.
Lower-impact scenarios can then illustrate context-sensitive alternatives. Participatory planning practices can bring more stakeholders into the process of deciding what belongs where, and why. An example from rural planning is a ‘chip game’ played among rural stakeholders. To translate ideas of density and zoning into development and conservation impacts, participants place chips in configurations based on land use choices. The community compares outcomes, or scenarios; chips on 1-4 acre parcels show how large-lot zoning impacts farmland, chips lining existing roadways with farmland behind show another common form of rural sprawl, and chips focused in one area emphasize place-making and conservation (Flinker and Kelly, 2011). This step can be an opportunity for local stakeholders to experiment with the interoperability of zoning, density, design and revenue.

4.2.9 Step Nine: Run Scenario Levels

From step seven came the ability to compare the capacity of diverse projects in Turners Falls. Here, the building-parcel fit from step eight generates revenue metrics for each scenario. Building form TYPA were applied to infill parcels, as dictated by scenario parameters. This provided an opportunity to measure what was included, as well as what had been excluded from scenarios. In the Avenue K area, site visits had revealed a plethora of underused barns and garages. I wanted to calculate infill potential for residential parcels that could have an Accessory Dwelling Unit (ADU), to add housing without destroying existing units. However, the Town Planner could find no existing ADUs downtown for me to add to the typologies. The observed unused capacity,
corroborated by a lack of existing ADUs, highlighted a special opportunity. With that information, the town could shape new strategies or programs to make better use of the properties and infrastructure that serves them.

If the components are valid and matches made carefully, this step is just a calculation. The redevelopment scenarios use building forms identified as having social and fiscal value, targeted to areas where the presence of assets demonstrates social and fiscal value. The metrics should, therefore, support decision-making that honors both. This is the culmination of a set of procedures to generate information through the UIAF. With capacity and revenue metrics, spatially dissimilar projects with similar fiscal benefit can be easily compared (Table 4.4).

Table 4.4 Turners Fall Greenfield Development and Redevelopment Comparison

<table>
<thead>
<tr>
<th>Suburban Office Park Expansion</th>
<th>Urban Infill Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>93 acres</td>
<td>20.14 acres</td>
</tr>
<tr>
<td>$573,600/yr tax yield</td>
<td>$669,972/yr tax yield</td>
</tr>
</tbody>
</table>

(Montague, 2012)

Revenue-driven scenario-building may be the right starting point for some communities. Alternatively, scenarios can build on forms that reflect a historic building
inventory or design guidelines. They can be geared towards planning goals, like targeting investment or population intensification. Small municipalities may never have the resources to execute these sorts of redevelopment plans. But assessment may reveal opportunities or barriers, like existing zoning and ordinance that prevent fast and predictable outcomes, a pre-requisite for developer profitability. Clarity about desired outcomes, to borrow a core concept from Form-Based Code, attracts investment and focuses scarce resources like grants and financing to help bridge a profitability gap where rents per square foot may be a fraction of those in more affluent towns and metropolitan areas. Finally, the UIAF can be a tool to assess proposed developments and explore alternatives that add value in the community’s terms (Minicozzi, 2013(c)).

4.3 Step 10: Interviews or Decision-making

The output of the last step is nine pairs of numbers; composite capacity and TYPA for three scenario levels, for each of the scenario sites. To test whether this simple information about spatially complex urban infill can change perceptions of infill, I conducted interviews with ten Turners Falls stakeholders. This step simulates the use of framework information to see if assessment bridges that gap between with local planning goals and decision-making. Assessment tools can promote the informed and meaningful participation of stakeholders like board members, committees, advocates, property owners, business people, and residents. Interviews tested framework data.
Interviews addressed the third research question: Does the framework information change the vision of redevelopment potential for Turners Falls’ stakeholders? If poor information impedes urban infill, can the UIAF help stakeholders see potential by conveying information about capacity and value? They elicited responses about where stakeholders perceive existing redevelopment potential in the Downtown area, evidence of spatial bias, and indications that simple information could offset negative perceptions of complex redevelopment.

An unexpected finding was that interviews yielded feedback on the basic framework components, not just the capacity and revenue data. This feedback was included as part of earlier steps’ validity. Most accepted the study area without comment, but several vocally affirmed the urban infill boundaries. Only one participant challenged the selected area, based on the exclusion of the two suburban industrial parks so essential to the local economy. Reacting to images of buildings selected for scenario-building, some were actively affirmed, all were accepted without objections. Using boundaries and buildings that were well-received set a positive tone for interviews, giving validity to the UIAF, but also illustrating the value of locally-derived information in establishing a positive environment for decision-making.

I conducted interviews with Turners Falls stakeholders in their offices and in Town Hall. Each person was asked to respond to the same set of prompts (see Appendix F.9 “Interview Form Template”). This was done without discussion or description of the research, to avoid influencing responses. In semi-structured interview activities
participants demonstrated their existing priorities for redevelopment by circling areas on a map of the Turners Falls urban infill area, then on a different map rating the three UIAF scenario areas 1-10. Then they reviewed ‘scenario cards’ showing the results of step nine, with images to illustrate the scenario context and typologies used. Having seen acreage and revenue data, they were asked to repeat the first two processes to show how new information affected their perceptions of urban infill potential (see Appendix F). After these activities, we transitioned to an unstructured interview format where subjects shared ideas about barriers and benefits to redeveloping the scenario areas. A summary of the interviews will be conveyed to the Montague Planning Office.

4.3.1 Interview Response Analysis: Map Drawings

The stakeholders were not a random sample. Every person interviewed stands to gain - professionally, personally or financially - from redevelopment in Turners Falls. They are therefore less prone to spatial bias against infill and refill than a random sample from the local community. Nonetheless, with only ten buildings downtown built since 1999, negative expectations for infill are based on experience (table 1.2).

Another form of spatial bias was ongoing adherence to Euclidean zoning’s separation of uses. This showed in participant concern about how current uses in certain areas (industrial, commercial, drive-thru, recreational) might impact future redevelopment. The scenarios presented did not dramatically alter use or character, making it easier for participants to envision change without needing to resolve the issue.
Nonetheless, adherence to separation of uses may have contributed to an aversion to considering residential areas, as vocalized by four subjects (and possibly felt by others).

Map 1 responses summary: Participants were given a map of the urban infill area and asked to circle several areas where investment, public or private, ought to be directed. Results from the first maps were as follows:

- 8 out of 10 selected the two large sites along the canal (Railroad Salvage and Strathmore Mill). Six selected both, and two selected one or the other.
- 5 of 10 people selected St Ann’s, a large church and rectory near the downtown center slated for adaptive reuse.
- 4 people selected individual parcels within the Livability Plan map area.
- 5 selected multi-parcel areas within the Livability Plan map area.
- 6 people selected some multi-parcel areas at all (including two who circled most of the downtown area), but most circles were around a single parcel.

These responses produced findings relating to spatial bias. There was evidence of significant bias towards the big, single-parcel redevelopment opportunities. There was strong focus generally on single-parcel infill sites. However, more than half of the respondents did include one or more spatially complex areas on this first map.

The accompanying commentary revealed an unexpected finding: responses reflected significant progress in planning related to urban redevelopment overall. All demonstrated understanding that brownfields can and should be reused. None questioned the value of historic preservation and adaptive reuse (with the exception of disagreement over the ruins of an old mill). Several demonstrated awareness of social justice concerns around gentrification and displacement. While some feared the scenarios implied urban-renewal style removal of all buildings, no one openly expressed
a desire to do so. There was no evidence of the core spatial bias embedded in the urban renewal of a previous era – a belief in a linear cycle of urban decay.

**Map 2 responses summary:** After detailed review of the three scenarios within each of the three scenario areas, subjects returned to a fresh map to circle areas where investment ought to take place. The changes from map 1 were as follows:

- 4 people added circles closer to the center (mid-point of the 1-mile Avenue A).
- 2 more people who already had circled the entire downtown core refined the boundaries to be more precise but still multi-parcel.
- 7 people added, or expanded circled areas along Avenue A (main street), particularly near the Avenue A scenario area.
- 6 people enlarged the circled areas for the 2nd map, encompassing more parcels.
- 2 people made no changes, 2 more almost no changes between maps 1 and 2.
- 8 who had the brownfields properties (RR Salvage and Strathmore) kept them.

The second maps showed increased interest in redevelopment areas with spatial complexity – multiple parcels, mixed uses, unofficial boundaries. The map results showed evidence that framework information influenced some stakeholder’s perceptions of urban infill potential in Turners Falls.

**4.3.2 Interview Response Analysis: Scenario Ratings**

After circling their choice of areas for investment on map 1, participants reviewed a map of the three study scenario areas and rated them based on their own subjective and objective knowledge. A trend evident in the maps drawings was borne out by these first ratings; many were intrigued by the possibilities of the Avenue A scenario. Some noted surprise at having overlooked this area’s potential. Participants remarked on the site’s opportunities and assets; abundant underused parcels, its
function as a gateway for visitors, proximity to popular neighborhoods, adjacency to the canal and bike path, and the importance of jobs and industry located there. Positive attributes of Avenue A were also described in contrast with the other scenarios, like a lack of residents to disturb with redevelopment, and a lack of historic buildings to disturb as well. However, despite strong vocal interest, the overall ratings on the first scenario map gave the First Avenue scenario (near Town Hall) the highest composite score (74). The K Street scenario was second (72), and Avenue A scenario the lowest (69) (See Appendix K, “Table of Results from Interview Ratings”).

Next, participants were shown Side 1 of the three ‘scenario cards’. This side has context and typologies photographs, and a scenario explanation. The capacity and revenue data are only on the reverse, Side 2. After some discussion to establish subjects understood the information, they were asked to flip over the card that most intrigued them to see capacity and TYPA. Six out of ten people selected the Avenue A scenario first. First Street was next (3), then K Street (2). This indicates that preference for Avenue A may have preceded uptake of the acreage and TYPA data.

In the second round of ratings Avenue A with 74 points nudges First Street (72) out of first place, and K Street (69) drops to third. Avenue A gained 11 points in ratings overall, First Street gained 5, K Street gained 0, and all saw movement in both directions. There was an overall gain in points for all scenarios, from 215 to 226 overall. This rise is not statistically significant, but more points used overall may indicate some increased comfort with complex redevelopment scenarios. With limited interviews it was not
possible to discern whether the metrics, the illustrations, or the power of suggestion removed a cognitive barrier. A larger sample size would be needed to more accurately understand shifts in perceived value for redevelopment scenarios, or for infill in general.

4.3.3 Interview Response Analysis: Participant Narrative

The high degree change between the first and second maps, and between the two sets of scenario ratings, indicates that the UIAF information is changing the perception of urban infill potential. Previous bias against spatially complex areas may have arisen from basic uncertainty, not negative perception of value. In that case, assessment information would be affirming, not influencing, how infill is viewed. This is no less important. This study proposes that structural bias against infill may be self-perpetuating, with weak knowledge about infill hampering redevelopment. Increasing infill expertise is a matter of increasing familiarity, confidence, and knowledge.

Participants asked questions and spoke aloud while engaging in the map and rating activities. In general, interviewees spoke more as they became comfortable with the process and the information. Afterwards, interview subjects were also prompted to describe the benefits and barriers to redeveloping each of the scenario areas. Below, a compiled content analysis of participant narrative describes their perceptions of infill potential, and challenges to reaching that potential. Some echo recent planning initiatives, others long-term goals or problems. The goals cited by subjects are organized thematically with citations for corresponding local planning documents to illustrate how interview subjects were linking the scenario information to planning goals:
• Downtown Revitalization: How far it has come, optimism about the future of the downtown, importance of focus there, improvement unforeseeable even a decade ago. *Downtown Livability Plan* (Montague, 2013(b))

• Gateway(s): The importance of all three major gateways in conveying a positive impression to routine and infrequent visitors. *Tourism Wayfinding Plan*. (Montague, 2010(d))

• Infrastructure costs, and budget: Increase tax rolls, redevelopment as source of funding to replace aging infrastructure, *Regional Sustainable Master Plan* (FRCOG, 2013)

• Natural and Cultural Amenities: Great bike path and parks, keep building entertainment and dining venues, arts and artists, more needed like river access to boat and swim, skate park *Opens Space and Recreation Plan, Creative Clusters* (Montague 2010(d); UMass LARP, 2004)

• Historic Preservation and adaptive reuse: Pride in historic Main Street, fear of losing structures to neglect. *St Ann’s RFP*. (Montague, 2013(d)); ambivalence about future of unused mill structures. *Strathmore Study*. (Montague, 2011)


• Market Rate Housing: A need for more, value of current residential neighborhoods, concern for ‘gentrification’ or displacement of low-income residents, and at the same time fear there is already too much low-income housing downtown. *Housing Plan*. (Montague, 2004)

• Money – Lack of it, things that might attract investment. *Livability Plan, Community Development Strategy*. (Montague, 2013(b); Ibid, 2013(a))

One surprise was how little interview participants focused on the metrics. Some asked questions to clarify, but the information was never challenged. Most stakeholders moved quickly from comprehension to discussing scenario options in light of infill-related goals. They made a mental leap, from comparing capacity and revenue data for three scenarios, to using the data for more complex deliberations. They applied the new information about capacity and revenue to cognitively construct a comparative framework in which to assess the value of certain locations (scenarios site, and locations of their choice) in light of specific planning goals. This shows the framework information
fulfilling its intended role; bridging a gap between goal-setting and decision-making, in order to proceed to site-preparation for redevelopment.

4.4 Major Findings

The main result of this research is a revised ten-step Urban Infill Assessment Framework. It contains within it methods, adapted through testing, to generate measures of tax efficiency and additive assessment for spatially complex redevelopment scenarios. This study’s three main findings are based on observations from creating, testing, and adapting the framework, as well as from interview responses.

4.4.1 The Importance of Qualitative Information and Analysis for Measurement

The framework was designed to generate simple, quantitative outputs that express infill’s fiscal and spatial potential. The two core methods adapted to measure TYPA and composite capacity incorporated qualitative aspects of the built environment, individual buildings and neighborhood context. Adaptation for use in Turners Falls required simplifying methods to enable them to be replicated by small-resource planning offices. But equally important, and unexpected, was a finding that framework adaptation required increased reliance upon qualitative information and analysis to make it work for a small-scale urban setting.

Gathering sufficient information to assess infill potential for small places requires qualitative information for accuracy, validity, relevance and acceptance. In small places, with small assets and opportunities, the quantitative data environment is limited.
Physical improvements may be too small to find through building permits or rising assessed values, but observations and research reveal investments (including sweat equity) like home façade improvements and community gardens. Official traffic studies and census counts rarely provide the level of detail needed for redevelopment planning at neighborhood scale, but use patterns and the social importance of certain amenities can be discovered through place-based research including observation, planning documents, and existing community surveys.

The shape and scope of quantitative information sources too often shapes redevelopment plans because it seems accurate. Qualitative information can perform similar functions, often better. When catalogued and mapped together, the integrated quantitative and qualitative data provide a more accurate information base, and a better picture of place-based characteristics and phenomena emerges. This finding is consistent with the overarching sustainability planning concept guiding this study, which proposes that successful sustainable development outcomes require integrating subjective and objective place-based data to create information for use in decision-making that reflects place-based values.

4.4.2 The Importance of Concepts

The second finding flows directly from the first. To integrate subjective and objective information, and conduct mixed methods analysis, requires conceptual guidance at critical points in the framework. I had expected to use a quantitative basis for many decisions like selecting building forms or refill parcels – to look for highest and
lowest quantitative values based on local-determined thresholds. The limitations of this quantitative approach became clear from testing the framework in Turners Falls. Instead, concepts provided a firm basis for analysis and decisions. Therefore, the second finding is that the framework is not a set of mixed-methods procedures, as originally conceived. Rather it is a structured application of concepts, within which mixed methods are used.

The concepts are necessary to generate measurement that has relevance to local redevelopment processes. Capacity and revenue metrics can be calculated for an entire urban area, with no contextualization or strategy - interesting, but not useful for decision-making. In Turners Falls, I relied upon three main concepts that had been used to create the UIAF. They guided analytical procedures within certain framework steps, in order to generate metrics that would be useful for redevelopment planning:

- **Targeting**: directing reinvestment to achieve critical mass where investment has already occurred, or to spur revitalization where investment is lacking.
- **Regeneration**: the fiscal and social impacts of dispersed investment.
- **Efficient land use**: fiscal and social benefit measure per spatial unit, to maximize return on investment (social and fiscal, existing and future).

The concepts frame questions. Specific answers depend upon local planning goals and the purpose for which the framework is being used. This research looked for three comparative scenarios with substantial capacity. Used elsewhere, conceptual guidance would come first from local infill goals. Then the concepts create an analytical framework for considering ways to best meet those goals. A concept-driven framework
is also more adaptable to varied planning environments. The mechanics of method matter less than fulfilling the intention of each step.

4.4.3 The Importance of a Process-Driven Approach to Urban Infill

The simplicity of the framework’s capacity and revenue metrics help overcome the barrier of spatial complexity that inhibits perception of infill’s potential. As a local resident, I knew that Turners Falls had untapped redevelopment potential based on the abundance of impervious surface. But as was probably the case for some interview participants, I already knew there was potential. The metrics affirmed that perception with quantitative expressions of value. Instead, it was the process of testing the framework, and struggling to adapt and improve it, that profoundly changed my understanding of a place I thought I knew.

Using the framework influenced my perceptions; The process of integrating quantitative and qualitative information and applying concepts to make sense of data, which in turn improved my understanding of the concepts themselves. In turn, conducting these processes structured further inquiry; site visits, expert consultation, revisiting planning documents and data analysis.

Conducting the procedures within each step, moving from step to step, was a process of discovery for me, the user. A planner applying the framework should experience a similar process of discovery. The resulting metrics facilitate comparison between parcels regardless of spatial complexity, but the process of creating those
numbers is no less important to overcoming spatial bias against infill. Building up a ‘redevelopable’ land inventory improves the likelihood of finding a match between urban infill goals and a desirable, feasible solution. Addition, rather than layered subtraction, is fundamental to the underlying concept of using land efficiently. The process of expanding one’s perception of potential, means revisiting assumptions parcel by parcel, neighborhood by neighborhood. Processes of ongoing analysis entailing the structured application of concepts can influence the practitioner’s approach, to reframe the planner’s view of urban infill potential.
CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter examines the value of the Urban Infill Assessment Framework as a tool for planners to advance infill in small-scale urban places. It begins with a look at using the information generated by the UIAF. Examples from Turners Falls’ scenarios illustrate how this information might affect redevelopment processes and outcomes. Then, an overview of the UIAF’s transferability consolidates insights and recommendations from the previous chapter. A broader view of possibilities for using the framework, and recommendations for further research are presented. The study concludes by revisiting the original objectives for this research in light of key findings, and the implications for small-scale urban planning.

5.2 Using Information Generated by the Framework

Interviews provided insight into how the framework information might be deployed by stakeholders. Stakeholders were asked to consider pre-designed scenarios, but were given no information about possible goals or outcomes. Nonetheless, reviewing scenario cards prompted many people to comment aloud on ways that each scenario might help to achieve specific goals or outcomes. For instance, the need to grow the employment base was weighed against possible demand for live-work lofts to
serve the town’s growing creative community. The need for tax revenue to replace aging infrastructure was considered in light of urgent needs for improved municipal facilities. Framework information expanded the universe of spatial and fiscal solutions to existing challenges.

For planners, the kind of information the UIAF generates is not a prelude to breaking ground. It serves an entirely different purpose from engineering studies or master plans. The value of this information comes back to fundamental questions about the planner’s role. Managing an ever-changing changing urban environment is fundamentally different than enforcing separation of uses through zoning, or creating uniform building sites through demolition. These are static solutions. Urban redevelopment is the management of complex human-environment system in constant flux. A model from ecological design proposes the designer, or planner, as a manager of systems who facilitates tradeoffs among stakeholders. These tradeoffs involve values stemming from our attachment to place (Lister, 2007). Planners need information to illustrate, and facilitate, tradeoffs.

Table 5.1 Four Planning Stages

<table>
<thead>
<tr>
<th>Goal-Setting</th>
<th>Assessment</th>
<th>Decision-Making</th>
<th>Site-preparation</th>
</tr>
</thead>
</table>

The framework information can help to clarify infill-related planning goals. Often, infill-related goals are described in fiscal or social terms, with few spatially specific, or
quantitative measures. It is entirely possible to establish a desired quantity of market rate housing units, a target for number of consumers in walking distance of downtown to support local businesses, the annual tax revenue needed to replace aging infrastructure, or a population density that can support transit. If it were easier to measure potential solutions, measurable goals might logically follow.

**Figure 5.2** Turners Falls Interviewee #1 First and Second Map Drawings

5.3 Using the Framework Information: Specific Examples from Turners Falls

From experimental application in Turners Falls came specific scenarios and numbers that showed the UIAF can produce assessment information, and this information tested in interviews to see if it can change how infill potential is perceived. These ‘results’ are not used to make recommendations for Turners Falls. But based on the scenarios, the respondents indicated that there was significant spatial and fiscal capacity in Turners Falls. Interviews made it clear that there is also significant support
for infill, either affirmed or enhanced by the UIAF’s detailed information about infill potential.

Examples from the three Turners Falls scenarios illustrated the UIAF information in action. Each one highlights local planning goals relevant to that site, along with examples of how revenue and redevelopment can help achieve them. To move from specific local goals (e.g. more jobs, market-rate housing, new library and senior center) to site preparation means identifying barriers. Therefore, suggestions are included for using scenario information to identify specific barriers, as well as solutions.

5.3.1 Avenue A and Economic Development:

Montague’s focus on fiscal responsibility and job-creation emphasizes land uses promoting economic development. Despite a perceived abundance of open land in Montague, there is actually a shortage of appropriately zoned and serviced land, and that makes it difficult to attract and retain important employers and taxpayers (Montague, 2012). In the downtown, even with underutilized buildings, there is a mismatch between these structures and the identified commercial needs: live-work residential units, high-quality office space, and expansion room for existing businesses.

With limited developable land Montague faces complex, inter-related land use decisions, including the siting of crucial municipal facilities. The framework identified the Avenue A scenario as containing significant investment (assets) and even more significant opportunity (capacity). Over 12 acres of infill can host DPW facilities and
meet other goals as well. Framework information enabled comparison with the Energy Industrial Park site. A recent study produced figures projecting buildout scenarios and accompanying tax yield (Montague, 2012, p.61). Unfortunately, the industrial park’s buildable area was recently revised down from almost 100 acres to less than half that due to environmental concerns. This raises the need to generate new information quickly and inexpensively to facilitate comparison at the local level.

The Avenue A scenario demonstrated that adding density can increase revenue. The difference between the lower and the higher density revenue scenarios redevelopment gives shape to a redevelopment tool. Increases in massing and building height could yield $281,179 per year more. These kinds of estimates can provide critical incentives to developers for creating high-end, mid-size office space that one of the interview participants says is sorely lacking for his clients. If downtowns and density were understood as revenue-generators, not a drain on resources, Avenue A growth could be conceived as a way to underwrite other economic development, such as the $872,000 investment required to run 12” waterline extension down Turnpike Road and expand the industrial park (Montague, 2012, p.65). Using multiple sites to accomplish multiple goals is a way to strategically, and thoughtfully direct existing development practices that already make urban infill more attractive and reduce sprawl.

5.3.2 K Street Area and Market-rate Housing

The 2004 Montague Housing Plan states that new market-rate housing downtown is “desirable...good for the town but not a priority for active assistance” (pg.
7-2). In contrast, rehabilitation of existing homes was rated something the town should “actively encourage”. Here, as in most of the country, a market-based approach to new housing has led to growth occurring in suburban and rural settings, despite steps taken to remove zoning barriers to urban infill. A proliferation of low-income housing in Turners Falls’ downtown (although Montague is still below 10%) was cited in planning documents, and interviews, as a barrier to market-rate redevelopment. At the same time, concern for gentrification supports adding market-rate housing units rather than converting existing low-income units, which may displace current residents (Montague, 2013(b)). While the K Street scenario has limited capacity and revenue potential, redevelopment could have other benefits, like a regenerative impact on an established residential neighborhood. Turners Falls needs reinvestment in residential neighborhoods, and more downtown residents to support downtown businesses.

The higher-density scenario only adds $32,462 more in annual tax revenue (over the low-density scenario), but an aging boiler at the elementary school needs to be fixed or replaced, with costs estimated from $40,000 to $110,000 in 2014 (Montague, 2013(e)). The boiler is a one-time cost. A common development concern is the cost of educating children of new residents. Ironically, this region struggles to sustain aging schools with a dwindling tax base and low student populations, further reduced by school choice. New students might push Montague over thresholds requiring new hires, or revitalizing this neighborhood could strengthen the tax base and benefit all students.
One intriguing possibility for K Street involved accessory dwelling units. Two blocks from the historic Main Street, T Street functions like an oversized alley behind homes, with several garages and carriage-houses, but few homes oriented to the street. Despite fairly high prices for apartments in the area, there are no [legal] ADU conversions here or anywhere in the downtown.\(^4\)\(^5\) Local construction costs and real estate investment practices are factors. Adding market-rate housing units to this neighborhood would improve assessments and therefore tax yield, and provide income to owners. It could add customers and consumer spending in local businesses (See Appendix N “Household Size and Housing Attrition Impacts on Residential Density”). Moreover, upgrading these structures would improve the town’s return on investment for maintaining an existing city block and its accompanying infrastructure.

### 5.3.3 First Street and Civic Facilities

The First Street scenario area is anchored north and south by parcels that have received tremendous reinvestment: adaptive reuse and preservation on historic Avenue A, and the recently refurbished Unity Park. Documents and interviewees emphasized the value of this area as a gateway, and highlighted the untapped recreational potential of the riverfront. There are abundant non-profit and civic uses here: a theater, the Town

\(^4\) The Department of Housing Urban Development (HUD) set 2014 Franklin County Fair Market Rents at $671, $724 and $917 for efficiency, one or two bedroom respectively.  
\(^5\) The Town Planner confirmed that the building department has issued no permits for accessory dwelling units downtown.
Hall, DPW garages, and the Discovery Center. With over five infill and refill acres adjacent to the historic and cultural heart of downtown, this scenario area could fulfill high priority civic-use goals: a library expansion and senior center, riverfront access for boating and swimming, and free parking.

The assets are present for this to be a strong area for residential and commercial redevelopment, while remaining the civic heart of downtown. The challenge is how to fulfill community needs while simultaneously expanding the tax base to pay for enhanced civic uses. The framework can help find this balance, by exploring scenarios that dedicate some parcels to civic use, while increasing density on others to compensate for lost tax base. Illustrating the tradeoffs in this manner helps to identify the winning combination of incentives to attract development and amenities for existing community members. Just as important is providing scenario information that people understand in order to build support for ambitious plans. The framework can help find this balance, by exploring scenarios that dedicate some parcels to civic use, while increasing density on others to compensate for lost tax base. Illustrating the tradeoffs in this manner helps to identify the winning combination of incentives to attract development and amenities for existing community members. Just as important is providing scenario information that people understand in order to build support for ambitious plans. The framework can help find this balance, by exploring scenarios that dedicate some parcels to civic use, while increasing density on others to compensate for lost tax base. Illustrating the tradeoffs in this manner helps to identify the winning combination of incentives to attract development and amenities for existing community members. Just as important is providing scenario information that people understand in order to build support for ambitious plans.
Dwelling Units. A more pro-active step could a local low-interest construction-financing program at local banks (using Community Reinvestment Act or CDBG funds). Removing barriers in the Avenue A scenario area might entail detailed study to generate cost and feasibility information and recommendations for zoning changes to ensure highest and best uses, in local terms, are as easy to build out as the industrial parks. In the First Street area, to encourage high-value and high-quality buildings compatible with the historic architecture and a need for revenue to offset civic uses, targeted tax breaks and density bonuses might help bring developer revenues in line with regional expectations.

The framework’s information helps compare the cost of inaction, as embodied in the low-density scenario levels, with the benefits of being proactive. Illustrating improved outcomes can remove institutional barriers to pro-active planning for urban redevelopment. In this way, the UIAF contributes to site preparation, the fourth and final phase of redevelopment, by helping to identify solutions and remove barriers.

5.4 Transferability

Transferability, or the ability for the framework to work in other small urban places, is addressed in three ways within the framework design itself; place-based information, simplification, and concepts. The framework is transferable because it is builds from information specific to each locale to generate outputs reflecting fiscal and social values. The components are specific to the municipality, not each site. The metrics facilitate comparison by using acreage so the information is generalizable across the entire urban development context for the specific city or town.
The framework was improved for greater simplicity both through changes to individual procedures, and through practices to make it more efficient to use for iterative practice. As presented, it builds a knowledge base through cataloguing and mapping. This approach maximizes return on investment for the planner’s time.

Adaptations and findings from this research significantly improved the ability to replicate framework steps successfully. However, the most substantial change to the framework was reducing the quantitative emphasis of the selected methods, and increasing qualitative understanding and concepts to create a more balanced approach. The evolution towards a balanced conceptual framework makes it more widely transferable.

A different way to consider the UIAF’s transferability has to do with the contexts in which it might be used, and its appropriateness as a tool for that context. This framework is specifically targeted to slow-growth small urban areas that have seen little new infill construction for decades. Inspired by ‘Strategic Incrementalism’ it promotes a comprehensive approach to take advantage of every possible asset in order to overcome resource constraints. In some towns zoning has impeded infill, or failed to offset forces favoring sprawl. Rurally located towns and small cities with low, no, or negative population growth have an asset in their underused infrastructure (roads, schools, water and sewer, local government) but need strategy to figure out better return on those ongoing investments. In the same way, urban areas within strong economic regions but with poor real estate markets (due, for instance, to factors like the
high construction costs in New England, or low values due to localized blight) must attract reinvestment just to hold back decline. The framework is well-suited to places that have little choice but to use every available asset and opportunity, or risk further decline.

The framework originally began with a simple idea about creating an infill land inventory so that municipalities could do more by understanding what they already have. The ongoing assessment of assets and opportunities may advance community-based redevelopment solutions, beyond public projects that rely upon external subsidy. However, with better infill information, a town can also prepare for the best-case scenario, an influx of development interest and capital. Nationwide, there are signs developers are becoming more interested in building infill (Becker et al, 2014). But in many towns, if a developer asked a planning board where it could put 50-100 units of something, the map of developable land is the simple answer. The map may overlook small sites or the urbanized area entirely. This framework produces an additive assessment of infill - developable land within the urban area. With planning goals and infill concepts thoughtfully applied through the framework, this information will be in the form of specific scenarios that show how to balance a need for revenue with form and density, amenities and preservation of assets. Rather than trying to fit community values onto an existing proposal through plan review and permitting, a developer can start with the community vision for itself.
During interviews participants talked about the human scale and charm of Turners Falls. The strong sense of community was cited by those who reside downtown, echoing an intangible social asset expressed in planning documents. Sustainable planning can encourage a built environment that contributes to the intangible, but important assets that create the ‘small town feel’ that many people desire. In addition, socially and economically vulnerable households can often maintain self-sufficiency and a high quality of life in this kind of setting. We are a country increasingly composed of such households. Small housing units found in high-density neighborhoods may suit single adult households, which are now 27.9% of the U.S. population (U.S. Census, 2013). Older residents (20% of Americans will be 65 and older by 2030) and car-free households (9.2% of the U.S.) are also generating increased demand for walkable communities (U.S. Census 2010(b); U.S. Census, 2012). Small-scale urban places require planning tools that preserve their fragile but profound assets, rather than unnecessarily forcing sacrifice between social and fiscal value.

This research targets individual small and resource-constrained communities. Each one is limited in its urban growth capacity, but these places have value across a larger scale. The focus on accommodating households in metropolitan markets rather than in small towns overlooks the underutilized assets, investments and unused capacity that exist nationwide. In this way, this research challenges an assumption that trends towards sprawling metropolitan regions are inevitable.
This study is attuned to local land use in Massachusetts with its Home Rule, heavy reliance on local property tax, limited land for growth, and abundant historic urban centers and neighborhoods. But just as the experience of large cities forms the basis of current infill knowledge, lessons from researching infill in smaller places may apply to wide-ranging situations, from struggling post-industrial rustbelt cities in the Ohio Valley to thriving coastal cities struggling to encourage revitalization without gentrification and displacement, we have much to learn about how to practice infill. Conversely, in low-density areas the urban infill assessment framework is likely to be less effective, as it may undermine the principal assumption of tax-density as a desirable form of efficiency to be measured. The framework was not devised with retrofitting suburbia or greenfields development in mind. Big ideas were adapted from big cities, but the complexity of those urban systems is beyond the scope of this work as well. Rather than creating the next best new town or fixing sprawl, the focus is on planning for old towns that have seen better days but think their best days lie ahead.

5.5 Recommendations for Future Research

The infill information gap that initially drove this research results from a lack of basic spatial analysis tools for small urban areas, appropriate to the scale of redevelopment and available local planning resources. It is difficult to identify parcels for infill, to maintain and update, and to work with that information. Poor data becomes a barrier to the larger-scale, multi-parcel planning that can help effectively fulfill planning goals. Research is needed so the additive assessment of redevelopment parcels
can take shape and take hold. Best practices for compiling data across municipal departments, using inexpensive mapping tools for visualization, would be more useful to low-resource municipalities than highly specialized GIS-based tools.

Stakeholder interviews touched on questions better explored with broad sampling, more detailed questions and analysis. Community-based research could further explore perceptions of urban infill potential, and ways in which information affects these views. Streamlined processes to assess infill supports the decision-making of stakeholders, but the deployment of this information will also generate new information and participant perspectives. This qualitative information can be incorporated into the framework. Research to develop methods for ongoing gathering and deployment of place-based information, including community members, seeks to bring sustainable development outcomes in line with goals by further integrating local values into sustainable planning (Montenegro-Menezes, 2014(b)).

Two research trajectories can further improve the Urban Infill Assessment Framework. One entails step-by-step refinement, applying it in multiple sites to generate broadly applicable improvements to methods like improved property value analysis and asset mapping. Testing the information in decision-making in other locales might yield a practice comparable to the rural planning ‘chip game’ used to advance stakeholder engagement and incorporate metrics to facilitate comparison across development types (Flinker and Kelly, 2011). Repeated testing can develop better visual
tools to improve process by reducing the gap between technical experts and local experts (Al-Kodmany, 2001).

The second research trajectory involves long-term application in a single municipality. I created, tested and adapted an Urban Infill Assessment Framework to improve strategic planning, routine activities, and decision-making for small-scale urban redevelopment. These efforts unfold at different rates, and interrelate over time. One study cannot replicate real planning where goals evolve and conditions change over the course of months and years. Iterative use would improve procedures, and explore how framework information affects long-term redevelopment outcomes.

The framework can be used to analyze processes and policies, to identify problems. The city I visited in Connecticut made Smartgrowth code adjustments years ago to allow residential uses on upper floors of downtown buildings. But only existing buildings were included. The local infill goals are clear, including replacement of demolished buildings and adding density to a dying downtown strip mall. But the zoning impediment to new mixed-use infill construction only recently came to light in the context of a concrete redevelopment proposal. Hypothetical scenario-building can be used to reveal procedural barriers to infill. This would be a welcome alternative to zoning audits and revisions that are both technically and politically challenging.

Finally, there is a need for research into comprehensive fiscal efficiency that considers both costs and revenue, to promote economically sustainable and equitable communities (Najafi, 2006; Chapman, 2008). I discussed this study with several planners.
Many validated a desire to help struggling towns but said the money just isn’t there. One technique considers costs and revenues for different development options over their life span (Urban3, 2013). A downtown acre generating $28,000 versus $60,000 per year over a 50-year building timeframe dramatically illustrates the impact of revising maximum building height and large setbacks to minimum densities with site design guidelines. Just as the framework metrics show capacity and value ‘hidden’ within spatially complex areas and limited land, there is a need to understand fiscal efficiency as it compounds good, or bad decisions over time.

5.6 Small is Beautiful

Attention gravitates to large sites. However, in Turners Falls stakeholders were generally quite willing to look shift their focus. After reviewing scenario information, most participants not only included more spatially complex areas, they seemed almost relieved to be given a reason to focus on them. Resolving the spatial bias against the complex redevelopment areas was less a matter of convincing, and more about providing evidence to affirm social values have a solid fiscal grounding. All the more reason not to let the shape and size of opportunity impede redevelopment goals.

An emphasis on big planning solutions may be perpetuated by having to borrow planning techniques from big cities. Small cities and towns need information and processes that may require “right-sizing.” The findings showed the usefulness of quantitative data and metrics that express value in terms suited to small-scale urban places.
Measuring the cumulative value of incremental gains from infill can shift perceptions away from reliance on large projects and funding. This reliance made sense in the era of big government infrastructure spending. Large projects can be transformative, but they can also be destructive to communities, and are increasingly unlikely in the future. Strategic incrementalism in practice is using care with small decisions, like spatially targeting multiple minor investments and actions to generate neighborhood vitality. It moves steadily towards a redevelopment vision, using big concepts to take little steps.

The UIAF is for small-scale urban areas. But small numbers can have a big impact on sustainability if applied at a larger scale. Just as the additive assessment shows the potential in small, distributed parcels, unused infill is a form of distributed capacity present at multiple scales. Hundreds of cities and towns nationwide can add density through infill development. Using this untapped potential can slow consumption of open space and reuse existing infrastructure, offering environmentally and fiscally sustainable alternatives to continued outward growth.

5.7 Conclusion: Information and Processes for Small-Scale Sustainable Urbanism

The Urban Infill Assessment Framework supports strategic land-use planning by generating information to compare development projects across diverse locations, scales, and spatial configurations. Improved tools and expertise for urban redevelopment can offset procedural and perceptual factors that favor low-density
growth and sprawl. Every measurement encodes subjectivity, first by deciding what is important measure. Choosing to measure infill asserts the importance of urban places. Improving infill information offsets the information bias favoring low-density growth and sprawl. Used and improved over time, infill metrics can build local redevelopment expertise. Shared understanding of the fiscal and social value of urban redevelopment can become part of local culture, even when the urban area is a small island of density in a sea of suburban and rural land use. In this way, assessment can help reframe the view of urban infill potential in small places.

The framework evolved from quantitative and methods-focused, towards the structured application of concepts. This makes sense in light of a fundamental gap upon which this research was based; the need to advance from “ad hoc” practices towards a comprehensive approach to infill redevelopment. The concepts ensure the process of measurement reflects planning goals, and is therefore relevant to redevelopment decisions and actions that might follow.

A process-oriented conceptual approach is appropriate to manage change and complex urban environments. Sustainable Urbanism requires planners to manage complexity without seeking to reduce or remove it, because complexity is an essential component of urban vitality (Leinberger, 2007, p 151; Jacobs, 1961). Urban planning that assumes linear decline followed by large-scale demolition and renewal destroys communities. To rely for urban planning upon tools suited to low-density suburbs (zoning, permitting and financing) is like trying to adapt the rules of baseball to a ballet.
The urban environment requires strategies and understanding truly suited to regenerative, dynamic and complex urban places.

Following the ten-step Urban Infill Assessment Framework immerses the user in the urban environment. It enhances spatial awareness at multiple scales; parcel, to scenario site and the overall urban context. From this process big possibilities take shape, while enriching the user’s contextual knowledge. Moving between concepts and methods, theory and practical application, deepened my understanding of Turners Falls and its capacity to grow and thrive. Like so many stories, this study ends with the conclusion that the journey is as important as the destination.
Certification of Human Subjects Approval

Date: October 1, 2013
To: Jennifer Stromsten, Landscape Arch Regional Plan
Other Investigator: Henry Renski, Landscape Arch Regional Plan
From: Lynnette Leidy Sievert, Chair, UMASS IRB

Protocol Title: Montague Land Use Planning Study for MRP Thesis
Protocol ID: 2013-1787
Review Type: EXEMPT - NEW
Paragraph ID: 4
Approval Date: 10/01/2013
Expiration Date: 09/30/2016
OGCA #: 

This study has been reviewed and approved by the University of Massachusetts Amherst IRB, Federal Wide Assurance #00003909. Approval is granted with the understanding that investigator(s) are responsible for:

- Modifications - All changes to the study (e.g. protocol, recruitment materials, consent form, additional key personnel), must be submitted for approval in e-protocol before instituting the changes. New personnel must have completed CITI training.

- Consent forms - A copy of the approved, validated, consent form (with the IRB stamp) must be used to consent each subject. Investigators must retain copies of signed consent documents for six (6) years after close of the grant, or three (3) years if the study is unfunded.

- Adverse Event Reporting - Adverse events occurring in the course of the protocol must be reported in e-protocol as soon as possible, but no later than five (5) working days.

- Completion Reports - Notify the IRB when your study is complete by submitting a Final Report Form in e-protocol.

- Consent form (when applicable) will be stamped and sent in a separate e-mail. Use only IRB approved copies of the consent forms, questionnaires, letters, advertisements etc. in your research.

Please contact the Human Research Protection Office if you have any further questions. Best wishes for a successful project.
APPENDIX B

BUILDING TYPOLOGIES FOR TURNERS FALLS

Most of the areas around Turners Falls are residential, with some businesses and civic uses along major routes. However, two industrial parks contain significant commercial acreage. Buildings from these industrial parks were included in the typologies, as were several homes from areas of Turners Falls outside the downtown. They incorporate a broad range of TYPA and density into scenario-building, particularly important since most buildings of higher value and recent construction are not located in the downtown. Buildings from more distant areas of Montague were not considered. In addition to striving to keep character and context relevant to downtown Turners Falls, real estate values were a consideration: Portions of Montague have much higher values than the Turners Falls area.

The original array of properties examined included a range of residential, commercial and industrial properties displaying a range of density and Tax Yield Per Acre. Map B.1 shows where these properties are located. The southern most properties are the two ‘rural’ residential forms. The large areas above, still to the south of the main downtown area, are a building type (Judd Wire) from the smaller industrial park and a multi-family auto-oriented apartment complex (Villa). The large parcel to the east is in the large industrial park (Heat Fab).
Figure B.1 Map of Turners Falls Development Typologies Sites
**Figure B.2.1: Residential Typologies – Descriptions**

<table>
<thead>
<tr>
<th>General Setting</th>
<th>RURAL</th>
<th>RURAL</th>
<th>SUBURBAN</th>
<th>SUBURBAN</th>
<th>SUBURBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning</td>
<td>Residential</td>
<td>Agricultural</td>
<td>Residential</td>
<td>Residential</td>
<td>Residential</td>
</tr>
<tr>
<td>Building Description</td>
<td>Non-farm single family home built 1930</td>
<td>Non-farm single family home built 1991</td>
<td>Historic Home built 1897</td>
<td>Cape or ranch-style home built 1951</td>
<td>Townhome Apartment Complex built 1980.</td>
</tr>
<tr>
<td>Property Address</td>
<td>9 Hillside Road</td>
<td>204 Turners Falls Road</td>
<td>10 High Street</td>
<td>42 Montague Street</td>
<td>1 Park Villa Drive</td>
</tr>
<tr>
<td>TOTAL Commercial Value 2012</td>
<td>$182,900</td>
<td>$207,300</td>
<td>$228,100</td>
<td>$190,500</td>
<td>$60,188</td>
</tr>
</tbody>
</table>
| Annual Tax @ 25.51     | $3,117 | $3,532 | $3,887 | $3,246 | $-
| TOTAL Residential Value 2012 | $124,095 | $522,949 | $493,946 | $315,723 |
| Annual Tax @ 17.04     | $3,117 | $3,532 | $3,887 | $3,246 | $-
| Total ANNUAL TAX       | $3,117 | $3,532 | $3,887 | $3,246 | $60,188 |
| Parcel Acreage         | 2.10 | 1.67 | 0.44 | 0.39 | 7.47 |
| TOTAL TAX per ACRE     | $87,075 | $124,095 | $522,949 | $493,946 | $315,723 |
| TYPA                  | $1,484 | $2,115 | $8,911 | $8,417 | $8,054 |
| PHOTOGRAPH             | ![Image 1](image1.png) | ![Image 2](image2.png) | ![Image 3](image3.png) | ![Image 4](image4.png) | ![Image 5](image5.png) |
Figure B.2.2: Residential Typologies – Descriptions continued

| General Setting | Zoning | Development Context | Building Description | Reference Planning Documents | Property Address | TOTAL Commercial Value 2012 | Annual Tax @ 25.51 | TOTAL Residential Value 2012 | Annual Tax @ 17.04 | Total ANNUAL TAX | Parcel Acreage | TOTAL TAX per ACRE | TYPA | PHOTOGRAPH |
|-----------------|--------|---------------------|----------------------|-----------------------------|----------------|
|                 | Residential | Downtown Resi. Former factory housing, single and multi family. | Two-family home built 1850. | Housing Plan | 3 H Street | $149,300 | $- | $- | $2,544 | $2,544 | 0.33 | $454,795 | $7,750 |
|                 | Central Business, Neighborhood Bus. | CBD3 4-story apartments, attached or row-home style. | 4-Story brick built 1875. | Downtown Livability | 14-16 Third Street | $262,700 | $- | $- | $4,476 | $4,476 | 0.15 | $1,733,765 | $29,543 |
|                 | Neighborhood Business | CBD 3-4 story apartment, detached traditional style. | 3-story built 1900. | Downtown Livability | 100 Second Street | $137,900 | $- | $- | $2,350 | $2,350 | 0.10 | $1,365,211 | $23,263 |

Selection Criteria/Development Pattern

This are "The Patch", is an important locally recognized distinct neighborhood. Owner-occupied sfh, not multi-family. (more of these as we get farther from Main St) Looking for owner-occupied multi-family. Livability Plan suggests something like this near Unity Park - included as an idea of tax yield for comparable style Apartment 4-8 - small, multi-unit building appropriate to higher density downtown area (more density than sfh or 1-3 families)
### Figure B.3.1 Commercial Typologies - Descriptions

<table>
<thead>
<tr>
<th>General Setting</th>
<th>URBAN</th>
<th>URBAN</th>
<th>URBAN</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning</td>
<td>General Business</td>
<td>General Business</td>
<td>Central Business</td>
<td>Central Business</td>
</tr>
<tr>
<td>Development Context</td>
<td>Highway Commercial standalone site</td>
<td>Highway Commercial strip mall</td>
<td>CBD Historic commercial main street (Avenue A)</td>
<td>CBD Historic commercial main street (Avenue A)</td>
</tr>
<tr>
<td>Property Address</td>
<td>282 Avenue A</td>
<td>250 Avenue A</td>
<td>53 Avenue A</td>
<td>64-66 Avenue A</td>
</tr>
<tr>
<td>TOTAL Commercial Value 2012</td>
<td>$1,395,100</td>
<td>$1,275,700</td>
<td>$275,900</td>
<td>$157,200</td>
</tr>
<tr>
<td>Annual Tax @ 25.51</td>
<td>$35,589</td>
<td>$32,543</td>
<td>$7,038</td>
<td>$4,010</td>
</tr>
<tr>
<td>TOTAL Residential Value 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Tax @ 17.04</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Total ANNUAL TAX</td>
<td>$35,589</td>
<td>$32,543</td>
<td>$7,038</td>
<td>$4,010</td>
</tr>
<tr>
<td>Parcel Acreage</td>
<td>1.99</td>
<td>2.19</td>
<td>0.21</td>
<td>0.14</td>
</tr>
<tr>
<td>TOTAL TAX per ACRE</td>
<td>$701,432</td>
<td>$582,613</td>
<td>$1,285,348</td>
<td>$1,131,831</td>
</tr>
<tr>
<td>TYPA</td>
<td>$17,894</td>
<td>$14,862</td>
<td>$32,789</td>
<td>$28,873</td>
</tr>
</tbody>
</table>

**PHOTOGRAPH**

- **Selection Criteria/Development Pattern**
  - High quality new construction, auto-oriented.
  - Services core for residents - grocery, Rx etc. Car-oriented but commonly accessed on foot.
  - Single story ‘box’ addition Main Street nestled between historic multi-story edifices.
  - Neighborhood bar in the heart of Main Street revitalization area. Small scale but aesthetic value.
### Figure B.3.2 Commercial Typologies - Descriptions continued

<table>
<thead>
<tr>
<th>General Setting</th>
<th>URBAN</th>
<th>URBAN</th>
<th>URBAN</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning</td>
<td>Central Business and Neighborhood Business</td>
<td>Central Business and Neighborhood Business</td>
<td>Central Business</td>
<td>Central Business</td>
</tr>
<tr>
<td>Development Context</td>
<td>CBD Historic center side streets - mixed resi and commercial</td>
<td>CBD Historic center side streets - mixed resi and commercial</td>
<td>CBD Historic center side streets - mixed resi and commercial</td>
<td>CBD Historic commercial main street (Avenue A)</td>
</tr>
<tr>
<td>Building Description</td>
<td>2-story office, historic brick, NE Fdn for Children, built 1880.</td>
<td>3-story mixed use, historic brick, 2nd Street Bakery, built 1900.</td>
<td>3-4 story mixed use, historic brick, Loot store, built 1900.</td>
<td>3-4 story mixed use, historic brick, built 1900.</td>
</tr>
<tr>
<td>Reference Planning Documents</td>
<td>Downtown Livability</td>
<td>Downtown Livability</td>
<td>Downtown Livability</td>
<td>Downtown Livability</td>
</tr>
<tr>
<td>Property Address</td>
<td>66 Second Street</td>
<td>104 Fourth Street</td>
<td>82 Third Street</td>
<td>60 Avenue A</td>
</tr>
<tr>
<td>TOTAL Commercial Value 2012</td>
<td>$239,300</td>
<td>$59,928</td>
<td>$62,010</td>
<td>$56,880</td>
</tr>
<tr>
<td>Annual Tax @ 25.51</td>
<td>$6,105</td>
<td>$1,529</td>
<td>$1,582</td>
<td>$1,451</td>
</tr>
<tr>
<td>TOTAL Residential Value 2012</td>
<td>$121,672</td>
<td>$114,690</td>
<td>$132,720</td>
<td></td>
</tr>
<tr>
<td>Annual Tax @ 17.04</td>
<td>$2,073</td>
<td>$1,954</td>
<td></td>
<td>$2,262</td>
</tr>
<tr>
<td>Total ANNUAL TAX</td>
<td>$6,105</td>
<td>$3,602</td>
<td>$3,536</td>
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<tr>
<td>Parcel Acreage</td>
<td>0.10</td>
<td>0.07</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>TOTAL TAX per ACRE</td>
<td>$2,369,072</td>
<td>$2,773,366</td>
<td>$2,904,817</td>
<td>$3,003,326</td>
</tr>
<tr>
<td>TYPA</td>
<td>$60,435</td>
<td>$55,010</td>
<td>$58,132</td>
<td>$58,808</td>
</tr>
</tbody>
</table>

**Selection Criteria/Development Pattern**

- Newly rehabbed Commercial Building - non-profit sector.
- Retail hub within resi area - active bakery, flanked by social service and resi.
- Just off of historic main street, active retail façade and resi above.
- Anchor building in historic main street core, active retail façade.
### Figure B.4 Commercial Typologies - Descriptions

<table>
<thead>
<tr>
<th>General Setting</th>
<th>RURAL</th>
<th>SUBURBAN</th>
<th>URBAN</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zoning</td>
<td>Industrial</td>
<td>Industrial</td>
<td>Industrial/General Business</td>
<td>Historic Industrial</td>
</tr>
<tr>
<td>Development Context</td>
<td>Industrial Park (Airport)</td>
<td>Industrial Park (Tpk Rd)</td>
<td>Downtown, between resi and commercial.</td>
<td>Mill Complex between river and canal</td>
</tr>
<tr>
<td>Reference Planning Documents</td>
<td>Energy Industrial Park Tpk Road Cecil Study</td>
<td>Energy Industrial Park Tpk Road Cecil Study</td>
<td>Energy Industrial Park Tpk Road Cecil Study</td>
<td>Downtown Livability/Strathmore Mill Study</td>
</tr>
<tr>
<td>Property Address</td>
<td>130 Industrial Boulevard</td>
<td>124 Turnpike Road</td>
<td>400 Avenue A</td>
<td>36 Canal Road</td>
</tr>
<tr>
<td>TOTAL Commercial Value 2012</td>
<td>$5,122,100</td>
<td>$10,990,100</td>
<td>$294,000</td>
<td>$840,300</td>
</tr>
<tr>
<td>Annual Tax @ 25.51</td>
<td>$130,665</td>
<td>$280,357</td>
<td>$7,500</td>
<td>$21,436</td>
</tr>
<tr>
<td>TOTAL Residential Value 2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual Tax @ 17.04</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Total ANNUAL TAX</td>
<td>$130,665</td>
<td>$280,357</td>
<td>$7,500</td>
<td>$21,436</td>
</tr>
<tr>
<td>Parcel Acreage</td>
<td>24.65</td>
<td>13.15</td>
<td>0.75</td>
<td>1.40</td>
</tr>
<tr>
<td>TOTAL TAX per ACRE</td>
<td>$207,790</td>
<td>$835,558</td>
<td>$394,102</td>
<td>$598,722</td>
</tr>
<tr>
<td>TYPA</td>
<td>$5,301</td>
<td>$21,315</td>
<td>$10,054</td>
<td>$15,273</td>
</tr>
<tr>
<td>PHOTOGRAPH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection Criteria/Development Pattern</td>
<td>Largest local employer</td>
<td>Anchor tenant for industrial park to be expanded</td>
<td>Common industrial/commercial building type in and around TF.</td>
<td>Last operating manufacturer in historic mill complex</td>
</tr>
</tbody>
</table>
Figure B.5  Residential Typologies Histogram of TYPA and Assessed Value

Lowest Density to Highest Density Buildings

- TOTAL Assessed Value 2012 in 100s
- Annual Tax Yield Per Acre (TYPA)

Parcel Total Acreage

Figure B.6  Commercial Typologies Histogram of TYPA and Assessed Value

Lowest Density to Highest Density Buildings

- TOTAL Assessed Value 2012 in 100s
- Annual Tax Yield Per Acre (TYPA)

Parcel Total Acreage
Figure B.7  Industrial Typologies Histogram of TYPA and Assessed Value

Lowest Density to Highest Density Buildings

- TOTAL Assessed Value 2012 in 100s
- Annual Tax Yield Per Acre (TYPA)

| Parcel Total Acreage | $120,000 | $100,000 | $80,000 | $60,000 | $40,000 | $20,000 | $ | $ |
|----------------------|----------|----------|----------|----------|----------|----------| |   |
| 24.65                | 24.65    | 0.75     | 24.65    | 24.65    | 24.65    | 24.65    | | |
| 0.75                 | 0.75     | 0.75     | 0.75     | 0.75     | 0.75     | 0.75     | | |
| 1.40                 | 1.40     | 1.40     | 1.40     | 1.40     | 1.40     | 1.40     | | |
APPENDIX C

MAP OF TOTAL ASSESSED VALUES PER ACRE TURNERS FALLS

This map shows the gradient of tax density. Darker tones represent parcels with higher assessed total value per acre. Montague’s split tax enhances this gradient, with a higher concentration of commercial uses downtown.
APPENDIX D

MAP OF TURNERS FALLS URBAN INFILL BOUNDARY

Map of the Urban Infill Boundary, showing also the Avenue A one-mile line that defines the main transit and commercial corridor, bisects the downtown area, and defines the walkable scale of the study area.
APPENDIX E

MAP OF IMPROVEMENT TO LAND (I/L) VALUES TURNERS FALLS

Trends in Improvement-to-Land Value ratios in the Turners Falls area do not correlate well to stated local values or observed value. I/L ratios are intended to convey a point at which the building value is so low in relation to land value that the parcel is ready for redevelopment. But the areas of lightest color on the map include, for instance, some of the most high value comes and stable residential neighborhoods. In contrast, the darkest area which shows the core of the Turners Falls downtown includes neighborhoods with the lowest home-ownership rates and a more visible signs of disinvestment than the two lower circled areas.
APPENDIX F

REPRODUCTIONS OF INTERVIEW MATERIALS

Figure F.1 Urban Infill Map (used twice)

Figure F.2 Three Scenarios Map (used twice)
Figure F.3 Avenue A Scenario side 1

Sample Site Information Card - Side 1

1. Only infill sites - existing vacant parcels

2. Some buildings as Scenario 1 - This time with infill and refi. Refi is parcels that are good candidates for redevelopment or ease taxes.

3. Both infill and refi parcels are used - this time with higher density development types.

Figure F.4 Avenue A Scenario side 2

Sample Site Information Card - Side 2

1. Scenario 1 Data
   - Infill area: 3.87 Acres
   - Annual Property Tax Yield: $25,804
   - Only infill sites - existing vacant parcels

2. Scenario 2 Data
   - Infill + Refi area: 12.72 Acres
   - Annual Property Tax Yield: $106,190
   - Same buildings as Scenario 1 - This time with infill plus refi. Refi is parcels that are good candidates for redevelopment or ease taxes.

3. Scenario 3 Data
   - Infill + Refi area: 12.72 Acres
   - Annual Property Tax Yield: $387,369
   - Both infill and refi parcels are used - this time with higher density development types.
Figure F. 5 K Street Scenario side 1

Sample Site Information Card - Side 1

1. Only Y/DF sites; existing vacant parcels.
2. Same buildings as Scenario 1 - This time with infill plus repell. Repell is parcels that are good candidates for redevelopment or reuse soon.
3. Both Y/DF and repell parcels are used - this time with higher density development types.

K Street - Three Scenarios

Figure F. 6 K Street Scenario side 2

Sample Site Information Card - Side 2

Scenario 1 Data
- Infill area: 0.21 acres
- Annual Property Tax Yield: $6,886

Scenario 2 Data
- Infill + Repell area: 2.20 acres
- Annual Property Tax Yield: $34,538

Scenario 3 Data
- Infill + Repell area: 2.20 acres
- Annual Property Tax Yield: $66,800

K Street - Three Scenarios
**Figure F. 7 First Street Scenario side 1**

Sample Site Information Card - Side 1

1. Only YdMF site - existing vacant parcels

2. Same buildings as Scenario 1 - This time with infill plus refill. "Refill" is parcels that are good candidates for redevelopment or reuse soon.

3. Both infill and refill parcels are used - this time with higher density development types.

**Figure F. 8 First Street Scenario side 2**

Sample Site Information Card - Side 2

1. Scenario 1 Data
   - Infill area: 1.8 Acres
   - Annual Property Tax Yield: $59,020

2. Scenario 2 Data
   - Infill + Refill area: 5.22 Acres
   - Annual Property Tax Yield: $141,013

3. Scenario 1 Data
   - Infill + Refill area: 5.22 Acres
   - Annual Property Tax Yield: $215,803

Only YdMF site - existing vacant parcels
### Instructions

This is anonymous and confidential. Answers will not be connected with your name.

<table>
<thead>
<tr>
<th>Step 1: Please examine the map. This is an aerial view of Turners Falls. Within the highlighted area, please circle 5-6 areas where public or private investment should occur in the near future.</th>
<th>IRB Consent form</th>
<th>Map of TF downtown, label #1</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 2: Please examine the map provided. This is an aerial view of Turners Falls showing some potential focus areas for reinvestment and redevelopment activity. Please rate here the likelihood that you would support directing resources to this focus area. Scale is 1-10. 1 = &quot;do not support&quot;, 5 = &quot;no opinion&quot;, 10 = &quot;strongly support&quot;</th>
<th>Map with 3 scenario areas</th>
<th>Photograph the map</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 3 A: Please examine the three cards. Each of these represents the sites you just rated – A, B &amp; C. The three scenarios represent low, medium and high change.</th>
<th>Three scenario cards – on &quot;Side 1&quot;</th>
<th>Record scenario card selected:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Step 3 B: (After people see scenarios and we have talked about them sufficiently, ask them to pick their favorite and turn it over to see the $$$.) Property tax yield for three redevelopment scenarios have been calculated using a range of values derived from existing Turners Falls properties.</th>
<th>Three scenario cards – on &quot;Side 2&quot;</th>
<th>Explain as needed</th>
</tr>
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<table>
<thead>
<tr>
<th>Step 4: Once again, I'd like you to rate the 3 scenario areas&quot; the likelihood that you would support directing resources to this focus area.&quot; Scale is 1-10. 1 = &quot;do not support&quot;, 5 = &quot;no opinion&quot;, 10 = &quot;strongly support&quot;</th>
<th>Map with 3 scenario areas</th>
<th>Fill in the numbers here</th>
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<table>
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<tr>
<th>Step 5: Please examine the map provided. Within the highlighted area, please circle 5-6 areas where public or private investment should occur in the near future.</th>
<th>Map of TF downtown, label #2</th>
<th>Photograph the Map</th>
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</thead>
</table>

### Material

- IRB Consent form
- Signed form
- Map of TF downtown, label #1
- Photograph the map

### Outcomes

- Photograph the Map
- Signed form
- Map of TF downtown, label #1

### Benefits and Barriers

Please examine the map showing the three sites, and the cards showing the information for the three redevelopment scenarios. In your opinion, what are some the positives and negatives of each area? Why is this a good redevelopment area or not? If you like it, tell me why. If you don't, tell me why. If you like it, tell me what problems there might be anyway. And vice versa. I'm looking for the site's assets and barriers.

<table>
<thead>
<tr>
<th>Avenue A</th>
<th>Benefits +</th>
</tr>
</thead>
<tbody>
<tr>
<td>K Street</td>
<td>Barriers -</td>
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<tr>
<td>First Street</td>
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</table>

All interviews were conducted in person, responses typed into a word document during interview.
APPENDIX G

SAMPLE OF MAPS EXAMINED FOR CONGRUENCE

Map G.1 Assets and Opportunities from Tax Data and Planning Documents: Sample Experimental Representation of Values using Hue and Shading
Map G.2 Assets and Opportunities from Tax Data and Planning Documents: Sample Experimental Representation of Values using Hue and Shading
**Map G.3** Assets and Opportunities from Tax Data and Planning Documents: Sample Experimental Representation of Values using Hue and Shading
APPENDIX H

MAPS OF TURNERS FALLS SITES CONSIDERED FOR SCENARIO-BUILDING

Map H. 1 Preliminary Sites Selected for Further Observation and Analysis

Map H. 2 Final Scenario Areas Selected
APPENDIX I

IRUN MAPS: PARCELS FOR INFILL, REFILL, UPGRADE AND NO CHANGE

Map I.1: Avenue A

Map I.2: K Street
Map I.3: First Street
APPENDIX J

IRUN MAPS: TRANSECT LINES AND BASELINE SCENARIO SELECTIONS

Map J.1: Avenue A

Map J.1: K Street

Map J.1: First Street
APPENDIX K

TABLE OF RESULTS FROM INTERVIEW RATINGS

<table>
<thead>
<tr>
<th>Subject</th>
<th>RATING 1</th>
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<th></th>
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<th></th>
<th>CHANGE</th>
<th>Abs value of chg</th>
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<td>First Street</td>
<td>First Look</td>
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<td>79</td>
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* “less than before”
** “8,9,10”
APPENDIX L

LIVABILITY PLAN MAP OF VACANT AND UNDERUSED LAND (MONTAGUE, 2013(B))
### APPENDIX M

**GLOSSARY OF FREQUENTLY USED TERMS**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brownfield</td>
<td>A site where past use has contaminated soils, structures, water or plant material. Partial or full mitigation may have occurred. Many sites are post-industrial, including historic mills or factories. State and federal programs have encouraged reuse of these sites through redevelopment. Many large urban infill sites are brownfields - undeveloped land close to a historic center is rare.</td>
</tr>
<tr>
<td>Density</td>
<td>Sometimes called “Building Intensity”. The range of locally appropriate or desired densities is specific to a place. Development density is a function of building form, site placement and distance between buildings. The common measure of residential density is dwelling units per acre (du/ac). It may be measured by floor-area ratio (FAR), which is the ratio of the gross building floor area to the net lot area of building site. Housing density refers to number of dwelling units per unit of spatial measure. Higher densities are typical of urban centers, and typically lower moving out from the city center (APA, 2007, p 260).</td>
</tr>
<tr>
<td>Greenfields</td>
<td>A developable area that does not currently feature [significant numbers of] buildings. The term implies a site free of structures like farmland or forest, and free of contamination, rather than brownfields.</td>
</tr>
<tr>
<td>Infill</td>
<td>Development within an area that is has already considered built out. Can be urban or suburban. It can take many forms; building additions, a single-lot built out, a brownfield development, adaptive reuse or renovations, and multi-parcel projects (APA, 2007, p 260). For the purpose of this study, infill development refers to new construction on vacant or underused lots.</td>
</tr>
<tr>
<td>Parcel</td>
<td>Legally defined piece of land with ownership defined by deed. Can be any size.</td>
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<tr>
<td>Redevelopment</td>
<td>Development within existing developed areas. May involve any kind of infill, but also implies broader change like adding amenities and upgrading infrastructure. Used interchangeably with the term ‘Urban Renewal’, a term coined in an era when neighborhood removal was the starting point for redevelopment.</td>
</tr>
<tr>
<td>Refill</td>
<td>Infill sites that are not vacant, but slated for building replacement. More than vacant infill sites, it raises issues of equity and property rights (Landis et al,2006).</td>
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<tr>
<td>Smart Growth</td>
<td>Smart growth is development that protects natural resources, enhances quality of life, offers housing choices, reduces energy consumption, and improves municipal finances by considering the location, design and long-term costs of development (Massachusetts EEA, 2013).</td>
</tr>
<tr>
<td>Site</td>
<td>May be one or many parcels. In land use, refers to any focus area for development or redevelopment.</td>
</tr>
<tr>
<td>Sprawl</td>
<td>Growth outwards from the center, creating areas that are neither urban nor rural. Sometimes called ‘suburban sprawl.’ Often used as a pejorative that describes areas without center or form, denotes consumption of farm or conservation land, and implies development forms featuring large buildings on large lots. Spatially there is no fixed definition of the density or location of sprawl.</td>
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APPENDIX N

HOUSEHOLD SIZE AND HOUSING ATTRITION IMPACTS ON RESIDENTIAL DENSITY

To maintain the population density that historic town centers had fifty years ago, towns would have needed to add density through infill. The tables below illustrate reduced residential density stemming from demographic changes and attrition of units (removed or abandoned). Even with minor reduction in number of residential units (10% unit loss 1964-2014), changes in household size mirroring the nation’s over the same time period (from 3.33 in 1964 to 2.58 in 2011) would mean that towns now have **101 fewer people for every 100 housing units** (U.S. Census, 2013).

<table>
<thead>
<tr>
<th>100 Homes in a Historic Downtown in 1964 = 333 Residents (hh size 3.33)</th>
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<th>100 Homes in a Historic Downtown in 2014 = 258 Residents (hh size 2.58)*</th>
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<th>90 Homes in a Historic Downtown in 2014 = 232 Residents</th>
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*Note: The reduction in housing units is a simplification for illustrative purposes and does not reflect the actual number of homes available.

100 Homes in a Historic Downtown in 2014 = 258 Residents (hh size 2.58)*
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