



# USDA Rural Development Multi-Family Housing Comprehensive Property Assessment

Report date: March 1, 2016

(This page intentionally left blank.)

## Acknowledgements

This report was prepared by CoreLogic, Inc. (CoreLogic) and RSM US LLP (RSM) consulting teams under contract to the U.S. Department of Agriculture (USDA) Rural Development (RD). The Rural Housing Service (RHS) is an agency of USDA RD. Special thank you to the USDA RD leadership and staff for their support of our analysis and for providing invaluable insight into the program's history and how it could evolve to address its current challenges. The USDA's State and Field Offices should also be commended for their support, especially during the capital needs assessments when they helped ensure our access to property managers and owners.

Questions or comments on this report should be directed to:

### **RSM US LLP**

1861 International Drive  
Suite 400  
McLean, VA 22102

### **CoreLogic, Inc.**

40 Pacifica, Suite 900  
Irvine, California 92618

(This page intentionally left blank.)

# Table of contents

Acknowledgements .....	i
Table of contents .....	iii
Glossary of terms .....	vii
List of abbreviations .....	ix
Executive summary.....	1
Study background.....	1
Study findings .....	2
A. RHS MFH portfolio has estimated reserves deficit of \$5.596 billion over next 20 years .....	2
B. Section 515 reserves deficit increased since 2004.....	3
C. MPR program improves property financial and physical conditions .....	5
D. Conclusions on MFH portfolio .....	5
E. Conclusions on sample of 394 properties.....	6
F. Summary of reserves deficits for MFH.....	6
1. Introduction .....	7
1.1. Overview and report summary .....	7
1.2. Statement of work .....	7
1.3. Background of USDA RD.....	8
1.4. Background of Comprehensive Capital Needs Assessment (CNA) .....	9
2. Portfolio analysis methodology .....	10
2.1. Capital Needs Assessment (CNA) methodology .....	11
2.2. Financial analysis methodology .....	17
2.3. Quality Assurance on CNA results.....	21
3. Results of the 2015 study .....	22
3.1. Summary of the results .....	22
3.2. Section 515 portfolio results.....	25
3.3. Section 514 Off-farm portfolio results .....	28
3.4. Section 538 portfolio results.....	30
3.5. MPR portfolio results.....	34
3.6. Changes to the Section 515 portfolio over 12 years.....	37
3.7. Key findings among the sample data of 394 properties.....	42
3.7.1. Analysis of most costly components .....	42
3.7.2. Analysis of property age on PUPA reserves deficit .....	43
3.7.3. Analysis of MPR sample properties .....	47

3.7.4. Analysis of property “overall conditions” .....	49
4. Recommendations and next steps .....	52
4.1. Recommendations .....	52
4.2. Next steps .....	54
5. Possible use of existing RHS tools to reduce capital reserves deficits .....	56
Appendices .....	63
Appendix A: Assumptions and limiting conditions .....	63
Appendix B: Sample selection methodology detail .....	65
Appendix C: Capital Needs Assessment template.....	67
Appendix D: PUPA reserves deficit methodology .....	73

## List of figures and tables

Figure 1 — Uninflated reserves for replacement deficit for MFH portfolio over 20 years.....	2
Figure 2 — Per unit per annum (PUPA) reserves deficit in MFH portfolio, by program, number of units ....	3
Figure 3 — Bridging the gap between the 2004 v. 2015 reports for Section 515.....	4
Figure 4 — Three phases of the analysis methodology created this final report.....	10
Figure 5 — Steps within the three phases of the portfolio analysis.....	11
Figure 6 — Actual overlap within MFH portfolio v. overlap within sample selected.....	12
Figure 7 — Steps within the financial analysis methodology.....	17
Figure 8 — Basic concept of how annual costs can exceed reserves.....	18
Figure 9 — Example calculation of PUPA reserves deficit/surplus.....	19
Figure 10 — Basic example of expanding a sample to a portfolio.....	19
Figure 11 — Quality Assurance Process.....	21
Figure 12 — Uninflated reserves for replacement deficit for MFH portfolio over 20 years.....	23
Figure 13 — Uninflated average PUPA reserves deficit for MFH portfolio.....	23
Figure 14 — PUPA reserves deficit in MFH portfolio, by program and number of units.....	24
Figure 16 — Distribution of near-term v. long-term capital needs for Section 515 portfolio.....	26
Figure 17 — Distribution of near-term v. long-term capital needs for Section 514 Off-farm portfolio.....	29
Figure 18 — Distribution of near-term v. long-term capital needs for Section 538 portfolio.....	31
Figure 19 — Near-term v. long-term capital needs: MPR.....	35
Figure 20 — Section 515 v. MPR PUPA reserves deficit.....	36
Figure 21 — Bridging the gap between Section 515 PUPA reserves deficit in 2004 v. 2015.....	38
Figure 22 — Section 515 average PUPA reserves deficit in 2004 v. 2015.....	40
Figure 23 — PUPA reserve deficit compared to property year built.....	44
Figure 24 — Average number of units per property for each program, by year built.....	45
Figure 25 — Average age of the properties within the sample.....	46
Figure 26 — MPR v. Section 515 and PUPA reserves deficits based on year property was built.....	48
Figure 27 — Distribution of property conditions for sample of 394 MFH properties.....	50
Figure 28 — PUPA reserves deficit by property condition for sample.....	51
Figure 29 — Scenarios B, C impact to Section 515 portfolio.....	59
Figure 30 — Scenarios B, C impact to Section 514 portfolio.....	61
Figure 31 — Example pro forma to calculate reserves for replacement deficit.....	73
Table 1 — Comparison of Section 515 between the 2004 and the 2015 report.....	5
Table 2 — Reserves deficits by program.....	6
Table 3 — Example of expanding Section 515 sample results to the portfolio.....	20
Table 4 — Section 515 units by bedroom size.....	25
Table 5 — Section 514 Off-farm units by bedroom size.....	28
Table 6 — Unit range as a proportion of the Section 538 sample.....	33
Table 7 — Most costly components among the sample properties.....	42
Table 8 — Scenarios applied to the MFH portfolio.....	58
Table 9 — MFH portfolio and sample selected for analysis.....	65
Table 10 — Sample selected for Section 515.....	66
Table 11 — Sample selected for Section 514 Off-farm.....	66
Table 12 — Sample selected for Section 538.....	66
Table 13 — Sample selected for MPR.....	66

(This page intentionally left blank.)



## Glossary of terms

**Coefficient of variation (CV).** A statistical measure of the dispersion of data points in a data series around the mean.

**Cost to maintain functionality.** The estimated costs to replace the capital items necessary to maintain the operational utility of the property.

**Cost to maintain functionality per annum.** The estimated annual costs to replace the capital items necessary to maintain the operational utility of the property.

**Cost to maintain functionality over 20 years.** The estimated gross cost to replace the capital items necessary to maintain the operational utility of the property over the 20-year period relied upon for this analysis. This is the gross cost before factoring in existing reserves for replacement.

**Economic life.** The period over which improvements to real property contribute to property value.

**Effective age.** The age of a property that is based on the amount of observed deterioration and obsolescence it has sustained, which may be different from its chronological age.

**Per unit per annum (PUPA).** The estimated reserves for replacement that a property must set aside for each unit per year in order to maintain functionality.

**Pro forma.** Data or information based on financial assumptions or projections.

**PUPA reserves deficit.** The PUPA net of reserves for replacement. If PUPA is greater than available reserves, then additional funding is required to maintain capital items. If the reserves for replacement is greater than PUPA, then PUPA reserves deficit becomes a PUPA reserves surplus.

**Remaining useful life.** The estimated period during which improvements will continue to provide utility.

**Useful life.** The period of time over which a structure or component of a property may reasonably be expected to perform the function for which it was designed.

(This page intentionally left blank.)

## List of abbreviations

ADA	American with Disabilities Act
AMAS	Automated Multi-Family Housing Accounting System
CNA	Capital Needs Assessment
CV	Coefficient of variation
FHA	Fair Housing Act
HVAC	Heating ventilation air conditioning
MFH	Multi-Family Housing
MPR	Multi-family Housing Preservation and Revitalization program
NPV	Net present value
PUPA	Per unit per annum
QA	Quality Assurance
RA	Rental Assistance
RD	Rural Development
RHS	Rural Housing Service
RRH	Rural Rental Housing
USDA	U.S. Department of Agriculture
VCT	Vinyl composition tile

(This page intentionally left blank.)

## Executive summary

### Study background

The mission of the United States Department of Agriculture (USDA) Rural Development (RD) is to improve the economy and quality of life in rural America. RD has multiple agencies that promote economic development of rural communities through loans, grants, and loan guarantees. The Rural Housing Service (RHS) is one of three agencies within RD and one of its purposes is to build or improve single-family housing, multi-family housing, and essential community facilities in rural areas. Today the RHS Multi-Family Housing Programs (MFH) supports a portfolio of 14,650 properties throughout the United States, Puerto Rico, the Virgin Islands, and Guam.

In 2004, RHS contracted for a study to analyze the Section 515 Rural Rented Housing Program, identify problems, and provide recommendations for changes to address such problems. The 2004 study focused on the Section 515 properties and how they could be better maintained and preserved to meet the needs of rural housing. Since that study, the Multi-family Housing Preservation and Revitalization (MPR) program was established as a way to provide flexible financing tools to modernize the properties. MPR can effectively extend properties' functional utility and restructure loans for existing Rural Rental Housing (RRH) and Off-farm Labor Housing projects to help revitalize and preserve the availability of affordable rental housing for economically disadvantaged residents.

This study, referred to herein as the 2015 Study, performs a comprehensive capital needs assessment (CNA) of MFH programs' portfolios of properties (henceforth "MFH portfolio") in order to understand the following: (1) the current conditions of the Section 515 portfolio; (2) a first-time review of the condition of the MFH's other programs' portfolios; and (3) determine the impact of the MPR program on reserves for replacement deficits since its implementation in 2006. Section 515 properties that have participated in the MPR program have, on average, significantly reduced their reserves for replacement deficits over the 20-year analysis period. Although the MPR program has been successful, the analyses concluded that on average the programs within the MFH portfolio are running reserves for replacement deficits over the 20-year analysis period. (In addition, RHS is assessing how it will meet the growing needs of the elderly and disabled population.)

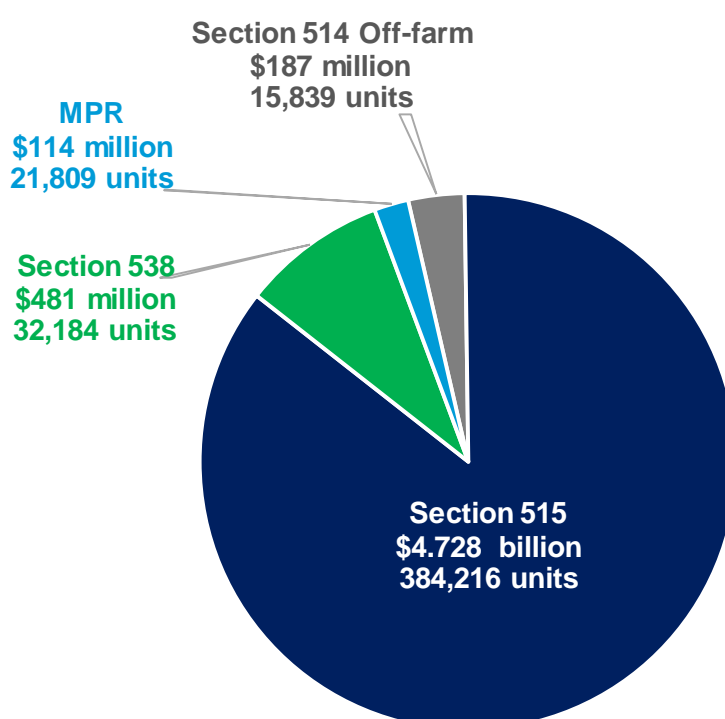
RHS can assess the results of this comprehensive capital needs portfolio analysis to make informed decisions, including but not limited to: (1) determine the severity of the problem of unmet capital reserves in the MFH portfolio; (2) how to meet the needs of their owner/borrow constituents; and (3) how to meet the specific housing demands of the varied type of rural renters, given the current state of the portfolio.

## Study findings

### A. RHS MFH portfolio has estimated reserves deficit of \$5.596 billion over next 20 years

This report analyzed the capital needs of the MFH portfolio of Sections 515, 514 Off-farm, 538, and MPR.<sup>1</sup> The analysis determined that MFH has costs to maintain functionality that exceed the available reserves for replacement.<sup>2</sup> Over the next 20 years, the MFH portfolio will have an estimated combined need for additional funding of \$5.596 billion uninflated<sup>3</sup> to cover the reserves for replacement deficit.

Figure 1 — Uninflated reserves for replacement deficit for MFH portfolio over 20 years



Per RHS, property counts for Section 515 and Section 514 Off-farm exclude properties that overlap currently with the MPR and Section 538 programs.

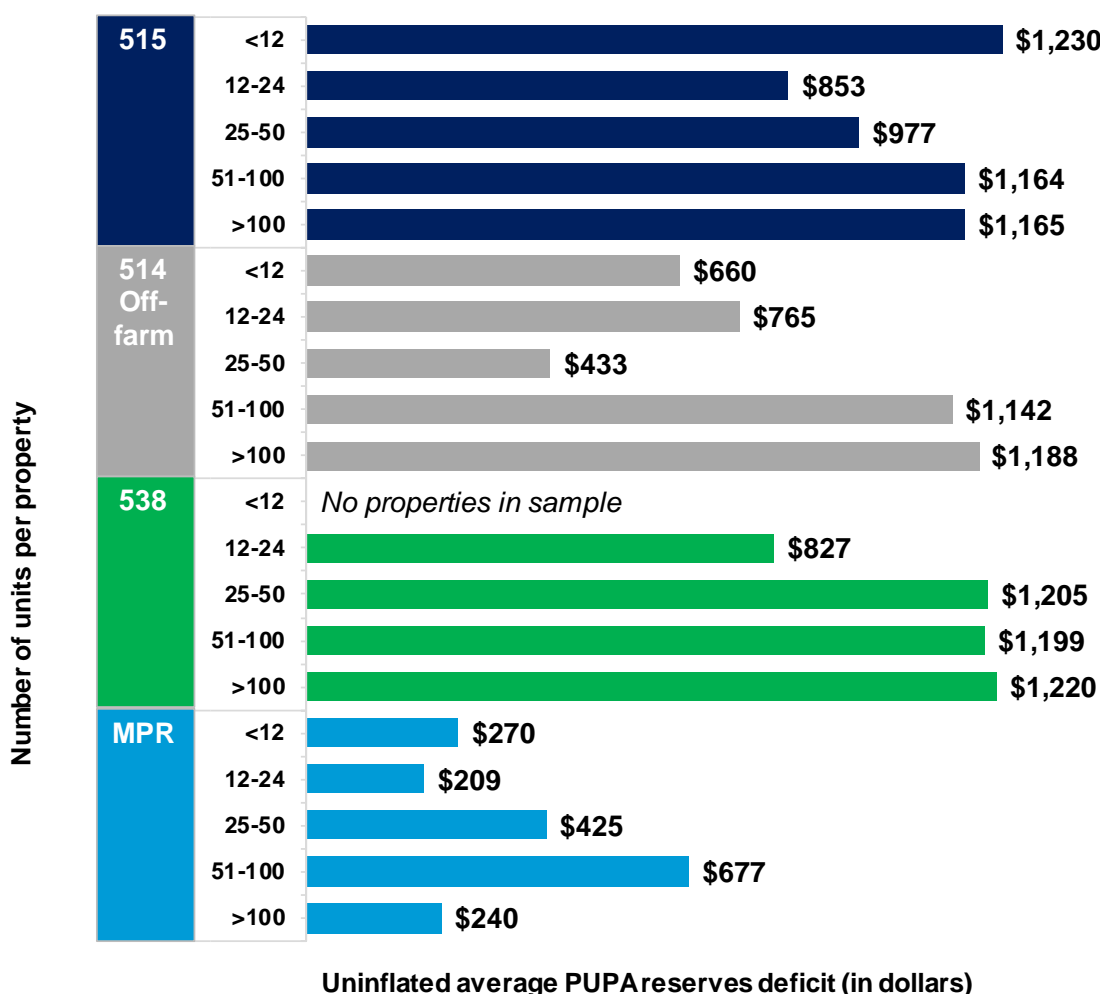
<sup>1</sup> In summary, the precision of point estimates generated by program and property size for this study is approximately +/- 8.33% at a 95% level of confidence for a 4.25% coefficient of variation (CV). The most precise estimates are for Off-farm Farm Labor Housing properties with more than 100 units (CV = 0.9% for a precision of 1.76%), whereas the least precise estimates generated for this study are for Off-farm Farm Labor Housing properties with less than 12 units (CV = 8.10% for a precision of 15.88%).

<sup>2</sup> The cost to maintain functionality net of reserves is the value of existing reserves plus annual reserve contributions, minus the estimated total capital costs.

<sup>3</sup> The uninflated reserves for replacement deficit for the four programs over 20 years was discounted at 5% assuming the mid-year discounting convention to estimate the net present value of the total MFH portfolio reserves deficit of \$5.596 billion.

The following chart illustrates the reserves deficits on a per unit per annum (PUPA) basis. PUPA is the estimated reserves for replacement that a property must set aside for each unit each year in order to maintain functionality. The columns represent the PUPA reserves deficit—i.e., the additional funds required per unit per annum—on average, within each program.

Figure 2 — Per unit per annum (PUPA) reserves deficit in MFH portfolio, by program, number of units

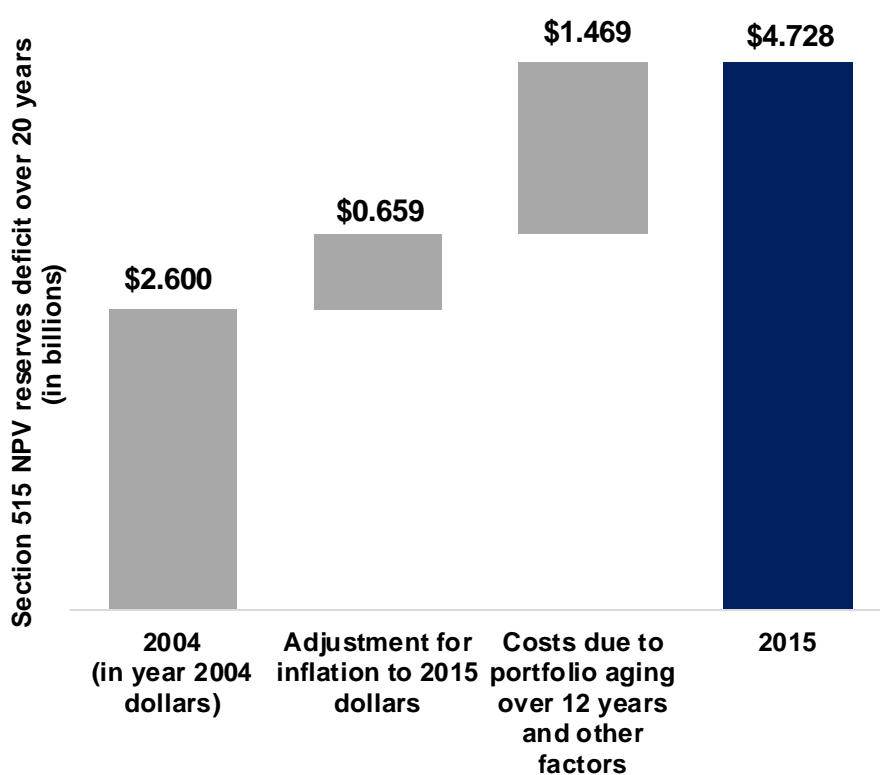


### B. Section 515 reserves deficit increased since 2004

A capital needs assessment report from 2004 reported on the Section 515 portfolio. This 2015 report will only make comparisons to the 2004 report in terms of the Section 515 portfolio. The 2004 report concluded that the Section 515 portfolio had an estimated reserves deficit of \$210 million annually. The Section 515 portfolio had 434,295 total units at the time of that report. The 2004 report projected the \$210 million annual reserves deficit over 20 years and discounted the total by 5% assuming end-of-year discounting convention to calculate a net present value (NPV) reserves deficit of \$2.600 billion.

The 2015 report concluded that the Section 515 portfolio had an estimated reserves deficit of \$370 million annually, which was projected over 20 years and discounted by 5% assuming mid-year discounting convention to calculate a NPV of \$4.728 billion. Importantly, this represents a nominal increase of \$2.128 billion to the reserves deficit, but is not inflation adjusted. Figure 3 illustrates bridging the gap by translating the \$2.600 billion from 2004 into 2015 dollars. Based on the Consumer Price Index, the inflation rate from 2004 to 2015 was approximately 1.9% annually.<sup>4</sup> When applied to the \$2.600 billion, inflation added \$659 million and translated the 2004 figure to \$3.259 billion in 2015 dollars. The residual gap between the 2004 figure and the 2015 figure was due to the portfolio aging and the corresponding costs of an incremental 12 years. Refer to section 3.6, which explores the more complex reasons for the differences in reserves deficits.

Figure 3 — Bridging the gap between the 2004 v. 2015 reports for Section 515



<sup>4</sup> [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm).



Table 1 — Comparison of Section 515 between the 2004 and the 2015 report

Section 515 portfolio	2004 report data (adjusted to 2015 dollars)	2015 report data
Annual reserves for replacement deficit	\$263 million per annum	\$370 million per annum
Total units	434,295 units	384,216 units <sup>5</sup>
PUPA reserves deficit	\$647 per unit per annum	\$964 per unit per annum
NPV of reserves deficit over 20 years	\$3.259 billion	\$4.728 billion

## C. MPR program improves property financial and physical conditions

Starting in 2006, the MPR program was launched to offer several types of assistance to owners or purchasers of Section 515 properties. The most common types of MPR assistance include debt deferrals, as well as in some cases the issuance of grants, loans.

This study analyzed the reserves for represent for MPR properties. Key findings of the analysis include:

- MPR properties, on average, had a statistically significant lower PUPA reserve deficits than Section 515 projects.
- MPR properties, on average, had tail-end weighted capital needs. This indicates long-term capital needs are a higher percentage of the total 20-year capital needs. When compared to Section 515 properties, MPR is expected to have lower capital needs in the near-term and medium-term.
- The success of the MPR program may partially explain the increase in reserves deficits of the Section 515 portfolio. Since the 2004 study, certain Section 515 properties participated in MPR if they met MPR's strict physical and financial requirements. As a result, the Section 515 properties that did not participate in MPR were, on average, more inclined to have higher capital needs.

## D. Conclusions on MFH portfolio

The 2004 report only analyzed Section 515. Therefore, historical comparisons within the MFH portfolio are limited to Section 515. The results of our analyses on the MFH portfolio are summarized below:

<sup>5</sup> Per RHS, property counts for Section 515 exclude properties that overlap currently with the MPR and Section 538 programs.

- It appears that size (number of units) of a property influences the reserves deficit. Typically the larger the property, the more costly it is to maintain on a per unit basis.
- The longer properties postpone replacing capital needs/components, the more expensive it is to replace them.
- MPR has a lower general PUPA reserves deficit. This is an indication that MPR is working from the perspective of supporting properties with maintaining functionality. It succeeds in tail-loading the capital cost to maintain functionality and thus reducing PUPA reserves deficit, and increasing the viability of the portfolio.
- Possible explanations for the high PUPA reserves deficits in other programs:
  - Section 515 is aging and underfunded.
  - Section 514 Off-farm has larger numbers of units, typically all family units with higher maintenance costs.
  - Section 538 has more amenities and larger square footage.

## E. Conclusions on sample of 394 properties

The results of our analyses on the sample of MFH properties are summarized below:

- MPR has a positive influence on reducing the PUPA reserves deficit.
- Property owners should consider replacing carpet with VCT once existing carpet reaches the end of its useful life.
- There appears to be a relationship between the age of the property and the greater average costs to maintain functionality.
- The cost per unit per annum decreases among the better rated (excellent and above average) properties, which is a good trend.

## F. Summary of reserves deficits for MFH

Table 2 — Reserves deficits by program

MFH portfolio	Section 515	Section 514 Off-farm	Section 538	MPR
Annual reserves for replacement deficit	\$370 million per annum	\$15 million per annum	\$38 million per annum	\$9 million per annum
NPV discounted at 5% mid-year over 20 years	\$4.728 billion	\$187 million	\$481 million	\$114 million
Total units	384,216 units <sup>6</sup>	15,839 units <sup>6</sup>	32,184 units <sup>6</sup>	21,809 units <sup>6</sup>
PUPA reserves deficit	\$964 per unit per annum	\$924 per unit per annum	\$1,171 per unit per annum	\$408 per unit per annum

<sup>6</sup> Per RHS, property counts for Section 515 and Section 514 Off-farm exclude properties that overlap currently with the MPR and Section 538 programs

# 1. Introduction

## 1.1. Overview and report summary

This report is an independent portfolio assessment based on a representative sample of 394 rural multi-family properties supported by the RHS MFH programs. RHS and their stakeholders are the intended audience of this report. The purpose of the report is to provide RHS with key financial information that might enable it to make informed operational decisions relating to the potential of unmet capital reserves in the MFH portfolio.

## 1.2. Statement of work

The purpose and underlying scope of the contract was to provide on-site property assessments to support the development of a portfolio-wide property needs assessment by determining the amount of met and unmet capital needs required to ensure proper maintenance of the MFH portfolio over a 20-year analysis period. This report was prepared under Contract # AG-31ME-C-11-1010; Task Order # AG-31ME-D15-0029 with CoreLogic and a subcontract with RSM LLP. USDA RD executed this contract on September 11, 2015, with a no-cost modification to extend the due date executed on January 29, 2016.

In support of this final report, CoreLogic provided the program management and contractual oversight and as needed provided Marshall & Swift data as well as demographic data and mortgage data for 192 of the 394 sample properties (demographic analysis was not part of the scope).<sup>7</sup> RSM provided the subject matter expertise through their Federal, real estate, and valuation practices to oversee and conduct on-site property assessments as well as provide quality assurance, financial analysis and the overall portfolio assessment leading to the publishing of this final report.

RSM/CoreLogic (henceforth “we”) developed the assessment template via a Capital Needs Assessment (CNA) form, combined all qualitative and quantitative cost data from the on-site property assessments with the financial analysis calculations into an Excel model. We published the result per property and at the aggregate portfolio level via the 20-year tables. The team recognized that an effective CNA analysis would help RHS target their limited resources by: (1) objectively assessing property condition; (2) identifying and prioritizing needed improvements; (3) providing accurate costs estimates; and (4) leaving behind a comprehensive report and data that enable both planning of improvement projects and ability to track and monitor those improvements. The results of these four steps will provide RHS with not only the required data, but analysis and insights into the data to help drive decisions affecting the capital needs of its portfolio.

The timetable for this study included time built-in for review of the CNA template, as well as an initial set of on-site property assessments called “rapid assessments.” Rapid assessments enabled

---

<sup>7</sup> RSM used Marshall & Swift data for the remaining sample properties.

RSM to test the method for collecting the property data, as well as test the process of engaging the RD State Officers, contacting the property owners, and enabling RHS to review the results.

RHS will review the findings of this report along with other internal reviews to determine what actions, if any, should be taken to modify the current MFH portfolio. Any statements, recommendations, or conclusions made in this report do not represent the views of the Rural Development Mission Area, the Secretary of Agriculture, or the Administration. This is one of a number of options and data elements to be considered when contemplating changes to the program.

### 1.3. Background of USDA RD

USDA RD has multiple agencies that promote economic development of rural communities through loans, grants, and loan guarantees (through banks, direct loans, credit unions, and community-managed lending pools). RD provides these financial instruments to businesses such as, for example, real estate property developers or agricultural producers. This enables the businesses in the community to support essential services such as housing, health care, first responder services and equipment, and utilities and infrastructure. RD also provides technical assistance and information to agricultural producers and helps rural residents obtain affordable housing.

RHS is one of three agencies within RD and its purpose is to build or improve single-family housing and multi-family housing and essential community facilities in rural areas. RHS MFH programs “offer loans to provide affordable rental housing for very-low-, low-, and moderate-income residents, the elderly, and persons with disabilities. Funds also may be used to buy and improve land and to provide necessary facilities such as water and waste disposal systems. In addition, USDA offers rental assistance to help eligible rural residents with their monthly rental costs.”<sup>8</sup> The MFH programs support properties throughout the United States, Puerto Rico, the Virgin Islands, and Guam, through various financial instruments described above.

As of June 2015, there were 14,650 unduplicated properties representing 454,048 total units across all four MFH programs: Section 515, Section 514 Off-farm, Section 538, and MPR.<sup>9</sup>

- Section 515 Rural Rental Housing provides below-market interest rate loans of up to 30 years (previously up to 50 years) for the construction, improvement, and purchase of multi-family rental housing in eligible rural areas for low-income individuals and families, including the elderly and people with disabilities. Eligible tenants can receive Section 521 Rental Assistance to help reduce tenant rent contributions.
- Section 521 Rental Assistance (RA) is available to units within Section 515 Rural Rental Housing and Section 514 Off-farm Labor Housing properties leased to eligible tenants. RA

<sup>8</sup> RHS website: <http://www.rd.usda.gov/about-rd/agencies/rural-housing-service>.

<sup>9</sup> Per RHS, property counts for Section 515 and Section 514 Off-farm exclude properties that overlap currently with the MPR and Section 538 programs.

payments make up the difference between the rent charged and the tenant contribution to rent, which is capped at 30% of adjusted household income.

- Section 514 Off-farm Labor Housing provides below-market interest rate loans of up to 33 years for the construction, improvement, repair, or purchase of housing for year-round and migrant or seasonal domestic farm laborers. Eligible tenants include US citizens or permanent residents—actively employed or retired—who receive or received a substantial portion of their income from farm labor activities, including growing, transporting, and processing agricultural and aqua cultural commodities. Eligible tenants can receive Section 521 Rental Assistance to help reduce tenant rent contributions.
- Section 538 Guaranteed Rural Rental Housing provides a loan guarantee of up to 90% on loans of up to 40 years, made by eligible lenders to construct, improve, or purchase multi-family rental housing for low- to moderate-income families and individuals in eligible rural communities.
- MPR restructures loans for existing Section 515 Rural Rental Housing and Section 514 Off-farm Labor Housing projects to help improve and preserve the availability of safe affordable rental housing for low-income residents. It provides four mechanisms for preserving affordability and funding capital improvements: (1) grants to nonprofits to address immediate health and safety concerns; (2) new zero-interest loans; (3) new soft-second loans with deferred payments; and (4) loan modification to reduce existing debt payments.

## 1.4. Background of Comprehensive Capital Needs Assessment (CNA)

RHS performs CNAs on the portfolio of properties that it supports for the purpose of collecting and analyzing data for long-term planning needs. A CNA consists of an on-site property assessment of RHS-supported properties with the intent to identify physical components in need of repair and estimate the costs to maintain functionality over a 20-year period. The analysis and insights are used as a strategic planning tool in the following ways:

- Enable property management to make informed decisions on the amount of reserves required per unit per annum to maintain functionality.
- Serve as documentation for a long-term grant or loan with more restrictive or contingent protocols (only for properties in the sample).
- Serve as a starting point for other analysis and portfolio decisions, including: alter policy to get out ahead of near-term and future challenges; seek funding sources to fund modernization and development requirements; and successful long-term management of RHS housing.

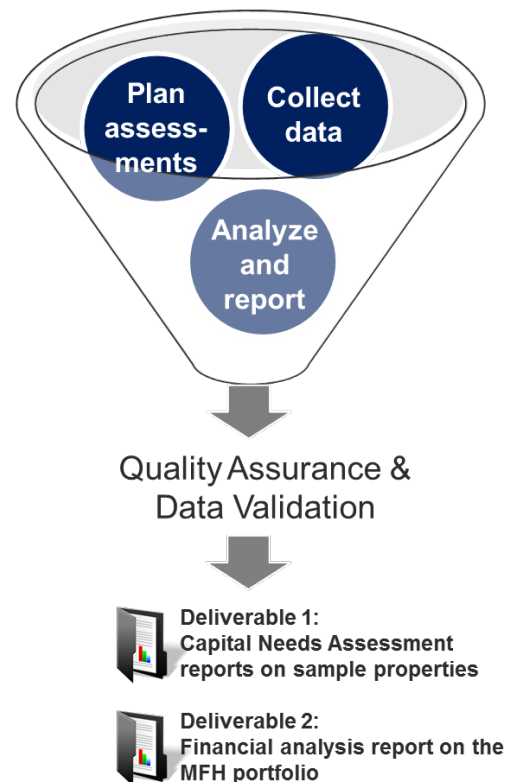
RHS aims to perform a CNA approximately every ten years for its MFH portfolio. The previous CNA was performed in 2004 by an independent contractor that focused on a sample of properties within the Section 515 portfolio. In 2015, CoreLogic and RSM performed CNAs on a sample of properties from all four programs: Sections 515, 514 Off-farm, 538, and MPR.

## 2. Portfolio analysis methodology

As shown below, we designed the portfolio analysis methodology to be repeatable for future MFH portfolio assessments. The basic three phases of the portfolio analysis ultimately are summarized into a two-part final deliverable. The final deliverables are (1) the capital needs assessment reports on all sample properties and (2) the financial analysis of the MFH portfolio, which is this report.

1. **Arrangements phase.** RHS selected sample properties from the MFH program portfolios and the team made plans for on-site visits.
2. **Data collection phase.** We performed on-site property assessments to collect data in the form of written observations and photographs, and estimated costs to maintain operational functionality of the property over a 20-year period.
3. **Financial analysis phase.** The data from the sample property assessments were compared to each property's beginning reserves for replacement balance and annual reserves deposits. The results of this calculation were the estimated reserves deficit/surplus for each property. We expanded the results to the MFH portfolio and performed analyses and documented observations about the results.

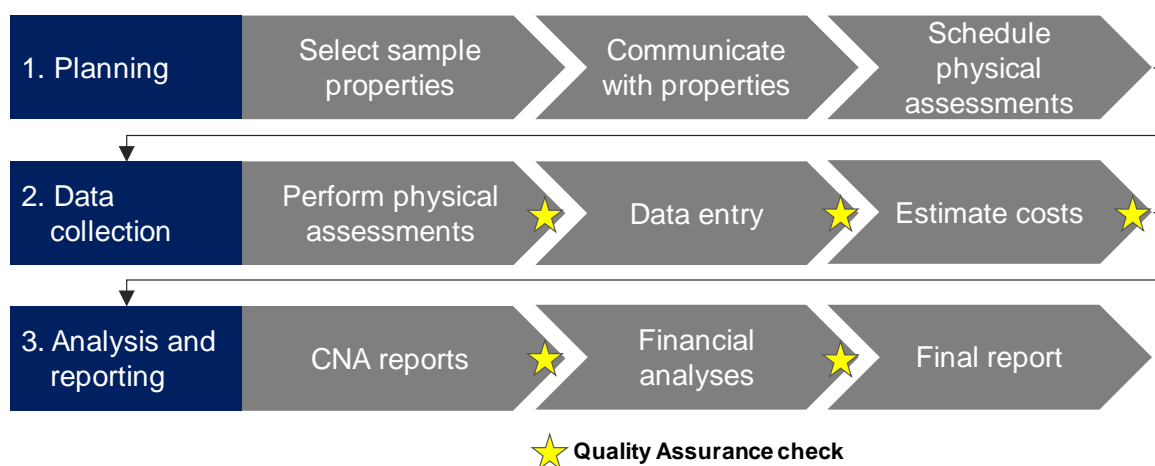
Figure 4 —Three phases of the analysis methodology created this final report



## 2.1. Capital Needs Assessment (CNA) methodology

This section describes how we created a consistent and repeatable methodology to plan physical on-site assessments, collect all data, and perform the analyses to produce the two final deliverables.

Figure 5 — Steps within the three phases of the portfolio analysis



### Phase 1: Planning

#### Step 1: Overview of sample property selection

The MFH portfolio has 14,650 unduplicated properties (counting only properties that do not overlap programs) and it was not feasible from a cost and time perspective to inspect all. Therefore, it was necessary for RHS to choose a representative sample of the portfolio. A representative sample is a subset of a population that, when expanded using statistical methodologies, will reasonably reflect the entire population. A representative sample should be an unbiased indication of the population.

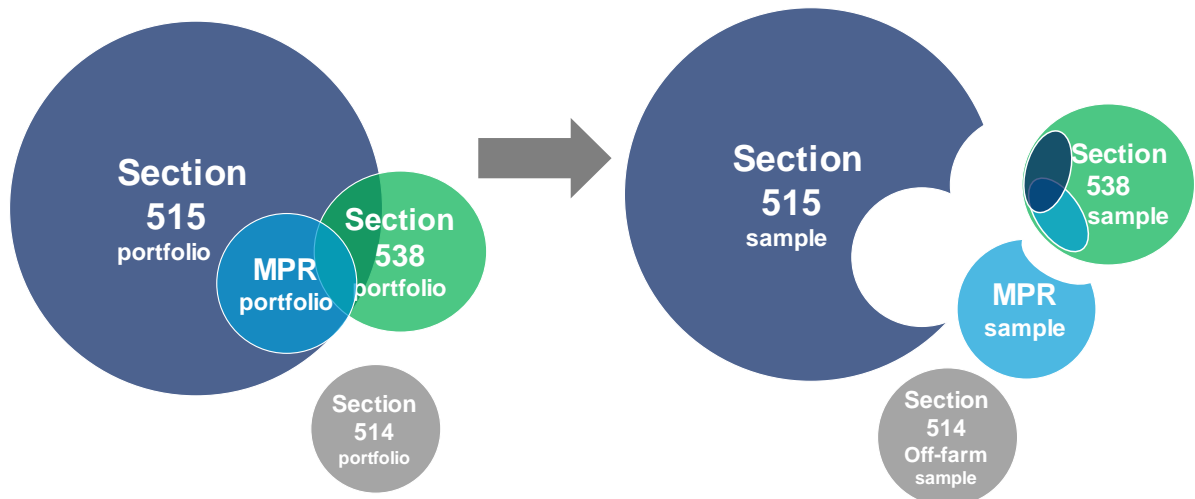
#### Determine sample methodology

RHS selected a representative sample of 394 properties from the MFH portfolio of Sections 515, 514 Off-farm, 538, and MPR. The sample was selected based on the number of total properties within each of the four programs as of June 2015 (March 2015 for Section 538). As of June 2015, there were 14,650 unduplicated properties representing 454,048 total units across all four programs. To avoid double-counting properties, each property was only counted in one program category even if currently financed by multiple MFH programs, as follows:

- **Section 515** — excluding any projects with Section 538 or MPR loans.
- **Section 514 Off-farm** — excluding any projects with Section 514 On-farm, Section 538, or MPR loans.

- **Section 538** — including any overlap with Section 515, Section 514 Off-farm and/or MPR.<sup>10</sup>
- **MPR** — excluding Section 514 Off-farm or Section 538 loans (all overlap with Section 515 or Section 514 by statute, thus are excluded from Section 515 category above).

Figure 6 — Actual overlap within MFH portfolio v. overlap within sample selected



### Determine sample size and level of precision

To select an appropriate sample of properties within each program, properties were stratified by their size according to total units. These size categories mirror those used for the 2004 report: 12 units or less, 12-24 units, 25-50 units, 51-100 units, or more than 100 units. The total number of properties and total number of units within each size category were first used to calculate the sample size, and then to expand the assessment findings of the sample properties to the entire portfolio.

The USDA National Agricultural Statistical Service designs its samples to achieve a high level of statistical confidence in calculated estimates at a relevant level of precision (the coefficient of variation (CV)). In a population with a normal distribution where values cluster around the average and spread out from there evenly on both sides, it can be assumed that 95%—referred to as the level of confidence—of sample observations drawn from the population will fall close to the true population values (within 1.96 standard deviations). The CV provides an additional measure of precision for each estimate. CV values closer to 0 indicate greater precision, whereas values closer to 100% indicate more variation.

<sup>10</sup> Section 538 properties with multiple USDA loan types were included in the count. Section 538 is utilized for Section 515 preservation, although it started out and continues to be a new-construction program.



### Select the sample properties

Once the sample sizes were calculated, properties were selected for the sample by program and property size using two methods. First, a panel of Section 515 properties was randomly selected from those that had participated in the 2004 study. This allows for future comparisons of their assessments, a task beyond the scope of this specific study and report. Second, an additional random sample was selected to complete the Section 515 sample, as needed, as well as to select properties from the other three programs. An oversample was drawn and used for each program to (1) ensure that most states and territories with funded USDA multi-family properties were included in the study, and (2) select additional properties for addition to the study in the event that owners of selected properties declined to participate.

There were 161 sample properties selected from the Section 515 portfolio for the 2015 study sample. Of those 161 sample properties, 98 properties representing 5,264 units were selected from the 2004 study sample, while another 63 sample properties with 4,777 units were randomly selected from the Section 515 portfolio to fill the remaining sample according to unit size.

For this study, a stratified simple random sample was drawn by program and property size using a 95% level of confidence and a CV of 4.25%.<sup>11</sup> This means that RHS can be fairly certain that the estimates based on program and property size in this study fall within approximately +/- 8.33% of the actual amounts. These values were selected in order to balance the need to minimize error and maximize the precision of estimates within budgetary constraints. Due to some post-selection data cleaning and slight changes in the number of properties that were able to be reasonably assessed by the end of the study period, actual CVs differ slightly from those targeted. The calculated sample and the actual sample selected is provided within Appendix B on page 65.

### Compare the sample to additional portfolio characteristics

Based on the sampling method used, study conclusions can only be expanded and generalized to the multi-family portfolio by program and unit size category. However, there are other property characteristics of interest that may be useful to consider, even though the sample was not selected to be representative of these.

<sup>11</sup> The sample size required for a stratified simple random sample (SRS) with a  $100(1 - \alpha)\%$  level of confidence and specified target CV is given by:

$$n_h = \frac{N_h s_h^2}{\frac{(CV_h T_h)^2}{N_h} + s_h^2}$$

Where: h is the stratum, n is the sample size for stratum h, N<sub>h</sub> is the stratum population, s<sub>h</sub> is the stratum standard deviation, CV<sub>h</sub> is the target stratum coefficient of variation, and T<sub>h</sub> is the stratum total.

stratum standard deviation, CV<sub>h</sub> is the target stratum coefficient of variation, and T<sub>h</sub> is the stratum total.

**Step 2: Communicate with properties**

RD leadership contacted their state offices and notified each State Program Director of the sample properties that were in their state. Together with RD leadership, we contacted the RD area specialist and property manager for each property. Property managers were given the option to decline to participate.

Out of the original 394 properties selected, 12 owners chose not to participate. Some properties had been through recent on-site property assessments for other purposes and did not want to inconvenience tenants, while others were in the midst of paying-off their mortgage, transferring to a new owner, and/or launching rehabilitation projects and chose not to participate due to the timing of those events. Those properties were replaced by others from the same program and unit size category, with an effort made to also select a property within the same state or region as the original property sampled.

**Step 3: Schedule on-site property assessments**

We deployed on-site property assessment specialists and scheduled their visits with property managers. We created a property plan to monitor and report on the scheduling, completed on-site property assessments, and completed analyses and 20-year tables of cost estimates. Lastly, we distributed the CNA template to the assessors for data collection.

**Phase 2: Data collection****Step 1: Perform on-site property assessments**

Trained personnel performed an on-site property assessment of the sample properties' major building systems. Major building systems include the building envelope, exterior and interior finishes, architectural items, and site improvements (parking lots and fences, for example). Each major building system has various different components. Lastly, we performed a Quality Assurance (QA) check.

The on-site property assessments were different from a typical RD physical inspection. RD regularly performs physical inspections on the properties to evaluate maintenance and safety-line conditions. RD will issue findings on any violations that need to be corrected. In contrast, the assessments performed for this report are a point-in-time estimate of the useful life of building components. This point-in-time estimates were used to determine the capital needs to meet and/or maintain operational functionality over the next 20 years.

**Step 2: Data entry**

The property components listed in *Appendix C* on page 67 were documented during the on-site property assessments. The property assessment template was filled-out and photographs were taken to support the written observations. Lastly, we performed a QA check.

**Step 3: Estimate cost to maintain the properties**

Each sample property required replacement of capital items at various points in the future. The cost to maintain or replace each component depends on its effective age, remaining useful life, and market price. The effective age of a property is based on the amount of observed deterioration and obsolescence it has sustained, which may be different from its chronological age. Remaining useful life is the estimated period during which improvements will continue to provide utility. The market price of each component was provided by data from the Marshall & Swift cost valuation manual. The cost of all replacements were estimated in present-day dollars with adjustments for local considerations, then projected for 20 years. The results of the analysis provided estimations of the total costs to maintain operational functionality of the property over the 20-year analysis period. Next, the estimated total cost was adjusted by the properties' State Cost Multiplier provided by Marshall & Swift. This cost multiplier attempts to account for variations in cost between properties in different states. Estimated costs were tabulated as uninflated and inflated with an assumed inflation rate of 3%. The CNA workflow summary is provided within *Appendix C* on page 67.

**Step 4: Collect sample properties' financial data from RHS**

The sample properties' historical financial operating data and projected budgets were necessary to estimate whether there would be a reserves-for-replacement deficit/surplus for MFH's portfolios. The financial operating data may include, but are not limited to:

- Prior fiscal year actuals for 2014, provided by the Automated Multi-Family Housing Accounting System (AMAS).
- Prior year audited financial statements, if available, for 2014, 2013, 2012 (collected for Section 538 properties only).
- Future fiscal year budget/projections for 2015 from AMAS.<sup>12</sup>
- Loan amortization schedules from AMAS.
- Tenant rent subsidies and unit occupation data from AMAS.
- Property types (family, elderly, etc.).

---

<sup>12</sup> Some properties' financial statements and/or budgets were unavailable in AMAS. In the absence of data, we made estimations to fill-in the gaps to complete the financial analysis.

## **Phase 3: Analysis and reporting**

### **Step 1: Prepare CNA reports for the sample properties**

A completed CNA contains:

- The assessors' written observations regarding the quality and quantity of the property components;
- The 20-year estimated cost analysis; and
- The property assessment photographs.

### **Step 2: Financial analysis**

The financial analysis follows a three-step methodology:

1. Estimate the capital cost to maintain, net of projected reserves based on the balance and projected reserves transfers, on a per unit per annum (PUPA) basis;
2. Expand the results of the sample data to the entire MFH portfolio; and
3. Arrive at conclusions.

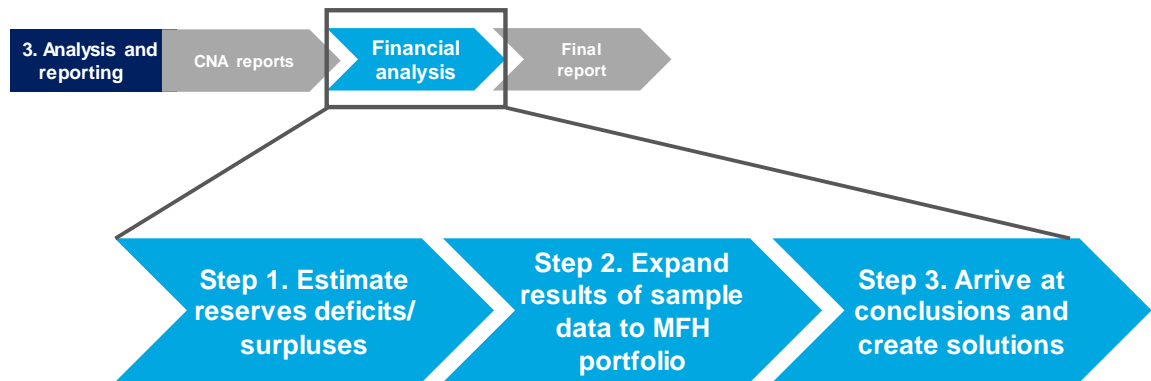
### **Step 3: Final report**

This document is the final report. It contains an executive summary, an explanation of all methodologies used to collect and analyze the data from the property assessment, results and conclusions about the analysis, graphics and charts to support the conclusions, and recommendations that align with the scope of the study.

## 2.2. Financial analysis methodology

We created a four-step methodology for the financial analysis portion within Phase 3: Analysis and reporting of the CNA methodology.

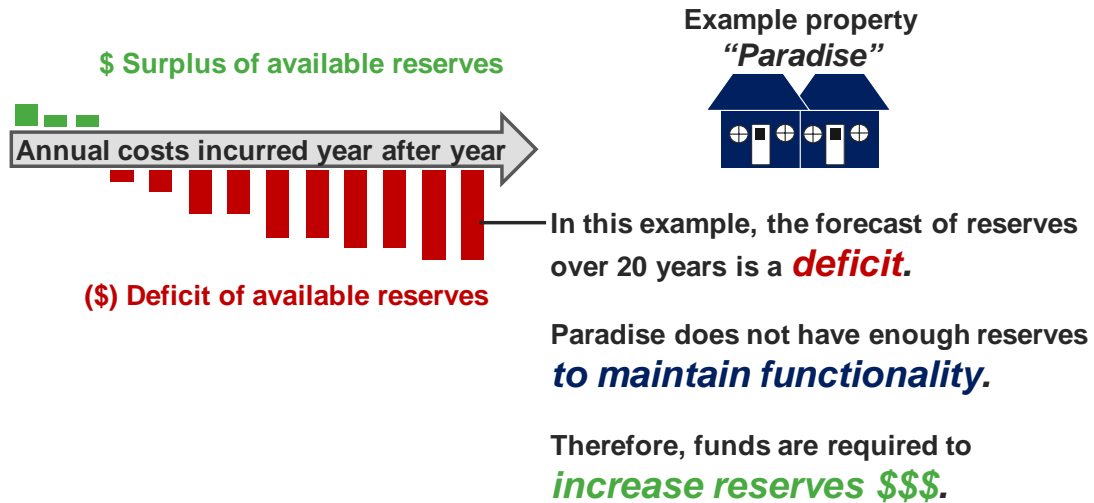
Figure 7 — Steps within the financial analysis methodology



### Step 1: Estimate the reserves deficits or surpluses

If a property's annual cost to replace components exceeds the available funds in reserves for replacement, the property will have a reserves deficit and will require additional funds to maintain functionality. Conversely, when a property's available funds in reserves for replacement exceeds the annual cost to replace components, then the property will have a surplus of reserves for replacement. Figure 8 illustrates this concept with an example property called "Paradise." The timeline arrow represents annual capital needs and the columns on the top and bottom represent the balance of reserves for replacement at the end of each year. In the following example, the red columns under the timeline arrow represent a deficit.

Figure 8 — Basic concept of how annual costs can exceed reserves



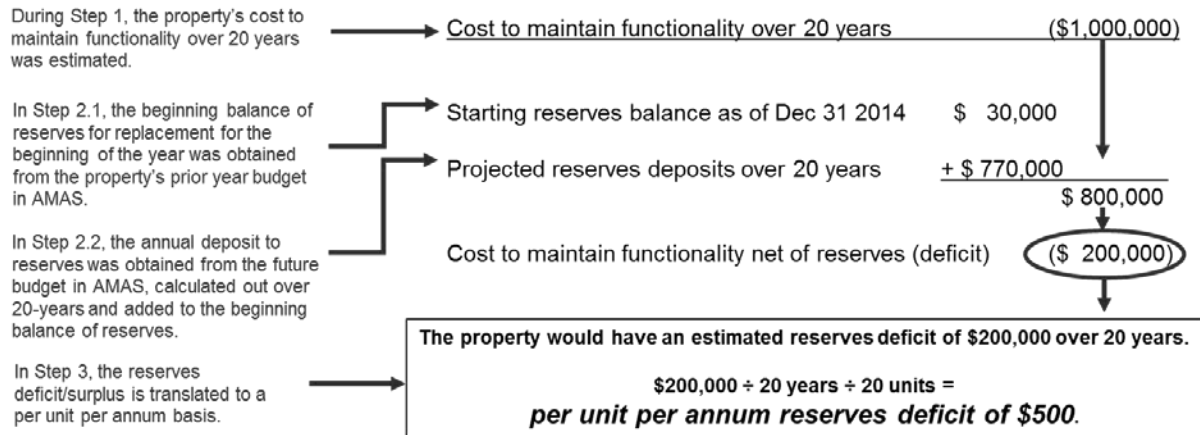
We created a financial pro forma—a projection based on assumptions—of estimated costs and reserves for all sample properties. The detailed pro forma is provided within *Appendix D* on page 72. We performed the following steps for each sample property:

1. **Reserves:** Calculate the amount of reserves the property has available to replace and maintain the property components. Sum the reserves balance as of December 31 of the prior fiscal year and the budget/projections for reserves deposit transfers.
2. **Net reserves:** Calculate the cost to maintain functionality net of reserves. Subtract the annual projections of the estimated cost to maintain functionality obtained in Step 1. A negative balance is a deficit, which indicates the property has inadequate reserves for replacement. Figure 9 illustrates the basic concept of estimating the reserves deficit. In this example, the reserves for replacement over 20 years is \$800,000, but the cost to maintain operational functionality over 20 years is \$1,000,000, which would create a reserves deficit of \$200,000 over 20 years.
3. **PUPA:** Calculate the net PUPA reserves deficit/surplus. Divide the reserves deficit/surplus over 20 years by 20 to obtain the annual figure. Then divide the annual figure by the number of units at the project to calculate the PUPA reserves deficit/surplus. For example, if the sample property in Figure 9 had 20 units, the PUPA reserves deficit would be the \$200,000 reserves deficit ÷ 20 years ÷ 20 units = \$500.

Figure 9 — Example calculation of PUPA reserves deficit/surplus



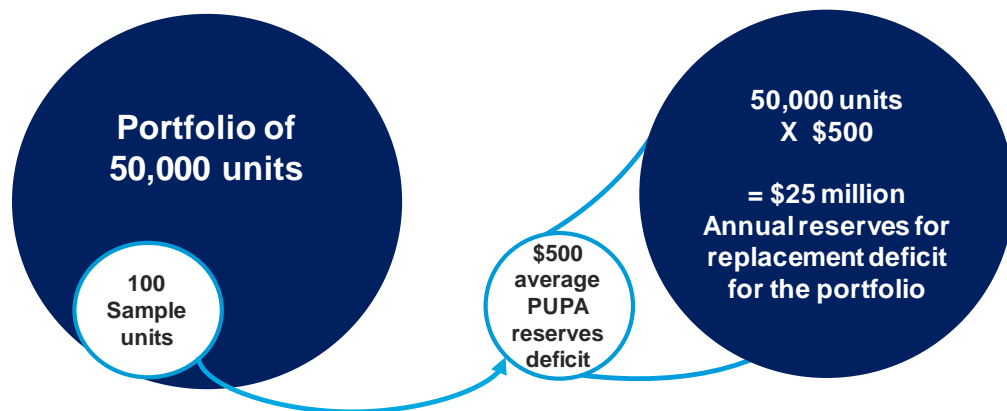
For example, assume a property has 20 units and we want to subtract the cost to maintain from the available reserves for replacement and see if there is a deficit or surplus per unit.



### Step 2: Expand the results of the sample data to the entire portfolio

Step 1 estimated the PUPA reserves deficits/surpluses to maintain functionality for 394 sample properties. The annual reserves deficits for the whole portfolio needed to be calculated to understand severity of the problem and to perform analyses between MFH program portfolios. Therefore the sample PUPA reserves deficits were expanded to the whole portfolio to obtain the portfolio's reserves deficit. Figure 10 illustrates a basic example where a sample of 100 properties were taken from a portfolio of 50,000 total units. The 100 sample properties have an average PUPA reserves deficit of \$500. The \$100 PUPA reserves deficit is multiplied by the 50,000 total number of units in the portfolio, which equals a total annual reserves deficit of \$25,000,000 for the whole portfolio.

Figure 10 — Basic example of expanding a sample to a portfolio



The weighted average mean was used to calculate the samples' average PUPA reserves deficits over 20 years for each program. The weighted average mean limits the influence of the outliers. The weighted average PUPA reserves deficits by unit count was then scaled to the portfolio for each program. Each portfolio's annual reserves deficits were projected over 20 years and discounted at 5% percent assuming mid-year discounting convention.<sup>13</sup> The results represented the estimated total present value of the 20-year reserves deficit. The expansion methodology for Section 515 is shown below as a visual example of the expansion process.

Table 3 — Example of expanding Section 515 sample results to the portfolio

Section 515 (MPR and 538 removed)			
Unit range	Total units	Sample PUPA reserves deficit (surplus)	Program total per annum by total units
<12	9,246	\$1,209	\$11,177,930
12-24	114,349	\$870	\$99,533,964
25-50	191,320	\$942	\$180,263,999
51-100	57,198	\$1,130	\$64,651,279
>100	12,103	\$1,209	\$14,628,372
ALL	384,216 <sup>14</sup>	Total annual	\$370,255,543
		NPV total 20-year	\$4,728,150,539

### Step 3: Arrive at conclusions and create solutions

We analyzed the results of the portfolio expansion and made conclusions for the primary metrics of program type and property size. Additional analyses were performed on other data that is not statistically representative of the portfolio, including, but not limited to, most expensive components, property type (elderly, family, etc.), construction year, and overall property condition. The 2004 report only analyzed Section 515 properties, therefore historical comparisons with the MFH portfolio are limited to Section 515, and some data and conclusions are not available for non-515 properties in this report.

<sup>13</sup> The discount rate of 5% reflects the long-term systemic risk to the cash flows of a property within the RHS MFH portfolio.

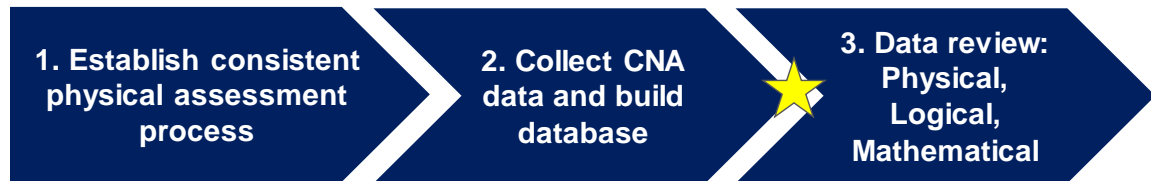
<sup>14</sup> Per RHS, property counts for Section 515 and Section 514 Off-farm properties that overlap currently with the MPR and Section 538 programs.



## 2.3. Quality Assurance on CNA results

Together with RHS, we agreed upon a methodology for Quality Assurance on CNA results.

Figure 11 — Quality Assurance Process



### Step 1: Establish consistent on-site property assessment process

Assessors used a CNA template in which they recorded a significant number of data points and commentary, as well as took extensive photographs of the property.

### Step 2: Collect CNA data and build database

Assessors uploaded photographs and CNA templates into a centralized location for organization and analysis.

### Step 3: Perform three-part data review

Data review was a three-part approach performed by the most experienced personnel. First, we used the photographs to verify the property descriptions documented in the CNA template. Second, we used the assessor's narratives and photographs to verify the quantities and effective ages of the property components on the 20-year assessment tables. QA reviewers contacted assessors immediately when questions arose. Finally, calculations were re-verified by validating totals and cost per unit formulas.

- A. **Physical:** We reviewed the title page and property description and compared to the photographs to verify they matched. Examples of the review included the following: type of construction; overall physical condition; utilities in place; type of heating, ventilation, and air conditioning (HVAC) systems; parking lot(s); reported amenities (laundry rooms vs. laundry hookups, playgrounds, business centers, etc.); utility master- or multi-metered; appliances; finishes (types of flooring, wall coverings, bathroom fixtures); and drainage (storm water ponds or drains).
- B. **Logical:** We reviewed the 20-year assessment table to verify that components accounted for in the narrative portion of the report matched components listed in the table, and the amounts entered are logical. We validated that effective ages were corroborated by the photographs and aligned to the overall condition reported, and are not in excess of the economic life of the specific components.
- C. **Mathematical:** We validated the calculations behind the first row of every table, as well as the total costs and cost per unit calculations.

## 3. Results of the 2015 study

### 3.1. Summary of the results

This section of the report contains the results of the analyses we performed on the MFH portfolio. Sections 515, 514 Off-farm, 538, and MPR each have a dedicated sub-section. Within each sub-section we described the purpose of the analyses, how we performed the analyses, and charts and commentary on the results. All sub-sections provide the distribution of the capital costs to maintain functionality over time and a comparison of PUPA reserves deficits. The 2004 report only analyzed Section 515 properties. Therefore, historical comparisons with the MFH portfolio are limited to Section 515.

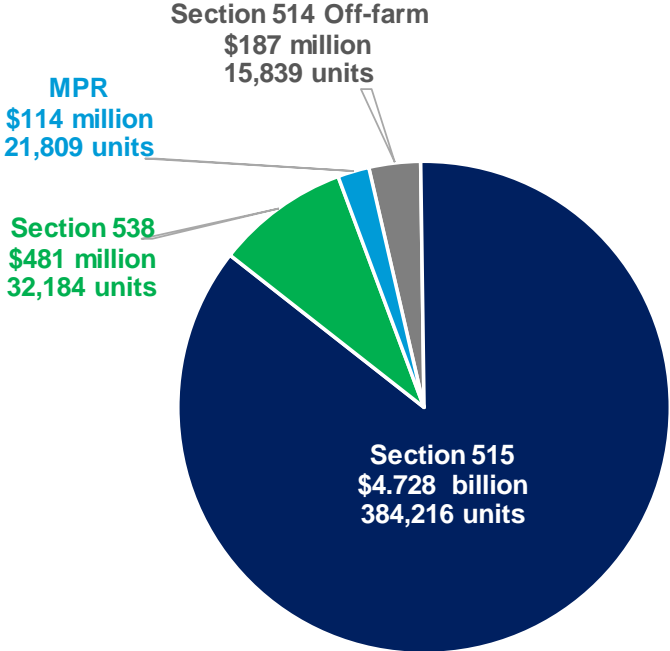
Page 19 explained that the results from the financial analysis of the sample of 394 properties were expanded to the MFH portfolio. Therefore, the results in the sub-sections on each program below are statistically representative of the MFH portfolio with 95% confidence that actual reserves deficits fall within 8.33% of estimated reserves deficits.

In addition to these statistically representative analyses, we also performed analyses that only applied to the sample of 394 properties. The results of the sample-specific analyses do not apply to the MFH portfolio. For example, a sample-specific analysis that is not statistically representative of the portfolio would be a comparison of the sample of 394 properties that were built before 1989 to properties built after 1989. The representative sample was not chosen by the year the properties were built, it was chosen by program and number of units per property, and therefore the results of this example analysis cannot be expanded to the portfolio. The key results of our sample-specific analyses begin on page 42.

#### **Total NPV of the uninflated reserves for replacement deficits over 20 years for the MFH portfolio**

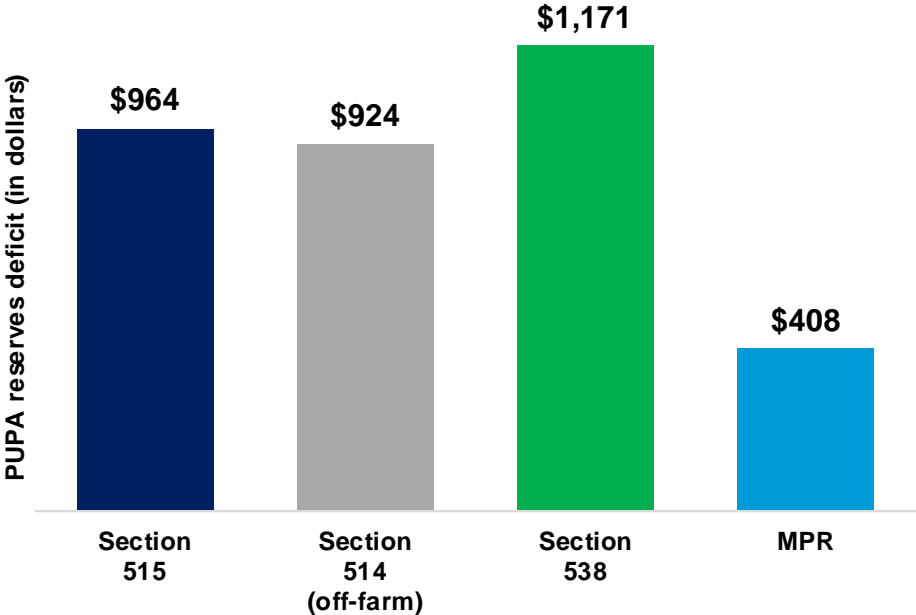
The total uninflated reserves for replacement deficit, discounted at 5% mid-year over 20-years, for the MFH portfolio is \$5.510 billion. This \$5.510 billion figure represents the combined additional reserves for replacement funds that the Sections 515, 514 Off-farm, 538, and MPR portfolios will require over the 20-year analysis period. Figure 12 illustrates the distribution of reserves deficits across the four programs, where Section 515 is the largest at \$4.728 billion.

Figure 12 — Uninflated reserves for replacement deficit for MFH portfolio over 20 years



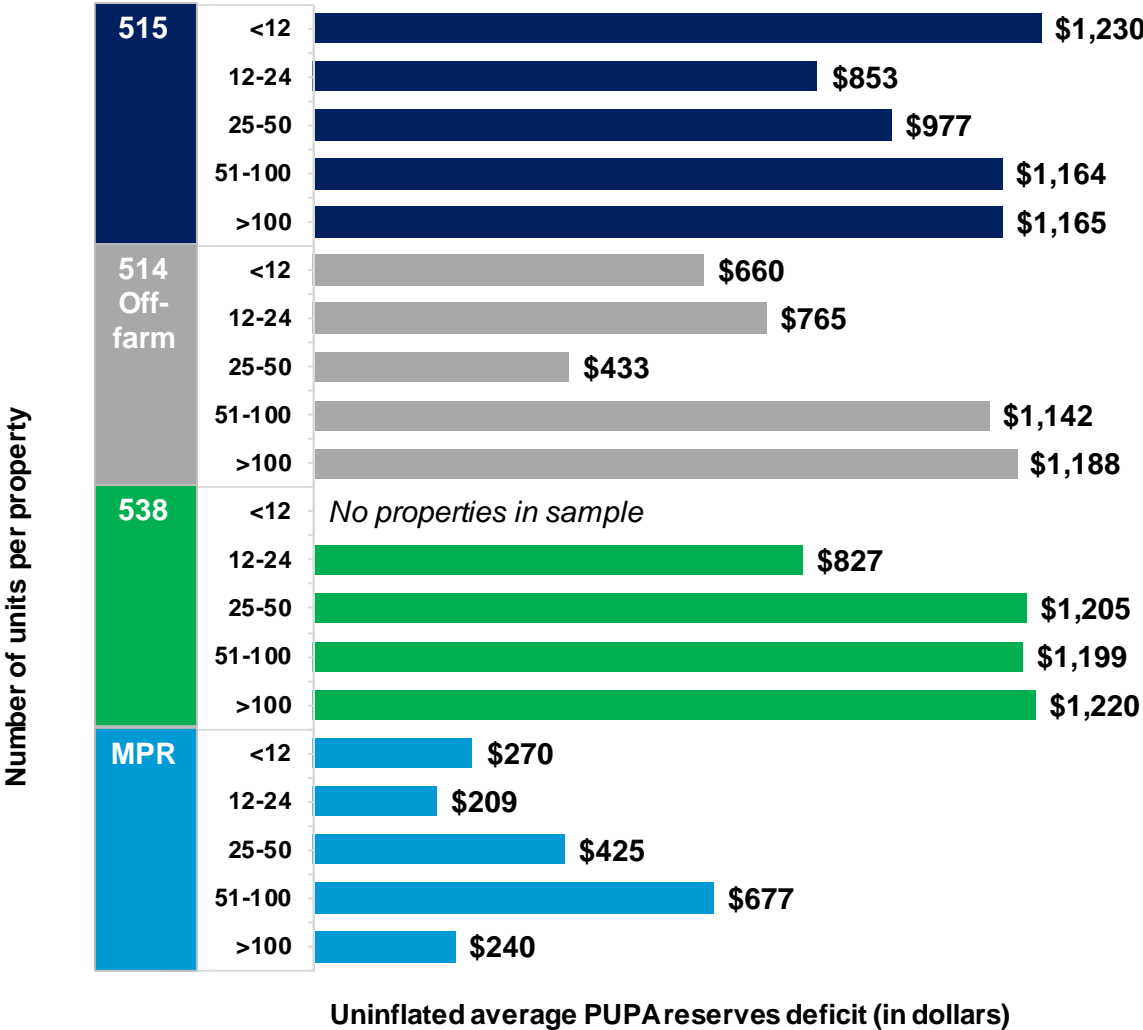
Per RHS, property counts for Section 515 and Section 514 Off-farm exclude properties that overlap currently with the MPR and Section 538 programs.

Figure 13 — Uninflated average PUPA reserves deficit for MFH portfolio



The columns represent the uninflated PUPA reserves deficit—i.e., the additional funds required per unit per annum—on average, within each program. Additional analyses on the implications of the high-level average PUPA reserves deficits by program are discussed in the forthcoming sections of this report.

Figure 14 — PUPA reserves deficit in MFH portfolio, by program and number of units



## 3.2. Section 515 portfolio results

### The purpose of this analysis

The purpose of this analysis was to understand the current conditions of the Section 515 portfolio. First, we plotted the capital costs to maintain operational functionality over time. Then, we compared the PUPA reserves deficits by the size of the properties within the programs.

### Context

- In 2004, the Section 515 average PUPA reserves deficit was \$647 (figure is inflated to 2015 dollars).
- Some properties have transferred over to MPR since its inception in 2006.
- Section 515's unduplicated property count is 13,077, with a total of 384,216 units, which is the largest in MFH.<sup>15</sup>
- 50% of the unduplicated properties have 25-50 units.
- 3% of the unduplicated properties have more than 100 units.
- Approximately 95% of properties in Section 515 have units with 1 to 2 bedrooms.<sup>16</sup>

Table 4 — Section 515 units by bedroom size

Section 515 ALL PROPERTY TYPES (Includes overlap with Section 538 and MPR) <sup>16</sup>	Studio	1 bdrm	2 bdrm	3 bdrm	4 bdrm	5+ bdrm
Number of properties	104	12,297	11,027	2,737	222	3
Number of units <sup>16</sup>	737	215,708	175,252	20,464	1,042	8
Proportion of total properties with bedroom sizes	1%	89%	79%	20%	2%	0%
Percent of Section 515 units with 3 bedrooms or more	5%					

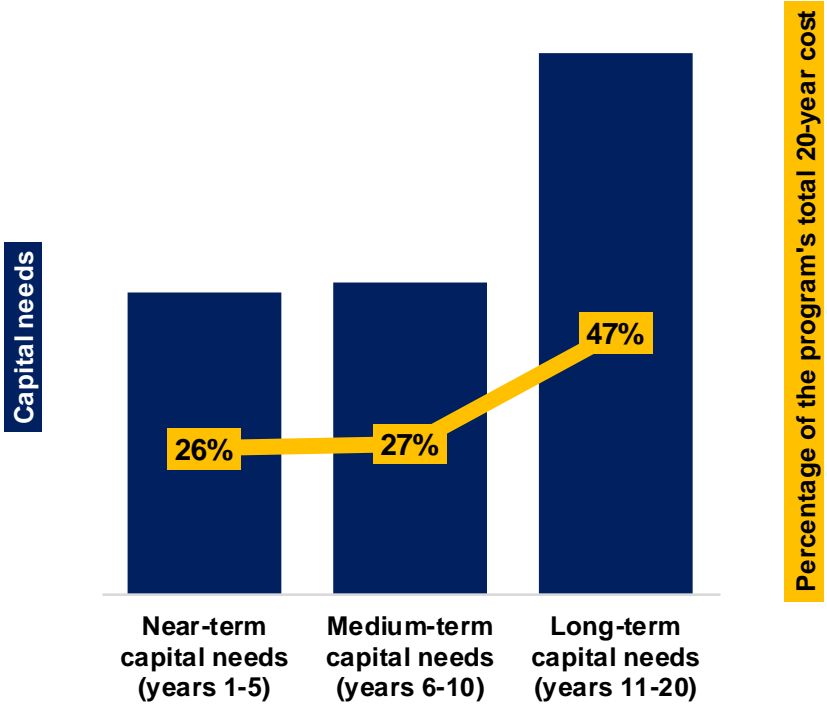
<sup>15</sup> Per RHS, property counts for Section 515 and Section 514 exclude properties that overlap currently with the MPR and Section 538 programs.

<sup>16</sup> In this instance only, the bedroom data for Section 515 in the table includes several properties that overlap with Section 538 and MPR and the figures are representative of entire Section 515 portfolio, rather than the reduced unduplicated count from which the sample for Section 515 was selected for this report.

### Distribution of costs over 20 years

The following chart illustrates the distribution of the portfolio’s estimated capital needs over the 20-year analysis period. The columns represent the distribution of uninflated capital needs in the near-term (1 to 5 years), medium-term (6 to 10 years), and long-term (11 to 20 years). The orange trend line represents the near-term, medium-term, and long-term as a percentage of the portfolio’s total cost of capital needs over 20 years. The purpose was to compare the three periods to determine whether the capital needs were front-end or tail-end weighted.

Figure 15 — Distribution of near-term v. long-term capital needs for Section 515 portfolio



### Observations and discussion

Based on the data, 26% of Section 515 portfolio’s 20-year capital needs could occur in the near-term and 53% of capital needs will occur in the first 10 years. By contrast, it is estimated that MPR could incur 47% of capital needs in its first ten years. If the capital needs were evenly weighted, the near-term and medium-term would each be 25% and the long-term would be 50% of Section 515’s total 20-year capital needs. However, the data indicated that Section 515 properties’ capital needs are, on average, slightly front-end weighted, meaning more than 50% of capital needs could occur in the first 10 years. In general, if a portfolio’s near-term capital needs are a large percentage of its total 20-year capital needs, it could suggest higher levels of deferred maintenance, or indicate a correlation between the advancing age of the portfolio and increasing costs to maintain functionality. This could increase the risk of the portfolio lacking adequate reserves for replacement.

## Relative PUPA cost compared to other programs

Refer to the chart on page 24 of the uninflated PUPA reserves deficits for Sections 515, 514 Off-farm, 538, and MPR portfolios.

One of the potential reasons why Section 515 indicated relatively high PUPA reserves deficits is because there is a possible correlation between the aging of the portfolio and the increased likelihood of higher PUPA reserves deficits.

The introduction of MPR in 2006 has had an impact on the PUPA reserves deficit for Section 515. As previously explained, when Section 515 properties participate in the MPR program they are considered part of the MPR portfolio even though the properties technically overlap both programs. However, in order to make a clear comparison between MPR and non-overlapping Section 515, all duplicated properties were excluded from the total property population cited for Section 515 in this report. Section 515 properties that participated in MPR benefit from a restructured or new mortgage/loan that could be used, for example, to fund capital improvements. We compared Section 515 to MPR and concluded that MPR has lower reserves deficits because its portfolio has higher reserves for replacement and/or lower costs to maintain functionality.

### 3.3. Section 514 Off-farm portfolio results

#### The purpose of this analysis

The purpose of this analysis was to understand the current conditions of the Section 514 Off-farm portfolio. First, we plotted the capital costs to maintain operational functionality over time. Then, we compared the PUPA reserves deficit by the size of the properties within the portfolio.

#### Context

- Two-thirds of unduplicated properties have more than 50 units.
- The unduplicated property count is 292, with a total of 15,839 units, which is the smallest program in MFH.<sup>17</sup>
- Off-farm Labor Housing are larger properties with more units and more bedrooms per unit, on average, than properties within Sections 515, 538, and MPR.
- The following table illustrates that approximately 59% of properties in Section 514 Off-farm have units with three bedrooms or more.<sup>18</sup> By contrast, approximately 5% of properties in Section 515 have units with three or more bedrooms.

Table 5 — Section 514 Off-farm units by bedroom size

Section 514 Off-farm (Includes overlap with Section 538) <sup>18</sup>	Studio	1 bdrm	2 bdrm	3 bdrm	4 bdrm	5+ bdrm
Number of properties	6	77	236	277	209	14
Number of units <sup>18</sup>	114	1,122	5,302	7,555	1,993	49
Proportion of total properties with bedroom sizes	2%	26%	79%	93%	70%	5%
Percent of Section 514 Off-farm units with 3 bedrooms or more	59%					

#### Distribution of costs over 20 years

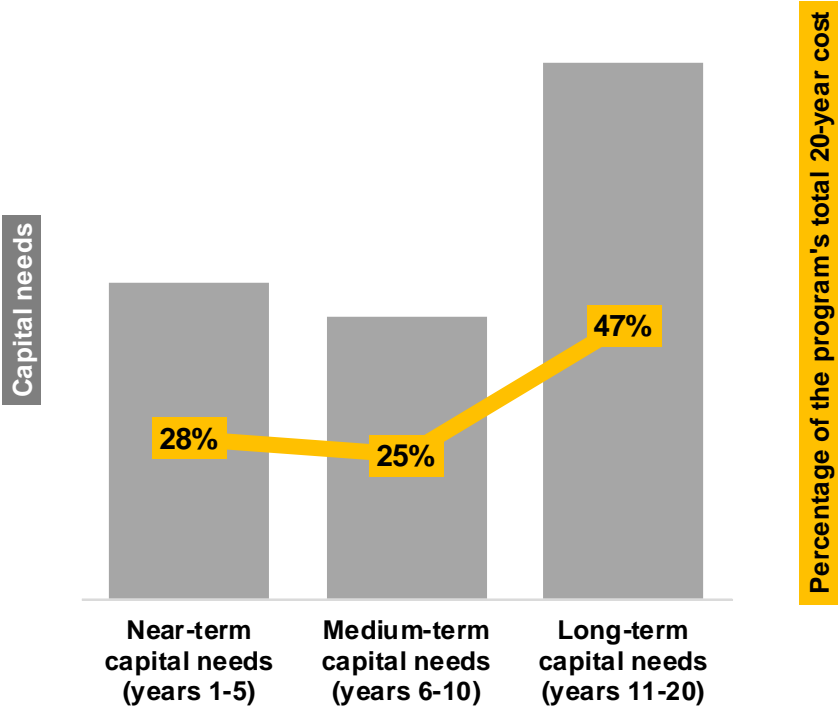
The following chart illustrates the distribution of the portfolio's estimated capital needs over the 20-year analysis period. The columns represent the distribution of uninflated capital needs in the near-term (1 to 5 years), medium-term (6 to 10 years), and long-term (11 to 20 years). The orange trend line represents the near-term, medium-term, and long-term as a percentage of the portfolio's total cost of capital needs over 20 years. The purpose was to compare the three periods to determine whether the capital needs were front-end or tail-end weighted.

<sup>17</sup> Per RHS, property counts Section 514 exclude properties that overlap currently with the Section 538 program.

<sup>18</sup> In this instance only, the bedroom data for Section 514 Off-farm in the table includes several properties that overlap with Section 538 and the figures are representative of the entire Section 514 portfolio, rather than the reduced unduplicated count from which the sample for Section 514 was selected for this report.



Figure 16 — Distribution of near-term v. long-term capital needs for Section 514 Off-farm portfolio



**Observations and discussion**

Based on the data, 53% of the Section 514 Off-farm portfolio’s 20-year capital needs could occur in the first 10 years, with 28% in the near-term (years 1-5). Section 514 Off-farm’s capital needs are, on average, slightly front-end weighted, meaning more than 50% of capital needs could occur in the first 10 years. Section 514 Off-farm had the highest near-term capital needs (as a percentage of portfolio) when compared to the other programs. In general, higher near-term capital needs suggest higher levels of deferred maintenance.

**Relative PUPA cost compared to other programs**

Refer to the chart on page 24 of the uninflated PUPA reserves deficits for Sections 515, 514 Off-farm, 538, and MPR portfolios.

Within Section 514 Off-farm, mid-size properties (with 25-50 units) had the lowest PUPA reserves deficit of \$433. Among mid-size properties across all program, Section 514 Off-farm is roughly equal to MPR. Within Section 514 Off-farm, the largest properties (with more than 100 units) had the highest PUPA reserves deficit of \$1,188, approximately on par with both Sections 515 and 538.

A reason why Section 514 Off-farm has high PUPA reserves deficits is due to the higher concentration of family-focus properties. Family-focus properties typically have larger units, which have more bedrooms, and therefore more estimated capital needs.

### 3.4. Section 538 portfolio results

#### The purpose of this analysis

The purpose of this analysis was to understand the current conditions of the Section 538 portfolio. First, we plotted the capital costs to maintain operational functionality over time. Then, we compared the PUPA reserves deficit by the size of the properties within the portfolio.

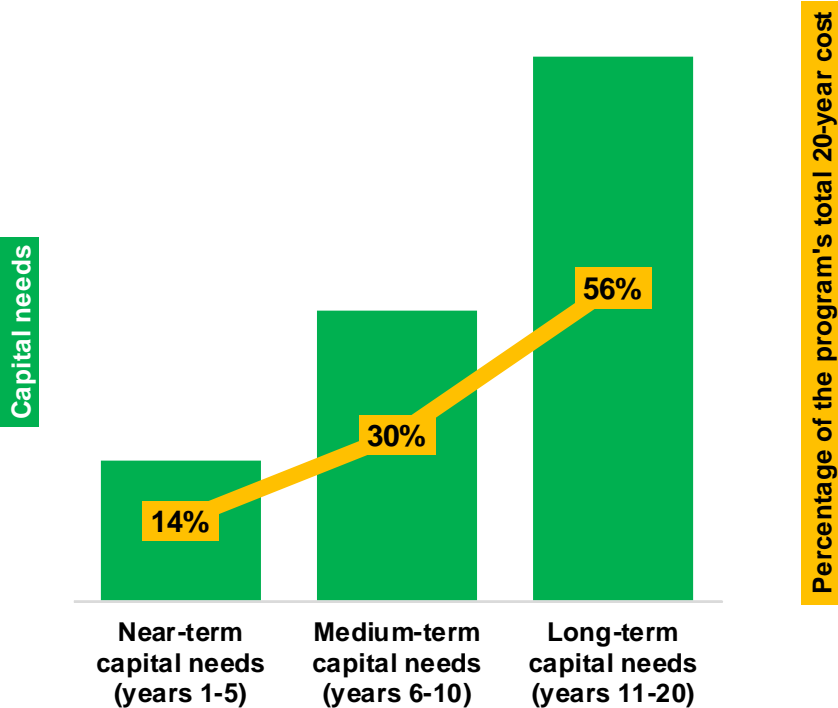
#### Context

- The portfolio contains 644 properties with a total of 32,184 units.
- 51% of the portfolio's properties have 25-50 units.
- 3% of the portfolio's properties have more than 100 units.
- As illustrated on Figure 6, the actual Sections 515, 538 and MPR portfolios have some overlapping properties. To avoid double-counting, the selected samples for Section 515 and MPR removed any properties that overlap with Section 538 and included those overlapping 515/MPR/538 properties in the selected sample for Section 538.

#### Distribution of costs over 20 years

The following chart illustrates the distribution of the portfolio's estimated capital needs over the 20-year analysis period. The columns represent the distribution of uninflated capital needs in the near-term (1 to 5 years), medium-term (6 to 10 years), and long-term (11 to 20 years). The orange trend line represents the near-term, medium-term, and long-term as a percentage of the portfolio's total cost of capital needs over 20 years. The purpose was to compare the three periods to determine whether the capital needs were front-end or tail-end weighted.

Figure 17 — Distribution of near-term v. long-term capital needs for Section 538 portfolio



**Observations and discussion**

Based on the data, 14% of the Section 538 portfolio's 20-year capital needs could occur in the near-term and 44% of capital needs could occur in the first 10 years. The data indicated Section 538's capital needs are, on average, slightly tail-end weighted, meaning more than 50% of capital needs could occur 11-20 years from now. Section 538's relatively lower near-term capital needs corroborate the fact that Section 538 properties are newer and therefore have less deferred maintenance compared to other programs.

**Relative PUPA cost compared to other programs**

Refer to the chart on page 24 of the uninflated PUPA reserves deficits for Sections 515, 514 Off-farm, 538, and MPR portfolios.

Within Section 538, smaller properties (with 12-24 units) had the lowest PUPA reserves deficit of \$824. A comparison of Section 538 to other programs revealed that Section 538 had the highest PUPA reserves deficit among all programs. Within Section 538, the largest properties (with more than 100 units) had the highest PUPA reserves deficit of \$1,220, approximately on par with Sections 515 and 514 Off-farm.

The relatively high PUPA reserves deficits for Section 538 could be due to one of more of the following reasons:

1. **Scattered sites.** The first explanation is that the portfolio includes properties with scatter-site housing developments and they include detached residences that are built on single tax parcels. For example, a property in Florida has 80 detached residences on a single tax parcel, with modern amenities such as a business room, computer room, and events room. All these factors add surface area and increase costs of maintenance/replacements.
2. **Amenities.** The second explanation is that multi-family properties within the Section 538 portfolio are, on average, newer, with larger units, higher-quality amenities, and more akin to market-rate apartments. Also, compared to other programs, Section 538 has certain amenities that are not permitted for properties in other programs.
3. **Overlap in the selected sample.** The third explanation is that the selected sample for Section 538 contains some properties that overlap with Section 515. The results of the analyses on Section 515 indicated a correlation between the Section 515 properties and a higher PUPA reserves deficit. Therefore, if the overlapping 515/538 properties mirror the high PUPA reserves deficits observed for the non-overlapping Section 515 properties, it could have an impact on the high PUPA reserves deficits for Section 538.
4. **Large size.** The fourth explanation is that the sample of Section 538 properties were weighted heavily toward larger properties. Table 6, below, compares the selected sample of Section 538 in box #1, to the Section 538 portfolio in box #2. The sample properties with a high number of units (50 units or more) had a greater proportion (53%) than the actual portfolio (38%). This factor may have had a minor contribution to a higher PUPA reserves deficit for the Section 538 portfolio.

Table 6 — Unit range as a proportion of the Section 538 sample

Section 538 sample						
Unit range	Number of properties	Proportion of sample	Number of units	Proportion of units in the sample	Sample reserve deficit per annum, all properties	Sample PUPA reserves deficit
<12	-	-	-	-	-	-
12-24	11	20%	243	6%	\$199,476	\$821
25-50	15	27%	609	16%	\$732,336	\$1,203
51-100	17	<b>#1</b> 30%	1,188	31%	\$1,397,562	\$1,176
>100	13	23%	1,772	46%	\$2,126,459	\$1,200
ALL	56	100%	3,812	100%	\$4,455,834	
Section 538 portfolio						
Unit range	Number of properties	Proportion of portfolio	Number of units	Proportion of units in the portfolio	Sample PUPA reserves deficit per annum, all properties	Portfolio reserve deficit per annum, all properties
<12	-	-	-	-	-	-
12-24	75	11%	1,633	5%	\$821	\$1,340,514
25-50	331	51%	13,380	42%	\$1,203	\$16,089,753
51-100	220	<b>#2</b> 34%	14,798	46%	\$1,176	\$17,408,346
>100	18	4%	2,373	7%	\$1,200	\$2,847,680
ALL	644	100%	32,184	100%		\$37,686,293

### 3.5. MPR portfolio results

#### The purpose of this analysis

The purpose of this analysis was to understand the current conditions of the MPR portfolio. First, we plotted the capital costs to maintain operational functionality over time. Then, we compared the PUPA reserves deficit by the size of the properties within the portfolio.

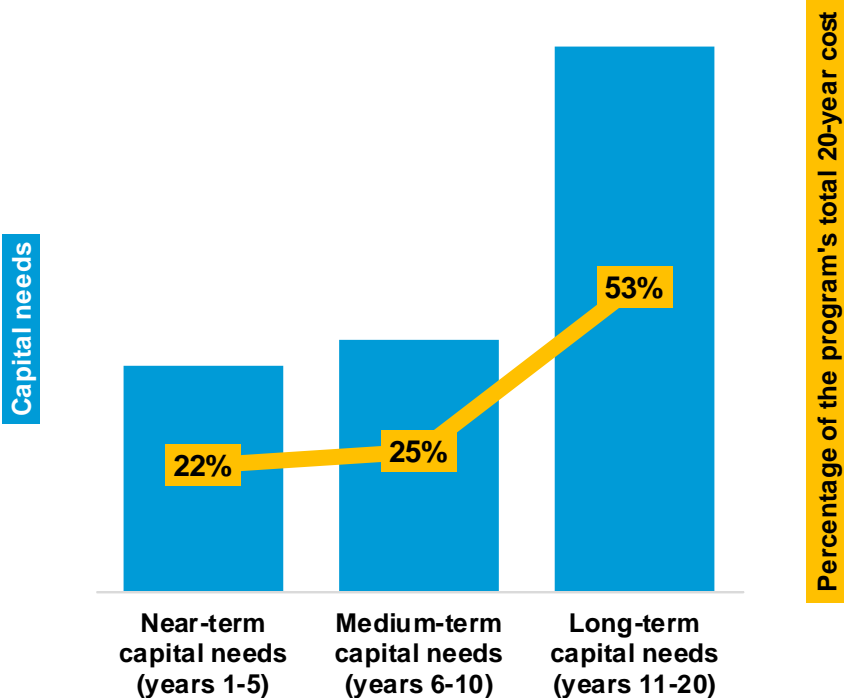
#### Context

- MPR began in 2006. Some Section 515 properties have participated in MPR since its inception.
- Section 514 properties are also eligible to participate in MPR, if they qualify. However, for the purposes of this report they were excluded from this part of the analysis per the sampling methodology.
- The unduplicated property count is 637, with a total of 21,809 units.
- 83% of the unduplicated properties had 25-50 units.

#### Distribution of costs over 20 years

The following chart illustrates the distribution of the portfolio's estimated capital needs over the 20-year analysis period. The columns represent the distribution of uninflated capital needs in the near-term (1 to 5 years), medium-term (6 to 10 years), and long-term (11 to 20 years). The orange trend line represents the near-term, medium-term, and long-term as a percentage of the portfolio's total cost of capital needs over 20 years. The purpose was to compare the three periods to determine whether the capital needs were front-end or tail-end weighted.

Figure 18 — Near-term v. long-term capital needs: MPR



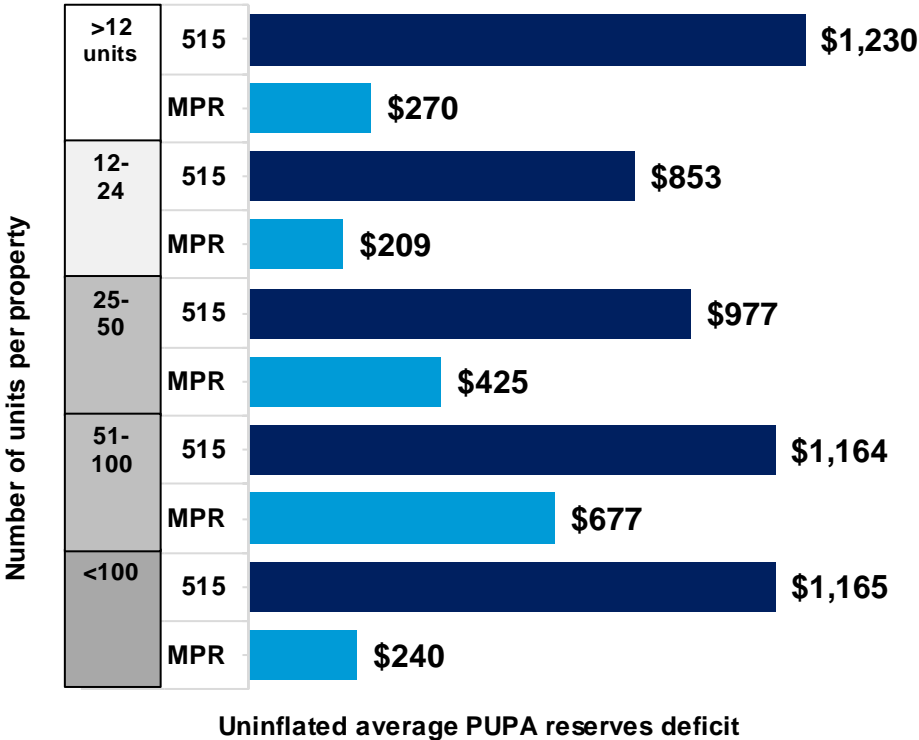
**Observations and discussion**

Based on the data, 22% of the MPR portfolio's 20-year capital needs could occur in the near-term and 47% of capital needs could occur in the first 10 years. By contrast, it is estimated that Section 515 could incur 53% of capital needs in its first ten years. MPR's capital needs are, on average, slightly tail-end weighted, meaning more than 50% of costs could occur 11-20 years from now. This indicates that MPR properties, on average, are less inclined to have near-term capital needs when compared to the other programs.

**MPR comparison to Section 515**

The MPR program began in 2006. The Section 515 properties that participated in the MPR program received additional RHS assistance, which could be used to maintain their functionality, and they were categorized as part of the MPR portfolio from that point on. The following chart illustrates how much lower the PUPA reserves deficits are for MPR, no matter the size of the property.

Figure 19 — Section 515 v. MPR PUPA reserves deficit



**Relative PUPA cost compared to other programs**

As illustrated on Figure 13, the PUPA reserves deficit for MPR was, on average, 57% lower than Section 515. The PUPA reserves deficit for MPR among properties with more than 100 units was 79% lower than Section 515.

**Observations and discussion**

The data indicate that since the introduction of MPR in 2006, properties that currently participate in the MPR program demonstrate significantly lower average reserves deficits.<sup>19</sup> The most likely reason why MPR properties have lower reserves deficits is because they either have more reserves for replacement, or their cost to maintain functionality is lower than Section 515 due to recent rehabilitations. Based on the data, this is an indication that the MPR program is working from the perspective of supporting properties with maintaining functionality.

<sup>19</sup> As illustrated on Figure 6, when Section 515 properties participate in the MPR program they are considered part of the MPR portfolio even though the properties technically overlap both programs. However, in order to make a clear comparison between unduplicated Section 515 and MPR, overlapping properties were excluded from the 13,077 properties cited for the Section 515 portfolio in this report.



### 3.6. Changes to the Section 515 portfolio over 12 years

The 2004 report concluded the Section 515 portfolio's estimated uninflated cost to maintain functionality net of reserves was \$210 million annually (\$262 million<sup>20</sup> in adjusted 2015 dollars). The 2004 report added the annual cost of \$210 million for 20 years and calculated a NPV (5% discount rate at year-end) of \$2.600 billion over 20 years (\$3.529 billion<sup>20</sup> in adjusted 2015 dollars). The 2004 report estimated the average PUPA reserves deficit to be \$43 per unit per month or \$516 per unit per annum (\$647<sup>20</sup> adjusted to 2015 dollars).

The 2015 report concluded the Section 515 portfolio's estimated uninflated cost to maintain functionality net of reserves was \$370 million annually. The NPV (5% discount rate at mid-year) of the annual cost of \$370 million for 20 years was \$4.728 billion. Annual cost of \$370 million was divided by 384,216 units<sup>21</sup> in the Section 515 portfolio (unduplicated property count) to calculate an estimated average uninflated PUPA reserves deficit of \$964.

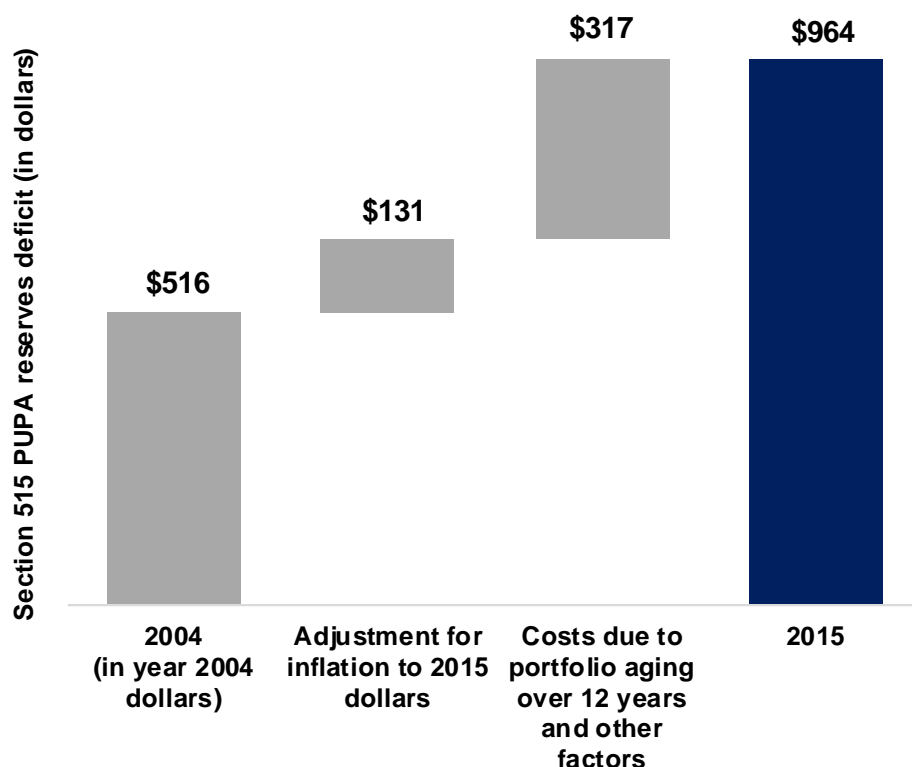
***In 2004:***  
***Section 515 PUPA  
reserves deficit was  
\$647***  
(adjusted to 2015 dollars)

***In 2015:***  
***Section 515 PUPA  
reserves deficit was  
\$964***  
***an increase of 49%***

<sup>20</sup> Based on the Consumer Price Index, the inflation rate from 2004 to 2015 was approximately 1.9% annually. [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm).

<sup>21</sup> Per RHS, property counts for Section 515 exclude properties that overlap currently with the MPR and Section 538 programs.

Figure 20 — Bridging the gap between Section 515 PUPA reserves deficit in 2004 v. 2015



### Select explanatory factors for increasing deficit over 12 years

- **Changes in portfolio characteristics and property mix.**
  - In 2004 the total number of units in the Section 515 portfolio was calculated to be 434,296, but in 2015 that figure was calculated to be 384,216 units.<sup>22</sup> The change in the unit count is a result of using a stratified sampling methodology versus a proportional sampling methodology.
  - Despite the lower number of units, total portfolio cost as well as the average PUPA reserves deficit increased. Since there has been limited new construction of Section 515 projects, there are offsetting factors leading to the total increase. These include the “survivor” bias of properties that were not selected for MPR rehabilitation as well as Section 515 properties that exited the program through prepayment or fulfilling their mortgage obligation. Survivor bias is the logical error of concentrating on the data that “survived” some process and inadvertently overlooking those that did not because of their lack of visibility. In this instance, the selected sample of Section 515 excluded properties that are being “helped” by MPR, and therefore the remaining sample Section 515 properties are the ones that would be more likely have higher reserves deficits. Therefore, the increase to PUPA reserves deficit is partially explained because all the data behind this

<sup>22</sup> Per RHS, property counts for Section 515 and Section 514 exclude properties that overlap currently with the MPR and Section 538 programs.

observation is based on these “surviving” properties that are more likely to have higher reserves deficits to begin with.

- **The impact of inflation and deferred maintenance over 12 years.**
  - Based on the Consumer Price Index, the inflation rate from 2004 to 2015 was approximately 1.9% annually.<sup>23</sup> When applied to the \$2.600 billion, inflation adds \$659 million and translates the 2004 figure to \$3.259 billion in 2015 dollars. The residual gap between the 2004 figure and the 2015 figure is due to the portfolio aging and the corresponding costs of an incremental 12 years.
- **The impact of more realistic time value of money calculations.**
  - The 2004 report used the end of year discounting convention assuming a 5% annual discount rate to estimate the NPV of the total 20-year reserves deficit. We used mid-year discounting at 5%, which is more realistic because it assumes the properties’ costs are spread evenly throughout the year as opposed to only occurring at year-end.
  - As a result of assuming cash outflows occur evenly throughout the year, utilizing mid-year discounting accounts for an increase of \$100 million in the NPV of the total 20-year reserves deficit, which was included in its current total reserves deficit of \$4.728 billion.
  - It is important to understand that mid-year discounting convention increased the NPV over 20-years, but it has no impact to the PUPA reserves deficit of \$964 in 2015. This is because the \$964 PUPA was calculated using a simple weighted average of the annual reserves deficit of \$370 million divided by the total number of units. The annual reserves deficit is a smoothed average of the total costs over 20 years and it should not be discounted.

### **Comparison of Section 515 properties analyzed in 2004 and 2015 studies**

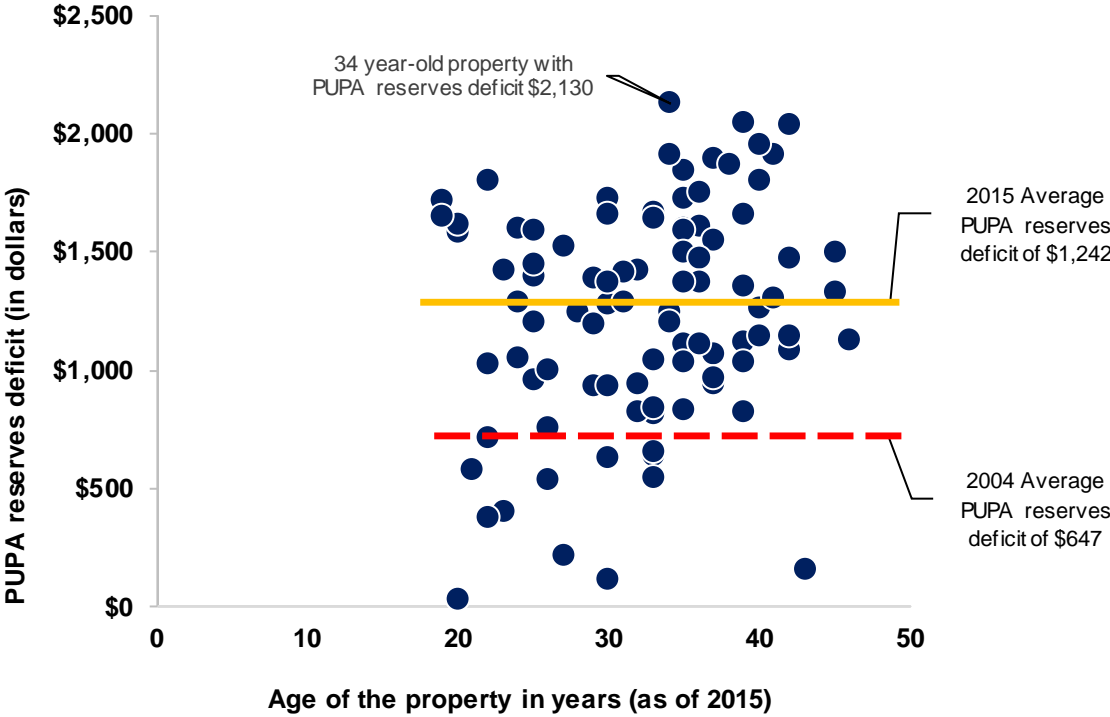
There are 98 sample properties within Section 515 that were assessed in both the 2004 report and our 2015 report. The 2004 CNAs for the 98 properties were unavailable, and therefore a one-for-one comparison to 2015 CNAs could not be performed. Instead, we took the average PUPA reserves deficit of the 333 sampled properties from the 2004 report and compared it the average PUPA reserves deficit of the 98 properties in 2015.

<sup>23</sup> [http://www.bls.gov/data/inflation\\_calculator.htm](http://www.bls.gov/data/inflation_calculator.htm)

**Context**

- Of the 98 properties, three properties were originally built 80 or more years ago. These properties were since converted before they joined the Section 515 portfolio, but due to the large age difference compared to the other 95 properties, the three were determined to be outliers and were excluded from the 98.
- The physical ages of the remaining 95 properties were greater than 18 years.
- Each blue data point on the chart below represents one of the 95 properties, by age and by PUPA reserves deficit in 2015.
- The orange line passes through the blue data points at their average.
- The 2004 average PUPA reserves deficit for the entire sample of 333 properties was \$647 (in 2015 dollars).
- The 2004 average PUPA reserves deficit of \$647 is represented by the red line.

Figure 21 — Section 515 average PUPA reserves deficit in 2004 v. 2015



---

## Observations and discussion

- The 95 properties had an average PUPA reserves deficit of \$1,242. By contrast, the 2015 Section 515 portfolio (unduplicated) average PUPA reserves deficit was \$964.<sup>24</sup>
- The \$1,242 mean of the 2015 PUPA reserves deficit for the 95 properties was 92% greater than the \$647 mean of the 2004 PUPA reserves deficit. This was a statistically significant difference that is unlikely to occur by chance.

Given the lower PUPA reserves deficits among MPR, it was logical to assume that Section 515 properties that did not participate in MPR would have continued to experience rising costs to maintain functionality, and therefore more inclined to have a higher reserves deficit. The 95 properties that did not participate in MPR as of 2015 were on a trend that indicated PUPA reserves deficits increases with property age. Due to the fact that the PUPA reserve deficit was lower for MPR, the implication is that “healthy” properties—i.e., those with a lower reserves deficit—have participated in MPR.

---

<sup>24</sup> Per RHS, property counts for Section 515 and Section 514 exclude properties that overlap currently with the MPR and Section 538 programs.

### 3.7. Key findings among the sample data of 394 properties

The results of the following analyses are not statistically representative of the portfolio and pertain only to the sample of 394 properties. Although, the results cannot be scaled to the whole portfolio, the implications could have broad implications on the MFH portfolio.

#### 3.7.1. Analysis of most costly components

**HVAC, carpets, cabinets, water heaters, and parking lots account for approximately 50% of the sample properties' cost to maintain functionality.**

#### The purpose of this analysis

This analysis identified which components will require the largest proportions of the reserves among the sample properties within Sections 515, 514 Off-farm, 538, and MPR. We examined the cost to maintain functionality by component as a percentage of the overall cost for the sample properties. Table 7 is a list of 24 components (with the remainder grouped under entry "Other") ranked largest to smallest in terms of the percentage of the overall cost to maintain functionality.

Table 7 — Most costly components among the sample properties

Components		515	514	538	MPR
Top 10 most costly	Common HVAC	29%	30%	26%	24%
	Carpet	9%	6%	9%	10%
	Cabinets	7%	7%	8%	8%
	Plumbing Systems Water Heater	4%	4%	4%	4%
	Parking Paving Re Surfacing	4%	5%	4%	3%
	Countertops	3%	3%	4%	4%
	Windows Vinyl sash	3%	4%	3%	3%
	Doors	3%	3%	4%	4%
	Windows Steel sash	4%	4%	1%	<1%
	Gutters Aluminum	4%	1%	5%	5%
Roofing asphalt shingles	3%	4%	3%	3%	
Ranges	3%	2%	3%	3%	
Soffit	2%	3%	2%	3%	
Bathtub Shower	2%	2%	2%	2%	
Exterior Walls Brick or Block	3%	<1%	<1%	3%	
Refrigerators	2%	2%	2%	2%	
Vanity	2%	2%	2%	2%	
Site Fencing	<1%	3%	<1%	<1%	
Fascia	1%	2%	2%	2%	
Exterior Walls Stucco	<1%	4%	<1%	<1%	
Sidewalks	1%	2%	1%	1%	
Range Hoods	1%	1%	1%	1%	
VCT Vinyl	1%	1%	1%	1%	
Front Metal Doors	<1%	<1%	<1%	<1%	
Other	6%	4%	9%	8%	

## Observations and discussion

- The top five components—HVAC, carpets, cabinets, plumbing/water heaters, and parking lot maintenance—account for approximately 50% of the sample properties' cost to maintain functionality.
- HVAC cost of replacement was the largest, accounting for approximately 25%-30%.
- Carpet was the second most costly at 6%-10% of total cost to maintain functionality.
- Components with high costs had the following in common: they were found in every property; they will have shorter relative useful lives; and they will experience high usage.

### 3.7.2. Analysis of property age on PUPA reserves deficit

**Based on the data, there appears to be a relationship between older properties and higher costs to maintain functionality.**

#### The purpose of this analysis

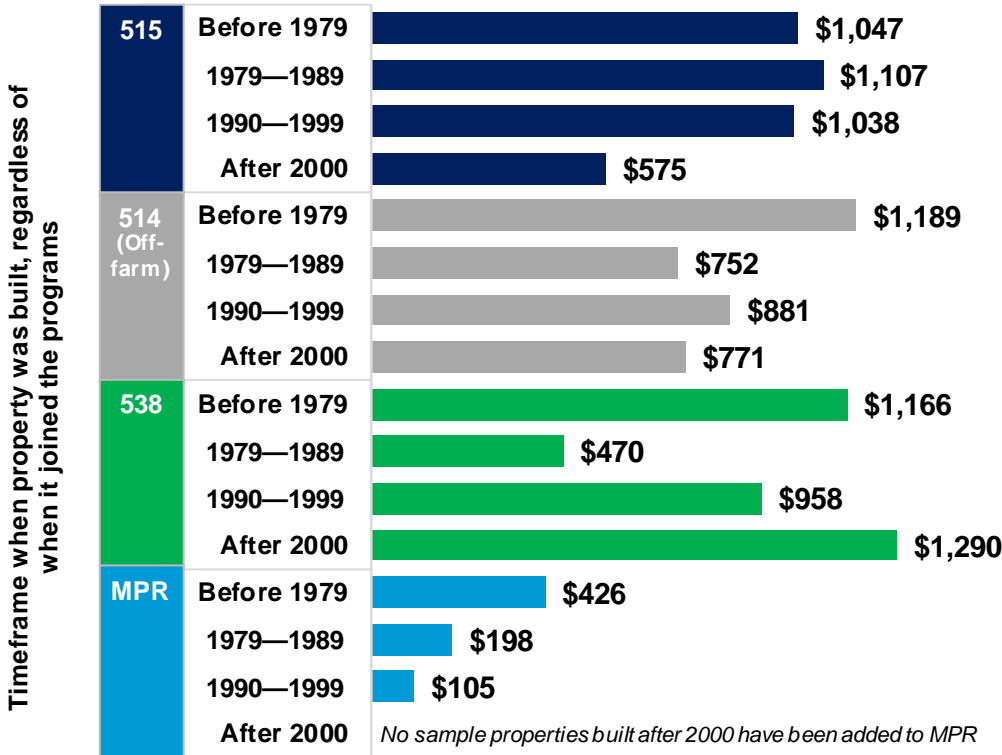
The purpose of this analysis was to examine the relationship between the year of construction of the sample properties and the PUPA reserves deficit. We grouped the sample properties into four periods and compared the results across the four programs: built before 1979; built between 1979 and 1989; built between 1989 and 1999; and built after 2000.<sup>25</sup>

#### Context

- The following charts were organized by the period when the properties were built, not the year they joined the programs.
- The year of construction ranges were selected because properties constructed before 1989 can pre-pay their mortgages and properties constructed after 1989 cannot.
- MPR started obligations in 2006.
- The Section 538 program started in 1996. The properties listed under Section 538 were Section 515 properties that refinanced with a private RHS-guaranteed loan and currently count among Section 538.
- Properties within Section 514 Off-farm and Section 538 have both continued to fund new construction annually, whereas Section 515 has not funded significant new construction in quite a few years.

<sup>25</sup> The date of construction for the properties was sourced from property tax records at the time of the physical assessments of the properties.

Figure 22 — PUPA reserve deficit compared to property year built



Uninflated average PUPA reserves deficit (in dollars)

**Observations and discussion**

- Properties built after 1989 had a lower PUPA reserves deficit than older properties constructed before 1979, with the exception of Section 538.
- MPR portfolio had the lowest PUPA reserves deficits among all other programs.
- Further analysis on MPR determined that there is a significant relationship between MPR and a lower PUPA reserves deficit.
- Section 514 Off-farm peaked in the category of built “Before 1979” before falling and leveling-out.

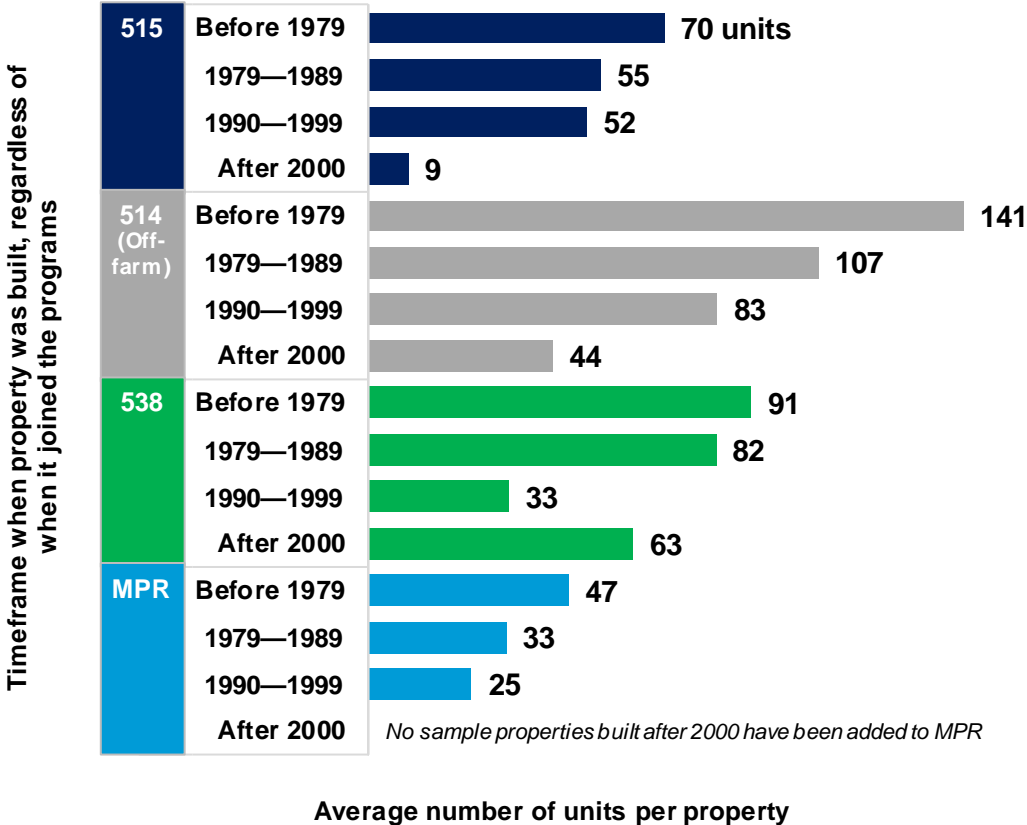
In the sample of MPR properties selected, none were built after 2000. The PUPA reserves deficit for Section 515 trended down among newer construction, which could indicate it is less costly to maintain the newer properties, and therefore they might be less likely to require use of an MPR tool. This is further supported by the difference between PUPA reserves deficits for all four periods of time, analyzed in the chart above. Section 515 properties that were built after 1989, but eventually participated in MPR, have on average up to seven times lower PUPA reserves deficits. Section 538 had an upward trend over time, which could be explained by the recent construction



of properties that might cost more to maintain due to reasons explained within section 3.4 on page 32.

We performed additional analysis to compare to the average number of units per property over the same periods. The purpose was to determine whether it was possible to identify any trends over time between PUPA reserve deficit and average number of units.

Figure 23 — Average number of units per property for each program, by year built

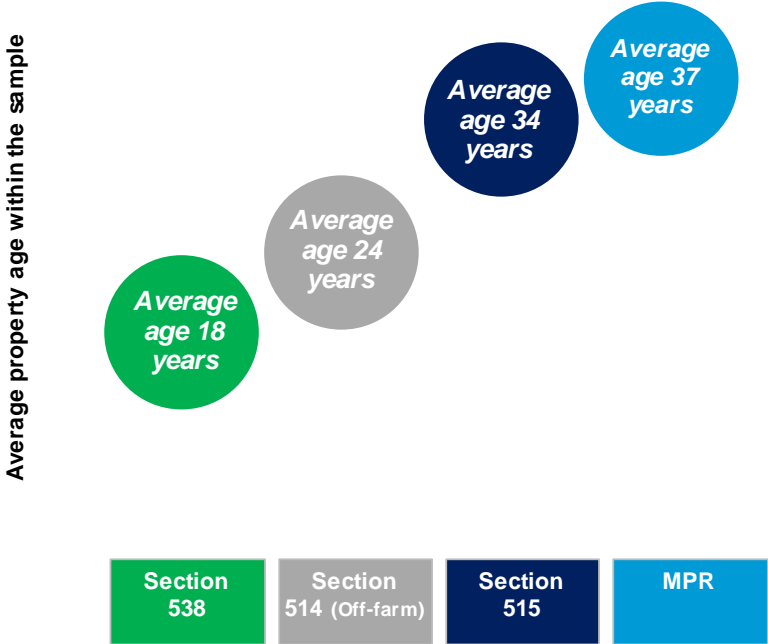


**Observations and discussion**

The average number of units per property was on a downward trend over time across all four programs, except Section 538. Section 515 had fewer properties in the category of built “After 2000” because fewer properties were added to the portfolio in recent years. Section 515’s average units and PUPA reserves deficit were both trended down, which have several possible explanations. The costs to maintain a unit at a Section 515 property could potentially be scaling down as the properties get smaller, or, more likely, the older construction have more maintenance/replace costs. This begged the question of why a PUPA reserves deficit can increase at a property that was constructed more recently, while the average number of units declined during the same construction period. For example, Section 538 had this happen between “1979 to 1989” and “1990 to 1999.” Taken at face value, it appeared that it was more expensive to maintain units at Section

538 properties and there is partial truth to this assumption. As explained within section 3.4 on page 32, the reason for this is that multi-family properties within the portfolio are, on average, newer with larger units, higher-quality amenities, and more akin to market-rate apartments.

Figure 24 — Average age of the properties within the sample



**Observations and discussion**

Section 538 properties were, on average, the newest among the sample properties within MFH, and almost half the age of Sections 515 or MPR. MPR were, on average, older than Section 515, which could indicate that despite having older properties, MPR is either in better physical condition (i.e., lower cost to maintain), or it has healthier reserves, or a combination of both.

### 3.7.3. Analysis of MPR sample properties

**The data appear to indicate MPR successfully lowers PUPA reserves deficits.**

#### The purpose of this analysis

The MPR program started in 2006 and the properties currently within the MPR portfolio were Section 515 properties that refinanced and currently count among the MPR portfolio. MPR appears to have lower PUPA reserves deficits compared to Section 515 and RHS was seeking to understand whether the MPR program is effective in maintaining its properties' operational functionality and reducing the reserves deficit.

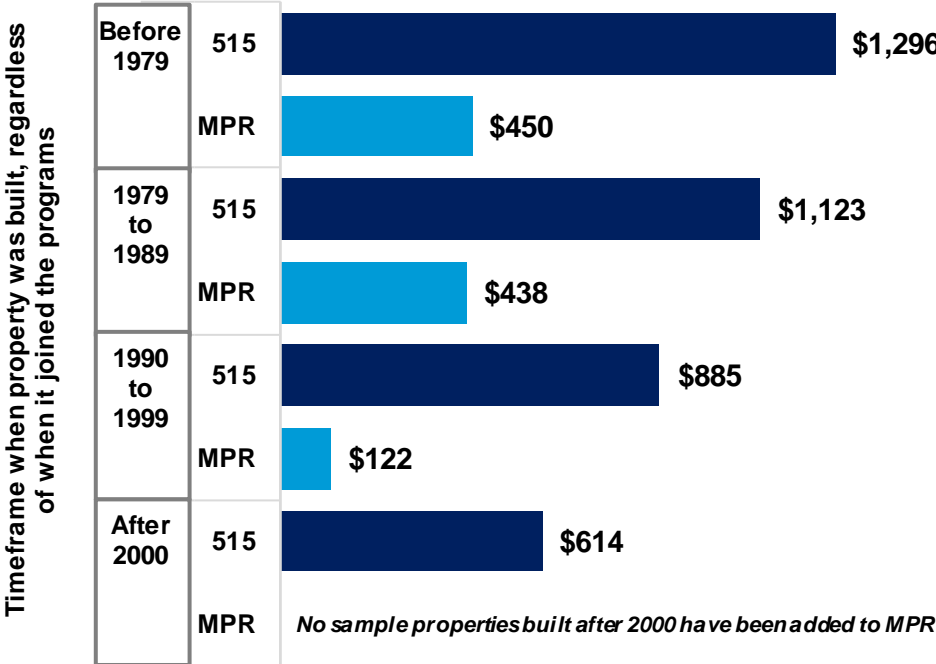
#### Context

- We grouped the sample properties into four periods and compared the results of the PUPA reserves deficits across the four programs: constructed before 1979; constructed between 1979 and 1989; constructed between 1989 and 1999; and constructed after 2000.<sup>26</sup> The following charts are organized by the year the properties were constructed and by program, not the year they joined the programs.
- The year of construction ranges were selected because properties constructed before 1989 can pre-pay their mortgages and properties constructed after 1989 cannot.

We performed hypothesis testing to prove whether MPR was effective at reducing reserves deficits. In simple terms, hypothesis testing is the use of statistics to determine the probably that a given assumption (a hypothesis) is true. There are two parts to a hypothesis. The null hypothesis—i.e., that the observations are the result of pure chance—and the alternative hypothesis—i.e., that the observations show a real effect combined with a component of chance variation. We chose a null hypothesis that there is no difference in PUPA reserves deficit between Section 515 and MPR (based on the sample of the MFH properties, not the whole MFH portfolio). The analysis began with calculation of the mean PUPA reserves deficit for Section 515 and MPR, followed by a test to determine whether the means differ. If the test proved that the mean PUPA reserves deficit for MPR was lower than the mean for Section 515, then it would disprove the null hypothesis that both were equal. If there was further evidence from the test that supported a significant relationship between MPR and a lower PUPA deficit, then we could confidently conclude that MPR had lower PUPA reserves deficits.

<sup>26</sup> The date of construction for the properties was sourced from property tax records at the time of the physical assessments of the properties.

Figure 25 — MPR v. Section 515 and PUPA reserves deficits based on year property was built



Uninflated average PUPA reserves deficit

The chart controls for variations in the year the properties were built—not the year the properties joined the programs. To demonstrate the impact of the MPR program on PUPA reserves deficits, we did a two-sample t-test of the means of the PUPA reserves deficits for MPR and Section 515. We tested the hypothesis that there is a statistical difference in the mean PUPA for MPR compared to Section 515. The hypotheses were as follows:

- Null hypothesis = the Section 515 mean PUPA = the MPR mean PUPA.
- Alternative hypothesis = the Section 515 mean PUPA ≠ the MPR mean PUPA.

**Observations and discussion**

Based on the data, there was enough evidence to reject the null hypothesis at the 95% confidence level. Based on the data, there appeared to be a statistically significant relationship that the mean PUPA reserves deficit of MPR was different (and does not occur by chance) than the mean PUPA reserves deficit of Section 515. Therefore, based on this measure, MPR was considered “successful” in terms of it meeting its objective as a program.

Since the sample was not chosen to be representative of the population based on the year properties were built, observations related to this metric were not expandable to the portfolio, but were illustrative to the trends in the sample. However, because the sample PUPA by program is a statistically representative measure of the portfolio, the results of our test indicate that the mean PUPA reserves deficit for MPR was statistically significant from the mean of Section 515. Therefore, the impact that MPR could have on effectively decreasing PUPA reserves deficit when compared to Section 515 was statistically valid at the portfolio level.

### 3.7.4. Analysis of property “overall conditions”

**The PUPA reserves deficits decreased among the higher-rated properties, which was a good trend.**

#### The purpose of this analysis

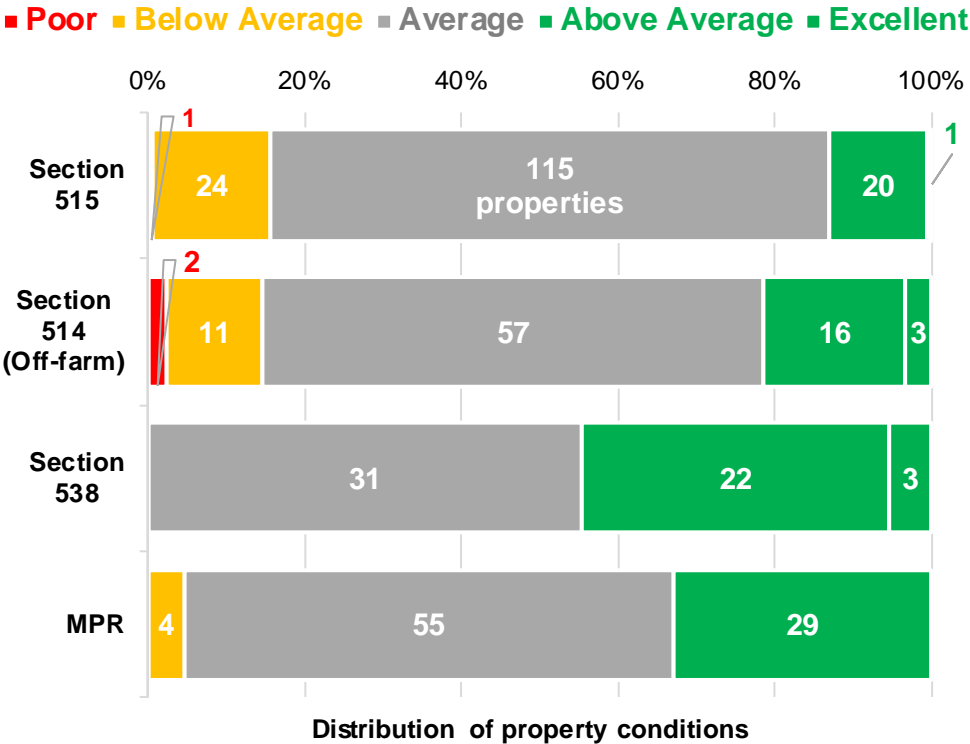
This analysis identified the distribution of overall property condition—excellent, above average, average, below average, and poor—among the sample 394 properties.

#### Context

The sample properties were assigned a qualitative property condition based on the assessors work in the field. This work was summarized in the 20-year assessment table for each property. Life safety/code conditions include, but are not limited to, observed issues with known applicable fire, construction, material, and ingress/egress building codes. An explanation of each rating is as follows:

- **Excellent:** The component is new or maintained in like-new condition with proactive maintenance practices, exhibiting no deferred maintenance or life safety/code issues.
- **Above Average:** The component is fully functional, well maintained, exhibits minimal wear and tear and no deferred maintenance or life safety/code issues. Any identified repairs are due to recent events (for example, a windstorm or a burst pipe) or are very limited in scope (routine maintenance). Low reserves are required.
- **Average:** The component is fully functional and generally well maintained. It may exhibit customary wear and tear based on age and may have minimal deferred maintenance. Any life/safety code issues can be readily corrected as part of the operating budget and are isolated in nature. Moderate reserves are required.
- **Below Average:** The component exhibits pervasive wear and tear, some limits in functionality and deferred maintenance issues. Life safety/code issues are significant and/or numerous and involve substantial cost. High reserves are required.
- **Poor:** The component exhibits inferior/deteriorating conditions and some limits functionality. Deferred maintenance is pervasive and will costly to cure. Multiple life safety/code issues are identified and involve significant cost. Extensive repairs are required.

Figure 26 — Distribution of property conditions for sample of 394 MFH properties



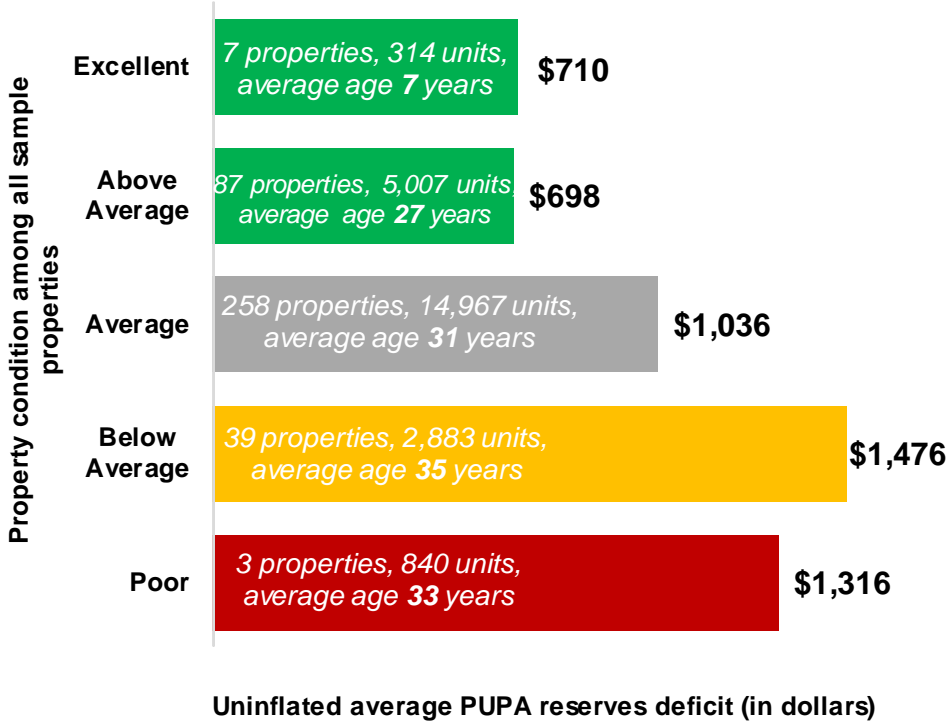
**Observation and discussion**

For Section 515, in terms of percentage of the sample, 17% (25 properties) were “below average” or “poor.” This was the highest among all programs. 15% (21 properties) were “above average” or “excellent.” This was the lowest among all programs. For Section 514 Off-farm, 15% (19 properties) were “above average” or “excellent” and 23% (13 properties) were “below average” or “poor.” For Section 538, 55% (25 properties) were “above average” or “excellent.” The remainder were all “average.” For MPR, in terms of percentage of the sample, 95% (84 properties) of MPR was “average” or “above average.”

It is important to reiterate that the overall conditions are only representative of our subjective opinions. The increase in recent construction among Sections 514 Off-farm and 538 contributed to the seemingly high portion of “above average” or “excellent,” especially for Section 538. As previously discussed, many of the Section 538 properties we inspected were newer with nicer amenities.

We performed additional analysis on the overall property condition by eliminating the break-out by program to determine whether it was possible to identify any trends between PUPA reserve deficits and average age of the properties. In Figure 27, the columns represent average PUPA reserves deficit. The text within the columns provide the average age of the sample properties, the property total, and unit total.

Figure 27 — PUPA reserves deficit by property condition for sample



**Observations and discussion**

If the average age of the properties increased in relation to the overall condition moving in the direction from “excellent” to “poor,” it could indicate that newer properties have a lower cost to maintain functionality. The PUPA reserves deficit decreased in relation to the overall condition moving in the direction from “poor” to “excellent,” which confirmed our expectation that the better properties would be less inclined to have a reserves deficit.

## 4. Recommendations and next steps

The majority of the work on this project involved gathering qualitative and quantitative data, and analyzing this data to provide the reader with observations regarding the capital needs of the RHS MFH portfolio. In addition, direct feedback was solicited from stakeholders of the RHS MFH programs on recommendations that could enhance RHS's MFH portfolio. The majority of this feedback came from property owners, property managers and RHS field officers, and was collected during the site inspections for the CNA portion of this project. Additional feedback from property owners and managers was solicited subsequent to the inspection period. This feedback, along with the observations provided in the previous Sections of this report, were scrutinized to provide a list of recommendations and next steps that could improve or enhance the RHS MFH portfolio in a variety of ways.

### 4.1. Recommendations

**Continue using the MPR program to maintain the functionality of existing properties.** The average PUPA reserve for replacement deficits for properties in the MPR program was the lowest of all the programs, and 58% less than properties in Section 515. This is a strong indication that the MPR program has been effective in reducing the reserve for replacement deficit of existing properties. Properties participating in the MPR program undergo various levels of rehabilitation. Based on field observations and discussions with some property owners/managers, funds from MPR loans are often used to replace large, long-lived capital items. These items included roofs, windows, doors, and cabinets/countertops. The replacement of such long-lived items can help property owners maintain the functionality of their properties and the viability of the RHS MFH portfolio. The continued use of the MPR program by RHS would require appropriations from Congress.

**Consider the use of existing RHS tools to help reduce the reserves for replacement deficit over the 20-year analysis period.** In searching for ways to reduce the PUPA reserves for replacement deficit across the portfolio, RHS should consider the use of available mortgage tools to divert cash flows from mortgage payments to fund such deficits over the 20-year analysis period. These tools include the ability of RHS to lower existing mortgage debt payments by deferring mortgage payments, re-amortizing mortgage payments, or a combination of both. Not all properties and existing mortgages would qualify or need such adjustments, but the staff at RHS is confident that such tools could be utilized to reduce the deficit in the reserves for replacement across the portfolio. Section 5 of this report provides an example of how these tools could be used, and the possible impacts on the reserves for replacement deficits across the RHS MFH portfolio. The use of these tools are not without costs. RHS would need to ask for Congressional appropriations to fund the cost of any deferred payments and new loans.

**Strategic sourcing of long-lived items through national purchasing agreements to obtain wholesale pricing.** It is not a new idea for affordable housing groups to use national purchasing agreements to obtain wholesale pricing on items commonly replaced during routine and preventive maintenance. The typical savings with such programs are +/- 20% from the retail price. These purchasing agreements are most commonly used on items such as flush valves, door knobs and air filters, and allow the property owner to obtain wholesale pricing on small or single-item



quantities. However, it is not common for affordable housing groups to obtain such purchase agreements for long-lived items such HVAC units and water heaters. It is recommended that RHS explore the option of leveraging its national presence and size to negotiate a national wholesale purchasing agreement of these long-lived items. This purchasing agreement would not be a binding contract on property owners, or an endorsement of a particular retailer. The intent of this recommendation is to explore the possibility of RHS providing property owners the ability to purchase these long-lived items at a wholesale discount regardless of the size of the purchase. It is anticipated that the savings generated by such a purchasing agreement would be substantial across the portfolio. For example, in the CNA analysis the average cost of an HVAC unit and water heater was estimated to be \$7,632 and \$754, respectively. Reducing the costs of these two items by 20% equates to a \$1,526 savings per HVAC unit and \$151 per water heater. Multiply these savings across the RHS MFH portfolio and the anticipated impact is expected to be material in reducing PUPA reserves deficits.

The most quoted reasons by stakeholders for not using national purchase agreements for long-lived items include the irregularity of such purchases on a property level, and a push by government agencies to buy local. National retailers can offer purchasing programs with wholesale pricing at retail locations across the United States. The large number of apartment units in the portfolio could offer these retailers a reliable source of wholesale purchasers, and these retailers provide large numbers of local jobs through a network of stores across the country.

**Property owners should consider replacing carpet with VCT once existing carpet reaches the end of its useful life.** Based on the 394 properties in the sample, carpet was one of the largest, single-item contributors to the capital needs over the 20-year analysis period. The relative cost and economic life of carpet versus the VCT provides impetus for an owner to consider removing carpet from apartment units and replacing it with VCT. We estimated that carpet had an average economic life of 7-years versus 15-years for VCT. Verbal feedback from property owners who had converted apartment units from carpet to vinyl indicated that maintenance costs related to flooring were lower, and the savings in cost for floor finishes were expected to be substantial over the economic life of the VCT. Optimizing the finishes in a unit based on durability and replacement costs could lead to substantial savings over time.

## 4.2. Next steps

**Perform additional analysis as to the impact on the MFH portfolio of complying with accessibility and ADA regulations.** Over the last two years the Department of Justice has been aggressively enforcing accessibility actions against property owners of affordable multi-family housing. Generally, these cases involve compliance issues with the Fair Housing Act (FHA), Section 504 and the American with Disabilities Act (ADA) Compliance with the requirements within both of these Acts has caused anxiety within the AH community. Each Act establishes *minimum* standards for compliance. Some states, counties and municipalities have additional compliance standards that contribute to increased costs with owning and operating an affordable housing unit.

Determining if a property within the sample was compliant with minimum accessibility and ADA standards was beyond the scope of work on this project. However, at the request of RHS, an estimated cost to bring an elderly apartment up to the minimum Federal accessibility standards under the FHA and ADA Acts was estimated. The cost estimate is based on a 720+/- square foot elderly apartment located in the Southeastern United States. The estimate includes the costs for bringing interior and dedicated exterior space into compliance. It does not include the cost to bring common area buildings, parking lots, and other exterior areas of property into compliance with the two Acts. Based on data provided by property owners who have performed such compliance work, the estimated cost is approximately \$10,000 per unit to meet the minimum federal requirements. Differences in cost between apartment units are mostly driven by such variables as:

- Relocating walls.
- Demolition of concrete slabs for plumbing relocation.
- Selection of appliances and floor coverings.
- Modification of door widths and interior openings.
- Access to the unit (sloped walkways and handrails).
- The design of the apartment building.

The financial impact of complying with accessibility and ADA minimum standards must be quantified for each property within the MFH portfolio.

**Follow up case study on the effectiveness of the four MPR tools.** The analysis previously presented indicates that the MPR program has been successful in lowering the PUPA reserve for replacement deficits. RHS could benefit from understanding which tool(s) are most effective at reducing these deficits by allocating future resources to the most effective tools. A study focusing on the effectiveness of the MPR tools is a logical next-step for RHS.

**Expand upon stakeholder engagement to generate additional ideas on revitalizing existing properties, as well as expanding the portfolio through new construction.** Feedback from property owners indicated a need for increased dialog with RHS in four general areas:

- Financial reporting requirement and financial assessments of properties.
- Consistency by RHS in the management of the portfolio.
- Strategic services, especially in the areas of technical assistance and training.
- Reducing the number of property inspections and assessments by government agencies (RHS and others).

**Expand on the capacity to determine whether a property should be kept in the MFH portfolio.** Establish a process and criteria to determine whether a property should be kept in the MFH portfolio. The criteria would include, at a minimum, the following:

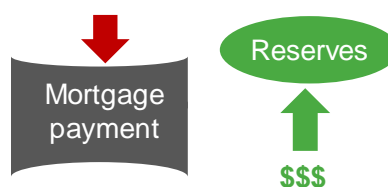
- Financial feasibility test that establishes a framework to identify properties that are good candidates for rehabilitation.
- Demographic analysis to determine if a property's location and tenant-mix support the mission of RHS.
- Analysis of cost-to-build new versus cost to rehabilitate an existing property to ensure that RHS financing mechanisms are being efficiently allocated.

## 5. Possible use of existing RHS tools to reduce capital reserves deficits

All MFH portfolios are facing PUPA reserves for replacement deficits to varying degrees. RHS is considering the current options available to it that can help remedy the reserves deficits.

To help alleviate the reserves for replacement deficit across the portfolios, RHS could consider requesting additional appropriations from Congress and/or using internal tools at its disposal to reduce or eliminate the deficit in reserves for replacement.

For the purposes of this report, RHS has requested a scenario analysis using internal tools at its disposal. Specifically, RHS asked to consider the use of mortgage underwriting tools that could be used to reduce a current mortgage payment on a property. The difference between the existing and reduced mortgage payment could then be applied to the deficit in the reserves for replacement.



RHS has three key tools to assist property owners with such reductions in mortgage payments:

- Interest rate reduction on existing RHS mortgages; and/or
- Reducing the payments by amortizing existing mortgages over a longer term; and/or
- Deferring mortgage payments until the properties can complete necessary renovations.

Some projects may already have utilized one or more of the tools noted above while others may find it beneficial to consider the impact of utilizing one or more of these tools to free up cash flow in the near-term. The net impact of the use of these tools are intended to redirect cash flows toward reserves for replacement, which would assist property owners in maintaining the functionality of a property over the 20-year analysis period.

RHS requested that we analyze the impact that three mortgage scenarios would have on the overall reserves for replacement deficit of its MFH's portfolio. The three scenarios are as follows:

- Scenario A: No change to existing debt payments.
- Scenario B: Reduce RHS debt payments by 50%.
- Scenario C: Reduce RHS debt payments to \$100 per month.

**These three scenarios include the simplifying assumptions and limiting conditions described below:**

1. The reductions to the mortgage payments in Scenarios B and C are simplifying assumptions that were used to explore the possible impacts on the reserves deficits of the four MFH programs.
2. The 50% payment reduction in Scenario B was based on the assumption that RHS could do a combination of any of the three options—interest rate reductions, payment deferrals or re-amortizations—to reduce debt payments by 50% over 20 years.
3. Scenarios B and C are not intended to be one-size-fits-all solutions because the compositions of properties and their underlying mortgages are project-specific. Some properties carry multiple mortgages that began at different times, and with different terms.
4. Scenario B and C, while not direct cash outlays by RHS, could require additional Congressional appropriations because deferrals and re-amortizations have a budget cost.
5. Scenario C is based on the potential to defer essentially all RHS debt or re-amortize older, low-balance RHS loans.
6. The results of these scenarios' analyses are for discussion purposes only and may differ materially from actual results if RHS were to implement one or more of the scenarios.

### **Performing the analysis**

Scenario A did not require any adjustments to the mortgage payments, therefore the PUPA reserves deficit for Scenario A are the same results presented within *Results of the 2015 study* beginning on page 22.

We performed the analyses using Scenarios B and C on RHS programs that were classified as Likely in Table 8 below. The methodology for these analyses was described on page 17. The pro forma calculations were modified to reduce the existing mortgage payments by 50% for Scenario B, and down to \$100 total for Scenario C. The cost to maintain functionality over 20 years, net of reserves, was projected over 20 years. The results of modified pro formas for Scenarios B and C created the adjusted reserves deficit data for the programs in the Likely category. Then the adjusted reserves deficits under Scenarios B and C were compared to Scenario A, which was the baseline for determining the impacts on a program's PUPA reserves for replacement deficit.

**Table 8 summarizes the likelihood of a Scenario being effective when applied to the different programs within RHS.**

Key categories of impact of a Scenario:

- **“Likely”** means that a scenario could be effective in reducing the reserves deficit given the nature of the underlying mortgages in a program’s portfolio.
- **“Limited”** means that a scenario could be effective in reducing the reserves deficit for a small number of mortgages in a program’s portfolio.
- **“Unlikely”** means that a scenario would not be effective in reducing the reserves deficit.

Table 8 — Scenarios applied to the MFH portfolio

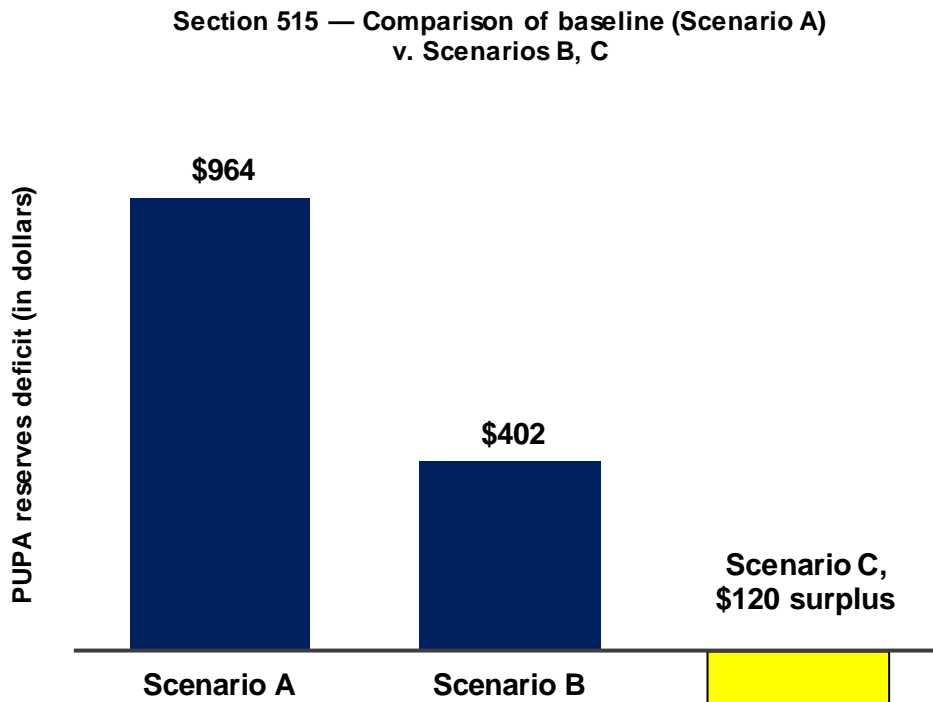
	<b>Scenario A</b>	<b>Scenario B</b>	<b>Scenario C</b>
	No change	Reduce mortgage payment by 50%	Reduce mortgage payment to \$100 total per month
<b>Section 515</b>	RHS will not make any changes to the properties’ mortgages.	<b>Likely</b> Based on the nature of the underlying mortgages in this portfolio, RD determined that a reduction of 50% in the mortgage payment could increase cash flows available to reduce the reserves for replacement deficits.	<b>Likely</b> Based on the nature of the underlying mortgages in this portfolio, RD determined that a mortgage payment of \$100 per month could increase cash flows available to reduce the reserves for replacement deficits.
<b>Section 514</b> Off farm		<b>Likely</b> (Same as 515)	<b>Likely</b> (Same as 515)
<b>Section 538</b>		<b>Unlikely because...</b>  While some savings could be generated, a significant reduction in mortgage payments is unlikely because the majority of Section 538 properties do not have significant RHS mortgages. Further, the impact is limited since RHS cannot ask lenders to alter non-RHS mortgage payment or defer non-RHS mortgages.  <b>Key considerations:</b>  For Section 515 properties that have not already gone through MPR but have a Section 538 mortgage, there could be an option to defer payments on the existing Section 515 mortgage, re-amortize the MPR mortgage, or consider other tools such as interest rate reductions or payment deferrals.	
<b>MPR</b>		<b>Limited</b>  Only possible if RHS can re-amortize or defer newer mortgages including the recent MPR mortgages.	<b>Unlikely because...</b>  RHS has already deferred the existing pre-1992 mortgage debt on properties within the MPR portfolio. Additional savings are not possible, unless post 1992 mortgage debt and MPR mortgages are also deferred.

## The impact of Scenarios B and C on the Section 515 portfolio PUPA reserves deficit

Both scenarios could divert cash flows from mortgage payments to apply toward the reserves for replacement deficits. Scenario B could reduce the Section 515 portfolio's average reserves deficit by 60% over the 20-year analysis period. Scenario C could erase the average reserves deficit and create a surplus over the analysis period.

The net impact of Scenarios B and C on MFH's overall portfolio would be high because of the absolute number of properties in the Section 515 portfolio that have not already been recapitalized through other RHS programs include MPR and Section 538—85% of units within the MFH portfolio are Section 515. The Section 515 portfolio (unduplicated) has 13,077 properties and 384,216 units with an average PUPA reserves deficit of \$964.<sup>27</sup> Scenario B—reducing existing mortgage payments by 50%—could reduce the PUPA reserves deficit from \$964 to \$402. Scenario C—reducing existing mortgage payments to a total of \$100 per month—could erase the PUPA reserves deficit and create a PUPA reserves surplus of \$122. Figure 28 is a chart of the outcomes of Scenarios B and C on the Section 515 portfolio.

Figure 28 — Scenarios B, C impact to Section 515 portfolio



<sup>27</sup> Per RHS, property counts for Section 515 and Section 514 exclude properties that overlap currently with the MPR and Section 538 programs.

It is important to reiterate the assumptions made by RHS when considering Scenarios B and C. RHS is assuming that it can use existing mortgage tools to:

- Extend mortgage repayment terms of existing loans.
- Defer old mortgage debt over the remainder of the repayment period.
- Provide interest rate reductions.
- Amortize unpaid loans over longer horizons.
- Provide a MPR loan on properties with large, immediate capital needs.
- Or a combination of the above.

As previously discussed, there are costs associated with the use of these tools. Any additional MPR mortgages will require additional Congressional appropriations. Where a mortgage is deferred almost entirely, there is a cost to the deferral in the form of a subsidy incurred by a property. The subsidy requires allocation of budgeted funds that would offset against the savings from the deferral of the mortgage, although RHS is assuming that the adjusted amortization of the mortgage would be less than the cost of the deferral.

### **The impact of Scenarios B and C on the Section 514 Off-farm portfolio PUPA reserves deficit**

**Both scenarios could divert cash flows from mortgage payments to apply toward the reserves for replacement deficits. Scenarios B could reduce the Section 514 Off-farm portfolio's average reserves deficit by 58% over the 20-year analysis period. Scenario C could erase the average reserves deficit and create a surplus over the analysis period.**

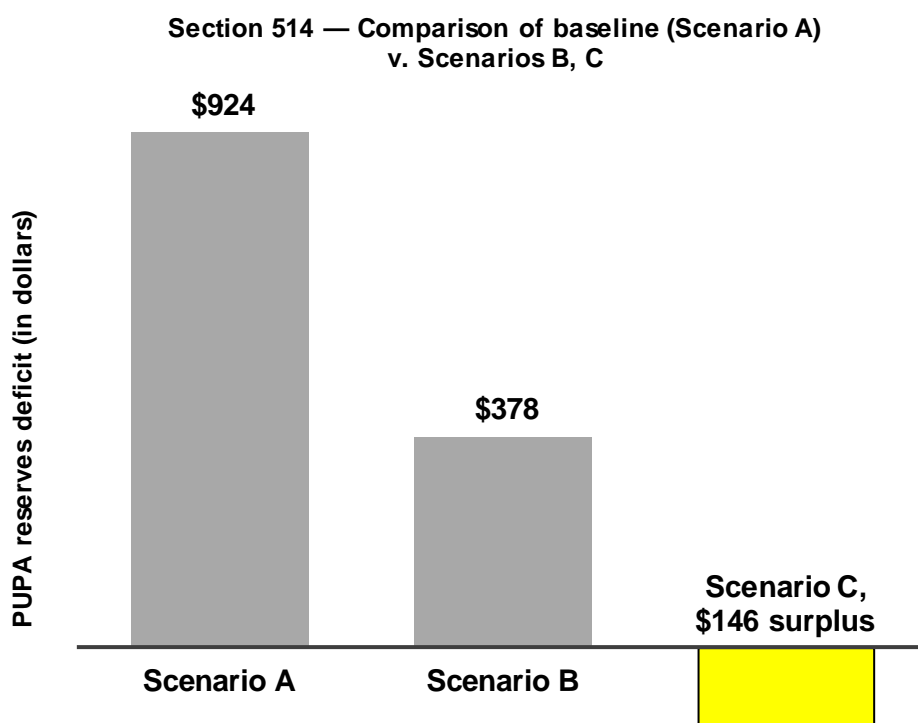
The Section 514 Off-farm portfolio that has not currently been recapitalized through other RHS programs such as MPR and Section 538 has 292 properties and 15,839 units, with an average PUPA reserves deficit of \$924.<sup>28</sup> Scenario B—reducing existing mortgage payments by 50%—could reduce the PUPA reserves deficit from \$924 to \$378. Scenario C—reducing existing mortgage payments to a total of \$100 per month—could erase the PUPA reserves deficit and create a PUPA reserves surplus of \$146. Figure 29 is a chart of the outcomes of Scenarios B and C on the Section 514 Off-farm portfolio.

---

<sup>28</sup> Per RHS, property counts for Section 515 and Section 514 exclude properties that overlap currently with the MPR and Section 538 programs.



Figure 29 — Scenarios B, C impact to Section 514 portfolio



### The impact of Scenarios B and C on Section 538 and MPR portfolios' PUPA reserves deficit

Scenarios B and C have little effect on Sections 538 and MPR portfolios' PUPA reserves deficits. Scenarios B and C can be effective by adjusting the mortgages on RHS mortgages to make cash flow available to reduce or eliminate the projected reserves for replacement deficit over the 20-year analysis period. However, because the RHS debt is a small percentage of the total property debt on Section 538 properties, Scenarios B and C are unlikely to be effective in reducing the reserves deficits.

For properties in the MPR portfolio, the application of Scenario B may be possible if RHS is able to re-amortize or defer newer loans including any recent MPR loans. However, the application of Scenario C is unlikely because RHS has already deferred the existing pre-1992 debt on those projects. The only additional savings could be realized by deferring post-1992 debt and MPR existing loans. It is currently unlikely that such deferrals would be to such a degree as to allow a \$100 per month mortgage payment.

## Conclusion

Sections 515, 514 Off-farm, 538, and MPR have a combined 14,650 properties and 454,048 units with variations in factors such as age, unit size, building materials, and outstanding mortgages. These factors, as well as others, influence the variation in the amount of the reserves for replacement for each project. Two properties with similar characteristics can have different maintenance/replacement needs and experience a reserves deficit or surplus. There is no one-size-fits-all option to funding the reserves for replacement deficit. However, the different scenarios discussed can provide a general concept of how adjustments could be made to the reserves by using tools available to RHS. The use of these tools are not without costs—RHS would need to ask for Congressional appropriations to fund the cost of deferred payments on existing mortgages and to fund additional MPR loans.

Scenarios B and C could have a positive impact on the PUPA reserves deficit for properties in Sections 515 and 514 Off-farm. A reasonable conclusion is for RHS to use its existing mortgage tools to reduce mortgage payments for qualifying properties, and direct the difference from the existing and reduced mortgage payment to the reserves for replacement fund. Calculating concrete projections was beyond the scope of this report, but we recommend RHS consider the following next steps to further its research on viable options for adjusting the mortgages using the existing tools available to RHS:

- A. Determine how much RHS debt contributes to overall property debt, on average, for each program.
- B. Consider adjusting the method-of-testing to determine if a property should be kept in the RHS portfolio. A property should meet the determination of inclusion before being considered for Scenarios B or C.
- C. Determine the internal requirements and processes for RHS to implement Scenario B and C. This would include the requirement that property owners participating in either Scenario direct all excess funds from the reduction in the mortgage payment to the fund for reserve for replacements.
- D. Outreach to existing property owners to determine who is eligible and interested in participating in either Scenario.

## Appendices

### Appendix A: Assumptions and limiting conditions

**Sample.** RHS selected the sample of 394 properties. We have undertaken no independent review of the sampling methodology. RHS selected the sample so that it would produce results that would be statistically significant at the level of each portfolio, and by number of units per property. Results will not be statistically significant for subsets other than those for which RHS designed the sample. In particular, results are not reliable at the level of individual properties. Conversely, we understand that expanded results are not statistically reliable for other levels (for example, statistically reliable conclusions cannot be drawn for the combination of state, property age, property size, etc.).

**Expansion factors.** For each property in the sample, RHS economists calculated and approved requisite expansion factors. The expansion factors expand the sample cost per unit per annum to maintain operational functionality to the number of units in the various MFH portfolios.

**Unit costs for capital needs assessments.** In accordance with our Statement of Work, our capital needs assessments utilized standard costs from the Marshall & Swift national database. Based on feedback from owners and managers, and from the capital needs assessment team, we believe that owners' actual unit costs will vary, sometimes materially, from the Marshall & Swift unit costs

**Data quality.** The U.S. Department of Agriculture (USDA) Rural Development (RD) and its designated representatives have warranted to us that the information supplied by them was complete and correct in all material respects to the best of their knowledge. It has been assumed that all facts and circumstances that would materially affect the calculation results have been disclosed to us. Any significant errors in, or omissions from, the information supplied to us could have a corresponding effect on our analyses and results. We performed a number of data validation checks on data elements received from RHS. RHS has been responsive to our requests for clarification and data correction. However, it is possible that some data entry errors were made by RHS that we did not discover. Information furnished by others, upon which all or portions of this report are based, is believed to be reliable; however, no warranty is given as to the accuracy of such information.

In addition, when data elements were missing, our calculations make simplifying assumptions. We believe that our substitutions and assumptions are reasonable and appropriate, but it is possible that the correct data could produce results that differ from the results discussed in this report. We were able to obtain the vast majority of data that we requested. However, there were some requests that were not met in their entirety:

- Several detailed budgets for income and expense for each properties;
- Several detailed mortgage data for various properties; and
- Several audited financial statements for all properties.

**Regulatory compliance.** Full material compliance with all applicable federal, state and local zoning, use, environmental and similar laws and regulations is assumed. It is assumed that all required licenses, certificates of occupancy, consents or other legislative or administrative authority from any local, state or national government or private entity or organization have been or can be obtained or renewed for any use on which the estimates contained in this report and underlying property CNA reports are based.

**Intended use.** This engagement is limited to a sample of property assessments to support the development of a portfolio wide property needs assessment by determining the amount of met and unmet capital needs required to ensure operational functionality of the multi-family housing portfolio. We understand the intended use of this document is for publication in the most public forums. Neither RSM/CoreLogic, nor any individuals signing or associated with this report shall be required because of this report to give testimony or appear in court or other legal proceedings.

**Projections.** The forecasts, projections, or capital needs estimates are based on: current market conditions; anticipated short-term supply and demand factors; a continued stable economy; and that annual budgeted payments to reserves will be made by property owners. These forecasts are, therefore, subject to change with future conditions. Some assumptions inevitably may not materialize, and unanticipated events may occur; therefore, the actual results achieved during the projection period may vary from the projection, and the variations may be substantial.

**Financial data.** We have compiled summary financial data and ratios that are contained in the report and various appendices. The data in these appendices represent financial data extracted from the sampled properties' historical financial statements as well as other sources. The financial information does not constitute a complete presentation of the sampled properties' financial statements in accordance with generally accepted accounting principles. We were provided with pro forma financial and operational data regarding the properties in the sample. Without independent verification, we have relied upon this data as accurately reflecting the results of the operations and financial position of the properties.

**Not an audit.** As independent advisors, we have not audited this data and express no opinion or other form of assurance regarding their accuracy or fairness of presentation. The information is included solely to assist in the development of the conclusions presented in this report and should not be used for any other purpose.

**Data timing.** Our capital needs data were gathered during October, November and December 2015. Additional financial data are as of December 31, 2014 and pro forma 2015 information. Additional data was provided but not relied upon. Our data on observed occupancy levels are as of the date of assessments specified in the individual CNA reports.

**Subsequent events.** This report is dated March 1, 2016. We have no responsibility to update this report for events and circumstances occurring subsequent to the Report Date. We are not responsible for any alternations, changes, additions, summaries, conclusions, recommendations or analysis made by any parties subsequent to the Report Date.

## Appendix B: Sample selection methodology detail

The following table provides the total properties within each MFH programs' portfolios and the actual sample size of properties selected for analysis.

Table 9 — MFH portfolio and sample selected for analysis

Program	Unit range	Total properties	Total units	Average units per property	Standard deviation	Target CV	Calculated sample size	Actual CV	Actual sample size
<b>515 ONLY</b>	<12	1,209	9,246	8	1.9	4.25%	33	4.20%	34
	24-Dec	5,771	114,349	20	4.45	4.25%	28	4.25%	28
	25-50	5,128	191,320	38	7.25	4.25%	21	4.14%	22
	51-100	880	57,198	65	12.59	4.25%	22	3.82%	25
	>100	89	12,103	136	42.38	4.25%	56	2.80%	52
	ALL	13,077	384,216	30			160		161
<b>514 Off-farm</b>	<12	18	136	8	3.28	4.25%	16	8.10%	11
	24-Dec	77	1,556	21	3.96	4.25%	17	4.25%	17
	25-50	108	4,120	39	7.46	4.25%	18	4.10%	19
	51-100	68	4,638	69	15.32	4.25%	20	4.10%	21
	>100	21	5,389	257	140.1	4.25%	19	0.90%	21
	ALL	292	15,839	55			89		88
<b>538 ALL</b>	<12	0	-	-	-	4.25%	-	-	-
	24-Dec	75	1,633	22	3	4.25%	9	4.25%	9
	25-50	331	13,380	40	6.86	4.25%	15	4.25%	15
	51-100	220	14,798	67	12.24	4.25%	17	4.25%	17
	>100	18	2,373	132	35	4.25%	16	4.55%	15
	ALL	644	32,184	50			57		56
<b>MPR ONLY</b>	<12	32	251	8	1.78	4.25%	15	4.25%	15
	24-Dec	249	4,958	20	4.34	4.25%	24	4.25%	24
	25-50	280	10,519	38	7.2	4.25%	19	4.20%	20
	51-100	65	4,394	68	15.62	4.25%	20	4.45%	19
	>100	11	1,687	154	64.2	4.25%	10	4.25%	10
	ALL	637	21,809	35			88		88
<b>Total Sample Size</b>							397		394

In summary, the precision of point estimates generated by program and property size for this study is approximately +/- 8.33% at a 95% level of confidence for a 4.25% CV.<sup>29</sup> The most precise estimates are for Off-farm Farm Labor Housing properties with more than 100 units (CV = 0.9% for a precision of 1.76%), whereas the least precise estimates generated for this study are for Off-farm Farm Labor Housing properties with less than 12 units (CV = 8.10% for a precision of 15.88%).

<sup>29</sup> In general, at a  $100(1 - \alpha)\%$  level of confidence, the precision of the estimate is  $Z_{1-\alpha/2} * CV$ . So, at 95% confidence ( $Z_{0.95}=1.96$ ) and a 4.25% CV, the precision is 8.33%.

The following tables provide a comparison between the proportion of units in the samples and the proportion of units in the portfolio.

Table 10 — Sample selected for Section 515

Section 515 (MPR and 538 removed)						
Unit range	Total properties in sample	Proportion of properties in sample	Proportion of properties in portfolio	Total units in sample	Proportion of units in the sample	Proportion of units in portfolio
<12	34	21%	9%	269	3%	2%
12-24	33	20%	44%	627	7%	30%
25-50	24	15%	39%	961	10%	50%
51-100	24	15%	7%	1,653	18%	15%
>100	46	29%	1%	5,803	62%	3%
ALL	161	100%	100%	9,313	100%	100%

Table 11 — Sample selected for Section 514 Off-farm

Section 514 Off-farm						
Unit range	Total properties in sample	Proportion of properties in sample	Proportion of properties in portfolio	Total units in sample	Proportion of units in the sample	Proportion of units in portfolio
<12	10	11%	6%	80	1%	1%
12-24	17	19%	25%	349	5%	10%
25-50	20	22%	36%	795	11%	26%
51-100	24	27%	25%	1,760	24%	29%
>100	18	20%	8%	4,454	60%	34%
ALL	89	100%	100%	7,438	100%	100%

Table 12 — Sample selected for Section 538

Section 538 (Contains all Section 538 properties, including those overlapping with 515 only, and those overlapping with MPR/515)						
Unit range	Total properties in sample	Proportion of properties in sample	Proportion of properties in portfolio	Total units in sample	Proportion of units in the sample	Proportion of units in portfolio
<12	-	-	-	-	-	-
12-24	11	20%	11%	243	6%	5%
25-50	15	27%	51%	609	16%	42%
51-100	17	30%	34%	1,188	31%	46%
>100	13	23%	4%	1,772	46%	7%
ALL	56	100%	100%	3,812	100%	100%

Table 13 — Sample selected for MPR

MPR (Contains all MPR projects NOT also funded by 538—all MPR overlap with Section 515)						
Unit range	Total properties in sample	Proportion of properties in sample	Proportion of properties in portfolio	Total units in sample	Proportion of units in the sample	Proportion of units in portfolio
<12	14	16%	5%	102	3%	1%
12-24	30	34%	39%	592	17%	23%
25-50	20	23%	44%	789	23%	48%
51-100	18	20%	10%	1,222	35%	20%
>100	6	7%	2%	743	22%	8%
ALL	88	100%	100%	3,448	100%	100%

## Appendix C: Capital Needs Assessment template

The development of the property CNA report followed the workflow summarized as follows:



Cost estimates in the 20-year Capital Needs table were sourced from Marshall Valuation Services (MVS) Cost Guide. As noted in MVS in Section 1, Page 7:

“Marshall Valuation Services is a complete, authoritative appraisal guide for developing replacement costs, depreciated values, and insurable values of buildings and other improvements. This service is an aid in determining values of nearly every kind of improved property where replacement or reproduction cost is desired. Marshall Valuation Services has the single most comprehensive database in the marketplace.”

“The integrated database combines three distinct approaches to information gathering:

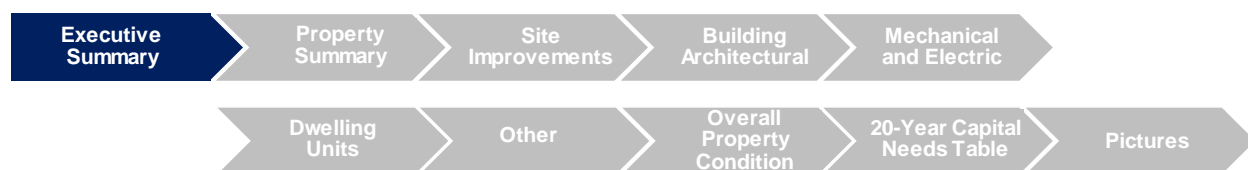
1. Building by Component – reflects data identified by hundreds of locations throughout the United States. MVS monitors the factors that drive the cost of construction and tracks actual building component costs. MVS gathers wage rates from all major labor trades and studies crew sizes and productivity rates for the personnel necessary for the installation of components.
2. Building by Example – allocates assembly costs according to various building categories (building structure, building system or building component). This systematized cost analysis approach always accounts for the total cost figure.
3. Building by Sampling – a unique approach to cost development. MVS gears its research toward the use of actual complete building costs. In grouping those costs by building type or occupancy, method or class, and cost range or quality of construction, they develop what the appraisal market perceives as the most accurate building cost information available.”

“MVS data has become the industry benchmark for preliminary budget feasibility and design alternative/life-cycle costing; energy audits; estimating and bidding for new construction or partial loss and damage repair.”

In addition to utilizing costs via MVS, we utilized costs from industry standards through previous work on multi-family residences and senior housing. Based on our experience and knowledge, we were able to provide a benchmark for individual costs for each component. We did not capture every individual material type for every component. However, we estimated an average cost for a component that is representative of the overall portfolio.

The estimated total replacement costs were adjusted based on a local cost multiplier supplied by MVS. This local cost multiplier is based on weighted labor and material costs, including local sales taxes; but does not include any new-construction rebates where applicable. The local multipliers, when applied to the total replacement cost, will adjust for variations in component costs as a whole for a particular region.

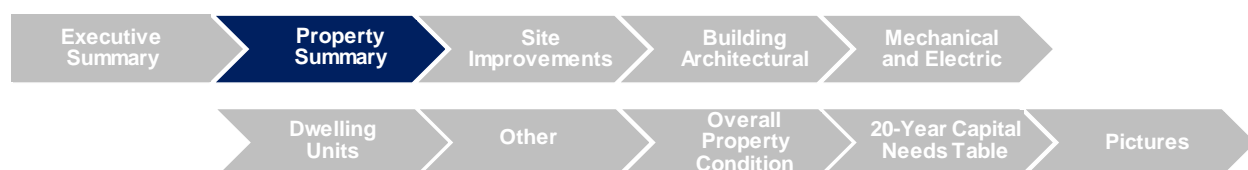
### Section 1: Executive Summary



An overview of the overall objective of the property assessment and the summary of the 20-year Capital Needs Table outlining specific objectives throughout the report. These objectives are as follows:

- Identify and locate significant defects, deficiencies, and items of deferred maintenance.
- Estimate the cost of significant capital items required to maintain the operating function utility of the property over the 20-year analysis period.
- Establish a cost estimate to correct such defects, deficiencies and deferred maintenance.
- Delineate the cost estimate by Years 1- 5, 6-10, and 11-20.
- Summarize the physical attributes of the property.
- Inspect a reasonable number of units, including one unit of each type (1 br, 2 br, 3 br, etc.) that are occupied or vacant (if applicable).

### Section 2: Property Summary



The property summary includes a list of key building and site descriptions deemed to be material to the overall analyses. These descriptions include the following:

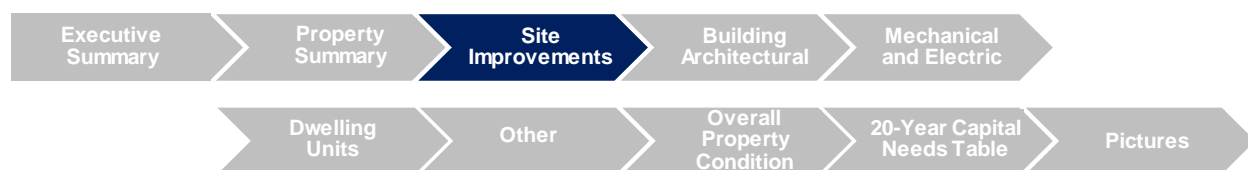
Building square feet	Number of total units	Number of stories	Number of apartment buildings
Vacancy level at time of inspection (%)	Year built/Year renovated	Site description	Surrounding land uses
Number of standard parking spots	Number of handicapped parking spots	Land size (acres)	Units delineated by number of bedrooms/ number of bathrooms
Style of apartment building (garden, mid-rise, et cetera)	Number of occupied and vacant units	Number of down units	Number of units inspected by delineation

Components considered critical to functionality of a property were assessed. Any major deficiencies were classified as critical, priority, or operational and summarized in with comments from the assessor. These components were divided among four categories:

1. Site Improvements;
2. Building Architectural;
3. Mechanical and Electric; and
4. Dwelling Units.



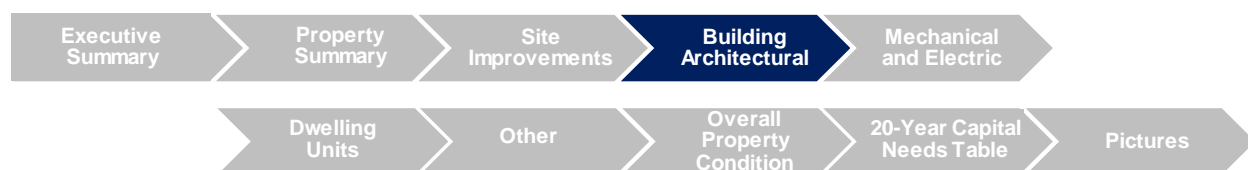
### Section 3. Site Improvements



This section of the CNA report identified key components related to the site improvements and adjacent land areas. Eight key components that drive capital needs related to site improvements were assessed. Components under the Site Improvements include:

Utilities available	Site fencing (type and linear feet)	Sidewalks (construction type and square feet)	Mail facilities
Landscaping	Site lighting	Parking/paved areas	Playground equipment

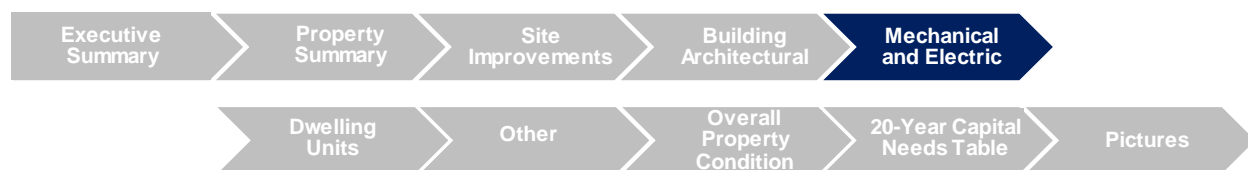
### Section 4: Building Architectural



This section of the CNA report identified key exterior components of the apartment buildings, and key components of the common area buildings. These components are typically long-lived and are expensive to replace. The eight components included in this portion of the assessment were:

Structure and foundation	Roof covering	Soffit/Fascia/Gutters	Windows
Exterior doors	Exterior walls	Building mounted lights	Carpet in common area buildings

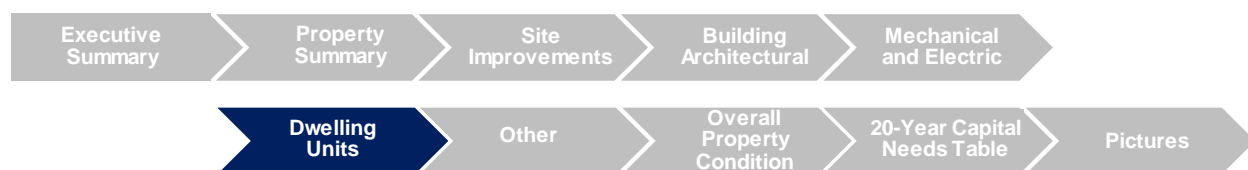
### Section 5: Mechanical and Electric



This section of the CNA report identified key mechanical and electrical components of a property. Inferior or outdate components were identified and commented on by the assessor. Components considered to be inferior include R-22 refrigerant, electrical service less than 60 amps, and non-GFCI outlets near wet areas. We assessed the following components:

HVAC systems	Plumbing systems	Electrical systems
--------------	------------------	--------------------

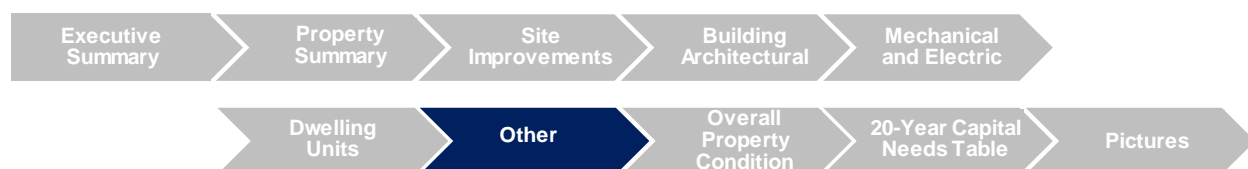
### Section 6: Dwelling Units



This section of the CNA report identified common appliances, types of finishes for floors, walls, and ceilings, and common kitchen and bathroom fixtures. These components are typically replaced on an as needed basis, or on tenant turnover. Inferior or outdate components were identified and commented on by the assessor. We assessed the following components:

Flooring	Interior walls	Ceilings	Interior doors
Bathroom and plumbing fixtures	Refrigerators	Range and range hoods	Dishwashers
Water heaters	Cabinets and countertops	Balconies	

### Section 7: Other



This section of the CNA report identified safety and security items not included elsewhere in the CNA analysis. We identified a number of components that are important to the safety and security of the property and the units. We assessed the following components:

Smoke detectors	Sprinkler systems	Carbon monoxide detectors	Emergency lighting and exit signs
Fire extinguishers	Fire alarms	Intercoms	Security cameras
Secured entrance doors			

Additional questions were asked to determine if there could be other safety and security issues with the property. These questions focused on physical conditions and issues including lead-based paint, mold, wood-damaging insects, problematic building materials, earthquake zones, and the use of fireplaces and washer & dryer hookups in the units. The answers to these questions influenced the overall property condition final assessment.

### Section 8: Overall Property Condition



The assessment of the components were taken into account when assigning a property a qualitative condition rating. These ratings were: Excellent, Above Average, Average, Below Average, and Poor.

**Excellent:** The component is new or maintained in like new condition with proactive maintenance practices, exhibiting no deferred maintenance or life safety/code issues.

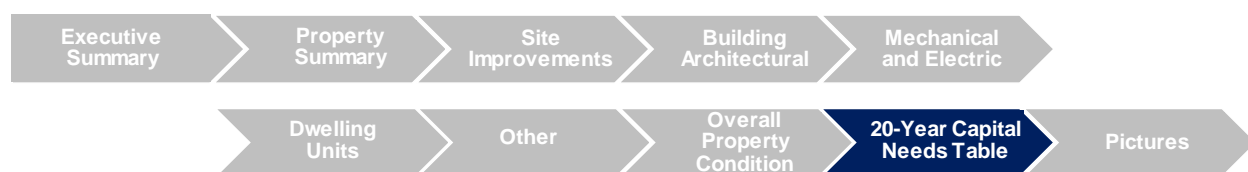
**Above Average:** The component is fully functional, well maintained, exhibits minimal wear and tear and no deferred maintenance or life safety/code issues. Any identified repairs are due to recent events (e.g. a wind storm or a burst pipe) or are very limited in scope (routine maintenance). Low reserves are required.

**Average:** The component is fully functional and generally well maintained. It may exhibit customary wear and tear based on age and may have minimal deferred maintenance. Any life/safety code issues can be readily corrected as part of the operating budget and are isolated in nature. Moderate reserves are required.

**Below Average:** The component exhibits pervasive wear and tear, some limits in functionality and deferred maintenance issues. Life safety/code issues are significant and/or numerous and involve substantial cost. High reserves are required.

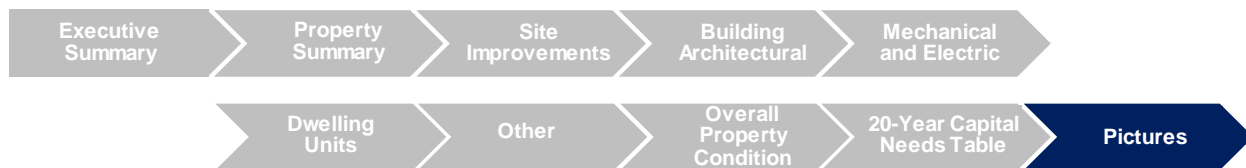
**Poor:** The component exhibits inferior/deteriorating conditions and some limits functionality. Deferred maintenance is pervasive and will costly to cure. Multiple life safety/code issues are identified and involve significant cost. Extensive repairs are required.

### Section 9: 20-Year Capital Needs Table



Based on the overall condition of the property and the condition of the individual components, we've estimated the cost of significant capital items required to maintain the functionality of the property over a 20-year holding period from the date of the assessment. This amount is gross of any reserves for replacement.

**Section 10: Pictures**



Photographs were taken of the property’s exterior, common areas, site improvements, and the interior of the units that were inspected.

## Appendix D: PUPA reserves deficit methodology

Figure 30 — Example pro forma to calculate reserves for replacement deficit

Year	Uninflated annual replacement needs for 20 years	Reserves for replacement beginning balance (as of Dec 31 2014)	Reserves for replacement annual deposit	Reserves for replacement balance after annual deposits	Withdrawals	Net reserves (deficit) at year end
1	\$112,026	\$1,198,474	\$153,000	\$1,351,474	-\$112,026	\$1,239,448
2	\$121,926	\$1,239,448	\$153,000	\$1,392,448	-\$121,926	\$1,270,522
3	\$112,026	\$1,270,522	\$153,000	\$1,423,522	-\$112,026	\$1,311,496
4	\$112,026	\$1,311,496	\$153,000	\$1,464,496	-\$112,026	\$1,352,471
5	\$120,118	\$1,352,471	\$153,000	\$1,505,471	-\$120,118	\$1,385,353
6	\$112,026	\$1,385,353	\$153,000	\$1,538,353	-\$112,026	\$1,426,328
7	\$263,774	\$1,426,328	\$153,000	\$1,579,328	-\$263,774	\$1,315,553
8	\$112,026	\$1,315,553	\$153,000	\$1,468,553	-\$112,026	\$1,356,527
9	\$126,656	\$1,356,527	\$153,000	\$1,509,527	-\$126,656	\$1,382,872
10	\$1,867,280	\$1,382,872	\$153,000	\$1,535,872	-\$1,867,280	-\$331,409
11	\$112,026	-\$331,409	\$153,000	-\$178,409	-\$112,026	-\$290,435
12	\$121,926	-\$290,435	\$153,000	-\$137,435	-\$121,926	-\$259,361
13	\$112,026	-\$259,361	\$153,000	-\$106,361	-\$112,026	-\$218,387
14	\$112,026	-\$218,387	\$153,000	-\$65,387	-\$112,026	-\$177,412
15	\$1,459,838	-\$177,412	\$153,000	-\$24,412	-\$1,459,838	-\$1,484,250
16	\$112,026	-\$1,484,250	\$153,000	-\$1,331,250	-\$112,026	-\$1,443,275
17	\$121,926	-\$1,443,275	\$153,000	-\$1,290,275	-\$121,926	-\$1,412,202
18	\$112,026	-\$1,412,202	\$153,000	-\$1,259,202	-\$112,026	-\$1,371,227
19	\$253,874	-\$1,371,227	\$153,000	-\$1,218,227	-\$253,874	-\$1,472,101
20	\$311,660	-\$1,472,101	\$153,000	-\$1,319,101	-\$311,660	-\$1,630,761
<b>Uninflated deficit (surplus) of reserves over 20 years</b>						<b>\$1,630,761</b>
<i>Calculation = Cost to maintain operational functionality, net of reserves for replacement</i>						
<b>Uninflated deficit (surplus) of reserves per annum</b>						<b>\$81,538</b>
<i>Calculation = cost to maintain operational functionality net of reserves for replacement, divided by 20 years</i>						
<b>Number of units at the property</b>						<b>160</b>
<b>Uninflated deficit (surplus) of reserves per unit per annum</b>						<b>\$510</b>
<i>Calculation = Uninflated deficit (surplus) of reserves per annum, divided by total number of units</i>						

For each of the properties in the sample, a financial analysis was conducted using the most relevant and reliable information sources. For some properties audited financial statements were available while for others, information from the AMAS database was utilized. The key inputs and assumptions relied upon in the PUPA reserves deficit methodology include:

1. **Beginning balance of reserves as of December 31, 2014.** For each property, this data point was identified either from audited financial statements or the AMAS database. If this amount was not available, we made an estimate based on the relative size, location and program of the property and benchmarking to other properties with similar characteristics.

2. **Annual projected transfer to reserves.** For each property, a 2015 projected budget was analyzed from information in the AMAS database. We identified the projected budgeted transfer to reserves and any growth in projected transfers to reserves. For most properties there was no projected growth in reserve transfers while others projected modest increases. For properties without multi-year projections of annual reserve transfers, a simplifying assumption is that each property will be able to make a projected transfer to reserves in each year during the 20-year observation period based on the projection for 2015.
3. **Capital needs withdrawals.** We determined the uninflated 20-year projected gross capital needs to maintain the operating functionality of each property. These are developed for each of the 394 sample properties. As previously discussed, the capital needs were determined to be exclusive of expenses that would be routinely found in the projected operating statements of the properties.
4. **Net reserves.** The net reserves in each year were calculated based on the beginning balance of reserves, plus the annual reserve transfer, less any projected capital needs withdrawals. For most properties this amount is negative which indicates a reserve deficit. A net reserve deficit can occur when a property has more capital needs than reserves available during the 20-year projected period. For some properties in the sample the net reserves were positive which indicated a surplus of reserves compared to the projected 20 year capital needs.
5. **Per unit per annum (PUPA) net reserves.** Since the total net reserves is an undiscounted figure, the annual amount of net reserves was first calculated based on the total 20-year net reserves spread evenly over the 20-year period. The annual net reserves figure was then divided by the number of units in the property to calculate the PUPA net reserves. This figure is the basis for the expansion of projected costs using the aforementioned expansion factors.
6. **Scenario analysis.** It should be noted this methodology was replicated for Section 5, Scenario Analysis. For example, to determine the impact of a 50% decrease in the debt payment, since the total amount of RHS debt was not readily available, at the direction of RHS, a simplifying assumption was utilized that assumed 50% of the projected annual debt payment would be added to the annual reserve transfer. For Scenario C, it was assumed that the entire projected debt payment (less \$100 x 12 months) would be added to the projected reserve transfer.

