

Median Household Income Determination Guidance for KIA Loan Programs

How does KIA Use Median Household Income?

- Determine interest rates for Fund A, Fund B, and Fund F
- Determine principal forgiveness eligibility for Fund A and Fund F
- Determine 30 year loan term eligibility for Fund A, Fund B, and Fund F

What is Median Household Income?

- The median of a numerical data set is a numerical value in the middle of the dataset when it is arranged in order from least to greatest. When the number of values in the dataset is odd, the median will be the middle value in the ordered array. When the number of values in the dataset is even, the median will be the average of the two middle values in the ordered array.
- Median household income (MHI) “includes the income of the householder and all other people 15 years and older in the household, whether or not they are related to the householder. The median of household income is the point that divides the household income distribution into halves, one half with income above the median and the other with income below the median. The median is based on the income distribution of all households including those with no income.”¹
- Median household income is not the same as mean (average) household income and should be interpreted differently. When considering median household income for KIA programs it is helpful to remember that half of the households in the project or system service area have an income that is less than the median amount and half of the households have an income that is greater than the median amount. The benefit of using median household income in KIA’s programs over mean household income is that the median isn’t skewed by extreme outliers and it offers a more realistic perspective of the incomes in the project or system service area.

What are MHI Data Sources?

- “American Community Survey is a nationwide survey designed to provide reliable and timely demographic, social, economic, and housing data for the nation, states, congressional districts, counties, places, and other localities every year.”²
- The default method of MHI determination in the WRIS Portal and a secondary modified method use ACS 5-Year Estimates to calculate MHI for the KIA Loan Programs because the data are more current than the decennial census and available for all areas across the state of Kentucky. The data are also available at smaller geographies, including census tracts. While the data are not as current as 1-Year estimates, they are more precise and more reliable because they are based on a larger sample size of data collected over 60 months (5 Years).

¹ Guzman, Gloria, “Household Income: 2016,” American Community Survey Briefs, September 14, 2017, 1, <https://www.census.gov/library/publications/2017/acs/acsbr16-02.html>.

² Guzman, Gloria, “Household Income: 2016,” American Community Survey Briefs, September 14, 2017, 6, <https://www.census.gov/library/publications/2017/acs/acsbr16-02.html>.

- If the ACS 5-Year Estimates are insufficient for a project area or do not appear to be representative of the impacted customers, then applicants have the option to complete an income survey to determine the number households in the project or service area that meet KIA's MHI thresholds.

KIA MHI Thresholds

MHI thresholds are household income ranges that are updated annually for KIA's SRF funding cycle. MHI thresholds are used for the Fund A, Fund B, and Fund F programs to determine the interest rate, principal forgiveness eligibility, and extended loan term (30 years) eligibility.

- **Standard MHI Threshold:** The standard MHI threshold is a range that is equal to Kentucky's MHI or greater according to 5-year ACS estimates. A project or system service area that has an MHI within this range qualifies for the standard interest rate; however, there are exceptions for projects that address agreed orders/consent decrees or are regional. The standard rate is the highest tier interest rate in KIA's Fund A, Fund B, and Fund F programs. Projects that have the standard rate are not eligible for principal forgiveness or an extended loan term.
- **Non-standard MHI Threshold:** The non-standard MHI threshold is a range that is greater than 80 percent of Kentucky's MHI and less than Kentucky's MHI according to 5-year ACS estimates. A project or system service area that has an MHI within this range qualifies for the non-standard interest rate. Projects that address agreed orders/consent decrees or are regional also qualify for the non-standard rate even if the MHI does not fall within the threshold's range. The non-standard rate is the middle tier interest rate in KIA's Fund A, Fund B, and Fund F programs. Projects that have the non-standard rate are not eligible for principal forgiveness or an extended loan term.
- **Disadvantaged MHI Threshold:** The disadvantaged MHI threshold is a range that is less than or equal to 80 percent of Kentucky's MHI according to 5-year ACS estimates. A project or system service area that has an MHI within this range qualifies for the disadvantaged interest rate. The disadvantaged rate is the lowest tier interest rate in KIA's Fund A, Fund B, and Fund F programs. Projects that have a disadvantaged rate are eligible for principal forgiveness and/or an extended loan term as appropriate. (NOTE: Eligibility does not automatically guarantee principal forgiveness or extended loan terms.)

What are the Accepted MHI Determination Methodologies?

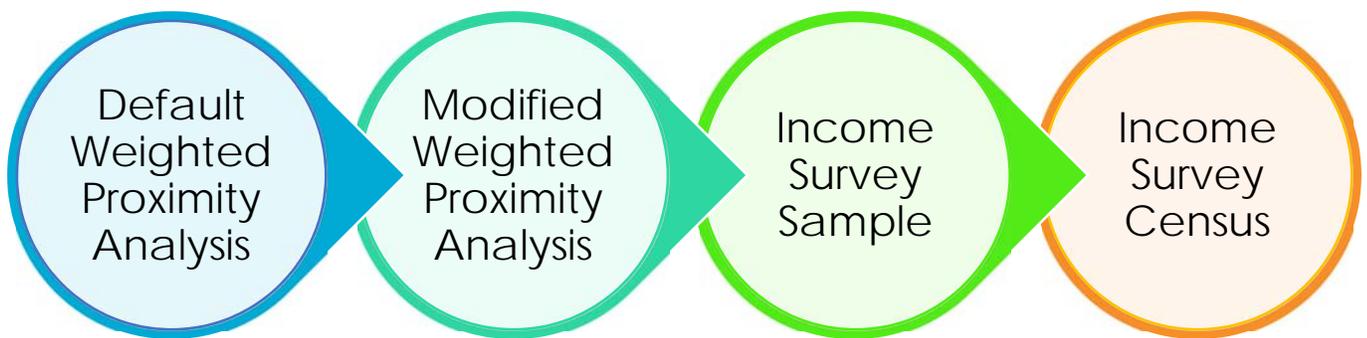
There are three types of methodologies that can be used to calculate Median Household Income for KIA loan programs. Applicants must work with KIA staff for guidance to determine which methodology is appropriate for the project.

- **Default Weighted Proximity Analysis (DWPA):** The Default Weighted Proximity Analysis method automatically calculates the project's MHI in the WRIS project profile. No additional work is required by the applicant. The DWPA is the primary methodology for KIA loan programs and applicants should seek guidance from KIA staff before pursuing any other methodologies.
- **Modified Weighted Proximity Analysis (MWPA):** The Modified Weighted Proximity Analysis is modeled after the Default Weighted Proximity Analysis. This method requires the applicant to conduct a spatial proximity analysis with customer meters or billing addresses and calculate a weighted MHI based on census tract data. The MWPA is the secondary methodology for KIA loan programs because it is based on the same principles as the DWPA.

- **MHI Income Survey (IS):** The MHI Income Survey is the most labor intensive methodology for applicants. This method requires the completion of surveys to collect income thresholds for households located in the project area. Surveys can be completed using a random sample of households in the project area or completing a project census for all households in the project area. The IS methodology should only be used when the DWPA and MWPA are inaccurate and/or insufficient for the project area.

Methodology Progression

The progression of methodologies is key to maintaining the integrity and fairness of KIA’s MHI determinations. The progression of an applicant’s MHI determination moves from easiest and lowest precision method (DWPA) to the most difficult and highest precision method (IS-Census). The levels of progression are as follows: 1) Default Weighted Proximity Analysis; 2) Modified Weighted Proximity Analysis; 3) Income Survey – Sample; and 4) Income Survey – Census (see chart below). Since each step up in the MHI determination levels improve the accuracy of the data an applicant cannot revert to a lower level of income analysis after a higher level of income analysis has been submitted to KIA and approved. In other words, the applicant cannot submit an Income Survey and later decide to utilize the results from the Default Weighted Proximity Analysis because it offered more desirable loan terms.



How to Select the Appropriate Methodology

The primary goal of KIA’s MHI determination methodologies is to provide an easy, flexible, and fair framework that will qualify all eligible applicants for non-standard or disadvantaged loan terms. This goal is achieved by first reducing the burden on the applicant with an automatically calculated MHI for every WRIS Project Profile using the Default Weighted Proximity Analysis (DWPA). Allowing applicants to take an alternative approach when the DWPA is insufficient ensures that everyone has the opportunity to demonstrate the need for non-standard or disadvantaged loan terms. This framework ensures fairness and equity by standardizing the process and progression of MHI determinations.

The Default Weighted Proximity Analysis is the default method for KIA loan programs. Alternatives will not be accepted unless the applicant can demonstrate that the default method produces an unreasonable MHI estimate for the project area. **All applicants must contact KIA staff before pursuing an alternative MHI determination methodology.**

The DWPA will be used for a project unless one or more of the following conditions occur:

1. The project does not include water or sewer service lines but has a defined service area that is smaller than the system service area. The DWPA method can only be used when there are water distribution lines or sewer collection

lines mapped in the WRIS for the project. If the project does not have lines and does not impact the entire system, then an alternative method is needed to calculate project area MHI (i.e. water tanks, pump stations, etc.).

If the project has mapping for water transmission lines or sewer interceptor lines, the DWPA method cannot calculate the MHI for the project area since there are no direct household connections to these types of lines. If a transmission main or interceptor line only services a specific area of the system, not the entire system, then an alternative method is needed to determine the project area MHI.

2. The MHI is close to the threshold that will lower the interest rate, make the project eligible for principal forgiveness, and/or a 30 year loan term. Generally, if the MHI for the project or system service area is not within a reasonable range of the threshold, it will not be lowered enough by an alternative methodology to benefit the applicant.
3. The project area is small and is not represented by the MHI of the census tract(s) or the system as a whole. For example, a project is located in a small area inside a census tract with a high MHI and a population of 1,500 households but the project will only serve 100 of the households in the lowest income area of the census tract. When the project area is small, an alternative method can also be considered in cases that have an MHI outside of a reasonable range of the threshold that will lower the interest rate, make the project eligible for principal forgiveness, and/or a 30 year loan term.
4. The MHI is not consistent with the conditions of the project area and the MHI evaluation factors indicate a significant possibility of error. The MHI evaluation factors are: (a) a large MHI Margin of Error; (b) a substantial difference between the MHI values of census tracts in the project or system service area; and (c) data from previous 5-Year ACS estimates place the MHI for the project or system service area within the threshold.

If one or more of the previous conditions occur, KIA staff will assist the applicant in choosing the appropriate method to determine the project or system service area MHI.

When should an applicant use the Modified Weighted Proximity Analysis method?

After an applicant has consulted with KIA staff, the Modified Weighted Proximity Analysis (MWPA) will be recommended under one or more of the following conditions:

1. The project or system service area is located in more than one census tract. This is a critical factor for projects using the MWPA method because the MHI is based on 5-Year ACS census tract data. If the project or system service area is completely contained within one census tract, then the MHI will not change using the MWPA method.

There must be sufficient differences between the MHI of each census tract that include MHI values below the thresholds set for the KIA loan programs. If there is not at least one census tract that meets the threshold, the MWPA method will not lower the project or system service area MHI.

2. The project requires a greater level of precision (i.e. the exact location of households). Precision is needed when the project or system service area covers multiple census tracts that have significantly different MHI values or includes service lines that are not used for residential customers with overlapping system service areas. By using exact locations of residential customers instead of estimated households generated by the DWPA method, the MWPA will provide a more accurate "weight" to the MHI values of each census tract.
3. There has been a population shift since the 2010 Decennial Census. While the MHI values are updated annually for census tracts using the 5-Year ACS Estimates, the estimated serviceable households calculated in the DWPA method uses 2010 census block data. If the project or system service area has experienced significant population growth or

decline since the 2010 Decennial Census, the MWPA can be used to account for those changes and assign the appropriate “weight” to the census tract MHI values. The following are examples of population shifts that can impact MHI: natural disasters, loss or gain of a large industry, or construction of new housing developments.

4. The project does not have water service lines or sewer service lines in the proposed project mapping but serves an area that is smaller than the entire system service area (i.e. water tanks, pump stations, lift stations, etc.). The DWPA method can only be used to calculate project area MHI if there are water or sewer service lines mapped for the project. The MWPA can be used for a project that does not have service lines because it utilizes the exact locations of households that will be serviced by the project and does not rely on the estimated serviceable household count generated in the DWPA method.

When should an applicant use the MHI Income Survey method?

After an applicant has consulted with KIA staff, the MHI Income Survey (IS) will be recommended under one or more of the following conditions:

1. The project or system service area is small or completely contained within a single census tract and the MHI of the census tract is not representative of the project or system service area. For example, the MHI of the census tract is greater than Kentucky’s MHI but the project area is a single street in the census tract and the MHI is expected to be less than 80 percent of Kentucky’s MHI.
2. There have been dramatic economic or population changes in the project or system service area that would impact the median household income (e.g. creation or loss of major industry, a natural disaster, a large development, etc.). If a dramatic change in the local economy has occurred within the last five years, the ACS data is not representative of the current conditions and an IS may be needed to determine the median income of the project or system service area.
3. The MHI of the census tract is not consistent with the conditions of the project area and there is a large MHI Margin of Error. Projects or system service areas within census tracts that have a high margin of error may require an IS because the ACS data does not provide a reliable estimate.

Default Weighted Proximity Analysis

As previously mentioned, the Default Weighted Proximity Analysis (DWPA) is automatically calculated in the WRIS Portal Project Profiles and is the primary method used to determine an applicant's MHI for a project or system service area.

This method has two distinct steps. First, the estimated serviceable households must be determined for each census tract in the project or system service area. Second, the estimated serviceable households within each census tract are used to calculate the weighted MHI for the project or system service area as a whole.

This method calculates estimated serviceable households through a spatial proximity analysis of water and sewer service lines within a specified distance of roads inside a census block. The serviceable percent of the census block is determined by dividing the length of water and sewer service lines by the length of roads. If the length of water and sewer service lines is greater than or equal to 80% of the length of roads, the census block is assumed to be 100% served.

NOTE: Service lines are water distribution lines and sewer collection lines. Water transmission lines and sewer interceptor lines are excluded in the spatial proximity analysis.

The estimated serviceable households of each block are added to get the subtotal for each census tract and the total for the project service area. Census tract subtotals are then used to calculate a weighted MHI for the project or system service area using 5-Year ACS data.

Assumptions:

- Most households will be located within a certain distance of roads; therefore, the water and sewer service lines will be within a certain distance of roads.
- The households within a project or system service area are adequately represented by census block and census tract data. In other words, the MHI of the entire census tract is representative of the project area or system service area within the tract.

Limitations:

- Service lines located in rural areas that are not within proximity to a road are not included in the calculation.
- Service lines located in rural areas that are within proximity to a road for long distances (the length of water or sewer service lines is a high percentage of the length of roads), but the service lines are not realistically within a serviceable distance for the majority of households within the census block.
- Service lines that serve primarily industrial or commercial customers instead of residential customers.
- Service areas that have multiple systems with parallel service lines.
- Population and household data are not current because the methodology requires census block level data that are available only from the decennial census.
- Only includes projects that have water or sewer service lines in the scope of work.
- Does not include "indirectly serviceable" populations.
- The Median Household Income of a census tract may not be representative of the project or system service area in the census tract.

Justification:

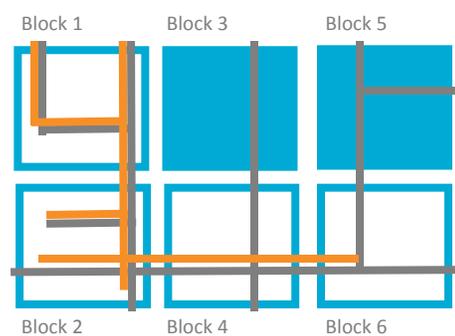
- By using the available resources of the Water Resource Information System (WRIS), the Default Weighted Proximity Analysis allows for the mass calculation of Median Household Income for all SRF Applicants. This is necessary due to the nature of Kentucky's SRF Program and prevents bottlenecks of administrative work required by other MHI determination methodologies.

- The Default Weighted Proximity Analysis provides applicants and KIA Staff with a basis and measurement to determine MHI, interest rates, and potential principal forgiveness during the beginning stage of a project. This would not be available using traditional survey methods.
- For projects and system service areas that are cohesive and have MHIs that are generally accepted, the Default Weighted Proximity Analysis eliminates significant labor, resource, and time requirements of other methodologies.

Default Weighted Proximity Analysis Methodology Description:

Applicants are not required to complete any data collection or analysis for the Default Weighted Proximity Analysis (DWPA) method to determine a project’s MHI. A description of the method has been detailed in this guidance document to provide an understanding of how the Modified Weighted Proximity Analysis is modeled after the DWPA.

PART ONE: DEFAULT PROXIMITY ANALYSIS



1. Determine the Percent Serviceable for Each Census Block

The illustration to the left represents the service lines of a water or sewer system in orange and roads or highways in gray. Each square represents a census block and all of the census blocks are within a single census tract.

The service lines are within a certain distance of the roads or highways. The percent serviceable is determined by using the formula below:

$$\frac{\text{Length of Service Lines (Within a Distance of Roads)}}{\text{Length of Roads}} = \text{Percent Serviceable}$$

2. Calculate the Estimated Serviceable Households for Each Census Block

The estimated serviceable households within each census block is calculated by multiplying the percent serviceable and the total number of households in the block. If the percent serviceable is greater than 80%, it is assumed that 100% of population is served.



Block	Households	Percent Serviceable	Estimated Serviceable Households
Block 1	50	100%	50
Block 2	40	90%	40
Block 3	NA	NA	0
Block 4	30	50%	15
Block 5	NA	NA	0
Block 6	20	25%	5

Census Tract 01

100 % 50/50	0%	0%
90 % 40/40	50% 15/30	25% 5/20

Census Tract 02

80 % 60/60	50% 10/20	0%
0%	75% 15/20	0%

Census Tract 03

0%	50% 15/30	0%
10% 2/20	25% 10/40	50% 25/50

3. Calculate the Estimated Serviceable Households for Each Census Tract

After the estimated serviceable households has been calculated for each census block, sum the blocks to find the estimated serviceable households for each census tract.

Block	Households	Percent Serviceable	Estimated Serviceable Households
Block 1	50	100%	50
Block 2	40	90%	40*
Block 3	NA	NA	0
Block 4	30	50%	15
Block 5	NA	NA	0
Block 6	20	25%	5
Census Tract Subtotal	140		110

*The estimated serviceable households for Block 2 is 40 because the percent serviceable is greater than 80% and assumed to be 100% served (as described in step 2).

4. Calculate the Total Estimated Serviceable Households for the Project Area

Sum the Estimated Serviceable Households of the census tract to find the total Estimated Serviceable Households for the entire project or system service area.

Census Tracts	Estimated Serviceable Households
01	110
02	85
03	52
Project Area Total	247

PART TWO: WEIGHTED MEDIAN HOUSEHOLD INCOME

5. Calculate the Weight of Each Census Tract

Divide the estimated households for each census tract by the total estimated serviceable households for the project area to get the percent or the weight for each census tract MHI.

Census Tract	Estimated Serviceable Households	Divided by Total Estimated Serviceable Households	Percent of Total or Weight
01	110	/ 247	45%
02	85	/ 247	34%
03	52	/ 247	21%

6. Calculate the Weighted MHI Value for Each Census Tract

Multiply the census tract MHI for each tract in the project area by the corresponding weight of each census tract.

Census Tract	Estimated Serviceable Households	Percent of Total or Weight	Census Tract MHI	Weighted MHI Value
1	110	45%	\$37,000	\$16,650
2	85	34%	\$30,000	\$10,200
3	52	21%	\$26,000	\$5,460

7. Calculate the Total Weighted MHI for the Project Area

Add the weighted census tract MHI values to get the total weighted MHI for the project area.

Census Tract	Estimated Serviceable Households	Percent of Total or Weight	Census Tract MHI	Weighted MHI Value
1	110	45%	\$37,000	\$16,650
2	85	34%	\$30,000	\$10,200
3	52	21%	\$26,000	\$5,460
Project Area Weighted MHI				\$32,310

Modified Weighted Proximity Analysis

The Modified Weighted Proximity Analysis (MWPA) is an alternative method that can be used to determine the MHI for a project or system service area. The applicant must consult with KIA staff for approval prior to utilizing this method.

The MWPA is similar to the Default Weighted Proximity Analysis (DWPA) but it is conducted by mapping residential customer meters or addresses within each census tract for the proximity analysis instead of using water and sewer service lines to calculate the estimated serviceable households within each census tract. This method uses the precise location of residential service connections impacted by the project to determine the number of households served in each tract.

The number of residential service connections in each census tract is used to calculate a weighted MHI average for the project or system service area using the 5-Year ACS Estimates.

Assumptions:

- The mapped households within a project or system service area are adequately represented by census tract data. In other words, the MHI of the entire census tract is representative of the project area or system service area within the tract.
- Meter or address data are available for the project or system service area and the applicant has the ability to complete a spatial analysis.

Limitations:

- Applicants are required to complete the data collection and the analysis.
- Applicants may not have mapping for meters or customer addresses or the ability to create the data and complete the spatial proximity analysis to census tracts.
- The Median Household Income of a census tract may not be representative of the project or system service area in the census tract.

Justification:

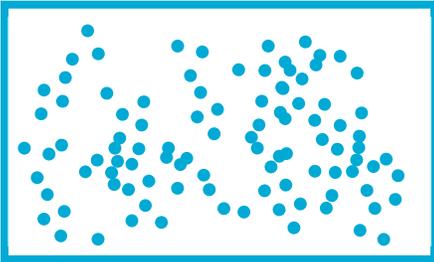
- The modified method allows applicants to calculate a more precise weighted MHI average for the project or system service area by using actual customer data rather than estimated serviceable households.
- Customer data are also more up to date than the 2010 census block data used to calculate estimated serviceable households in the DWPA method.
- The standard DWPA method does not account for “indirectly serviceable” populations, or populations of adjoining systems impacted by the project. The MHI in the DWPA is only calculates a project area (for linear projects) or the primary beneficiary system. The modified method is not limited to the primary beneficiary system and can be applied to all beneficiary systems (i.e. regional treatment plant projects).
- While the modified method requires the applicant to complete additional work to determine the MHI for the project or system service area, it is not as labor, resource, or time intensive as completing an income survey and is consistent with the accepted DWPA method.

Modified Weighted Proximity Analysis Methodology Description:

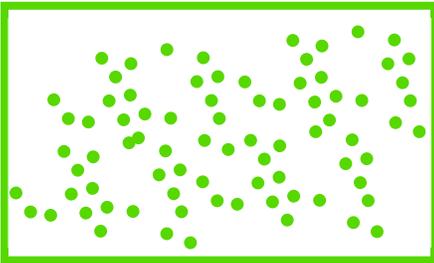
The Modified Weighted Proximity Analysis (MWPA) is based on the same principles of the Default Weighted Proximity Analysis (DWPA) but the applicant must gather the data and complete the analysis following the methodology described below. Applicants must always contact KIA staff before starting the MWPA to determine if it is the appropriate method for the project.

PART ONE: MODIFIED PROXIMITY ANALYSIS

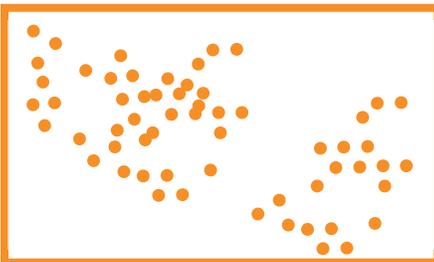
Census Tract 01



Census Tract 02



Census Tract 03



1. Gather Residential Customer Location Data

The first step of the modified method is to collect the data for the residential customers that will be served by the project. This can be completed by using mapped customer meters, joining customer billing addresses with 911 or PVA data, or by geocoding customer billing addresses.

2. Attach the Residential Customer Location Data to the Census Tracts

A proximity spatial analysis will need to be performed by completing a spatial join between the customer meter points and the 5-Year ACS census tracts to determine the number of customers within each tract. Census tract MHI data and shapefiles can be downloaded from the American FactFinder at Census.gov. Contact KIA for assistance in selecting and downloading census tract data. **All shapefiles should be projected in the Kentucky State Plane Single Zone to complete the analysis.**

3. List the Total Number of Residential Customers in Each Census Tract

Complete the proximity spatial analysis and list the number of households served in each census tract. The sum of households served in each census tract should equal the total number of residential customer meters or addresses that were mapped for the project service area.

Census Tract	Households
01	110
02	90
03	60
Total	260

PART TWO: WEIGHTED MEDIAN HOUSEHOLD INCOME

4. Calculate the Weighted MHI Census Tract Values & the Total Weighted MHI for the Project Area

Use the total number of customer meters or addresses within each census tract to calculate the weighted MHI. Complete the KIA Modified Weighted Proximity Analysis Request Form. (Refer to *Part Two: Weighted Median Household Income* in the DWPA methodology description)

Census Tract	Estimated Serviceable Households	Percent of Total or Weight	Census Tract MHI	Weighted MHI Value
01	110	42%	\$37,000	\$15,540
02	90	35%	\$30,000	\$10,500
03	60	23%	\$26,000	\$5,980
Project Area Weighted MHI				\$32,020

PART THREE: SUBMIT FOR KIA REVIEW AND APPROVAL

5. Submit the following to KIA for review and approval:

- KIA Modified Weighted Proximity Analysis Request Form
- PDF Map: Project Mapping, System Mapping, Customer Meter/ Address Points, & Census Tracts
- Project Customer Meter/Address Shapefile
- Project Census Tract Shapefile

Documents can be submitted via email. If the file is too large a Dropbox or Google Drive link will be accepted. Contact KIA for assistance.

6. KIA will review the modified method request and respond with an approval, a request for additional information, or a denial.

MHI Income Survey

The MHI Income Survey (IS) is an alternative method to determine the relative MHI for a project or system service area. The applicant must consult with KIA staff for approval prior to utilizing this method.

Unlike the DWPA and the MWPA, the IS method generates relative MHI values for the project or system service area. The IS method determines the number of households in each MHI threshold category rather than estimating a weighted MHI value for the project or system service area. The IS method requires the applicant to conduct a sample or a census of the project or system service area to determine the number of households below the non-standard or disadvantaged MHI thresholds.

To qualify for the non-standard MHI threshold, at least the median number of survey respondents (see example on the right) must have an income below Kentucky's median household income. To qualify for the disadvantaged MHI threshold, at least the median number of the survey respondents must have an income below 80 percent of Kentucky's median household income.

The median number is determined by taking the total number of values in the dataset (the total number households) and counting to the "middle" or median of the dataset. For an odd number of households, the median number is equal to the total number of households divided by two rounded up to the nearest whole number. For an even number of households, the median number is equal to the total number of households divided by two plus one.

The Median Number Example:

For Odd Number of Households

1. There are 225 households in the survey universe.
2. When arranged in numerical order, the median value will be the middle number of the 225 values.
3. The median number or the middle number of 225 is equal to 225 divided by 2 and rounded up to the nearest whole number.

$$225 \div 2 = 112.5$$

$$\text{Median Number} = 113$$

4. At least 113 of the households in the survey universe must be in the target MHI threshold to be eligible for the associated loan terms.

For Even Number of Households

1. There are 200 households in the survey universe.
2. When arranged in order, the median value will be the average of the middle two numbers of the 200 values.
3. The median numbers or the two middle numbers of 200 are equal to a) 200 divided by 2; and b) 200 divided by 2 plus 1.

$$\text{a) } 200 \div 2 = 100$$

$$\text{b) } 100 + 1 = 101$$

$$\text{Median Number} = 101$$

4. Since the median value of 200 would be the average of the 100th and 101st value, the median number for the relative MHI survey should be 101 to ensure that the correct number of households are within the targeted MHI thresholds. Therefore, at least 101 of the households in the survey universe must be in the target MHI threshold to be eligible for the associated loan terms.

PART ONE: SELECTING THE TYPE OF SURVEY

Applicants must select the type of survey to be conducted. KIA does not restrict the type of survey that can be used to collect MHI thresholds; however, applicants should adhere to the requirements of other funding sources as applicable. For example, if the applicant is conducting an LMI survey for a Community Development Block Grant (CDBG) application for the same project, then the applicant should use the type of survey that is required for the CDBG program.

1. Primary Data Collection Type

Decide how the survey data will be collected. Options include telephone, door-to-door, mail, or web-based questionnaires. Applicants should consider available staff, size of the sample needed, the means available for identifying samples for the survey, and the requirements of other funding sources involved in the project.

- (a) Telephone – The interviewer asks questions of the respondent via telephone. The interviewer must ensure that the respondent is competent and knowledgeable enough to answer questions about the family income status. Must determine alternatives and methodologies for households that do not have a telephone or have unlisted numbers.
- (b) Door-to-door – The interviewer asks questions of the respondent in a face-to-face encounter. It involves substantial work since the interviewer must go and knock on doors in order to collect the surveys. Interviewers must be well trained to ensure consistency and responses are not influenced by tone or facial expressions.
- (c) Mail – A questionnaire is sent by mail accompanied with a letter of explanation and a self-addressed stamped envelope for returning the questionnaire. The respondent is expected to complete the questionnaire, put it in the envelope, and return it.
- (d) Web-based – A web-based survey is a data collection method whereby the questionnaire is administered online. Like the mail survey, the web-based questionnaire must be completed and submitted independently by the respondent. Consider households that do not have internet access or the ability to complete computerized forms.

2. Alternative and Follow-up Data Collection Types

Decide how the survey data will be collected when the primary method does not produce a sufficient response. Since there are advantages and disadvantages to each approach, an applicant may use multiple methods to ensure equal access and maximize response rates.

PART TWO: DEVELOP THE QUESTIONNAIRE

The questionnaire used in the survey must include the correct MHI threshold for the project. MHI thresholds are updated for each funding cycle. Consult with KIA staff before conducting the survey to ensure that the appropriate MHI thresholds have been used.

To maintain consistency with the DWPA and the MWPA, the questionnaire must specify that the household income collected for the MHI thresholds includes income from all persons age 15 and older living in the household at the time the survey is completed.

Applicants can create a customized questionnaire or use KIA/Multi-Funding questionnaire templates.

Option One: Create Customized Questionnaire

- (a) Determine the content, scope, and purpose of the questionnaire. The questions in the questionnaire should be short, simple, and efficient. Keep the language as simple as possible. Avoid bias. Do not induce particular answers. Include other questions, if you like, but make sure that the survey does not take too long. Avoid burdensome questions (i.e. questions with no correct answers or opinion related questions).
- (b) Use the correct MHI thresholds for the project funding cycle.
- (c) Choose the response format to be used in collecting information from the respondent.
- (d) Word the questions simply and clearly.
- (e) List questions in logical order. All respondents must be asked the same questions in the same order. Responses must be recorded exactly and without addition or deletion.
- (f) Submit the completed questionnaire to KIA staff for review and approval before conducting the survey.

Option Two: Use KIA Multi-Funding Questionnaire Templates

- (a) The KIA Multi-Funding Questionnaire Template includes information for KIA, CDBG, and USDA income surveys. The questionnaire template will be provided upon request following income survey consultations with all applicable funding sources. The appropriate MHI thresholds will be provided by KIA and other funding sources will provide additional income limits for the project area.

PART THREE: DEFINE THE SURVEY SCOPE

1. Define the Service Area

The service area for a water or wastewater project should encompass all of the households that will be impacted by the proposed project. For some projects the area may be restricted to a few streets while others, such as a treatment plant upgrade, will impact the entire system. The geographic boundary of the service area must be defined to determine the total number of households affected by the project. After the boundary has been determined, create a complete list of all households (along with the addresses and telephone numbers) within the project or system service area.

2. Define the Survey Scope

The survey scope is the level of completeness of a survey and KIA applicants have two options. The first option is a random project sample of households in the project or system service area to determine the representative MHI threshold percentages. The second option is a project census that includes all of the households in the service area to determine the comprehensive MHI threshold percentages. Applicants must contact KIA and take other funding source requirements into consideration before determining the survey scope.

(a) Project Sample

Step One - Identify the Sample: The complete list of residential households should be created using the water or wastewater system’s residential customer/meter information. If for some reason customer/meter information is unavailable or inadequate (i.e. extension of lines to unserved areas or improved services for multi-family units such as apartments), the applicant must identify an alternative source for the addresses and telephone numbers of all households within the defined project or system service area. Document the source of all data.

Step Two - Determine the Sample Size: The sample size is determined based on the total number of households in the project area. The sample size must follow the chart below for the sample size and the over sample range. The sample size column shows the total number of responses required. The over sample range column shows the range of randomly selected households needed during the randomization process to ensure the total number of responses can be achieved at a response rate between 75 and 90 percent. **Applicants must complete 100 percent of the sample size using the spare randomized households if needed.**

Households in Service Area	Sample Size	Over Sample Range (75% - 90% Response Rate)
0 – 55	50	55
56 – 63	55	63
64 – 70	60	70
74 – 77	65	77
78 – 87	70	87
88 – 99	80	99
100 – 115	90	115
116 – 133	100	133
134 – 153	110	122 – 147
154 – 180	125	139 – 167
181 – 238	150	167 – 200
239 – 308	175	194 – 233
309 – 398	200	222 – 267
399 – 650*	250	278 – 333
651 – 1,200	300	333 – 400
1,200 – 2,700	350	389 – 467
2,701 or More	400	444 – 533

* Due to the over sample range, a project census should be considered for projects that have less than 651 total households in the service area.

Step Three - Randomly Select the Sample: The randomization of the sample can be completed in Excel or using a web based randomizer such as www.randomizer.org. The randomization methodology must be sound and documented. Every household in the service area must have an equal opportunity for being selected.

Since applicants are unlikely to get a response from every household in the sample size, the over sample range must also be randomized during the initial randomization. Additional households cannot be randomly added to

the sample size later if the applicant cannot complete 100 percent of the sample size. (If 100 percent of the sample size cannot be achieved, the applicant must transition from a project sample to a project census.)

The randomization must be documented and the order of randomized households must be maintained so that replacements for unresponsive households can be substituted in order.

Step Four - Respondent Replacement Procedures: Applicants cannot classify a household as unresponsive until at least two reasonable attempts to contact the household have failed. A reasonable attempt includes contacting the household not only during the day but during the evenings or weekends as well to maintain the integrity of the randomized sample survey (i.e. the survey does not exclude respondents who are not available at home during regular business hours). Failed contact attempts should be fully documented in the IS record files.

The applicant may utilize the alternative survey collection types if contact cannot be made using the primary collection type.

(b) Project Census

If the applicant conducts a project census instead of a project survey, at least the median number of the households in the service area must have a household income less than Kentucky's MHI to qualify for the non-standard loan terms. At least the median number of households in the service area must have a household income less than 80 percent of Kentucky's MHI to qualify for the disadvantaged loan terms.

Although the number of households in the project census is the total number of households in the project service area, a survey does not need to be completed for 100 percent of the households. At minimum, the median number of households will need to be surveyed to achieve the target MHI threshold. Households that are not surveyed and households with an unsigned survey are required to be counted in the standard MHI threshold. Counting households that have not been surveyed in the standard MHI threshold will not impact from the targeted threshold if the median number of total households in the service area has been reached.

Since the project census uses the total number of households in the project service area boundary instead of a randomized sample, data collection is

Project Census Example:

1. There are 200 total households in the project service area boundary.
2. At least 101 households need to be in the target MHI threshold to qualify for the associated loan terms (See *'The Median Number Example'*).
3. Surveys are completed for 130 households with the following distribution:

Standard Threshold Households = 7
Non-standard Threshold Households = 10
Disadvantaged Threshold Households = 113

4. No additional surveys are collected. The remaining households are assumed to be in the standard threshold. The final project census will have the following distribution:

Surveyed Standard Threshold Households = 7
Incomplete Standard Threshold Households = 70
Surveyed Non-standard Threshold Households = 10
Surveyed Disadvantaged Threshold Households = 113

5. The applicant will be eligible for the disadvantaged MHI threshold loan terms because there are 113 households in the project area in the disadvantaged MHI threshold which is greater than the minimum requirement of 101 households for the project service area.

not required to be randomized. The applicant may choose which neighborhoods, streets, or areas to survey first. Unresponsive households may be skipped and counted in the standard MHI threshold at the applicant's discretion. Once the applicant has reached the median number of households in the target MHI threshold, no additional surveys are required.

PART FOUR: CONDUCTING THE SURVEY

Before conducting the survey the following items and considerations should be addressed:

1. Establish Written Procedures

- (a) What is the primary survey collection type and how will it be implemented?
- (b) What are the alternative survey collection types and how/when will they be implemented?
- (c) What are the follow-up procedures to clarify the information on the survey form?
- (d) How will respondents be notified of the income survey? Applicant must ensure the notification is worded to avoid bias in the results.
- (e) How to deal with a respondent who refuses to cooperate?
- (f) How to deal with a respondent who is not available?
- (g) When to label a household as unresponsive and move to the next household? Applicant should consider the difference when conducting a project sample versus a project census.
- (h) Under what circumstances will a survey not be included in the final tally? (i.e. incomplete or ambiguous surveys)
- (i) How will records of the survey be maintained and organized?
- (j) How will respondent confidentiality be ensured?

2. Training

If using the face-to-face or phone interview as the primary and/or alternative survey collection types, train interviewer(s) to ask the questions in the same way, in the same order, and record answers correctly on the form.

Train survey reviewers/processors how to read and interpret the surveys so the results are recorded consistently and correctly. Improper recording of information can make the survey ambiguous and invalid.

3. Confidentiality

Emphasize to the interviewer(s), the reviewers/processors, and the respondents that the surveys are confidential.

PART FIVE: DETERMINE THE RESULTS

The survey results will need to be edited and tabulated when the data collection is complete. The survey reviewer/processor must determine if the surveys are complete. Questions or errors on the survey questionnaires should be referred back to interviewer or the respondent for clarification.

The KIA MHI Income Survey Worksheet should be used to tabulate the responses and calculate the total number of households in each MHI threshold. Information regarding the survey methodology must be included on the Methodology page regarding the MHI threshold ranges, survey collection type, the survey scope, and the survey procedures.

The KIA MHI Income Survey Worksheet also includes a certification that surveys and results were not manipulated and are accurate to the best of the applicant's knowledge. This must be signed by the authorized official of the applicant.

PART SIX: DOCUMENTATION

If the survey is conducted properly, the results will have a high level of accuracy and dependability. All applicants should maintain accurate documentation of the survey results and methodologies. The survey records should include all of the following:

1. Completed Questionnaires
2. List of Actual Respondents
3. Project Area
4. Sample Pool (for project samples)
5. Description of sampling method (for project samples)
6. Written Survey Procedures (including interview methods)
7. All Worksheets
8. Certification of MHI Threshold Results