COFFELT-LAMOREAUX PUBLIC HOUSING REDEVELOPMENT

Health Impact Assessment Report

This report was produced for the Housing Authority of Maricopa County based on a collaborative project by Catalyze Research and Consulting (CRC), Local Initiatives Support Corporation Phoenix (LISC)and the Phoenix Revitalization Corporation (PRC). LISC Phoenix was the primary funding agency for this Health Impact Assessment.

Author

Debarati "Mimi" Majumdar Narayan, PhD
Director of Research and Strategies
Catalyze Research and Consulting, LLC

November, 2013

Publisher

This report was published by the Local Initiatives Support Corporation (LISC), Phoenix.

Suggested citation:
Majumdar Narayan, D. (2013). *Coffelt-Lamoreaux Public Housing Redevelopment: Health Impact Assessment Report.* Phoenix, AZ: Local Initiatives Support Corporation

For further copies please contact:
LISC Phoenix
111 W Monroe St,
Phoenix, AZ 85003
T: (602) 252-6312

Catalyze Research & Consulting

LISC Phoenix

PRC Phoenix Revitalization Corporation

Acknowledgements

This Health Impact Assessment would not have been possible without the support of many people. I would like to express my deepest gratitude to Jane Pearson, a consultant for Local Initiatives Support Corporation (LISC), who offered invaluable assistance, support and guidance on all aspects of this assessment process. This project would not have come to fruition without our funder – LISC Phoenix.

My utmost gratitude goes to the residents of the Coffelt-Lamoreaux Public Housing whose input, enthusiasm and wisdom was the heart of this project. The staff at Phoenix Revitalization Corporation (PRC), especially Eva Olivas, Executive Director and Wendoly Abrego, Sustainable Communities Program Manager, were instrumental in organizing the community and leading the outreach efforts. Julian Sodari, a former employee at PRC completed partial analysis of community data and assisted with community involvement. Al Brown, our environmental consultant provided a comprehensive analysis and report of the issues plaguing the neighborhood. Dean Brennan and Shawn Monk completed the GIS mapping analysis and provided valuable input to this final product. Michele Scanze, the epidemiological teams at Arizona Department of Health Services (ADHS) and Maricopa County Public Health Department (MCPHD) and Health in Public Policy and Practice, Arizona (HIP2) were key in sourcing health data and providing further assistance with the HIA.

I would like to acknowledge several other individuals and groups who provided a range of assistance and support on this project: Gloria Munoz, Director of Housing Authority at Maricopa County; Brian Swanton, Arizona Market President at Gorman and Company, Inc.; Eddie Villa, City of Phoenix Parks and Recreation Department; CJ Eisenbarth Hager, Associate Director, Community Health Policy at St. Luke's Health Initiative; Vivek Narayan, Media Coordinator, Catalyze Research and Consulting.

This page was intentionally left blank

Contents

List of Figures and Tables

Acronyms

This list provides the expansions for acronyms used throughout the document.

HAMC: Housing Authority of Maricopa County

PRC: Phoenix Revitalization Corporation

ADHS: Arizona Department of Health Services

MCPHD: Maricopa County Public Health Department

CDC: (United States) Centers for Disease Control and Prevention

ADOT: Arizona Department of Transportation

USDOT: United States Department of Transportation

FHA: (United States) Federal Highway Administration

ADEQ: Arizona Department of Environmental Quality

MCAQD: Maricopa County Air Quality Department

USEPA: United States Environmental Protection Agency

MCESD: Maricopa County Environmental Services Department

MCACC: Maricopa County Animal Care and Control

MCRMD: Maricopa County Risk Management Department

This page was intentionally left blank

Introduction

What is a Health Impact Assessment (HIA)?

A Health Impact Assessment (HIA) aims to make the health impacts of public decisions explicit. The International Association of Impact Assessment and the World Health Organization define HIA as "a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population" (Quigley, et al., 2006; World Health Organization, 2013).

The World Health Organization identifies four key values underlie a HIA (World Health Organization, 2013):

- Democracy – allows people to participate in the development and implementation process
- Equity – assures that the HIA assesses the distribution of impacts from a proposal on the whole population, with a particular reference to impacts on underserved populations.
- Sustainable development – considers both the short and long term impacts of a policy or project.
- Ethical use of evidence – identifies and uses the best available quantitative and qualitative evidence in the assessment.

Defining health

Health has been defined in many ways by public health and medical professionals. A working definition of health used by the WHO (World Health Organization, 1946)and other major public health organizations is the following:

"Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity"

For the purposes of a HIA "health" is not merely defined in terms of the individual characteristics and behaviors of a person, but rather viewed from a larger ecological perspective. In addition to the individual characteristics and behaviors, health depends on the quality of our physical and social environments. Figure 1 illustrates the social determinants and their relative impact on health. As evident, only about 25% of our health is impacted by our individual characteristics and behavior, while a significant 55% is impacted by our total ecology. Where we live matters. Our bond with friends and neighbors matters. How and where we play matters.

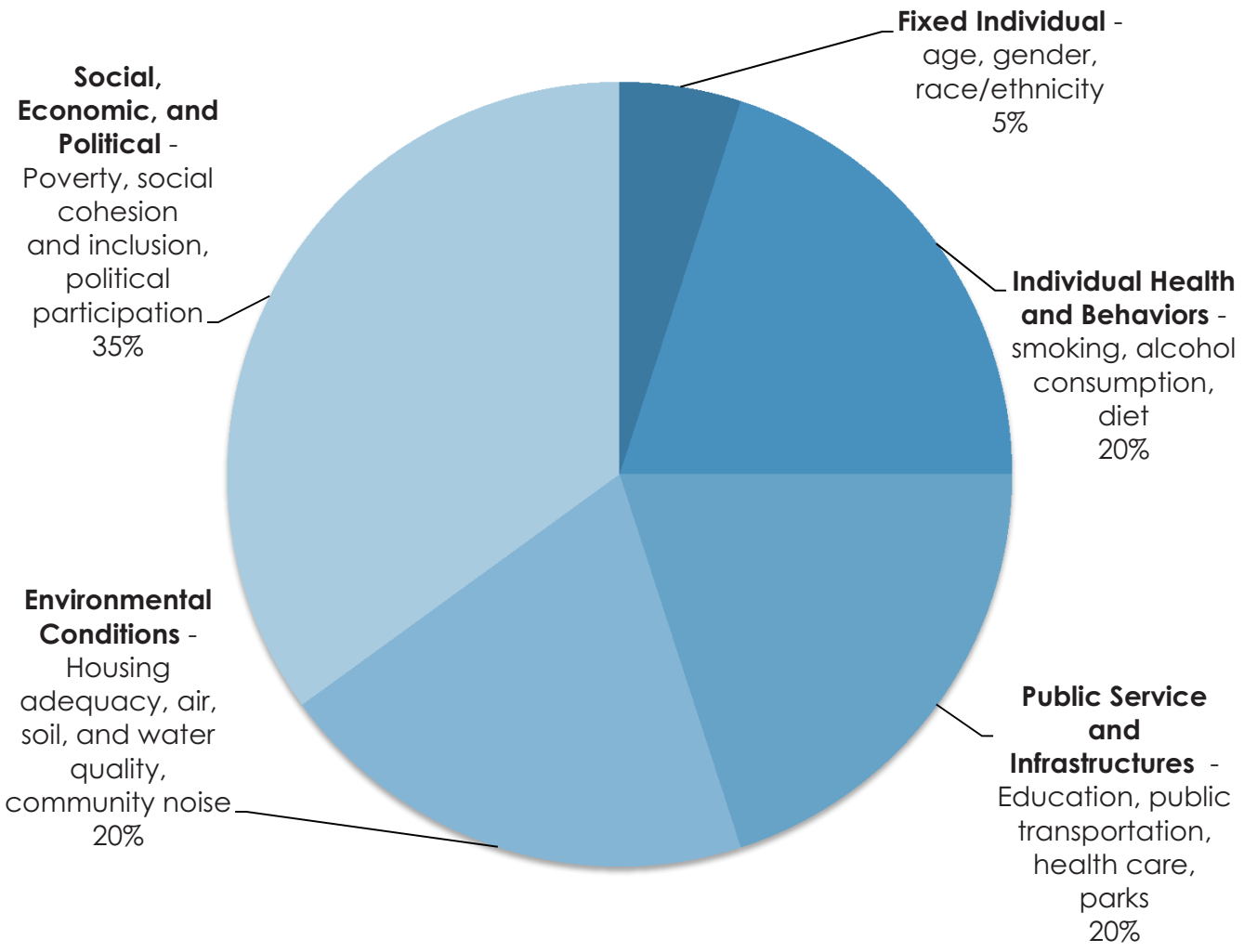


Figure 1. Social determinants of Health adopted from the CDC's model (Centers for Disease Control and Prevention, 1999).

HIA process

A HIA is typically conducted for specific intervention, using a methodology with specific goals in mind. These are to:

- Identify harms and benefits before decisions are made.
- Identify evidence-based strategies and recommendations to promote health and prevent disease.
- Increase transparency in the policy decision-making process.
- Support inclusive and democratic decision-making.
- Support community engagement in the decision-making processes.
- Advance equity and justice.
- Shift decision-making from an economic to a quality of life framework.
- Inform a discussion of the trade-offs involved with a project or policy.
- Facilitate decisions and their implementation.

The methodological steps involved in a HIA are as follows.

1. *Screening:* This involves determining whether a HIA is feasible, timely, and would add value to the decision-making process.
2. *Scoping:* This creates a plan and timeline for conducting a HIA that defines priority issues research questions and methods, and participant roles.
3. *Assessment:* This involves a two-step process of
    - Creating a profile of the existing conditions for a geographic area and/or population in order to understand baseline conditions and to be able to predict change.
    - Evaluating the potential health impacts, including the magnitude and direction of impacts using quantitative and qualitative research methods and data.
4. *Recommendations:* These are developed to improve the project, plan, or policy and/or to mitigate any negative health impacts.
5. *Reporting:* This involves creating written or visual presentation of the HIA results and communicating the results within the decision-making process.

6. *Monitoring:* This tracks the impacts of the HIA on the decision-making process and the decision, the implementation of the decision, and the impacts of the decision on health determinants.

The Coffelt- Lamoreaux Public Housing

The Coffelt-Lamoreaux Public Housing Project (Coffelt) was developed in 1953 and was annexed in 1959 by the City of Phoenix, but the streets were not annexed into the city street plan. It is the oldest operational project in the Housing Authority of Maricopa County's (HAMC) public housing stock. Over the past 50 years, the neighborhood has been encroached upon by industrial and commercial land uses, creating an island of public housing.

The boundaries for the Coffelt neighborhood extend from 19th Avenue on the East to the I-17 on the West, and Buckeye Road on the North to the Durango Curve on the South. South of the neighborhood is Hamilton Elementary School, part of the Murphy Elementary School District. Three quarters of the school's children come from the Coffelt Neighborhood. Hamilton School also houses a clinic that is available to the immediate community. The school has a full-size baseball diamond, a basketball court and a football field.

Legend

Coffelt Neighborhood

Study Area

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 175 350 700 Feet

Legend

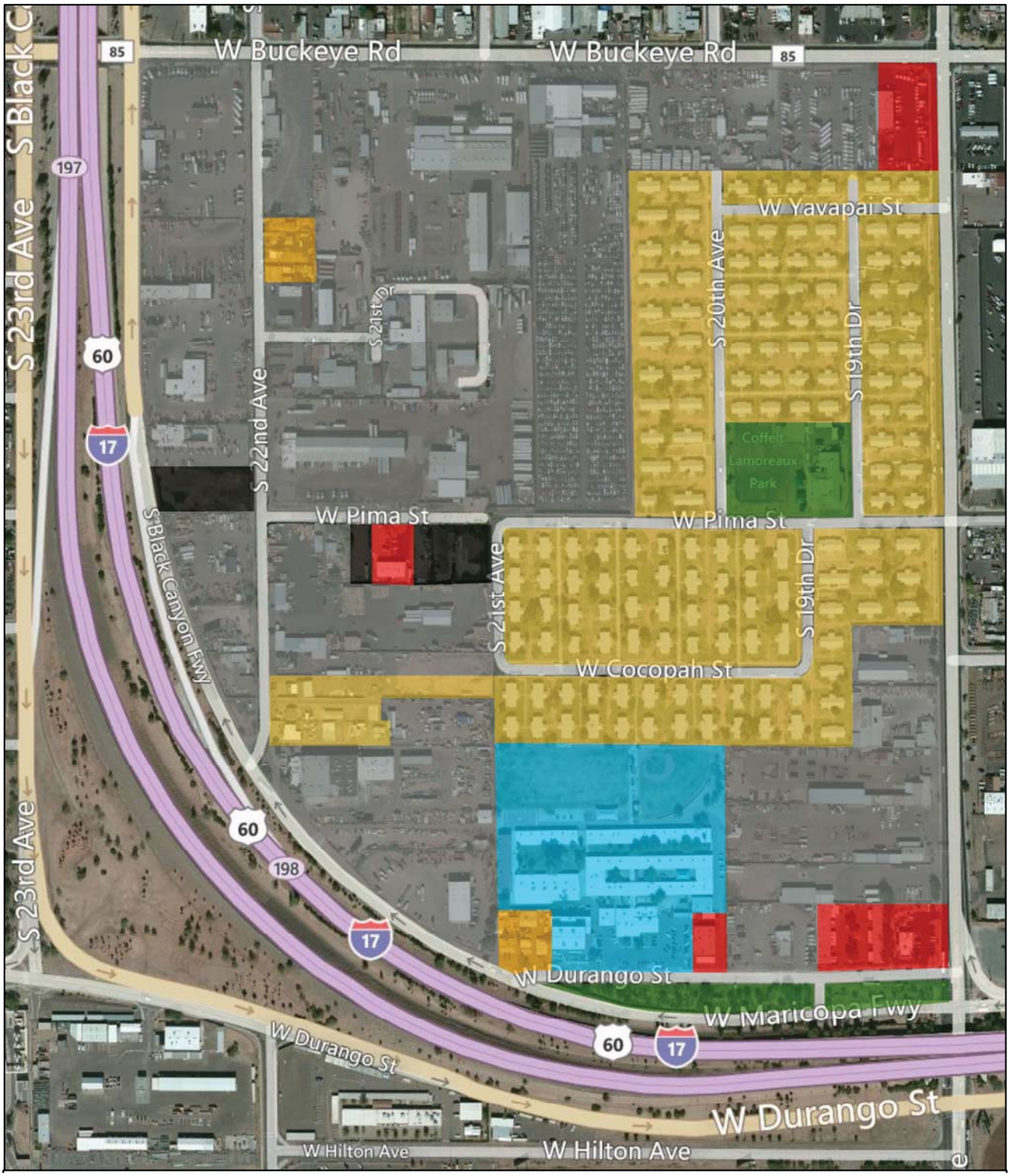
- Coffelt Neighborhood
- Park/Open Space
- 10 to 15 du/acre-Higher density
- Public/Quasi-Public
- Commercial
- Commerce/ Business Park
- Transition

General Plan Land Uses

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 150 300 600 Feet



Legend

- Coffelt Neighborhood
- Single-Family Residential
- Multi-Family Residential
- Park
- Commercial
- Industrial
- School
- Vacant

Existing Landuse

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 150 300 600 Feet

Legend

- Coffelt Neighborhood
- Owner Occupied
- Renter Occupied
- Unoccupied

Occupancy

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 150 300 600 Feet

The larger neighborhood is approximately .3 square miles in area, with the housing project being 37.75 acres. The site contains 296 residential units (148 duplexes), a community park, two community center buildings and the HAMC property management offices. A profile of Coffelt residents in 2012 is described in the following charts (Figure 2 to 4) and table 1.

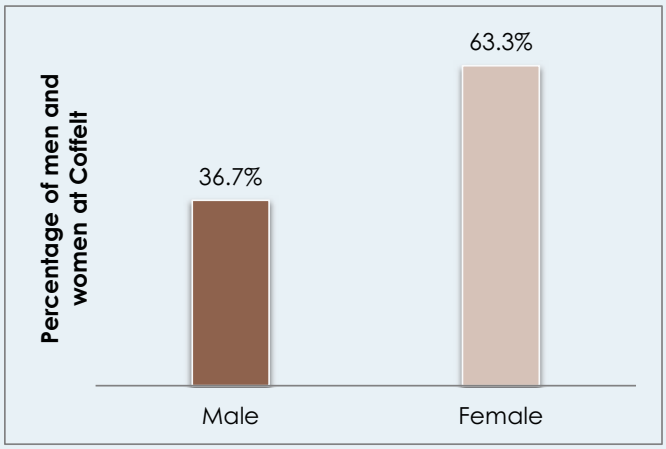


Figure 2. Coffelt residents' gender distribution

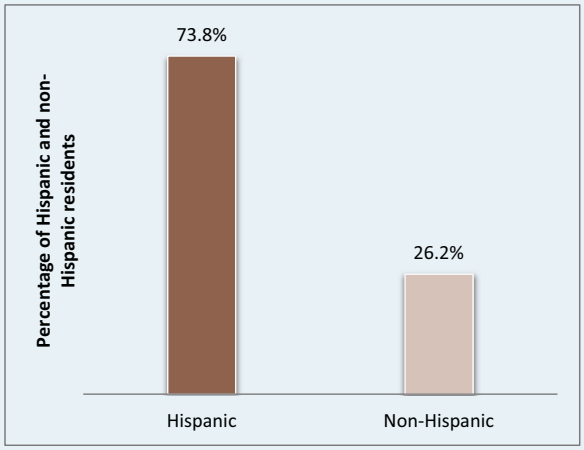


Figure 3. Hispanic residents

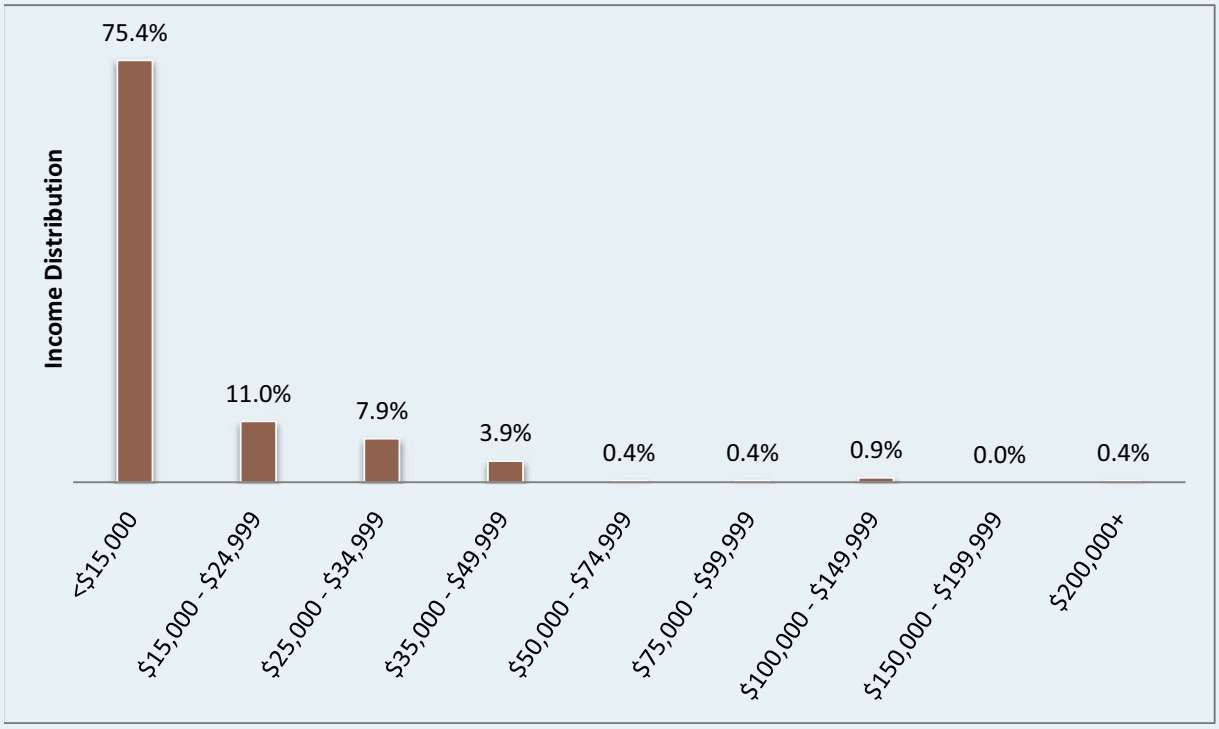


Figure 4. Income distribution of Coffelt Residents

Demographic profile

Demographic	Data point
Children (individuals 18yrs and under)	58.1%
Single parent families with children	70.6%
Average Household size	3.52
Spanish speakers	66.3%
Citizens	79.8%
Percentage of individuals with disabilities	10.2%
Occupancy	228 households
Median Household Income	$9,985

Table 1. Demographics for Coffelt Residents

Value of and need for an HIA at Coffelt

The proposed plan for Coffelt is to redevelop the 296 units and their surrounding complex. The redevelopment has the potential to directly or indirectly (positively or negatively) impact health outcomes in a significant manner. A HIA was proposed to identify the health-related issues associated with the area and the proposed project and develop recommendations that would mitigate their impact and potentially improve the health of the residents. Several impacts were identified and are outlined in the pathway diagram below (Figure 5).

Pathway diagram

Pathway diagrams are logic models and key to prediction in an HIA. They show the links between the proposal and the predicted health outcomes. This pathway diagram (Figure 5) was created to elaborate on the impacts and outcomes from the Coffelt Public Housing redevelopment.

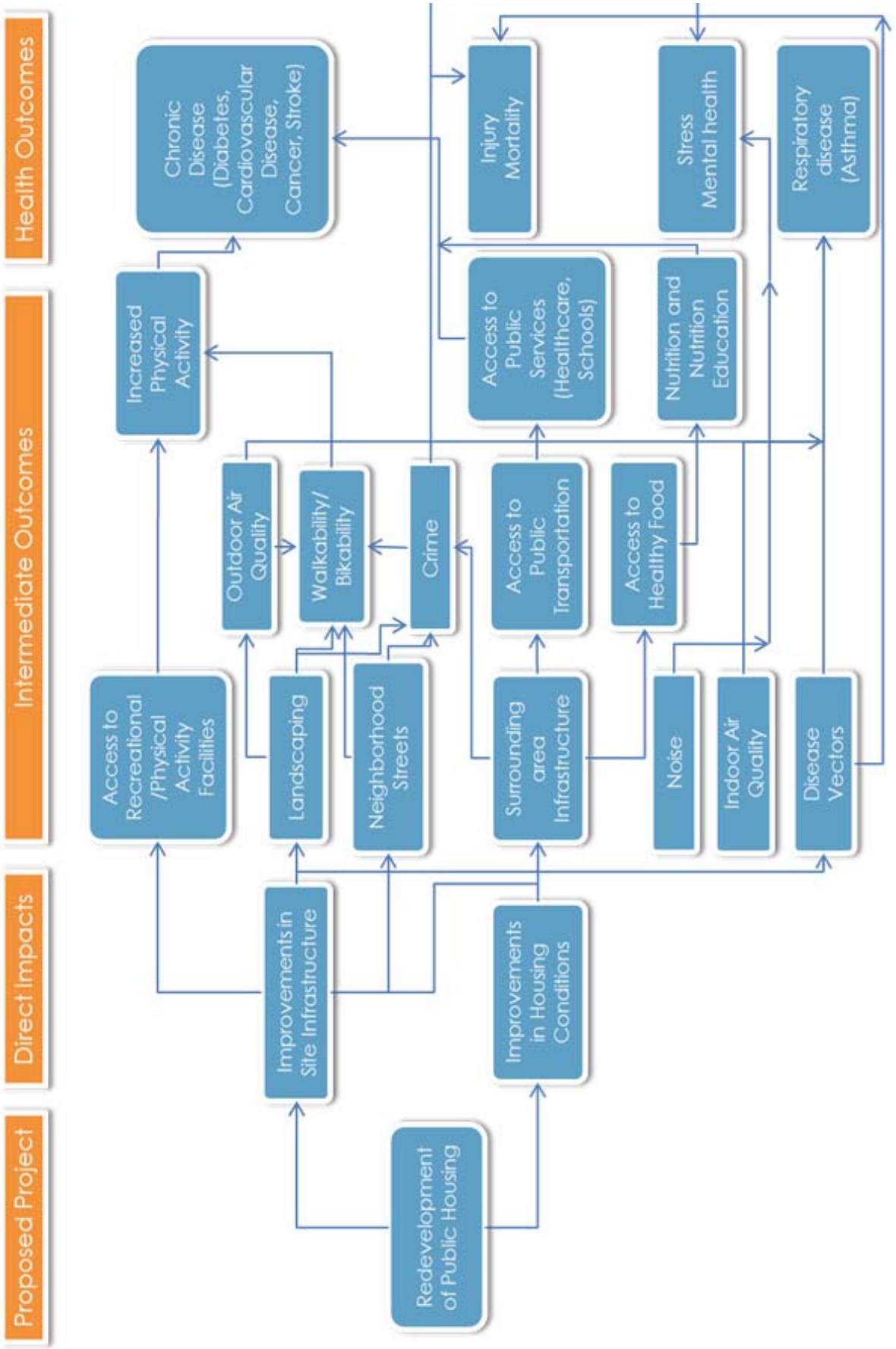


Figure 5. Pathway Diagram for the Redevelopment of the Coffelt-Lamoreaux Public Housing

Gathering Data

Several sources were identified for health, environmental and demographic data. Residents of Coffelt provided audit, survey and asset data that helped supplement the quantitative data from other agencies and prioritize the needs of the community. All data sources are outlined in figure 6.

Figure 6. Data sources (for details on Acronyms, please see section 1 of this document)

Park and Street Audits

For each of the two identified street segments, two residents volunteered to conduct street audits (see Street Audit tool in Appendix A). Many of the issues identified during street audits were also discussed at the community workshops. Four residents also completed park audits (see Park Audit tool in Appendix B) for two parks (two residents per park) in the community. The small park across the street from the school was also audited, but not used in the analysis because it is not accessible to the community. Both tools were provided in Spanish and English (St. Luke's Health Initiative, 2012).

Health Survey

At the community workshops, health surveys were completed by residents. The purpose of the survey (St. Luke's Health Initiative, 2012) was to identify issues related to healthy eating, physical activity and access to public transportation. In all, 38 surveys were returned. Survey data is referenced throughout this report. A full report of survey results can be found in Appendix C.

Community Workshops

Community input on the Coffelt neighborhood and residents' issues related to healthy foods, active living, public transportation and neighborhood safety were collected through two interactive community workshops. Both workshops held at the Coffelt community center, were conducted in dual languages – Spanish and English – to ensure inclusion of all residents. Sixty residents participated in the first workshop held on August 8th, 2013, while 44 residents participated in the second workshop on August 21st, 2013.

Residents were placed into small groups and provided with a large aerial map of the district and surrounding areas. Residents used colored labels to identify healthy eating, active living and transportation assets and liabilities. A summary of their findings, including assets and liabilities identified by residents, is presented in Appendix D.

Developing Recommendations

A team of residents and technical experts developed recommendations based on the data collected and the input of the residents. Technical experts were selected based on content area of the assessments. Two recommendation meetings were conducted to ensure thorough discussion of all issues.

Community Health Status

Mortality

Mortality is another indicator of community health. Mortality data not only reports the occurrence, but also the cause of the death. This is helpful in identifying disparities between population groups or geographic communities. In 2011, the percent of deaths by population for the Coffelt zip code, 85009, was 0.5% compared to 0.65% for the county as a whole. The lower mortality numbers in 85009 is likely due to the age of the population. The median resident age in this zip code is 26.6 years while for the county it is 34 years. Given that the median resident age in Coffelt is 12.8 years, the number of deaths at Coffelt is likely even lower.

For both the county and the zip code, heart disease and its complications is the leading cause of death. However, the second highest cause of death in 85009 is due to respiratory diseases and is 2.5 percentage points higher than the county average for the same year. Exposure to several environmental pollutants and toxins from industrial sites and the freeway are likely contributors to this health disparity.

Deaths caused by assaults and unspecified firearm and gun discharge reflect the level of violence and crime in a community. In zip code 85009 these deaths account for 2% of the overall death making them the eight leading cause of death. This compares to 0.8% in Maricopa County that same year.

Chronic Disease

One indicator to assess a community's health is the prevalence of chronic disease within the community such as diabetes, heart disease and cancer. Hospital discharge data reports on chronic disease conditions that may have been the cause of their hospital stay. Though by no means a comprehensive picture, it does provide some insight into the community's health. Data from emergency rooms, physician's offices, and other smaller health care providers add to the picture. Due to privacy laws and regulations, this data is hard to come by, particularly for a small geographic area like Coffelt.

Hospital discharge data for the Coffelt neighborhood was obtained at the zip code level. Though the geographic area of the zip code is much larger than Coffelt, due to demographic similarities, it is indicative of chronic disease conditions for Coffelt residents. In 2011, there were 29,624 hospitalizations in the 85009 zip code.

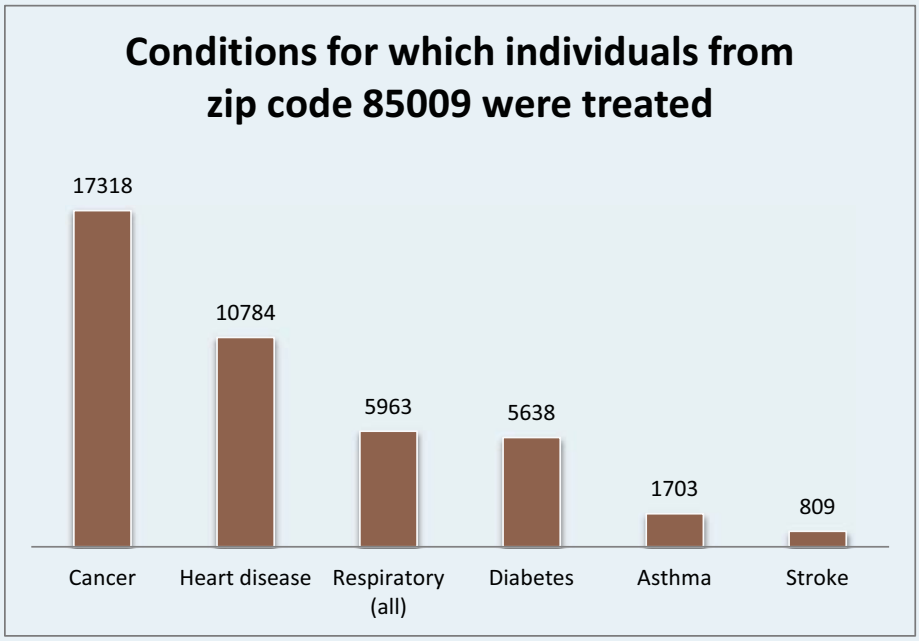


Figure 7. Underlying chronic disease conditions for which residents of zip code 85009 were hospitalized in 2011.

Almost 95% of hospitalizations reported patients with either cancer or heart disease (see Figure 7). Heart disease and lung cancer, specifically, were also among the leading causes of death in this zip code. A plethora of environmental issues plague this area including toxins and particulate matter from the freeway and surrounding industrial sites. Managing exposure to these pollutants and toxins along with a healthy diet and regular exercise can help manage these conditions, both of which are directly affected by the built environment.

Asthma

One of the most prevalent chronic respiratory diseases among children in the country is Asthma. According to the CDC, low-income populations, minorities and children living in inner cities are disproportionately at risk for this disease (Centers for Disese Control and Prevention, 2013).

As with all chronic disease data, prevalence rates for smaller geographic areas are difficult to obtain. At the county level, asthma prevalence in children under 18 yrs was 7.5% in 2011. Data obtained from the Arthur Hamilton Elementary school health office document that 51% of the children have asthma. This statistic, though staggering, is not surprising given the chronic exposure to toxic and dangerous air pollutants as a result of the industrial sites and the freeway in their vicinity.

Access to Healthy Food

The foundation of overall health and well-being is good nutrition and regular exercise. A well-balanced, nutritious diet can reduce and prevent chronic disease such as obesity, heart disease, stroke, cancer and diabetes (Centers for Disease Control and Prevention, 2012). The lack of local access to healthy foods makes it difficult for families, especially in low-income urban communities, to maintain a well-balanced, nutritious diet. Geographic areas with limited or no access to healthy, affordable food is as described by the United States Department of Agriculture, Economics and Research Service (2009) as a "food desert". Minority or low-income families are more likely than middle income, white families to live in communities that are "food deserts".

The convenience of retail food outlets, coupled with low family income and high transportation cost, can exert substantial influence over what a family eats. Families who live near a supermarket are more likely to eat the daily recommended amount of fruits and vegetables (Kettel Khan, et al., 2009). According to the World Health Organization, nutrition is a major modifiable determinant of chronic disease. An important finding in the relationship between nutrition and chronic disease is that dietary adjustments may not only influence present health, but may determine whether or not an individual will develop such diseases as cancer, cardiovascular disease and diabetes much later in life.

Existing Conditions

Diet

About a third of the respondents reported consuming at least one serving of fruit and an equal serving of vegetables a day. Only 10% to 25% reported consuming the recommended four to six servings of fruit and vegetables. Forty eight percent of the health survey respondents reported consuming at least one can of soda a day, while an alarming 52% reported consuming two or more sugar sweetened drinks daily. In any given week, respondents reported eating breakfast, lunch and dinner at home (90%). However a substantial 70% reported at least one to two of these meals weekly as being fast food rather than home cooked meals.

Respondents reported affordability (66%), quality (50%) and more stores in the neighborhood (55%) as the three most critical factors that would improve their family's diet. Given that a large majority of children attending Hamilton elementary are from Coffelt, 61% of respondents would welcome more fruits and vegetables at the school cafeteria. Further, almost a 90% showed interest in growing their own food if they had access to a community garden, and half of them were eager to participate in cooking and nutrition classes.

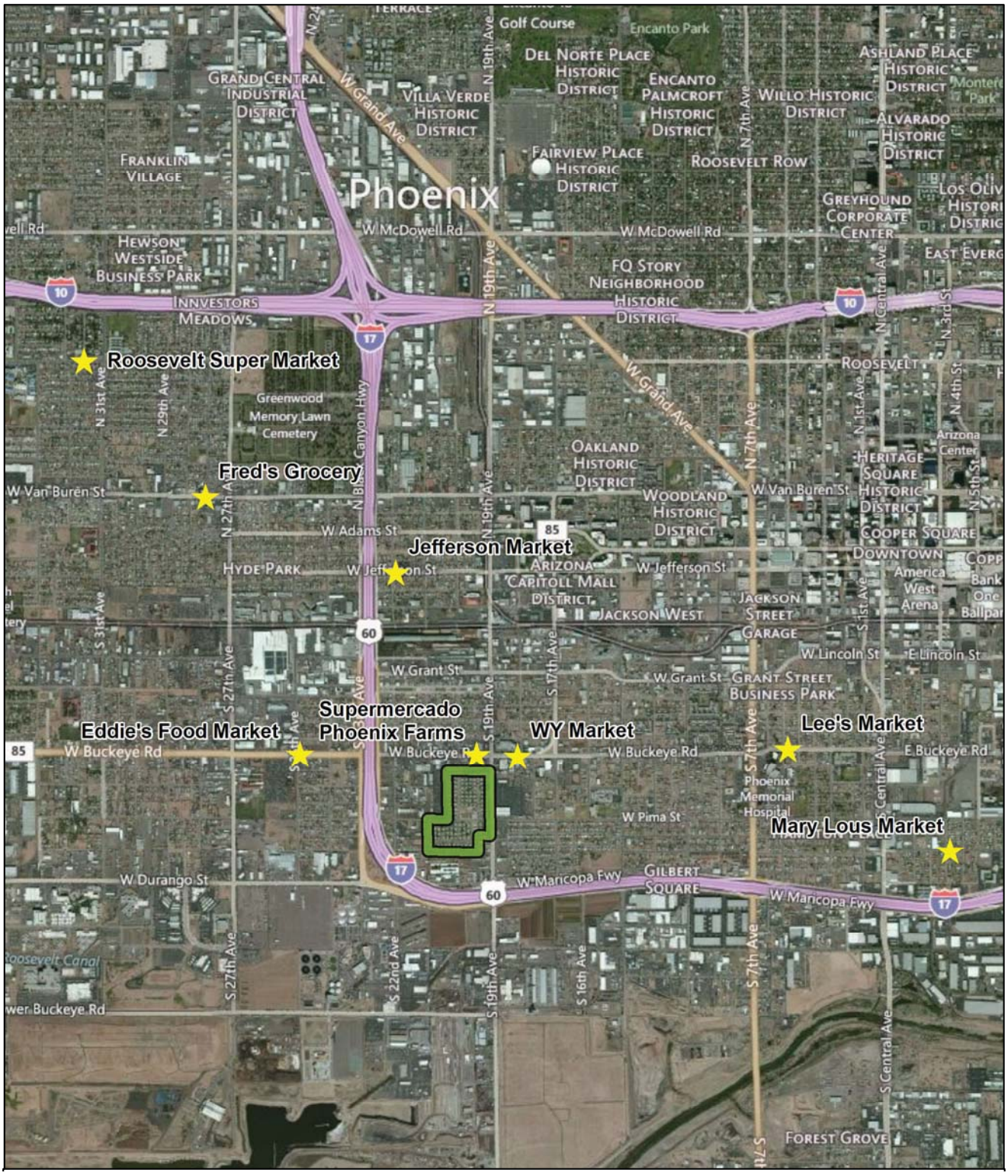
Healthy Food infrastructure

According to the USDA's "food desert" measure, the Coffelt neighborhood resides in a census tract that is considered a food desert. A significant number of residents in this low-income census tract live more than half a mile from the nearest supermarket. Residents of Coffelt, however, do have a small grocery store 0.2 miles away from their neighborhood. In spite of the physical proximity to the store, residents face several barriers to accessing healthy food.

The Phoenix Farms Supermercado is located at the northwest corner of 19th Avenue and Buckeye Road, only a five-minute walk away from the Coffelt. Although this store is a Women, Infants, and Children program (WIC) vendor, the selection of fresh fruits and vegetables is limited. Residents found the produce here to be often of poor quality and assessed them along with most other staple items such as milk and canned goods as overpriced. Personal safety was cited as another barrier to accessing this store. Due to the sale of single serve alcohol at this location, intoxicated individuals often loiter outside, discouraging residents, particularly women with young children, to visit this store.

Phoenix Farms Supermercado is the closest grocery store to Coffelt.

The other WIC Vendor located close to Coffelt also has limited fresh fruits and vegetables.



Legend

Coffelt Neighborhood

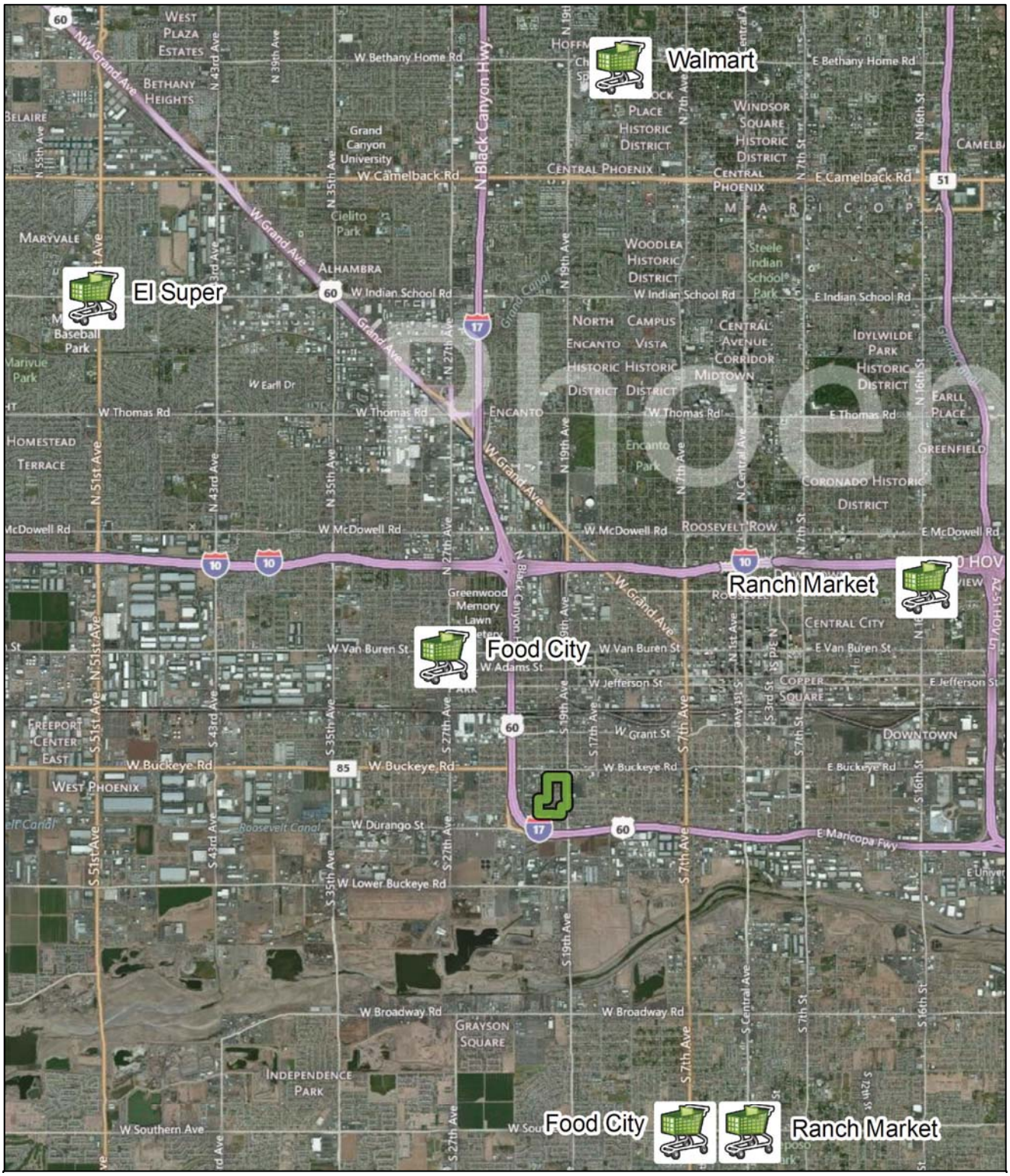
Food Outlets

WIC Vendors

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 1,0002,000 4,000 Feet


Walmart
El Super
Food City
Ranch Market
Food City
Ranch Market
Legend
Coffelt Neighborhood
Food Outlets
Food Outlets Frequented by Residents
Coffelt-Lamoreaux Housing Health Impact Assessment
N
0 2,2504,500 9,000 Feet

There are two other WIC vendors near Coffelt: WY Market located 0.3 miles East on Buckeye Road and Eddie's Food Market 0.9 miles West across I-17 (see WIC Vendor map). WY Market is a convenience store and fast food restaurant offering almost no fresh fruits and vegetables. Eddie's Food Market is not considered an accessible WIC vendor given that it is a 20-minute walk for Coffelt residents including a dangerous freeway crossing for mothers with young children.

Residents have to cross busy 19th Avenue to get to bus stops or walk along this dangerous street to get to the grocery store nearby

Accessing healthy foods

Respondents of the health survey reported doing most of their grocery shopping, particularly for fresh fruits and vegetables at stores outside of their neighborhood. The closest of these stores was the Food City located at 27th Ave and Southern Avenue, 2.3 miles from the community. Several other stores such as Walmart and Ranch Market also receive business from residents of Coffelt on a regular basis (see Most Frequented Grocery stores map). This phenomenon was further substantiated by data from The Reinvestment Fund (TRF), which cited the Coffelt neighborhood as an area that saw 53-82% of retail leakage in 2011. TRF defined grocery retail leakage rate as "the percentage of total grocery shopping demand for a given Limited Supermarket Access (LSA) Area being "leaked" or lost from the LSA to nearby stores" (The Reinvestment Fund, 2013).

Most residents reported carpooling or using public transportation to access these stores outside of their community. In addition to long travel times to the stores, residents reported long waits at the bus stops when using public transportation. With no shade or seating at most bus stops near Coffelt, using public transportation to get to healthy food stores becomes an arduous process. This is a critical barrier particularly during the excessively hot summer months in Arizona.

Evaluating potential health impacts

A direct impact of the redevelopment of Coffelt is improved infrastructure within the community. The establishment of a community garden within the community will directly impact access to healthy and fresh foods. The process of creating and maintaining a community garden can also raise residents' awareness of healthy foods and nutrition. In the health survey almost 45% of residents expressed an interest in cooking and nutrition classes. Awareness will subsequently increase the demand for healthy and fresh foods.

In keeping with this demand, the local grocery store would need to offer a wider selection of affordable, healthy foods. Residents already show an interest in having a larger variety of fresh fruits and vegetables available to their children at the school. The increased demand in fresh and healthy foods could compel the school to include programs that meet these demands, such as a school gardening program. Residents and HAMC can form alliances with organizations such as PRC and other local groups as an outcome of the redevelopment process. Working together they can draw Farmer's markets and corner stores to the area as additional food sources.

Based on the ripple effects of the redevelopment and improvements in the community's diet will eventually lead to an improvement in the community's overall health.

Recommendations

The goal of these recommendations is to improve access to healthy, safe, and affordable foods. Two approaches are recommended to meet this goal:

- Improve existing healthy food options
- Introduce new healthy food options

Improve existing healthy food options

1. Work with existing store on 19th Avenue and Buckeye (Phoenix Farms Supermercado) to provide more affordable, health food options. The Housing Authority of Maricopa County and/or Phoenix Revitalization can assist the store in exploring financing options such as the Healthy Food Financing Initiative to expand or renovate space, increase efficiency, and ultimately expand the store's selection of healthy foods.

Rationale: Building on the infrastructure of the local grocery store to create a source for healthy food is a more effective short –term, financially viable solution in this low-income neighborhood than developing a new store. The Reinvestment Fund found that in 2011the Coffelt area had a retail demand of 1.1million dollars or less, which is not enough to create a new supermarket (The Reinvestment Fund, 2013). The Healthy Food Financing Initiative was specifically created to support renovation and expansion of such existing retail food outlets to expand access to nutritious foods (Policy Link, 2012). Lack of healthy, affordable food options can lead to higher levels of obesity and other diet-related diseases, such as diabetes, heart disease, and cancer (Centers for Disease Control and Prevention, 2012).

2. Work with the local Walmart (35th Avenue & Southern), Food City (7th Avenue & Southern) and Ranch Market (Central & Southern) to introduce free shuttle busses for residents of Coffelt. Model this service based on free shuttle services offered in underserved communities by local Walmarts in Michigan.

   Rationale: While many residents use public transportation or carpool to get to these supermarkets located outside of their community, this mode of access is arduous and lengthy. Given that these stores receive substantial business from the Coffelt residents, providing a free shuttle service can prove profitable with considerable return on investment (ROI). Walmart has implemented such a shuttle service for a few hours a day on certain days of the week in Saginaw Valley, MI. They consider it a service to the community and it costs Walmart a mere $60-$70 per hour – likely as much as one or two of its customers spends in one shopping trip (Lynch-Morin, 2012).

3. Introduce a shuttle service to Food Bank at 3140 W. Buckeye Rd on the 3rd Wednesday of every month for residents. Since this location is the Murphy School District offices, a partnership with the school district using their buses might be feasible.

   Rationale: Though transportation to grocery stores would help support the community at Coffelt, some residents who live in severe poverty can only afford to source groceries from food banks. The closest food bank is 4.7 miles away at 31st Avenue and Thomas Road. Transportation was the major barrier to accessing food banks. Shuttle busses provided by the Murphy school district to transport residents to the food bank set up at their offices every month would provide Coffelt residents with a more accessible source for free groceries.

Introduce new healthy food options

1. Develop a Community Garden in collaboration with Phoenix Revitalization Corporation (PRC).

   Rationale: Community gardens not only offer a convenient source of nutritious, affordable foods, but also act as a nutrition education classroom and a tool for building social cohesion (Hallberg, 2009). A survey of community gardens in upstate NY indicated gardens in low-income neighborhoods were four times as likely as non-low-income gardens to lead to other issues in the neighborhood being addressed; reportedly due to organizing facilitated through the community gardens (Armstrong, 2000). PRC has already helped build and support seven community gardens in the Central City South area. Their expertise and resources can be used at Coffelt to help residents launch the garden.

2. Restart the school gardening program at Hamilton Elementary School modeled after Red Mountain Academy's gardening program. The location of the garden at the school's green space can also be a place for Farmers Markets to set up on a weekly basis.

   Rationale: School gardens benefits children's nutritional, social and behavioral development and academic outcomes. This is particularly true for children from low-income neighborhoods. In a study conducted among 800 students in 4th and 8th grades in a low-income area of Louisiana, students who learned many of their lessons in math, science, reading and social studies by integrating a school garden into the curricula increased their test scores by 15% in reading, 20% in math, and 15% in social studies (Coyle, 2010).

3. Introduce a small grocery store that carries some daily essentials such as milk, bread, eggs within the community or on vacant lot adjacent to community by working with the Healthy Food Financing Initiative and the Food Trust's Healthy Corner Store initiative. Model after the Philadelphia/ Pittsburg Healthy Corner Stores.

   Rationale: Having a small convenience/corner store within the Coffelt site would particularly serve the needs of the elderly, the sick and mothers with young children within the community. Funding from the Healthy Food Financing Initiative and technical assistance from the Food Trust's Healthy Corner Store Initiative can help provide the skills to make such a store profitable. The Healthy Corner Store Initiative also supports educating youth in schools near targeted corner stores to reinforce healthy messages and provide nutrition education.

Access to Physical Activity

Regular physical activity is a key component to maintaining a healthy lifestyle and improving overall health. In particular, it can help decrease heart disease, diabetes and other chronic conditions; strengthen muscles and bones; and improve mental health.

For low-income communities public parks provide an affordable setting to engage in regular physical activity. People who live closer to a park exercise more (Babey, Brown, & Hastert, 2005; Cohen, McKenzie, & al, 2007) and those who do not often go without exercise for extended periods of time (The Trust for Public Lands, 2006). Exercising is a lifestyle that is adopted by youngsters, especially when modeled by adults in their family.

However, a critical barrier to regular outdoor exercise is concerns about safety – real and perceived (Babey, Brown, & Hastert, 2005). In neighborhoods that display a high degree of "physical disorder" such as litter, graffiti and lack of residential maintenance, outdoor play is limited (Miles, 2008). The dilapidated condition of the park and its surroundings including neighboring streets contribute to the perceived lack of safety.

A well maintained park with appropriate amenities and adequate lighting encourages people to frequent it. The presence of more people in turn enhances the sense of safety at the park.

Existing condition

Active Lifestyle

The health survey respondents considered physical activity an important part of their daily life. Almost half of them (49%) engaged in exercise to benefit their health, many of them, three or more times a week (44%).

Sixty nine percent reported walking in and around their home as their primary mode of exercise. Residents cited the summer heat in Arizona (42%) as the primary barrier to physical activity. Even though 74% of the respondents live within walking distance of a park, only 30% of those that exercise reported doing so at the park. In spite of Coffelt

Park being located in the center of the community, 26% of survey respondents cited the lack of an adequate park/ recreational facility as the primary reason for their inability to exercise.

Physical Activity Infrastructure

Coffelt Park is a 1.5 acre facility located centrally within Coffelt. The park contains a basketball court, two shaded play structures, two swing sets and a large green space, the southwest corner of which serves as an unmarked softball field. The condition of the park and its facilities are in a state of disrepair. Large cracks are visible on the concrete basketball court and nets are missing. The play structures are not compliant with the Consumer Protection Safety Commission's (CPSC) National Playground Safety Handbook; sand levels for ground cover are low, slides are cracked, distances between play equipment and curb are too narrow and parts of the equipment access routes are locked with chains. Tagging, littering and other forms of vandalism are rampant throughout the playground. A couple of barbeque stations and picnic benches are located on the southern boundary of the park. Though a few trees dot the periphery of the park, there is not adequate shade over the picnic benches and other seating. There are no water fountains.

The Coffelt community center is located on the east side of the park adjacent to the Housing Authority of Maricopa County property management office. The park and the community center are maintained and managed by the City of Phoenix Parks and Recreation department. The community center is open from 4pm to 8pm Monday through Friday and 10am to 4pm on Saturdays to provide programs for kids at Coffelt.

Coffelt Park

Arthur Hamilton Elementary School grounds

Arthur Hamilton Elementary School bordering the southern boundary of the Coffelt neighborhood has a large playground and extensive sports facilities including a football field, a basketball court and a full-scale baseball diamond. According to the principal at Hamilton Elementary, as part of their outreach programs, the Arizona Diamondbacks, the Arizona Cardinals and the Phoenix Suns partner with this school to provide regular after school physical activity and training programs for the kids. Two shaded age appropriate play structures and swing sets are also located here. Though there is a direct pathway from Coffelt to these grounds, the gates are locked at all times and access is blocked. The school building is a secure gated facility, sectioned off from the playground area.

Resident Completed Park Audits

As part of the assessment process, two pairs of residents were recruited to conduct walking audits at Coffelt Park and Arthur Hamilton Elementary playground (Park Audit tool in Appendix A). The audit tool examines issues such as accessibility, physical condition of playgrounds and other amenities, park quality and safety.

These residents assessed Coffelt Park as an asset that does not meet the needs of the community in its current state. They reported the lack of access to public restrooms and drinking fountains when the community center was closed and adequate shade and lighting as barriers to using this facility. Poor maintenance was cited as an ongoing issue here. Residents observed signs of tagging and vandalism throughout the park and considered it unsafe particularly at night. Residents who audited this park stated that they would not recommend this facility to friends and family due to a perceived lack of personal safety.

Low sand levels on playground

Broken slide, locked equipment

Tagging on playground

Residents found the playground and sports facilities at Arthur Hamilton Elementary to be in good condition. Play structures were shaded and adequate lighting allowed for use of this facility at night. Additional seating, shade over bleachers and drinking fountains were recommended. Residents reported that this facility is locked at all times and there is no direct access even when their own children participate in sporting activities on these grounds.

Evaluating potential health impacts

As part of the redevelopment of Coffelt, improvements will be made to Coffelt Park and its surrounding infrastructure. Coffelt Park can become the community space that residents long for. A community garden could provide a local source for fresh fruits and vegetables to residents while being an educative tool on good nutrition. Extended hours at the community center could allow residents to congregate there throughout the day. Community meetings and celebrations could be held at this location to build community cohesion and restore pride. Additional shade trees and seating, with a working and safe play area could transform this park into a true community centric space for residents. Redeveloped streets and sidewalks to the park and the jogging track at the park would encourage residents to walk more increasing their physical activity levels. The constant presence of residents at this park would increase eyes on this public space and reduce crime as a result.

With Coffelt Park serving as a community gathering place, a joint use agreement with Arthur Hamilton Elementary school could open up the playground there for organized sporting events and exercise. As part of the redevelopment process, the youth at Coffelt could participate in enhancing the physical environment of this playground into an inviting space. Engaging Coffelt teenagers and young adults in this process gives them a sense of ownership that discourages vandalism and tagging. Building on existing physical activity programs for children, adult exercise classes will be held here. Sporting events will further enhance the community's cohesion.

The combined effects of adding a community garden, increasing physical activity opportunities and fostering community cohesion and pride will positively impact the residents' physical and mental well-being.

Recommendations

The goal of these recommendations is to improve access to physical activity and recreation. These are divided into two approaches:

- Improve existing physical activity infrastructure.
- Introduce new physical activity infrastructure by using existing resources.

Improve existing physical activity infrastructure

1. Implement basic infrastructure improvements at Coffelt Park including adding shade (through trees and/or additional shade structures), seating/gathering spaces and drinking fountains.

   Rationale: As with any other city park in Arizona, amenities such as drinking fountains should be present, at a minimum. Adding seating and shade will increase the use of this park as a central gathering point for the community.

2. Implement upgrades and repairs to existing basketball court.

   Rationale: In spite of its state of disrepair, the basketball court is the most used amenity at this park. Improving the surfacing and replacing the baskets can prevent serious injury to those that play on this court while increasing its use.

3. Introduce additional amenities such as a splash pad and a walking/jogging track at Coffelt park.

   Rationale: These additional amenities will further promote physical activity in the community and draw more people to the park.

4. Replace the playground equipment at Coffelt Park and make the playground consistent with US Consumer Product Safety Commission Public Playground Safety Handbook. There may be funding available through programs like "Kaboom". At the very least, existing equipment must be removed as it is a hazard to children's lives.

   Rationale: A well designed and safe playground is critical to preventing injuries in young children. Between 2001 and 2008 the CPSC reported 67% of injuries on playgrounds occurred due to falls or equipment failure (O'Brien, 2009). Playgrounds in low-income areas are more likely to have maintenance-related hazards such as rusty play equipment or damaged fall surfaces than playgrounds

in high-income areas (Suecoff, Avner, Chou, & Crain, 1999). Following the CPSC's Public Playground Safety Handbook guidelines during upgrades to the Coffelt Park playground can reduce the potential for injury and enhance the physical appearance of the playground equipment.

5. Reinforce partnership with City of Phoenix to continue programming at Coffelt Park community center. Explore other partnership options such as the Boys and Girls Clubs of America, Arizona Bicycle Club, Girl Scouts, Boy Scouts, and others to add programming for kids year round.

   Rationale: Children at Coffelt are considered an at-risk group due to the many challenges facing them and their families. Lapses in after school programs like the one currently provided by the City of Phoenix at Coffelt Park are a possibility given the recent budgetary constraint. Such lapses can put these children at higher risk for actual danger, not to mention delinquency. Additional partnerships with non-profit groups can bolster and supplement current programming to support the physical and mental health of Coffelt children.

6. Build partnerships between local agencies and HAMC to keep Coffelt Park including the community center open all day and reestablish this as a community space for residents.

   Rationale: The community center's restrictive timings currently do not serve the community's needs. Given that City of Phoenix may be unable to provide the financial and staffing resources needed to keep this facility open all day and over weekends, partnerships with other agencies can fill this gap. Keeping the space open all day can also address resident concerns about the lack of restrooms at the park since the community center has public restrooms. This space can become the physical location to foster community cohesion and pride.

Introduce new physical activity infrastructure by using existing resources

1. Develop a joint use agreement with Hamilton School for use of the playground, library and multi-purpose room by Coffelt residents. Model joint use based on program at Wilson Elementary School. Involve the kids at Coffelt and at Hamilton Elementary in designing the school garden and graffiti wall/walkway.

Rationale: Arizona recently passed Senate bill 1059 that offers immunity from liability for the recreational use of school grounds. Data from the federal government shows that nationwide, close to 90% of schools allow the community to use their outside facilities during non-school hours. In Arizona, that number is 64 percent. At Coffelt, a well-maintained school ground already exists right next to the community. Based on the liability waiver put forth by Arizona SB1059, a joint use agreement would benefit the community significantly with minimal negative impact on the school. Given that a large majority of the students attending Arthur Hamilton Elementary are from the Coffelt neighborhood, such a partnership would strengthen the school's role in the community.

2. Introduce organized activities for adults such as fitness programs at Hamilton School playground built on existing programs created by the Arizona Cardinals and Diamondbacks for the kids at this school.

   Rationale: The Arizona Cardinals and Diamondbacks provide physical activity programs for the kids at this school. Extending these programs to adults will expand the possibilities for physical activity for adults at Coffelt.

3. Create a graffiti artist wall/floor/walkway for kids in the community that engage in these activities to reduce vandalism.

   Rationale: Tagging is visible throughout this community. Portland's Office of Neighborhood Involvement has developed a set of strategies for preventing and removing graffiti. One of their strategies includes creating a public art wall on a wall that is frequently tagged. Creating such a wall/walkway and involving Coffelt youth to express themselves through their art would give them a sense of ownership of the facilities.

4. Involve interested parents in starting a league, soccer, baseball and other team sports at the Hamilton School playground. They could do programming with the support from HAMC and the Arizona sports teams that already provide programming at the park. Supplies like balls, bats, and gloves can be donation based and a place to store the equipment can be a community-build project.

   Rationale: Many parents at Coffelt are already involved or want to be involved in the sporting activities that interest their children. Opening the school grounds to these parents at all times will give them a safe, well- maintained venue where they can practice. This will not only increase physical activity in the community, but it will build stronger relationships between adults and children in the community.

This page was intentionally left blank

Access to Safe Streets and Transportation

Walking is an inexpensive and easy way to be physically active. The Surgeon General recommends at least 30 minutes of walking five times a week as a means of reducing obesity and other chronic health conditions (2012). Adults and children that walk on a daily basis have been shown to have lower rates of obesity and better overall health (Ewing, Schmid, Killingsworth, A., & Raudenbush, 2003; Active Living Research, 2009).

For people living in low-income neighborhoods, walking is sometimes a necessity when no other forms of transportation are as affordable or easy to access. Those who use public transportation tend to walk to and from the stop. The safety and infrastructure of the street is critical to its walkability. Walkability is defined as "the extent to which the built environment is friendly to the presence of people living, shopping, visiting, enjoying or spending time in an area" (Abley, 2005). Some of the infrastructural factors affecting walkability are the presence and quality of sidewalks, buffers to moving traffic, traffic volume and speed, pedestrian crossings, shade or sun in appropriate seasons and street furniture.

Existing conditions

There are several neighborhood streets within Coffelt. Yavapai Street, Pima Street and Cocopa Street run east-west, while 19th Drive and 20th Avenue run north-south. These interior streets see relatively light traffic but the majority of the street surface is in severe disrepair. There are neither marked bike lanes nor buffer zones between the sidewalk and the street. Parked cars on both sides take up a majority of the street real estate. In several locations, the sidewalks are broken or uneven, making them unsafe to use. Trash lines some of the peripheral streets within the neighborhood, particularly in the southwest corner of the site. Tagging is seen on road signs and sidewalks. There is limited shade on the sidewalks and inadequate lighting. Though there are streetlights, some are broken, some not functional and all the lights are too high to illuminate the street and sidewalks sufficiently. Due to improper grading of the site, there are storm water drainage issues on many streets leading to frequent flooding and water stagnation during the monsoon season.

Buckeye Road and 19th Avenue are the closest arterial streets to the Coffelt site to the north and east respectively. 19th Avenue provides the main access points to

the community. It is the major traffic corridor running north-south that links I-17 to the western part of central city south. This is a five-lane street (with a center lane and a parking lane additionally) with no median and a speed limit of 40 miles per hour. There is a traffic light at the freeway off-ramp onto 19th Avenue as well as at Buckeye Road. There are no other traffic lights or cross walks between these two points. The industrial businesses surrounding Coffelt draw heavy truck traffic on 19th Avenue. Lack of buffers between sidewalks and streets, inadequate lighting and shade are additional barriers to walking and biking. On street parking on the west side of 19th Avenue prevent visibility of on-coming traffic for residents driving out of Coffelt.

Resident Completed Street Audits

To assess the quality and condition of street infrastructure and safety, two pairs of residents were recruited to conduct street audits (see Street Audit Tool in Appendix B). Street segments were selected based on the highest frequency of pedestrian traffic, both inside and peripheral to the Coffelt site. The two street segments audited were 19th Avenue from Buckeye Road to I17 and Pima Street from 19th Avenue to 21st Avenue. One audit was conducted during daytime while the other was conducted after dark.

19th Avenue is a five lane arterial street with a dedicated turning lane. There are sidewalks on the east and west sides of the street but no buffer zone between the street and the sidewalk. Along the exterior perimeter of the site, on 19th Avenue, dedicated on-street parking forms the buffer between pedestrians and traffic. Sidewalks are in fair condition other than some sporadic broken edges and uneven paving. Landscaping along the sidewalks is not adequately maintained. Trash and tagging are recurrent. Residents reported inadequate lighting along this entire street segment which resulted in a perceived lack of safety.

There are traffic lights on 19th Avenue at the intersection of Buckeye Road and at the I-17 off-ramp. These lights also serve as the designated pedestrian crossing points for this segment of 19th Avenue. There are no other crosswalks along this 0.5 mile segment of 19th Avenue. The main access point to Coffelt is located approximately mid-point in this segment. Residents conducting the audits reported several people jaywalking across 19th Avenue at Pima St. This is particularly dangerous considering the heavy traffic, reckless driving and speeding reported by the residents. While this study was ongoing, two young children from Coffelt were fatally struck by a motor vehicle as they were crossing 19th Avenue at this very intersection.

One of the residents who audited Pima St was on a mobility scooter. Pima St is a single lane bi-directional street that runs through the Coffelt neighborhood. Residents assessed the condition of the street as excessively poor. Potholes, cracks and bumps were prevalent throughout. Though the speed limit is marked at 25miles per hour, residents observed excessive speeding and reckless driving. These driving behaviors in conjunction with broken and narrow sidewalks made for a perilous walk along these streets. For the resident in the mobility scooter, the ill maintained sidewalks were an even greater challenge. Inadequate lighting and shade were additional barriers to walkability. Drug and gang activity reported by residents contributed further to a perceived lack of safety.

Injury and Crime

According to crime statistics in 2012 (Phoenix Police Department), five crimes were reported in and around the Coffelt area. Two assaults and one property theft occurred inside the community. A drug related crime occurred on 22nd Avenue just outside the community, and another assault was reported on 19th Avenue. Crime statistics in this area were not very high due to under-reporting; residents mentioned several instances of criminal activity both within the Coffelt site and in the surrounding areas.

A bus stop near Coffelt at Buckeye Road that has no seating or shade. There is no pull-in for the bus and when this bus stop gets crowded, individuals are forced to stand at the edge of the sidewalk without a buffer between them and the busy road.

Injuries resulting from bicycle and pedestrian collisions with motor vehicles are reported by the City of Phoenix at zip code level. Though, the bicycle collision rate (per 10,000 residents) was low in 2010 for the Coffelt zip code area, the adjoining zip code containing 19th Avenue had the highest rate of bicycle collisions in the city. Similarly, pedestrian-involved collisions in 2011 were between 5 and 7 per 10,000 residents for the Coffelt zip code while collisions in the adjoining zip code were 7 and up per 10,000 residents. In comparison, 45 of the 58 zip code areas within the City of Phoenix reported 3 or less pedestrian collisions per 10,000 residents in 2010.

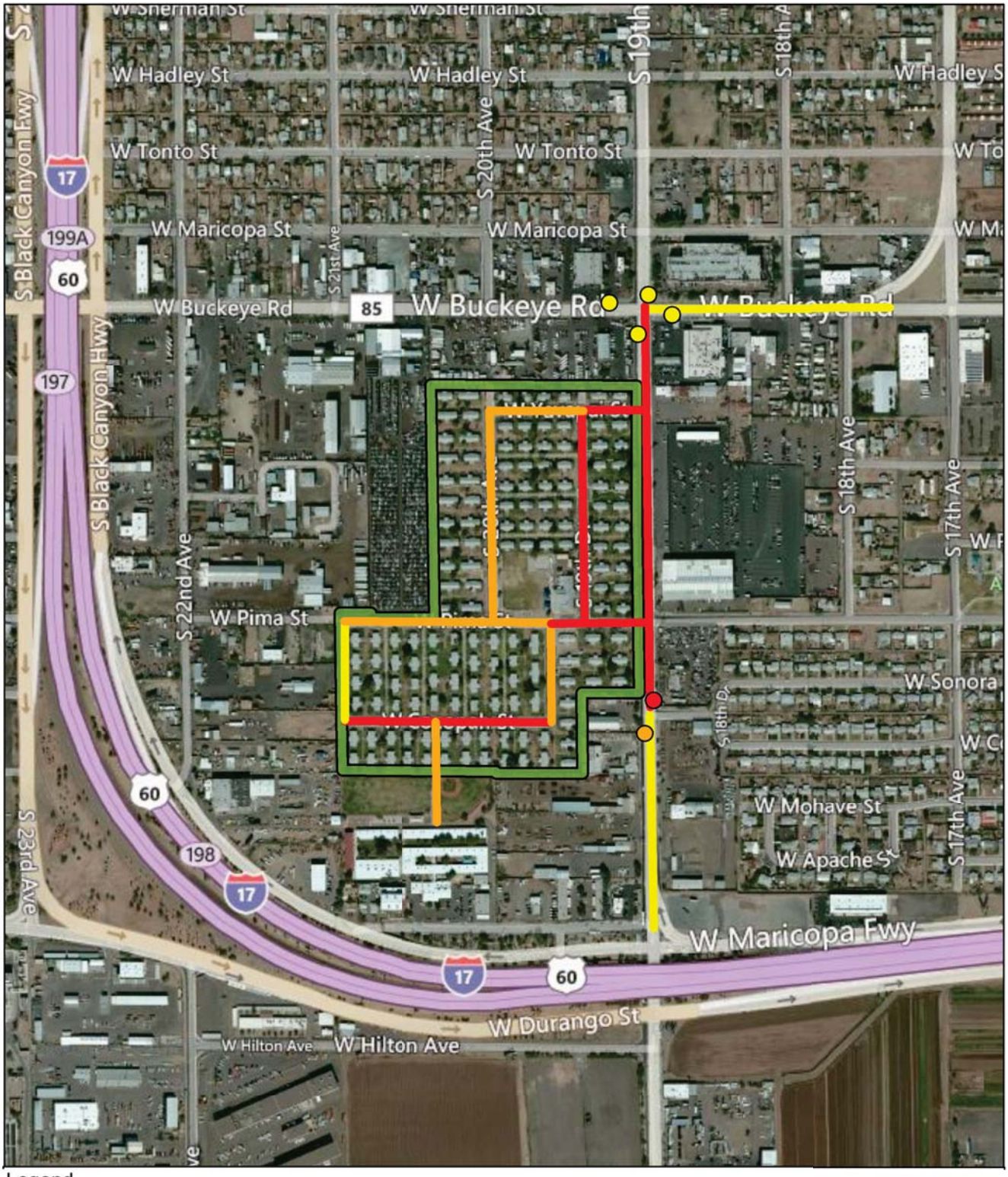
Walking and Biking Analysis

The most frequently walked street segments in and around Coffelt were identified by residents during the community workshop. Within the Coffelt site, Cocopah Street between 21st Avenue and 19th Drive; 19th Drive between W. Cocopah Street and W. Pima St; W. Pima Street between S. 19th Drive and S. 19th Avenue; S. 19th Drive between W. Pima Street and W. Yavapai Street; and W. Yavapai Street between S. 19th Drive and S. 19th Avenue were identified as the most frequently walked street segments. W. Yavapai Street and W. Pima Street at S. 19th Avenue are the two access points to the community. Outside Coffelt, S. 19th Avenue between W. Cocopah Street and W. Buckeye Road was the most frequently watched segment. Major assets such as bus stops and the closest grocery stores were located along S. 19th Avenue.

Biking in and around the community could not be analyzed due to insufficient data. Residents mentioned that there is very little biking within Coffelt. Barriers to biking included unsafe streets, cost of bike purchase and maintenance, and summer heat.

Public Transportation Infrastructure

The only public transport option for Coffelt residents is the Valley Metro bus service. Two bus routes (10 & 19) serve this area at a frequency of 15-30 minutes during on and off-peak hours respectively. Bus stops are located at Cocopah Street and at Buckeye Road on 19th Avenue. The Cocopah Street bus stops have shaded seating while the Buckeye Road bus stops have neither seating nor shade. Shade structures are poorly maintained – tagging and trash are some of the issues here. Residents reported longer waits than the 15-30 minutes listed in the bus schedules and generally perceived bus stops to be unsafe.



Legend

Coffelt Neighborhood

Walking Frequency
- High
- Medium
- Low

Bus Stop Use Weekly
- 1-5
- 6-10
- 11-18

Walking & Bus Stop Use Frequency

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 250 500 1,000 Feet

Use of Public Transportation

In the health survey, Coffelt residents reported cars as the primary mode of transportation (58%), followed by buses (42%). According to City-data (Advameg, Inc., 2013), between 2005-2010, 32-48% of Coffelt households did not own a car while 20% of households had access to one car. Typically, the family car is used by a household member to commute to work because for 39% of residents, commuting to work by bus would take up to an hour. Residents use buses predominantly on weekdays to go shopping for groceries and other items. For a majority of residents (60%), the closest bus stop was a 5 to 10min walk away.

During the mapping exercise, 11-20 residents reported using the northbound bus stop at Cocopah Street at least once a week. The second most frequently used bus stop was the southbound Cocopah Street bus stop, while only 1-5 residents reported using the bus stops at Buckeye Road weekly. While 75% of the respondents felt safe walking through their neighborhoods to the bus stops during the day, 60% considered it unsafe at night. In addition to these barriers, residents cited the summer heat as another safety issue to using public transportation.

Evaluating potential health impacts

Improvements in street infrastructure within this neighborhood can direct and indirect impact on the health outcomes in the community. Better streets, improved sidewalks with shade and better lighting will increase walkability and bikeability within the community, affording greater opportunities for physical activity. Additionally, improvements in streets will enhance the aesthetics of the community and draw more people out of their houses to congregate in the common spaces. An increase in frequency of chance encounters will enhance social cohesion.

Infrastructure improvements in peripheral streets, especially in 19th Avenue, will improve access to public transportation. For low-income families, improved access to public transportation has a direct impact on access to better health care, education, employment, healthy food, physical activity and other public services. Better streets and transportation also improves connectivity to surrounding neighborhoods and their programs and events.

More "eyes on the street" will reduce criminal activity making the neighborhood safer. Streets redesigned for motorists, bicyclists and pedestrians alike will lead to a decrease in injury and collisions. Shade structures and trees at bus stops and along heavily

walked streets will decrease Urban Heat Island (UHI) effect, increasing public safety in the extreme heat of the Arizona summer.

Recommendations

The goal of these recommendations is to improve and facilitate access to safe streets and affordable transportation.

1. Redesign and reconstruct 19th Avenue based on Phoenix Complete Streets Policy including making the sidewalks ADA compliant, providing a buffer between sidewalk and street, introducing shade trees and adding adequate lighting. As part of the redesign process, assess the following:

    a. Provide a HAWK crosswalk on 19th Avenue. and Pima

    b. Road dieting on 19th Avenue.

    Rationale: Complete Streets is a transportation policy and design approach that requires streets to be planned, designed, operated, and maintained to enable safe, convenient and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation. Currently 19th Avenue, just outside of the Coffelt site, does not meet these requirements, but is a heavily walked street by residents from this community and others. Residents, including young children, cross 19th Ave at Pima Street several times a day. The lack of a crosswalk at this location puts their lives at risk and increases the rate of injury and mortality for this community. A complete street plan for this street segment will assess the type and magnitude of design interventions needed to mitigate such hazards.

2. Construct street improvements within community including repaving the streets, widening sidewalks and making them ADA compliant, introducing additional street lighting and introducing shade.

    Rationale: Street infrastructure with the Coffelt site is in dismal condition. Street improvements including sidewalk redesign, additional shade and repaving of streets can foster an increase in walkability and bikeability within the community. When residents in a community walk more, there are more eyes on the street, which inherently discourages crime and vandalism. People being out and about can provide opportunities for chance meetings between residents, which can foster greater networking. An increase in physical activity can also decrease

chronic disease and improve the overall mental health of the community.

3. Improve bus stops on 19th Ave by installing shelters that provide seating and shade.

   Rationale: Residents reported long wait times at bus stops on 19th Ave, even in the grueling Arizona summer heat. Almost 1,400 Arizonans every year suffer from a heat related illnesses so serious they end up in the emergency department (Arizona Department of Health Services, 2010). Shade is essential in mitigating the adverse effects of exposure, especially given that mothers with young children, the elderly and youth from Coffelt are often the primary users of public transport. Seating can further enhance the comfort of waits for this vulnerable population.

Healthy and Safe Housing

There is a strong connection between health and housing. Inadequate housing can contribute to many preventable diseases and injuries. Proper design and construction of houses can mitigate issues such as thermal comfort, indoor environmental concerns and home safety. Conditions such as indoor air quality, exposure to toxins, exposure to insects and rodents, exposure to mold and injury hazards may exist inside and around homes (for the full environmental report see Appendix E). Since most people spend at least fifteen hours each day inside their homes (Frumkin, 2010), residences must be built and maintained to minimize exposures to environmental hazards in order to ensure good health for the occupants.

Existing conditions

Coffelt Housing

The Coffelt site contains 151 structures of which there are 148 duplexes, a rental office and two community buildings, one of which was previously used as a childcare building. Each duplex contains two dwelling units; configurations range from one to four bedroom units. Regardless of the configuration, each unit has only one bath. Amenities include standard kitchen appliances, an evaporative cooler, running water and electricity.

The units at Coffelt were originally built in 1953 and are considered a historic site by the State Historic Preservation Office (SHPO). Since then, these units have undergone minor renovations such as window upgrades and kitchen and bathroom fixture replacements. Some units have also been brought into compliance with ADA regulations. The basic framework, including the original footprint of these structures, remains unchanged. The block walls are not insulated. The building materials are suspected to contain asbestos and lead.

The exterior of the units are indicative of the age of these structures. Cracks on the external façades, rotting eaves, broken window screens, rusted window casings and evaporative coolers, and peeling paint are evident in most buildings. Some buildings are missing roof tiles and are tagged. Landscaping around the units is often poorly maintained; building foundation is visible in places due to soil erosion. Walkways

leading to and from the units are often cracked or broken. Though trash and recyclable waste materials are collected by the City of Phoenix weekly, litter is visible throughout the community.

In addition to poor physical conditions of the housing units, several environmental issues plague this site. Table 2 provides an overview of environmental issues at Coffelt.

Environmental Issue	Coffelt Conditions
Air quality	Poor outdoor air quality Poor indoor air quality
Drinking water	Safe
Sewage disposal	Meets requirements
Solid waste disposal	Meets requirements
Flood control	Meets requirements
Heat	Excessive in Summer
Noise levels	High
Lead & asbestos	Present
Disease vectors	Flies Mosquitoes Rodents Unleashed dogs

Table 2. Overview of Environmental issues

Air quality in the Coffelt neighborhood

Portions of Maricopa County, including the area of the Coffelt neighborhood have been classified by the EPA as nonattainment areas for the criteria pollutants PM-10 (coarse particulate matter measuring 10 microns or less) and ozone. Nonattainment is the term used by the EPA for classification of areas that do not meet one or more of the national standards. The nonattainment area also experiences occasional exceedances of the National Ambient Air Quality Standard (NAAQS) for PM-2.5 (fine particulate matter measuring 2.5 microns or less), but the EPA has not declared that Maricopa County is in nonattainment for PM-2.5.

The Maricopa County Air Quality Department operates and maintains a network of air monitoring stations. There are two air monitoring stations within a three mile distance of the Coffelt neighborhood. They are the Durango Curve (DC) and Greenwood (GR) monitors. These air monitoring stations are not equipped to measure ozone. The DC site is equipped to measure both PM-10 and 2.5. The GR site measures PM-10, but not PM-2.5.

The County experienced 33 exceedances of the 24-hour NAAQS for PM-10 during 2012, including 4 at the DC monitor and 2 at the GR monitor. Sustained high wind events causing blowing dust may be responsible for many of the exceedances. The Arizona Department of Environmental Quality has petitioned EPA to consider most of the exceedances to be classified as exceptional events. An exceptional event is defined by the EPA as an uncontrollable event caused by natural sources of pollution. If the EPA accepts a petition for an exceptional event, the measured pollution event will not be used in determination of compliance with the NAAQS (Maricopa County Air Quality Department, 2013)

There were 28 unique days in Maricopa County when at least one monitor exceeded the ozone NAAQS of 0.075 ppm. There were 90 individual exceedances of the 8-hour standard. All of the 2012 exceedance days occurred during the hot months of May – August. The closest ozone air monitoring stations to the Coffelt neighborhood are the Central Phoenix, South Phoenix and West Phoenix sites. The highest 2012 ozone readings, exceedances and violations for the three nearest ozone monitoring station are given in Table 3.

Site Name	Exceedances	Maximum 8-hour ozone	NAAQS Violation Status
Central Phoenix	6	0.084 ppm	In compliance
South Phoenix	5	0.087 ppm	In violation
West Phoenix	9	0.087 ppm	In violation

Table 3. 2012 Ozone 8-hour summary for the Central Phoenix, South Phoenix and West Phoenix air monitoring sites

Sources of air pollution near the Coffelt neighborhood

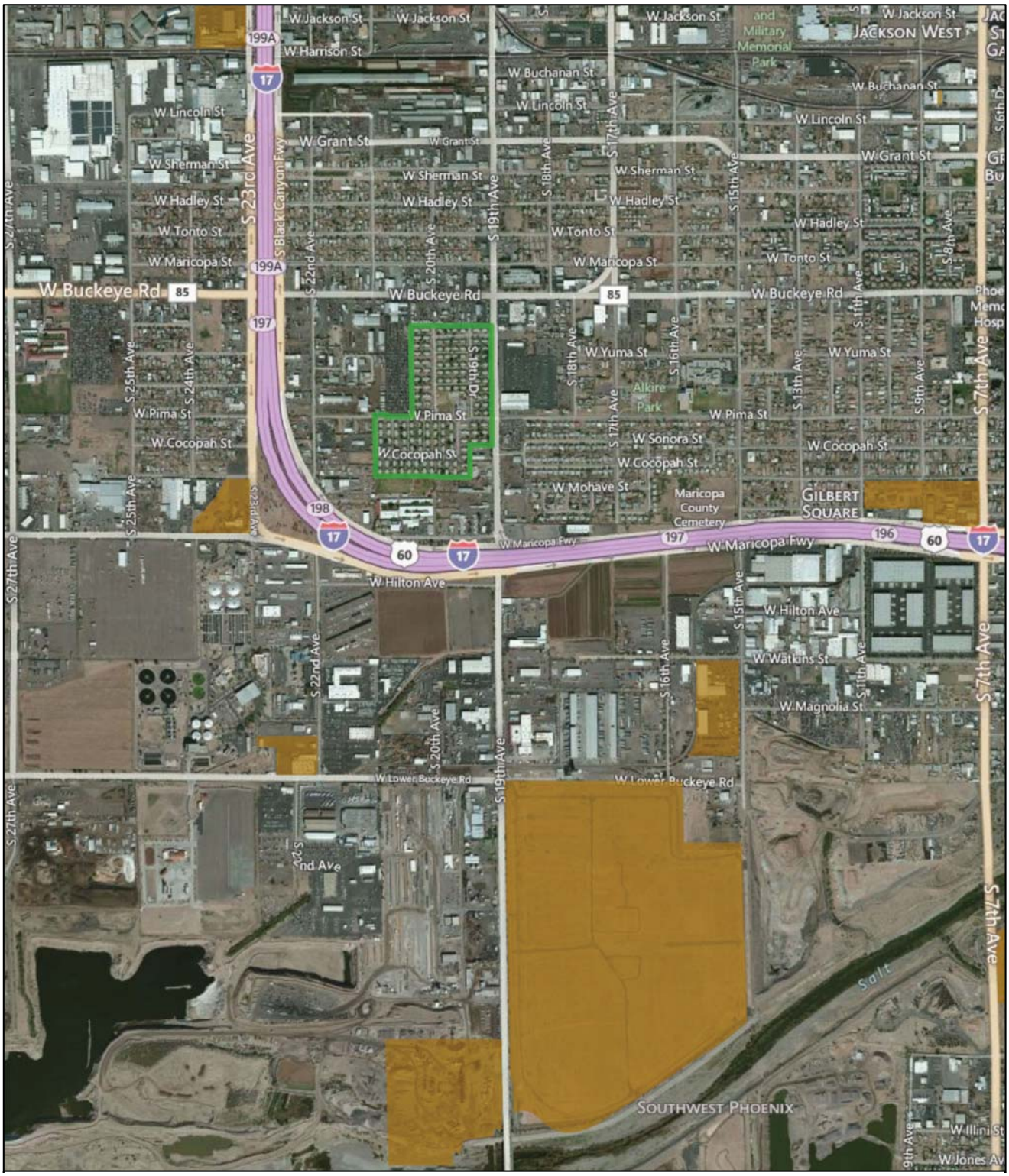
There are several sources of air pollution close to the Coffelt site affecting the neighborhood. These include the I-17 freeway, major point sources, non-point sources, HAPs sources and odor sources.

I-17 freeway

By far, the largest single source of long-term air pollution is the I-17 freeway. Traffic count information provided by the (Arizona Department of Transportation, 2008) reported an average of 96,500 vehicles per day between Exit 197 (I-17 and 19th Ave) and Exit 199A (I-17 and Grant Ave). ADOT has not performed an actual traffic count on this freeway segment since 2008. However, ADOT estimated 109,000 vehicles per day in 2010. It is likely that this number is now greater than 110,000 vehicles per day.

Point sources of air pollution near Coffelt neighborhood

The area zip codes 85007 and 85009 have 59 large air pollution sources in the EPA Enforcement and Compliance History Online (ECHO) database. Below is a map showing the air pollution sources within a two-mile radius of the Coffelt neighborhood. Most of the facilities are located south of the neighborhood.



Legend

- Air Pollution Generating Business
- Coffelt Neighborhood

Air Pollution Sources

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 500 1,000 2,000 Feet

Sources of HAPs near Coffelt neighborhood

Hazardous air pollutant sources are facilities that emit any of the 187 listed HAPs in amounts that exceed the threshold for air pollution control regulations that specify the use of a Maximum Available Control Technology. Other sources of HAPs may be facilities that use listed hazardous substances in amounts greater than the threshold reporting quantities. A search of the EPA Toxic Release Inventory (U.S. Environmental Protection Agency, 2013)and EPA ECHO database was conducted to produce the Toxic Sources map showing the location sources within two miles of the Coffelt neighborhood. There are approximately 20 facilities within a two-mile radius of the Coffelt neighborhood that emit the most significant hazardous air pollutant.

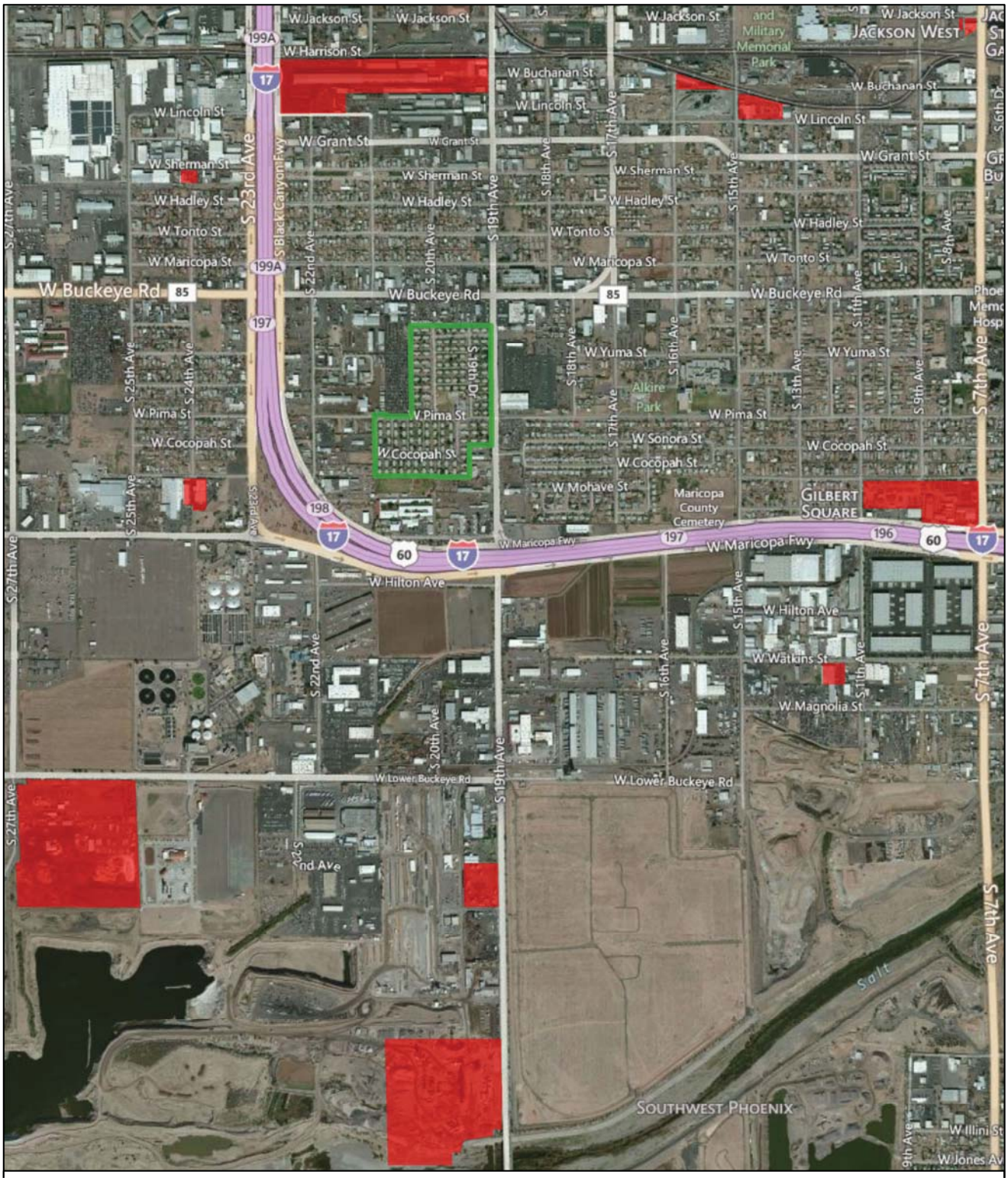
Non-point sources of air pollution near Coffelt neighborhood

Vacant lots, unpaved parking lots, agricultural activities, construction activities and unpaved roads contribute to the PM-10 emissions for the Maricopa County PM-10 nonattainment area. A common problem for vacant land areas along the Salt River is trespassing by off-road vehicles.

Dust storms typically move from south to north. Strong winds crossing the exposed vacant lands just south of the Coffelt neighborhood push huge volumes of soil into the neighborhood during storm events.

Potential sources of odors for Coffelt neighborhood

The presence of unpleasant odor is not by itself a cause of human disease. Strong objectionable odor may serve as a warning that there has been a release of a chemical or putrescible waste such as sewage that should be avoided (see Odor Sources map following Toxic Sources map).



Legend

Business Producing Odor

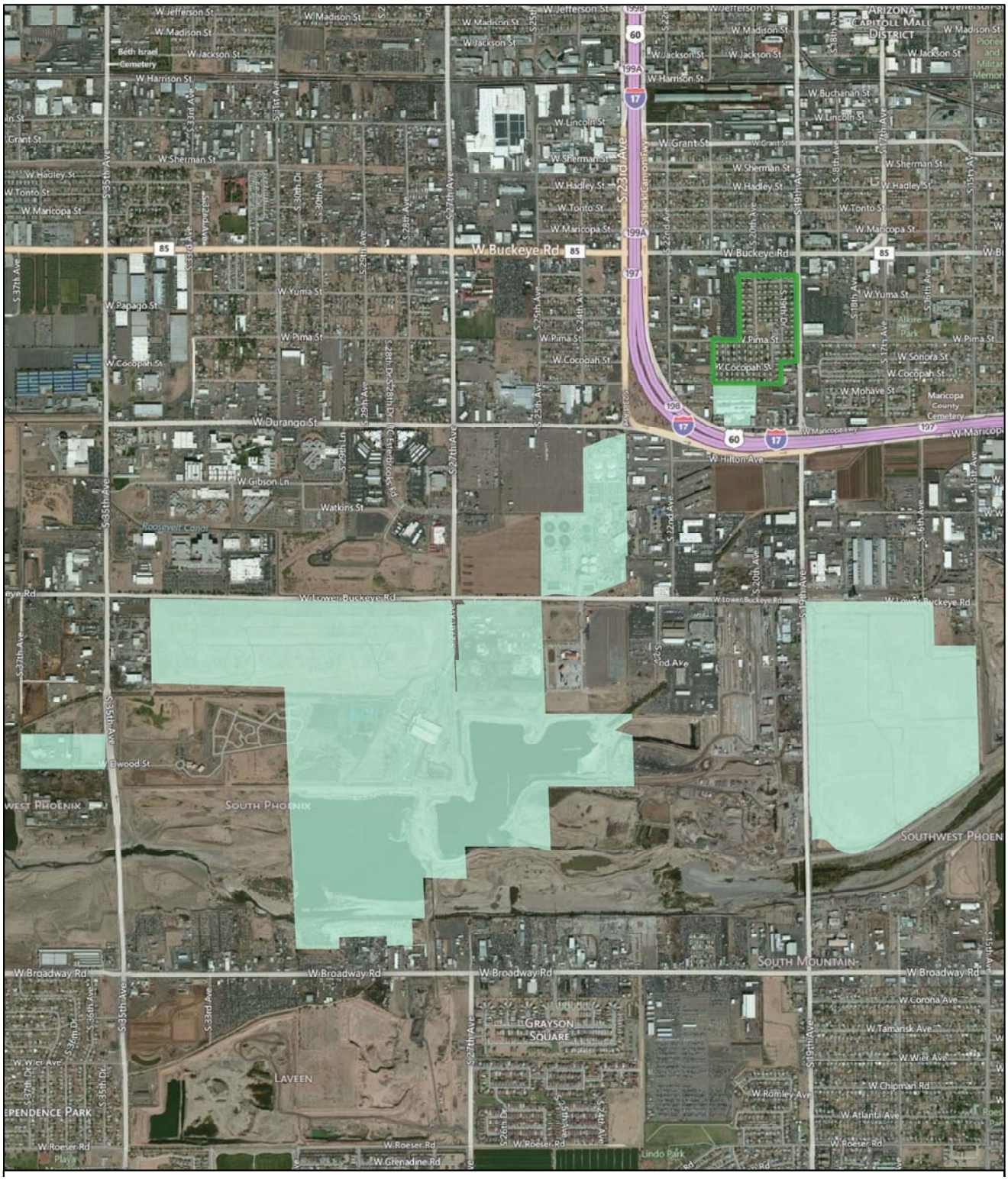
Coffelt Neighborhood

Toxic Sources

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 500 1,000 2,000 Feet



Legend

Coffelt Neighborhood

Parcels Producing Odor

Odor Sources

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 700 1,400 2,800 Feet

Indoor air pollution sources

The air inside houses, schools, shopping centers, churches, offices, hospitals, factories and all other buildings can potentially become unhealthy due to a buildup of chemicals and particulates from numerous sources. Indoor air pollutants can cause the same types of health problems that have previously been identified for the ambient air pollutants. Table 4 is a list of common indoor air pollutants and their sources.

Pollutant	Source
Tobacco smoke	Smokers in the household
Carbon monoxide	Gas stove, gas furnace, broken exhaust vents
Formaldehyde	Furniture, carpeting, insulation
Asbestos	Insulation, wall and ceiling texture
Radon	Cracks in the slab
Mold and other biological	Plumbing leaks, unsanitary conditions
Volatile organic compounds	Paints, solvents, cleaners
Pesticides	Any application of pesticides
Particulates	Wood burning, fuel oil burning, remodeling
Nitrogen oxides	Wood, oil or gas stoves and furnaces
Carbon dioxide	Poor ventilation
Hydrogen sulfide	Sewer gas, dry floor drains, dry plumbing fixtures
Methane	Sewer gas from dry floor drains and plumbing fixtures
Insect parts and waste	Cockroach and cricket infestation

Table 4. Common Indoor Air Pollutants and Their Sources (Adapted from: EPA, (2013) An introduction to indoor air quality)

Health effects of air pollution

Particulate matter

Both PM-10 and PM-2.5 are dangerous to human health. In general, the smaller the particle, the deeper it can be inhaled into the lungs. Most of the PM-2.5 size particles become permanently entrapped inside the lungs. The larger PM-10 particles may be removed by coughing up mucous that is excreted because of the irritation of the airways caused by the particles. The concentrations of both PM-10 and PM-2.5 are greater near the sources of these emissions, especially freeways and large areas of disturbed ground.

Another issue of concern for Arizonans is Valley Fever, also known as Coccidioidomycosis. This is a lung infection caused by a fungus that lives in Arizona soils. The U.S. Centers for Disease Control (2013) reported that Arizona had 66% of all United States cases in 2011. Breathing soil disturbed by construction, agriculture, landscaping, dust storms and other disruptions is a risk factor for contracting Valley Fever.

Ozone

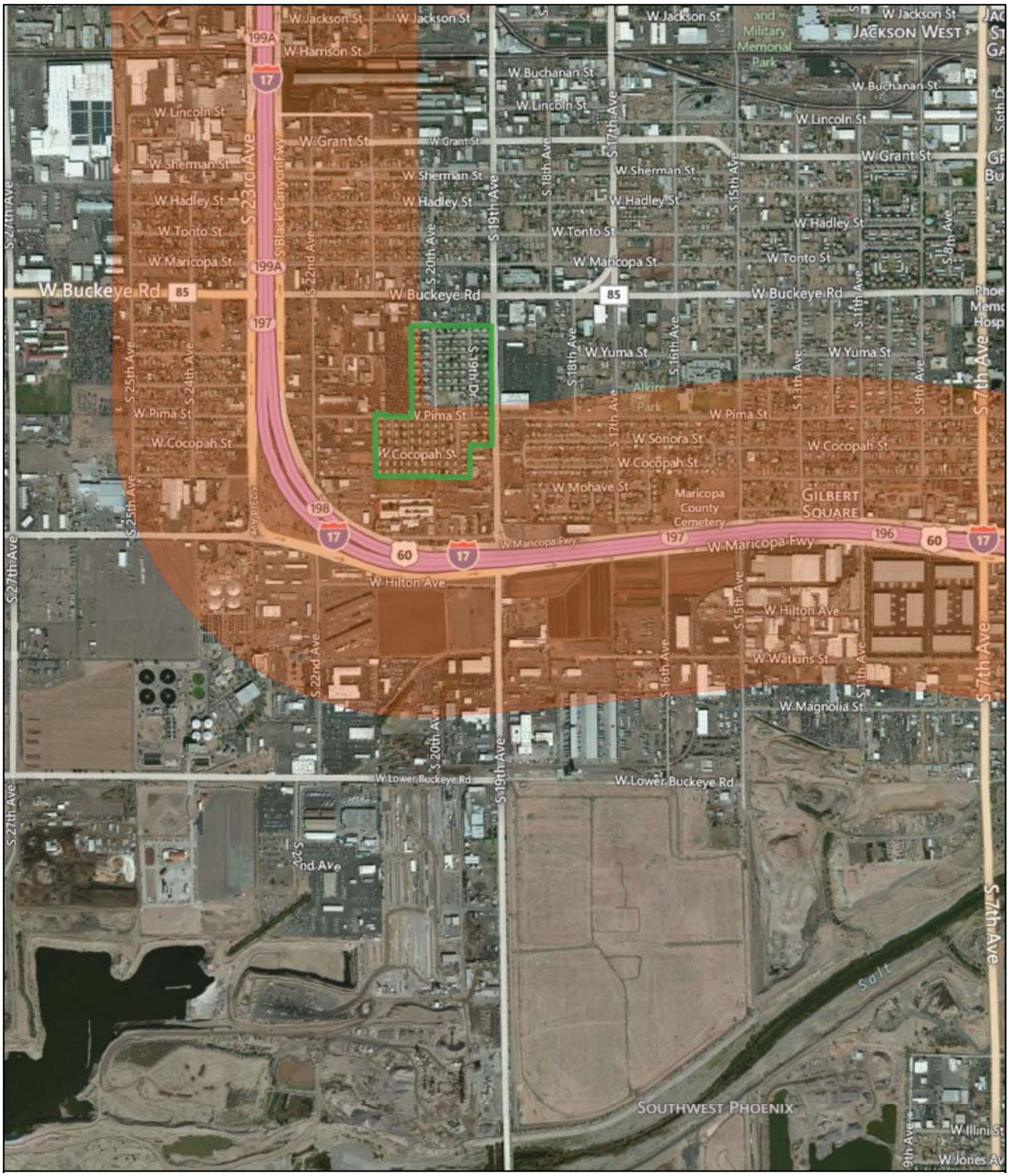
The EPA has established enforceable health-based standards for ozone in the ambient air. The latest science on the health effects of ozone concludes that short-term (one-day) exposures to levels of ozone above the NAAQS for the 8-hour standard are unhealthful. EPA recommends that people should stay indoors and avoid vigorous exercise on days when the ozone levels are expected to exceed the standard. Housing with evaporative cooling will provide less protection from high ambient air ozone levels than housing with air conditioned recirculated air.

Hazardous Air Pollutants

The EPA has not adopted any requirements for either ambient air monitoring or NAAQS for these health hazards. In a study conducted in the greater Phoenix area (Hyde, 2013), exposure to HAPs increased cancer risk at approximately 700 cancer cases per million population. EPA's published acceptable risk level for cleaning up Superfund sites and other hazardous materials releases is no more than 100 cancer cases per million populations. Thus, Phoenix area residents are exposed to hazardous air pollutants at levels that are seven times greater than other regulated environmental hazards.

Health risks associated with living near freeways

A growing body of evidence is emerging that suggests there is a positive association between living near a major transportation corridor such as a freeway and adverse health effects. Several studies have found a causal relationship between exposure to traffic-related air pollution and exacerbation of asthma and other respiratory symptoms, cardiovascular morbidity and mortality, and diabetes (Pearson, Bachireddy, Shyamprasad, Goldfine, & Brownstein, 2010; The Health Effects Institute, 2010; Roberts, 2013). Studies have demonstrated that children and adults living in proximity to freeways or busy roadways have poorer health outcomes in comparison to persons living at least 500 meters (547 yards) from the roadways (see map below).



Legend

- 500 Meter Air Shed of Interstate 17
- Coffelt Neighborhood

Critical air pollution zone around I-17

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 500 1,000 2,000 Feet

How close is the Coffelt neighborhood to the I-17? The following map indicates a distance of 118 meters (129 yards) from the freeway to the entrance of Hamilton Elementary School. The athletic field for this school is approximately 200 meters (219 yards) from the freeway. The nearest house is 250 meters (273 yards). Most of the houses are within 400 – 500 meters (437 – 547 yards). The most distant house is 720 meters (787 yards) from the freeway; however it is only 123 meters 134 yards) from the busy intersection of 19th Avenue and Buckeye Road. The prevailing winds in Phoenix are from the southeast through southwest vectors. The Coffelt neighborhood is downwind of I-17 on most days of the year.

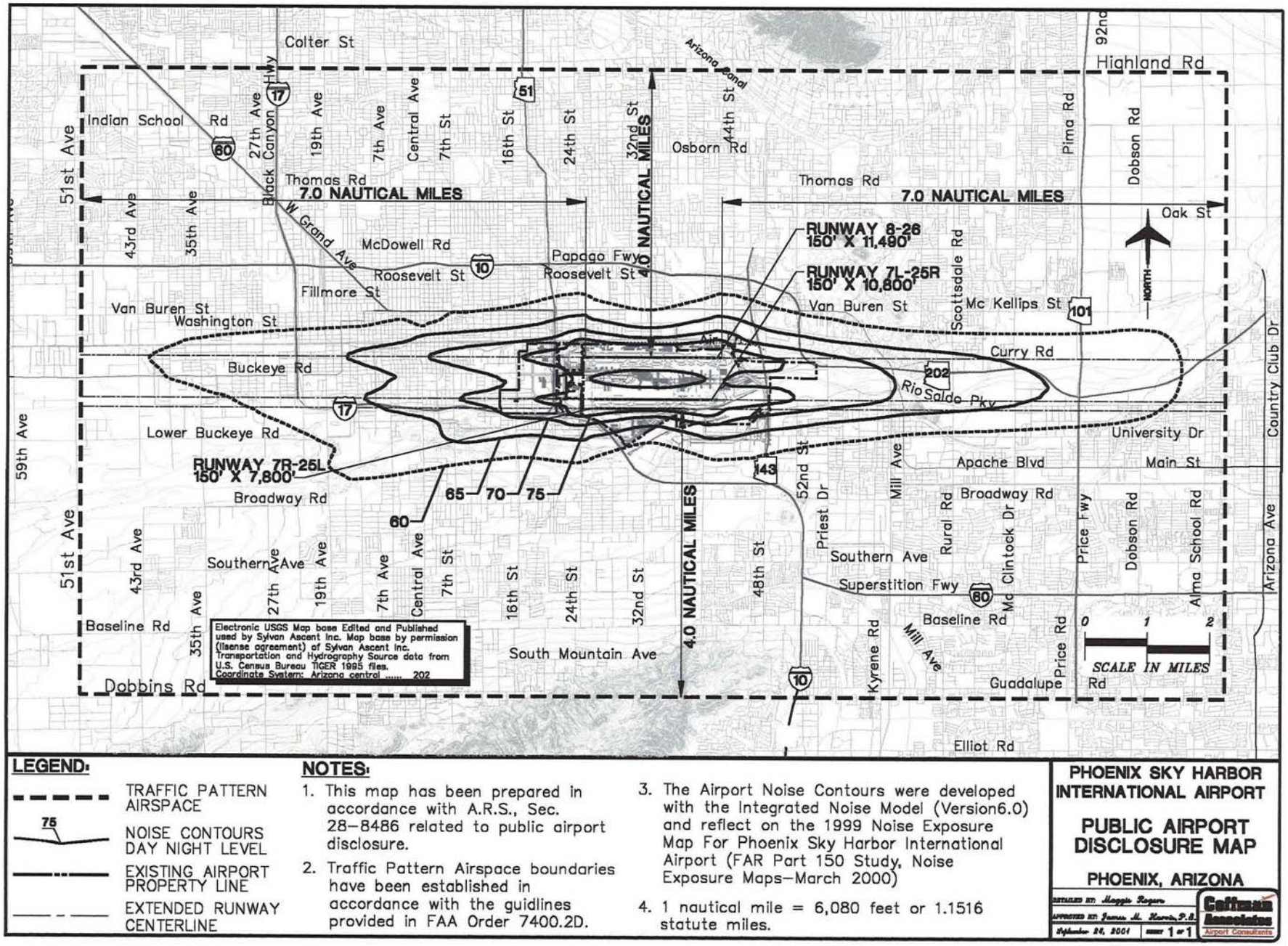
Noise

The U.S. Occupational Health and Safety Administration (OSHA) has established an enforceable permissible exposure limit of 85 dBA over an 8-hour work day (U.S. Department of Labor, 2013). The health impacts of noise depend on the intensity, duration and context of exposure. Documented health effects from noise include hearing impairment, sleep deprivation, speech intelligibility, stress, impaired cognitive function, hypertension and annoyance (Health Impact Partners, 2011).

Sources of noise for the Coffelt neighborhood

Sky Harbor Airport

The City of Phoenix reports noise levels using a standardized noise reporting index called the day-night average sound level (DNL). The FAA uses a maximum of 65 DNL to identify areas impacted by aircraft noise. FAA considers all land uses to be compatible with an airport, including residential areas, schools and libraries, if the DNL is below 65 DNL. FAA will not fund noise mitigation projects in areas with a DNL less than 65. A review of the existing Noise Exposure Map indicated in 1999 that the Coffelt neighborhood is just to the west of the 65 DNL contour line.



LEGEND:

- TRAFFIC PATTERN AIRSPACE
- 75 NOISE CONTOURS DAY NIGHT LEVEL
- EXISTING AIRPORT PROPERTY LINE
- EXTENDED RUNWAY CENTERLINE

NOTES:

1. This map has been prepared in accordance with A.R.S., Sec. 28–8486 related to public airport disclosure.
2. Traffic Pattern Airspace boundaries have been established in accordance with the guidlines provided in FAA Order 7400.2D.
3. The Airport Noise Contours were developed with the Integrated Noise Model (Version6.0) and reflect on the 1999 Noise Exposure Map For Phoenix Sky Harbor International Airport (FAR Part 150 Study, Noise Exposure Maps–March 2000)
4. 1 nautical mile = 6,080 feet or 1.1516 statute miles.

PHOENIX SKY HARBOR INTERNATIONAL AIRPORT

PUBLIC AIRPORT DISCLOSURE MAP

PHOENIX, ARIZONA

DRAWN BY: Maggie Rogers
APPROVED BY: James M. Hawes, P.E.
September 24, 2001 | SHEET 1 of 1

Coffman Associates Airport Consultants

Traffic

The Coffelt community is surrounded by high-volume roadways. Of course, the most significant noise sources are the I-17 freeway to the south and west; Buckeye Road to the north; and 19th Avenue to the east. Both Buckeye Road and 19th Avenue are considered arterial roadways because they connect to major freeway corridors. In addition to the more than 100,000 vehicles per day on I-17, there are also trucks and emergency vehicles moving about with loud exhaust and siren noises.

Other nearby sources of traffic noise include 19th Avenue and Buckeye Road. Traffic noise is greater when the traffic is moving at high speeds. Due to the low speed limits of 40 miles per hour on Buckeye Road and 19th Avenue, it is reasonable to conclude that the average noise exposure will not exceed the FHWA noise abatement criteria level of 67 dBA.

Industrial facilities near the neighborhood

One or two residents attending the two community meetings reported occasional loud noises emanating from the adjacent industrial and commercial facilities. Industrial and commercial uses are legally allowed by the City of Phoenix zoning requirements along the north, west and southeast boundaries of the Coffelt community. The same uses are allowed on the east side of 19th Avenue. This means that the potential exists for noises from business activities may impact the neighborhood. The present businesses nearest to the neighborhood are auto and truck salvage, recycling, and wood pallet construction. These land uses would be expected to cause occasional loud and short-term noises during normal business hours.

Disease vectors

Dogs off leash

Residents reported unleashed dogs as a hazard in the Coffelt community. Unleashed dogs are more likely to bite people. Dog bites are a serious public health issue. Each year in the United States, about 4.5 million people are bitten by a dog. Approximately 800,000 or 18% require medical attention (Maricopa County Animal Care and Control, 2013).

Although rare in the United State, the disease rabies can be transmitted by dogs and cats. Rabies is an infectious viral disease that affects the nervous system. It is almost always fatal after symptoms appear. Persons exposed to a rabid animal must receive

anti-rabies serum and vaccine soon after the bite to prevent rabies infection. Dogs with up-to-date rabies vaccinations are not likely to develop rabies. Laboratory testing of animals suspected of having rabies indicate that bats are the most frequently affected animal.

Flies

Over 30 diseases have been associated with the common housefly including dysentery, cholera, typhoid, infantile diarrhea, numerous other diarrheal diseases, pink-eye, pinworms, roundworms and tapeworms (Robson, Hamilton, & Siriwong, 2010). The most common source of flies in the Coffelt neighborhood is dog droppings. City of Phoenix trash collection occurs every week and will prevent flies from breeding in household garbage.

Mosquitoes

Mosquitoes are actually small biting flies. They are the vector for numerous human diseases including malaria, dengue fever, yellow fever, West Nile Virus and several encephalitis viruses (Robson, Hamilton, & Siriwong, 2010). Maricopa County has several species of mosquitoes that may carry dengue fever, West Nile Virus, St. Louis encephalitis and Western Equine encephalitis (Maricopa County Department of Emergency Management, 2013). People over fifty years of age are more likely to get serious symptoms of West Nile Virus and should take special precautions to avoid mosquito bites.

Rodents

Several residents and property management staff commented about the presence of mice on the Coffelt site. Mouse droppings can cause food borne diseases such as salmonellosis. Fleas and mites living on mice can transmit murine typhus and rickettsia pox. Mice have small heads and bodies, allowing them to enter houses through openings as small as a dime. They prefer human foods and often seek the warmth of housing during the colder months. The wood pallet business and vehicle salvage yards near the neighborhood provide many suitable harborages for rodents. In addition, the aging buildings of the Coffelt neighborhood have cracks and other openings around plumbing penetrations through the exterior walls that will permit rodents to migrate into the buildings.

Construction Phase Environmental Issues

Asbestos is a known human carcinogen. Previous surveys of the Coffelt neighborhood have identified the presence of asbestos containing materials other than regulated asbestos containing materials and regulated asbestos containing materials (Maricopa County Risk Management Department, 2001).

Lead is a heavy metal known to be present in many household products, but especially paint in homes built before 1978. Health effects from lead exposure include central nervous system damage, cardiovascular system and kidneys. There are many potential and known sources of lead that may have accumulated in the soil.

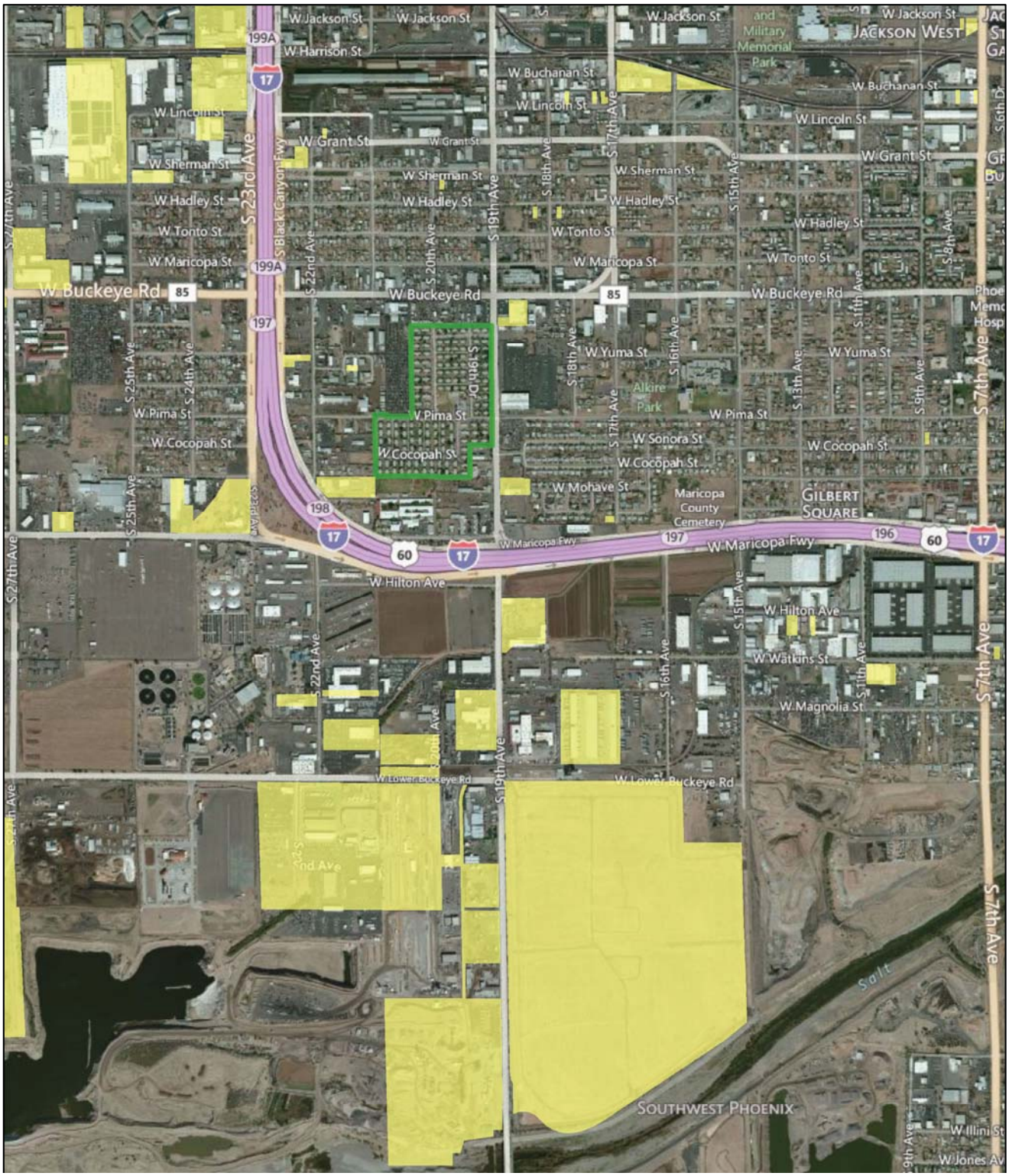
The most significant source is the I-17 freeway and 19th Avenue roadways. Lead was used in gasoline until January of 1995 (U.S. Environmental Protection Agency, 1995). Particulate emissions from vehicles burning leaded fuels have settled out in all areas of the city. Higher accumulations are expected near freeways.

During construction and renovation, soil disturbance will occur that triggers a requirement to apply for and comply with a dust control permit from the (Maricopa County Air Quality Department, 2013). As discussed previously, exposure to particulate matter is a health hazard. Residents continuing to live on the site during the demolition and reconstruction must not be exposed to unhealthful levels of dust from the construction activities.

Hazardous materials and emergency preparedness

Residents of the Coffelt neighborhood should be prepared for a wide variety of emergencies caused by natural and human-caused events. Common natural hazards are strong winds (microbursts from thunderstorms), dust storms, flooding and wildfires. Common human-caused hazards are spills of hazardous materials, structural and material storage fires, and long-term power outages. Residents should become aware of the hazards they face and develop plans for responding to and recovering from an incident.

The Coffelt neighborhood is located near a major freeway and an arterial roadway. These public roads are used by commercial vehicles to transport hazardous materials. In addition, the surrounding land parcels are zoned for industrial and commercial uses. This means that trucks will be traveling into and out of nearby facilities that handle large quantities of hazardous materials.



Legend

Coffelt Neighborhood

Waste Generating Business

Hazardous Material and Waste Sources

Coffelt-Lamoreaux Housing Health Impact Assessment

N

0 500 1,000 2,000 Feet

The Arizona Department of Transportation (2008) estimated a traffic volume of 109,000 vehicles per day in 2010 at the I-17 Durango Curve. Data were not available to determine the number of trucks that travel this stretch of highway each day. However, ADOT has designated the I-17 Maricopa Freeway as the designated truck route through Phoenix for vehicles carrying hazardous materials. It is not unreasonable to estimate that there are more than 1,000 vehicles per day carrying hazardous materials through the Durango Curve area of the I-17. Based on the above discussion, residents of the Coffelt neighborhood should become prepared for responding to a possible hazardous materials release as a result of a traffic accident on the Durango Curve.

Releases of hazardous materials are also a threat from sources such as the industrial, municipal and commercial facilities in the vicinity of the Coffelt neighborhood. The EPA ECHO database also shows 59 large sources of air pollution and 162 hazardous waste generators, treatment, storage and transport facilities within the zip codes of 85007 and 85009.

Evaluating potential health impacts

Improving housing conditions will have the most significant impact on the health of Coffelt residents. The plethora of environmental issues such as air pollution, noise, environmental toxins and disease vectors that plague this community will be addressed in the redesign of the units and their surroundings. Though it is challenging to control noise and air pollution outdoors, several strategies using affordable emerging technologies can be used to minimize the negative health impacts indoors. Testing and implementing a comprehensive plan to mitigate environmental toxins will be a part of the redevelopment process. Partnerships with animal and pest control experts during and after the construction phase will help residents and management address issues related to disease vectors.

Site improvements including trash cleanup, site leveling to reduce stagnant water and improved landscaping will further address the above-mentioned environmental issues. Improved lighting around the units and bringing designated parking spots close to the respective homes will improve safety and convenience.

Prevalence of chronic health problems such as cardiovascular disease, cancer and respiratory diseases including asthma will be reduced as an outcome of these interventions. Improved housing conditions will also reduce stress and improve mental health.

Recommendations

The goal of these recommendations is to improve housing conditions including improvements to the units and their surrounding area.

Improve existing Housing Units

Climate control and pollution

1. Replace swamp coolers in each unit with high-efficiency HVAC systems. Properly ventilated units will reduce the constant exposure to exhaust and poor air quality/ pollution. Advanced air filtration should be installed in the air handling units for each house.

   Rationale: Heat exposure is one of the leading causes of death in Arizona. Swamp coolers do not effectively fight the summer heats in Arizona, where extreme temperatures can get up to 115 F. HVAC systems also provide better filtration of air pollutants.

2. Install electric cooking appliances to minimize carbon monoxide levels inside the home. Water heaters can be natural gas as they are vented.

   Rationale: Natural gas currently used for cooking appliances produces high levels of carbon monoxide inside dwellings. This can have detrimental effects on the health of inhabitants. Tightly sealed air-conditioned homes will trap carbon monoxide inside. Using energy efficient, electric appliances instead can minimize this risk.

3. Provide automatic closing devices on doors to allow residents to keep doors and windows closed. This will further reduce exposure to pollution and help with climate control.

   Rationale: Existing doors and windows are in poor condition and some do not close or lock. Seals on doors and windows are essential in minimizing indoor pollution and noise.

4. Use high quality, energy efficient appliances to reduce energy consumption and operating costs.

   Rationale: Residents were concerned about an increase in their electricity bills. Using energy efficient appliances will mitigate this.

5. Explore the use of Titanium Dioxide as a coating on the exterior of buildings at Coffelt to help mitigate the impact of environmental pollutants, specifically smog.

   Rationale: There is emerging research in material sciences that is currently exploring the use of titanium dioxide as an exterior coating on buildings to neutralize the harmful effects of smog. In a site with as much exposure to air pollution as Coffelt, it is worth looking into the risks and benefits of such an application.

Mitigating Noise

1. Install sound insulation meeting best available technology in units during reconstruction. This includes doors and windows that have the highest available decibel reduction rating. Use noise mitigation/abatement standards that are used for housing in the flight path of Sky Harbor.

   Rationale: Sound insulating doors and windows can help mitigate the noise of airplanes flying over the neighborhood and noise from the traffic on I-17.

2. Follow standards for noise mitigation during the construction phase.

   Rationale: Heavy machinery used during construction phase will produce increased levels of noise at the site. Added to the already existing levels of noise pollution, this could have serious negative impacts on residents. Maintaining noise levels within the regulatory standards is of particular importance on this site.

3. Provide a well-insulated high-efficiency HVAC system and provisions for closing doors to help with noise mitigation.

   Rationale: Insulation will help keep heat, pollutants and noise out.

4. Consult with the Phoenix Aviation Department to determine if there is any funding available to help pay the cost of soundproofing the structures because of the location in the flight path for Sky Harbor.

   Rationale: Insulation will help keep heat, pollutants and noise out.

Rodents

1. Conduct regular clean-up both inside and outside the units. The site clean-up efforts can be resident led along with support from other community groups.

   Rationale: Trash littering the site can attract rodents. A community clean-up drive can serve the purpose of removing these food sources for rodents, but also as a community-building exercise.

2. Provide tools and technical assistance to residents to help address the rodent problem.

   Rationale: Often the tools and techniques used by residents and HAMC to manage the rodent problem do nothing to eliminate it, but rather just move rodents to a different location. With the proper tools and knowhow, residents can take matters into their own hands.

3. Involve Maricopa County Vector Control in discussions with residents and HAMC on controlling rodents at Coffelt and adjacent properties.

   Rationale: Education is a key part of understanding and managing the rodent problem. Effective methods of pest control can help eliminate this problem. Vector control can provide such assistance both to the residents of Coffelt and to the adjacent industrial sites, where these problems originate.

Bathrooms

Increase the number of bathrooms to 2 for the 3 and 4 bedroom units as per the request of the community.

Rationale: With four bedrooms in a unit, occupancy can be up to 8 people. Having one bathroom for 8 individuals can be unhygienic and have implications on health.

Safety at units

1. Install adequate lighting on the exterior wall of the units, especially near exits.

   Rationale: Poor lighting just outside the units makes visibility difficult at night. This leaves residents feeling unsafe. Properly installed, adequate lighting is needed to illuminate the outdoor environment.

2. Install a porous fencing on the front and back of each unit exterior to create a defined back and front yard.

   Rationale: In their current state, units do not have a defined front or back yard. Residents reported people walking through their yards invading their privacy. To create a sense of territory, fenced yards will help regulate the flow of pedestrian traffic. The fences will be porous to ensure visibility.

Improve site conditions

Lighting

1. Improve lighting throughout site by ensuring that all lights are in working condition.

   Rationale: Adequate lighting, especially at night, can facilitate the perception of safety and increase walkability of the neighborhood. Lighting can also deter crime and vandalism.

2. Install pedestrian level lighting where ambient lighting is inadequate.

   Rationale: Part of the problem with current lighting at the site is that it is too high and sometimes the strength of the bulb is not sufficient to illuminate the sidewalk or street. Lower lights can help supplement the existing lighting.

3. Ensure all on-site lighting is dawn-to-dusk.

   Rationale: A current problem on this site was that lights did not come on until long after it was dark. Dawn-to-dusk lights will automatically come on as soon as it the sun sets and turn off at the first light of the sun. This will ensure adequate lighting when needed as well as cost savings.

Landscaping

1. Improve landscaping by adding trees and other vegetation to help improve the air quality and mitigate the urban heat island effect. Use modeling recommendations presented in the ASU heat island study done in Sherman Park so that the use of vegetation will be as effective as possible. Plants having low water use and low volatile organic compound (VOC) emissions should be selected.

Rationale: It is critical to select the right vegetation to maximize shade coverage and yet use minimum water. Native low water-use trees with broad and dense canopies are one possibility, but trees should be selected only after consultation with an arborist and landscape architect. Some plants naturally emit VOCs which contribute to the area's ozone pollutant levels.

2. Provide additional shading along sidewalks and on exterior of units through trees. Consider both desert and green vegetation for optimal pollution/noise/heat island effect control while also mitigating water usage. Plants having low water use and low volatile organic compound emissions should be selected.

   Rationale: Different types and classes of vegetation have specific characteristics that afford unique benefits. Selecting the right vegetation can be critical in achieving multiple goals such as mitigating noise, pollution and heat while being low maintenance. Some plants naturally emit VOCs which contribute to the area's ozone pollutant levels.

3. Implement a program that allows residents proficient in landscaping maintenance to assist in exchange for a stipend from HAMC.

   Rationale: Residents expressed interest in providing technical expertise and actual management of landscaping within the community. Using existing skills in exchange for stipends or community hours can be beneficial to both the community and HAMC.

4. Rebuild irrigation system to afford the use of SRP water for flood irrigating the landscaping at Coffelt.

   Rationale: SRP water is easily accessible and cost effective.

5. Plant trees that are fast growing and reach a height of 30', along the perimeter of the community. Trees having low water use and low volatile organic compound emissions should be selected.

   Rationale: This will help block the view of the freeway and adjacent non-residential land uses. Some plants naturally emit VOCs which contribute to the area's ozone pollutant levels.

Lead

1. Conduct soil tests to evaluate the level of lead on site. Mitigate lead concentration to residential soil clean-up levels specified by the Arizona Department of Environmental Quality by either removing or placing a clean fill cap over areas that are identified as elevated above acceptable residential area levels.

   Rationale: Given that this is site that has seen a lot of industrial development in surrounding areas and withstood the emissions from cars on the I-17 for decades, there is a high possibility of lead in the soil. It is important to test the levels of lead and find measures to mitigate such toxins for the health of the community.

2. Conduct water testing on site before construction to determine lead and copper concentrations in both interior and exterior plumbing.

   Rationale: Due to the location and age of the site there is a possibility of lead and copper contamination in water from older plumbing systems.

Dogs and vermin

1. Design site to provide effective water drainage system to help minimize mosquito breeding areas.

   Rationale: Stagnant water that collects in low lying areas after rains can attract mosquitoes. They tend to breed in such environments and quickly spread through the community. The most effective method to prevent mosquito infestation is to design for minimum water stagnation.

2. Implement a stagnant water education program that informs residents of strategies to prevent and manage standing water.

   Rationale: While the design of the environment can prevent water stagnation by providing adequate drainage, containers left outside during rains can act as breeding grounds for mosquito larvae. Education on preventative measures to manage mosquito populations can be helpful in minimizing the impacts of this disease vector.

3. HAMC should consult with the Maricopa County Vector Control program to request mosquito control when necessary.

   Rationale: During monsoons and at times when mosquito population is naturally high, pest control measures may be the only way to keep the mosquito population in check.

4. Implement a multipronged dog control program in partnership with the Animal Defense League of Arizona (ADLA) and the Maricopa County Animal Care and Control Department to control loose guard dogs, abandoned/dumped dogs in the area and unleashed pets.

   Rationale: Stray dogs can be hazardous to human health as they can be disease vectors and cause injury from dog bites. Managing stray dog population is a difficult task that requires several strategies and approaches to ensure safety for both humans and the dogs.

Trash

Initiate resident-driven site clean-up and recycling activities in partnership with local community groups, the City of Phoenix Solid Waste Department and HAMC.

Rationale: Trash can attract rodents. A community clean-up drive can serve the purpose of removing these food sources for rodents, but also as a community-building exercise.

Parking

Introduce parking in close proximity to units to ensure good visibility and supervision of parked cars. Assess the need for additional ADA accessible parking spaces. Feedback from the community indicates that there is such a need.

Rationale: Most residents have to park on neighborhood streets and sometimes outside the community because there is insufficient parking on site. Cars parked far away from their owners, leaves them vulnerable to vandalism and theft.

Safety

1. Construct a block wall along the Coffelt boundary where adjacent to industrial uses bordering the housing. Height of the wall should be determined based on code specifications and in collaborative talks with owners of neighboring industrial sites.

   Rationale: A block wall will serve several purposes. It will act as a sound barrier, a barrier to pollutants and a barrier to dogs entering this community.

2. Install video cameras at strategic locations both on community streets and along the school fence.

Rationale: Certain locations in the community were identified by residents as more susceptible to crime than others. Video cameras can often be a deterrent to crime.

3. Establish a Block Watch program.

   Rationale: Block watch programs can empower residents to take back the streets. These programs are often tied to some minimal funding sources and would provide the community with added social capital.

4. Community evacuation planning or shelter-in –place planning should be prepared by the Housing Authority of Maricopa County.

   Rationale: Due to the location of the Coffelt site residents here are at higher risk of emergency situations. Emergency preparedness plans should be tested and response staff trained during regularly scheduled exercises that may be as simple as a table-top exercise.

Social Cohesion and Community Well Being

Social cohesion is a term used in social policy, sociology and political science to describe the bonds that bring people together in society, particularly in the context of cultural diversity. Social cohesion is critical for societies to prosper economically and for development to be sustainable (The World Bank, 2013).

It includes:

- Supportive social networks that provide access to material and emotional support.
- Relationships that provide friendship and company.
- Collective action to address issues affecting the community

There are several indicators of social cohesion such as overall well-being (life satisfaction), societal dysfunctions (suicide, work accidents), social conflict (strikes) and number of prisoners (Carpentier, Marx, & Bosch, 2008).

Social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions. Social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together (The World Bank, 2013).

Coffelt children came together for a dance festival at the community center as adults were providing valuable input during community workshops.

Relationship between social networks/cohesion and health

Social support and cohesion are important factors in supporting positive physical and mental health (Healthy Cities 21st Century; International Center for Health and Society, 2003). In one of the earliest studies on the relationship between social and community ties and mortality, researchers found that people who lacked social and community ties were more likely to die in the follow up period than those with more extensive relationships (Berkman & Syme, 1979).

Social trust and social capital contributes to people's self-rated health over and above individual relationships and networks (Poortinga, 2006). A growing body of research has found that the presence of social capital has a protective quality on health. It affects health behaviors by discouraging individuals from engaging in risky behaviors such as smoking, binge drinking, unsafe sex (Bolin, Lindgren, Lindstrom, & Nystedt,1982).

In a study of over 3,000 Maricopa county residents, researchers found that neighborhood social cohesion was significantly related to better self-reported physical and mental health (Rios, Aiken, & Zautra, 2012).

Existing conditions

During the community engagement process, different residents voiced similar concerns in separate encounters. It was apparent that there were clear divisions and groups within the neighborhood, primarily based on their location within the site. Residents that had lived for many years in Coffelt took a "neighbor helping neighbor" approach to cope with daily challenges and improve their quality of life. In spite of efforts by individual residents to improve living conditions at Coffelt a cohesive social network that brought residents together to advocate for a common cause was clearly lacking.

A central issue raised by the workshop participants was a perceived lack of communication between the HAMC, the developer, and the community members. Though the HAMC and the developer had conducted several meeting in an effort to discuss the redevelopment process, residents remained uncertain about procedural details and timelines of this project. This uncertainty was stressful to many.

Several residents that participated in the community workshops cited the absence of an accessible community space as a primary barrier to social cohesion. The timings for the existing community center, particularly its closure on Sundays, do not serve the

working population at Coffelt. The elderly reported feeling confined to their homes due to the lack of such a gathering space during the day time hours.

While the City of Phoenix provides after school programs at the community center, there are no classes or programs for adults. Residents envisioned a community space that would provide programs, education and technical assistance on gardening, diet and nutrition, mitigating disease vectors, health and physical activity.

Vandalism, tagging and the general state of disrepair on this site were evidence to the lack of community pride. There is currently no signage that identifies this community. At the community workshops, longtime residents shared stories of a different time, decades back, when Coffelt was a thriving residential neighborhood. There was a sense of nostalgic yearning to restore pride in this community as part of this proposed redevelopment process.

This site is surrounded by industrial businesses on three sides and is physically isolated from other residential neighborhoods in Central City South. The lack of a cohesive community group makes it harder for residents of Coffelt to engage in programs and outreach efforts organized by the local Community Development Corporation that serves Central City South. This further exacerbates their isolation.

The socioeconomic condition of this population combined with the isolation and lack of social cohesion contribute to a decline in community wellbeing. Residents reported alcohol and drug abuse are prevalent throughout this community. Domestic violence and other forms of assault occur on a daily basis but often go unreported to authorities.

Evaluating potential health impacts

The redevelopment process at Coffelt will impact everyone in the community. This is one issue around which residents can come together to build a stronger network with a singular voice. This process can foster the creation of a formal body that not only addresses issues within the community, but also has the capacity to form partnerships and build on the external resources.

An expanded pool of resources and social networks will enhance living conditions for these residents. The improvements and beautification of the community will engender a sense of pride and identity among its residents. Overall satisfaction with living conditions has been shown to improve mental and physical wellbeing and further enhance quality of life.

Recommendations

The goal of these recommendations is to promote programs for social cohesion, wellbeing and education in this community.

1. Create a Community Council with assistance from the HAMC and PRC. Leadership Academies conducted by PRC will create the foundation for this council. Housing Authority to provide a space for the council to meet.

   Rationale: A Community Council will empower the community to advocate for issues that require eminent change. This council can also seek out resources from and engage with other local agencies to help meet the needs of the community.

2. Design and construct a community gallery/celebratory space that will allow residents that live at Coffelt to share their stories. This space will be used for community celebrations and used as a tool to involve more residents in the council. Consider including a community kitchen space to facilitate food prep in the future.

   Rationale: Celebrations are a powerful way of enhancing a sense of cohesion in a community. They can bring different people together and foster positive and dynamic relationships between and within local communities (Merton Borough Council, 2008). A space designated for ongoing celebrations is an essential infrastructure for these events.

3. Facilitate regular community education meetings through the community council to receive

   a. updates on construction progress from HAMC and Gorman

   b. information and education about high pollution advisories

   c. education about vermin control

   d. continuing education led by local community groups

   Rationale: An ongoing community education program will help facilitate better communication between community members while providing an opportunity for skill building. While this can empower residents to take steps towards improving their lives at an individual level, it can also foster stronger community cooperation and collaboration.

4. Include Coffelt in the circulation zone for the CCS newsletter. Newsletter should include Coffelt resident stories and information about the redevelopment. HAMC and Developer to create information that should be included in the newsletter about redevelopment.

   Rationale: Being part of the CCS newsletter can reverse the sense of isolation and alienation that residents of Coffelt feel due to social and physical barriers from the rest of Central City South. The newsletter can also act a tool to restore community identity and pride for Coffelt residents.

5. Provide incentives for residents to be involved in the community including developing ways to provide residents with community service hours and proving stipends for those who help HAMC in their efforts.

   Rationale: While many residents at Coffelt are involved and engaged in the community or at least do what little they can to improve their lives, for others there are several barriers to being involved. Individuals often work many jobs, have young children or elderly parents to take care of, or are just not interested. Currently there is little incentive provided by the HAMC for residents to be involved in the community. Other public housing have used stipends for community-related work as a model and proven that it works as a catalyst to get residents engaged. Community involvement not only builds cohesion amongst residents, but also supports the management in its tasks.

6. Construct a community sign at the Pima Street entrance to the Coffelt community to establish an identity and help build resident sense of community and instill community pride.

   Rationale: Creating an identity is a foundation for establishing a sense of ownership.

7. Replace the decorative wall/fence along 19th Avenue with a solid decorative wall and landscaping to improve privacy and help reduce vehicle noise.

   Rationale: The decorative wall will add to the sense of identity and make the community stand out from the neighboring sites.

This page was intentionally left blank

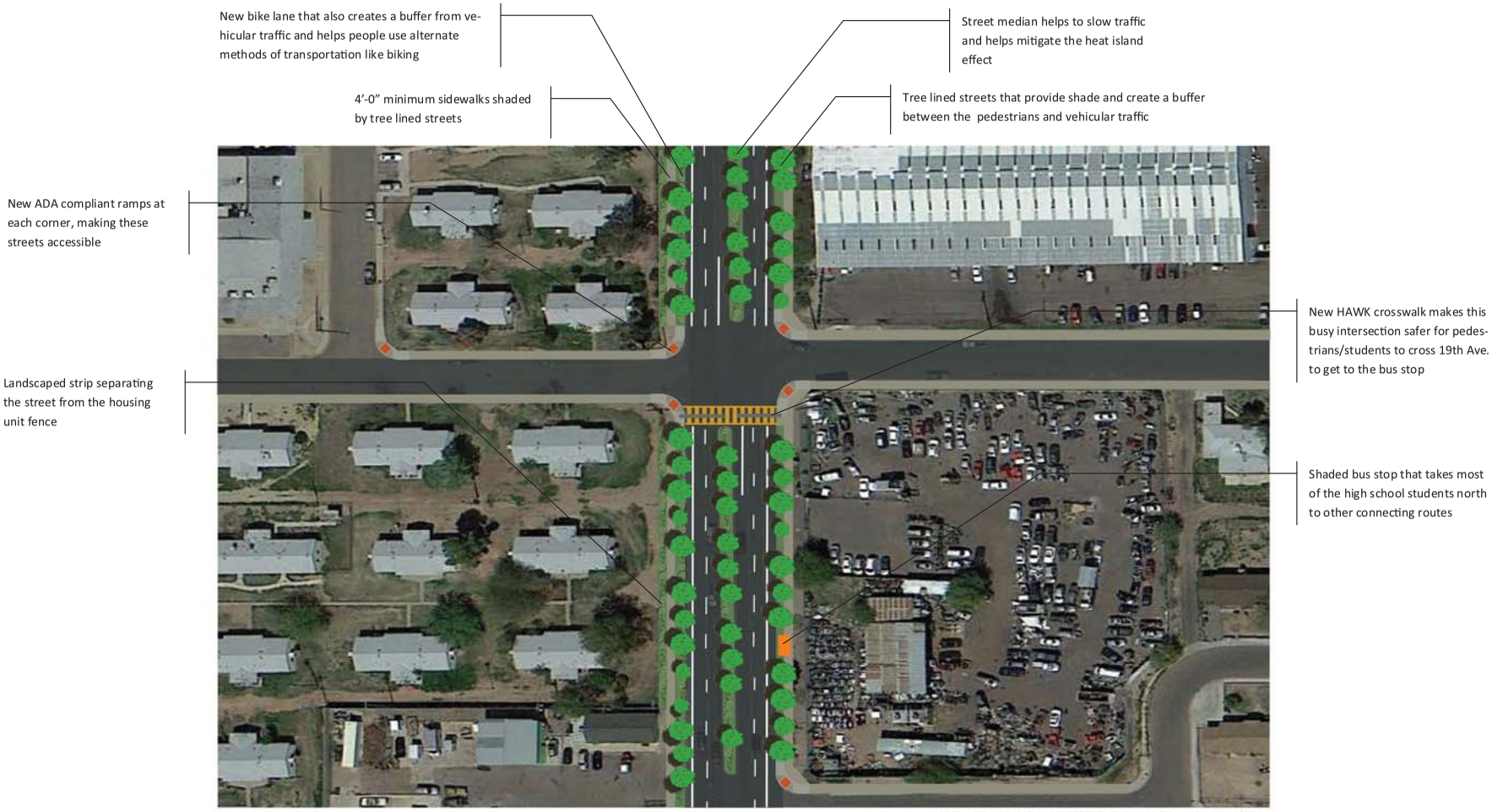
Visual Scenarios

In the interest of providing some perspective on how some of these recommendations might manifest in the physical environment, visual scenarios were created for the community presentations. Those ideas are represented here. These are by no means the final designs to be used in the redevelopment process, but rather snapshots of some of the possible ways in which the Coffelt site and its surroundings may change as a result of the redevelopment.

Coffelt Site Plan Featuring New Coffelt Park Plan, New Community Park at Hamilton, New Prototype Unit and New Streets Plan


Green buffer between sidewalk and driveway
Sidewalks need to be a minimum of 4'-0" wide to comply with ADA
Green buffer between street and sidewalk (shading for pedestrians)
Landscaping dividing the private backyards and the driveways
Front yard walkways 6'-0" wide leading to individual walkways to units 4'0" wide
Private backyards with individual walkways
Shade structures for front yard/unit entrance
Green buffer between housing units and industrial sites
Backyard driveways with individual parking for units
6'-0" block wall around the perimeter of the housing units separating from the industrial sites
Private backyards with gardens, gardens have screens for vines that also serve as privacy screens
Unit Prototype

Unit Prototype Private Back Yards with Individual Parking



Pedestrian HAWK Crosswalk on 19th Avenue and Pima

Tree lined streets that provide shade and create a buffer between the pedestrians and vehicular traffic

New HAWK crosswalk makes this busy intersection safer for pedestrians/students to cross 19th Ave. to get to the bus stop

New ADA compliant ramps at each corner, making these streets accessible

Street median helps to slow traffic and helps mitigate the heat island effect

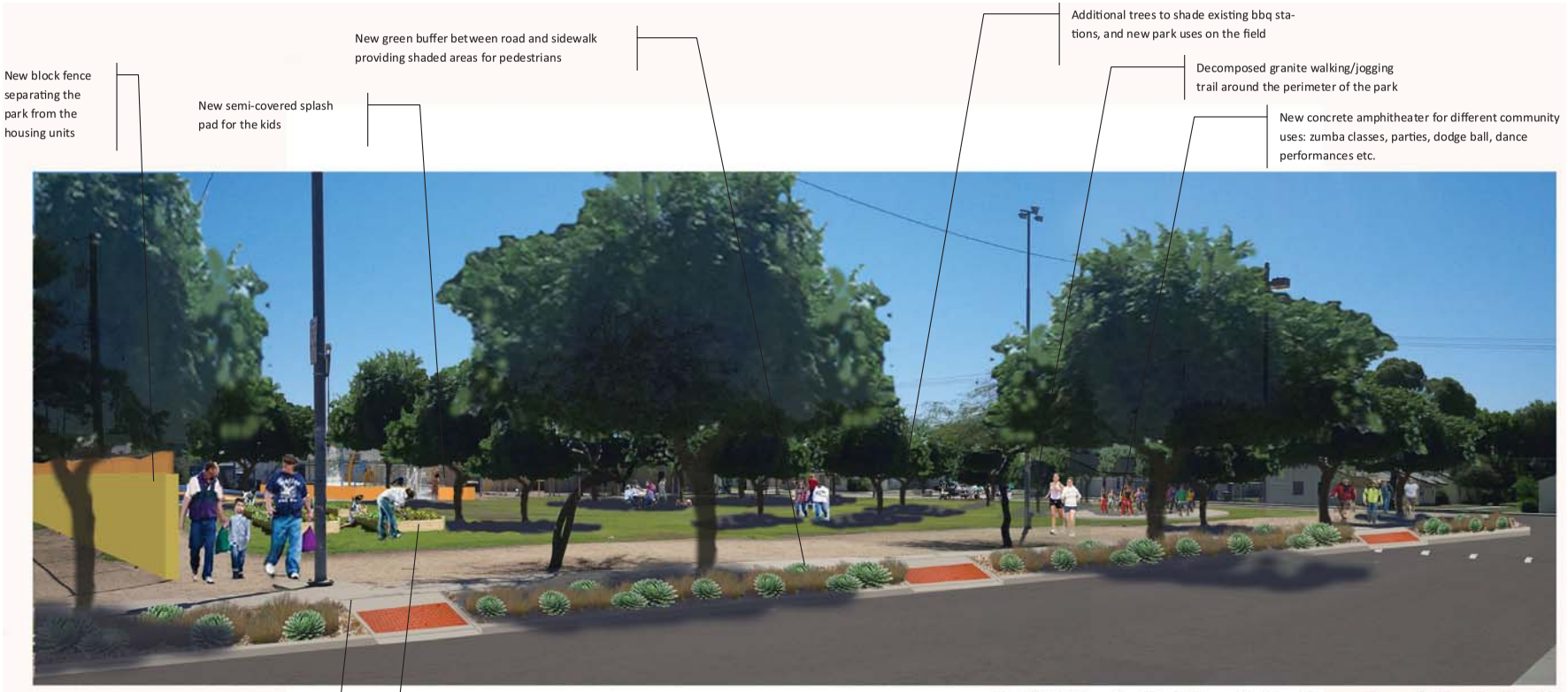
4'-0" minimum sidewalks shaded by tree lined streets

New bike lane that also creates a buffer from vehicular traffic and helps people use alternate methods of transportation like biking

Landscaped strip separating the street from the housing unit fence

Pedestrian HAWK Crosswalk on 19th Avenue and Pima


Resurfaced basketball court
Decomposed granite walking/jogging trail around the perimeter of the park
New community garden space to address the lack of fresh, affordable foods
New block fence separating the park from the housing units
New semi-covered splash pad for the kids
New concrete amphitheater for different community uses: zumba classes, parties, dodge ball, dance performances etc.
New green buffer between road and sidewalk providing shaded areas for pedestrians
4'-0" minimum sidewalk with ADA compliant ramps
Additional trees to shade existing bbq stations, and new park uses on the field
Coffelt Park



Coffelt Park Walking Path. Resurfaced Basketball Court, New Splash Pad and Community Garden


Iron fence, keeps the visibility from the housing units to the park, eyes on the streets makes everyone safer
Main gate welcoming residents to the Coffelt community park, sidewalk leading to park 4'-0" minimum
Mural on the walkway leading from the housing units to the school community park
Concrete block wall separating the school and park from the industrial sites
New green buffer to separate the school from the surrounding industrial sites
Existing gates separate the school zone and the park zones open to the community
New community garden for school to use with students, shaded by trees
New canopy for temporary uses by both the community and the school; shaded seating for the soccer games, zumba classes or out-door school activities
Hamilton School Community Park

New community garden for school to use with students, shaded by trees

New canopy for temporary uses by both the community and the school; shaded seating for the soccer games, zumba classes or outdoor school activities

New green buffer to separate the school from the surrounding industrial sites

Mural on the walkway leading from the housing units to the school community park

Hamilton School Community Park

Conclusion

The redevelopment of Coffelt will positively impact the community. The redevelopment will create better housing conditions both in terms of the individual units and in terms of the overall site. The improvements will increase access to healthy foods, opportunities for physical activity, access to safe transport, enhance the sustainability of the neighborhood and empower residents to build social capital. The HAMC and local agencies such as PRC should continue to monitor the health determinants outlined here to assess the continued needs of this community.

This page was intentionally left blank

Works Cited

Abley, S. (2005). Walkability Scoping Paper. Christchurch, New Zealand. Retrieved from http://www.levelofservice.com/walkability-research.pdf

Active Living Research. (2009). Walking and Biking to School, Physical Activity and Health Outcomes.

Advameg, Inc. (2013). 85009 Zip Code Detailed Profile. Retrieved from City-Data: http://www.city-data.com/zips/85009.html

Arizona Department of Health Services. (2010). New Heat Report Stresses Summer Dangers. Phoenix: Arizona Department of Health Services.

Arizona Department of Transportation. (2008). Data and analysis, Average annual daily traffic. Retrieved from Arizona Department of Transportation: http://azdot.gov/planning/DataandAnalysis/average-annual-daily-traffic

Armstrong, D. (2000). A survey of community gardens in upstate New York: Implications for health promotion and community development. Health & Place, 319-327.

Babey, S., Brown, E., & Hastert, T. (2005, December). Retrieved October 4, 2012, from Access to Safe Parks Helps Increase Physical Activity among Teenagers: http://www.healthpolicy.ucla.edu/pubs/Publication.aspx?pubID=159

Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: a nine-year follow-up study of Alameda County residents. . American Journal of Epidemiology, 186-204.

Bolin, K., Lindgren, B., Lindstrom, M., & Nystedt, P. (1982). Bolin K., Lindgren B., Lindstrom M., & Nystedt P. Invetments in social capital implications of social interactions of the production of Health. Social Science and Medicine, 2379-90.

Carpentier, S., Marx, I., & Bosch, K. V. (2008, May 15). Social Cohesion and Social Policy: Does income inequality matter? Retrieved from Social Cohesion in Flanders: www.socialcohesion.eu/14.%20UA.ppt

Centers for Disease Control and Prevention. (1999). Social Determinants of Health. Retrieved from Centers for Disease Control and Prevention: http://www.cdc.gov/socialdeterminants/FAQ.html

Centers for Disease Control and Prevention. (2012). Health Effects of Limited Access to Healthy Food: Obesity, Chronic Disease and Poor Nutrition. Retrieved December 5, 2012, from http://www.cdc.gov/healthyplaces/healthtopics/healthyfood/obesity.htm

Centers for Disese Control and Prevention. (2013, February). Adolescent and School Health. Retrieved from Centers for Disese Control and Prevention: http://www.cdc.gov/healthyyouth/Asthma/index.htm

Cohen, D., McKenzie, T., & al, e. (2007). Contribution of Public Parks to Physical Activity. American Journal of Public Health, 509-514.

Coyle, K. J. (2010). Back to School: Back Outside. National Wildlife Federation.

Ewing, R., Schmid, T., Killingsworth, R., A., Z., & Raudenbush, S. (2003). Relationship between Urban Sprawl and Physical Activity, Obesity and Morbidity. American Journal of Health Promotion, 18(1), 47-57.

Frumkin, H. (2010). Healthy buildings. In H. Frumkin, Environmental health: from global to local (pp. 689-729). San Francisco, CA: Jossey-Bass.

Hallberg, B. (2009). Using Community Gardens to Augment Food Security Efforts in Low-Income Communities. Blacksburg, VA: Virginia Tech.

Human Impact Partners, (2011). Gateway Cities Air Quality Action Plan, I-710 Corridor Project Health Impact Assessment. Unpublished.

Healthy Cities 21st Century; International Center for Health and Society. (2003). The Social Determinants of Health: The Solid Facts. WHO Europe.

Hyde, P. (2013). Health effects of air pollution in metropolitan Phoenix. South Mountain Citizens Advisory Team Meeting.

Kettel Khan, L., Sobush, K., Keener, D., Goodman, K., Lowry, A., Kakietek, J., & Zaro, S. (2009, July 24). Recommended Community Strategies and Measurements to Prevent Obesity in the United States. Retrieved October 9, 2012, from Morbidity and Mortality Weekly Report: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5807a1.htm

Lynch-Morin, K. (2012, December 10). Saginaw County Walmart stores offer free shuttle service for customers. Retrieved from MLive: http://www.mlive.com/business/mid-michigan/index.ssf/2012/12/saginaw_county_walmart_stores.html

Maricopa County Air Quality Department. (2013). Frequently Asked Questions. Retrieved from Maricopa County Air Quality Department: http://www.maricopa.gov/aq/about/faq.aspx#Att

Maricopa County Air Quality Department. (2013). Permit applications. Retrieved from Maricopa County Air Quality Department: http://www.maricopa.gov/aq/divisions/permit_engineering/applications/

Maricopa County Animal Care and Control. (2013). Animal bites. Retrieved from Maricopa County Animal Care and Control: http://www.maricopa.gov/Pets/Bites/default.aspx

Maricopa County Department of Emergency Management. (2013). Preparedness. Retrieved from Maricopa County Department of Emergency Management: http://www.maricopa.gov/Emerg_Mgt/prepare.aspx

Maricopa County Risk Management Department. (2001). Asbestos-containing material management plan:Coffelt-Lamoreaux homes. Project No. 01050. Maricopa County Risk Management Department. Retrieved from Maricopa County Risk Management Department: Maricopa County Risk Management Department, (2001a). Asbestos-containing material management plan:Coffelt-Lamoreaux homes. Project No. 01050.

Merton Borough Council. (2008). CommunityCohesion Event Toolkit. Merton Borough Council.

Miles, R. (2008). Neighborhood Disorder, Perceived Safety and Readiness to Encourage Use of Local Playgrounds. American Journall of Preventitive Medicine, 34, 275-281. doi:10.1016/j.amepre.2008.01.007

O'Brien, C. W. (2009). Injuries and Investigated Deaths Associated with Playground Equipment, 2001-2008. Bethesda, MD: Consumer Product Safety Commision.

Pearson, J. F., Bachireddy, C., Shyamprasad, S., Goldfine, A. B., & Brownstein, J. S. (2010). Association between fine particulate matter and diabetes prevalence in the U.S. Diabetes Care.

Phoenix Police Department. (2012). Phoenix Police Department. Retrieved from City of Phoenix: http://phoenix.gov/police/crista1.html

Policy Link, T. F. (2012). A Healthy Food Financing Initiative: An Innovative Approach to Improve Health and Spark Economic Development. Policy Link.

Poortinga, W. (2006). Social relations or social capital? Individual and community health efects of bonding social capital. Social Science and Medicine, 255-270.

Quigley, R., Broeder, L. d., Furu, P., Bond, A., Cave, B., & Bos, R. (2006). Health Impact Assessment International Best Practice Principles. Fargo, USA: International Association for Impact Assessment.

Rios, R., Aiken, L. S., & Zautra, A. J. (2012). Neighborhood contexts and the mediating role of neighborhood social cohesion on health and psychological distress among Hispanic and non-Hispanic residents. Annals of Behavioral Medicine, 50-61.

Roberts, P. T. (2013). Near-road impacts of vehicle emissions: Examples of impacts and mitigation. . South Mountain Citizen's Advisory Team Meeting. Phoenix, AZ: South Mountain Citizen's Advisory Team .

Robson, M. G., Hamilton, G. C., & Siriwong, W. (2010). Pest control and pesticides. In H. Frumkin, Environmental health: from global to local. (pp. 591 -634). San Francisco, CA: Jossey-Bass.

St. Luke's Health Initiative. (2012). Health Impact Questionnaire. A Survey for the Reinvent Pheonix Project. Phoenix: City of Phoenix - Reinvent Phoenix Project (contacts - http://slhi.org/, http://phoenix.gov/pdd/reinventphx.html)

St. Luke's Health Initiative. (2012). Mini Park Audit. An audit for the Reinvent Pheonix Project. Phoenix: City of Phoenix - Reinvent Phoenix Project (contacts - http://slhi.org/, http://phoenix.gov/pdd/reinventphx.html)

St. Luke's Health Initiative. (2012). Street Audit. An audit for the Reinvent Pheonix Project. Phoenix: City of Phoenix - Reinvent Phoenix Project (contacts - http://slhi.org/, http://phoenix.gov/pdd/reinventphx.html)

Suecoff, S. A., Avner, J. R., Chou, K. J., & Crain, E. F. (1999). A comparison of New York City playground hazards in high- and low-income areas. Archives of Pediatrics and Adolescent Medicine, 363-366.

Surgeon General of the United States. (2012). Overweight and Obesity: What You Can Do. Retrieved October 9, 2012, from http://www.surgeongeneral.gov/library/calls/obesity/fact_whatcanyoudo.html

The Health Effects Institute. (2010). Traffic-related air pollution: A critical review of the literature on emissions, exposure, and health effects (HEI Special Report 17)., (p. 1).

The Reinvestment Fund. (2013, October 22). TRF Policy Map. Retrieved from Estimated Total Grocery Retail Demand: http://www.policymap.com/maps

The Reinvestment Fund. (2013, 0ctober 21). TRF Policy Map. Retrieved from Estimated Grocery Retail Leakage Rate, as of 2011: http://www.policymap.com/maps

The Trust for Public Lands. (2006). Retrieved October 4, 2012, from The Health Benefits of Parks: http://www.eastshorepark.org/HealthBenefitsReport_FINAL_010307.pdf

The World Bank. (2013, October 25). What is Social Capital. Retrieved from The World Bank: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/EXTTSOCIALCAPITAL/0,,print:Y~isCURL:Y~contentMDK:20185164~menuPK:418217~pagePK:148956~piPK:216618~theSitePK:401015,00.html

U.S. Centers for Disease Control and Prevention. (2013). Designing and building healthy places. . Retrieved from U.S. Centers for Disease Control and Prevention: http://www.cdc.gov/healthyplaces/

U.S. Department of Agriculture, Economic Research Service. (2009). Access to Affordable and Nutricious Food: Measuring and Understanding Food Deserts and their Consequences, Report to Congress. Report to Congress. Retrieved October 11, 2012, from http://www.ers.usda.gov/media/242675/ap036_1_.pdf

U.S. Environmental Protection Agency. (1995). Leaded gas phaseout. Retrieved from U.S. Environmental Protection Agency: http://yosemite.epa.gov/R10/airpage.nsf/webpage/Leaded+Gas+Phaseout

U.S. Environmental Protection Agency. (2013). An introduction to indoor air quality. . Retrieved from U.S. Environmental Protection Agency: http://www.epa.gov/iaq/ia-intro.html

U.S. Environmental Protection Agency. (2013). Toxic release inventory. Retrieved from U.S. Environmental Protection Agency: http://oaspub.epa.gov/enviro/brs_report_v2.get_data?hand_id=AZD009010273&rep_year=2011&naic_code=&naic_code_desc=&yvalue=2011&mopt=0&mmopt=&wst_search=0&keyword1=&keyw

World Health Organization. (1946). Preamble to the Constitution of the World Health Organization. New York: The World Health Organization.

World Health Organization. (2013). Health Impact Assessment. Retrieved from World Health Organization Programmes and Projects: http://www.who.int/hia/en/

This page was intentionally left blank

Appendix A

Street Audit Report

Tips for Using the Street Audit Report

- Please think about your personal safety when conducting this audit, such as: don't go alone; be alert to potential danger; and don't go at night.

- Depending upon the weather, you may want to take some water and a hat, or use sunscreen. You may be outside for over an hour, so please take measures to keep yourself healthy.

- Pay attention to the street and your walk. You may have been on this street many times before, but look at your street again with extra attention to details.

- You may need to switch between sections or pages as you complete your street audit. Please review and be familiar with all of the sections and questions before you begin.

- We encourage you to take pictures of the street and to help us understand the condition of the street. Throughout the audit, we have included a camera icon as a reminder. Please make notes on this audit about the photos you have taken. 

Section A: Street Information

My Name: _____

Date (m/d/yr): _____ /_____ /_____ **Day of the Week:** _____

Street Name *(example: Oak Street)*: _____

Cross Streets *(example: 3rd Avenue and 12th Avenue)*: _____

Approximate Temperature: _____ °F **Weather:** ❑Clear ❑Partly Cloudy ❑Rainy

Start Time: ___ ___ : ___ ___ ❑AM ❑PM **End Time:** ___ ___ : ___ ___ ❑AM ❑PM

Section B: Street, Cars and Drivers

This section asks for general information about the street, its surroundings and its drivers.

As you answer questions, please keep the following definitions in mind:

> **Good condition**: looks clean and maintained; for example, minimal rust or graffiti

For most of your walk, how many **lanes** are available for traffic? *Do not count the turning lane.*

_____

Do you see a posted **speed limit sign**? ❑No ❑Yes

If yes … What is the posted **speed limit**? If there are different speeds along your walk, please list all. _____

What kind of **neighborhood** do you see on either side of this street? *Check all that apply.*

❑Houses or apartments ❑Businesses ❑Institutions, like a school or hospital
❑Industrial, for example a warehouse ❑Vacant land ❑Parks ❑Abandoned buildings
❑Highway or Interstate road, such as I-10

Do you see any **bus or light rail stops** along your walk? ❑No ❑Yes

If yes … How many? _____ bus stops _____ light rail stops

What kind of **amenities** do you see at the stops? *Check all that apply.*

❑Bench or other seating ❑Covered shelter ❑Trash can ❑Public art

Were the amenities at the bus or light rail stop in **good condition**? 

❑All or most in good condition ❑About half ❑None or few in good condition

Did you see anyone **waiting** for a bus or light rail train? ❑No ❑Yes

If yes … About how many people? _____

Would you **feel safe** waiting for a bus or light rail train right now?

❑No ❑Yes ❑I don't know

If no … why? _____

_____

Do you see any **bike routes or lanes**? *Check all that you see.*

❑None ❑Marked lane ❑Designated route sign ❑Share the road signs

What kind of **traffic signals or signs** do you see along your walk? *Check all that you see.*
❑Stop sign ❑Traffic light ❑Speed bump ❑Painted or marked cross walk ❑Yield sign
❑Other: _____ ❑Other: _____

During your walk, do you see any **drivers** doing the following:

Not stopping for people crossing the street? ❑Yes, a lot ❑Yes, a little ❑None at all
Driving faster than the speed limit? ❑Yes, a lot ❑Yes, a little ❑None at all
Speeding up to make it through a yellow light? ❑Yes, a lot ❑Yes, a little ❑None at all
Other dangerous driving habits? ❑Yes, a lot ❑Yes, a little ❑None at all

If yes … please describe: _____
_____

Does the street have **street lights or lamps**? ❑No ❑Yes

If yes … How much of the street could be lit? ❑less than 25% ❑25% to 75%
❑more than 75%

Section C: Sidewalks

This section asks detailed questions about sidewalks along this street. You will need to walk the entire route on both sides of the street. For example, if you are reporting on Oak Street, you will need to walk the entire route from 3rd Avenue to 12th Avenue on the north side (*Side 1*) of the street, and then 12th Avenue to 3rd Avenue on the south side (*Side 2*) of the street. *It is important to gather information about both sides of the street.*

As you answer questions, please keep the following definitions in mind:

> **Good condition**: looks clean and maintained; for example, not much litter and no cracks in the sidewalk surface

Side One

Which side of the street are you walking on? ❑North ❑South ❑East ❑West ❑I don't know

Does this side of the street have a **sidewalk**? ❑Yes, all or most of this side has a sidewalk ❑About half ❑None of this side has a sidewalk

If no … Where do people walk? ❑In the grass or dirt along the street ❑On the street ❑Other: _____ *If there is no sidewalk, please skip the following questions and go to* ***Side Two****.*

What is the sidewalk made of? *Check all that you see.* ❑Concrete ❑Asphalt ❑Gravel ❑Dirt ❑Other: _____

Is the sidewalk in **good condition**? ❑Yes, all or most of this side in good condition ❑About half ❑None of this side is in good condition

Is there a **"buffer"** between the sidewalk and the street, such as a grassy or dirt patch, trees or bushes? ❑Yes, all or most of this side has a buffer ❑About half ❑None of this side has a buffer

Are there **major obstacles blocking** the sidewalk making it difficult to use? *Check all that you see.* ❑Trees ❑Large plants, weeds or bushes ❑Utility or telephone poles ❑Large cracks, bumps or holes ❑Other: _____

About **how wide** is the sidewalk for most of your walk?
❑Only one adult can walk on the sidewalk ❑Two adults can walk side-by-side on the sidewalk ❑Three adults can walk side-by-side on the sidewalk ❑Four or more adults can walk side-by-side on the sidewalk

If the sun was directly overhead, how much of this sidewalk would be **shaded**? ❑less than 25% ❑25 to 75% ❑more than 75%

Side Two

Which side of the street are you walking on? ❑North ❑South ❑East ❑West ❑I don't know

Does this side of the street have a **sidewalk**? ❑Yes, all or most of this side has a sidewalk ❑About half ❑None of this side has a sidewalk

If no … Where do people walk? ❑In the grass or dirt along the street ❑On the street ❑Other: _____ *If there is no sidewalk, please skip the following questions and go to* ***Section D****.*

What is the sidewalk made of? *Check all that you see.* ❑Concrete or asphalt ❑Gravel ❑Dirt ❑Other: _____

Is the sidewalk in **good condition**? ❑Yes, all or most of this side in good condition ❑About half ❑None of this side is in good condition

Is there a **"buffer"** between the sidewalk and the street, such as a grassy or dirt patch, trees or bushes? ❑Yes, all or most of this side has a buffer ❑About half ❑None of this side has a buffer

Are there **major obstacles blocking** the sidewalk making it difficult to use? *Check all that you see.* ❑Trees ❑Large plants, weeds or bushes ❑Utility or telephone poles ❑Large cracks, bumps or holes ❑Other: _____

About **how wide** is the sidewalk for most of your walk?
❑Only one adult can walk on the sidewalk ❑Two adults can walk side-by-side on the sidewalk ❑Three adults can walk side-by-side on the sidewalk ❑Four or more adults can walk side-by-side on the sidewalk

If the sun was directly overhead, how much of this sidewalk would be **shaded**? ❑less than 25% ❑25 to 75% ❑more than 75%

Section D: Appearance and Safety

This section will ask about the safety and appearance of the street. As you answer questions, please keep the following definitions in mind:

Good condition: looks clean and maintained; for example, minimal rust or graffiti

Do you see any of the following **safety or appearance concerns** along your walk? C*heck all that you see.*

	I don't see any of this.	I see a little of this.	I see a moderate amount of this.	I see a lot of this.
Poor lighting, for example, absent or limited lighting	❑	❑	❑	❑
Graffiti	❑	❑	❑	❑
Vandalism	❑	❑	❑	❑
Broken glass				
Excessive litter	❑	❑	❑	❑
Heavy traffic	❑	❑	❑	❑
Excessive noise, for example, noticeable sounds that are unpleasant or annoying	❑	❑	❑	❑
Vacant buildings or lots, or undesirable uses, for example, abandoned houses or a liquor store	❑	❑	❑	❑
Poorly maintained properties, for example, tall weeds in yard or broken windows	❑	❑	❑	❑
Lack of eyes on the street, such as absence of people, no houses or store fronts	❑	❑	❑	❑

	I don't see any of this.	I see a little of this.	I see a moderate amount of this.	I see a lot of this.
Evidence of threatening persons or behaviors, such as gangs, or alcohol or drug use	❑	❑	❑	❑
Animal waste	❑	❑	❑	❑
Undesirable odors, such as garbage or sewer	❑	❑	❑	❑
Stray or unleashed dogs	❑	❑	❑	❑
Other:	❑	❑	❑	❑
Other:	❑	❑	❑	❑

About **how many** of the following things did you see during your walk:

Other people walking _____

People biking on the sidewalk _____

People biking on the street _____

People biking in a bike lane _____

Benches (*don't count the ones at light rail or bus stops*) _____

If there were benches, were they in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Trash cans (*don't count the ones at light rail or bus stops*) _____

If there were trash cans, were they **overflowing** with trash? ❑All or most overflowing ❑About half ❑None or few overflowing

Shade structures, like awnings or pergolas _____

If there were shade structures, were they in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Did you feel **safe** during your walk? ❑No ❑Yes

If no … Describe why you feel unsafe.

What can be done to make this street safer for people who walk?

If you have other observations or comments about this street, please describe them.

Thank you for your help! Please check that you have filled out the entire report.

Appendix B

MINI PARK AUDIT REPORT

TIPS FOR USING THE PARK AUDIT TOOL

- Please think about your personal safety when conducting this audit, such as: don't go alone; be alert to potential danger; and don't go at night.
- Depending upon the weather, you may want to take some water and a hat, or use sunscreen. You may be outside for over an hour, so please take measures to keep yourself healthy.
- Drive, bike, or walk around the park to get a feel for the contents and characteristics of the park and surrounding neighborhood. You may have been in the park many times before, but tour your park again with extra attention to details.
- This report is organized so that questions on similar topics are grouped together. However, you may need to switch between sections or pages as you complete the park audit. Please review and be familiar with all of the sections and questions before you begin.
- We encourage you to take pictures of the park and use them to help us understand the condition and use of your park. Throughout the audit, we have included a camera icon as a reminder. Please make notes on this audit about photos you have taken.

SECTION A: PARK INFORMATION

My Name: _____

Date (m/d/yr): _____ /_____ /_____

Park Name: _____

Park Address/Location: _____

Was the park easy to find? ❑No ❑Somewhat ❑Yes

Approximate Temperature: _____ °F **Weather:** ❑Clear ❑Partly Cloudy ❑Rainy

Start Time: ___ ___ : ___ ___ ❑AM ❑PM **End Time:** ___ ___ : ___ ___ ❑AM ❑PM

SECTION B: NEIGHBORHOOD, ACCESSIBILITY AND SIGNAGE

This section asks about getting into the park and the surrounding neighborhood. When thinking about the **surrounding neighborhood**, look at all areas that you can see from all sides of the park.

When rating the access and the park's surrounding neighborhood, please use the following definition:

> GOOD CONDITION: IS CLEAN AND MAINTAINED, AND CAN BE USED FOR ITS INTENDED PURPOSE; FOR EXAMPLE, IS USABLE OR WORKING; HAS NO BROKEN PARTS; NO GRAFITTI

Do **sign(s)** give the following information? *Check all that are present.* 
❑Park name ❑Park hours ❑Park rules

Does the park post **rules about animals**, such as dogs must be leashed? ❑No ❑Yes

Do **gates, fences or walls** make it difficult enter the park? ❑No ❑Yes

Can you see a **bus or light rail stop** from the park? ❑No ❑Yes

What types of **parking** are available for the park? C*heck all that you see.*
❑None ❑Parking lot ❑On-street parking ❑Bike rack(s)

Do the roads around the park have **sidewalks**? ❑No ❑Yes

If yes … Are they **in good condition**? ❑All or most are useable ❑About half ❑None or few are in good condition

Do any of the sidewalks alongside or entering the park have **curb cuts or ramps** for wheelchair accessibility or stroller use? ❑No ❑Yes

Do any roads around the park have **bike routes or lanes**? *Check all that you see.* 
❑None ❑Marked lane ❑Designated route sign ❑Share the road signs

Do any roads around the park have **traffic signals**? For example, crosswalk, stop light or stop sign. ❑No ❑Yes

How did you get the park today? ❑Walked ❑Biked ❑Drove

What kind of **neighborhood** surrounds the park? *Check all that you see.*

❑Houses or apartments ❑Businesses ❑Institutions, like a school or hospital

❑Industrial, for example a warehouse ❑Vacant land

❑Highway or Interstate road, such as I-10

Do you see any of the following **safety or appearance concerns** in the **area surrounding the park**? C*heck all that you see in the surrounding neighborhood within sight of the park.*

	I don't see any of this.	I see a little of this.	I see a moderate amount of this.	I see a lot of this.
Graffiti	❑	❑	❑	❑
Vandalism	❑	❑	❑	❑
Excessive litter	❑	❑	❑	❑
Heavy traffic	❑	❑	❑	❑
Excessive noise, for example, noticeable sounds that are unpleasant or annoying	❑	❑	❑	❑
Vacant buildings or undesirable uses, for example, abandoned houses or a liquor store	❑	❑	❑	❑
Poorly maintained properties	❑	❑	❑	❑
Lack of eyes on the street, such as absence of people, no houses or store fronts	❑	❑	❑	❑
Evidence of threatening persons or behaviors, such as gangs, alcohol or drug use	❑	❑	❑	❑
Other:	❑	❑	❑	❑

	I don't see any of this.	I see a little of this.	I see a moderate amount of this.	I see a lot of this.
Other:	❑	❑	❑	❑

COMMENTS OR GENERAL OBSERVATIONS ON THE PARK'S SETTING AND ACCESS:

SECTION C: PARK AMENITIES

This section asks about amenities in your park. When rating the amenities of the park, please use the following definitions:

> GOOD CONDITION: IS CLEAN AND MAINTAINED, AND CAN BE USED FOR ITS INTENDED PURPOSE; FOR EXAMPLE, IS USABLE OR WORKING; HAS NO BROKEN PARTS; NO GRAFITTI

Does the park have **drinking fountain(s)**? ❑No ❑Yes

If yes … Are the drinking fountains in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Are they **near activity areas**? ❑All or most are near ❑About half ❑None or few are near

Does the park have **bench(es)** to sit on? ❑No ❑Yes

If yes … Are the benches in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Do you see anyone **sitting on** the benches? ❑No ❑Yes

If yes … About how many people? _____

Does the park have **picnic table(s)**? ❑No ❑Yes

If yes … Are the tables in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Do you see anyone **using** the picnic tables? ❑No ❑Yes

If yes … About how many people? _____

Does the park have a **picnic shelter or ramada**? ❑No ❑Yes

If yes … Are the shelters or ramadas in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Do you see anyone **using** the picnic shelters or ramadas? ❑No ❑Yes

If yes … About how many people? _____

Does the park have **trash cans**? ❑No ❑Yes

If yes … Are they **overflowing** with trash? ❑All or most overflowing ❑About half ❑None or few overflowing

Are they in **good condition**? ❑All or most in good condition ❑About half ❑None or few in good condition

Are they **near activity areas**? ❑All or most are near ❑About half ❑None or few are nearby

Does the park have **recycling containers**? ❑No ❑Yes

COMMENTS OR GENERAL OBSERVATIONS ON THE PARK'S AMENITIES:

SECTION D: PLAYGROUND AREAS

This section asks about the playground areas in the park. For each playground feature, please list the condition, shade, lighting, and the approximate number of people using the area.

For each feature:

Categorize the condition of the park features. If the park does not have the listed feature, please move on to the next one. A feature in good condition looks clean, maintained and can be used. If the feature is in use, try your best to rate it.
Example: Of the swings, all or most were in good condition.

Answer how many of these features are under a shade canopy, other shade structure, or trees, and if this feature has lighting for when it is dark.
Example: Of the swings, none were under trees or a shade canopy, and about half were in a lighted areas.

Count the number of people using these features.
Example: Two children were using the swings.

Lastly, count the number of people watching or helping with these features.
Example: Three adults were helping the children on the swings and one adult was watching.

When rating the equipment, please use the following definitions:

> GOOD CONDITION: IS CLEAN AND MAINTAINED, AND CAN BE USED FOR ITS INTENDED PURPOSE; FOR EXAMPLE, IS USABLE OR WORKING; HAS NO BROKEN PARTS; NO GRAFITTI

	Rate condition of equipment			Can this equipment be shaded by trees or other shade structures			How many can be lit at night				
	All or most in good condition	About half in good condition	None or few in good condition	All or most can be shaded	About half can be shaded	None or few can be shaded	All or most can be lit	About half can be lit	None or few can be lit	Number of people using this feature	Number of people helping or watching this area
Example: Swings	☑	❑	❑	❑	❑	☑	❑	☑	❑	*2*	*4*
Swings	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Slides	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Monkey or other climbing bars	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Rock climbing wall, ropes, nets or other climbing features	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Sandbox	❑	❑	❑	❑	❑	❑	❑	❑	❑		

	Rate condition of equipment			Can this equipment be shaded by trees or other shade structures			How many can be lit at night			Number of people using this feature	Number of people helping or watching this area
	All or most in good condition	About half in good condition	None or few in good condition	All or most can be shaded	About half can be shaded	None or few can be shaded	All or most can be lit	About half can be lit	None or few can be lit		
Balance Beam	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Riding Animals	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Other Play Areas or Elements:	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Other Play Areas or Elements:	❑	❑	❑	❑	❑	❑	❑	❑	❑		

	Rate condition of equipment			Can this equipment be shaded by trees or other shade structures			How many can be lit at night			Number of people using this feature	Number of people helping or watching this area
	All or most in good condition	About half in good condition	None or few in good condition	All or most can be shaded	About half can be shaded	None or few can be shaded	All or most can be lit	About half can be lit	None or few can be lit		
Other Play Areas or Elements:	❑	❑	❑	❑	❑	❑	❑	❑	❑		

COMMENTS OR GENERAL OBSERVATIONS ON THE PARK'S PLAYGROUND AREAS:

SECTION E: SPORTS AND RECREATION FEATURES

This section asks about the sports and recreation areas in the park. For each area, please list the condition, shade, lighting, and the approximate number of people using the area.

For each feature:

Categorize the condition of the sports and recreation areas. If the park does not have the listed area, please move on to the next one. An area in good condition looks clean, maintained and can be used. If the feature is in use, try your best to rate it.
Example: None of the soccer fields were in good condition.

Answer how many of these areas are under a shade canopy, other shade structure, or trees, and if this feature has lighting for when it is dark.
Example: None of the soccer fields were shaded and half had lights for nighttime games.

Count the number of people using these features.
Example: Twelve people were playing soccer.

Lastly, count the number of people watching or helping with these features.
Example: Three people were watching the soccer game.

When rating the sports and recreation areas of the park, please use the following definitions:

> GOOD CONDITION: IS CLEAN AND MAINTAINED, AND CAN BE USED FOR ITS INTENDED PURPOSE; FOR EXAMPLE, IS USABLE OR WORKING; HAS NO BROKEN PARTS; NO GRAFITTI

	Rate condition of equipment			Can this equipment be shaded by trees or other shade structures			How many can be lit at night				
	All or most in good condition	About half in good condition	None or few in good condition	All or most can be shaded	About half can be shaded	None or few can be shaded	All or most can be lit	About half can be lit	None or few can be lit	Number of people using this feature	Number of people helping or watching this area
Example: *Field, soccer*	❑	❑	☑	❑	❑	☑	❑	☑	❑	*12*	*3*
Field, other:	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Court, basketball	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Court, other:	❑	❑	❑	❑	❑	❑	❑	❑	❑		

	Rate condition of equipment			Can this equipment be shaded by trees or other shade structures			How many can be lit at night				
	All or most in good condition	About half in good condition	None or few in good condition	All or most can be shaded	About half can be shaded	None or few can be shaded	All or most can be lit	About half can be lit	None or few can be lit	Number of people using this feature	Number of people helping or watching this area
Other feature:	❑	❑	❑	❑	❑	❑	❑	❑	❑		
Other feature: _____	❑	❑	❑	❑	❑	❑	❑	❑	❑		

COMMENTS OR GENERAL OBSERVATIONS ON THE PARK'S SPORTS AND RECREATION AREAS:

SECTION F: PARK QUALITY AND SAFETY

This section asks about factors related to quality and safety when using the park.

If the sun was directly overhead, how much of the park would be **shaded**? ❑less than 25% ❑25 to 75% ❑more than 75%

Is there a place to get **dog waste pick-up bags** in the park? ❑No ❑Yes

If yes … Are bags available? ❑No ❑Yes

Does the park have **lights**? (not including neighborhood street lights) ❑No ❑Yes

If yes … How much of the park could be lit? ❑less than 25% ❑25% to 75% ❑more than 75%

Is the **park monitored,** such as with volunteers, patrolled by police or park rangers, or cameras? ❑I don't know ❑Yes

Did you see evidence of **threatening behavior or persons** in the park, such as gangs or alcohol/drug use? ❑No ❑Yes

Which of the following **park quality concerns** do you see **in the park**? *Check all that are present.*

- ❑ I don't see any quality concerns
- ❑ Graffiti, such as markings or paintings that reduce the visual quality of the area
- ❑ Vandalism, such as damaged signs, buildings or equipment
- ❑ Excessive litter
- ❑ Excessive animal waste
- ❑ Excessive noise
- ❑ Poor maintenance, such as overgrown grass/weeds/bushes
- ❑ Other _____

Does the park have any dangerous spots, such as an abandoned building or pit/hole? ❑No ❑Yes

IF YES … DESCRIBE THE DANGEROUS AREA.

Do you feel safe in the park? ❑No ❑Yes

IF NO … DESCRIBE WHY YOU FEEL UNSAFE.

COMMENTS OR GENERAL OBSERVATIONS ON THE PARK'S QUALITY AND SAFETY:

SECTION G: YOUR USAGE OF THIS PARK

Over the past six months, about how many times have **you** used or visited this park? ❑About once a week or more ❑About once every other week ❑About once a month or less ❑I haven't visited this park in the past six months ❑I have never visited this park

Over the past six months, about how many times has **someone you live with** used or visited this park? ❑About once a week or more ❑About once every other week ❑About once a month or less ❑No one who lives with me uses this park ❑I don't know

Is there anything that prevents you from using this park? ❑No ❑Yes

If yes … What makes it difficult to use this park? *Check all that apply.* ❑ I don't have enough time ❑It is too far from my house ❑I didn't know about this park ❑I don't feel safe at this park ❑I don't feel safe walking to this park ❑The neighborhood around the park isn't safe ❑The equipment in the park isn't in good condition ❑ The park doesn't have equipment I would use ❑ It is too hot ❑There aren't enough benches or shade in the park ❑Other:_____

IS THERE ANYTHING THAT COULD BE CHANGED THAT WOULD ENCOURAGE YOU TO VISIT THIS PARK MORE OFTEN? ❑NO ❑YES

PLEASE EXPLAIN.

WOULD YOU RECOMMEND THIS PARK TO YOUR FRIENDS OR FAMILY? ❑NO ❑YES ❑IT DEPENDS

PLEASE EXPLAIN.

IF YOU HAVE OTHER OBSERVATIONS OR COMMENTS ABOUT THIS PARK, PLEASE DESCRIBE THEM.

THANK YOU FOR YOUR HELP! **PLEASE CHECK THAT YOU HAVE FILLED OUT THE ENTIRE REPORT.**

Appendix C

HEALTH IMPACT QUESTIONNAIRE

Access to Healthy Eating and Active Living

GENERAL INFORMATION

1. **What is your approximate age?**
   a. Under 30 years of age
   b. 30 to 39
   c. 40 to 49
   d. 50 to 59
   e. 60 to 64
   f. 65 years or older

2. **Please tell me which of the following BEST describes you. Do you consider yourself:**
   a. Caucasian or white
   b. Latino or Hispanic
   c. Black or African American
   d. Asian, pacific islander or native Hawaiian
   e. Native American or American Indian
   f. Other (specify): _____

3. **Gender**
   a. Male
   b. Female

HEALTHY FOODS

1. **Where do you buy your general groceries?** *Name grocery store.*
   a. Name:
   b. Location:

2. **Where do you most often shop for fruits and vegetables?**
   a. Supermarkets
   b. Ethnic markets (such as ranch market, carnicerias)
   c. Farmers Markets
   d. Other _____ (explain)

3. **Do you grow any of your own food in a community garden or backyard garden?** *If your answer is **Yes**, please skip to **question 6** in this section.*

   a. Yes _____ (specify where)
   b. No

4. **Why do you not grow your own food?** *Select the 3 most important reasons.*
   a. It is too much work
   b. I have no time
   c. I don't know how to grow my own food
   d. It is not allowed
   e. I do not have a backyard
   f. I grow food my own food at a community garden (skip to #6 if you selected this)

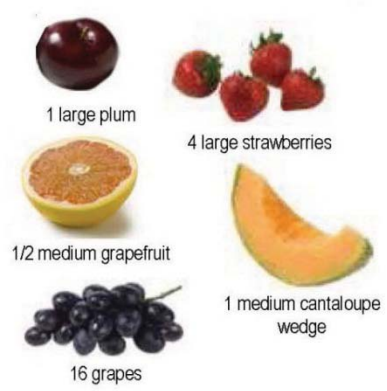
5. **Would you grow some of your own food if you had access to a community garden?**
   a. Yes
   b. No

6. **How do you to get to your grocery store?** *Choose one.*
   a. Car
   b. Bus
   c. Light rail
   d. Bicycle
   e. Walking

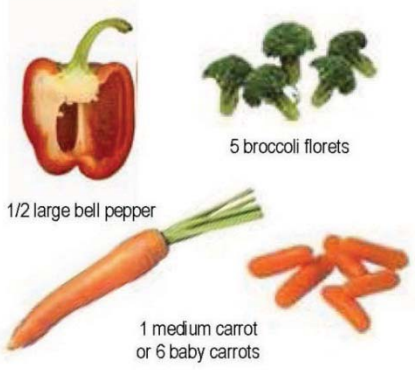
7. **How far is your primary grocery store from your house?**
   a. 1 – 5 blocks
   b. 6 – 10 blocks
   c. 11 – 20 blocks
   d. More than 20 blocks

8. **During the week where do you eat your:**
   a. Breakfast
      i. At home
      ii. In your car
      iii. At work
      iv. At School
   b. Lunch
      i. At home
      ii. In your car
      iii. At work
      iv. At School
   c. Dinner
      i. At home
      ii. In your car
      iii. At work
      iv. At School

9. **How many stores within one-half mile of your home sell fruits and vegetables?**
   a. ( ) Number
   b. I don't know



One serving of each type of fruit



One serving of each type of vegetable

10. **How many servings of fruit do you usually eat in a typical day**? *Do not count juices.*
    a. ( ) servings
    b. I don't know

11. **How many servings of vegetables do you usually eat in a typical day?** *Do not include fried potatoes like French fries or hash browns.*
    a. ( ) servings
    b. I don't know

12. **How many cans of soda such as Coke or 7-Up do you usually drink in a typical day?** *Do not include diet soda.*
    a. ( ) servings
    b. I don't know

13. **How many servings of other types of sugar-sweetened drinks do you usually drink?** - *Such as sugar added juices, lemonades or cocktails. Do not include diet drinks.*
    a. ( ) servings
    b. I don't know

14. **During a typical week, how many times do you eat fast food?** *—Such as food you get at McDonald's, KFC, Panda Express, or Taco Bell. This would include meals eaten at home, work or in a fast-food restaurant.*
    a. ( ) times
    b. I don't know

15. **When you buy fruits and vegetables, what are the most important factors to you?** *Select the 3 most important.*
    a. _____Price
    b. _____Quality
    c. _____Organic
    d. _____Popular in my culture
    e. Other_____ (explain)

16. **Which of the following would you support?** *Select the 3 most important.*
    a. _____More fruits and vegetable in our school meals
    b. _____More fruits and vegetables in local stores.
    c. _____More fruits and vegetables in local restaurants
    d. _____More cooking and nutrition classes in the community.
    e. _____Community gardens for people to grow their own food
    f. _____Food cooperatives to share food and cost
    g. _____Other _____ (explain)

17. **What is the most important thing that would help you improve your or your family's diet and nutrition?** *Circle the 3 most important factors.*
    a. Less expensive fruits and vegetables in stores where I shop
    b. Better quality fruits and vegetables where I shop.
    c. More stores in my neighborhood that sell fruits and vegetables.
    d. More transportation to stores with quality fruits and vegetables.
    e. More transportation to stores with affordable fruits and vegetables.
    f. More time to prepare meals at home.
    g. More stores that carry fruits and vegetables we eat in my culture.
    h. If my family liked vegetables.
    i. If I knew how to cook vegetables
    j. Other _____ (explain)

EXERCISE AND ACTIVE LIVING

1. **How active is your daily life?**
    a. Very active most days
    b. Very active once or twice a week
    c. Not very active
    d. Inactive

2. **Do you exercise other than the activities of your daily life?** *If your answer is **NO**, please skip to **question 9** in this section.*
    a. Yes
    b. No

3. **Where do you exercise or play sports?** *Choose one*
    a. Home
    b. Park
    c. Street
    d. Gym

4. **What type of exercise do you do?** *Choose one*
    a. I run
    b. I swim
    c. I work out at the gym
    d. I play sports
    e. I walk
    f. Other

5. **How many times per week or month do you exercise?**
    a. Once a week
    b. Twice a week
    c. Three or more times per week
    d. I do not exercise at all

6. **And when you take part in this activity, for how many minutes/ hours do you usually keep at it?**
   a. 10 minutes
   b. 20 minutes
   c. 30 minutes
   d. 1hour or more

7. **When do you exercise?**
   a. Morning
   b. Afternoon
   c. Night

8. **How far is the place at which you exercise?**
   a. I exercise at home
   b. 1 – 5 blocks
   c. 6 – 10 blocks
   d. 11 – 20 blocks
   e. More than 20 blocks

9. **Is there a park, playground, or open space within walking distance of your home?** *An open space refers to a sports field, hiking trail or other recreation area. Include public places for hiking, biking, golf, basketball, baseball, tennis, soccer, football, skateboarding, etc.*
   a. Yes
   b. No
   c. I don't know

10. **In the past 30 days, have you been to a park, playground or public open space?** *An open space refers to a sports field, hiking trail or other recreation area. Include public places for hiking, biking, golf, basketball, baseball, tennis, soccer, football, skateboarding, etc.*
   a. Yes
   b. No

11. **What factors make it difficult for you to get the physical activity you want?** *Circle the 3 most important factors.*
   a. I don't have time to exercise
   b. I have a physical disability which limits exercise
   c. Few parks and recreation opportunities
   d. Recreation opportunities are too expensive
   e. I don't feel safe walking or bicycling in my neighborhood
   f. Not enough walking paths or bicycle trails available
   g. Heat during the summer is too hot
   h. Other _____ (explain)

12. **What does exercise mean to you?**

_____

_____

TRANSPORTATION

1. **What type of transportation do you use?** C*heck all that apply*
   a. Car
   b. Bus
   c. Light rail
   d. Bicycle
   e. Walking

2. **Is your neighborhood safe to walk alone during the day:**
   a. Yes
   b. No
   c. It depends _____

3. **Is your neighborhood safe to walk alone during the evening/night:**
   a. Yes
   b. No
   c. It depends _____

4. **Do you use public transportation?** *If your answer is **NO**, please skip to **question 9** in this section.*
   a. Yes
   b. No

5. **If you use public transportation, what do you use it for?** *Circle all that apply*
   a. To go to work
   b. To go to school
   c. To go shopping
   d. To go grocery shopping
   e. To go to the park
   f. To go play or exercise
   g. Other _____

6. **How many days per week do you use public transportation?**
   a. Once a week
   b. Twice a week
   c. Monday through Friday
   d. Only weekends

7. **How far do you walk/bike to the transportation stop?**
   a. One block
   b. Two blocks
   c. Three blocks
   d. Four blocks or more

8. **How long does it take you to reach your work/school by public transportation?**
   a. 10 minutes
   b. 20 minutes
   c. 30 minutes
   d. 1 hour
   e. 2 hours or more

9. **If you don't use public transportation, why not?** *Select the 3 most important factors.*
   a. It takes too long to go to work
   b. Service times are not convenient
   c. There is no service to my destination
   d. It is too expensive
   e. It is not safe
   f. It is not comfortable
   g. The bus or light rail stop is too far
   h. It is too hot during the summer

Appendix D

Community Identified Assets and Liabilities

During the community workshop residents at Coffelt identified health assets and liabilities in their community.

An asset was defined as "anything that can be used to improve the quality of community life" based on the definition taken from the Work Group for Community Health and Development at the University of Kansas (The Community Toolbox, 2012). Assets were classified into three categories: positive, latent and desired. Positive assets were those that residents identified as resources for the community, while latent assets were identified as those that do not always support the unique needs of the community. Desired assets were resources that residents would consider a valuable addition to their community.

Liabilities were defined as facilities or services that did not serve the community well or were a hindrance to residents.

Table 1 represents some of the positive, latent and desired assets as well as the liabilities as prioritized by Coffelt residents. The Community Identified Assets and Liabilities Map shows the location of some of these.

Positive Assets	Latent Assets	Liabilities	Desired Assets
Coffelt Park/ Recreation Center	Coffelt Park/ Recreation Center	Stray Dogs	Crosswalk or Stop Light at 19th Ave. & Pima St.
Coffelt Management	Streets	Streets	Street Improvements
Transportation systems in close proximity	Landscaping	Crosswalk at 19th Ave and Pima St.	Grocery Store at 19th Ave. and Buckeye Rd.
Hamilton Elementary	Street Lighting	Supermarket at 19th Ave and Buckeye Rd.	Increase Street Lighting
		Landscape	Increase Shade
		Junk Yard	Install Air Conditioning Units
		Vandalism	Gym/Recreation Space
		Parked cars outside of Coffelt	

Table 1. Community Identified Assets and Liabilities

Legend

- Coffelt Neighborhood
- Crosswalk Needed
- Improvement Needed
- Access Desired
- Asset
- Liability

Assets & Liabilities

Coffelt-Lamoreaux Housing
Health Impact Assessment

N

0 250 500 1,000 Feet

Appendix E

Environmental Health Aspects and Impacts
Prepared by Albert Brown, M.P.A., R.S.

I. Introduction

The Environmental Aspects and Impacts chapter of this HIA introduces the reader to the identified hazards and relative risks from involuntary exposures to undesirable environmental conditions that currently exist for all residents of the Coffelt neighborhood. Environmental health aspects are the air we breathe, water we drink, ingestion of soil and dust by children, and exposure to insects that may carry disease. Environmental health impacts are the potentially harmful effects resulting from exposure to the environmental health aspects. Examples of environmental health impacts include respiratory diseases from air pollutants, mosquito-borne disease, and diarrheal illnesses from flies and rodents.

The chapter summarizes hazards from air pollution, noise, insects, rodents, unleashed dogs and hazardous materials. A summary of known sources of air pollution and hazardous materials is presented. Existing data on air pollution and noise are reported. Methods and practices to reduce exposure and risk from environmental hazards are described. A section of the chapter describes the most likely emergencies that may impact the Coffelt neighborhood. Recommendations are provided for each environmental aspect and impact for consideration by neighborhood revitalization planners and residents.

A. Responsible government agencies and overview of environmental aspects and impacts

i. Adequate housing

The Housing Authority of Maricopa County is responsible for the operations and maintenance of the Coffelt neighborhood. The planned revitalization of the neighborhood will explore the feasibility of a wide menu of housing and neighborhood improvements, all of which will be evaluated for their potential environmental and public health benefits. There is a strong connection between health and housing. Conditions such as indoor air quality, exposure to toxins, exposure to insects and rodents, exposure to mold and injury hazards may exist inside and around homes. Because most people spend at least fifteen hours each day inside their homes (Frumkin, 2010), residences must be built and maintained to minimize exposures to environmental hazards in order to ensure good health for the occupants. Today, there are many design, construction and technologies available to achieve safe and healthy housing. Constructing dwellings using strategies for reducing energy and water consumption will provide benefits to both the surrounding community and residents of the houses.

ii. Clean air

The Maricopa County Air Quality Department and the Arizona Department of Environmental Quality have responsibility for providing air pollution control planning, monitoring, permitting, inspection and enforcement services within the area occupied by the Coffelt neighborhood. An average adult breathes approximately two gallons of air each minute (Maricopa County Air Quality Department, 2013). When multiplied by an average human lifetime of approximately 85 years, it is easy to imagine the opportunity for respiratory system damage if the air does not meet established health standards and recommended

safe levels for unregulated exposures. Common air pollutants in the outdoor air include particulates (dust and soot), ozone and hazardous air pollutants like benzene. Indoor air may be unhealthful if it contains tobacco smoke, wood smoke, carbon monoxide, asbestos, lead, certain organic chemicals, radon and dust. The primary source of most air pollution in outdoor settings is vehicular traffic. Nearby factories and municipal operations may contribute to the presence of hazardous air pollutants and odors. The greater Phoenix metropolitan area including the Coffelt neighborhood has been classified by the U.S. Environmental Protection Agency (EPA) as non-attainment for particulate matter having a size of 10 microns or less (PM-10) and ozone (MCAQD, 2013). Air pollution control requirements are in place and being enforced to continuously improve the quality of our outdoor air. Poor building design, inadequate ventilation, natural gas appliances, tobacco smoking and wood burning are sources and causes for the major indoor air pollutants. Modern housing construction materials, designs and methods are available for creating high quality indoor air. This chapter will provide more detail on each of the air quality issues mentioned here.

iii. Safe drinking water

Safe drinking water for the Coffelt neighborhood is provided by the City of Phoenix Water Department. The water coming from the tap goes through an extensive water treatment process and an extensive series of daily laboratory tests to ensure that it meets EPA standards. An annual report of the drinking water quality is provided by the City of Phoenix (City of Phoenix, 2013). Drinking water comes from a combination of surface water and groundwater sources. Wells in the area surrounding the Coffelt neighborhood are not used to provide drinking water because the underlying groundwater is contaminated with industrial chemicals and old landfill discharges of leachate. The water provided to the Coffelt neighborhood meets EPA safe drinking water standards.

iv. Sewage disposal

Domestic wastewater disposal in the Coffelt neighborhood is provided by the City of Phoenix Water Services Department. Wastewater flows from the houses into a municipal wastewater collection system that discharges to the 23rd Avenue Wastewater Treatment Plant. The wastewater treatment plant is inspected by the Maricopa County Environmental Services Department and the Maricopa County Air Quality Department. The treatment plant is in compliance with all environmental requirements (S. Kincaid. personal communication, September 3, 2013). Additional information on air quality requirements for odor control is provided in the section of this chapter for air quality.

v. Solid waste disposal

The City of Phoenix provides collection and disposal of municipal solid waste generated by the residents of the Coffelt neighborhood. This service includes provision of a separate disposal container for recyclable materials such as metals, glass and paper. A weekly pick up service is provided.

vi. Other utilities

Electricity is provided by the Arizona Public Service Company. Natural gas for heating and cooking is provided by the Southwest Gas Corporation. Telephone and internet services are provided by Cox

Communications Corporation. These three services are vital for the health and safety of every community. They are regulated by the Arizona Corporation Commission.

vii. Flood control

The Maricopa County Flood Control District is responsible for the planning, design, construction and operation of a flood control system for Maricopa County. This area includes the Coffelt neighborhood. The area lies within a historical 100-year floodplain. Several flood control structures and dam improvements have occurred since the original establishment of the Coffelt neighborhood. A significant life-threatening flood event is unlikely at the current time.

viii. Healthy community design

The Maricopa County Planning and Zoning Department and the City of Phoenix have authority to assign approved land uses and to approve applications for conforming land use improvements such as the proposed revitalization of the Coffelt neighborhood. The Centers for Disease Control (2013) have published recommended healthy community design considerations. An opportunity exists during the planning phase of the Coffelt neighborhood revitalization project for the inclusion of elements of the Centers for Disease Control (CDC) recommended community design practices. Public health and environmental benefits are expected to accrue over the 50 or more years that elapse between initial community construction and redevelopment. Further discussion of the healthy community design practices are discussed throughout the Coffelt-Lamareoux Public Housing Redevelopment Health Impact Assessment Report.

The CDC recommends the following community design practices.

- Mixed land use
- Greater land density
- Transportation alternatives (public transit)
- Good Pedestrian and bicycle infrastructure
- Affordable housing (housing for different incomes and different stages of life)
- Access to green spaces and parks
- Community town centers

II. Air Quality

A. Regulatory framework

i. Federal

Air quality has been an important issue for the United States since the 1940's when there were several deadly episodes of excessive air pollution in some U.S. cities. National regulation of air quality began in

the 1960's but the first significant law to establish major source pollution control programs did not occur until the Clean Air Act of 1970. A significant revision to the law was enacted by the U.S. Congress in 1990. The EPA is charged with the responsibility of enforcing the Clean Air Act as amended throughout the United States. EPA establishes national standards for air quality called criteria pollutants that every state must meet. There are standards for several criteria air pollutants called National Ambient Air Quality Standards (NAAQS) (EPA, 2013a). The greater Phoenix area meets the standards for all of the criteria pollutants except for particulate matter of less than ten microns (PM-10) and ozone. This means that the greater Phoenix area has unhealthful air quality on several days of the year for these two pollutants. The term used by the EPA for classification of areas that do not meet one or more of the national standards is **nonattainment**. The EPA has designated specific areas of Maricopa County as nonattainment for PM-10 and ozone. The EPA has oversight authority over the State of Arizona and Maricopa County to ensure that reasonable further progress is occurring to eventually attain the air quality requirements.

ii. State of Arizona

The State of Arizona, Arizona Department of Environmental Quality is the liaison between Maricopa County and the EPA for the region's efforts to meet national standards.

iii. Maricopa Association of Governments

The Maricopa Association of Governments provides significant coordination services between the 28 individual Tribal, county, city governments and the State affected by regional commitments to EPA called State Implementation Plans.

iv. Maricopa County

The Maricopa County Air Quality Department (MCAQD) regulates all permitted and some unpermitted sources of air pollution. Examples of regulated air pollution sources near the Coffelt neighborhood include the 23rd Avenue Wastewater Treatment Plant and the numerous industrial properties that are immediately adjacent to the Coffelt neighborhood. A new requirement is for owners of vacant properties that may generate blowing dust to comply with general permit requirements.

v. City of Phoenix

The City of Phoenix regulates sources of air pollution such as unpaved parking lots, unpaved alleys and roads. The City is responsible for keeping its facilities in compliance with the MCAQD rules for landfills, wastewater treatment plants, fuel storage facilities and city sponsored construction projects.

B. Health effects of air pollution

i. Particulate matter

The EPA has established enforceable National Ambient Air Quality Standards (NAAQS) for two sizes of particulate matter: fine and coarse. The coarse particulate matter standard refers to the measurable

fraction of particles ranging in size from 2.5 microns to 10 microns in diameter. The abbreviation for coarse particulate matter is PM-10. Fine particulates are those less than 2.5 microns in diameter; the abbreviation for fine particulates is PM-2.5. For perspective, one particle of PM-10 measuring 10 microns in diameter is about 1/7th the size of a human hair. Please refer to figure E.1. A PM-2.5 particle is four times smaller than a 10 micron particle, meaning that it would take a line of 28 PM-2.5 particles to fit across the width of one human hair. These particles are so small that it requires a microscope to see them. In general, the smaller the particle, the deeper it can be inhaled into the lungs. Most of the PM-2.5 size particles become permanently entrapped inside the lungs. The larger PM-10 particles may be removed by coughing up mucous that is excreted because of the irritation of the airways caused by the particles. Both sizes of particulate matter are dangerous to human health.

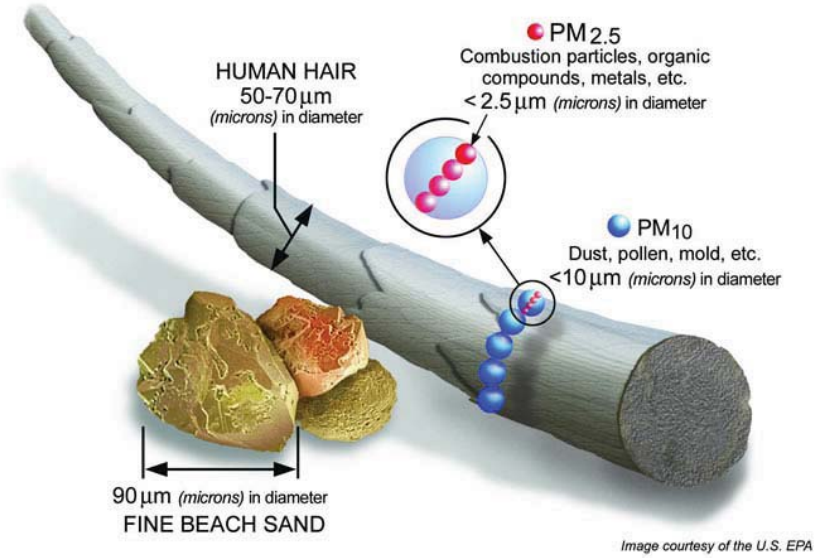


Figure E.1 Comparisons of relative sizes of fine beach sand, human hair, PM-10 and PM-2.5. Particulate matter small enough to be inhaled is regulated by the EPA as either PM-10 or PM-2-5. Adapted from "Particulate Matter (PM) Basic Information" by U.S. EPA, 2013b, retrieved from: http://www.epa.gov/airquality/particlepollution/basic.html

An exhaustive review of the latest scientific knowledge of the health effects from particulate matter was conducted by the EPA in 2009 (EPA, 2009). The document is called Integrated Science Assessment for Particulate Matter (ISA-PM). The ISA-PM concluded that short-term exposures (24 hours or less) to PM-10 at concentrations higher than the NAAQS yield a "suggestive causal relationship" for adverse respiratory and cardiovascular effects. The same level of scientific evidence of causality was determined for a higher risk of dying. The "suggestive" level of causality means that there is at least one valid study concluding a causal association of exposure to the pollutant and adverse health effects. However, there are other studies which are less convincing because experimental bias such as confounding factors could not be ruled out. The ISA-PM concluded that there is less causal evidence for adverse health effects due

to long-term exposure to PM-10 at levels above the annual NAAQS. Table E.1 is adapted from Table 2.6 from the ISA-PM. It provides a good summary of the weight of evidence for adverse health effects due to exposure to PM-10 and PM-2.5.

Table E.1

Summary of PM causal determinations by exposure duration and health outcome.

Size Fraction	**Exposure**	**Outcome**	**Causality Determination**
PM-2.5	Short-term	Cardiovascular Effects	Causal
		Respiratory Effects	Likely to be causal
		Central Nervous System	Inadequate
		Mortality	Causal
	Long-term	Cardiovascular Effects	Causal
		Respiratory Effects	Likely to be Causal
		Mortality	Causal
		Reproductive and Developmental	Suggestive
		Cancer, Mutagenicity, Genotoxicity	Suggestive
PM-10	Short-term	Cardiovascular Effects	Suggestive
		Respiratory Effects	Suggestive
		Central Nervous System	Inadequate
		Mortality	Suggestive
	Long-term	Cardiovascular Effects	Inadequate
		Respiratory Effects	Inadequate
		Mortality	Inadequate
		Reproductive and Developmental	Inadequate
		Cancer, Mutagenicity, Genotoxicity	Inadequate

An update to the 2009 ISA for PM was performed by the EPA in 2012 (EPA, 2012). This assessment made a "causal determination" for both cardiovascular effects and mortality due to both short-term and long-term exposure to PM-2.5 at levels exceeding the NAAQS. A determination of "causal" means that "evidence is sufficient to conclude that there is a causal relationship with relevant pollutant exposures" and the listed health effect (EPA, 2013c, p. lxviii). The determination of "causal" also means that the pollution studies are high quality "studies in which chance, bias and confounding could be ruled out with reasonable confidence" (EPA, 2013c, p. lxviii). The study found that there is "likely to be a causal relationship" between both short-term and long-term exposures to PM-2.5 and respiratory effects. A likely causal relationship means the evidence is sufficient to conclude that a causal relationship is likely to exist, but important uncertainties remain. A "suggestive" level of evidence of carcinogenicity, mutagenicity, genotoxicity and reproductive effects was found if populations are subjected to long-term exposures of PM-2.5 at levels above the NAAQS. In conclusion, the EPA integrated science assessment documents provide reliable evidence that people should not be subjected to air that is polluted with either PM-10 or PM-2.5 at concentrations above the NAAQS.

PM-10 in the greater Phoenix area comes from industrial emissions such as sand and gravel mining, windblown dust and vehicular traffic on both paved and unpaved roads. Any type of soil disturbance such as agriculture, construction, off-road vehicles etc. loosens the soil so that it becomes airborne as dust at wind speeds as low as 15 miles per hour. Most PM-2.5 in the Phoenix area comes from burning of diesel fuel, other vehicle exhaust and wood burning. Chemical reactions also occur in the atmosphere between many types of pollutants resulting in the formation of ultra-fine particles or aerosols which are inhaled. The concentrations of both PM-10 and PM-2.5 are greater near the sources of these emissions, especially freeways and large areas of disturbed ground.

Another issue of concern for Arizonans is Valley Fever, also known as Coccidioidomycosis. This is a lung infection caused by a fungus that lives in Arizona soils. The University of Arizona has found that Arizona has the highest rate of Valley Fever cases in the entire U.S. (2013). The U.S. Centers for Disease Control (2013) reported that Arizona had 66% of all United States cases in 2011. The CDC report reviewed reported Valley Fever cases from 1998 – 2011. Arizona cases increased at a rate of 16% per year during this period. The current incidence rate is 247.7 cases per 100,000 population. Breathing soil disturbed by construction, agriculture, landscaping, dust storms and other disruptions is a risk factor for contracting Valley Fever.

ii. Ozone

The EPA has established enforceable health-based standards for ozone in the ambient air. Ozone is not directly emitted from pollution sources. It is formed on hot sunny days when other air pollutants react with one another in the air. A family of gaseous compounds called nitrogen oxides and another group of chemicals in vapor form called volatile organic compounds react in the presence of sunlight to form ozone. Nitrogen oxides come from tailpipe emissions and industrial emissions from burning fossil fuels. Volatile organic compounds are found in common products such as gasoline, paints and solvents. EPA recently updated the Integrated Science Assessment for Ozone and Related Photochemical Oxidants (2013c). Tables E.2 and E.3 provide a brief summary of evidence from the Integrated Science Assessment for Ozone and Related Photochemical Oxidants (ISA-Ozone). The latest science on the health effects of ozone concludes that short-term (one-day) exposures to levels of ozone above the NAAQS for the 8-hour standard are unhealthful. EPA recommends that people should stay indoors and avoid vigorous exercise on days when the ozone levels are expected to exceed the standard. Housing with evaporative cooling will provide less protection from high ambient air ozone levels than housing with air conditioned recirculated air.

Table E.2 Summary of evidence from the ISA-Ozone on the health effects associated with **short-term** exposure to ozone

Health Outcome	**Conclusion from ISA-Ozone**
Respiratory effects	Causal relationship
Cardiovascular effects	Likely causal relationship
Central nervous system effects	Suggestive causal relationship
Total mortality	Likely causal relationship

Table E.3 Summary of evidence from the ISA-Ozone on the health effects associated with **long-term** exposure to ozone

Health Outcome	**Conclusion from ISA-Ozone**
Respiratory effects	Likely causal relationship
Cardiovascular effects	Suggestive causal relationship
Reproductive and developmental effects	Suggestive causal relationship
Central nervous system effects	Suggestive causal relationship
Cancer	Inadequate to determine causal relationship
Total mortality	Suggestive causal relationship

iii. Hazardous Air Pollutants

There are 187 hazardous air pollutants listed by the EPA (EPA, 2013a). The most common HAPs are asbestos, benzene, perchloroethylene, toluene, 1,3 butadiene, and formaldehyde. Sources of HAPs in the ambient air include tailpipe emissions from vehicles, evaporation of gasoline from engine compartments, industrial emissions and combustion of fuels for any reason. The HAPs associated with vehicles are called Mobile Source Air Toxics (MSATs). In April, 2013, the Federal Highway Administration (FHWA) reported on the top seven HAPs that are associated with risk of cancer in a Draft Environmental Impact Statement for the proposed South Mountain Freeway (Loop 202) in Phoenix (FHWA, 2013). The seven MSATs are listed in order of highest to lowest emissions rates in tons per year based on national data:

1. Diesel particulate matter (diesel PM)
2. Formaldehyde
3. Benzene
4. 1,3-butadiene
5. Naphthalene
6. Acrolein
7. Polycyclic organic matter (POM)

The FHWA report projects long-term reductions of MSATs due to cleaner engines and cleaner burning fuels. However, the downward trend is expected to level off and then slightly increase as our population and vehicle miles travelled increase. In summary, MSATs are predicted to be a cancer-risk concern for at least 20 years. If our national fleet of cars, trucks and buses is eventually converted to alternative fuels such as electricity or hydrogen, then the MSATs cancer risk will drop off.

Actual data sources for MSATs and HAPs are difficult to find. The reason is because the EPA has not adopted any requirements for either ambient air monitoring or NAAQS for these health hazards. Instead, the EPA is relying upon technology based requirements to drive the ambient concentrations of MSATs and HAPs lower over the years. Examples of the technology based standards are requirements imposed upon vehicle manufacturers to produce vehicles that emit fewer pollutants per mile driven, and specific industries, such as dry cleaners, to install Maximum Available Control Technology (MACT) devices at their business locations. This is important because industrial sources are often located very

near residences. One of the few available studies on concentrations of HAPs in the ambient air is the Joint Air Toxics Assessment Project (JTAP) conducted in the greater Phoenix area (Hyde, P., 2013). Eight HAPs monitoring locations were selected. The nearest location to the Coffelt neighborhood was the Greenwood air monitoring station. The site is named after the Greenwood cemetery close to the intersection of I-10 and I-17. Results from the air samples collected were analyzed to produce an estimated excess lifetime cancer risk from all of the MSATs collected by the sampling devices. The Greenwood sampling location estimated the highest cancer risk of the eight selected sites at approximately 700 cancer cases per million population. EPA's published acceptable risk level for cleaning up Superfund sites and other hazardous materials releases is no more than 100 cancer cases per million population (Hyde, P., 2013).

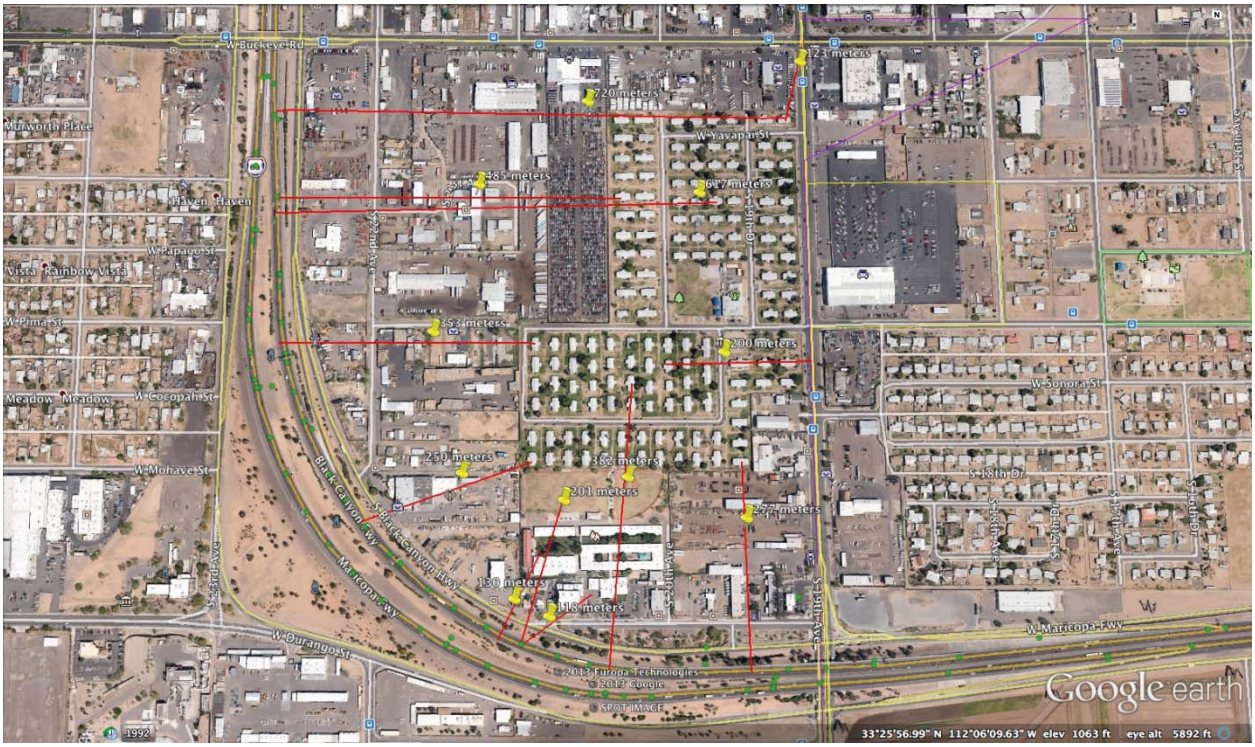
iv. Health risks associated with living near freeways

A growing body of evidence is emerging that suggests there is a positive association between living near a major transportation corridor such as a freeway and adverse health effects. Although many uncertainties still exist, the literature review conducted for this health impact assessment points to a need for a national public policy debate on the issue of constructing new high volume transportation projects within a reasonable risk distance of the nearest resident or susceptible receptors of the pollution such as children attending schools or seniors living in facilities. This section of the health impact assessment reports the results of several current studies on air pollution levels near freeways. The Health Effects Institute (2010, p.1) "concluded that the evidence is sufficient to support a causal relationship between exposure to traffic-related air pollution and exacerbation of asthma. It also found suggestive evidence of a causal relationship with onset of childhood asthma, nonasthma respiratory symptoms, impaired lung function, total and cardiovascular mortality, and cardiovascular morbidity." Kramer, et al. (2010) studied diabetes and air pollution and found an association between traffic-related air pollution and type 2 diabetes among elderly women. Pearson, et al. (2010), concluded that there is an increase of greater than 20% in prevalence of diabetes associated with counties in the U.S. having the highest concentrations of PM-2.5. Roberts et al., (2013) conducted ambient air sampling at schools in the vicinity of U.S. 95 in Las Vegas, Nevada. A maximum concentration of 2.4 $\mu g/m^3$ was detected at a school located 18 meters from U.S. 95. A maximum concentration of 1.1 $\mu g/m^3$ was detected at schools located 136 and 2400 meters from the freeway. A health impact assessment report was prepared to evaluate the effects of widening I-710 in the Los Angeles area (Human Impact Partners, 2011). The report included a literature review of studies related to health effects of roadway proximity. The nine epidemiological studies cited in the I-710 report consistently demonstrated that children and adults living in proximity to freeways or busy roadways have poorer health outcomes in comparison to persons living at least 500 meters from the roadways. The I-710 report estimated there is currently likely to be 48 excess annual deaths occur in the population living within 500 meters of the freeway attributable to traffic PM-2.5 exposure.

Taken together, the cited studies are suggestive of a causative relationship between higher pollution levels, health effects and distance from high volume roadways.

How close is the Coffelt neighborhood to the I-17? Figure E.2. indicates a distance of 118 meters from the freeway to the entrance of Hamilton Elementary School. The athletic field for this school is approximately 200 meters from the freeway. The nearest house is 250 meters. Most of the houses are within 400 – 500 meters. The most distant house is 720 meters from the freeway; however it is only 123 meters from the busy intersection of 19th Avenue and Buckeye Road. The prevailing winds in Phoenix are from the southeast through southwest vectors. The Coffelt neighborhood is downwind of I-17 on most days of the year.

Figure E.2. Distances from I-17 in meters



C. Air quality in the Coffelt neighborhood

i. As described earlier in this report, portions of Maricopa County, including the area of the Coffelt neighborhood have been classified by the EPA as nonattainment areas for the criteria pollutants PM-10 and ozone. The nonattainment area also experiences occasional exceedances of the NAAQS for PM-2.5, but the EPA has not declared that Maricopa County is in nonattainment for PM-2.5. The pollutant of highest concern for Maricopa County is PM-10. This is because the area experiences multiple days of the year with PM-10 readings that are significantly above the 24-hour standard of 150 $\mu g/m^3$. The EPA has revoked the annual PM-10 NAAQS which was 50 $\mu g/m^3$. In February 2008, the EPA lowered the NAAQS for ozone from 0.08 parts per million (ppm) to 0.075 ppm. The area now experiences several days a year of ozone concentrations that are slightly above the 0.075 ppm standard. The Maricopa County Air Quality Department operates and maintains a network of air monitoring stations. Figure E.3. is a map showing the locations of all the air monitors. Data from the air monitors are reported to the public and EPA in an annual report (MCAQD, 2013b). The following information is provided by the 2012 report.

There are two air monitoring stations within a three mile distance of the Coffelt neighborhood. They are the Durango Curve (DC) and Greenwood (GR) monitors. These air monitoring stations are not equipped to measure ozone. The DC site is equipped to measure both PM-10 and 2.5. The GR site measures PM-10, but not PM-2.5.

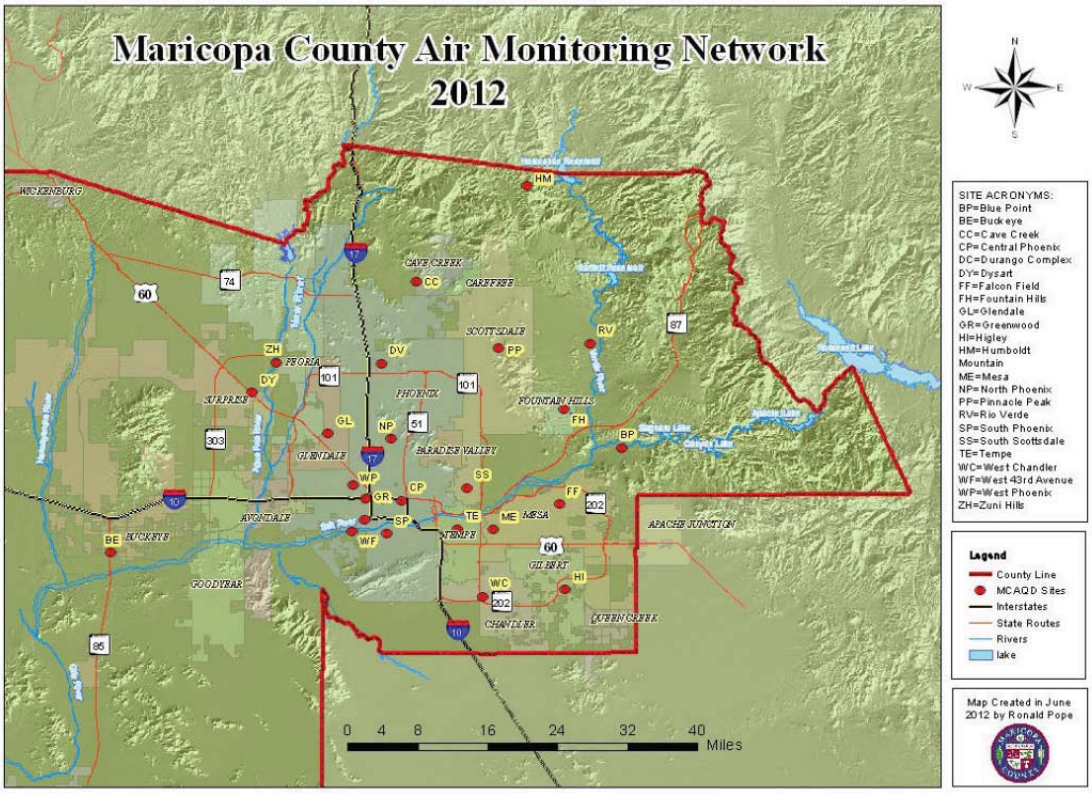


Figure E.3. Map of Maricopa County Air Monitoring Network. Adapted from MCAQD (2013a)

There were 33 exceedances of the 24-hour NAAQS for PM-10 during 2012, including 4 at the DC monitor and 2 at the GR monitor. The maximum 24-hour reading at the DC monitor was 221 $\mu g/m^3$. The maximum 24-hour reading at the GR monitor was 323 $\mu g/m^3$. Sustained high wind events causing blowing dust may be responsible for many of the exceedances. The 33 exceedances occurred on 13 unique days. The Arizona Department of Environmental Quality has petitioned EPA to consider most of the exceedances to be classified as exceptional events. An exceptional event is defined by the EPA as an uncontrollable event caused by natural sources of pollution. If the EPA accepts a petition for an exceptional event, the measured pollution event will not be used in determination of compliance with the NAAQS (MCAQD, 2013b). As of this writing, the EPA is proposing to accept most of the exceptional event petitions. According to the EPA rules for determining NAAQS violations, the 2012 air monitoring data have the potential to demonstrate 13 violations of the PM-10 NAAQS.

There were 28 unique days when at least one monitor exceeded the ozone NAAQS of 0.075 ppm. There were 90 individual exceedances of the 8-hour standard. EPA uses a formula based on the three-year average of the fourth highest reading per ozone monitor to determine whether or not a violation of the NAAQS has occurred. According to the EPA rules for determining NAAQS violations, the 2012 air monitoring data have demonstrated 8 violations of the 8-hour ozone NAAQS. All of the 2012 exceedance days occurred during the hot months of May – August. The closest ozone air monitoring stations to the Coffelt neighborhood are the Central Phoenix, South Phoenix and West Phoenix sites. The highest 2012

ozone readings, exceedances and violations for the three nearest ozone monitoring station are given in Table E.4.

Table E.4. 2012 Ozone 8-hour summary for the Central Phoenix, South Phoenix and West Phoenix air monitoring sites

Site Name	Exceedances	Maximum 8-hour ozone	NAAQS Violation Status
Central Phoenix	6	0.084 ppm	In compliance
South Phoenix	5	0.087 ppm	In violation
West Phoenix	9	0.087 ppm	In violation

Although there were no violations of the 24-hour or annual PM-2.5 NAAQS, there were 8 exceedances on 4 unique days. The highest readings occur during the winter months, especially around the Christmas-New Year holiday season. The 24-hour PM-2.5 NAAQS is 35 $\mu g/m^3$. The highest reading at the DC monitor was 74.4 $\mu g/m^3$ on January 1, 2012. No PM-2.5 data are available from the GR air monitoring station because it does not have a PM-2.5 measuring instrument.

D. Sources of air pollution near the Coffelt neighborhood

This section of the HIA gives a summary of the closest air pollution sources affecting the Coffelt neighborhood including the I-17 freeway, major point sources, non-point sources, HAPs sources and odor sources. A brief discussion of indoor air pollution is also included.

i. I-17 freeway By far, the largest single source of long-term air pollution is the I-17 freeway. Section B.iv. described the health effects of living near a freeway.

A study of the I-10 in west Los Angeles concluded that elevated pre-sunrise hours of ultrafine particle number concentrations extended at least 1,200 meters from the freeway (Hu et al. 2009). The researchers associated these elevated pre-sunrise concentrations with a nocturnal surface temperature inversion, low wind speeds, and higher relative humidity. The Durango Curve area of Phoenix experiences similar meteorological effects, especially during the months of October – March. A study by Zhu et al. (2002) looked at black carbon concentrations near a freeway. Black carbon is associated with diesel emissions. The study found that concentrations of black carbon upwind from I-710 measured an average of 4.6 $\mu g/m^3$, 21.7 $\mu g/m^3$ at a distance of 17 meters downwind from the freeway, and 5.5 $\mu g/m^3$ at 300 meters downwind. This study suggests that black carbon pollutant levels dropped to nearly background levels at a distance of greater than 300 meters from the freeway.

California law prohibits school construction within 500 feet (approximately 153 meters) of busy roadways (California Air Resources Board, 2006). Both the California Air Resources Board (CARB) and South Coast Air Quality Management District (SCAQMD) recommend that schools and other sensitive receptors should not be located near roadways (CARB 2005; SCAQMD 2005).

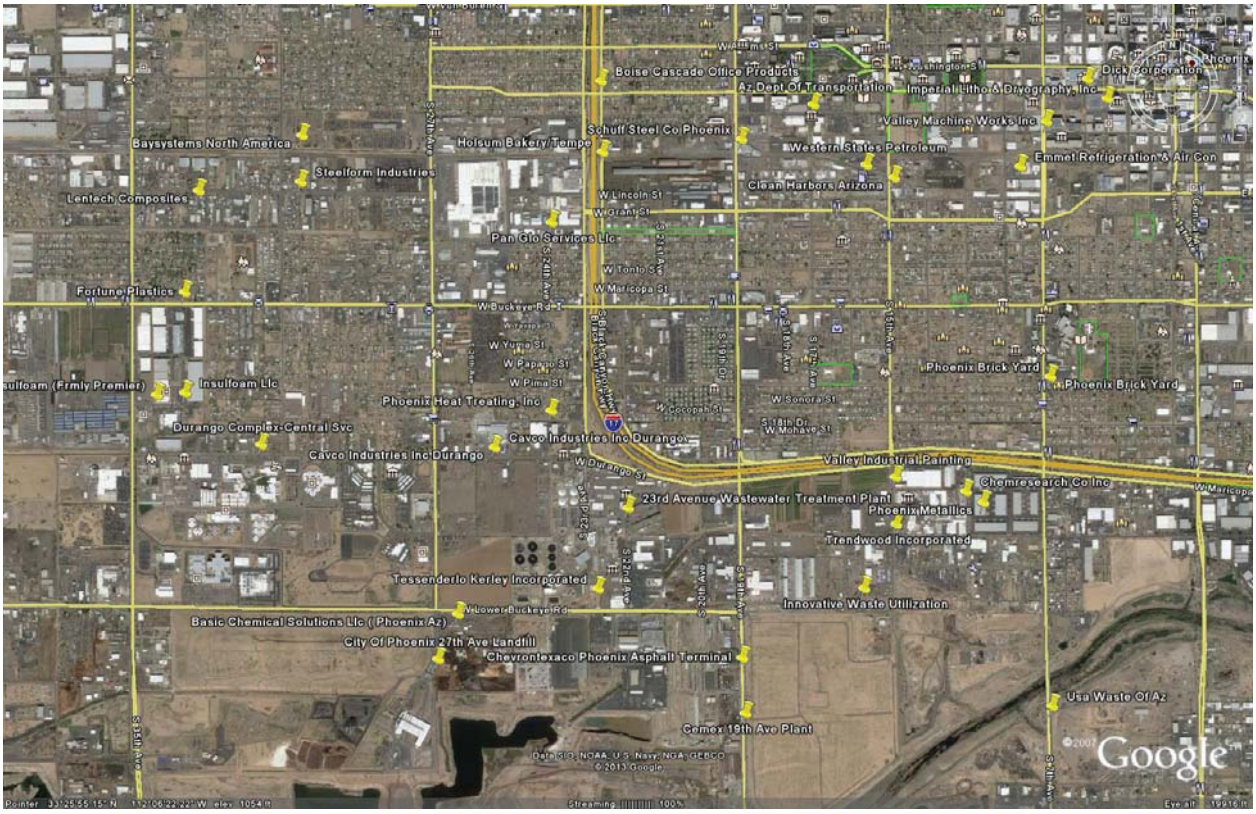
The I-710 HIA recommends the adoption of new city ordinances that prohibit construction of new residential and recreational developments within 300 meters of the I-710 corridor (Human Impact Partners, 2011).

Traffic count information provided by the Arizona Department of Transportation (2008) reported an average of 96,500 vehicles per day between Exit 197 (I-17 and 19th Ave) and Exit 199A (I-17 and Grant Ave). ADOT has not performed an actual traffic count in this freeway segment since 2008. However, ADOT estimated 109,000 vehicles per day in 2010. It is likely that this number is now greater than 110,000 vehicles per day.

ii. Point sources of air pollution near Coffelt neighborhood

The MCAQD issues air pollution control permits to sources of air pollution that emit regulated air pollutants in quantities greater than the amounts published in Maricopa County rules. In addition, the Arizona Department of Environmental Quality issues permits to portable concrete and asphalt batch plants. EPA's Enforcement and Compliance History Online database (2013d) lists the largest sources of air pollution. The area codes 85007 and 85009 have 59 large air pollution sources in the ECHO database. Figure E.4. is a map showing the air pollution sources within a two-mile radius of the Coffelt neighborhood. Most of the facilities are located south of the neighborhood.

Figure E.4. Large Point Sources of Air Pollution from EPA ECHO Database



ii. Sources of HAPs near Coffelt neighborhood

Hazardous air pollutant sources are facilities that emit any of the 187 listed HAPs in amounts that exceed the threshold for air pollution control regulations that specify the use of a Maximum Available Control Technology. Other sources of HAPs may be facilities that use listed hazardous substances in amounts greater than the threshold reporting quantities. A search of the EPA Toxic Release Inventory

(EPA, 2013e) and EPA ECHO database was conducted to produce Figure E.5. which depicts the locations of the most significant hazardous air pollutant sources within two miles of the Coffelt neighborhood. There are approximately 20 facilities within a two-mile radius of the Coffelt neighborhood.

Figure E.5. Sources of Hazardous Air Pollutants and Toxic Release Inventory Filers near Coffelt Neighborhood

iii. Non-point sources of air pollution near Coffelt neighborhood

Vacant lots, unpaved parking lots, agricultural activities, construction activities and unpaved roads contribute to the PM-10 emissions for the Maricopa County PM-10 nonattainment area. Although there are regulatory requirements in effect to minimize the release of dust, the vast areas of disturbed land, arid climate and frequent high wind events continue to challenge the regional efforts to reach attainment of the NAAQS for PM-10. The aerial photo images depicted throughout this report show that there are dozens of square miles of disturbed land near the Coffelt neighborhood with little or no ground cover such as buildings, paved roads and parking lots. Most of this area is along the Salt River just to the south of the neighborhood. Property owners of vacant or undeveloped land and unpaved parking lots and roads are required by MCAQD rules to stabilize or cover exposed soils and to prevent uses of the property that generate dust. These land owners must also comply with general permit requirements for dust control (MCAQD, 2013c). A common problem for vacant land areas along the Salt River is trespassing by off-road vehicles. Farmers are required to comply with Agricultural Best Management Practices enforced by the ADEQ (2013). Construction activities are heavily regulated by the MCAQD. Figure E.6. shows the potential for excessive dust pollution if the rules are not followed.

Figure E.6. Construction Activity is a Non-Point Source of PM-10 Pollution

Source: Maricopa County Air Quality Department

Dust storms typically move from south to north. Strong winds crossing the exposed vacant lands just south of the Coffelt neighborhood push huge volumes of soil into the neighborhood during storm events. Figure E.7. shows the magnitude of a dust storm event in the Phoenix area.

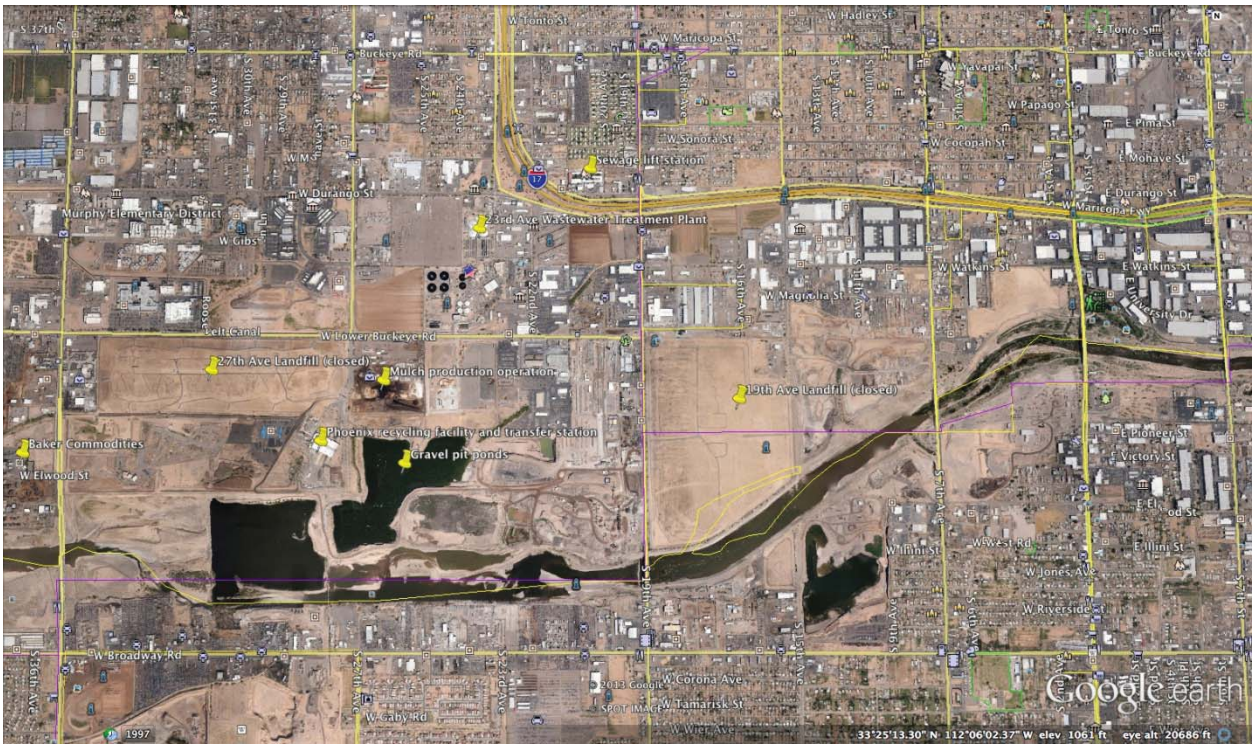
Figure E.7. Dust Plume Generated by a Thunderstorm in the Phoenix Area

Source: Maricopa County Air Quality Department

iv. Potential sources of odors for Coffelt neighborhood

A review of the EPA ECHO database (EPA, 2013) and maps provided by Google Earth (2013) was conducted to prepare Figure E.8. which identifies potential odor sources that may occasionally impact the Coffelt neighborhood. The presence of unpleasant odor is not by itself a cause of human disease. Strong objectionable odor may serve as a warning that there has been a release of a chemical or putrescible waste such as sewage that should be avoided.

Figure E.8. Potential Sources of Odors near Coffelt Neighborhood



The closest potential source of odor is a small sewage lift station operated by the Hamilton Elementary School. When properly operated and maintained, this facility should not cause odor problems for the neighborhood. Moving south past the I-17 freeway, the map shows the City of Phoenix 23rd Avenue Wastewater Treatment Plant. The MCAQD air pollution control permit for this facility specifies a maximum concentration of hydrogen sulfide gas that may be present at the property boundary. Hydrogen sulfide is generated by decomposition of organic matter, and is the most measureable of all odor causing chemicals emitted by a wastewater treatment plant. Hydrogen sulfide gas testing was performed during a recent inspection by the MCAQD. All of the sample results showed no detectable quantities of hydrogen sulfide (S. Kincaid. personal communication, September 3, 2013). All wastewater treatment plants have points throughout the treatment process that produce unpleasant smells. When properly operated and maintained, these odors should not pose a nuisance condition for residents downwind of the site.

There are two closed landfills downwind of the Coffelt neighborhood. They are the 19th and 27th Avenue Landfills. The landfills are maintained by the City of Phoenix. During the lifetime of the landfills, they

received thousands of tons of municipal solid waste. Much of the waste is putrescible and is continuing to decompose underground. The decomposing waste emits methane, hydrogen sulfide and a variety of gases associated with landfills. The landfills are in compliance with operating permits requiring capture and treatment of landfill gases, maintaining an impermeable soil and geotextile cap, groundwater monitoring and several other environmental protection requirements. The two landfills will not generate any noticeable odors for the Coffelt neighborhood provided that they continue to be properly operated and maintained by the City of Phoenix.

The City of Phoenix operates a municipal solid waste transfer station, materials recovery facility and mulching operation near the 27th Avenue Landfill. The municipal solid waste coming into the transfer facility is from weekly waste collections throughout the city by the City of Phoenix Solid Waste Department trash trucks. There will be some unpleasant odors and dust associated with the loading and unloading of the materials. However, the waste is removed from the site on a daily basis to other landfills for burial. The rapid turnover of the waste prevents a buildup of unacceptable odors that would occur if the waste remained in piles decomposing for more than a day. Materials such as plastics, metals, glass and paper are recovered through a sorting and packaging process and then shipped off-site to vendors who pay the City of Phoenix for the remaining value of the materials. There is very little odor associated with this process.

A privately owned mulch production operation is adjacent to the 27th Avenue Landfill and transfer station. In addition, the City of Phoenix produces mulch for its public parks and common areas. These two mulching operations have the potential to produce detectable odors if not properly operated and maintained. The production of mulch entails decomposition of organic matter that can produce unpleasant odors. The raw materials (tree and grass trimmings) do not have unpleasant odors. Mulch plant operators must follow a careful schedule and procedure for adding water and mixing the materials to prevent the production of unpleasant odors.

Figure E.8. displays large areas of ponded water. Most of the water is groundwater from sand and gravel extraction that has seeped into deep pits in the riverbed. Surface water from rainfall events and nuisance water runoff from city streets also accumulates in the low points of the riverbed. Decomposition of organic matter is taking place at the bottom of the ponds. There are also periodic blooms of algae that occur causing a sudden increase of organic material that eventually decays, releasing unpleasant odors. Seasonal variation in odor levels is expected to occur from these bodies of water. The total surface area is large enough to generate odors that would be detectable in the Coffelt neighborhood because the neighborhood is downwind from this odor source.

A final potential source of odors marked on Figure E.8. is the Baker Commodities facility. The facility produces tallow which is derived from the carcasses of livestock and waste oil from restaurants. The rendering process is designed to minimize odors. The facility has a permit from the MCAQD that includes provisions for odor control. When properly operated and maintained, this facility should not cause obnoxious odors for residents of the Coffelt neighborhood. There is a three mile distance from the neighborhood which is sufficient to dissipate odors that are generated under normal operating conditions.

The above discussion is not an exhaustive list of potential odor sources. There are several industrial facilities that handle large quantities of chemicals within a two-mile distance and there is a large bakery. Most people would not object to the odors associated with bakeries.

v. Indoor air pollution sources

The air inside houses, schools, shopping centers, churches, offices, hospitals, factories and all other buildings can potentially become unhealthy due to a buildup of chemicals and particulates from numerous sources. Table E.5. is a listing of common indoor air pollutants and their sources.

Table E.5. Common Indoor Air Pollutants and Their Sources

Pollutant	Source
Tobacco smoke	Smokers in the household
Carbon monoxide	Gas stove, gas furnace, broken exhaust vents
Formaldehyde	Furniture, carpeting, insulation
Asbestos	Insulation, wall and ceiling texture
Radon	Cracks in the slab
Mold and other biological	Plumbing leaks, unsanitary conditions
Volatile organic compounds	Paints, solvents, cleaners
Pesticides	Any application of pesticides
Particulates	Wood burning, fuel oil burning, remodeling
Nitrogen oxides	Wood, oil or gas stoves and furnaces
Carbon dioxide	Poor ventilation
Hydrogen sulfide	Sewer gas, dry floor drains, dry plumbing fixtures
Methane	Sewer gas from dry floor drains and plumbing fixtures
Insect parts and waste	Cockroach and cricket infestation

Adapted from: EPA, (2013f) *An introduction to indoor air quality*

Indoor air pollutants can cause the same types of health problems that have previously been identified for the ambient air pollutants. Please refer to the Recommendations section of this report for advice on how to minimize indoor air pollution.

E. Recommendations

i. Reducing exposure to ambient levels of air pollution

As discussed, the largest source of outdoor air pollution for Coffelt neighborhood residents is the I-17 freeway. Most of the houses and the Hamilton School are within 500 meters of the freeway. A growing body of air pollution research is recommending that new housing and school construction should be prohibited within 500 meters of a freeway. A few opportunities exist to minimize exposure to freeway generated air pollutants for those populations already living within 500 meters of a freeway. They are related to building design and construction. The existing houses should be rebuilt with the best available indoor air filtration technology. A study conducted at two Las Vegas schools (Roberts, 2013) showed that an upgrade to the filtration system on one of the two school's air conditioning systems resulted in a 97% removal efficiency for black carbon removal. The upgraded filters were less effective at removal of

volatile organic compounds such as benzene. Another significant building design feature is installation of best available insulated windows with seals that prevent dust intrusion.

Residents living in the Coffelt community should also be informed to keep the windows and doors to their houses closed at all times, every day of the year. This is because the pollution from the freeway will always be present. The pollutant levels will decrease when the wind is coming from north or northeast vectors. However, the prevailing wind pattern for Phoenix is from the southeast through west vectors. Emissions from I-17 will enter the Coffelt neighborhood whenever the wind is moving in from the southeast, south, southwest and west.

Evergreen trees such as Palo Verde may trap and filter some of the particulate pollutants. However, the benefits from additional trees are difficult to measure.

Residents may also choose to advocate during the public policy setting process for cleaner vehicles including the eventual elimination of vehicles powered by fossil fuel combustion engines.

Other sources of air pollution identified in this report are point and non-point sources such as factories and vacant lands. Residents should be made aware of how to file complaints with the responsible government regulatory agencies for inspecting and permitting the point and non-point sources of air pollution. The primary agency for this is the Maricopa County Air Quality Department. The Arizona Department of Environmental Quality regulates the portable concrete and asphalt batch plants at the nearby sand and gravel mines and the agricultural areas to the south of the community. Vigilance over the operations of surrounding air pollution sources will aid in keeping the sources in compliance. Examples of reasons to file a complaint include observation of visible emissions (excess smoke or dust) and detection of odors. Both the MCAQD and ADEQ would provide a speaker to discuss the role of community members in air pollution control.

Non-point sources of air pollution near individual houses include the city streets and outdoor areas throughout the community. The City of Phoenix is responsible for maintaining the streets. Regular street sweeping with PM-10 efficient street sweepers should take place. The Housing Authority of Maricopa County is responsible for the common areas around the houses. Dust control measures such as maintaining a ground cover of grass, other vegetation and gravel is important for preventing localized dust pollution. Residents should be made aware of how to request street sweeping services and maintain an ongoing dialogue with the housing authority to minimize locally generated dust.

ii. Indoor air pollution

Tobacco smoke and carbon monoxide are the two most common indoor air pollutants. Residents should not smoke tobacco inside of homes. Homes should be reconstructed to provide an electric stove and oven. A food cooking exhaust hood should be installed above the stove and oven. The exhaust should be vented to the outside, not recirculated through a filter and then back into the room. A recirculating filter hood does not remove carbon monoxide. It may not be feasible to install electric heaters and hot water heaters in the houses. If natural gas is used for heating water and wintertime heating of the houses, then the appliances must be properly installed and maintained to prevent carbon monoxide buildup.

Finally, carbon monoxide detectors should be installed inside the homes if natural gas continues to be used.

Other common forms of indoor air pollution include mold, and allergens. The presence of these pollutants can be prevented by fixing plumbing leaks and good housekeeping practices. Unhealthful levels of mold should not be present if there are no plumbing leaks and the air conditioning system is properly maintained. This includes ensuring proper drainage of condensate and regular changing of filters. Dust and insect parts are common allergens. Good housekeeping practices including the use of a damp cloth to regularly remove dust and cleaning up food spills will minimize the accumulation of allergens.

iii. House reconstruction should apply "green building" principles and practices such as using building materials that have lower levels of volatile organic compounds such as formaldehyde. Furniture made from pressed sawdust/wood and carpeting are two known sources of VOC's inside homes. The installation of carpeting should be avoided.

iv. Residents should become aware of safer cleaning compounds and other household chemicals. Choosing cleaning compounds that do not have VOC's is advised. Pesticides should only be applied as necessary by a licensed structural pest control operator. Proper housing construction and good housekeeping should eliminate the need for pesticide use.

III. Noise

A. Health effects from noise

Referred to as noise pollution, there is a large body of research revealing hazards of very loud noise exposures of over 85 decibels calibrated to the A-weighted scale (dBA) causing hearing loss in 8-hour workplace exposure situations. The U.S. Occupational Health and Safety Administration (OSHA) has established an enforceable permissible exposure limit of 85 dBA over an 8-hour work day (U.S. Department of Labor, 2013).

To put noise into perspective with respect to the dBA noise measurement convention, a few comparisons are given. A light wind blowing through leaves on a tree produces a 20-30 dBA reading. Normal conversation is 50-60 dBA. A fire truck siren at 100 feet is about 110- 120 dBA (Human Impact Partners, 2011).

The health impacts of noise depend on the intensity, duration and context of exposure. Documented health effects from noise include hearing impairment, sleep deprivation, speech intelligibility, stress, impaired cognitive function, hypertension and annoyance (HIP, 2011). What level of involuntary noise exposure should communities accept or tolerate? The World Health Association (WHO) is a branch of the United Nations. The WHO has published guidelines for community noise exposure. Table E.6. summarizes the WHO guidelines.

Table E.6.

World Health Organization Community Noise Guidelines

Specific Environment	Critical Health Effect	Sound Level (dBA)	Time (hours)
Bedrooms	Sleep disturbance	30	8
Inside dwellings	Speech intelligibility	35	16
School classrooms	Disturbance of message communication	35	During class
Outdoor living areas	Serious annoyance	55	16
Industrial, commercial and traffic areas	Hearing impairment	70	24
Music through earphones	Hearing impairment	85	1
Entertainment events	Hearing impairment	100	4

Adapted from World Health Organization (1999).

B. Sources of noise for the Coffelt neighborhood

i. Sky Harbor Airport

Community meetings conducted on August 4 and 21, 2013 gave residents of the Coffelt community an opportunity to identify environmental problems. Noise from airplanes was mentioned at least X times by attendees at the August 4 meeting and X times by persons in attendance on August 21. City of Phoenix Aviation Department noise reports for Sky Harbor Airport (2013) were reviewed. A brief summary of the findings of this review is presented in this section of the HIA.

The City of Phoenix reports noise levels using a standardized noise reporting index called the day-night average sound level (DNL). Readings are made using a decibel meter that is calibrated to measure the intensity of sound based on the A weighted scale or dBA. A DNL number is produced for each 24-hour period to represent both the day and night exposure events. To account for human sensitivity to noise between the hours of 10 PM and 7 AM, noise events occurring during these hours are assigned an extra 10 dBA.

The City of Phoenix Aviation Department is in the process of updating the Noise Exposure Map for the Phoenix Sky Harbor Airport. The current map is displayed below as Figure E.9.

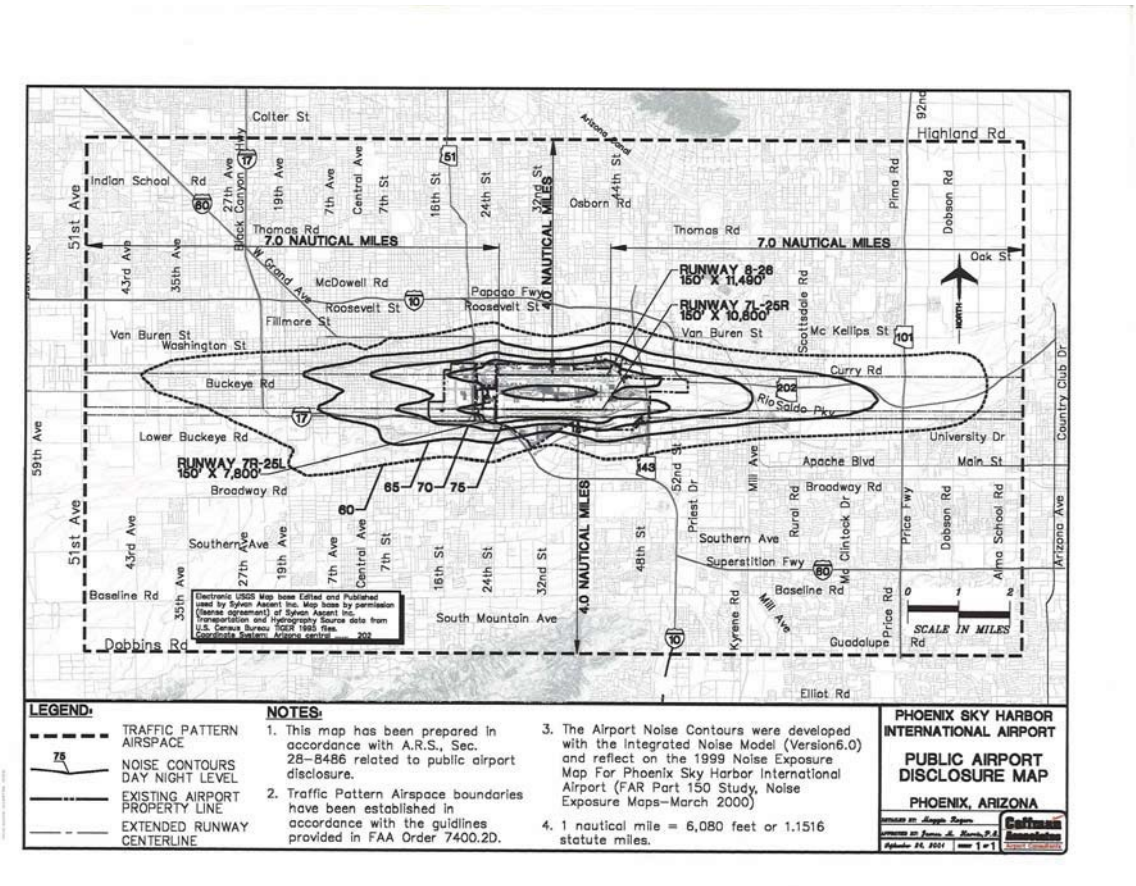


Figure E.9. Airport noise contours as shown on the 1999 Noise Exposure Map for Phoenix Sky Harbor Airport.

Three public workshops were conducted in late 2012 to gather public input. A report (City of Phoenix, 2012) describing the workshops included summaries of presentations explaining the process which is required by the Federal Aviation Administration (FAA). The FAA uses a maximum of 65 DNL to identify areas impacted by aircraft noise. FAA considers all land uses to be compatible with an airport, including residential areas, schools and libraries, if the DNL is below 65 DNL. FAA will not fund noise mitigation projects in areas with a DNL less than 65. A review of the existing Noise Exposure Map shown in Figure E.9. concludes that in 1999 that the Coffelt neighborhood is just to the west of the 65 DNL contour line.

During the process of updating the Noise Exposure Map, the City of Phoenix will look at which runway aircraft use when landing or taking off. Figure E.10. was produced as a part of the 2012 annual noise report published by the Phoenix Aviation Department (2013). Phoenix has a goal of balancing the runway uses and directions to achieve noise impact equity throughout the affected community. Weather conditions are a determining factor for runway utilization primarily for safety reasons.

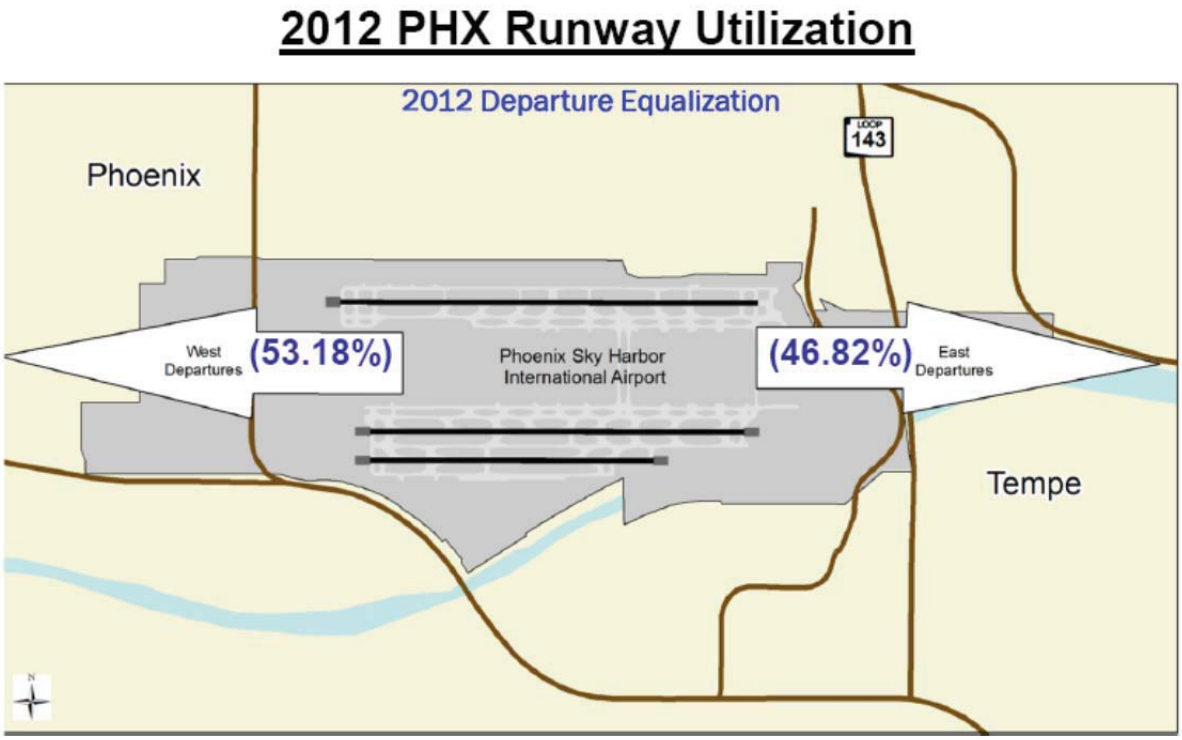


Figure E.10. Phoenix Sky Harbor Airport 2012 flight departure runway utilization showing actual percentages of departures for planes headed both east and west. Adapted from Sky Harbor Annual Noise Report for 2012.

A network of twenty noise monitoring stations is used to help explain and understand noise conditions during the Noise Exposure Map update process. The Coffelt community lies between monitoring sites 2 and 4 as depicted on Figure E.11.

2012 Noise Monitoring Site Measurements

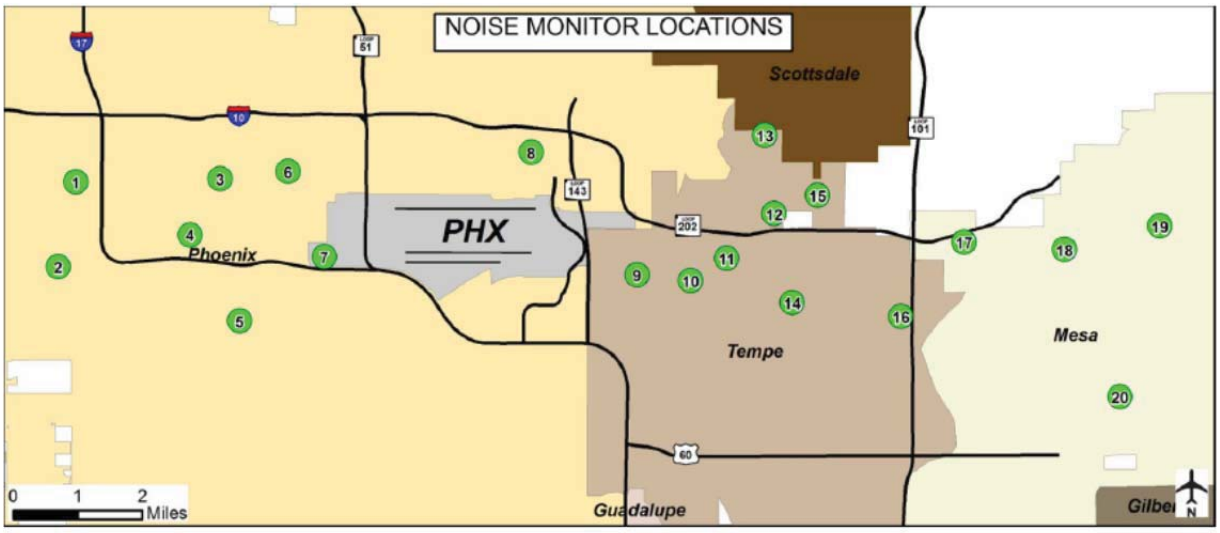


Figure E.11. Map of Noise monitor locations for Phoenix Sky Harbor Airport during 2012. Adapted from Sky Harbor Airport Annual Noise Report for 2012.

Data presented in the 2012 Annual Noise Report summarizing readings taken from monitoring sites 2 and 4 indicate that both sites are below the 65 DNL threshold for incompatible land use. The average DNL in 2012 at site number 2 was 55.6. Site number 4 reports an average 2012 DNL of 59.1.

ii. Traffic

The Coffelt community is surrounded by high-volume roadways. Of course, the most significant noise sources are the I-17 freeway to the south and west; Buckeye Road to the north; and 19th Avenue to the east. Both Buckeye Road and 19th Avenue are considered arterial roadways because they connect to major freeway corridors. In addition to the more than 100,000 vehicles per day on I-17, there are also trucks and emergency vehicles moving about with loud exhaust and siren noises. The Federal Highway Administration is required to identify noise-sensitive land uses near proposed freeways and to consider noise abatement options. Federal regulations specify noise abatement criteria for land uses as shown in Table E.7.

Table E.7.

Federal Highway Administration Noise Abatement Criteria

Activity Category	L_{Aeq1h} [a]	Description of Activity Category
A	57 (exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (exterior)	Developed land, properties, or activities not included in Categories A or B above
D	—[b]	Undeveloped land
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums

Source: 23 Code of Federal Regulations § 772

[a] L_{Aeq1h}, 1-hour equivalent sound level; logarithmic energy average over a 1-hour period (measured in dBA, a logarithmic unit that expresses the ratio of the sound pressure level being measured to a standard reference level and is frequency-weighted using the A-scale, to approximate the frequency response of the human ear)

[b] not applicable (or no standard exists)

Adapted from U.S. Federal Highway Administration (2013), *Draft environmental impact statement for South Mountain freeway loop 202*.

Existing noise levels for the I-17 area near the Coffelt neighborhood were not available. Noise levels projected for the proposed South Mountain Freeway near the intersection of I-10 and 59th Avenue would exceed the 67 dBA threshold for noise abatement and thus, require noise abatement such as a concrete wall (FHWA, 2013). However, the projected traffic volume for this intersection is much higher than the I-17 Durango Curve area. Therefore, the noise level from the I-17 freeway at the Coffelt neighborhood receptor site is inconclusive. It should be noted that residents did not report annoyance with freeway noise during the two community meetings.

Other nearby sources of traffic noise are 19th Avenue and Buckeye Road. Traffic noise is greater when the traffic is moving at high speeds. Due to the low speed limits of 35 miles per hour on Buckeye Road and 19th Avenue, it is reasonable to conclude that the average noise exposure will not exceed the FHWA noise abatement criteria level of 67 dBA.

iii. Industrial facilities near the neighborhood

One or two residents attending the two community meetings reported occasional loud noises emanating from the adjacent industrial and commercial facilities. Industrial and commercial uses are legally allowed by the City of Phoenix zoning requirements along the north, west and southeast boundaries of the Coffelt community. The same uses are allowed on the east side of 19th Avenue. This means that the potential exists for noises from business activities may impact the neighborhood. The present businesses nearest to the neighborhood are auto and truck salvage, recycling, and wood pallet construction. These land uses would be expected to cause occasional loud and short-term noises during normal business hours.

iv. Dog barking

One or two residents attending the two community meetings reported excessive dog barking. The dog owners are immediate neighbors. This is a common complaint in almost every community.

B. Recommendations

Houses should be reconstructed to prevent the penetration of noise from the identified sources. Houses built to best available technology guidelines for energy efficiency will achieve adequate reduction of the identified outdoor noises. Best available energy efficiency housing construction guidelines include increased insulation in walls and ceilings, dual or triple pane windows and high efficiency air conditioners.

Residents may consider petitioning the Arizona Department of Transportation for noise abatement mitigation. However, the noise levels may not exceed the noise abatement criteria required by the FHWA. Sound walls could also be constructed on all perimeters of the community. However, there is currently no governmental requirement for this amenity. Constructing a sound wall along 19th Avenue would reduce the risk of pedestrian injury or death.

Noises emanating from the adjacent industrial and commercial properties and barking dogs are regulated by the City of Phoenix. Residents should become aware of the appropriate City of Phoenix department for filing complaints. The City of Phoenix will provide speakers at community meetings to discuss resident concerns.

IV. General Environmental Health

During the two community meetings, residents expressed concerns about several general environmental health issues such as dogs, mice, flies, mosquitoes, ticks and bedbugs. This section of the HIA provides a brief discussion of each of these issues.

A. Dogs off leash

Five comments were made at the first community meeting (Phoenix Revitalization Corporation, 2013a) and several comments were heard at the second community meeting (PRC, 2013b) regarding dogs running loose in the Coffelt neighborhood. Unleashed dogs are more likely to bite people. Dog bites are a serious public health issue. Each year in the United States, about 4.5 million people are bitten by a dog. Approximately 800,000 or 18% require medical attention (Maricopa County Animal Care and Control, 2013). Table E.8. lists the frequency of dog bites per breed.

Table E.8. Dog Bites by Breed

Breed	Percent of total dog bites
Pit Bulls	21
Mixed breed	16
Rottweilers	13
German Shepherds	9
Wolf dogs	5
Siberian huskies	5
Malamutes	4
Great Danes	3
St. Bernards	3
Chow Chows	3
Doberman Pinschers	3
Other or not specified	15

Dog bites usually happen when the dog is being teased. Arizona law states that all dogs must be confined inside a house or enclosed yard unless they are on a leash. Dogs must be up-to-date on Rabies vaccination and have a current Maricopa County Dog License (MCACC, 2013).

Although rare in the United State, the disease rabies can be transmitted by dogs and cats. Rabies is an infectious viral disease that affects the nervous system. It is almost always fatal after symptoms appear. Persons exposed to a rabid animal must receive anti-rabies serum and vaccine soon after the bite to prevent rabies infection. Dogs with up-to-date rabies vaccinations are not likely to develop rabies. Laboratory testing of animals suspected of having rabies indicate that bats are the most frequently affected animal.

B. Flies

Over 30 diseases have been associated with the common housefly including dysentery, cholera, typhoid, infantile diarrhea, numerous other diarrheal diseases, pink-eye, pinworms, roundworms and tapeworms (Robson, M.G., Hamilton, G.C., Siriwong, W., (2010).). One single fly has the potential to harbor over 32 million bacteria on its body. Flies multiply rapidly. One female fly can lay approximately 3,000 eggs over its one-month lifetime. In warm climates, fly eggs hatch into larvae (maggots), then become pupae and finally mature into adult flies within 7 days. Adult flies are attracted to any type of moist organic material including human feces, dog feces, garbage, grass clippings etc., where they feed and lay eggs. The most common source of flies in the Coffelt neighborhood is dog droppings. City of Phoenix trash collection occurs every week and will prevent flies from breeding in household garbage. Avoid the use of pesticides to control flies. Instead, keep doors and windows closed. Kill flies inside homes with fly swatters and sticky fly paper. Figure E.12. is a picture of the life cycle stages for the common housefly.

Figure E.12. Life Cycle Stages for the Common Housefly (*Musca domestica*)

Sources: http://entweb.clemson.edu/cuentres/cesheets/hhold/ce185.htm
http://commons.wikimedia.org/wiki/file:musca_domestica_September_2007-1.jpg

C. Mosquitoes

Mosquitoes are actually small biting flies. They are the vector for numerous human diseases including malaria, dengue fever, yellow fever, West Nile Virus and several encephalitis viruses (Robson, M.G., Hamilton, G.C., Siriwong, W., (2010).). Maricopa County has several species of mosquitoes that may carry dengue fever, West Nile Virus, St. Louis encephalitis and Western Equine encephalitis (Maricopa County Environmental Services Department, 2013). Mosquitoes have a rapid life cycle. Some species found in Maricopa County go from egg to adult after only three days in standing water. Dogs are also susceptible to heartworm disease resulting from the bite of a mosquito. Do not allow any standing water including rainwater or irrigation water that collects in toys, buckets and other containers left outside. Avoid mosquito bites by keeping doors and windows closed, wearing insect repellent and loose fitting long sleeve shirts and long pants. Figure E.13. shows a common mosquito vector and application of repellant. People over fifty years of age are more likely to get serious symptoms of West Nile Virus and should take special precautions to avoid mosquito bites.

Figure E.13. Protect Yourself from Mosquitoes by Using Insect Repellent

D. Cockroaches, Ticks, Fleas and Bedbugs

Cockroaches are known to contaminate food and can be a risk factor for triggering an asthma attack (Robson, M.G., Hamilton, G.C., Siriwong, W., 2010, Grineski, S. 2008). Maricopa County has several species of cockroaches including the American, German and Brown-banded cockroaches. Good housekeeping and use of cockroach glue traps is recommended.

Fleas are carriers of plague and murine typhus. There are several species living in Arizona including dog and cat fleas. There have been no plague cases caused by flea bites in the greater Phoenix area. The four corners region of Arizona routinely experiences human plague cases. Pet owners who discover fleas should apply flea control products and seek veterinarian advice. More information is available from the CDC at http://www.cdc.gov/plague/prevention/index.html (2013a).

Ticks have piercing-sucking mouthparts and can feed on a wide variety of hosts including humans, dogs, cats and birds. American dog ticks are vectors for Rocky Mountain spotted fever and tick paralysis. In Arizona, the western deer tick is known to transmit Lyme disease in humans. Other diseases such as tick-borne relapsing fever may be caused by ticks (Robson, M.G., Hamilton, G.C., Siriwong, W., (2010). Urban settings like the Coffelt neighborhood may occasionally experience localized tick infestation resulting from dogs that become infested. This is another reason to always keep your dog on a leash when it is outside in the common areas. Tick killing pesticides are available for treating individual dogs. Please refer to the Centers for Disease Control and Prevention (CDC) webpage at http://www.cdc.gov/ticks/avoid/on_pets.html for more information (2013b).

Bedbugs have piercing-sucking mouthparts in order to feed on the host's blood. Eggs are laid away from hosts and hatch in six to seventeen days. Once the eggs hatch immature forms called nymphs immediately begin feeding on hosts. Humans are the preferred host, but bedbugs can feed on dogs, cats, mice and rats. Bedbugs feed while the host is sleeping, and hide in the cracks, crevices and folds of mattresses, bedding, carpeting and upholstery of furniture. They are not considered important vectors of human diseases. However, laboratory tests show that they have the potential to transmit many diseases such as anthrax, plague, tularemia, yellow fever, typhus, and relapsing fever (Robson, M.G.,

Hamilton, G.C., Siriwong, W., 2010). The best way to control bedbugs is to inspect bedding, frequently wash bedding, practice good housekeeping and use a licensed structural pest control applicator if an infestation occurs. More information is available from CDC at http://www.cdc.gov/parasites/bedbugs/faqs.html (CDC, 2013c). Fully mature bedbugs are easily visible as depicted in Figure E.14.

Figure E.14. Top and Side Views of a Bedbug

E. Mice

Coffelt Housing Project Manager Sherida Barnes reported that mice are frequently observed and trapped throughout the neighborhood (S. Barnes, personal communication, August 21, 2013). The house mouse, *Mus musculus*, is the most commonly encountered species in and around housing. Other species such as field mice and kangaroo rats may be present in the urban areas of Phoenix. Mice can transmit diseases to humans and can be a vector for rat-bite fever and Weil's disease (Robson, M.G., Hamilton, G.C., Siriwong, W., 2010). Mouse droppings can cause food borne diseases such as salmonellosis. Fleas and mites living on mice can transmit murine typhus and rickettsialpox. Mice have small heads and bodies, allowing them to enter houses through openings as small as a dime. They prefer human foods and often seek the warmth of housing during the colder months.

Another type of mouse is the deer mouse, *Peromyscus maniculatus*. This species may transmit hantavirus pulmonary syndrome (HPS). Deer mice do not typically inhabit the urban areas of Phoenix. However, they do live in surrounding rural areas. HPS has a high fatality rate. Fortunately, the disease is rare in the greater Phoenix area. Humans can contract HPS by inhaling aerosolized virus. Inhalation of HPS is most likely to occur when cleaning up deer mouse droppings. Please review the

recommendations for safe clean-up methods later in this report. Photos are provided in Figures E.15. and E.16 to help you identify the type of mouse that may be present.

Figure E. 15. House Mouse

Figure E. 16. Deer Mouse

F. Ensuring safe drinking water

Plumbing in the Coffelt neighborhood was installed and is maintained by the Housing Authority of Maricopa County. Contamination of the water supply is rare but it may occur if plumbing lines are connected with non-potable water lines. This is called a cross-connection. Many areas of Phoenix are now using reclaimed waste water for irrigation. Also, potable water is used in underground plumbing systems to irrigate lawns and plants. These two kinds of plumbing systems, reclaimed water, and drip irrigation, contain water that should not be consumed by people. Another way that the potable water in houses can become contaminated is through back-siphonage of contaminated water into the potable water system. Back-siphonage can occur when the end of a hose is submerged in a bucket or puddle of contaminated water and there is a sudden loss of water pressure in the water supply that is feeding the

hose. Under normal conditions of water pressure, the potable water flows out the end of the hose and there is no contamination of the water inside the hose or the house plumbing to which the hose is attached. Back-siphonage usually happens when there is a waterline break near the place where the hose is submerged in unclean water; or when a fire department opens a nearby fire hydrant. The sudden drop of water pressure caused by such activities will cause the contaminated water from the container or puddle where the hose is placed to be sucked back into the plumbing system of the house. Water line breaks occur when there is a construction accident, or sudden unexpected waterline failure. Fire departments and city water system crews regularly test and flush fire hydrants to be sure they will work if there is a fire.

F. Recommendations

Dogs Report dogs off leash to authorities; Contact Maricopa County Animal Control and Care (MCACC) at 602-506-7387 or call 602-747-7500 to access the 24-hour hotline. Learn how to avoid dog bites by reviewing the MCACC web site. Request a guest speaker from MCACC.

Flies Provide dog waste bags and signage to remind pet owners to pick up after their pets.

Mosquitoes Design site drainage to avoid standing water. Dry wells should not be installed when the neighborhood is reconstructed. Retention basins that allow standing water to drain or percolate within three days are preferred for storm water retention. Report mosquitoes to Maricopa County Vector Control. Arrange for speakers from the Maricopa County Public Health Department or Environmental Services Department to educate residents on mosquito and vermin control.

Cockroaches, Fleas, Ticks and Bedbugs Maintain houses so that windows and doors seal tightly. Maintain all external wall penetrations for plumbing and vents so that there are no openings into the wall. Practice good housekeeping by immediately cleaning up spilled food and crumbs. Use glue board traps instead of pesticides. If an infestation becomes severe, use only a licensed structural pest control applicator to treat infested areas.

Mice Maintain houses so that windows and doors seal tightly. Maintain all external wall penetrations for plumbing and vents so that there are no openings into the wall. Practice good housekeeping by immediately cleaning up spilled food and crumbs. Use glue board traps instead of pesticides. Residents should not use rat poisons because they are hazardous to children and pets. If an infestation becomes severe, use only a licensed structural pest control applicator to treat infested areas. Report waste piles and rodent breeding areas to the Housing Property Manager and to the Maricopa County Environmental Services Department Vector Control program. Carefully follow health department guidelines for cleaning up mouse droppings and urine. Do not use a vacuum cleaner. Wear gloves and a pollen mask. Spray the area with a 9:1 water to bleach mixture, then wipe up the area with disposable wipes and dispose the waste in a closed plastic bag. Review the proper cleaning procedures at: http://www.cdc.gov/rodents/cleaning/index.html (CDC, 2013d).

Safe Drinking Water Label plumbing that does not carry potable water such as reclaimed wastewater and irrigation system plumbing. Install back-siphonage control devices on all hose bibs. Conduct regular inspections of the plumbing to check for cross connections and back-siphonage hazards.

V. Hazardous materials and emergency preparedness

A. All hazards view of emergencies

Residents of the Coffelt neighborhood should be prepared for a wide variety of emergencies caused by natural and human-caused events. Common natural hazards are strong winds (microbursts from thunderstorms), dust storms, flooding and wildfires. Common human-caused hazards are spills of hazardous materials, structural and material storage fires, and long-term power outages. Residents should become aware of the hazards they face and develop plans for responding to and recovering from an incident. This section of the HIA identifies the hazards that could threaten the health and safety of the community and provides information and resources on how to prepare for, respond to and recover from the incident.

B. Hazardous materials transport on I-17 and surrounding streets

The Coffelt neighborhood is located near a major freeway and an arterial roadway. These public roads are used by commercial vehicles to transport hazardous materials. In addition, the surrounding land parcels are zoned for industrial and commercial uses. This means that trucks will be traveling into and out of nearby facilities that handle large quantities of hazardous materials. Hazardous materials are transported more often by truck than any other mode of transportation including rail, water and air. The following is a list of the nine classes of hazardous materials regulated by the U.S. Department of Transportation, the Arizona Department of Transportation and the Arizona Department of Public Safety (U.S. Department of Transportation, 2004):

Class 1 - Explosives
Class 2 – Gases
Class – 3 Flammable liquids
Class – 4 Flammable solid
Class 5 – Oxidizers and Organic Peroxides
Class 6 – Toxic Materials and Infectious Substances
Class 7 – Radioactive Materials
Class 8 – Corrosive Materials
Class 9 – Miscellaneous Dangerous Goods

Approximately 15% of the freight tonnage moved in the United States is regulated as hazardous (Transportation Research Board, 2005). Shippers must ensure that the hazardous materials are properly packaged, labeled and accompanied by documentation on contents, quantities, and emergency contacts. Shippers and carriers must be sure that all hazard information is properly displayed, accurate and available for emergency personnel.

Some hazardous materials have high risk consequences due to their large volume and danger of the substance. A summary of the highest risk commodities was prepared by the U.S. Department of Transportation (2011) to help understand hazardous material transport characteristics in ways that will

continue to improve hazardous materials safety. Table E.9. lists the top 10 commodities having adverse consequences weighted by high-impact casualties.

Table E.9. – Top 10 Commodities 2005-09 Ranked by Weighted High-Impact Casualties
(High Impact Casualties = Fatalities + Major Injuries or Hospitalizations)

Rank	Commodity Name	Incidents
1	Gasoline	1306
2	Chlorine	48
3	Diesel fuel	573
4	Propylene	15
5	Fireworks	60
6	Liquefied petroleum gas (LPG)	473
7	Carbon dioxide, refrigerated liquid	1269
8	Sulfuric acid	1270
9	Argon, refrigerated liquid	42
10	Propane	31

Source: U.S. DOT, Top Consequence Hazardous Materials Commodities, 2011

The U.S. DOT Top Consequences Report (2011) indicates there were 75,094 roadway accidents nationwide involving hazardous materials transported by during the five-year period of 2005 – 2009. There were 56 fatalities and 117 major injuries. Eighty-six percent of the hazardous materials accidents were on roadways, with the remainder involving rail, water and air shipments.

The Arizona Department of Transportation (2008) estimated a traffic volume of 109,000 vehicles per day in 2010 at the I-17 Durango Curve. Data were not available to determine the number of trucks that travel this stretch of highway each day. However, ADOT has designated the I-17 Maricopa Freeway as the designated truck route through Phoenix for vehicles carrying hazardous materials. It is not unreasonable to estimate that there are more than 1,000 vehicles per day carrying hazardous materials through the Durango Curve area of the I-17. Based on the above discussion, residents of the Coffelt neighborhood should become prepared for responding to a possible hazardous materials release as a result of a traffic accident on the Durango Curve.

C. Industrial accidents

Releases of hazardous materials are also a threat from sources such as the industrial, municipal and commercial facilities in the vicinity of the Coffelt neighborhood. A review of the EPA Toxic Release Inventory database (EPA, 2013g) and EPA ECHO database (EPA, 2013h) was conducted to determine the types of industrial facilities that handle hazardous materials or generate hazardous wastes.

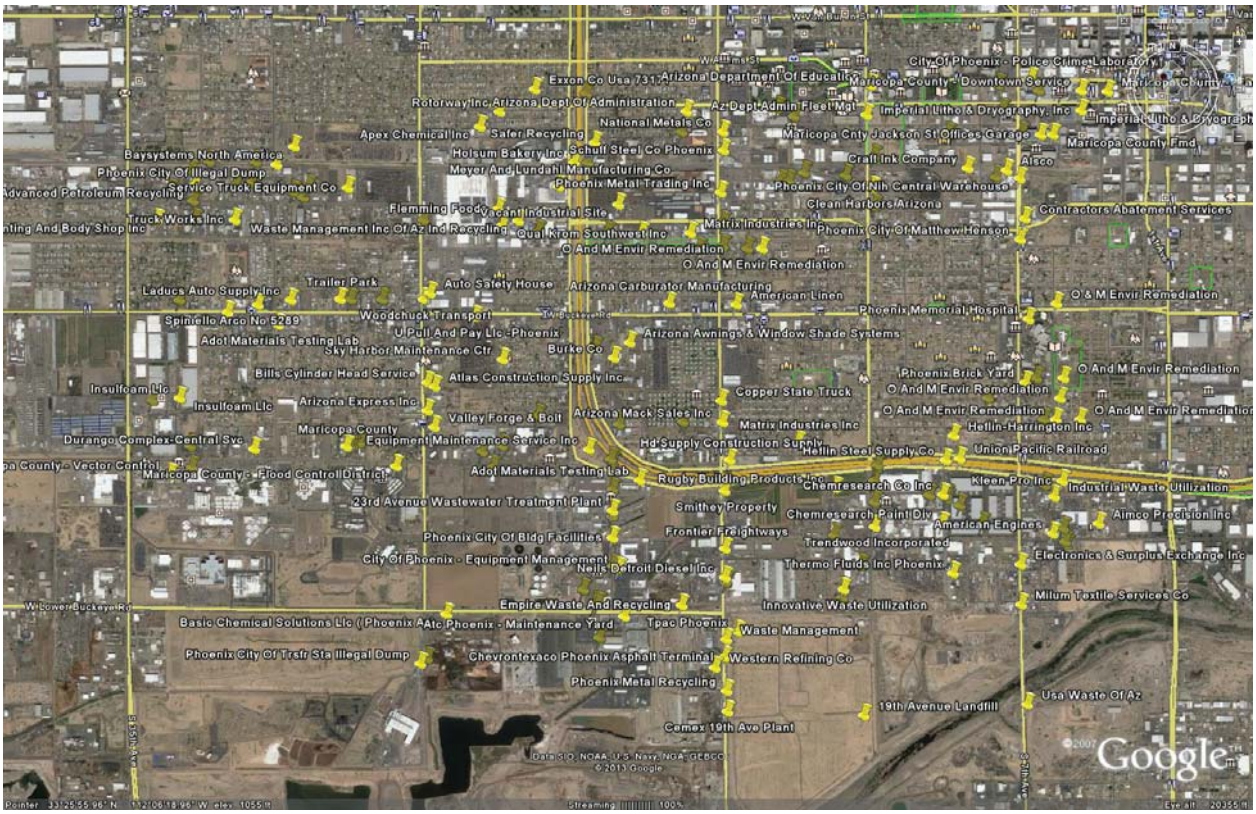
An example of a large quantity generator of hazardous waste is Phoenix Heat Treating. This facility is located less than one mile to the west of the Coffelt neighborhood on West Mohave Street. According to the 2011 EPA Toxic Release Inventory report (EPA, 2013i), Phoenix Heat Treating generated and shipped off site 11.1 tons of hazardous wastes including cyanide and nitric acid.

An example of a major source of hazardous air pollutants is Flex Foam. This facility is located approximately 1.5 miles north of the Coffelt neighborhood. The EPA ECHO database indicates Flex foam released 17,000 pounds of hazardous air pollutants during the most recent reporting period.

The EPA ECHO database also shows 59 large sources of air pollution and 162 hazardous waste generators, treatment, storage and transport facilities within the zip codes of 85007 and 85009.

Figure E.17. is a map showing the proximity of the potential sources of hazardous materials releases to the Coffelt neighborhood.

Figure E.17. Hazardous Materials and Waste Sources Near Coffelt Neighborhood



Case Study

On October 20, 1992 at 5:39 PM, the City of Phoenix Fire Department responded to a fire at Aritex Tire Removal, 1701 S. 22nd Avenue (Reid, B., Sanchez, R., Thompson, C., 1992). This location is immediately to the west of the Coffelt neighborhood between the housing project and I-17. For the next three days, firefighters would battle a blaze that consumed approximately 100,000 waste tires, and residents of the Coffelt neighborhood were kept away from their residences due to unhealthful thick black smoke containing carcinogens. Residents began evacuating at about 11 PM. Evacuation locations were to

nearby hotels, Carl Hayden High School, and the Salvation Army Youth and Family Center. City officials provided transit buses to move people to the temporary shelters. Many Coffelt residents elected to move in with friends and relatives. Red Cross workers and volunteers quickly responded to the two designated shelters. Classes were dismissed and canceled at Alfred F. Garcia Elementary School, Mary Bethune Elementary School and Arthur Hamilton Elementary School because of the danger. Maricopa County Housing Authority Property Manager, Sherida Barnes assisted residents with the evacuation and watched over the abandoned neighborhood while the fire was burning (S. Barnes, personal communication, August 21, 2013). After three days the fire was finally out and Coffelt community members were allowed to return to their residences. Figure E.18. is a photo of a tire fire that occurred in Casa Grande, Arizona. The image is typical of the dense and dangerous plume of hazardous air pollutants emitted by a petroleum-based product.

Figure E.18. Tire Fire in Casa Grande, Arizona

In the year following the incident, many fingers were pointed and court cases ensued to sort out the responsible parties. In the end, the operator of the Aritex Tire Removal Center was sentenced to six months in jail and ordered to pay $492,000 for 13 violations of the Phoenix fire code. He was also sentenced to four years of probation. The Arizona Department of Environmental Quality ordered Swain

to clean up the site which had been operating in violation of several environmental requirements (Pearce, K., 1993).

Fortunately, there were no deaths or injuries due to the quick responses and decisions made by the Housing Authority of Maricopa County property manager Sherida Barnes, City of Phoenix Fire Department, cooperation of Coffelt neighborhood residents, and multiple other response agencies, organizations and volunteers. The remaining 150,000 unburned tires and the ashes of the burned 100,000 tires have been removed. The site is now occupied by other industrial facilities that legally use combustible materials.

Lessons learned from this incident include a realization that despite the existence of multiple regulatory requirements intended to prevent industrial accidents, they still happen. Another important lesson from this incident is the need for preparedness on the part of residents and the Housing Authority of Maricopa County to deal with any type of plausible emergency incident such as another fire, a release of hazardous material from a truck rollover on the I-17 or a prolonged power or natural gas outage.

D. Natural hazards

The Coffelt neighborhood was located within a 100 year flood plain according to a 1998 report (U.S. Department of Housing and Urban Development Environmental Review Record). Since that time, the Maricopa County Flood Control District has constructed new flood control structures upstream of the impacted areas. The current flooding threat would be from localized flooding during a severe thunderstorm. The amount of water accumulation is not expected to be life threatening.

Microburst wind speeds of greater than 100 miles per hour have been recorded within the greater Phoenix metropolitan area during severe thunderstorms. Winds at these speeds will cause deadly blowing debris. Cloud to ground lightning also occurs during thunderstorms. Residents will be safe if they stay inside their houses during the storm event.

E. Power and natural gas outages

Prolonged power outages can and will occur. In September of 2011, a power outage affecting areas of western Arizona, northern Baja Mexico and southern California lasted for at least twelve hours. The estimated economic loss was $400 million dollars (Federal Energy Regulatory Commission, 2012). Air conditioning and use of electrical appliances would be lost during a prolonged outage resulting in a need for residents to evacuate to shelters that have electricity supplied by back-up power. Heat stroke is a significant health threat during summer months. If the power outage occurs during winter months, individuals may also suffer deadly health effects from hypothermia (critically low body temperature). The Tucson, Arizona area experienced loss of natural gas during a prolonged winter freeze in 2012. Schools were closed and people were evacuated to temporary shelters. Our power supplies are very reliable. However, they are vulnerable to outages due to natural disasters and cyber-attacks.

F. Recommendations

The Federal Emergency Management Agency, Maricopa County Emergency Management Department and the Red Cross have excellent web pages that provide sound family and community emergency planning advice (2013).

Families should plan for an emergency that requires evacuation of the residence within minutes of notice and absence for up to one week. Planning for this type of major incident includes making prior arrangements with all family members for communications that will inform family members of the location to where family members were evacuated and other important arrangements. A list of essential items such as prescription medications, flashlights, batteries, bottled water, cell phones and chargers, and other valuable items should be made immediately. Families should assemble a kit or duffle bag that is pre-loaded with these essential items so that the kit can be grabbed on the run during an urgent evacuation. The Red Cross web site has excellent advice on preparing a short-notice evacuation kit. Some emergency shelters will not accept pets. Families with pets should consider this possibility.

Community evacuation planning or shelter-in –place planning should be prepared by the Housing Authority of Maricopa County. The plans should be tested and response staff trained during regularly scheduled exercises that may be as simple as a table-top exercise. The Maricopa County Emergency Management Department offers training services to help all County agencies prepare for emergencies.

VI. Construction Phase Environmental Issues

A. Asbestos

Asbestos is a known human carcinogen. Previous surveys of the Coffelt neighborhood have identified the presence of asbestos containing materials other than regulated asbestos containing materials and regulated asbestos containing materials (Maricopa County Risk Management Department, 2001).

Existing plans for the reconstruction of the Coffelt neighborhood call for the preservation of exterior walls of the buildings. The Maricopa County Risk Management Department (MCRMD) conducted a Comprehensive Asbestos Survey of the Coffelt neighborhood in 2001. The survey concluded that all asbestos containing materials other than regulated asbestos containing materials and the regulated asbestos containing materials should be handled in accordance with U.S. EPA and U.S. Occupational Health and Safety Administration requirements prior to any renovation of the facility (MCRMD, 2001a). In addition, the disturbance of presence of any regulated asbestos containing materials requires compliance with Maricopa County Air Quality Department requirements.

Asbestos containing materials that are left in place after the renovation will require ongoing sampling and control measures whenever the building materials are disturbed for any reason such as repairs.

B. Lead based paint

Lead is a heavy metal known to be present in many household products, but especially paint in homes built before 1978. Other sources of lead include lead solder in plumbing and circuit boards, ammunition, fishing line weights, and folk remedies such as greta and azarcon (MCRMD, 2001b). Health effects from lead exposure include central nervous system damage, cardiovascular system and kidneys. A survey conducted by the Maricopa County Risk Management Department found lead present in a portion of the samples of lead-based paint. Exterior walls left in place during the reconstruction may have lead based paint on them. The MCRMD survey recommended that OSHA and Resource Conservation and Recovery Act standards must be followed during the demolition and reconstruction process.

C. Dust control

During construction and renovation, soil disturbance will occur that triggers a requirement to apply for and comply with a dust control permit from the Maricopa County Air Quality Department (2013d). The permit application process requires the submittal of a dust control plan outlining control measures for maintaining adequate dust control at all times during the construction and renovation phases. Previous sections of this chapter discussed the health hazards associated with exposure to particulate matter. Residents continuing to live on the site during the demolition and reconstruction must not be exposed to unhealthful levels of dust from the construction activities.

D. Water conservation

Opportunities exist during the reconstruction of the project to install multiple water conservation devices.

E. Energy efficiency

Opportunities exist during the reconstruction of the project to install multiple energy efficiency and renewable energy devices and technologies.

F. Lead concentrations in soil

Coffelt neighborhood has been occupied since 1953. There are many potential and known sources of lead that may have accumulated in the soil. The most significant source is the I-17 freeway and 19th Avenue roadways. Lead was used in gasoline until January of 1995 (EPA, 1995). Particulate emissions from vehicles burning leaded fuels have settled out in all areas of the city. Higher accumulations are expected near freeways. Adjacent industries and nearby industries are associated with lead. Examples include the former National Metals automobile shredder facility, Schuff Steel, and numerous small battery and auto recycling facilities. Past flood incidents and dust storms may have transported lead from the nearby industrial property uses onto the Coffelt neighborhood soils. The 1992 tire fire at Aritex may also have contributed to an accumulation of lead in the soils. History of the land use for this site before 1953 is unknown. Standard professional practices exist for conducting environmental site assessments such as a Phase I Environmental Site Assessment. The most well recognized publication for Environmental Site Assessments is ASTM E1527 -05 (ASTM, 2013). There is no known legal requirement to conduct a soil sampling survey to assess lead levels.

G. Recommendations

Comply with MCAQD asbestos requirements before, during and after the demolition and reconstruction of the housing project. Inform all existing and future residents not to drill holes into external walls if asbestos containing materials continue to remain.

Remove and or encapsulate remaining lead based paint. Inform all existing and future residents to not drill holes into external walls if lead containing materials remain.

Comply with MCAQD dust control rules. Residents should be informed of the manner in which they may file a complaint about excess dust from the construction activities.

Consult with the Arizona Department of Water Resources, Arizona Municipal Water Users Association, University of Arizona Extension Service, City of Phoenix Water Department and Salt River Project to develop strategies and plans for installing and implementing the best available technologies and

practices for water conservation during the reconstruction project. Examples of best practices and technologies include xeriscaping, low flow fixtures and automatic shut off devices on outdoor hose bibs. Consult with the Arizona Public Service Company to identify the best available practices and technologies for energy efficiency and generation of renewable energy. APS offers incentives for purchase of renewable energy and energy efficiency devices.
Consider soil sampling to characterize lead concentrations in soils during demolition and site preparation. If concentrations exceeding the ADEQ soil clean-up standards for residential property use are found, then remedial actions such as installing a layer of clean soil on top of the high lead soils should be considered.

Conduct a Phase I Environmental Site Assessment using best professional practices as described in ASTM-E1527-05.

Construct the community center building and street infrastructure to facilitate rapid emergency evacuation of the population in the event of a hazardous materials release that impacts the neighborhood. This may include a building design that will allow rapid intake and accounting of residents, including physically disabled individuals, as they are assigned to emergency shelters, and rapid loading of buses to transport community members off-site.

Conduct emergency response exercises at least one time per year. Consult with the Maricopa County Emergency Management Department on the planning of the exercises.

VII. Summary of recommendations

In summary, there are plentiful opportunities to install best available technologies and building materials to minimize risks from the hazards to human health that have been identified in this report.

Construct houses that achieve “green building” certification such as the Leadership for Energy and Environmental Design (LEED) criteria published by the U.S. Green Building Council (Green Building Council, 2013). High quality environmentally conscious construction will accomplish significant health risk reductions associated with air pollution, noise, and vectors of disease. Constructing buildings to be energy and water efficient will also benefit the entire community by reducing air pollution and greenhouse gas emissions from electricity generating power plants.

Enhance emergency response capabilities during the design phase through consultation with the Maricopa County Emergency Management Department.

References

I. References for Introduction

City of Phoenix, Water Services Department, (2013). *2012 Water Quality Report*. Retrieved from: http://phoenix.gov/webcms/groups/internet/@inter/@dept/@wsd/documents/web_content/wsdwqr2012.pdf

Frumkin, H., (2010). Healthy buildings. In H. Frumkin, (Ed.), *Environmental health: from global to local*, (pp. 689-729). San Francisco, CA: Jossey-Bass.

Maricopa County Air Quality Department, (2013). *Air quality awareness week* (News Release April 29, 2013). Retrieved from :http://www.maricopa.gov/pr_detail.aspx?releaseID=2308

Maricopa County Air Quality Department, (2013). *Frequently Asked Questions*. Retrieved from:http://www.maricopa.gov/aq/about/faq.aspx#Att

U.S. Centers for Disease Control, (2013). *Designing and building healthy places*. Retrieved from: http://www.cdc.gov/healthyplaces/

II. References for Air Quality Section:

Arizona Department of Environmental Quality, (2013). *Air quality division: Preventing air pollution: Air Pollution control programs*. Retrieved from: http://www.azdeq.gov/environ/air/prevent/pcp.html

Arizona Department of Transportation, (2008), *Data and analysis, Average annual daily traffic*. Retrieved from: http://azdot.gov/planning/DataandAnalysis/average-annual-daily-traffic

California Air Resources Board, (2005). Air quality and land use handbook: A community health perspective. Retrieved from: http://www.arb.ca.gov/ch/landuse.htm.

California Air Resources Board, (2006). Childhood Asthma and Exposure to Traffic. Retrieved from: http://www.arb.ca.gov/research/health/healthup/feb06.pdf.

Grineski, S., (2008). Coping with asthma in the central city: Parental experiences with children's health care, *Journal of Health Care for the Poor and Underserved, 19 (2008): 227-236.*

Google Earth, (2013). *Download google earth*. Retrieved from: http://www.google.com/earth/index.html

Health Effects Institute, (2010), *Traffic-related air pollution: A critical review of the literature on emissions, exposure, and health effects* (HEI Special Report 17).

Hyde, P., (2013, April). Health effects of air pollution in metropolitan Phoenix. In *South Mountain Citizens Advisory Team Meeting*. Symposium conducted at the meeting of the South Mountain Citizens Advisory Team , Phoenix, Arizona.

Hu, S., S. Fruin, K. Kozawa, S. Mara, S.E. Paulson, and A. Winer, (2009). A wide area of air pollutant impact downwind of freeway during pre-sunrise hours. *Atmospheric Environment*, 43:2541-2549.

Human Impact Partners, (2011). Gateway Cities Air Quality Action Plan, I-710 Corridor Project Health Impact Assessment. Unpublished.

Kramer, U. et al., (2010). Traffic related pollution and incident Type 2 diabetes: results from the SALIA cohort study. *Environmental Heath Perspectives*. Retrieved from: http://ehp03.niehs.nih.gov/article/info%3Adoi%2F10.1289%2Fehp.0901689

Maricopa County Air Quality Department, (2013a). *Annual network review: Map of Air Monitoring Network*. Retrieved from: http://alert.fcd.maricopa.gov/alert/Google/v3/air.html

Maricopa County Air Quality Department, (2013b). *Annual network review*. Retrieved from: http://www.maricopa.gov/aq/divisions/monitoring/docs/pdf/2012_Network_Assessment.pdf

Maricopa County Air Quality Department, (2013c). *Dust compliance, vacant lots/unpaved areas*. Retrieved from: http://www.maricopa.gov/aq/divisions/compliance/dust/vacant_lots/Default.aspx

Pearson, J. F., et al., (2010). Association between fine particulate matter and diabetes prevalence in the U.S. *Diabetes Care*, Vol 33, No. 10.

Roberts, P. T., (2013, April). Near-road impacts of vehicle emissions: Examples of impacts and mitigation. In *South Mountain Citizens Advisory Team Meeting*. Symposium conducted at the meeting of the South Mountain Citizens Advisory Team , Phoenix, Arizona.

South Coast Air Quality Management District, (2005). Air quality issues in school site selection: Guidance document. Retrieved from: www.aqmd.gov/prdas/aqguide/doc/School_Guidance.pdf.

U.S. Centers for Disease Control, 2013, Morbidity and Mortality Weekly, Increase in Reported Coccidioidomycosis-United States 1998-2011, Retrieved from : http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6212a1.htm?s_cid=mm6212a1_w

U.S. Environmental Protection Agency, (2009). *Integrated science assessment for particulate matter*. Retrieved from: http://www.epa.gov/ncea/isa/pm.htm

U.S. Environmental Protection Agency, (2012). *Provisional assessment of recent studies on health effects of particulate matter exposure* (EPA Publication No. EPA/600/R-12/056F). Retrieved from: http://www.epa.gov/ncea/isa/pm.htm

U.S. Environmental Protection Agency, (2013a). *Overview of Clean Air Act*. Retrieved from: http://www.epa.gov/air/caa/peg/

U.S. Environmental Protection Agency, (2013b). *Particulate matter (PM) Basic Information*. Retrieved from: http://www.epa.gov/airquality/particlepollution/basic.html

U.S. Environmental Protection Agency, (2013c). *Integrated science assessment for ozone and related photochemical oxidants* (EPA Publication No. EPA 600/R-10/076F). Retrieved from: http://www.epa.gov/ncea/isa/ozone.htm

U.S. Environmental Protection Agency, (2013d). *Enforcement and compliance history online.* Retrieved from: http://www.epa-echo.gov/cgi-bin/ideaotis.cgi

U.S. Environmental Protection Agency, (2013e). *Toxic release inventory*. Retrieved from: http://oaspub.epa.gov/enviro/brs_report_v2.get_data?hand_id=AZD009010273&rep_year=2011&naic_code=&naic_code_desc=&yvalue=2011&mopt=0&mmopt=&wst_search=0&keyword1=&keyword2=&keyword3=&rvalue1=&rvalue2=&rvalue3=&cvalue1=&cvalue2=&cvalue3=

U.S. Environmental Protection Agency, (2013f). *An introduction to indoor air quality*. Retrieved from: http://www.epa.gov/iaq/ia-intro.html

U.S. Federal Highway Administration, (2013). *Draft Environmental Impact Statement, South mountain freeway loop 202*. Retrieved from: http://azdot.gov/projects/phoenix-metro-area/loop-202-south-mountain-freeway

University of Arizona, Valley Fever Center for Excellence, (2013). *Coccidioidomycosis*. Retrieved from: http://www.vfce.arizona.edu/

Zhu, Y., W.C. Hinds, S. Kim, S. Shen, and C. Sioutas, (2002). Study of ultrafine particles near a major highway with heavy-duty diesel traffic. *Atmospheric Environment*, 36:4323–35.

III. References for Noise

Arizona Department of Transportation, (2008), *Data and analysis, Average annual daily traffic*. Retrieved from: http://azdot.gov/planning/DataandAnalysis/average-annual-daily-traffic

City of Phoenix Aviation Department. (2013). *1992/1999 Noise contour* maps, Retrieved from: http://skyharbor.com/community/noiseContourMap.html

City of Phoenix Aviation Department. (2013). *Phoenix Sky Harbor International Airport noise exposure map update public workshops report November 14, 15 and December 12, 2012.* Retrieved from: http://skyharbor.com/pdf/NEM_PublicWorkshopsReport_NovDec2012.pdf

City of Phoenix Aviation Department. (2013), *Annual Noise Report 2012*. Retrieved from: http://skyharbor.com/community/noiseReports.html

Human Impact Partners, (2011). Gateway Cities Air Quality Action Plan, I-710 Corridor Project Health Impact Assessment. Unpublished.

U.S. Department of Labor, Occupational Safety & Health Administration. (2013). *Occupational noise exposure*, 29CFR§1910.95. Retrieved from: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9735

U.S. Federal Highway Administration, (2013). *Draft Environmental Impact Statement, South mountain freeway loop 202*. Retrieved from: http://azdot.gov/projects/phoenix-metro-area/loop-202-south-mountain-freeway

World Health Organization. (1999). *Guidelines for community noise*, (Eds. Berglund, B., Lindvall, T., Schwela, D.) Retrieved from: http://whqlibdoc.who.int/hq/1999/a68672.pdf

IV. References for Environmental Health

Maricopa County Animal Care and Control, (2013). *Animal bites*. Retrieved from: http://www.maricopa.gov/Pets/Bites/default.aspx

Maricopa County Environmental Services Department, (2013). *Fly information.* Retrieved from: http://www.maricopa.gov/EnvSvc/VectorControl/Fly/FlyInfo.aspx

Phoenix Revitalization Corporation, (2013a, August). Summary of community meeting on August 4, 2013. *In Coffelt housing project health impact assessment archives*, Symposium conducted at the meeting of the Coffelt community, Phoenix, Arizona.

Phoenix Revitalization Corporation, (2013b, August). Summary of community meeting on August 4, 2013. *In Coffelt housing project health impact assessment archives*, Symposium conducted at the meeting of the Coffelt community, Phoenix, Arizona.

Robson, M.G., Hamilton, G.C., Siriwong, W., (2010). Pest control and pesticides. In H. Frumkin, (Ed.), *Environmental health: from global to local*, (pp. 591 -634). San Francisco, CA: Jossey-Bass.

U.S. Centers for Disease Control, (2013a). *Plague prevention*. Retrieved from: http://www.cdc.gov/plague/prevention/index.html

U.S. Centers for Disease Control, (2013b). *Preventing ticks on your pets*. Retrieved from: http://www.cdc.gov/ticks/avoid/on_pets.html

U.S. Centers for Disease Control, (2013c). *Bed bugs FAQs*. Retrieved from: http://www.cdc.gov/parasites/bedbugs/faqs.html

U.S. Centers for Disease Control, (2013d). *Cleaning up after rodents*. Retrieved from: http://www.cdc.gov/rodents/cleaning/index.html

V. References for hazardous materials and emergency preparedness

American Red Cross, (2013). *Prepare your home and family*, Retrieved from: http://www.redcross.org/prepare/location/home-family

Arizona Department of Transportation, (2008). *Data and analysis: Average annual daily traffic*. Retrieved from: http://azdot.gov/planning/DataandAnalysis/average-annual-daily-traffic

Federal Emergency Management Agency, (2013). *Protecting our communities*. Retrieved from: http://www.fema.gov/protecting-our-communities

Federal Energy Regulatory Commission, (2012). *Arizona-southern California outages on September 8, 2011: Causes and recommendations*.

Maricopa County Department of Emergency Management, (2013). *Preparedness*, *Retrieved from:* http://www.maricopa.gov/Emerg_Mgt/prepare.aspx

Pearce, K., (1993, July 17). Jail, restitution ordered in wake of Phoenix tire fire. *The Arizona* Republic, p. B1.

Reid, B., Sanchez, R., Thompson, C., (1992, October 21). Tire fire smoke forces evacuations. *The Phoenix Gazette*, pp. B1, B8.

Transportation Research Board, (2005). *Cooperative research for hazardous materials transportation,* (Special Report No. 283). Retrieved from: http://onlinepubs.trb.org/Onlinepubs/sr/sr283.pdf

U.S. Environmental Protection Agency, (2013g). *Toxic release* inventory. Retrieved from: http://www.epa.gov/emefdata/em4ef.html?pQuery==MULTI=-112.19521=33.36486=-92.539146=33.542124

U.S. Environmental Protection Agency, (2013h). *Enforcement & compliance history online*. Retrieved from: http://www.epa-echo.gov/cgi-bin/get1cReport.cgi?tool=echo&IDNumber=AZ0020559

U.S. Environmental Protection Agency, (2013i). *Enforcement & compliance history online*. Retrieved from: http://www.epa-echo.gov/cgi-bin/ideaotis.cgi?idea_database=MAPDFRECHO_AFS&ids=0401301087

U.S. Department of Housing and Urban Development, (1998). *Environmental review record: Format – II categorical exclusion*.

U.S. Department of Transportation, (2004). *Hazardous materials: 2002 economic census, transportation, 2002 commodity flow survey* (DOT Publication No. EC02TCF-US(HM)). Retrieved from: http://www.census.gov/prod/ec02/ec02tcf-haz.pdf

U.S. Department of Transportation, (2011). *Top consequence hazardous materials by commodities & failure modes: 2005-2009*. Retrieved from: http://phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Hazmat/Risk%20Management/Top%20Consequence%20Hazardous%20Materials%20Commodities%20Report.pdf

VI. References for Construction Phase Environmental Issues

American Society for Testing and Materials International, (2013). *Standard practice for environmental site assessments: Phase I environmental site assessment process*. ASTM E1527-05.

Maricopa County Risk Management Department, (2001a). *Asbestos-containing material management plan:Coffelt-Lamoreaux homes*. Project No. 01050.

Maricopa County Risk Management Department, (2001b). *Lead hazard control plan:Coffelt-Lamoreaux homes*. Project No. 01050.

Maricopa County Air Quality Department, (2013d). *Permit applications*. Retrieved from: http://www.maricopa.gov/aq/divisions/permit_engineering/applications/

U.S. Environmental Protection Agency, (1995). *Leaded gas phaseout*. Retrieved from: http://yosemite.epa.gov/R10/airpage.nsf/webpage/Leaded+Gas+Phaseout

U.S. Green Building Council, (2013). *Leadership in energy & environmental design*. Retrieved from: http://www.usgbc.org/leed