A RESIDENTIAL SURVEY OF ENVIRONMENTAL CONCERN AND ATTITUDES TOWARDS RELOCATION, REZONING, AND REVITALIZATION IN TWO NEW CASTLE COUNTY, DE COMMUNITIES: EDEN PARK AND HAMILTON PARK

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EXECUTIVE SUMMARY

At its core, this survey research examined the relationship between environmental concern, desire to relocate, and likelihood to move out of one's community among householders in both Eden Park and Hamilton Park, separately. An in-person census of householders[1] at the valid, occupied addresses in each community known to the research team was performed. The survey also examined preferences for alternatives to relocation, including environmental hazard cleanup, effective environmental hazard regulation, and revitalization, among other things.

The original universe[2] for each community consisted of known, valid residences, dichotomized into owner-occupied and renter status, or pre-designated as vacant. This address-based approach assumes a one-to-one ratio of residence to householder, allowing for an equal probability of selection of householders in our universe of addresses (not including vacant properties). The self-identified householder should be able to speak to their own experiences and represent the household accurately, but also provide their interpretation of how their opinions are consistent with the broader community.[3] The final universe list for Hamilton Park was 63 residences (40 owner-occupied, 23 rental). In Eden Park, the final universe list was 71 residences (49 owner-occupied, 22 rental).

Final dispositions and response rates for each community show an overrepresentation of homeowners and an underrepresentation of renters in each completed group, relative to these known characteristics in the universe for each community. In Hamilton Park, the universe was comprised of 63.5% owner-occupied residences and 36.5% rentals. Of those that completed a survey, 76.3% were owner-occupied and 23.7% were rentals. The overall response rate for Hamilton Park was 60.3%, with a 72.5% response rate for owner-occupied residences and a 39% response rate for rental residences. Additionally, the overall refusal rate for Hamilton Park was 9.5% and the non-contact/non-response rate was 30.2%.

In Eden Park, the universe was comprised of 69% owner-occupied residences and 31% rentals. Of those that completed a survey, 76.3% were owner-occupied and 23.7% were rentals. The overall response rate for Eden Park was 53.5%, with a 59% response rate for owner-occupied

[1] A self-identified, individual adult resident to represent the household. The householder is more commonly known as the "head of household." The householder is usually, but need not be, the owner or the primary renter of the property.

[2] A population, or entire list of valid residential addresses in each community that had eligible survey respondents or were pre-designated as vacant. This original list from New Castle County was not entirely accurate, as at least one residence was torn down but still on the list, while some residences may have been be vacant (and *not* occupied) or others newly occupied (and *not* vacant), but represents the best-known list of valid residences to start with. Steps were taken to validate the addresses through community walk-throughs and the use of the county's web-based data on parcels in each community. Additionally, during the actual survey administration, survey administrators took note of residences pre-designated as vacant that had since been occupied, and addresses not pre-designated by the county as vacant, but were vacant in our experience in the community.

[3] In our experience with this project, this held true as it was not difficult to identify a single householder, and responses to the question on how respondents' answers represented their household members were mostly "very well."

residences and a 40.9% response rate for rental residences. Notably, the overall refusal rate for Eden Park was 23.9% (30.6% for owner-occupied residences), and the overall non-contact/non-response rate was 22.5%.

Statistical results suggest that, owner-occupied and rental householders that completed a survey all together, a significant proportion of each community is likely to very likely to move out of their current residential community if given a fair value of a house comparable to a similar home in a low crime area, or with financial assistance if they did not own the home they live in (i.e., a renter). Specifically, relative to the known occupied residences in our universe of valid addresses and based on the completed surveys, 54% of Hamilton Park householders and 45% of Eden Park householders would be likely to very likely to move out of their current residential community.[4] [5] Of those that responded to the surveys[6] in Hamilton Park, 92.9% of owner-occupied householders (N = 26/28) and 100% of renter householders (N = 8/8) reported being likely to very likely to move out for fair value or with financial assistance. Of those that responded to the surveys in Eden Park, 89.7% of owner-occupied householders (N = 26/29) and 66.7% of renter householders (N = 6/9) reported being likely to very likely to move out for fair value or with financial assistance.

Of those that responded to the surveys, very few reported that they would be unlikely to move out of their community for fair value or with financial assistance, and though there was some variation in the desire to relocate, over 50% reported a great desire to relocate in each community. With knowledge of the response rates, this suggests that there may be some skew in motivation to complete the survey – that is, some leaning towards financial payment to aid in out-migration of the community – even if a desire to relocate may not as universally strong. It may be the case that some of those that did not complete a survey (i.e., non-response and refusal) may also be likely to move out or have some desire to relocate, but due to non-response we do not know. Responding to a request by attendees of the Eden Park and Hamilton Park Civic Association meeting in October 2018, the report provides hypothetical statistical estimates of the percentage of householders that would be likely to move out had the full universe of respondents completed a survey.[7] Likelihood to move out the community

[4] These estimates are based on the completed surveys, relative to the total number of known, occupied, valid addresses in the universe for each community (i.e., completed surveys plus non-response), and assume that those who refused the survey or never responded to the survey would be unlikely to move out.

[5] Unweighted data. Weighting procedures were performed to evaluate representativeness based on our collected data and the characteristics of respondents relative to the known characteristics of the populations, but due to a lack of appropriate variables and a heightened influence of renters, who generally had higher levels of non-response than owner-occupied residences, unweighted data were used for all statistical analyses.

[6] Valid data only.

[7] These estimates are provided later in the report. During administration of the survey, survey administrators did hear (anecdotally) from some householders that they refused the survey because they were not interested in relocating. Local civic association leadership, conversely, suggests that non-response and refusals may reflect community fatigue in doing several surveys over the years, as well as a belief that the survey would not catalyze any changes. See https://www.delawarepublic.org/post/environmental-survey-shows-some-residents-likely-move-if-bought-out.

and desire to relocate are two qualitatively different concepts, overlapping but capturing different attitudes and motivations for out-migration.

Additionally, of those that responded to the surveys, a significant proportion expressed high levels of environmental concern. Across both communities (i.e., both communities combined), 80% of the respondents reported being extremely concerned about any environmental pollution or contaminants in their community (over 75% in each community, respectively). Further, independent samples t-tests show small mean differences in levels of environmental concern and desire to relocate across communities, suggesting both communities generally share similar opinions on these issues, on average.

There is evidence of variation in the levels of agreement or disagreement for revitalization and environmental cleanup alternatives (rather than relocation), even among the owner-occupied residences that completed a survey, for both communities. This suggests that, among those that responded to the surveys, given the current conditions of their community many respondents would likely move out, but the idea of improving the community's environmental conditions and economic vitality is appealing to at least some that reported being likely to move out for fair value or with financial assistance.

The variation in agreement or disagreement with some of the alternatives to relocation, even among owner-occupied householders, should be examined in more detail in the future. The historical mobilization of local community members to relocate was largely predicated on cumulative environmental hazard exposure, but if alternatives to relocation, which include effective environmental hazard regulations and cleanup are supported by some proportion of respondents, these alternatives should be discussed intimately by all parties affected. For those that responded to the survey, the statistical evidence here shows at least some residents support alternatives to relocation (even if they would be likely to move out), while there was also a large proportion of each community that agreed rezoning the area to separate industry from residential would benefit people's health. Though this latter question was situated within the broader context of resident relocation, it may be the case that some residents feel that industry should be moved out, and not residents, in terms of rezoning. These findings should be explored in the future.

At the bivariate level, descriptive statistics (i.e., cross-tabulations) generally suggest that owner-occupied and renter respondents that are moderately to greatly concerned about environmental pollution or contaminants in their communities would be likely to very likely to move out of their residential community for fair value or with financial assistance. Interestingly, though the correlation between likelihood to move out and environmental concern for owner-occupied respondents in Hamilton Park is positive and moderately strong, there is no association between these two variables for owner-occupied respondents in Eden Park. Thus, the coupling of these two variables (using Spearman's rho correlation coefficient) is much more consistent for Hamilton Park than it is for Eden Park.

Further, the data suggest that the strength of the relationship between environmental concern and desire to relocate (a different measure than likelihood to move out) varies some across communities, but is positive and moderately strong for each community. The correlation between overall environmental concern and desire to relocate is slightly stronger in Hamilton Park than it is in Eden Park, but the difference in effect size (Spearman's rho) is small.

Though both communities show high proportions of respondents reporting great concern for soil quality (in fact a larger percentage of respondents in Eden Park show great concern for soil quality), there is some variation in concern for soil quality in Hamilton Park. Because there is an ongoing soil mitigation effort in Hamilton Park, this variation in concern could be due to respondents' direct or indirect experiences with the effort and these experiences serving as a mediator for how they interpret relocation. In theory, mitigation should minimize concerns among those that have had their properties cleaned up and possibly diffuse to others in the community. This research evidence points to this *and* some still having significant environmental concerns, in light of cleanups, which suggests an ambiguity about the issues of contamination, cleanup, and their relationship to respondents' desire to relocate. These findings are illustrated in the qualitive data later on.

Qualitative data analysis revealed several themes in the responses, including concerns about arsenic discovery in soil several years ago, growing food in soil, truck traffic, industry surrounding the area, Diamond Materials and fugitive dust problems, and some ambiguity in local knowledge of contamination and efforts by DNREC to mitigate known soil contamination. Additionally, environmental concerns were often linked to subjective health interpretations of individuals, generations of family, and pets, while the lived experience of environmental hazards (like fugitive dust) informed much of how residents in Eden Park understood their local conditions; in Hamilton Park, the discovery of arsenic in the soil and the presence of industries due to intensive zoning (Taylor 2014) were prominent narratives. Lastly, themes of mistrust, recreancy, frustration, and a lack of transparency were strong in both communities, though there were some nuanced differences. The desire to relocate to improve people's health was notable across qualitative responses in both communities.

Overall, in both communities, taking the patterns in response rates into account, approximately 50% of householders (owner-occupied and rental together) are likely to very likely to move out of their residential community for fair value or with financial assistance.[8] Overall, hypotheses about the positive relationship between environmental concern, likelihood to move out for fair value or with financial assistance, and desire to relocate are supported in most analyses, though a bivariate association between likelihood to move out and environmental concern is absent among Eden Park owner-occupied respondents. The variation in desire to relocate, relative to a general tendency to report being likely to move out with financial compensation, may be explained by a general community feeling that if major re-zoning and other changes are

[8] Again, these estimates are based on the unweighted completed surveys, relative to the total number of known, occupied, valid addresses in the universe for each community (i.e., completed surveys plus non-response), and assume that those who refused the survey or never responded to the survey would be unlikely to move out.

potentially happening in the area, though with some reluctance, respondents may be willing to entertain moving out because they feel it is necessary or inevitable. On the other hand, it is likely that disputes over relocation and land use will arise as this issue moves forward, even though significant proportions of each community reported being likely to move out. Though this survey serves as one small component of procedural and transitional justice, crucially, residents of both communities should be involved in learning more about the environmental conditions in the area and any opportunities for helping to plan the future of these communities, whatever that might be.

RESEARCH QUESTIONS[9]

This project utilized an address-based census approach to survey householders in both the Eden Park and Hamilton Park communities in New Castle County, separately, to provide a current assessment of any concern that local residents may have about environmental pollution or contaminants in their community; measure the desire to relocate among residents in each community; and determine their level of agreement or disagreement with some of the potential rezoning, revitalization, and relocation scenarios put forth by the Wilmington Area Planning Council's (Wilmapco)[10] Route 9 Corridor Master Plan.[11]

The main research question was "How does concern for any environmental pollution or contaminants in the community correlate with desire to relocate?" It was hypothesized that an increase in concern for any environmental pollution or contaminants will covary with an increase in residents' desire to relocate out of their current residential community. Additionally, it was hypothesized that an increase in concern for any environmental pollution or contaminants will covary with an increase in the likelihood that residents would move out of their residential community if given a fair value of a house comparable to a similar home in a low crime area, or if given the financial assistance to do so if not a homeowner (i.e., a renter).

Other important research questions examined influences on level of agreement or disagreement with general statements about the possible rezoning and revitalization of the local area in the future. Given the context of a history of mobilization around environmental concerns and ongoing soil remediation (i.e., cleanup of contaminants) in Hamilton Park, as well as fugitive dust concerns and truck traffic in Eden Park, this research explored any variation in attitudes about the future of the community based on attitudes and experiences with the environmental conditions and the potential impact of length of residence and homeownership status. In this way, the research could illuminate someone's place in a collective narrative of knowledge about local environmental hazards that has evolved over time, while also elucidate the consequent preference for relocation or alternatives to adapt in place as a result.

[9] Portions of this report were drawn verbatim from the July 26, 2018 University of Delaware (UD) Institutional Review Board (IRB) approved amended research protocol, and revised and edited as needed for this report. The research protocol goes into detail about certain phases of the survey development and project methodology, so portions of it are included here as relevant. Only minor corrections were made where necessary (grammatical, citation), while minor edits were done to improve clarity and cogency of the content, or to update tense.

[10] http://www.wilmapco.org/

[11] See the plan in full at: http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.

BACKGROUND OF THE STUDY

Need for the Survey

The issue of environmental inequality is paramount as a guiding principle in this research, centering on disparate environmental hazard exposure, health impacts, and social impacts (Downey 2005). There is a history of community mobilization around issues of environmental pollution and contamination impacting human health, which includes litigation, in both of the Eden and Hamilton Park communities.[12] Further, there is an ongoing dialogue between community leadership (especially the Eden Park and Hamilton Park Civic Association) and agencies including the Delaware Department of Natural Resources and Environmental Control (DNREC), the Delaware Division of Air Quality (DAQ), and the regional Environmental Protection Agency (EPA) representative regarding issues of environmental concern, as well as relocation.[13] Environmental concerns include, among other things, "fugitive dust," truck and automobile exhaust fumes, and soil contamination (lead and arsenic being noted concerns).

The survey was a recommendation in the Route 9 Corridor Master Plan to assess the current opinions of residents regarding relocation, as the basic conceptual model proposed in the plan is to separate industrial use areas from the residential areas of Eden Park and Hamilton Park, which is one of the major reasons that both communities face environmental hazards (current and legacy).[14] Quoting the plan (p.54):

> Given the strong and enduring presence of industry in and around Terminal Avenue (Center 1), the presence of contaminated brownfields here, the desire by the City of Wilmington to maintain and expand light industry along nearby Garasches Lane, the need for expansion of the Port of Wilmington, and the desire of residents for more jobs, strong consideration should be given to buying out and fully relocating residents from the Eden Park neighborhood and re-zoning that land for light industrial or open space. The Hamilton Park neighborhood, south of Eden Park, is also surrounded by industry and should be

[12] Litigation in 2004, for example, involved numerous community members and made claims of arsenic and lead soil contamination in the local community. The plaintiffs sought monetary damages, which included fair value for their properties, and medical monitoring. The particulars about the sources of contamination and its causal impact on human health, as well as the outcome of the case notwithstanding, this litigation shows the degree to which mobilization around these issues took place. See, for example: https://www.delawarelitigation.com/CleanEarth.pdf.

[13] See, for example, two recent letters from a local community leader and president of the Eden Park and Hamilton Park Civic Association (McDuffy) in the News Journal regarding these issues: https://amp.delawareonline.com/amp/14942097 and https://www.delawareonline.com/story/opinion/readers/2018/05/07/high-capacity-magazine-ban-targets-honest-citizens-reader-says/585766002/. Additionally, at a meeting in the spring 2018 of the Route 9 Monitoring Committee's survey sub-group, which consisted of residents and other stakeholders from outside of the Eden and Hamilton Park communities providing feedback on the survey, a DNREC representative provided a summary of recent activities (included with this report as an appendix) dealing with soil contamination cleanup in the Hamilton Park area (and its history) and air quality testing in Eden Park.

[14] See pages 24, 42, 66, 70, 89, and 91 of the Route 9 Corridor Land Use and Transportation Plan (i.e., "Master Plan"): http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.

> rezoned to allow for commercial, office, institutional, and open space while prohibiting further residential and industrial uses. This approach, long advocated by the local civic association leaders, should only take place after careful consultation with every property owner and resident in each community and their approval. This process should begin by conducting a sociological relocation survey of both communities to introduce the idea and gather feedback.[15]

In their "master plan" for the rezoning of the northern part of the Route 9 corridor to separate residential from industrial areas, Wilmapco describes their extensive outreach efforts to ascertain the environmental (and other) concerns of local residents and also details the longstanding support for separating residential from industrial areas by local civic association leadership.[16] To further quote the plan: "With residential uses removed from the northern tier of our study area, we will address a public health concern in our study area – heavy localized exposure to particulates caused by dust and emissions" (p.54).[17] Furthermore, the Steering Committee for the plan, which included several local Route 9 community leaders, "are in support of a relocation strategy for the residents of the Hamilton Park neighborhood" (p.70).[18]

Thus, previous relocation efforts in these local communities and the current conceptual model from Wilmapco are largely predicated on resident concerns about exposure to perceived environmental hazards and the illogical zoning of the area. As a cross-sectional survey with both open- and closed-ended items, this survey research project was an attempt to capture the historical narrative of environmental concerns about air pollution and soil contamination (Adams et al. 2018), but also attempted to determine what people's opinions and beliefs are about the current state of environmental pollution or contamination if they are new to the area, have not been involved in the mobilization, are one of the residents that has a property that DNREC has already cleaned, or any other number of circumstances. In this way, the survey can capture the concerns of residents (or lack thereof) depending on any myriad of factors in the social construction of knowledge regarding the environmental conditions of the area, during an ongoing remediation effort in at least Hamilton Park, as they relate to human health and the future of the community (Harclerode et al. 2016). The environmental concerns items try to capture any resident's position or stage within this narrative and allow them to be statistically examined in relation to desire to relocate, in addition to a variety of other measures on rezoning and revitalization as provided in the Route 9 Corridor master plan. This information is useful for anyone interested in how an ongoing narrative of environmental concern is socially constructed.[19]

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[15] See page 54 of the Route 9 Corridor Master Plan: http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.
[16] See pages 24, 42, 66, 70, 89, and 91 of the Route 9 Corridor Land Use and Transportation Plan (i.e., "master plan"): http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.
[17] See page 54 of the Route 9 Corridor Master Plan: http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.
[18] See page 70 of the Route 9 Corridor Land Use and Transportation Plan (i.e., "master plan"): http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.
[19] Also, of note: as the research project took shape, it was clear that there was at least some division within the communities about desire to relocate, reflecting the complexities of environmental justice research and the impact of internal community conflicts on land use and the presence/impact of environmental hazards. Survey

Theoretical Approach

Though there is considerable scholarship on how climate change impacts may induce relocation and "adaptive migration,"[20] there is a need for more academic research on how environmental justice communities perceive their environmental conditions and its relationship to preferences for *relocation* as an environmental justice outcome in small communities.[21] Relocation due to climate change is being reconceptualized not as failure to adapt in place, but as a precautionary activity (Bardsley and Hugo 2010), involving direct experience with others, indirect information from government agencies, mass media, and fellow community members, and depends on the subjective interpretations of one's experience with environmental conditions *and* their adaptive capacity (Koubi, Stoll, and Spilker 2016:441).

Migratory patterns into and out of locales with known environmental hazards is mixed, though race has been identified as an important factor (Crowder and Downey 2010). Adaptive migration (or planned relocation) of environmental justice communities is a contentious issue, akin to a form of forced migration, due to disparate exposure to environmental hazards and related deterioration of the local environmental conditions. The voluntariness of the act (i.e., "desire to relocate") as a community-based initiative does address some of these concerns, but it still remains a complex mix of vulnerability to environmental hazards coupled with profound immobility due to a lack of resources to do so (Adams 2016). Shriver and Kennedy (2005), for example, show how one Oklahoma community with legacy contamination and ongoing remediation of that contamination was splintered into two factions, one supporting relocation and the other not, hotly contesting a federal relocation program offered to the community. This splintering was distilled down to the "ambiguity of harm," still a prominent theme in many environmental justice discussions (Shriver and Kennedy 2005:501). Additionally, Jacobson (2016:239) illustrates the dissension that environmental and health concerns can create in communities:

> Concerns about environmental health threats may disrupt positive feelings regarding one's community or home. Public disputes over environmental threats may cause property values to decrease, making it difficult for people to sell their homes and move out of the area. Governing bodies concerned about the

administrators tried to ensure that the survey would allow people to express whatever views they hold, given the historical antecedents and ongoing soil remediation efforts in the area and scientific testing of air quality. The internal conflicts within the communities regarding these issues are notable, and results of the survey should be interpreted with this in mind. For a discussion of this issue, see Brown, Phil. 2012. "Qualitative Approaches in Environmental Health Research." Pages 33-45 in *Contested Illnesses: Citizens, Science, and Health Social Movements*, edited by Phil Brown, Rachel Morello-Frosch, Stephen Zavestoski, and the Contested Illnesses Research Group. Berkeley: University of California Press.

[20] See the work of Koko Warner.

[21] Performing "buyouts" of communities located near industry does happen but is contentious and does not necessarily solve all of the issues associated with environmental racism. For example, pre-testing of our survey showed that one resident felt that they will take whatever health impacts have already happened to them with them, even if they relocate. See page 327 in Bullard, Robert D. 2017. "Overcoming Racism in Environmental Decision Making." Pages 315 to 331 in *Environmental Ethics: Readings in Theory and Application*, 7th ed., edited by Louis P. Pojman, Paul Pojman, and Katie McShane. Boston: Cengage Learning.

> potential costs of investigating environmental risks may deny citizen requests for relocation, environmental testing, or medical assistance (Edelstein 2004; Shriver and Kennedy 2005), contributing to psychological stress and creating a 'secondary trauma.'

Much of the work on relocation of environmental justice communities that is available comes in the form of academic and community collaborations in areas that have voiced their environmental concerns, or are fenceline communities,[22] and have had significant visibility while addressing their local environmental concerns and related health issues.[23] [24]

In general, the theoretical approach in this research was informed by the idea that living in area with some documented environmental hazards, perceived environmental hazards, and a history of social networks mobilizing around environmental hazards will lead to a general increase in concern for those hazards among residents of the community. Drawing from the work of Mohai and Bryant (1998), Marshall and colleagues (2006:33) illustrate this when they state that "living in a contaminated community will lead to a greater concern about industrial pollution." Additionally, the work of Jones and Rainey (2006:490-491) posited that the "perceived differential exposure to environmental risks" helps to explain how perceptions of environmental hazards are mediated by one's social environment and the perceived fairness of that exposure:

> …responses to environmental conditions are mediated by interpretive processes that are shaped by a variety of sociocultural, economic, and biophysical factors. These processes create different meanings, values, and social priorities for individuals that ultimately have real consequences to people and the environment. Thus, those who believe they are being exposed to more environmental risks, associated health impacts, and environmental injustices are going to be more concerned about their local environment…The framework postulates that links between environmental concern, health, and justice are more salient for specific groups of people and/or more apparent under specific socioenvironmental conditions.

This project also borrows from the theoretical elements of environmental stressor and climate change-induced migration to try to explore any desire to relocate among residents in the Eden and Hamilton Park communities, based on the history of mobilization around environmental

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[22] A fenceline community is one "where residents live immediately adjacent to heavily polluting industries or military bases" (page 3 in Lerner, Steve. 2010. *Sacrifice Zones*. Cambridge, MA: MIT Press).

[23] See, for example: Communities for a Better Environment (CBE) (http://www.cbecal.org/resources/our-research/ and https://medium.com/@mayahrc/big-oil-small-town-the-fight-for-environmental-justice-in-richmond-california-97324244caff). Cohen et al. (2012) were part of the academic collaboration with CBE in doing community environmental and health surveys (see http://www.cbecal.org/wp-content/uploads/2012/05/Richmond-Health-Survey.pdf).

[24] See, for example: Lougheed, Tim. 2014. "Arising from the Ashes: Environmental Health in Detroit." *Environmental Health Perspectives* 122(12):A324-A331.

hazard issues in those communities and the evidence presented in the Route 9 Corridor master plan regarding local environmental hazards. Zander and colleagues (2016) and Chen and colleagues (2013), for example, employ similar attitude-intention-behavior theoretical approaches, while Adams (2016:430) suggests that the "roles of environmental scarcity or environmental risks and hazards have not featured prominently in theories of migration…but are now emerging as important dimensions…."

METHODOLOGICAL APPROACH AND SURVEY INSTRUMENT

Background and CBPR Approach

The fundamental research approach is based on the collective work of scholars such as Rachel Morello-Frosch, Alison Cohen (Cohen et al. 2012), Phil Brown (Brown, Morello-Frosch, and Zavestoski 2012), and others that employ community-based participatory research (CBPR) methods to study communities and their perceptions of environmental and health hazards. This project was an attempt to implement the core aspects of this method as best as possible, given resource limitations and the social conditions of the communities, as well as the history of mobilization in the area, by working with local community groups, leadership, and residents to develop and perform the research as an academic-citizen collaboration. The CBPR method begins by getting to know key community leaders and groups that can serve to allow access to the wider community and allow for problem identification through the lens of the community (D'Alonzo 2010). From there, researchers interact with those identified community leaders to develop rapport with local residents and gain a better understanding of the issues at hand that the research will seek to examine, while eventually involving community members in the process of designing and conducting the research.

Insight into possible environmental concerns in the community was initially made possible by the exploratory pre-research[25] performed in the summer 2017 for the DE Division of Air Quality, as well as learning more about the community outreach efforts made by Wilmapco in the preparation of the Route 9 Corridor master plan. The pre-research efforts by the PI and research assistant Archer in the summer of 2017, by way of invitation from the Delaware Department of Natural Resources and Environmental Control (DNREC) Division of Air Quality (DAQ) and Wilmapco, revealed that the people that we spoke to had concerns about air pollution and soil contamination, among other things.

Soon, we were in contact with and had ongoing discussions with the leadership of the Eden and Hamilton Park Civic Association and some of its members. Initially, feedback on the survey content and methodological approach were limited and mostly involved a dialogue with the president of the civic association, though community feedback was obtained through a couple of civic association meetings that we attended in the fall of 2017. We were also able to recruit, initially, three people from the community or people that had family still living in the community who were interested in serving as survey administrators and helping to develop the instrument. The process of moving forward was complicated and slow at this point, with intra-community and inter-community politics and dynamics impacting the progression.

[25] Perez and Archer did not define this earlier effort as research, as they were not collecting data to generalize to some larger body of science or population, but to gather information that could be used to help structure future research studies. Additionally, all data in that earlier project were anonymous and anything identifying was redacted from our records. See one summary of the effort included with this report as an appendix. The pre-research exploratory effort helped to identify some of the core concerns of people attending the Health Hookup Fair in the local Route 9 area, close to the communities of Eden and Hamilton Park. The method of identifying themes was derived from the community-based participatory research approach illustrated in the work of Cohen and colleagues (2012) and D'Alonzo (2010).

Unfortunately, at this stage, those three persons did not end up serving as survey administrators, though one did assist us in a read through and in-house pre-test of an early draft of the survey in January 2018.

In winter 2018, the survey research project picked up significant momentum through a handful of interactions with New Castle County personnel involved[26] and local community members and leadership. At that point, the survey's early drafts were presented at several public meetings from March through May 2018 to the Route 9 Monitoring Committee survey sub-group, which was a group of persons involved in overseeing and providing feedback on the larger Route 9 Corridor master plan, as well as specific feedback to the survey research effort and the survey instrument itself. At these meetings, Perez and Archer were able to gather contact information for people interested in serving as volunteer "block captains" or guides when the survey was to be administered, several people interested in serving as pre-testers of the survey, and one community member that successfully passed human subjects protections certification through IRBNet at the University of Delaware to administer surveys in the communities. This person, additionally, worked with the PI, research assistant Archer, and research assistant Otegui in refining the survey instrument, validating our addresses for the census, and in general developing the research project through research team meetings in the spring and early summer of 2018.

In addition to persons involved in the Route 9 Monitoring Committee, the survey sub-group consisted of Eden and Hamilton Park community leadership, community residents, and a handful of community stakeholders from outside of these specific communities but along the Route 9 corridor. Some meetings were very contentious, as the history of these issues and the role of the survey made for often tense and difficult dialogue. The dialogue, though, allowed for input on the survey from all who attended and, as true to the method of community-based participatory research as possible, revisions were made to the survey instrument (i.e., the questions) to reflect the preferences of the community and others attending these public meetings. In all, the survey instrument was revised numerous times and presented to the group for final approval in May 2018 before pre-testing, striking a balance between having an instrument that can capture adequate data to answer the fundamental research questions and still reflecting the input from the community about the survey, its content, and its perceived role in addressing local environmental concerns.[27]

[26] The funders of the project.

[27] For example, questions about environmental concern had to offer response options such as "IAP," or Inapplicable, if the respondent did not think that there were any environmental hazards in the area. Feedback during the survey sub-group meetings included the observation that we should not ask about a resident's direct knowledge of any environmental hazard because, as some voiced at the meeting, "how would they know" if something is there, "without sitting down with the science in a way that they can understand" [paraphrased]. Though the current research is based on the collection of scholarship showing how people's embodied experiences with local environmental conditions inform their subjective interpretations of hazards (and recognize the mechanisms of social contagion and risk amplification or attenuation possible in small communities), Perez tried to adhere to the feedback as much as possible without completely eliminating crucial items needed to answer the research question. One scenario that illustrates this complexity: during public meetings, Perez and Archer heard feedback that some people were knowledgeable of and had experienced local hazards, like truck exhaust, but

Also, minor revisions were made to the survey during several meetings throughout the spring 2018 by the survey research team, which included a community member. These meetings were used to discuss and rehearse the survey script and familiarize ourselves of its content, interpretation, and best practices for administration, while also providing a few opportunities to make minor changes based on ideas from the survey research team.

It is recognized that the focus of the current study was relatively narrow and centered on environmental concerns and perception of the presence and impact of local hazards, but that there might be a host of other reasons why residents would be attached to their community or would want to relocate, including lack of jobs, access to fresh food, crime, prostitution, and other factors. Early work on the development of survey items in the spring, summer, and fall of 2017 included several of these factors as they were identified in the Route 9 Corridor master plan in their outreach efforts. Many of the attachment to community measures initially included in the survey were taken out based on the feedback during the public meetings noted above, especially as it was suggested that the survey was too long and too complicated in early drafts. Since the central driving force in the prior community mobilization efforts for relocation was perceived exposure to environmental hazards, and since the Route 9 Corridor master plan suggests a major reason for rezoning is to separate industry from residential to help improve health and quality of life, the final survey instrument reflects a focus on these issues. Further, after meeting with community members and others numerous times throughout this process, it was clear that a profound sense of frustration and urgency was present among those who had been dealing with environmental concerns for decades, so the instrument narrowed in on those items that we felt would *best* explain people's desire to relocate.

As research, it is also noted how a survey that has a relatively narrow focus on environmental concerns, in a community with likely different levels of knowledge, understanding, and experience with the history of mobilization around environmental hazard concerns and the local conditions, may motivate some residents to wonder why we are doing a survey about these issues. Inherent in doing door-to-door survey research on environmental concerns is the possibility of the survey serving as an impetus for some to seek out more information on these issues, and, perhaps, to gain a better understanding of the history of the community in which they live. Any survey on environmental issues would serve to raise these questions among some residents.

Based on the background work and all of the information gleaned, the door-to-door method was selected as it is extremely valuable for numerous reasons for this type of work (Hillier et al. 2014). Also, it was estimated that a significant number of residents, especially those that are long-time homeowners and those have been residents for some time (either renter or homeowner), would have at least *some* familiarity with the history of the issues in the area

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were not concerned about it. In this way, they may respond to a concern item that they are not concerned at all but may believe that the area has some form of environmental hazard. There was a need for consistency in responses from perceived presence of some hazard to concern and to write the survey in a way that best accomplished this, given the challenges of incorporating feedback from a multitude of stakeholders at these meetings.

and/or have some experience with the previously noted environmental concerns that have been raised.

Survey Instrument

Borrowing on prior survey work by the principal investigator, the current survey instrument was primarily constructed[28] using the theoretical and conceptual frameworks in the work of Cohen and colleagues (2012), Jones and Rainey (2006), Chakraborty and colleagues (2017), Mobley (2016), Marshall and colleagues (2006), and White, Hall, and Johnson (2014), which were used to theorize that environmental concern is a function of interpretive processes that involve the local cultural, social, economic, and biophysical environment.[29] Further, it was theorized that the "embodied experiences" of people in their local residential communities would help to inform their beliefs, attitudes, and opinions about local environmental conditions (Brown et al. 2012). In this way, environmental concern was conceptualized as an attitude that is based on the direct experiences people may have had in their communities (Mohai, Simoes, and Brechin 2010), as opposed to more general views on environmentalism or the environment, with perceived source-point pollutants exposure and a history of dialogue among at least some residents and outside agencies concerning other environmental hazards in the area (Judge et al. 2016). From the perspective of environmental sociology, then, a measure of "environmental concern"[30] can capture the confluence of emotional and cognitive processes that elucidate how knowledge, experience, and awareness of environmental conditions in one's neighborhood are reflexive and socially constructed through historical antecedent and in the contexts of social networking, community mobilization, and shared scientific information from agencies like DNREC and the DAQ (Auyero and Swistun 2008; Franzen and Vogl 2013).[31]

There is considerable variation in how environmental concern has been measured using surveys, while the target populations of research endeavors have also varied depending on the nature of the measures used.[32] For example, environmental concern among the general population has been measured using instruments like the New Environmental Paradigm Scale and the New Ecological Paradigm Scale (Fransson and Garling 1999; Liu, Vedlitz, and Shi 2014),

[28] PI Perez has an extensive list of other scholarship consulted throughout the course of this study.

[29] Also see Xu, Jianhua, Cheryl S.F. Chi, and Kejun Zhu. 2017. "Concern or Apathy: The Attitude of the Public Towards Urban Air Pollution." *Journal of Risk Research* 20(4):482-498; see Bickerstaff, Karen. 2004. "Risk Perception Research: Socio-Cultural Perspectives on the Public Experience of Air Pollution." *Environment International* 30:827-840 for a review of theoretical approaches; also see Day, Rosemary J. 2006. "Traffic-Related Air Pollution and Perceived Health Risk: Lay Assessment of an Everyday Hazard." *Health, Risk & Society* 8(3):305-322.

[30] For a similarly scaled item on environmental concern and use in predicting perceived risk, see Grasmuck, Dirk and Roland W. Scholz. 2005. "Risk Perception of Heavy Metal Soil Contamination by High-Exposed and Low-Exposed Inhabitants: The Role of Knowledge and Emotional Concerns." *Risk Analysis* 25(3):611-622. For an example of environmental concern as a dependent variable, measured similarly, see Hannibal, Bryce, Xinsheng and Arnold Vedlitz. 2016. "Personal Characteristics, Local Environmental Conditions, and Individual Environmental Concern: A Multilevel Analysis." *Environmental Sociology* 2(3):286-297.

[31] See presentation from the Division of Air Quality to the Eden and Hamilton Park Civic Association an example of communicating air quality testing, included with this report as an appendix.

[32] PI Perez has a list of over 2 dozen studies employing different Likert-type scales to measure environmental concern, illustrating the wide variation in operationalization of the concept.

while local attitudes towards perceived risk and presence of environmental hazards/quality of environmental conditions have been explored in the work of Harclerode and colleagues (2016), Mobley (2016), Wakefield and colleagues (2007),[33] and a variety of others using a diversity of quantitative and qualitative research instruments (Weber, Hair Jr., and Fowler 2000). One extremely common method of operationalizing these measures, regardless if they assess type of risk, probability or risk of harm, perceived danger, size or breadth of an environmental problem, perceived quality of the environment, presence of a hazard, likelihood of a health outcome, fear, likelihood of exposure, or a range of other measures, is the Likert-type scale, which employs unipolar and bipolar ranges of attitudes and perceptions in categories or values, commonly using 4, 5, or 7-point ordinal scales (Dillman, Smyth, and Christian 2009).[34]

PI Perez and research assistant Archer began developing the original survey during the late spring, summer, and fall of 2017, drawing on prior survey work by Perez, the relevant scholarly literatures, the Route 9 Corridor master plan, and what was known about local community mobilization and environmental concerns from the regulatory agencies working with these communities.[35] The survey instrument for the current research, as noted earlier, was attuned specifically for its use in the Eden and Hamilton Park communities and incorporated feedback from community leadership, residents, and others involved in the Route 9 Monitoring Committee survey sub-group meetings in the spring of 2018 (3 meetings in total with this larger group) and community leadership.

During the spring of 2018, though there was limited input into what items to add to the survey during these meetings, there was considerable feedback during these meetings about what to take out. Overall, a significant amount of the original survey draft was removed, including nearly all of the items on demographics and attachment to community. Items that were added/revised by others included likelihood of moving out of the residential community if given a fair value of a house comparable to a similar home in a low crime area, and two questions on familiarity with the Route 9 Corridor Master Plan and Port of Wilmington expansion. Crucially, the item on moving out of the residential community if given a fair value was an item provided by local community leadership (revised from the original PI Perez provided). Representative of just transition in its adoption of language provided by a community member, the survey strived to include items provided by the community, and was able to include a few provided by people outside of the research team. Also, as noted earlier, there were some minor revisions made to the content throughout the spring 2018 by the research team to enhance its validity and clarity in use.

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[33] Also see Elliott, Susan J., Donald C. Cole, Paul Krueger, Nancy Voorberg, and Sarah Wakefield. 1999. "The Power of Perception: Health Risk Attributed to Air Pollution in an Urban Industrial Neighborhood." *Risk Analysis* 19(4):621-634.

[34] See Dixon, Jane K., Karrie C. Hendrickson, Elizabeth Ercolano, Robi Quackenbush, and John P. Dixon. 2009. "The Environmental Health Engagement Profile: What People Think and Do About Environmental Health." *Public Health Nursing* 26(5):460-473.

[35] Additionally, items 8 (determining homeownership status) and 22 (determining length of residence) of the survey were modeled after the Wilm2028 comprehensive plan survey. See https://www.wilmingtonde.gov/Home/Components/News/News/1600/225.

The survey used mostly ordinal, Likert-type scales for the close-ended questions, and several open-ended questions that respondents could answer in their own words. Additionally, when deemed appropriate, the close-ended survey questions adhered to the condition of being construct-specific (Dillman, Smyth, and Christian 2009). In May 2018, at a public meeting of the Route 9 Monitoring Committee survey sub-group, community leadership, community residents, and others from the nearby area, the research team went through each survey question, noted any final changes requested by the group, and agreed on the pre-test version of the survey.

Pre-Tests

At Route 9 Corridor survey sub-group meetings in spring 2018, residents were able to sign up if they were interested in serving as pre-testers of the survey. During the months of May and June 2018, the PI and two members of the survey administration team (including the community member working as a survey administrator) were able to pre-test with 5 individuals total (2 did it together, as requested) at their residences.[36] Feedback from the pre-testers, as well as the experience of performing the pre-tests by the survey administrators, was incorporated into a handful of minor revisions to the survey approved at the May 2018 Route 9 Monitoring Committee survey sub-group meeting.[37]

Pre-tests provided valuable feedback about survey comprehension and timing, as well as how monetary incentives and the survey itself may be interpreted by community residents. There is a contentious history of these issues in the area and, as we learned anecdotally from some community members and during pre-testing, other surveys had already been done and that "not much had changed" regarding people's opinions about the issues. In general, pre-test feedback and experience in administering it was used to make mostly small revisions to scripts to add context and rephrased one open-ended question to allow for more consistency in responses across questions concerning perceptions of harm and presence of hazards. Once revisions after the pre-test had been made, a final review and minor modifications were made at a group meeting of the research team, New Castle County representatives, and a Wilmapco representative in June 2018. The final survey used for the study is included with this report.[38]

[36] Several pre-testers had signed up at meetings, and one was provided to the PI by way of recommendation, representing both owner-occupied and renter residents. Each one was offered $20 cash for their time and feedback, though not everyone took the compensation.

[37] It was made clear to everyone attending this meeting that some revisions may be necessary based on the pre-test outcomes and the experience of performing the survey in the field, making it clear that some further changes might be needed.

[38] The final survey (included with this report as an appendix) directs the survey administrator, at the end of the survey, to an opportunity to collect the email address of a respondent if they were interested in receiving a copy of the Route 9 Corridor master plan. This was a recommendation in survey development that we decided would be a potential breach of confidentiality for *participation* in the survey, even though a respondent could still not be connected to their data. This was left in the final version of the survey erroneously. When surveys were being done in July/August 2018, survey administrators were directed to not collect any information about email addresses to send the plan after a survey was completed, and only note the address, separately, from the data collection instrument to have a copy of the plan *mailed* to interested respondents.

STUDY POPULATION, RECRUITMENT, AND SURVEY ADMINISTRATION

The target populations for this survey effort included each residential householder in the Eden Park and Hamilton Park communities. These two communities along the Route 9 corridor (New Castle Avenue) meet the City of Wilmington's southern border. Each of the communities is located adjacent to one another on New Castle Avenue in an area of considerable racial segregation in housing, with predominantly African-American residents. Further, these communities are also situated in an area with relatively low median household incomes, while Hamilton Park also is part of a block group that has a higher amount of vacant homes relative to other nearby communities.[39] Additionally, pre-research efforts, community engagement activities, and survey pre-test work by the principal investigator and two members of the survey administration team provided several anecdotes about the sizable senior citizen population in each community. As such, the intersection of age, race, and socio-economic status (e.g., housing conditions and household income) in each of these communities creates socially vulnerable populations. The survey research team was considerate of these vulnerabilities in our approach to the work.

Initial Postcard

A postcard that informed both of the Eden and Hamilton Park communities that UD would be performing a study in the area in the coming months was sent out ahead of time, in June 2018, to inform the community of our presence. The postcard language read:[40]

> Hello! The University of Delaware (UD) will be doing a survey in your residential community this summer, sometime between late June and August. The people doing the survey will be wearing UD shirts and will have identification while they are in the community. We just wanted to let you know that we were coming before we start. Thank you!

This, in addition to our UD clothing and IDs, was an attempt to help to make the survey more successful by more deeply integrating ourselves into the community and making residents aware of our presence ahead of time (Hillier et al. 2014; Dillman, Smyth, and Christian 2009; Weiss and Bailar 2001). Further, during the weeks in July and August 2018 that survey administration was taking place in the communities, the local civic association president provided fliers to each community.[41] Additionally, in September of 2017, we drafted language for a flier about the community survey that was intended for members of the civic association and to be distributed to the wider community, but we were unable to determine if those fliers were ever disseminated amidst some early delays in beginning the research project.

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[39] See page 20 of Wilmapco's Route 9 Corridor Land Use and Transportation Plan (i.e., "Master Plan"): http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf.

[40] Postcard is included with this report as an appendix.

[41] See the flier included with this report from the Hamilton Park community as an appendix. The flier for Hamilton Park was placed at residences the week prior to the survey, while the flier for Eden Park was placed at residences early on during our survey efforts, early in the week we did that particular community. We have yet to obtain a flier given out in Eden Park for purposes of documentation for the study report.

Target Populations

The data collection period for this study began July 17, 2018 and ended August 31, 2018. There were two target populations in this research, which involved a census of householders in both the Eden Park and Hamilton Park communities. Specifically, the target populations were the "householder" in each residence in each community. A householder is defined as:

> the person (or one of the people) in whose name the housing unit is owned or rented (maintained) or, if there is no such person, any adult member, excluding roomers, boarders, or paid employees. If the house is owned or rented jointly by a married couple, the householder may be either the husband or the wife. The person designated as the householder is the 'reference person' to whom the relationship of all other household members, if any, is recorded. The number of householders is equal to the number of households. Also, the number of family householders is equal to the number of families. [U.S. Census 2015]

The census method, thus, was modeled after Census procedures for the Current Population Survey.[42] This was done to ensure a wider breadth of responses across the community, rather than seek a larger sample size with more respondents within in a single home, and to try and increase the response rate by doing door-to-door surveys (Kelley et al. 2003). Additionally, it was an attempted census because the target population sizes are small (each community fewer than 100 households) (Draugalis and Plaza 2009), meaning that a probability sample of the target population would need to have a very high response rate, anyway, in order to ensure generalizability.

New Castle County information about owner-occupied, rental property, and vacancy statuses was used to determine valid residences from which to draw upon for surveying. PI Perez was sent a list of all parcels for the area by New Castle County in summer 2017, from which all non-residential properties were filtered out. [43] PI Perez and two survey administrators validated the addresses by physically walking through each community on separate days in spring 2018, ensuring the accuracy of the lists. The lists were both generally accurate, but needed some revision due to addresses being repeated, not on the list, or that reflected vacant lots. PI Perez ensured owner-occupied or rental status by comparing the home addresses of the owner to the property: if they were the same, it was an owner-occupied residence. This method was confirmed by county personnel, but it is acknowledged that the address lists may contain some errors due to the complexities of the living situations that some residents described to the

[42] See an examination of use of the term "householder" in the potential to create biased research results in Kleinjans, Kristin J. 2013. "The Man of the House – How the Use of Household Head Characteristics May Lead to Omitted Variable Bias." *Economics Letters* 119:133-135.

[43] A couple of addresses that included "0" and the street name were not utilized from each community list, but it is possible that they, too, were vacant lots (we estimate 2 or 3, maximum, in each community). Ultimately, vacant lots and vacant homes were not included in the universe of valid addresses as there would be no one living at the property to answer the community survey. These numbers are provided in this report based on a request from the community members at the October 2018 Eden and Hamilton Park Civic Association meeting when Perez presented survey findings.

researchers in earlier meetings. The survey instrument had an area for each survey administrator to use in conjunction with their address list to identify owner-occupied vs. rental status, but this question was also asked of the householder in the survey to try and confirm the pre-identified data. The only information on the survey that placed it in either community is the indication that it is a survey from Eden Park or Hamilton Park – no addresses were on the actual surveys. In order to generalize to both communities separately, as suggested by New Castle County, it was necessary to create and utilize two separate universe lists for survey administration.

PI Perez also checked over each address list using the New Castle County Zoning website[44] in June 2018 to double-check for accuracy of the lists (this was done before sending out initial postcards to alert the communities that we were coming to do a survey). What remained were two lists of addresses containing owner-occupied, rental, and vacant homes, including some vacant lots. The original universe list for Hamilton Park consisted of 86 residences, which included Pyles Lane; of these 86, 14 were pre-designated as vacant, bringing the total universe in Hamilton Park to 72 valid addresses (33 rental, 39 owner-occupied). The original universe list in Eden Park consisted of 95 residences; of these 95, 15 were pre-designated as vacant, bringing the total universe in Eden Park to 80 valid addresses (28 rental, 52 owner-occupied).

In June 2018, pre-research postcards were sent to each community to notify residents of the researchers coming later in the summer, after double-checking the occupancy status of each address on the county's website for parcels. Any of these postcards that came back as vacant were used to remove that address from the universe for that specific community. In Hamilton Park, 3 postcards came back as vacant, bringing the universe down to 69 households. In Eden Park, 2 postcards came back as vacant or undeliverable, bringing the universe down to 78 households.

PI Perez generated two full address lists with the validated addresses for both communities and owner-occupied vs. rental status for each address. Further, a column for "done" was included as a space to signify that that address has been completed (survey completed or non-response) and no longer needed attention. Each survey administrator got a subset of community addresses for each community (approximately ¼ of the total universe of valid addresses for each community, separately) at random that was used for surveying. The address lists for each community were in sequential numerical order, according to the address number. By assigning a random number to each address and then providing a subset range of addresses to each survey administrator (e.g., PI Perez may have been assigned random numbers 1-20 for one community, and each of those random numbers corresponded to a unique address), the method attempted to minimize interviewer characteristic bias.

During the process of survey administration in July/August 2018, additional valid residences were identified, along with some formerly valid addresses being brought to our attention as vacant. In Hamilton Park, it came to our knowledge that 1 formerly listed vacant property was

[44] See https://nccde.maps.arcgis.com/apps/webappviewer/index.html?id=91cec43f37074931935625fa80b1ae53.

actually occupied, bringing the universe to 70. However, also during survey administration, 7 additional properties were actually determined to be vacant, ***bringing the final universe list for Hamilton Park to 63 (40 owner-occupied, 23 rental).*** In Eden Park, 1 residence not included on the original universe list was identified as occupied, bringing the universe to 79 residences. However, also during survey administration, 7 additional properties were actually determined to be vacant, bringing the universe to 72. Finally, 1 follow-up postcard that was sent to an Eden Park residence after survey administration in July/August 2018 came back as vacant, ***bringing the final universe list for Eden Park to 71 (49 owner-occupied, 22 rental).***

To reiterate, address lists that each survey administrator carried showed each address, if the home is owner-occupied or a rental, and then contained a space to be marked "done" once a disposition had been assigned to an address.[45] The address lists that they carried were separate from the surveys they carried and did not contain date of completion, ensuring anonymity of the survey data. Each survey had a single address stapled to it. Thus, the address list showed "done" for any type of disposition, and once a final disposition was given for a survey, the address sheet attached to the survey was torn from it and placed in their respective, separate folders, both of which are separate from the list of addresses used by the survey administrator. In this way, survey administrators had a record of completed addresses, one folder to house addresses torn from each survey, and one folder for each completed survey. This maintained the anonymity of the data and allowed for needed record keeping of completed and uncompleted surveys.

Based on our general knowledge of the communities, we speculated that there would generally be a one-to-one correspondence between an address and a household, so using addresses as sampling units to find a self-identified householder that can speak to their own experiences and attitudes is warranted.[46] We also felt confident that the narrative about any environmental concerns in the community and someone's place in it would be reflected by a householder remarking on how their opinions are shared by others in their household and the broader community. We assumed that a self-identified householder would be someone that would also be heavily involved in any desired plans for relocation.

Survey Procedures and Identification of the Householder

Doing door-to-door surveys helped to align best with CBPR principles and could increase the response rate (Hillier et al. 2014). Each survey administrator approached a home from their address list and knocked on the door, if approachable, and then introduced themselves as a researcher from UD doing a community survey about resident perceptions of the environment and the future of the community, and then gave a brief description of its anonymity and voluntariness. Next, they asked for a self-identified householder and, if more than one, used the householder with the next birthday present (a quasi-random method of selection). If the

[45] Contact dispositions followed four of the main codes provided by the American Association of Public Opinion Research (AAPOR) for simplicity in application for the research team.

[46] See the American Association for Public Opinion Research (AAPOR) at https://www.aapor.org/Education-Resources/Reports/Address-based-Sampling.aspx.

householder whose next birthday was not present, we used the householder that was present, if they agreed to do the survey. If no householder was home, we noted that disposition (non-contact) and date on the survey and asked the person we were speaking to for a better time to come back. Occasionally, we had to schedule a time to come back to speak with the householder if they were the primary contact that day but not available for the survey at that time (respondent unavailable).

If there was no householder present, or no contact at all was made, we marked that disposition on the survey for that address and attempted to return at a later date. If upon returning at a later date there was no one present or the householder was again not present, we marked that disposition on the survey for that address and sent a follow-up postcard with PI Perez's phone number to try and schedule a survey time that PI Perez could go to the community for that survey. Thus, we used a multiple contact method that included at least two in-person attempts, followed up by a postcard for non-contacts. These follow-up postcards were sent in early August and contained this language:[47]

> Hello! Recently, researchers from the University of Delaware (UD) were at your residence to do a community survey, but we could not contact anyone. If you would like to hear more about the possibility of doing a survey, please call Dr. Perez at 302-831-6232. Thank you!

Once a follow up postcard was sent out, an interested resident at that address could have called PI Perez and scheduled a time for him to go to the residence and administer the survey the same way as it is done in-person. If, by the end of the study period August 31st there was no contact from an address, the final disposition of no contact/non-response was noted.

If there was no householder at a residence (i.e., none identifiable), we used the adult present whose birthday came next.[48] Like the Census, we surveyed an adult in the home if there was no identifiable householder because it is a shared space (e.g., mutually shared rental space among adults). Overall, we had little difficultly identifying the householder during survey administration and there were very few respondents identified as "adult."

<u>More on Survey Administration and Compensation</u>

The residences in Eden and Hamilton Park are largely single-family homes. At each household, the survey was read directly to the respondent by the survey administrator and the administrator recorded their responses to both the quantitative and qualitative questions on paper surveys. For accuracy, qualitative questions were read back to the respondent to ensure the meaning of their response was recorded correctly. In addition to their survey materials, survey administrators carried lightweight chairs with them so that they may offer a respondent

[47] Postcard is included with this report as an appendix.

[48] If there were multiple persons living in the property and no one designated as householder, we used the adult whose birthday was next. Most often, though, the householder was identifiable and we did not need to use the quasi-random method of selection.

a chair when doing a survey at their residence if they chose to sit outside. If a survey administrator was invited inside a residence, they were well aware that they may do so at their own discretion and needed to inform the respondent that they must legally report any signs of child abuse to the appropriate authorities. PI Perez informed members of the survey administration team that they did not need to do any survey work that makes them feel unsafe or uncomfortable, and that doing surveys in pairs with other administrators or community volunteers is ideal for rapport and safety, including when deciding to enter homes. Ultimately, surveyors were able to complete their work independently with a great deal of support from the community members they interacted with, except for only a few minor incidents of disapproval from residents.

Based on the pre-test feedback, surveys were planned to be administered during weekdays from 11 AM to 2 PM and after 6 PM, mostly, with coordinated efforts of all survey administrators on each street at the same time whenever possible to try and survey numerous homes in a single event, which also highlighted our presence. We also did surveys outside of that timeframe if indicated by a resident for a specially scheduled time, though we never needed to do a survey outside of the community (we had planned for some at the local library, if needed). The survey methodology was a multiple contact method, attempting to reach a householder at least twice at their residence on different days and at different times, before sending out a follow-up postcard with the contact information of PI Perez. In practice, on occasion homes were approached more than two times if a survey administrator had the time and capacity, and this was recorded in the disposition section of the survey.

Once a respondent was identified as suitable and present, the survey administrator confirmed their interest in participating. They stressed that it is voluntary, anonymous, and that we would offer $10 for their participation in the 20-minute survey (see pre-script on survey). If they were interested in participating, the survey administrator arranged the area where the survey would take place (outside or inside home) and read the script (which described the study, voluntariness and anonymity, etc.) to move forward and collect respondents' data. The survey administrator noted that by beginning the survey, the respondent was consenting to participate in the research. At the end of the survey, the respondent was thanked for their participation and given the study information sheet and a $10 bill in a University of Delaware envelope.[49] It is important to note that participants were *offered* $10 cash for their participation. We use the term *offer* because some pre-testers revealed to us that they didn't want the money, but solely the opportunity to do the survey. If someone began the survey and completed it to any degree, they were offered the $10 cash (regardless if they completed it).[50]

The surveys were anonymous. In the case that a survey administrator had to return to a home because the respondent was not there or could not do the survey at the first time approached, each of the survey administrators' surveys had a sheet stapled to the top of it with the address

[49] Study information sheet included with this report as an appendix.

[50] Of the completed surveys, almost all of them were fully completed (i.e., no partials or breakoffs, though some completed surveys had some missing data).

of the home that they were supposed to survey (i.e., each of their assigned addresses was on a sheet of paper, stapled to the top of each blank survey). When a survey was completed, the survey administrator then removed the stapled sheet with the address from the completed survey, noted the final disposition on the survey and their separate address list described earlier, and placed each in a separate folder to maintain anonymity. Once a survey was complete or a residence was noted as "done" because of non-response, the survey administrator marked this on their list of addresses and moved on – this ensured that there was no way to connect survey data to addresses. The survey administrators performed their research beginning July 17th in the Hamilton Park community, and then moved to the Eden Park community the following week. The first wave of all in-person surveying was completed by August 1, 2018. Any non-contacts were then sent a follow-up postcard, after PI Perez sorted through the data and identified addresses in need of one, on August 9th. Residences that received a postcard had until August 31st to respond to Perez and schedule a survey, though very few did.[51]

At the end of the survey the administrator would ask if the resident would like a copy of the Route 9 Corridor Master Plan once the survey project for both of the communities was complete. Those involved in the corridor planning had attempted extensive outreach to promote awareness of the plan, but many residents still may not have been familiar with it and when asked about it in the survey may want a copy. We took down the *addresses only* of residents that wished to receive a plan on a separate, blank sheet of paper at each survey event, and then collated all of the addresses and had copies sent to them at the end of the study period (August 31st) by Wilmapco, who then shredded the addresses. Though sending copies of the plan might indicate that someone took the survey or was at least interested in getting the plan by way of our presence in the neighborhood, their survey data can in no way be connected to their address. We do not feel that this posed any risk to confidentiality but was cited as a likely issue to come up (i.e., people may want the plan) and that this would be a good opportunity to also use the survey research method to provide outreach opportunities for residents to receive the plan. Additionally, we offered the web address of the plan on the study information sheet that we gave to respondents after they completed a survey, so that they may access it on their own if they did not want a paper copy.

Risks and Benefits

In the survey script, read to respondents before beginning the survey, it is noted that there may be some emotional and psychological risk to participating in the survey because it could bring up issues that a respondent has been dealing with for some time, involving complex social and environmental conditions and the perceptions of the human health and community impacts of those conditions. This risk was not more than what could happen on any given day during a community discussion of these issues, so the research instrument would not heighten any risk that could be present during a civic association meeting or another gathering where these issues are discussed.

[51] Fewer than 3 residents used the follow-up postcard to contact PI Perez for a survey.

As noted earlier in the report, the survey was (generally) an attempt to provide a current assessment of the environmental concern that some residents may have and its statistical relationship to any desire to relocate, among other social and environmental issues that could impact the future of the community (e.g., rezoning). The survey itself served as an instrument to provide the community an objective voice concerning these issues and shows any variation in perceptions about these issues that may exist. In this way, it served as a baseline of information from the community, about the community, which can be used as one element of several to help inform any potential future changes in the area. Notably, the Route 9 Master Corridor master plan carefully acknowledges the role of the survey in helping to demonstrate what the communities' desires about relocation may be, and then, only after consultation with every community member and property owner, discussing any future relocation efforts if that is what the majority of either community reports. As such, the survey itself creates no social or financial risk to the respondent and is an instrument to help inform discussions and policy/planning concerning the future of the area (e.g., through a just transition).

The role that any survey can play in circumstances such as these is noted. When at least a significant portion of each community has mobilized around these issues in the past and have actually been involved in one or more survey efforts of similar issues, there are myriad political, economic, social, and scientific issues that arise. By the very nature of there being a survey, some residents who have not lived in the area for very long, may not own a property, or may not have been civically engaged might infer a problem simply because people are being asked about these issues; others in the area may be very familiar with the history of the issues and not have any concerns. As a community-based project, this survey was designed with the input and direct experience of community leadership and some residents to aid in "problem identification" as much as possible. In a community confronting at least some forms of documented environmental hazards and their perceived impacts, notwithstanding any debate about causal impacts on their health or the actual quality of the environmental conditions in the area, the survey was an instrument that could illustrate these issues and provide some transparency on community sentiment and governmental process.

Further, by consulting the peer-reviewed academic literature, it was clear that other surveys have been done similarly in communities with environmental hazards, "real or perceived," and so the potential to motivate some people to ask about the environmental conditions and the history of relocation efforts in the area is inherent in any related effort. This survey was designed to measure someone's place in a narrative of environmental concerns and relocation efforts previously documented among at least a sizable portion of residents in the area, but allowing any respondent to provide their opinions about any environmental concern (or lack thereof) and beliefs and desires about relocation (if any). The survey thus aids in opening "the way for engaged policy application, better access to participants, and deeper and more complex responses" (Brown 2012:39).

With any research, there is some risk of breach of confidentiality to the data. This risk is not anticipated, as measures were taken to protect the anonymity of the data and the survey only recorded a small number of demographic variables that one might try and use to identify a

respondent, if the individual-level data were made available. Individual-level data will not be provided and results are only being reported in aggregate form to the public, while making presentations of aggregate level data to the community and (local) others interested in the results of the project.

Further, there are no risks anticipated with the follow up postcard procedure. If a resident did call PI Perez and scheduled a survey time in the community, the only information that Perez was made aware of is the person's phone number, address, and possibly their name (if given). None of this information was kept for any purpose, and was only used at that moment to schedule a time for a survey at the residence. These procedures did not change the anonymity of the data as it was collected in the same way as before, and the only identifiable information Perez had included the telephone number and (possibly) the name of the resident for scheduling a survey time only. Again, none of this information was kept and was only used to contact the respondent at their residence, and is not connected to their data.

In the research protocol submission to the University of Delaware's (UD) Institutional Review Board (IRB) on June 25, 2018, it was noted that these risks are not above minimal and provided some steps to minimize risks. For example, we informed the respondent in our script of the potential psychological and/or emotional risk of answering questions about environmental concerns and relocation, which we believe helped to allow the respondent make an informed decision before participating in this research. Also, the survey methods helped to ensure anonymity of respondent data and the results will only be reported at the aggregate level, and we will not share individual level data outside of the research team. Further, in the survey script and the study information letter, the role of the survey in creating a baseline of information about community environmental concerns, desire for relocation, and potential future changes in the area was addressed, but that there are currently no funds for relocation. The UD IRB granted us an Exemption Category #2 for the project on July 9, 2018, with a Waiver of Documentation of Consent. [52] Primary in-person data collection began July 17th and lasted until August 1st, covering both communities. The protocol needed one amendment to include the follow-up postcard that would be sent out to those householders we could not contact, which was approved on July 26, 2018.[53]

Voluntariness, Anonymity, and Protection of the Data

It is worth reiterating that respondents' data are completely anonymous at this point. Data on homeownership by address is publicly available information, but our address-based sampling technique did not ask for nor require individually identifying information. Our data could not be connected to a residence nor individual once the final disposition was noted, and the methods for analysis and presentation strive to maintain that anonymity.

[52] The informational letter provided to respondents is included with this report as an appendix. The informational letter describes all of the study information, risks, benefits, and procedures to maintain anonymity in the same way that a consent form does, but does not require the form to be signed before administration of the survey. The survey script describes the procedures in detail and was read to the respondent before the survey was taken, asking for verbal consent.

[53] Both IRB approval letters are provided with this report as an appendix.

The only point during the study where an address was linked to a survey outcome was when the householder or adult had not been contacted. On the survey form for such an address, the only information listed was if the address is owner-occupied or rental and the dates of non-contact dispositions – no data had been collected at this point. Once a refusal or when data collection occurred, the address sheet for a particular residence was torn from the actual survey and "done" was marked on the survey administrators' address lists. Residences that required a follow-up postcard due to non-response were the only surveys remaining that still had an address stapled to them.

PI Perez collected surveys and address sheets from survey administrators and brought them to UD to be sorted and stored in a locked cabinet in the locked office of PI Perez by early August 2018. At that point, PI Perez entered all the data into SPSS on his password-protected computer in his locked office and shred all paper copies of the address sheets and surveys; the address lists from each survey administrator were shredded once the final response rate was calculated and recorded. Additionally, all non-contact/non-response surveys were shredded after presenting survey findings to the Eden Park and Hamilton Park Civic Association meeting in October 2018.

PI Perez met with two members of the survey administration team and conversed via email with one other to go over any insights gleaned during the research effort, and then noted any issues or concerns about data collection. At the in-person meeting, PI Perez also presented preliminary statistical results to the survey research team for clarity of interpretation. Further, the survey administrators had been asked to read through and find themes in the open-ended responses from the anonymous data, organized by community and owner-occupied or rental status. These themes were presented to Perez and discussed with the survey team.

All electronic data will be stored for 3 years. After three years, the electronic data will be deleted using a secure-erase program. Data will not be shared with anyone outside of the research team. Only aggregate results are being reported. Data were analyzed using SPSS and appropriate descriptive and inferential statistical techniques,[54] including basic descriptive statistics, correlations, cross-tabulations, and comparison of means. Qualitative data was examined for general themes for summary presentation, but these data are also presented verbatim in the aggregate form for classes of respondents (e.g., in a comparison homeowners and non-homeowners) where particularly illustrative. Any information in these responses that may somehow identify an individual or specific residence has been redacted.

[54] Some scholars argue that the use of p-values and other assessments of statistical significance are inappropriate for describing results of an attempted census. PI Perez agrees with this sentiment, but provides measures of statistical significance (i.e., p-values) for the sake of any outside interest.

RESULTS

Final Dispositions, Completed Group Characteristics, and Response Rates

The final dispositions for each community included four possibilities drawn from the American Association of Public Opinion Research[55] (AAPOR) and slightly modified for the purposes of this community-based study (namely for ease of use among administrators). These dispositions included completed, partially completed, refused, and non-contact/non-response. These dispositions were used, relative to the known, valid addresses in the final universe list, to provide completed group characteristics[56] to assess comparability, and to calculate completion, refusal, and non-contact/non-response rates.

Hamilton Park

The completed group characteristics for Hamilton Park were as follows:

- 40/63 owner-occupied in universe (63.5%)
    - 29/38 in completed survey sample (76.3%)
- 23/63 renters in universe (36.5%)
    - 9/38 in completed survey sample (23.7%)

As evidenced here, there is an overrepresentation of owner-occupied householders in the completed group, and an underrepresentation of renters, but completed group characteristics of owner-occupied/renter match up relatively well to population (representative).

The response rates (unweighted)[57] for Hamilton Park were as follows:

- 38 completed surveys
    - Response rate for population 38/63 = 60.3%
        - Response rate for owner-occupied 29/40 = 72.5%
        - Response rate for renters 9/23 = 39%
    - Refusal rate for population was 6/63 = 9.5%
        - Refusal rate for owner-occupied 3/40 = 7.5%
        - Refusal rate for renters 3/23 = 13%
    - Non-contact/non-response rate 19/63 = 30.2%
        - Non-contact/non-response for owner-occupied 8/40 = 20%
        - Non-contact/non-response for renters 11/23 = 47.8%

[55] See AAPOR at https://www.aapor.org/AAPOR_Main/media/publications/Standard-Definitions20169theditionfinal.pdf.

[56] Owner-occupied or renter, relative to the known universe.

[57] Perez attempted weighting the data using both proportional and scale weighting procedures with the only variable for which some known population characteristic was available: owner-occupied or rental. Weighting inflated renters and missing cases. Overall, major patterns in the data did not change, but lowered the percent of people likely to move for fair value/financial assistance in Hamilton Park from 54% to 49%. Due to the limited number of variables needed to weight appropriately and the small sample size, as well as the high inflation for renters and increase in missing cases, unweighted data was used in all of these analyses and are presented here. Weighting creates a situation where the total N increases, and part of that is an increase in missing data, making the number of people missing and the influence of renters inflated (as renters had a higher rate of non-response).

Overall, the response rate is high at 60.3%, with nearly three-quarters of owner-occupied householders in our universe completing a survey. Though the refusal rates were both relatively low for owner-occupied and rental households, there were significant non-contact/nonresponse rates, especially for renters at nearly 50% of the renters in the Hamilton Park universe.

Eden Park

The completed group characteristics for Eden Park were as follows:

- 49/71 owner-occupied in universe (69%)
    - 29/38 in completed survey sample (76.3%)
- 22/71 renters in universe (31%)
    - 9/38 in completed survey sample (23.7%)

As evidenced here, there is a slight overrepresentation of owner-occupied householders in the completed group, and a slight underrepresentation of renters, but completed group characteristics of owner-occupied/renter match up well to population (representative).

The response rates (unweighted)[58] for Eden Park were as follows:

- 38 completed surveys
    - Response rate for population 38/71 = 53.5%
        - Response rate for owner-occupied 29/49 = 59%
        - Response rate for renters 9/22 = 40.9%
    - Refusal rate for population was 17/71 = 23.9%
        - Refusal rate for owner-occupied 15/49 = 30.6%
        - Refusal rate for renters 2/22 = 9.1%
    - Non-contact/non-response rate 16/71 = 22.5%
        - Non-contact/non-response for owner-occupied 5/49 = 10.2%
        - Non-contact/non-response for renters 11/22 = 50%

Overall, the response rate is good at 53.5%, with over half of owner-occupied householders in our universe completing a survey. The refusal rate was high, overall, for the community of Eden Park and very high for owner-occupied households at 30.6%. This high of a refusal rate is likely not random, indicating some degree of non-random survey error. Similar to Hamilton Park, the non-contact/non-response rate for rental householders was high at 50%.

[58] Perez attempted weighting the data using both proportional and scale weighting procedures with the only variable for which some known population characteristic was available: owner-occupied or rental. Weighting slightly inflated renters and missing cases. Overall, major patterns in the data did not change, but lowered the percent of people likely to move for fair value/financial assistance in Eden Park from 45% to 42%. Due to the limited number of variables needed to weight appropriately and the small sample size, as well as the higher inflation for renters, unweighted data was used in all of these analyses and are presented here. Weighting creates a situation where the total N increases, and part of that is an increase in missing data, making the number of people missing inflated and the influence of renters (with a high non-response rate) inflated.

Statistical/Quantitative Results

Hamilton Park

Unweighted results of the survey question on likelihood to move out of one's residential community for a fair value of a house comparable to a similar home in a low crime area or with financial assistance, depending on if one owned or rented, are presented first. The focus on this particular variable is based on the fact that it represents one of the items that was revised by community leadership, illustrating its role in procedural/transitional justice. If there was a single survey item that was needed to represent attitudes towards a "buyout" scenario, this was it. Specifically, once the householder and the nature of their relationship to the property was determined (e.g., owner-occupied or renter) and they began the survey, at one point they were asked about their likelihood of moving out of the community for some form of financial payment. Based on self-identification of householder and the nature of their relationship to ownership of the property, the survey questions utilized in Hamilton Park included:

- For owner-occupied respondents: "how likely is it that you would move out of your residential community if you were given a fair value of a house comparable to a similar home in a low crime area?" (very likely, likely, unsure, unlikely, very unlikely)
- For renters: "how likely is it that you would move out of your residential community if you were given the financial assistance to do so?" (very likely, likely, unsure, unlikely, very unlikely)

Results of these questions, again using unweighted data, included:

- 26 owner-occupied and 8 renters reported likely to very likely (34/63, or 54% of total universe).
    - 26 owner-occupied reported likely to very likely (26/40, or 65% of owner-occupied).
        - Assuming the 1 very unlikely, 1 unsure, and 1 prefer not to answer, plus 11 missing all are unlikely to move out, 35% unlikely to move out (most conservative estimate).
    - 8 renters reported likely to very likely (8/23, or 35% of renters).
        - Assuming the 1 prefer not to answer, plus 14 missing all are unlikely to move out, 65% unlikely to move out (most conservative estimate).

When examining the valid data only (i.e., completed surveys with known, reported data), 92.9% (N = 26/28) of owner-occupied householders reported being likely to very likely to move out for fair value as defined above. Similarly, when examining the valid data only, 100% (N = 8/8) of rental householders reported likely to very likely to move out with financial assistance.

When results were presented to the Eden and Hamilton Park Civic Association in October 2018, attendees requested that hypotheticals be calculated to determine what the most liberal estimate may be, if those householders that did not respond, refused, or preferred not to answer were assumed to have said "likely" or "very likely" to move out. If this were the case, using unweighted data, hypothetically:

- For owner-occupied properties, adding 3 refusals, 8 non-contacts/non-responses, and 1 prefer not to answer to the 26 completed surveys that reported being likely to very likely to move out, a total of 38 owner-occupied properties would be likely to very likely to move out.
- For rental properties, adding 3 refusals, 11 non-contacts/non-responses, and 1 prefer not to answer to the 8 completed surveys that reported being likely to very likely to move out, a total of 23 rental properties would be likely to very likely to move out.
- Overall, this hypothetical would suggest that 61/63 householders in the universe would be likely to very likely to move out, or 97% of the Hamilton Park householders.[59]

The survey also measured several attitudes, opinions, and preferences related to environmental concerns, attachment to community, and other important sociological concepts. Several notable findings are presented here, using the unweighted, valid data (i.e., completed surveys only) for owner-occupied and renter respondents together. The variables measured are in bold. Per the interest of members of the Eden and Hamilton Park Civic Association, response patterns in these data for *owner-occupied respondents only* are also presented when any notable differences between them and the completed group (i.e., owner-occupied and renters together) are present. Additionally, Tables 1 and 2 that follow these results present data from the various measures of attachment to community and alternatives to relocation, and how well the respondent feels that their experiences and opinions align with those others in their household and the community more broadly.[60]

- 75.7% (N = 28/37) of respondents reported the highest level of **overall environmental concern** (a score of 5), while 89.2% reported a score of 4 or 5 (N = 33/37).
- 73% (N = 27/37) of respondents reported the highest level of **concern for air quality** (a score of 5), while 83.4% (N = 31/37) reported a score of 4 or 5.
- 68.4% (N = 26/38) of respondents reported the highest level of **concern for soil quality** (a score of 5), while 78.9% (N = 30/38) reported a score of 4 or 5.
    - This slightly larger range of variation in soil concern, relative to other concern measures, may be due to the cleanup efforts by DNREC in this community. This was illustrated in some of the open-ended responses, as well.
- Of all respondents, 26.3% (N = 10) reported that they “don't know” if **environmental pollution impacted home values**. Of those that provided a valid response, 88% (N = 22/25) agreed to strongly agreed with this statement.
- 80.7% (N = 25/31) agreed to strongly agreed that the **environmental pollution impacts the quality of life residents**, while 19.4% (N = 6/31) disagreed to strongly disagreed with this statement.

[59] For Hamilton Park, desire to relocate and likelihood to move for fair value had a moderately strong, positive, statistically significant correlation for owner-occupied respondents (Spearman’s rho = .611**, N = 26), but is weak and non-significant for renters (Spearman’s rho = .130, N = 8, renters asked about likelihood to move out with financial assistance).

[60] Table 1 responses range from strongly disagree, disagree, neither agree nor disagree, agree, to strongly agree.

- 64.9% (N = 24/37) agreed to strongly agreed that they **had considered moving due to environmental pollution**, though 32.4% (N = 12/37) disagreed to strongly disagreed.
- Wide variation in **familiarity with previous efforts to relocate**: 34.2% (N = 13) not at all familiar, 36.8% (N = 14) somewhat familiar, and 28.9% (N = 11) very familiar.
    - Owner-occupied only somewhat more likely to be very familiar with previous efforts to relocate (37.9%).
- Wide variation in **familiarity with the Rt. 9 Corridor Master Plan**: 42.1% (N = 16) “no” (i.e., not familiar) and 57.9% (N = 22) “yes" (i.e., familiar).
    - Owner-occupied more likely to say “yes” (69%).
- The majority of respondents, 76.3% (N = 29), “yes” are **familiar with the Port of Wilmington expansion**.
- Some variation in **desire to relocate**: 19.4% (N = 7) reported lowest value of 1 (no desire), 2.8% (N = 1) reported a value of 2, 19.4% (N = 7) reported a value of 3, 5.6% (N = 2) reported a value of 4, and 52.8% (N = 19) reported the highest value of 5 (great desire).
    - Owner-occupied more likely to report highest value of 5 (63%).
- 47.1% (N = 16/34) reported **poor to fair health**, with the remaining 52.9% (N = 18/34) reporting good to excellent health.
- Some variation in **experience health problems due to pollution**, with 57.1% (N = 16/28) reporting agree to strongly agree, with the remaining 42.9% (N= 12) valid responses reporting disagree to strongly disagree. Notably, N = 10 reported “don’t know."
    - For owner-occupied, 68.4% (N = 13/19) reported agree to strongly agree (also with 10 don’t know), so they were more likely to agree they had experienced health problems as a result of environmental pollution.
- Regarding **length of residence**, 21.1% (N = 8/38) of respondents were in their current residence 5 or fewer years, 26.3% (N = 10/38) of respondents in current residence 6 to 20 years, and 52.6% (N = 20/38) in their current residence 21 or more years.

Table 1: Attachment to Community and Alternatives to Relocation – Hamilton Park

	SD (%)	D (%)	N (%)	A (%)	SA (%)	N
Community is Isolated	24.2	12.1	3.0	33.3	27.3	33
Stay if Env. Regulations Prevented Problems	27.0	18.9	2.7	29.7	21.6	37
Moving Difficult without Add. Financial Help	5.3	5.3	0.0	23.7	65.8	38
Lose Social Ties if Relocate	71.1	5.3	5.3	10.5	7.9	38
Difficult to Move because of Age	63.2	15.8	5.3	5.3	10.5	38
Rezoning Would Benefit People's Health	10.5	5.3	0.0	31.6	52.6	38
I Would Prefer to Age in Place	48.3	20.7	6.9	13.8	10.3	29
Residents Benefit from Revit. and Staying	43.3	16.7	10.0	20.0	10.0	30
Residents Benefit from Cleanup and Staying	31.4	17.1	2.9	25.7	22.9	35

Regarding Table 1, examining only owner-occupied respondents showed some minor differences. For the variable **stay if environmental regulations prevented problems**, 35.7% (N = 10) of owner-occupied reported strongly disagree, and 17.9% (N = 5) of owner-occupied reported agree (all other percentages were similar for this variable). For the variable **all residents benefit from revitalization** and staying, 54.5% (N = 12) of owner-occupied reported strongly disagree, and 13.6% (N = 3) of owner-occupied reported agree (all other percentages relatively similar). For the variable **all residents benefit from local cleanup**, 42.3% (N = 11) of owner-occupied reported strongly disagree, while 19.2% (N = 5) and 15.4% (N = 4) of owner-occupied reported agree and strongly agree, respectively (all other percentages were relatively similar). These differences, overall, suggest that owner-occupied respondents lean more heavily towards disagreeing with the alternatives to relocation, though there is still measurable variation in their agreement or disagreement towards these possibilities.

Table 2: Experiences and Opinions Align with Others – Hamilton Park

	Not At All (%)	Very Little (%)	Somewhat (%)	Very Well (%)	N	DK
Responses to Env. Conditions Questions Reflect Most Other Community Members	0.0	13.3	20.0	66.7	30	8
Responses to Rezoning, Revit., and Relocation Questions Reflect Household	0.0	3.4	0.0	96.6	29	2
Responses to Rezoning, Revit., and Relocation Questions Reflect Most Other Community Members	0.0	10.0	23.3	66.7	30	7

Regarding Table 2, responses to the question on **if the respondent's answers reflect most other community members concerning rezoning, revitalization, and relocation**, 73.9% (N = 17) (examining only owner-occupied respondents) reported "very well," indicating a greater belief among owner-occupied respondents that most others feel similarly to them regarding these

issues. In other words, when owner-occupied and renter respondents are looked at together, as they are in Table 2, there is less agreement that most others in the community share their responses regarding rezoning, revitalization, and relocation. These results suggest a greater degree of perceived homogeneity among owner-occupied respondents and that their opinions on these particular issues are likely shared by others in the community.

Eden Park

Unweighted results of the survey question on likelihood to move out of one's residential community for a fair value of a house comparable to a similar home in a low crime area or with financial assistance, depending on if one owned or rented, are presented first. Based on self-identification of householder and the nature of their relationship to ownership of the property, the survey questions utilized in Eden Park needed to include householders that were owner-occupied, primary renter, renter resident, and "other" living situation. Taken together, owner-occupied and "other" were considered owner-occupied residences, based on feedback during survey administration, and the two types of rentals were considered rental residences.[61] Consequently, the survey items utilized in Eden Park included:

- For owner-occupied respondents: "how likely is it that you would move out of your residential community if you were given a fair value of a house comparable to a similar home in a low crime area?" (very likely, likely, unsure, unlikely, very unlikely)
- For renters: "how likely is it that you would move out of your residential community if you were given the financial assistance to do so?" (very likely, likely, unsure, unlikely, very unlikely)
- For renter resident: "in your opinion, how likely is it that the primary renter would move out of your residential community if they were given the financial assistance to do so?" (for example, a householder that is not the primary renter) (very likely, likely, unsure, unlikely, very unlikely)
- For "other": "how likely is it that you would move out of your residential community if you were given the financial assistance to do so?" (for example, a householder that lives in a property, but doesn't pay rent, and where the homeowner may be a sporadic resident but not present at time of survey) (very likely, likely, unsure, unlikely, very unlikely)

Results of these questions, again using unweighted data, included:

- 26 owner-occupied and 6 renters reported likely to very likely (32/71, or 45% of total universe).
    - 26 owner-occupied/other reported likely to very likely (26/49, or 53% of owner-occupied).
        - Assuming the 1 very unlikely, 2 unsure, plus 20 missing[62] all are unlikely to move out, 47% unlikely to move out (most conservative estimate)

[61] There was only one rental where the respondent was not the primary/equitable renter, and only 1 owner-occupied that was considered "other."

[62] The missing data include 15 refusals.

- 6 renters (primary and resident) reported likely to very likely (6/22, or 27.3% of renters)
    - Assuming the 1 unlikely, 2 unsure, plus 13 missing all are unlikely to move out, 72.7% unlikely to move out (most conservative estimate)

When examining the valid data only (i.e., completed surveys with known, reported data), 89.7% (N = 26/29) of owner-occupied householders reported being likely to very likely to move out for fair value as defined above. When examining the valid data only, 66.7% (N = 6/9) of rental householders reported likely to very likely to move out with financial assistance.

When results were presented to the Eden and Hamilton Park Civic Association in October 2018, attendees requested that hypotheticals be calculated to determine what the most liberal estimate may be, if those householders that did not respond, refused, or preferred not to answer were assumed to have said "likely" or "very likely" to move out. If this were the case, using unweighted data, hypothetically:

- For owner-occupied properties, adding 15 refusals and 5 non-contacts/non-responses to the 26 completed surveys that reported being likely to very likely to move out, a total of 46 owner-occupied properties would be likely to very likely to move out.
- For rental properties, adding 2 refusals and 11 non-contacts/non-responses to the 6 completed surveys that reported being likely to very likely to move out, a total of 19 rental properties would be likely to very likely to move out.
- Overall, this hypothetical would suggest that 65/71 householders in the universe would be likely to very likely to move out, or 92% of the Eden Park householders.[63]

As noted in the above section for Hamilton Park, the survey also measured several attitudes, opinions, and preferences related to environmental concerns, attachment to community, and other important sociological concepts. Several notable findings are presented here, using the unweighted, valid data for owner-occupied and renter respondents together for Eden Park. The variables measured are in bold. Per the interest of members of the Eden and Hamilton Park Civic Association, response patterns in these data for *owner-occupied respondents only* are also presented when any notable differences between them and the completed group (i.e., owner-occupied and renters together) are present. Additionally, Tables 3 and 4 that follow these results present data from the various measures of attachment to community and alternatives to relocation, and how well the respondent feels that their experiences and opinions align with those others in their household and the community more broadly.[64]

- 84.2% (N = 32/38) of respondents reported the highest level of **overall environmental concern** (a score of 5), while 86.8% reported a score of 4 or 5 (N = 33/38).
    - For owner-occupied respondents only, 89.7% reported a score of 5.

[63] For Eden Park, desire to relocate and likelihood to move for fair value had a strong, positive, statistically significant correlation for homeowners (Spearman's rho = .738**, N = 27), and is also strong, positive, and statistically significant for renters (Spearman's rho = .839*, N = 6).
[64] Table 3 responses range from strongly disagree, disagree, neither agree nor disagree, agree, to strongly agree.

- 84.2% (N = 32/38) of respondents reported the highest level of **concern for air quality** (a score of 5).
- 83.8% (N = 31/37) of respondents reported the highest level of **concern for soil quality** (a score of 5).
- Of all respondents, 23.7% (N = 9) reported that they "don't know" **if environmental pollution impacted home values**. Of those that provided a valid response, 96.4% (N = 27/28) agreed to strongly agreed with this statement.
- 93.8% (N = 30/32) agreed to strongly agreed that the **environmental pollution impacts the quality of life residents**.
- 62.2% (N = 23/37) agreed to strongly agreed that they **had considered moving due to environmental pollution**, though 24.3% (N = 9/37) disagreed to strongly disagreed.
    - 70% of owner-occupied respondents agreed to strongly agreed that they had considered moving due to environmental pollution.
- Wide variation in **familiarity with previous efforts to relocate**: 31.6% (N = 12/38) not at all familiar, 44.7% (N = 17/38) somewhat familiar, and 23.7% (N = 9/38) very familiar.
    - Owner-occupied respondents were more familiar, overall, with 82.8% reporting somewhat to very familiar.
- Wide variation in **familiarity with the Rt. 9 Corridor Master Plan**: 48.6% (N = 18/37) "no" (i.e., not familiar) and 51.4% (N = 19/37) "yes" (i.e., familiar).
    - Owner-occupied respondents more likely to say "yes" (64.3%).
- The majority of respondents, 52.6% (N = 20/38), "yes" are **familiar with the Port of Wilmington expansion**.
    - Owner-occupied respondents somewhat more likely to say "yes" (62.1%).
- Some variation in **desire to relocate**: 12.1% (N = 4) reported lowest value of 1, 6.1% (N = 2) reported a value of 2, 15.2% (N = 5) reported a value of 3, 12.1% (N = 4) reported a value of 4, and 54.5% (N = 18) reported the highest value of 5.
- 52.9% (N = 18/34) reported **poor to fair health**, with the remaining 47.1% (N = 16/34) reporting good to excellent health.
- Some variation in **experience health problems due to pollution**, with 70% (N = 21/30) reporting agree to strongly agree, with the remaining 30% (N = 9/30) of valid responses reporting neither agree nor disagree, disagree, to strongly disagree. Notably, N = 6 reported "don't know."
    - For owner-occupied respondents, 66.7% reported agree to strongly agree (also with N = 4 don't know), so they were slightly *less* likely to agree that they had experienced health problems as a result of environmental pollution.
- Regarding **length of residence**, 26.3% (N = 10/38) of respondents were in their current residence 5 or fewer years, 26.3% (N = 10/38) of respondents in current residence 6 to 20 years, and 47.4% (N = 18/38) in their current residence 21 or more years.

Table 3: Attachment to Community and Alternatives to Relocation – Eden Park

	SD (%)	D (%)	N (%)	A (%)	SA (%)	N
Community is Isolated	6.1	21.2	12.1	42.4	18.2	33
Stay if Env. Regulations Prevented Problems	27.8	8.3	8.3	19.4	36.1	36
Moving Difficult without Add. Financial Help	2.6	0.0	2.6	10.5	84.2	38
Lose Social Ties if Relocate	66.7	16.7	2.8	5.6	8.3	36
Difficult to Move because of Age	57.9	18.4	2.6	5.3	15.8	38
Rezoning Would Benefit People's Health	13.5	13.5	2.7	32.4	37.8	37
I Would Prefer to Age in Place	62.1	10.3	3.4	6.9	17.2	29
Residents Benefit from Revit. and Staying	37.5	25.0	9.4	9.4	18.8	32
Residents Benefit from Cleanup and Staying	27.0	24.3	2.7	24.3	21.6	37

Regarding Table 3, examining only owner-occupied respondents showed that they were slightly less likely to agree or strongly agree to **stay if environmental regulations prevented environmental problems** (50%, N = 14/28), relative to owner-occupied and renters together, but all other percentages for this variable are relatively similar. Owner-occupied respondents were more likely to disagree/strongly disagree that **all residents benefit from revitalization and remaining in homes** (73.9%, N = 17/23) relative to the full completed group, but all other patterns in this variable relatively similar. Owner-occupied respondents were more likely to report disagree to strongly disagree that **all residents benefit from cleanup and remaining in homes** (58.6%, N = 17/29), but all other patterns in this variable were relatively similar. These differences, overall, suggest that owner-occupied respondents lean more heavily towards disagreeing with the alternatives to relocation, though there is still measurable variation in their agreement or disagreement towards these possibilities.

Table 4: Experiences and Opinions Align with Others – Eden Park

	Not At All (%)	Very Little (%)	Somewhat (%)	Very Well (%)	N	DK
Responses to Env. Conditions Questions Reflect Most Other Community Members	7.1	3.6	17.9	71.4	28	9
Responses to Rezoning, Revit., and Relocation Questions Reflect Household	3.0	3.0	9.1	84.8	33	2
Responses to Rezoning, Revit., and Relocation Questions Reflect Most Other Community Members	3.7	11.1	22.2	63.0	27	9

Regarding Table 4, all patterns for the variables are relatively similar when comparing owner-occupied and renter respondents together to owner-occupied respondents only.

Bivariate Analyses and Community Comparisons

At the bivariate level, data generally suggest that owner-occupied and renter respondents that are moderately to greatly concerned about environmental pollution or contaminants in their communities would be likely to very likely to move out of their residential community for fair value or with financial assistance. In Hamilton Park, 21 of the 28 owner-occupied respondents, or 75%, reported the highest level of overall environmental concern (a score of 5 or "extremely concerned"). Of these 21 respondents, 100% of them reported being likely to very likely to move out of their current community for a fair value of a house comparable to a similar home in a low crime area. Further, 7 of the 8 renter respondents, or 88%, reported the highest level of overall environmental concern. Of these 7 respondents, 100% of them reported being likely to very likely to move out of the current community if they were given the financial assistance to do so. In Eden Park, 26 of the 29 owner-occupied respondents, or 89.7%, reported the highest level of overall environmental concern. Of these 26 respondents, 88.5% reported being likely to very likely to move out of their current community for a fair value of a house comparable to a similar home in a low crime area. Further, 6 of the 9 renter respondents, or 66.7%, reported the highest level of overall environmental concern (a score of 5). Of these 6 respondents, 50% of them reported being likely to very likely to move out with the financial assistance to do so.

In Hamilton Park, among owner-occupied respondents, the bivariate correlation between overall environmental concern and likelihood to move out of the community for fair value was moderately strong, positive, and statistically significant (Spearman's rho = .493, p = .008, N = 28). In Eden Park, interestingly, among owner-occupied respondents the bivariate correlation between overall environmental concern and likelihood to move out of the community for fair value was near zero with a Spearman's rho = .037, p = .849, N = 29. The lack of a clear association by way of Spearman's rho, even though cross-tabulations show that generally owner-occupied respondents with environmental concern scores of 5 are likely to very likely to move out, may be due to a small number of respondents reporting low levels of environmental concern while still being likely to move out, and some with high levels of environmental concern being unsure or unlikely to move out of Eden Park.

The strength of the bivariate relationship between overall environmental concern and desire to relocate varies across communities, though both are moderately strong and positive. The correlation between overall environmental concern and desire to relocate is slightly stronger in Hamilton Park (Spearman's rho = .452, p = .006, N = 35) than it is in Eden Park (Spearman's rho = .370, p = .034, N = 33), suggesting that other factors are potentially contributing to any desire to relocate in Eden Park. The correlation between environmental concern for soil quality and desire to relocate in the Hamilton Park community (Spearman's rho = .494, p = .002, N = 36) is only slightly stronger than it is in Eden Park (Spearman's rho = .444, p = .011, N = 32). This small difference may be explained by the ongoing cleanup of residential properties in the Hamilton Park community by DNREC. The stronger correlation between concern for soil quality and desire to relocate in Hamilton Park may mean that there is a stronger coupling of these attitudes at both the higher and lower ends of each scale, meaning that among respondents

who had experienced cleanup and reported lower concern, their desire to relocate may have also diminished.

The bivariate correlations between all three measures of environmental concern and desire to relocate for each community are presented in Table 5.

Table 5: Correlations for All Measures of Environmental Concern and Desire to Relocate

	Env. Concern	Concern for Air Quality	Concern for Soil Quality	Desire to Relocate
Env. Concern	1	.606** (HP) .655** (EP)	.457** (HP) .471** (EP)	.452** (HP) .370* (EP)
Concern for Air Quality	.606** (HP) .655** (EP)	1	.839** (HP) .714** (EP)	.518** (HP) .504** (EP)
Concern for Soil Quality	.457** (HP) .471** (EP)	.839** (HP) .714** (EP)	1	.494** (HP) .444* (EP)
Desire to Relocate	.452** (HP) .370* (EP)	.518** (HP) .504** (EP)	.494** (HP) .444* (EP)	1

-Hamilton Park (HP) and Eden Park (EP) listed next to respective coefficients for comparison.
-Spearman's rho correlation coefficient used to illustrate bivariate correlations.
* .05 2-tailed significance.
** .01 2-tailed significance

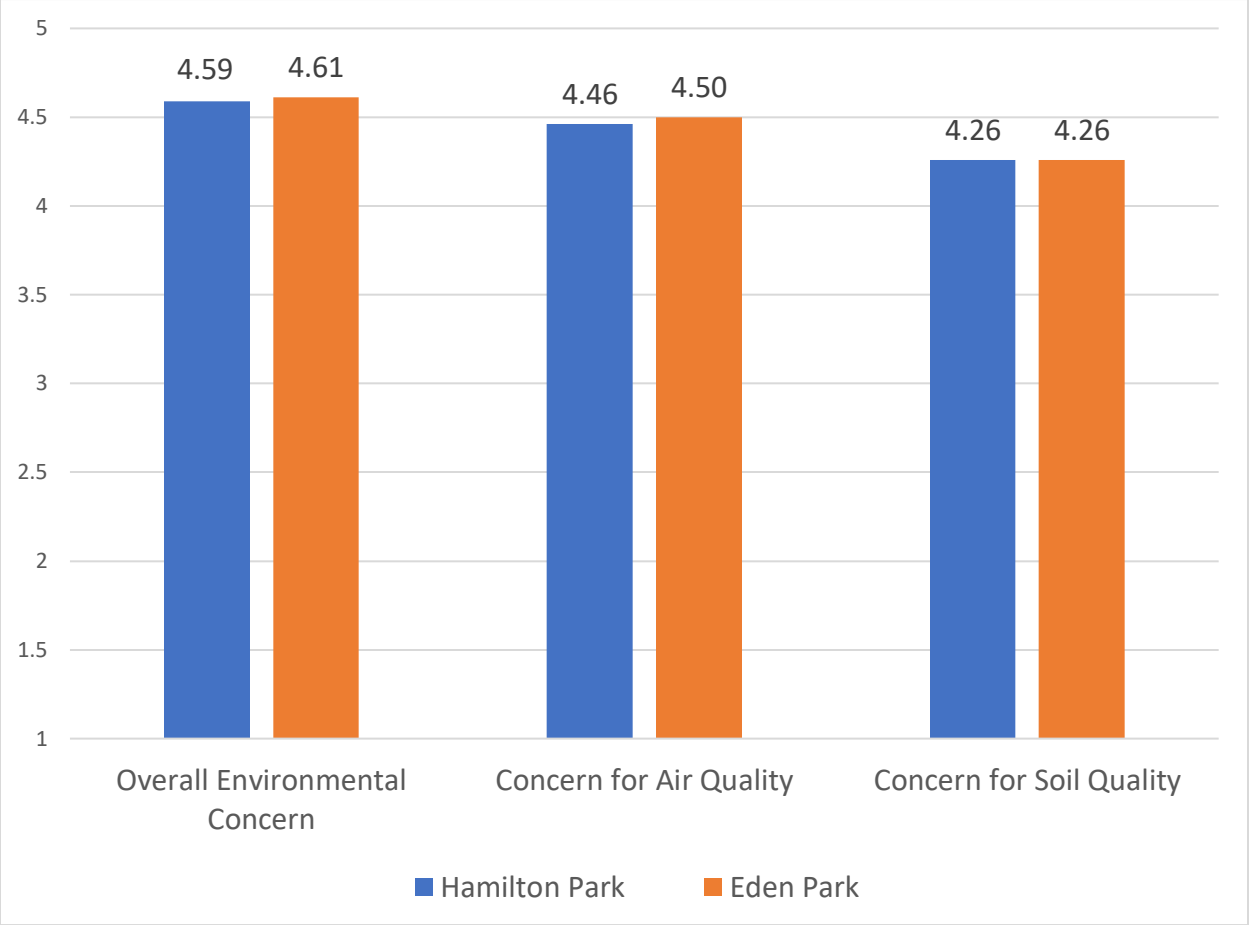
Among owner-occupied respondents only in both communities, the correlations between all three core measures of environmental concern (overall, air quality, and soil quality) and desire to relocate change some. Among Hamilton Park owner-occupied respondents only, the bivariate correlations all increase to reflect moderately strong, positive associations (air quality concern and desire to relocate being the strongest correlation with a Spearman's rho = .668, p = .000, N = 26). Among Eden Park owner-occupied respondents only, the correlations between desire to relocate and all three measures of environmental concern change very little. Comparing these results for both communities, it is clearer that in Hamilton Park the desire to relocate is more strongly and more universally associated with environmental concern (though differences in effect sizes are small), especially among owner-occupied respondents, while in Eden Park it is most strongly tied to air quality concerns (and likely the experience of fugitive dust and other remarks made in the qualitative findings). As such, lived experiences with air pollution may overshadow other environmental concerns for respondents in Eden Park.

Additionally, the bivariate relationships between the alternatives to relocation and environmental concern were examined for both communities. In Eden Park, overall environmental concern had weak, negative, and non-statistically significant relationships with "stay if environmental regulations prevented problems" (Spearman's rho = -.006, p = .973, N = 36), "all residents benefit from revitalization and remaining in homes" (Spearman's rho = -.202, p = .268, N =32), and "all residents benefit from local cleanup and remaining in homes" (Spearman's rho = -.273, p = .102, N = 37). In Hamilton Park, overall environmental concern had varying types of association with the alternatives to relocation. Environmental concern had a

negative, moderately strong, statistically significant association with “stay if environmental regulations prevented problems” (Spearman’s rho = -.433, *p* = .008, N = 36) and “all residents benefit from local cleanup and remaining in homes” (Spearman’s rho = -.344, *p* = .047, N = 34). The bivariate relationship between “all residents benefit from revitalization and remaining in homes” and environmental concern was weak, negative, and non-statistically significant (Spearman’s rho = -.136, *p* = .483, N = 29). These relationships suggest that, generally, environmental concern in Hamilton Park more strongly influences disagreement with the alternatives that would involve residents staying in the community, relative to Eden Park, though all of these relationships are in the hypothesized direction (i.e., negative).

Among valid responses, independent samples t-tests show non-statistically significant differences across communities in the mean scores for all measures of environmental concern and desire to relocate (see Figure 1 below for environmental concern variables). Regarding the desire to relocate, Hamilton Park had an average of 3.69 (scale ranged from 1 to 5), with a standard deviation of 1.6; Eden Park averaged 3.91, with a standard deviation of 1.4 (Student’s t = .583, df = 67, *p* = .562). Additionally, 19.4% (N = 7) of respondents in Hamilton Park reported no desire to relocate (i.e., a score of 1 on the scale) and 12.1% (N = 4) of respondents in Eden Park reported no desire to relocate, while the percentage of householders that have a higher degree of desire to relocate shows nearly a 10% difference across both communities (58.3% in Hamilton Park with a score of 4 or 5 on the scale; 66.7% in Eden Park with a score of 4 or 5).

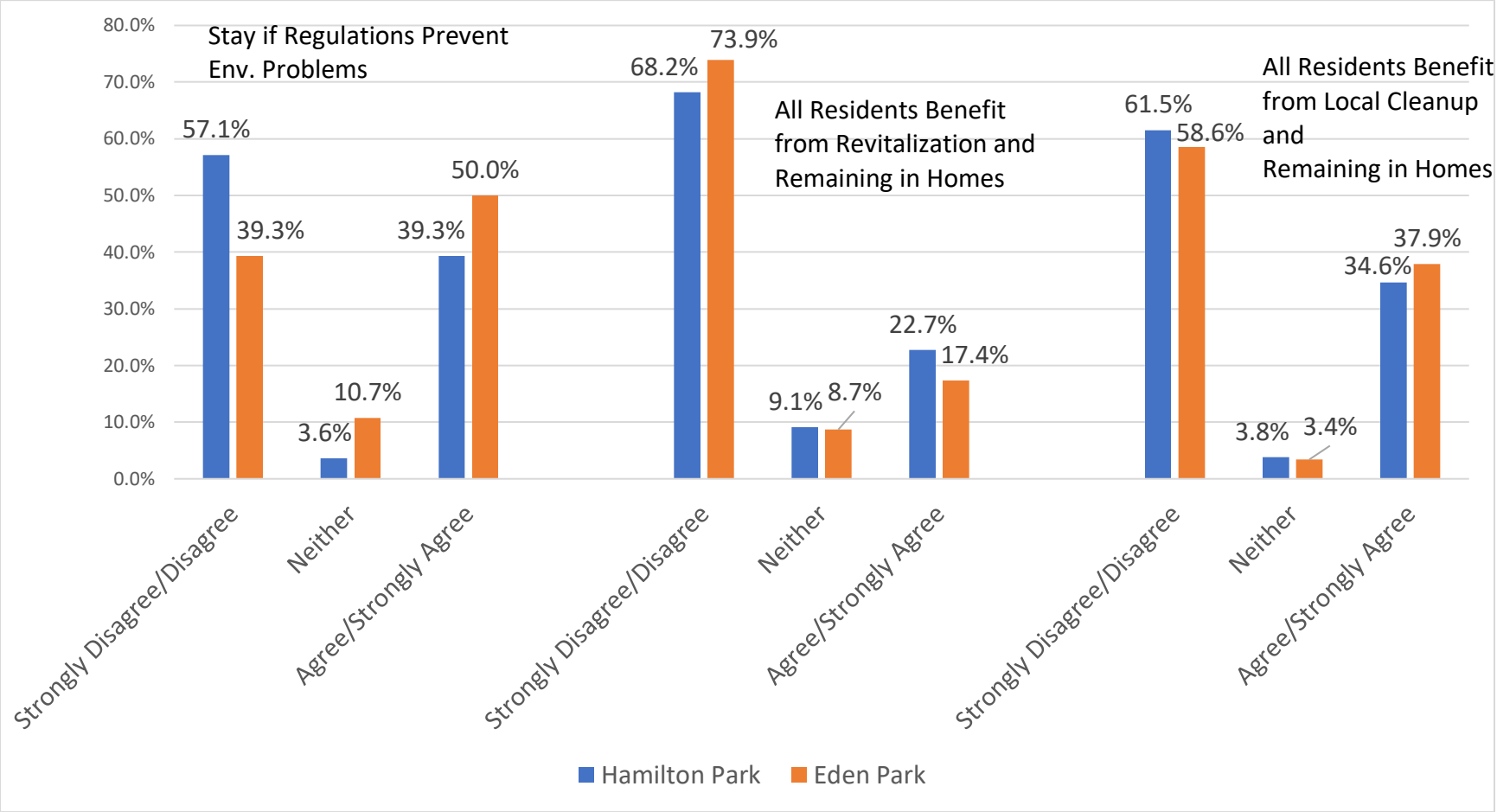
Figure 1: Mean Differences for Environmental Concern Variables by Community



-Independent samples t-tests show no statistically significant differences between means across communities: overall environmental concern t = .049, df = 73, sig. = .961; air quality t = .153, df = 73, sig. = .879; soil quality t = .651, df = 73, sig. = .517.

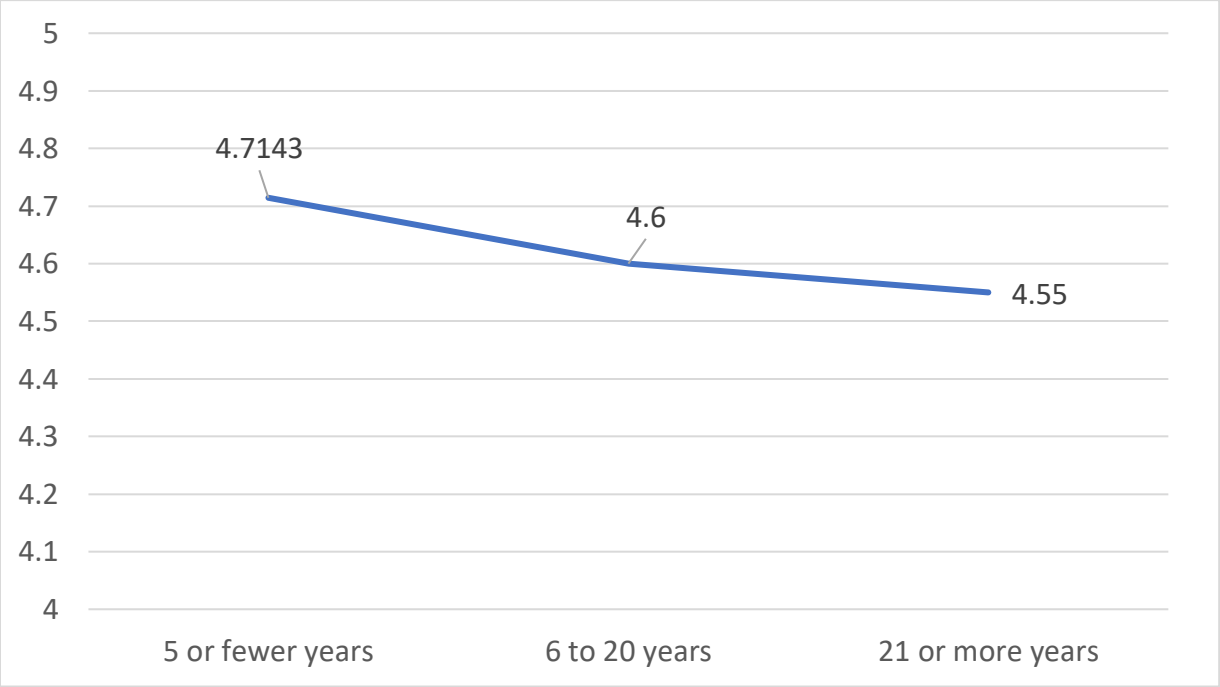
Another useful comparison across communities involves agreement or disagreement with alternatives to relocation. As illustrated in the results for each community, there was some variation in these responses, indicating that although significant proportions of each community would be likely to very likely to move out for financial compensation, there is still some agreement with alternatives to relocation that involve environmental mitigation, more effective environmental regulations, and community revitalization. Figure 2 below compares the valid data for each community on these measures for owner-occupied respondents only, illustrating some variation in attitudes towards these alternatives in each community. Overall, still, a majority of respondents in each community tend to lean towards relocation or a "buyout" scenario, if we take disagreement with these alternatives to mean this.

Figure 2: Agreement or Disagreement Towards Alternatives to Relocation for Owner-Occupied Respondents Only



For each community, analysis of variance (ANOVA) was run to compare means of overall environmental concern and desire to relocate across categories of length of residence. In Hamilton Park, the means for overall environmental concern and means for desire to relocate for each length of residence category are presented below in two means plots, respectively, illustrating the findings. Though there were not statistically significant differences between the means for environmental concern (F = .089, sig. = .915), nor desire to relocate (F = 3.005, sig. = .063), the findings are interesting and worth discussing. Mean environmental concern stays relatively consistent (and high) across length of residence categories, all with standard deviations below 1, suggesting that length of residence is not profoundly impacting levels of environmental concern (see Figure 3), on average. This may mean that the experiences and knowledge of the local environmental conditions have developed in a way that, at least among the respondents to this survey and assuming the respondents are part of the same social network in Hamilton Park, informs newer and long-time residents similarly to create a higher degree of environmental concern (at least among respondents to this survey) (Scherer and Cho 2003).

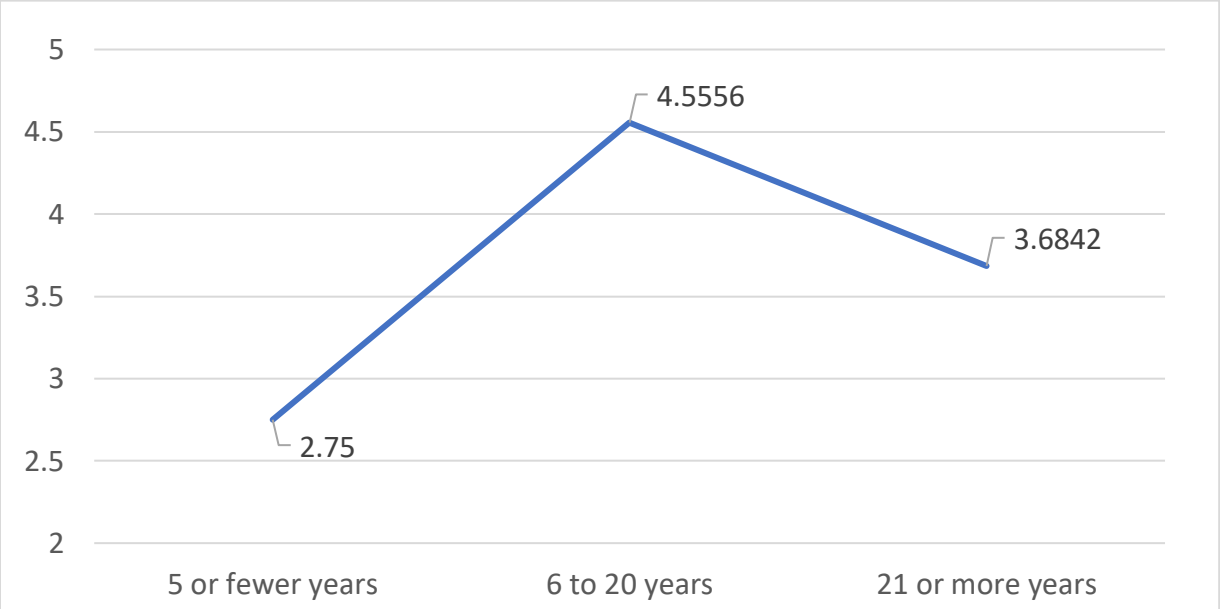
Figure 3: Means of Overall Environmental Concern by Length of Residence – Hamilton Park



In Figure 4 below, interestingly, the patterns in mean desire to relocate across length of residence categories fluctuate much more than means for environmental concern. The mean desire to relocate among newer residents and the mean desire to relocate among longtime residents fall below the mean desire to relocate for those in the community 6 to 20 years. The standard deviation (for desire to relocate) for the length of residence group 5 or fewer years is 1.4, while the standard deviation for the group 6 to 20 years is 1.3, and 1.6 for the group 21 or more years. These mean differences and the respective standard deviations suggest greater

variation in desire to relocate in each length of residence grouping (minimum reported score was 1, maximum reported score was 5), relative to environmental concern. These wider ranges of responses may suggest that at both ends of the length of residence spectrum, for some, the less likely they are to want to relocate. Perhaps this is due to the simple fact that moving is difficult, expensive, etc., and some may not see the utility in it at this point in their lives, or have a stronger attachment to the community than others, all other things being equal. Further, the shorter one has lived here, perhaps the less likely they are to want to move again.[65]

Figure 4: Means of Desire to Relocate by Length of Residence – Hamilton Park

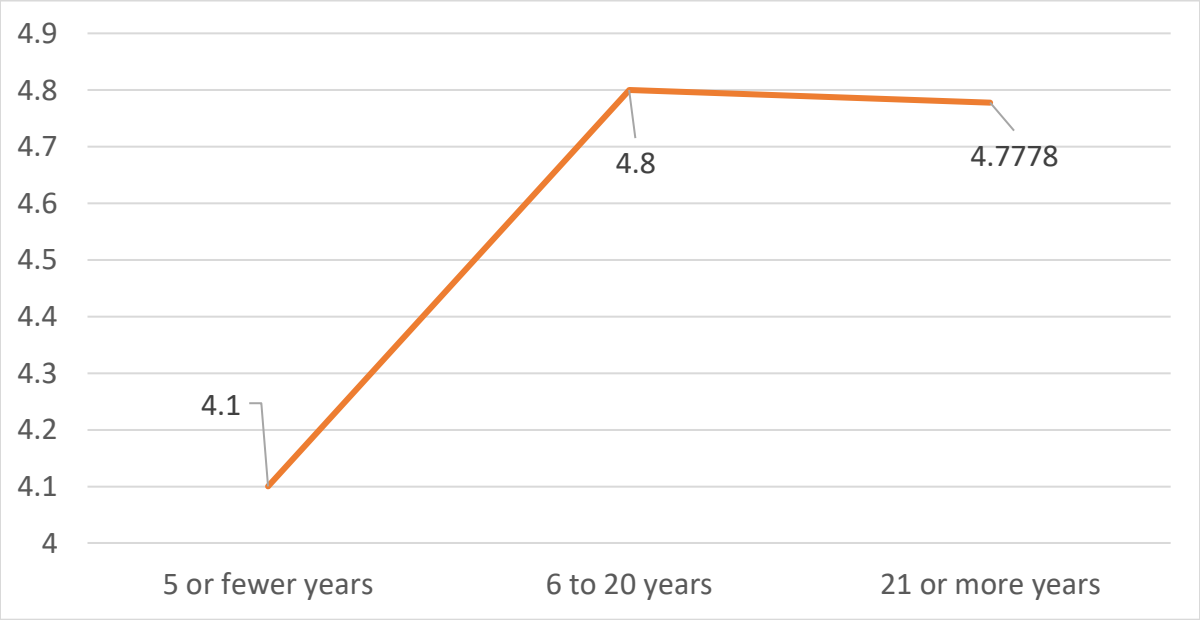


In Eden Park, the means for overall environmental concern and means for desire to relocate for each length of residence category are presented below in two means plots, respectively, illustrating the findings. Though there were not statistically significant differences between the means for environmental concern (F = 1.734, sig. = .197), nor desire to relocate (F = .438, sig. = .649), the findings are interesting and worth discussing. For environmental concern, all length of residence categories have average concern scores above 4, peaking at 6 to 20 years, but being generally high across all categories. There was some variation in standard deviation across categories, with 5 or fewer years having a standard deviation of 1.4, 6 to 20 years a standard deviation of .632, and a standard deviation of .943 for 21 or more years in current residence. Like Hamilton Park, this suggests that that length of residence is not profoundly impacting levels of environmental concern (see Figure 5), on average. This may mean that the

[65] Additionally, in an unmodified chi-square analysis of length of residence by likelihood to move out for fair value (owner-occupied only, original variable categories), most respondents reported likely to very likely to move out, and this was present along the continuum of length of residence (chi-square = 6.850, df = 12, *p* = .867). In other words, regardless of length of residence, generally, owner-occupied respondents in Hamilton Park reported likely to very likely to move out for fair value.

experiences and knowledge of the local environmental conditions have developed in a way that, at least among the respondents to this survey and assuming the respondents are part of the same social network in Eden Park, informs newer and long-time residents similarly to create a higher degree of environmental concern (at least among respondents to this survey) (Scherer and Cho 2003).

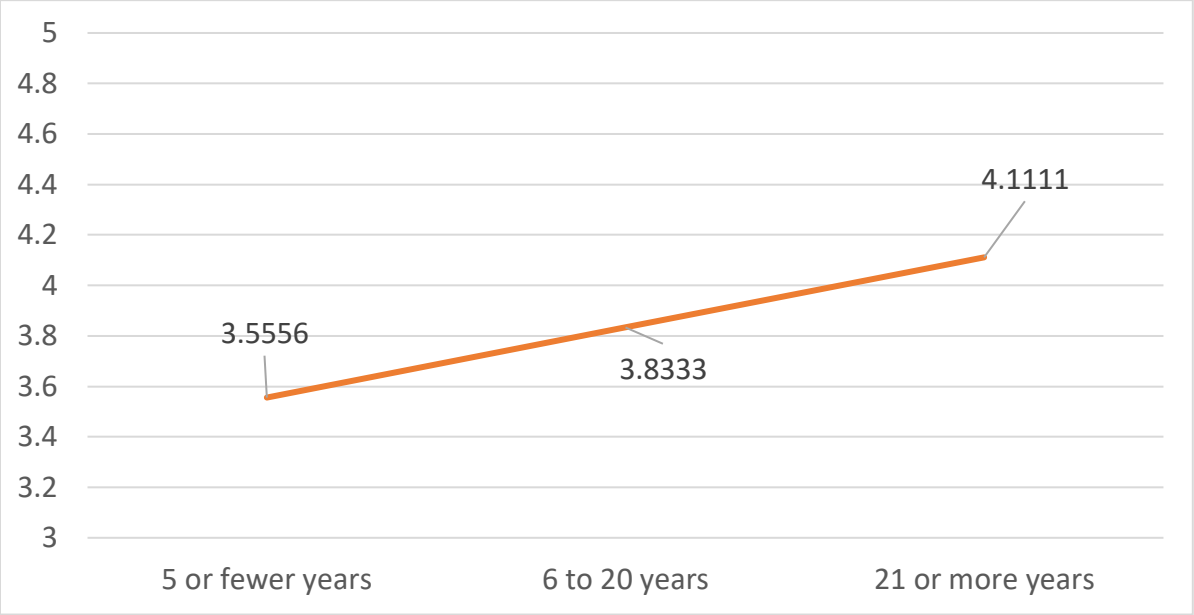
Figure 5: Means of Overall Environmental Concern by Length of Residence – Eden Park



In Figure 6 below, interestingly, the patterns in mean desire to relocate across length of residence categories fluctuate much more than means for environmental concern. Unlike Hamilton Park, mean desire to relocate is lowest among respondents who have lived in the community 5 or fewer years, and highest among respondents who have lived in the community 21 or more years.[66] The standard deviation (for desire to relocate) for the length of residence group 5 or fewer years was 1.740, and with a mean of 3.56, suggesting a wider range of responses (minimum reported score was 1, maximum reported score was 5). As shown in Figure 6, mean desire to relocate increases across the length of residence of categories, while the standard deviation for the group 6 to 20 years was .983 and the standard deviation for the group 21 or more years was 1.5. This pattern in mean desire to relocate according to length of residence is slightly different than Hamilton Park, though the mean difference across length of residence categories is small (largest mean difference is .55).

[66] Additionally, in an unmodified chi-square analysis of length of residence by likelihood to move out for fair value (owner-occupied only, original variable categories), most respondents reported likely to very likely to move out, and this was present along the continuum of length of residence (chi-square = 19.969, df = 15, p = .173). In other words, regardless of length of residence, generally, owner-occupied respondents in Eden Park reported likely to very likely to move out for fair value.

Figure 6: Means of Desire to Relocate by Length of Residence – Eden Park



These results suggest that, regardless of length of residence, most respondents in each community would be likely to very likely to move out of their community for a fair value of a house comparable to a similar home in a low crime area or with financial assistance. The variations in mean scores for desire to relocate, though, suggest that respondents' length of residence influences a *desire* to relocate more than it does a *likelihood to move out with some form of financial payment/assistance*. These bivariate results shed light on one possible influence that earlier statistical results showed in the differences between likelihood to move out and desire to relocate.

Qualitative Results

Including owner-occupied and rental respondents together for both communities, several themes in the open-ended questions emerged in qualitative analysis and in discussion with survey administrators that had collected and studied these data. Three survey questions allowed respondents to provide, in their own words, their beliefs, opinions, knowledge, and experiences related to any concerns they have of environmental pollution or contaminants in their community, what the hazards are, and where they/it come from; any concerns or needs related to potential future changes in the community, including rezoning, revitalization, or relocation; and anything else that they would want to tell us regarding the topics in the survey. These questions were especially important in understanding how lived experiences of residents interacted with sources of knowledge of environmental hazards and what factors mediated any interpretative processes in how residents understood their local communities.

Analysis of qualitative data was done using a straightforward approach common for analyzing interview data. First, the valid data[67] were examined and openly coded, tagging any specific references and including them in categories of prominent themes in the responses that included "critical terms, central people, key events, or themes" (Neuman 2011:510). Thus, any prominent themes that emerged from repeated references to experiences or beliefs were identified. The themes, or categories, were then used to house phrases, statements, and other parts of responses to collectively describe "the essence of each broader categorical characteristic" (Berg and Lune 2012:267) in the exact words of the respondents. This approach allows for a better understanding of "the data in context of the setting or situation…to provide further history and context to the material" (Berg and Lune 2012:267), but also to allow for an unfettered illustration of how respondents experience and interpret their local environmental experiences. Due to the open-ended format of the questions, references to specific environmental hazards, types of concerns, sources of pollution, and impacts of those hazards, among other things, often were woven together within response narratives. As such, where necessary, statements were drawn out of responses and categorized as reasonably as possible to adhere to the respondents' intention for interpretation and use.

Prominent Themes Identified for Both Communities Together (Owner-Occupied and Renter)
Environmental Concerns

- Soil
    - Arsenic concerns and discovery of arsenic in the area's soil
    - Growing food
    - Bringing dirt into the home
    - Digging in dirt outside
- Air
    - Fugitive dust (Eden Park, especially)
    - Truck exhaust
    - Smells
    - "The dump" / landfill near Terminal Ave. (smells come from it)
    - In Eden Park, trucks violate traffic laws going to the port
    - In Hamilton Park, trucks idle on Pyles Lane
- Water
    - Taste/smell
    - "Swamp"
- Past and present industries in general being responsible for environmental problems in the area
    - Much of the onus, particularly in Eden Park, of the source of environmental problems is on Diamond Materials and its "dirt piles"
    - Lack of code enforcement
    - Industry all around (*intensive zoning*)
- No changes in environmental conditions

[67] Not all respondents who completed a survey provided answers to the qualitative questions, or they had nothing more to add, beyond their responses to the fixed-choice questions.

    - Previous identification of environmental problems (e.g., arsenic) has not led to any tangible changes to actually solve the issues in the minds of some residents
- Some ambiguity in local knowledge of contamination and cleanup efforts by the Delaware Department of Natural Resources and Environmental Control (DNREC)
- Need confirmation of contamination, concerned about "what we do not know"
- Very few, but some, respondents reported little or no concern about the area's soil, air, smell, or water in open-ended responses
- A handful of respondents reported an increased confidence in the soil and overall environmental conditions after the cleanup efforts of DNREC

Health Concerns

- Individual and family health
- Generational health
    - Health of children and grandchildren
- Health of pets and pets dying
- Moving into the area generally makes people sicker
    - Respondent had/has cancer or knows someone with it, asthma, breathing issues, headaches/migraines
    - Take health effects of area with you (i.e., even if relocate)

Revitalization, Rezoning, and Relocation Concerns and Observations

- Enjoy the community, but not the environmental issues
- No noise, no crime here
- Truck traffic and traffic increasing with revitalization
- Concerns for moving and disrupting lives
- Some desire to age in place, or desire to leave because of older age
- Uncertainty about what the plans are for rezoning
- Relocation being the only solution and desire to move (*urgency*)
- Past attempts at buyouts not successful
- Concerns for getting fair value for home and financial ability for moving, as well as finding somewhere else affordable

Quality of Life Concerns

- Can't open windows or sit outside
- Kids shouldn't play here
- Can't keep car clean

Recreancy[68] *with Local and State Government and Related Concerns*

- Mistrust with local government and lack of faith in regulatory agencies to protect residents (*protection*)
- Lack of transparency
- No one cares about residents' health
- Dishonest and profit-centered
- Past efforts of regulatory bodies unsuccessful (in cleanup and/or code enforcement)
- No one has done anything, doubt anything will change / nothing has happened in the past, this has been a long process, what will it take? (*frustration*)

Below, the prominent themes are used to organize statements from each community, representing common responses from householders and the key terms within them. On occasion, some statements have had terms replaced to protect anonymity, terms added to provide clarification, and/or an interpretation by the researcher in brackets. These categorized statements allow for collective descriptions, in the words of the respondents themselves, of the major themes identified in this research. In particular, these statements provide context and insight into the social construction of knowledge of environmental hazards and their impact on respondents' lives, illustrating how the lived experience and interactions with various sources of information about any hazards (e.g., regulatory agencies, other residents, etc.) inform complex subjectivities of these issues.

Any potentially identifying information collected in the verbatim responses has been removed, while a small number of responses (approximately 5) to certain open-ended questions were not included at all because of potential breaches of anonymity. Statements from respondents are organized according to community to highlight any notable differences across them, while retaining their particular community salience, respectively. Due to the limited number of renter respondents and some overlap in the content of their responses with owner-occupied respondents (e.g., smell of the area), owner-occupied and renter householders are summarized together. A brief paragraph after each community summarizes selected unique content from renters to illustrate any remaining insight and experience from this distinct group.

Hamilton Park

Environmental Concerns

- Soil
    - "Soil pollution was already here. It existed before [community] was here."
    - "I know there is arsenic in the ground."
    - "The ground is polluted."
    - "They say we have arsenic. I have papers from when they tested my soil."
    - "The soil is of lesser concern [than air] because it can be addressed [at a] later date."

[68] Recreancy in this context "arises when it is believed that institutional actors (including public sector agencies and their employees) are not carrying out their responsibilities at a level commensurate with the level of societal trust the institutional actors possess" (Lynn 2017:321-322).

    - "I can remember we had a garden and ate from the garden, and [family member(s)] died of cancer, all from this right here."
    - "I wouldn't grow any produce – that wouldn't be a good idea."
    - "I wouldn't eat anything from the soil because they found arsenic 10 years ago. They said that it drained from the plants."
    - "We were told, years ago, not to plant anything here (edible plants) because of soil quality."
- Air (including smell)[69]
    - "I feel that the air is the most important because we all breath the air."
    - "Dump yard nearby - you can smell air pollution."
    - "There's a stench when it rains. Very strong odors. Stays damp, gets mold in the home."
    - "Most pollution is in the air and if this was waste land from the start – it was put here."
    - "The air is of most concern to me. It is very difficult to breathe, sometimes it causes headaches."
    - "We're on top of [an] old swamp…Sometimes the smell gets unbearable. Hard to say where it's coming from."
    - "I am not aware of the existence of pollution in the air but I note often the smell and I don't know where it is coming from."
    - "Smell, inhaling pollution."
    - "When we walk out the smell is horrible."
    - "The smell walking out. The air especially on humid days is horrible."
- Water
    - "Water pollution."
    - "Swampy water."
- Past and present industries in general being responsible for environmental problems in the area
    - "Diamond Materials doesn't help much with all the mess they have over there."
    - "Problem originated from factories on Pyles Lane several years back."
    - "From community meetings I've learned that old industrial corporations in surrounding areas left arsenic and other contaminants in the ground that can cause medical damage (to people)."
    - "Hazards come from the history of the community (factories, leather tannery) contaminating the soil."
    - "The company Diamond State throw stuff in the ground. We have many industries with gas coming from them."
    - "We're close to industrial area – God knows that the pollution in the area from there causes."
    - "Diamond Materials is polluting 24/7, no one will make them move, no one has talked to them, we have to move because they're not going to change."

[69] Arguably, smell could be construed as a quality of life issue. Since other quality of life themes that were present included patterns of social activity, smell was housed with air pollution concerns.

    - "They have the plant that takes scrap metal. There is a lot of industrial stuff that uses chemicals."
    - "We live near the port, so I feel like it's a lot of contamination stuff coming in and out from the trucks. It stinks. It causes air pollution."
    - "It [smell] comes from out there, on New Castle Avenue, they are breaking stuff down. The port."
- No changes in environmental conditions [*frustration*]
    - "Concerned for years. Soil, water, and air quality is bad. They've caused sickness, cancer, itching, rashes, breathing problems in the elderly. Dealing with this for over 20 years. Seen people die and be sick. Bad dust levels…If you clean dust today, tomorrow it's back."
- Some ambiguity in local knowledge of contamination, as well as cleanup efforts by DNREC
    - "If, in fact, the properties are as contaminated as they say it is, I would like to get out. And if it is contaminated will you pay me and help me to get out of here?" ["they" was a common term, and only sporadically directly connected to DNREC, which means it could be also used to refer to regulatory bodies, New Castle County, EPA, other residents, community organizations, and/or entities not explicitly mentioned in the course of our research]
    - "Soil contamination was our biggest concern. They weren't sure it was good or bad. They advised people on soil and what they were supposed to do, but didn't do them [houses] all. Only a few houses, about 3. Did some houses, not all, and didn't come back."
    - "DNREC dug up and put new soil down. Concerned about my family living here. Side effects from poor soil and air on health." [suggests *uncertainty* of the effectiveness of cleanup]
    - "They dug here, which caused problems. Didn't put yard back like it was."
    - "If ground is contaminated, you can't even grow a garden or vegetables, it is a hazard to your health (a major concern). A couple of years ago they [assume DNREC] took soil samples and refilled some yards but we never heard anything about it again." [suggests a gulf in communication between community knowledge and experience and regulatory agency efforts]
    - "They [environmental hazards] come from soil, air, and water – that has been confirmed by DNREC." [underscores the *differences in certainty of knowledge* of local environmental hazards]
    - "I don't know where the contaminants come from."
    - "If my house was built on waste land (not absolutely sure it was) then I'd be concerned and want to leave."
    - "If it is polluted (this land/area), I'd absolutely move."
- Need confirmation of contamination, concerned about "what we do not know"
    - "My family has been here since [several decades] and we can't verify that there really is contamination."

    - "Would like more info about the environmental issues here. If it is bad, [resident] would definitely want to move, but if not, [resident] would prefer to stay so [they] don't have to uproot [their] kids."
    - "We all need to know, and we are used to gardening and growing our own food. Only when they told us about the soil did people stop growing vegetables." [this suggests that some residents may have been growing food on potentially contaminated property for some amount of time before learning of it]
- Very few, but some, respondents reported little or no concern about the area's soil, air, smell, or water in open-ended responses
    - "Haven't felt the effects of environmental contamination and I don't know anyone else in the area who has had health issues."
    - "We don't grow anything so we are not concerned."
- A handful of respondents reported an increased confidence in the soil and overall environmental conditions after the cleanup efforts of DNREC
    - "Because we received new top soil." [response explaining a lack of concern for pollution or contaminants in the community]
    - "Not concerned about soil quality because ours was capped and tested by DNREC."
    - There was arsenic in the soil – they dug it up and gave me new soil. Now as they've replaced the soil I'm less concerned."

Health Concerns

- Individual and family health
    - "My [child] has respiratory problems and I'm concerned they're due to local contamination."
    - "Mother doesn't visit anymore because she has health issues."
    - "I am concerned about the health of my family if we remain in this community for a longer period of time. It is already bad as it is."
    - "I have a heart condition but I don't think that it has to do with local pollution."
    - "Heard Hamilton Park was a cancer cluster when I was a teenager."
    - "Health problems have risen in our house due to the environment. Doctors gave us [information] that say the environment can play a part."
- Generational health
    - Health of children and grandchildren
        - "I'm concerned for my health, my grandkids and [children] come here and their health."
        - "Afraid of being out here anymore because of [potential health impacts of area] on grandkids and anyone that spends any length of time out here."
        - "Old people live out here and can't get sicker."
        - "For those with kids they should clean and/or relocate."
- Health of pets
    - "Dogs…passed away…because of the soil."
    - "When you have animals, you are concerned because they are out there."

    - "My dog gets rashes from the soil. Another neighbor's dog has similar issues – always scratching."
- Moving into the area generally makes people sicker
    - "Severe allergy problems after moving here. Migraine headaches."
    - "I'm not well and since I've been living here…I was never told any of my health issues could be due to local pollution. Some people say they've had cancer (due to local pollution/contamination) but we can't know for sure at this point."
    - "People in my neighborhood are getting sick all the time."
    - "It wasn't long after I moved here that I got [various illnesses], and these are things I never had before. Afraid of being out here anymore because of the decline in our health."

Revitalization, Rezoning, and Relocation Concerns and Observations

- Enjoy the community, but not the environmental issues
    - "People are nice. Love living out here. Been a nice neighborhood, otherwise [relative to environmental concerns].
- No crime here
    - "Where do I go that is as safe as this community?"
    - "Like to community. Low crime. No problems."
    - "The crime is low here and I haven't had a problem since moving here."
- Truck traffic and traffic increasing with revitalization
    - "On this side our concern is the traffic. Before there was no port. We have been trying to rezone traffic to another location."
    - "Due to rezoning nearby, higher volume and bigger ships coming in – more traffic. Pyles Lane rezoned to allow trucks which is causing one neighbor…to want to sell [their] home."
- Concerns for moving and disrupting lives
    - "Considered moving but decided not to move because of local friends."
    - "People who live here are scared that by moving it may disrupt their quality/way of life."
    - "It would be difficult to rebuild what we have here. We plan to retire and stay here."
    - "I would like to keep it as a residential area."
    - "Rents are so high these days. If someone were to sell this home they wouldn't tell interested buyers that there's contamination. Most people at civic meetings keep talking about wanting to be paid to move – it's all they talk about. I'd rather stay here and die rather than move now."
    - "Depends on my kids. I'd hate to start over again. I'm established here. It would be hard to pick up and start over."
- Aging in place (positive and negative positions)
    - "Not going to spend my senior years here. I can't do it anymore."
    - "I don't want to move – I'm too old."
- Uncertainty about plans for rezoning

    - "I have relocating and rezoning concerns in general – I don't see how they can keep the industry from the neighborhood."
    - "I heard bits about the part that were trying to buy the area but I am hanging because I don't know what's going on."
    - "I need to know more about it before making a statement. More about what they're planning on doing."
    - "I am concerned about the environment. I'm also concerned about moving out of the community. If I am able to stay, will I be given credits (or grandfathered) in into the new development [housing]?"
    - "Would like to know more about the plans for improving the area."
    - "How long does this take (to try and rezone, upgrade, etc.)? How long and how soon until that takes effect? How beneficial is this to each one of us in the community? Is everything going to be done the way they said they would do it? Isn't this a 5- to 10-year plan?"
- Relocation being the only solution / desire to move
    - "I just want to move out of all this contamination."
    - "I strongly feel that it is an emergency to move forward as quickly as possible with the relocation plans."
    - "There are the health effects we would take with us, even if we relocated. At our age our health is more important than staying here. It's best for all generations to relocate."
    - "There's so much industry surrounding the area that the only thing that could benefit the community is relocation; for years the community has been trying to clean up the area and it has not worked."
    - "I am just really concerned and we would like to see some movement on this process being completed ASAP."
    - "If something is done ASAP, people may regain some of their health. Health problems will go down, people will have a better chance of getting better if this is expedited or sped up."
    - "A church member told us that we need to relocate. The soil can be contaminated."
- Concerns for getting fair value for home and financial ability for moving, as well as finding somewhere else affordable
    - "Now everybody wants the land, the county, port, everybody. So please come with a decent offer for our property."
    - "Concerns about getting a fair value – 'they always will try to give you the smallest amount of money.'"
    - "If you want me to relocate, please make it worth it to me to move."
    - "Need the money to move. Tired of people wanting us out instead of buying us out."
    - "Financial concerns. Fixed income – concerned about needing to move to a place that's less affordable."
    - "If I receive the financial help that I need, I would be very willing to relocate."
    - "We just want them to be really fair if they make us an offer."

- Past attempts at buyouts not successful
    - "All talk about buyout."

Quality of Life Concerns

- Can't open windows or sit outside
    - "I don't want to live out here anymore. Lots of construction companies. I don't want to go outside."
    - "[Decades] ago, could see water and boats. It was quiet. Dump truck company was here but only 8 AM to 4 PM, trucks were covered. Port to port came and ruined view – now trucks, dirt, dust. Can't open windows anymore. Lights come in through windows at night. All dirt and dust coming in even when windows closed (always cleaning windows)."
    - "With open windows in the summer, [dust] blows into people's homes without A/C."
- Kids shouldn't play here
    - "We were told not to dig or let children play and not to have gardens."
    - "Don't want our grandchildren playing outside."
- Can't keep car clean
    - "Cars are covered in dirt and dust and who knows what's in that stuff."

Recreancy[70] with Local and State Government and Related Concerns

- Mistrust with local government and lack of faith in regulatory agencies to protect residents
    - "When they [DNREC] dug up the soil it was so dark and smelly…Not fair. It's coming from the soil…Just wanted to say they did something, didn't care about finishing the job…A guy from Philadelphia EPA said we should be concerned about [it]…Soil problems are still here…Quarry nearby, they didn't care about how high they make that dirt pile, it looks like fog but it's dirt and dust flying around. No one enforces codes. They should move that dirt pile."
    - "I am concerned and, to date, no one has done anything to help us."
    - "Local government is not for us."
    - "'They've already made it clear they don't care about us.' We…know someone from DNREC changed zoning so trucks could come in front of homes here…This is what Delaware does. People running for Johnson's seat. He knew what we were dealing with, others are full of shit (people running for office). People in neighborhood aren't very educated – 'they don't see it's a scam.'"
    - "Nobody gives a damn, we complained and nobody did anything about it."
    - "When I got this house and found out the [person] who sold it never told me about the soil, they should have condemned this area a long time ago – should have prevented people from buying and selling property here."

[70] Recreancy in this context "arises when it is believed that institutional actors (including public sector agencies and their employees) are not carrying out their responsibilities at a level commensurate with the level of societal trust the institutional actors possess" (Lynn 2017:321-322).

    - "Comes back to city and county. Diamond Materials would say that they're in Wilmington, not New Castle. In my opinion, Wilmington and New Castle don't get along in terms of upholding the health and welfare of the people."
- Lack of transparency
    - "Land was contaminated when we moved in, for how long it was contaminated I don't know. I think it was known to some people who were not truthful."
    - "Mobile air quality testing happened – they never gave us the results (fed up). They had the results but they won't report it to us because it's [deadly]." [illustrates some *gulf* between governmental bodies and residents in reporting results of testing, and/or some residents' belief in the results of the testing]
    - "Need to have DNREC and state and county to be truthful and stop playing games and to include the courts because the court case was stopped, but in my interpretation, it should have moved forward."
    - "I don't know where the survey is going or leading. The data that we receive was not clear. We knew Dr. Perez was coming but not who he was."
    - "Thank the university for the survey. I hope [that it] is in the best interest of the homeowners of Hamilton Park. I ask the university to guide us in the right direction. If we have to sell that they don't take advantage [of] us."
- No one cares about residents' health
    - "They didn't care about anyone's health or land (when building here)."
    - "Politicians don't care."
    - "Bottom line – they don't care. I know people in Southbridge that had health problems."
- Dishonest and profit-centered
    - "You know how it is: they only care about profit."
    - "People's perceptions could be wrong. This could be a rumor to move people out to build more profitable area here."
- Past efforts of regulatory bodies unsuccessful
    - "In my opinion, the money they spent on clean-up was a waste because it does not clean up the entire environment. I still have concerns that, over time, people will continue to get sick. What can you do about that?"
- No one has done anything, doubt anything will change / nothing has happened in the past, this has been a long process, what will it take? [*frustration*]
    - "The money they put in to dig the soil out shouldn't have been done. They should have poured concrete, instead."
    - "County will always say they don't have the money to relocate. [Person] needs to find a company that will buy people out."
    - "We've been waiting over 20 years. What will it take in order to make this process move quickly? It's taken so long – 'does someone have to die in order for something to happen and for us to be heard?' I don't want to raise my grandkids here."
    - "How much time to see results and be relocated? Years and years, we have been through the same thing and nothing happened. The problem hasn't

changed. It has gotten worse. For those that can make the change they would like things to change."
    - "When they found arsenic, we went through this before but nothing happened, so what's the point?"
    - "It has been too long. Nothing gets done."
    - "This has been going on for so long. I know that in 2025 they'll still be talking about this – nothing will be done. Homeowners come to the meeting when there's money being handed out…stopped going to meetings for a while because it was the same thing over and over again. They always promise things but that's because it's in their interest – they don't follow through."

Hamilton Park Renters

There were some responses from renters that didn't fit entirely neatly into the prominent themes identified in the qualitative analysis. For Hamilton Park, in general, some of the more unique responses from renters included a concern for owner-occupied residents and the challenges that they might face being rooted in the community through a financial investment. One renter noted that "For those that own, it must be hard." Additionally, concerns over oil spills, trucks crashing, the safety of children in public, and "making it comfortable for the residents and for our community and to be at ease and not have to worry so much" were present in a few responses.[71] Notably, one response from a renter did speak more to the social conditions of the community, including access to healthy food options, relative to most owner-occupied respondents: "[We] need a convenience store. There's lots of liquor stores. Wish we had more produce stores, things that benefit your health."

Eden Park

Environmental Concerns

- Soil
    - "Soil was tested – extremely toxic."
    - "Arsenic."
    - "Soil had to do with the plants [industrial] that were back there before, and now our soil is contaminated."
    - "[Testing] found that air was polluted and the soil receives the contaminants from the air…examinations in the soil revealed arsenic and other contaminants."
    - "Some soil contamination with the recycling plants – where is the runoff going?"
    - "I wouldn't plant anything or dig in the yard. I would use raised beds to grow things…bring in our own dirt."
    - "There is arsenic. They found that the soil was highly contaminated. Contaminants four times higher than normal limits. [They] showed me a few articles that talked about this and even scientific research with the findings of the soil contamination." [shows the various sources of information of local contaminants]

[71] Recall that fewer than 10 respondents in each community was renting; the majority of the completed surveys came from owner-occupied householders.

    - "Noticed ground issues (with the soil) and I've only been here [timeframe]."
    - "I can tell you about the fruit that won't grow and that is because of the contaminants in the soil."
    - "I used to have a garden every year. Now they tell me I can't grow food in my yard."
    - "I was advised not to eat anything in the soil [like fruits grown]."
    - "Neighbor has a garden, but doesn't eat from it anymore."
    - "We can't plant [edible vegetation], need to take shoes off before coming into house."
- Air (including smell)[72]
    - "The smells that come from Diamond Materials."
    - "Dump/landfill smell in the evening and night (in the summertime it is terrible, worse in the summer, but always bad)."
    - "Some air pollution."
    - "…the air quality is not good at all. At night you can see increased pollutants being out into the air."
    - "Sometimes it even smells very bad."
    - "The smells – I can smell it when they run the nearby plant."
    - "When I go somewhere else it is not a bad smell. When I come back it smells horrible. We didn't know when we moved in that it was that bad."
    - "[Terminal Ave.] bus stop needs coverage/booth. The dust is ridiculous when a bus goes by."
    - "The pile of dust in front of the street covers everything right after I clean."
- Water
    - "Water taste is horrible. I need sterile water. Can't use the tap water."
    - "We can't really use our water. It has a brownish color to it."
    - "Sewer system stops when it rains a lot; you can't flush the toilet."
- Past and present industries in general being responsible for environmental problems in the area
    - "The quality of air is so polluted from the companies nearby."
    - "Across the street (Diamond Materials) the dust is terrible – it's in the house, car – coughing is terrible."
    - "Air quality is from Diamond Materials. We used to have the plant back by the port. Cherry Lane – used to have smells coming from there. Diamond Materials – hills are too high, they don't spray them down the way they're supposed to. Unfortunately, they don't have to be covered like the ones at the port. Compost plant used to stink, but they put them out."
    - "Landfill is enough to be concerned about."
    - "I know Diamond Materials residual dust is problematic – especially on windy days."

[72] Arguably, smell could be construed as a quality of life issue. Since other quality of life themes that were present included patterns in references to social activity, smell was housed with air contamination/pollution concerns.

    - "All the dust coming from Diamond Materials. There's a recycling plant, scrap yard, and dump nearby – we have all that. We're stuck in a box."
    - "I suspect strongly that the source of these contaminants comes from the industry surrounding the residential community."
    - "A large portion would come from Diamond Materials, and other companies, the concrete company, others, doing same business as Diamond Materials."
    - "My concerns are about what Diamond Material is putting out into the community."
    - "…air is being messed up because of Diamond Materials."
    - "Not much, just do something about Diamond Materials."
    - "Soil is here before my time. Concerns are with Diamond Material – dust."
    - "Port is all joined in, all companies in this area that service the trucks that carry hazmats (hazmat liquid materials) are a concern."
    - "The dust from Diamond Materials and other industries make it difficult to breathe and even live here (this area)."
    - "The plant across the street – all the dust – all that you're breathing in."
    - "Hazards that effect air, water, and soil is from across the street [Diamond Materials] and the trucks that run back and forth to the port and 495 highway (impacts air). Everything's dusty from over there [Diamond Materials] – the house, the air, the cars. Diamond Materials moving all the soil, concrete, asphalt – it seeps into the ground, into the water. Hills of asphalt are towering behind the liquor store, no other stores near Diamond Materials."
    - "I think Diamond Materials is not safe – might cause lung disease."
    - "They say from industrial park."
    - "In my opinion, Diamond Material is the source of the pollutants. They should be responsible to help restore our property to a safe condition."
- Some ambiguity in local knowledge of contamination and information about soil quality from DNREC
    - "They've tested some properties; some are worse than others."
    - "Not sure if it's the environment, land, air, or our house."
    - "Can't tell you where they [contaminants/pollution] come from."
    - "I have some issues. I cannot say it is because of the environment, but I feel that the environment contributed to my poor health."
    - "Don't know much about the area except Diamond Material."
    - "Listening to people talk about local pollution makes me concerned for my health…DNREC says they tested the area. I don't think I believe everything is OK – I'd appreciate another opinion from a second source."
    - "The rock crushing and junk yard is bad for the environment, but City of Wilmington Center doesn't hurt anyone (all they do is pump gas)."
- Need confirmation of contamination, concerned about "what we do not know"
    - "I don't know much about the environment, but if it is bad for the health of my family, then I would want to move."
    - "My concern is what's unknown about the air and water. Biggest concerns are air quality, soil, water."

    - "I'm concerned about what we don't know. I'm concerned about the soil contamination and homes being sold to buyers who are not informed about the air quality not being 100% (though DNREC says its within OK range)."
- Very few, but some, respondents reported little or no concern about the area's soil, air, smell, or water in open-ended responses
    - "None. I don't want to move from my home."
    - "Soil is good."
    - "I sit outside a lot and I don't smell anything or notice anything wrong. Water tastes good. Air is fine. Trees here look good. PA has environmental issues. Diamond Materials has been here for years, it isn't harming anyone. 'This is our mountain in DE.' It isn't effecting us."
    - "Water isn't brown, the smell of the air is fine, and we live right by all the stuff. Trucks aren't giving off black smoke anymore."

Health Concerns

- Individual and family health
    - "A lot of my concern relates to breathing. I've been here [decades] and my [family] and I suffer from asthma."
    - "My [family member's] health is deteriorating. [They] get bad migraines. My [family] moved away…and I hope they don't come back to live here because of the pollution."
    - "I don't know what effect it [pollution/contaminants] has on us, but it has some bad effect on us and it is going to catch up with us at some point."
    - "I have asthma – wind blowing the dust here doesn't help it."
    - "Revitalizing the area will not help our health. There's no other port I've been around where residential is this close."
    - "As much as I'm attached to this home – I love this little piece of land – but not at the expense of my family's health."
    - "I have breathing problems and that is because of the air pollution."
- Health of pets
    - "I've had animals die prematurely...I think its related to them being out in the yard and getting sick from contaminants."
    - "I've had…dogs here that have died…Might be caused by local environment."
- Moving into the area generally makes people sicker
    - "People started getting sicker when they moved here."
    - "People around here are getting sick."
    - "Although I don't feel as though the environment has affected my health personally to date, I strongly suspect that it did negatively impact my [family member's] health…It might be an anomaly, but who knows?"
    - "People just seem sicker here than where we lived before."

Revitalization, Rezoning, and Relocation Concerns and Observations

- Enjoy the community, but not the environmental issues
    - "Diamond Materials – dust; everything else I can deal with."

    - "The location is fine aside from the environmental concerns."
    - "Love the neighborhood, but not Diamond Materials."
    - "This is a nice community. The only problem I have is the truck noise."
- No noise, no crime here
    - "This is a great area to live in. Low crime and quiet. But if I could find another area like this one, I would consider moving."
- Truck traffic and traffic increasing with revitalization
    - "House shakes all day every day from trucks (interrupts sleep), and ceiling cracks from it. Shaking less so on Saturday or Sunday."
    - "Traffic noise. Dogs get hit by trucks."
    - "To me, the [truck] noise is a greater pollutant than the air or soil."
- Concerns for moving and disrupting lives
    - "I'm [age]. I don't want to start over again. Meet new neighbors…I've been here all my life with the same friends here. But I'm stuck between a rock and a hard place."
    - "Some will be bought out, some won't (some don't like change)."
    - "I like living here."
    - "Some people like it here and some don't. Some say they will move if they have to."
- Aging in place (positive and negative positions)
    - "Some people would want to move, some won't (mostly older would want to stay)."
    - "Where will I move at my age? To a community like this one? [meaning a similar community]
    - "I would like to stay here but it is impossible because I am old and I don't know how much time it will take for the government to clean this up."
- Uncertainty about plans for rezoning
    - "Rezoning would be good because it would give us a chance to be able to move and get the financial help that's needed for us to do so. Relocation is a major concern because we were looking at moving the entire community to a single place, or individuals could move wherever they'd want to (we'd have the option)."
    - "We need to know what they're going to do ASAP."
    - "Wondering how rezoning would benefit me."
    - "I really like the area, but if they are going to do something, they need to do it soon."
    - "I would like to have more information on the county's plans to relocate us and how soon it can be."
    - "Whatever they're going to do, they should do it soon so we can make our decisions."
    - "I don't know much about rezoning, but how are they going to separate industry from residence?"
- Relocation being the only solution / desire to move

    - "I don't know what can be done at this point. But the government should clean up the entire area and/or move us out into a safe community. I don't think it is effective for the government to try and clean up this area."
    - "Please help this neighborhood immediately. My basement is a dirt basement and the fumes from the soil [are] destroying my living environment. It's destroying everything in my home. The mold is very bad. I want to get out of here. Please help me get out as soon as possible."
    - "I don't necessarily want to move, but I don't see any positive changes coming to this community."
    - "I don't think that revitalization will help us. Relocation is the only solution as soon as possible for our health."
    - "If they aren't going to shut down Diamond Materials, I don't want to stay here."
    - "In my opinion, you can't clean up or remove contaminants out of the area, so that would be useless. Moving people is probably the best solution."
    - "The area is dangerous so everyone would be better off if they moved. The company in front [Diamond Materials] will not go anywhere."
    - "Get us out of here as soon as possible. I can tell the difference when I travel in terms of breathing, food taste, energy level."
    - "I don't know why others would not want to move. But you can smell the pollution so everybody should move. This side should be for the trucks. They come and go very often and this cannot be solved."
    - "Time is running out for people. [Community members] have died from cancer. They need to work on getting the funding together to get people out."
- Concerns for getting fair value for home and financial ability for moving, as well as finding somewhere else affordable
    - "I would consider moving if I were given a fair value for my property because industry and residential is not a good mix. Something should be done to try and correct this."
    - "If people are going to move they'll need to think about things financially – it has to be a fair value."
    - "If the funds became available I would gladly move to a [healthier] location."
    - "I would move if the price is right."
    - "Either case [move individual homes or the entire community], we'd need relocation money."
    - "I am more than willing to move, but I will need a fair price for my home. The only problem is the actual moving itself."
- Past attempts at buyouts not successful
    - "I have no opinion about rezoning or relocating, but people have tried several times to buy my home and I said no!" [included here to illustrate the historical context of buyouts attempts, in whatever form they have taken place, been pursued, or been opposed, in the community]

    - "Local meetings are all bickering and nothing gets resolved. Offers have been on the table to be bought out by a company at the port, but many hold out because they want the most money."
    - "Some people held the process back when there was a potential buyout in the past."

Quality of Life Concerns

- Can't open windows or sit outside
    - "We had to [make home improvements] to keep noise out."
    - "Dust everywhere (can't keep porch clean). Can't open any windows. If you wear white t-shirts on porch they'll turn tan. Sometimes an entire wave of dust comes through."
    - "Sometimes when I open the door, dirt and dust fly in my face…I have to wash the inside of my house."
    - "Dust comes over here, can't have windows open. Sand gets in your eyes."
    - "The dust and dirt collect on the porch."
    - "Can't open windows to get the breeze."
    - "We don't open windows much because of dust."
    - "You open your windows and black soot comes in."
    - "We learned not to sit outside because of dust. You blow black stuff out of your nose (soot)."
    - "They need to rezone to move Diamond Materials. Seeing the dust is a mental thing, causes us stress."
    - "We can't keep our windows open without dirt flying in. The area is really industrial."
- Kids shouldn't play here
    - "Kids can't be on Terminal Avenue (can't cross it)."
- Can't keep car clean
    - "[Dust] ruins the paint job on your car."
    - "When I wash my car, it is immediately dirty again."
    - "If you wash your car, immediately it is dirty again."
    - "Constantly cleaning cars."

Recreancy[73] with Local and State Government and Related Concerns

- Mistrust with local government and lack of faith in regulatory agencies to protect residents
    - "I feel that the county, state, and federal government are responsible for allowing this area to be contaminated such as it is."
    - "I feel that a great mistake has been made when they settled these communities and it was integrated with industry. The government has a responsibility to fairly

[73] Recreancy in this context "arises when it is believed that institutional actors (including public sector agencies and their employees) are not carrying out their responsibilities at a level commensurate with the level of societal trust the institutional actors possess" (Lynn 2017:321-322).

rectify this situation for all concerned (residents, business, industry) – it can be done! Government has to make an honest, fair effort to do so, so that it could be a win-win-win situation (residents, government, business, and industry)."
    - "The county, state, and federal government should look out for the health and need of its citizens and do all that they can to protect the citizens and not be as concerned about business/industry."
    - "Area needs representation with county (no communication). County doesn't talk to homeowners about issues…they used to spray for mosquitoes, but they don't do it anymore…no agency will even come here to look at conditions."
    - "It is the state in general. Pollution is everywhere in Delaware."
- Lack of transparency
    - "I don't have anything else to say because you are going to do what you want to do."
    - "I want to make sure there's transparency. People weren't aware of the rezoning they wanted to do. As long as there is community involvement and opinions shared."
- No one has done anything, doubt anything will change / nothing has happened in the past, this has been a long process, what will it take? (*frustration*)
    - "I am concerned but don't think that much can be done to really clean up this area."
    - "I am concerned that conditions in the area are not getting any better. What can be done about it?"
    - "Just get rid of Diamond Materials."
    - "It's going to take a massive cleanup to check the air quality, the water quality, and the soil quality (people can't afford to do this – need to dig up pipes). Gotta get rid of Diamond Materials because it effects my breathing. They [Diamond Materials] don't spray water on debris piles enough."
    - "I feel like we hear the same answers – people are tired of it."

Eden Park Renters

Eden Park renters' responses to qualitative questions generally fell within the prominent themes identified for both communities. One notable difference between Eden Park and Hamilton Park renters, though, involved a few respondents' descriptions of housing conditions. In Eden Park, there were a few references to poor housing conditions and a lack of upkeep by landlords, with less emphasis on the specific environmental burdens focused on in this study.

DISCUSSION OF RESULTS

Final dispositions and response rates for each community show an overrepresentation of homeowners and an underrepresentation of renters in each completed group. The overall response rate for each community was high (greater than 50% for each community), and the completed group characteristics (at least as measured with owner-occupied or renter) for each community showed relatively representative groups to each known universe. It was necessary to include renters in the community study because some renters, as we learned in our pre-test and other preliminary work, have lived in the community for some time and have opinions on and experiences with the environmental conditions. The overrepresentation of owner-occupied householders in the response rates for both communities is not a surprise, though, given the degree of involvement that owner-occupied householders likely have in community networking, relative to renters. For example, it may be that very few renters, if any, attend local civic association meetings and therefore may not be as connected to others or as motivated to participate in the survey.

The refusal rate in Hamilton Park was much lower than it was in Eden Park, suggesting some degree of non-random effects on survey participation in Eden Park. In our experience with survey administration, we heard anecdotes from some refusals that they didn't want to move, and therefore didn't want to participate in the survey. This suggests that at least some community members equated completing a survey with wanting to move out of the community or relocate. Based on the findings concerning likelihood to move out (i.e., large percentages of respondents in each community reported being likely to very likely to move out), the high refusal rate in Eden Park may be due to residents seeing completing the survey as an indication of their desire to move out of the community. We cannot know this for sure, but based on what we heard while doing the survey and the response patterns, this is one possible explanation for the higher refusal rate in the Eden Park community.

In Hamilton Park, the conservative estimate of the percentage of householders that would be likely to move out was 54%, assuming missing responses would be unlikely to move out and then combined with those that reported "unlikely" or "unsure." The alternative hypothetical that Perez presented suggests that if missing data were added as "likely" to move out to those that actually reported "likely" or "very likely" to move out in the survey responses, 97% of householders would be likely to move out. This scenario provides a makeshift confidence interval, ranging from 54% to 97%, based on the known universe and the actual responses to the survey. This interval should be interpreted with caution, though, as it assumes missing data would be "unlikely" to move out or "likely" to move out, depending on the scenario, but missing data are unknown. Examining the valid data only, respondents overwhelmingly reported being likely to very likely to move out, with 92.9% of owner-occupied respondents and 100% of renter respondents reporting this.

In Eden Park, the conservative estimate of the percentage of householders that would be likely to move out was 45%, assuming missing responses would be unlikely to move out and then combined with those that reported "unlikely" or "unsure." The alternative hypothetical that

Perez presented suggests that if missing data were added as "likely" to move out to those that actually reported "likely" or "very likely" to move out in the survey responses, 92% of householders would be likely to move out. This scenario provides a makeshift confidence interval, ranging from 45% to 92%, based on the known universe and the actual responses to the survey. This interval should be interpreted with caution, though, as it assumes missing data would be "unlikely" to move out or "likely" to move out, depending on the scenario, but missing data are unknown. Examining the valid data only, respondents generally reported being likely to very likely to move out, with 89.7% of owner-occupied respondents and 66.7% of renter respondents reporting this.

The variation in desire to relocate, relative to a general tendency to report being likely to move out with financial compensation, may be explained by a general community feeling that if major re-zoning and other changes are potentially happening in the area, though with some reluctance, respondents may be willing to entertain moving out because they feel it is necessary or inevitable (in other words, reporting lower levels of a desire to relocate than likelihood to move out). The patterns in response rates and results suggest some bias in the motivation to complete the survey. If this is true, then alternative voices that were not as well-represented by the survey may lead to intra-community disputes over relocation and land use as this issue moves forward, with the possibility of some seeing relocation as absolutely necessary and others seeing relocation as not necessary and/or not desired. Lynn's (2017:331) research illustrated some community division over a partial relocation plan, noting that "Where some residents questioned the need for relocation at all, others became frustrated waiting to be relocated."

Very few respondents reported that they would be unlikely to move out of their community for fair value or with financial assistance, and coupled with the finding that there was some variation in the desire to relocate (though over 50% reported a great desire to relocate in each community), a leaning towards financial payment to aid in out-migration of the community could have been a motivator to participate in answering the survey. Likelihood to move out of the community and desire to relocate are two qualitatively different concepts, overlapping but capturing different attitudes and motivations for out-migration. As noted in the results section, the bivariate correlations between environmental concern and desire to relocate, as well as environmental concern and likelihood to move out are mostly (but not entirely) positive, moderately strong, and statistically significant. Interestingly, though the correlation between likelihood to move out and environmental concern for owner-occupied respondents in Hamilton Park is positive and moderately strong, there is no association between these two variables for owner-occupied respondents in Eden Park. However, the bivariate correlation between desire to relocate and likelihood to move out for owner-occupied respondents ranges between a Spearman's rho of .611 for Hamilton Park and .738 for Eden Park, suggesting that the correlation between these two variables in each community is strong, but not so strong to be measuring the same phenomenon. Overall, the chief hypotheses are supported except for the lack of a correlation between environmental concern and likelihood to move out for Eden Park owner-occupied respondents.

A significant proportion of respondents expressed high levels of environmental concern. Over 75% of respondents in each community reported "extremely concerned" about any environmental contaminants or pollution in their community. Results of independent samples t-tests show small mean differences in levels of environmental concern and desire to relocate across communities, suggesting both communities generally share similar opinions on these issues, on average.

The evidence of variation in the levels of agreement or disagreement for revitalization and environmental cleanup alternatives (rather than relocation), even among the owner-occupied residences that completed a survey, is intriguing. These results suggest that, given the current conditions of the community, the prospects of cleanup and/or effective environmental regulations are appealing to at least some that (even) reported being likely to move out for fair value or with financial assistance. Given the variation in desire to relocate, if there were possible alternatives to relocation that would solve the environmental concerns and experiences that people have had, a sizable proportion of the respondents in each community agree with statements on these alternative initiatives, instead of relocation. Again, this is said with the knowledge that large majorities of owner-occupied respondents (and most renters, too) would be likely to very likely to move out for fair value.

Though both communities show high proportions of respondents reporting great concern for soil quality, the ongoing soil mitigation effort in Hamilton Park may have influenced the variation in concern measured for this variable in this community. Respondents' direct or indirect experiences with the effort could be serving as a mediator for how people interpret relocation. As noted earlier, mitigation should minimize concerns among those that have had their properties cleaned up and possibly diffuse to others in the community. The evidence here points to this *and* some, still, having significant environmental concerns in light of cleanups. These findings illuminate an ambiguity about the issues of contamination, cleanup, and their relationship to respondents' desire to relocate.

Many respondents reported concerns over financial difficulties when gauging the issue of relocation, and while age is an issue for some (i.e., moving out difficult because of one's age) aging in place was not something that a majority of respondents agreed to. Further, very few respondents reported a concern for losing social ties in the event of relocation. Even though the quantitative data suggest that few respondents in each community agree that they are concerned about relocation because they would lose their social ties, in the qualitative data there were a few statements of people staying because of their social attachments in the area. Overall, it seems that financial difficulties to moving is a prominent theme for many, but aging in place and losing social ties are not major concerns among the respondents.

Qualitative results suggest that respondents' interpretation of the local environmental hazards' impact on their health is partly mediated through their experiences with others describing their poor health, DNREC cleanup with local properties and community narratives about cleanup efforts, and limited, confusing, or ambiguous information about local contaminants and pollution from governmental sources. This was illustrated by many comments referring to what

"they" (i.e., regulatory bodies) recommended residents do and not do, relative to their local environments, including not eating anything grown on properties, not letting children dig in local properties, and removing shoes before entering one's home. Based on these research findings, in the minds of residents, the sporadic and inconsistent presence of authorities on the matter and their activities (i.e., cleanups) resulted in opportunities for risk information diffusion and amplification through local social networks within the community. Generally, community sentiment as reflected in the qualitative data demonstrates anxiety and concern mostly over the potential impact of the local area's environmental hazards and its effect on human health; interestingly, quantitative results show some variation when people were asked if the local environmental conditions caused them to experience health problems.

In the qualitative data, respondents elaborated on their environmental concerns often through the lens of health impacts, and tied ideas about relocation to health impacts of local environmental conditions, as well. Rezoning to separate industry from residential, as well as data on environmental regulations and cleanup, suggest that improving the environmental conditions could help to address day-to-day lived experiences of environmental burdens and the health impacts of the local conditions on community members, so these alternatives may have been more appealing to some respondents because they helped to address some primary concerns over lived health impacts. However, at least one respondent commented that any health impacts people have from living in the area will be taken with them, even if they relocate, illustrating a perceived incremental, cumulative health impact of living in the area.

Additionally, quantitative results suggest that a sizable portion of respondents in each community "don't know" or disagree that local environmental conditions have caused health problems, though in Eden Park 70% agree to strongly agree that they have experienced health problems as a result of the local environmental conditions. This is likely due to the lived experiences with fugitive dust that has come up in qualitative data, while in Hamilton Park day-to-day experiences may not be as profoundly felt, and concerns about soil reflect a potential health impact more difficult to discern on the surface (some ambiguity in the harmful impacts).

Several other conclusions can be drawn from the qualitative data. In Hamilton Park, the discovery of arsenic in the soil of some properties and advice to not grow or eat food from outside gardens has partially informed the way that respondents interpret their contemporary health conditions. Respondents' beliefs about health are also tied to the intensive zoning that situates residential properties adjacent to industry and declines in health after moving into the area, generally. Information about discovering arsenic in the soil allows for a degree of retrospective interpretation about the (potential) cumulative, incremental effects of interacting with the soil (e.g., being in one's yard, eating food grown outside) for some that have lived there for longer periods of time. There were, though, a few residents that reported less concern about their property after DNREC had cleaned and replaced (or capped) soil. The certainty of the environmental harm and health knowledge varies in responses, though many have described lived experiences that they posit have some relationship to the environmental conditions in the area.

There was also some ambiguity in understanding of the *nature and degree* of soil contamination in the Hamilton Park responses, however, according to these data. In part, this is illustrated by several references to a lack of clear understanding of testing and cleanup done by DNREC, suggesting a gulf between some residents and this regulatory agency, even for some that had their properties cleaned up. Further, the data suggest a high degree of vocal criticism and mistrust for local government, or a strong sense of recreancy and frustration, among respondents in Hamilton Park. This degree of vocal frustration and urgency in the Hamilton Park community is possibly the result of being at the core of community mobilization over the years. For Hamilton Park, these data intimate a wide swath of understanding, trust, and confidence in the area's soil and DNREC. Further study of the nature and depth of interaction between the community and DNREC regarding soil testing, results, and efforts at cleanup would provide more insight into this variation in knowledge and ambiguity in understanding.

In Eden Park, respondents' lived experiences with dirt and dust heavily informed their beliefs about soil and air contamination/pollution, and the quality of life (e.g., can't sit outside) and health outcomes (e.g., asthma) described in relation to the dust. In their research, Wakefield and colleagues (2001) refer to the activities that some respondents in Eden Park described to deal with the fugitive dust (e.g., not sitting outside or washing their car) as a "reappraisal of lifestyle options," which are behaviors of respondents that try to deal with the environmental problems but not contribute to social change (p.170) (also see Dory et al. 2015). Unlike Hamilton Park, in Eden Park there was less direct, vocal criticism of DNREC but a significant amount of discussion of the role of Diamond Materials as being the source of the environmental hazards that they dealt with. In Hamilton Park, the frustration regarding knowledge of soil contamination and cleanup was strong, but in Eden Park it was likely less vocal because of their closer connection with day-to-day direct exposure to dust. As a local, readily identifiable source of one environmental hazard that residents described, Diamond Materials was easily connected in the minds of respondents to their everyday lived experiences and their beliefs about its impact on health and quality of life, among other things. As such, in Eden Park, the onus was less on the recreancy and mistrust of a regulatory body (e.g., DNREC) and more on a direct form of environmental injustice through the dust that respondents described. That said, though, there were still several responses that touched on government responsibility for alleviating a situation that several respondents claimed it was responsible for: *allowing* for residential spaces and industrial spaces to be zoned adjacent to one another.

A few of the prominent themes in Hamilton Park were not readily apparent in the responses of Eden Park householders that we surveyed, or were situated within other collective narratives. For example, though in Hamilton Park there was a strong sense of frustration that nothing has changed (in terms of making environmental conditions better), this was only explicitly mentioned a few times by Eden Park respondents. More so, statements like "just get rid of Diamond Materials" implied a longstanding frustration with the local industry's impact on the community, but also that there seemed like little could be done to correct things. Further, relative to Hamilton Park, there was less emphasis in Eden Park on generational health impacts of Diamond Materials or other environmental burdens described by respondents. Among the Eden Park respondents, as well, statements referring to generational impacts of the conditions

in the area had less to do with following advice from regulatory bodies (e.g., don't let kids dig in the dirt), and more about the safety of children due to the traffic and Terminal Avenue. These differences, too, should be investigated in future study.

There were a few similarities across communities in the qualitative data worth noting here. First, one commonality resides in the urgency to relocate among many respondents and the need to do so to benefit people's health. Many respondents in both communities connect environmental burdens to health impacts and suggest the need to relocate for health benefits, though there was some degree of variation in agreement or disagreement that local environmental pollution had caused health problems. Additionally, several respondents in both communities share the anxiety and trepidation of growing local food or having had grown and consumed food in the past, resulting in a subjective potential connection between some contemporary health ailments and the soil through food consumption. These findings illustrate how "…environmental issues…are always made sense of or localised in the physical, social, and cultural context in which individuals live, work and interact with others" (Bickerstaff and Walker 2001:143).

In future study, it is important to more explicitly understand who residents are referring to as "they" in their descriptions of being given advice or having had their properties mitigated for contamination. Though DNREC was mentioned specifically as "they" in several responses (through probing), in others it was not. The way that knowledge and experience of environmental hazards interact and form belief systems depend heavily on the sources of information and the credibility or trust that residents have of those entities in informing their subjective beliefs. As Senier and colleagues (2012:211) noted:

> One of the most robust findings from social-science research on people living in contaminated communities is that animosity and mistrust frequently develop between residents and the staff of regulatory agencies charged with responding to contamination crises…

The degree of uncertainty/ambiguity in knowledge of local contamination and cleanup efforts (at least in Hamilton Park) suggests the need for a *consistent and sweeping outreach effort* to inform residents of both communities of the local environmental conditions, but also to more robustly solicit their input and experiences. This effort should allow for all residents to provide their own feedback on their experiences in the area, as they understand them, emphasizing their lived experiences and exploring any dimensions of both place (i.e., environmental) and community attachments (Brehm, Eisenhauer, and Krannich 2006). In this way, a mutual, collaborative base of knowledge and experience, drawing from both the dominant epidemiological paradigm (Brown 2007) and the embodied experiences of local residents, can create a common ground of understanding from which to move forward.

OBSERVATIONS

There are myriad ways to move forward in thinking about the next steps regarding the Hamilton Park and Eden Park communities – too many to discuss in this report. Social science scholarship should continue to inform the efforts in these communities regarding the extraordinary complexities of environmental hazard mitigation, human health impacts, community stigma, relocation and resettlement challenges, and zoning. Given the knowledge that this survey lends to the current state of community sentiment about these issues, it is clear that a consistent, dedicated outreach effort should occur immediately, engaging all community members regarding these issues. Community representation in these discussions needs to be as wide as possible, capturing voices from across the spectrum of beliefs and experiences regarding the local environmental conditions, contributing to both process and outcome justice (Gould and Lewis 2017). Community inclusion and transparency in process are crucial for the success of any initiative that may involve something as complicated as a community buyout (Binder and Greer 2016).

These data suggest that approximately half of householders in the respective community universes are likely to very likely to move out, and among respondents to the survey the percentages are even higher (much higher). Given these findings, but also the possibility of non-response and refusal due to non-random influences, it is imperative to look to the wider community's beliefs, opinions, and experiences regarding these issues through outreach. Numerous strategies for community engagement have been implemented and evaluated, and the democratic involvement of all parties impacted in a community can be challenging (Gallagher and Jackson 2008).

That said, continuing efforts at outreach and engagement will be done concomitantly with a great deal of environmental concern among many residents, illustrating how the potential human health impacts and lived experiences with known environmental burdens will go on, even as efforts to try and address them through relocation and/or mitigation continue. The urgency surrounding addressing these issues is paramount in the minds of many of the respondents to this survey.

It is clear that many people deal with local environmental conditions that impact quality of life and potentially impact health, and the data from this survey provide veracity to those lived experiences through respondents' own words. The lived experience is profound for some, speaking of dust blowing into their homes, on their cars, and their clothes and bodies regularly. The burden of legitimizing these environmental risk hazards is heavily placed on the community, while their control over these environmental risks seems minimal and trust in regulations to address them low, which may be contributing to the emotional content of their risk perceptions (Brown 2014:A278). Moreover, the finding of arsenic in the soil of some properties comes to some in the Hamilton Park community after having lived there for some time, causing a swirling of emotions and understandings about their situation. Furthermore, cleanup efforts were/are not necessarily clearly explained to some residents, at least as it is shown in some of these data, leading some respondents to a state of anxiety and uneasiness

about their past and current levels of exposure. Conversely, some respondents reported not being worried about anything or being less concerned after DNREC soil mitigation.

The history of people's environmental experiences in the area and the history of mobilization and community-led efforts to address their environmental concerns is an important consideration in light of this research. This survey was situated and completed within a history or a timeline of environmental justice work and numerous other processes occurring in and around the New Castle and South Wilmington areas. This research project took place during a lengthy series of efforts by many local community members to mobilize around environmental concerns and relocation. As a result, the research was situated intricately within an ongoing effort, by at least a sizable number of residents in both communities, to address long-standing environmental concerns. In this way, the research project had to navigate a series of complicated relationships between community members, between community members and others in the local area, and between community members and local government. The project was embedded within a deep sense of urgency of many community members to relocate and their efforts to have that happen.

Finally, this study being done in the context of the Route 9 Corridor Master Plan allowed for a handful of narratives to emerge that survey administrators were able to pick up on, anecdotally, throughout the course of survey administration. Some of the narratives aligned with the theoretical approach of this study, while others diverged from it. The narratives included:

- Relocation is necessary because of the local environmental hazards.
- Relocation isn't necessary once properties have been cleaned up (it is OK to live here).
- Trying to address and learn more from community members about the local environmental conditions, including preferences for relocation and opinions about alternatives, is interacting with a renewed interest in redevelopment in surrounding areas. As such, the narrative of gentrification emerged, suggesting that "they" are trying to move us out to either gentrify the area or because home values will go up once people are bought out. Though there was mobilization to be bought out previously over environmental pollution, and though DNREC had been cleaning up properties for some time, this narrative over timing of the current survey project did emerge.
- The survey, regardless of what the results are, will allow the government to employ eminent domain.

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APPENDIX A

RESEARCH OFFICE

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: July 9, 2018

TO: Victor Perez, PhD
FROM: University of Delaware IRB

STUDY TITLE: [1284876-1] Eden Park and Hamilton Park Community Survey

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: July 9, 2018

REVIEW CATEGORY: Exemption category # *(2)*

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office. Please remember to notify us if you make any substantial changes to the project.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.

RESEARCH OFFICE

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: July 26, 2018

TO: Victor Perez, PhD
FROM: University of Delaware IRB

STUDY TITLE: [1284876-2] Eden Park and Hamilton Park Community Survey

SUBMISSION TYPE: Amendment/Modification

ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: July 26, 2018

REVIEW CATEGORY: Exemption category # *(2)*

Thank you for your submission of Amendment/Modification materials for this research study. The University of Delaware IRB has determined this project is EXEMPT FROM IRB REVIEW according to federal regulations.

We will put a copy of this correspondence on file in our office. Please remember to notify us if you make any substantial changes to the project.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.

Respondent ID: EP or HP Owner-occupied or rental

Householder or adult

Date and disposition:

Repeat (if needed):

Sent postcard for contact (if needed):

Final date and disposition (if needed):

[continued on next page]

Eden Park and Hamilton Park Community Survey

BEFORE READING SCRIPT

- Circle Eden Park (EP) or Hamilton Park (HP) on top of survey.
- Confirm owner-occupied or rental status with sampling frame and circle accordingly on top of survey.
- Approach home and introduce yourself as a researcher from the University of Delaware doing a community survey on resident perceptions of the environment and the future of the community (add any context about Rt 9 as needed for clarity or context).
- Identify the "householder" to answer the survey: a resident adult (over 18) that is considered the "head of household." If multiple "householders," select the adult with the next birthday to answer the survey (if this adult is not present, use the householder that is present if that is OK with them – if not, ask when you can come back to speak to other householder).
    - If there is no identifiable householder, select the adult with the next birthday to answer the survey. Only do this if there is no identifiable householder at that residence (present or not).
- Confirm their interest in possibly participating.
- Stress that it is voluntary: they do not have to take it and can stop at any time.
- Stress that it is anonymous: their responses cannot be connected to their identity or residential address after the survey is completed.
- Inform them that it would take about 20 minutes to complete and we can offer them $10 cash for their participation.
- The survey can be done inside or outside of the home (if inside, you would have to inform the appropriate authorities if there were any signs of child abuse), or at another convenient location (like the library) at another time if they want to schedule it.

SCRIPT

We would like to ask you a few questions about your experiences and attitudes concerning the environment, health, and the potential rezoning and relocation of the Eden Park and Hamilton Park communities. We recognize that not everyone may agree or share the same views on these issues, so our goal is to try and understand what different opinions people may have across the community. Please know that there is no funding available at this time towards relocation, and the survey is a current assessment of how people feel about the community in which they live. There are 18 core questions in this survey and some of the topics may be a little difficult to talk about, so please know that it is completely voluntary and anonymous, and we will only be reporting the results in a way that helps to protect a person's answers from being identified. We will write in or mark your response for each of the questions. By beginning this survey, you are consenting to participate in this research. Would you like to begin?

[continued on next page]

SURVEY

1. On a scale from 1 to 5, with **1 meaning not at all concerned to 5 meaning extremely concerned**, are you concerned about any environmental pollution or contaminants in your community? (circle one value below)

Not at all 1 2 3 4 5 Extremely

Don't know

Prefer not to answer

2. In general, air and soil quality can be impacted by hazardous environmental contaminants and other forms of pollution. On a scale from 1 to 5, with **1 meaning not at all concerned to 5 meaning extremely concerned**, are you concerned about the effects of any environmental hazards in your community on: (place a check for the level of concern in the appropriate box for these two issues)

	Not at all 1	**2**	**3**	**4**	**Extremely 5**	**Don't Know**	**Prefer not to answer**
Air quality							
Soil quality							

[continued on next page]

3. **[NOTE CONCERN IN ITEMS 1 AND 2 AND ASK ACCORDINGLY]**
   [If some concern in 1 and/or 2] If you are concerned about any environmental pollution or contaminants in your community, in your own words, can you tell us more about your concern, what the environmental hazard(s) is(are), and where it comes from?
   [If no concern in 1 and 2] If you aren't concerned about any environmental pollution or contaminants in your community, can you tell us more about that?
   [Don't know or prefer not to answer for 1 and 2] If you don't know or aren't sure about your concern, you may also tell us that. (write response here and read back for accuracy)

_____

[continued on next page]

4. **[NOTE CONCERN IN ITEMS 1, 2, AND 3 AND ASK ACCORDINGLY]**
[IF NO CONCERN IN ITEMS 1 TO 3, REITERATE NO HAZARDS OPTION AS THESE QUESTIONS MAY NOT BE RELEVANT TO RESPONDENT]
For the **following three statements [4a-4c]**, please **indicate your level of agreement or disagreement**, ranging from **Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree,** to **Strongly Agree.** If you don't think your community has any environmental hazards, or if you don't know, you may also tell us that. (circle the appropriate response after each question)

   a. Any environmental pollution or contaminants in the area have **impacted the home values**.

      Strongly Disagree Disagree Neither Agree Strongly Agree

      I don't think the residential area has environmental hazards.

      Don't know

      Prefer not to answer

   b. Any environmental pollution or contaminants in the area have **impacted the quality of life** of residents.

      Strongly Disagree Disagree Neither Agree Strongly Agree

      I don't think the residential area has environmental hazards.

      Don't know

      Prefer not to answer

   c. **I have considered moving out** of my community because of any **environmental pollution or contaminants** that might be in this area.

      Strongly Disagree Disagree Neither Agree Strongly Agree

      I don't think the residential area has environmental hazards.

      Prefer not to answer

5. How **familiar are you with any previous efforts to relocate local residents** because of environmental issues or related concerns in your community? (circle one response below)

Very familiar **Somewhat familiar** **Not at all familiar**

Prefer not to answer

6. Are you familiar with the **RT 9 Corridor Master Plan?** (circle one response)

Yes **No** NA (if not answered)

7. Are you familiar with the **Port of Wilmington expansion?** (circle one response)

Yes **No** NA (if not answered)

8. Do **you or someone else in your household own or rent your home**? (owning also means being listed on the mortgage or deed) (circle one response below, read aloud if needed for clarity of options)

I own the home/am listed on the mortgage or deed
(move to item 9)

Another resident owns the home/is listed on the mortgage or deed
(skip to item 10)

I rent the home or share equally to pay rent (double-check that it is a rental home)
(skip to item 11)

Another resident rents the home (double-check that it is a rental home)
(skip to item 12)

Other: (please specify)_____
(skip to item 13)

Don't know/Not sure

9. **[Owner-Occupied Respondent is Homeowner]** As an owner-occupied homeowner, ranging from very likely to very unlikely, how likely is it that you would move out of your residential community if you were given **a fair** value of a house comparable to a similar home in a low crime area? (read response options and circle one response below)

Very likely

Likely

Unsure

Unlikely

Very unlikely

Prefer not to answer

IAP if not owner-occupied homeowner

10. **[Owner-Occupied but Respondent Not Homeowner]** As a resident of an owner-occupied home, ranging from very likely to very unlikely, in your opinion, how likely is it that the owner would move out of your residential community if they were given **a fair** value of a house comparable to a similar home in a low crime area? (circle one response below)

Very likely

Likely

Unsure

Unlikely

Very unlikely

Prefer not to answer

IAP if not resident only of owner-occupied home

11. **[Primary Renter Respondent or Equitable Renter]** As a rental home, ranging from **very likely to very unlikely**, how likely is it that you would **move out** of your residential community **if you were given the financial assistance to do so?** (circle one response below)

Very likely

Likely

Unsure

Unlikely

Very unlikely

Prefer not to answer

IAP if not primary renter respondent

12. **[Rental but Respondent Not Primary Renter]** As a rental home, ranging from **very likely to very unlikely**, in your opinion, how likely is it that the primary renter would **move out** of your residential community **if they were given the financial assistance to do so?** (circle one response below)

Very likely

Likely

Unsure

Unlikely

Very unlikely

Prefer not to answer

IAP if not renter respondent

13. **[Other Living Situation Respondent]** Ranging from **very likely to very unlikely**, how likely is it that you would **move out** of your residential community **if you were given the financial assistance to do so?** (circle one response below)

Very likely

Likely

Unsure

Unlikely

Very unlikely

Prefer not to answer

IAP if not other living situation respondent

[continued on next page]

14. Depending on their views of some of the topics in this survey, people may have different ideas about the future of the community. For the next nine statements concerning the potential for rezoning, revitalization, and relocation, please **indicate your level of agreement or disagreement** by selecting one response, ranging from **Strongly Disagree** (SD), **Disagree** (D), **Neither Agree nor Disagree** (N), **Agree** (A), to **Strongly Agree** (SA). (check the appropriate response for each statement)

	SD	**D**	**N**	**A**	**SA**	**DK/Prefer not to answer/IAP**
My residential community is isolated from other communities in the New Castle County area.						
I would prefer to stay in my residence if the environmental regulations in the area prevented any environmental problems we face in this community, rather than relocate. [IAP if no hazards]						
Moving out of the community would be difficult for me without additional financial help.						
If relocation were an option, I would be concerned about leaving the community because I may lose my social ties.						
Moving out of the community would be difficult for me because of my age.						
Moving forward, rezoning the local Route 9 area to separate industrial use areas from residential use areas would benefit local people's health.						
I would prefer to age in place; that is, not move out because I am older. [IAP if not older]						
All residents would benefit from local revitalization and staying in their current residences, more than they would from relocation.						
All residents would benefit from local cleanup efforts of residential properties and remaining in their homes as opposed to relocating. [IAP if no hazards]						
	SD	**D**	**N**	**A**	**SA**	**DK/Prefer not to answer/IAP**

[continued on next page]

15. On a scale from 1 to 5, **where 1 means no desire and 5 means great desire**, **how much do you want to relocate** out of your residential community? (circle one value below)

No desire 1 2 3 4 5 great desire

Don't know

Prefer not to answer

16. **Please tell us anything else** about what your concerns or needs are regarding any potential future changes in the community, **including rezoning, revitalization, or relocation.** (write in the space below and read back for accuracy)

[continued on next page]

17. Overall, how would you **rate your own personal health, ranging from poor to excellent**? (circle one response below)

Poor **Fair** **Good** **Very Good** **Excellent**

Prefer not to answer

18. Please tell us your level of agreement or disagreement with the following statement: I believe that I have **experienced health problems** due to exposure to environmental pollution or contaminants in my residential area. If you don't think your community has any environmental hazards, or if you don't know, you may also tell us that. (circle one response below)

Strongly agree **Agree** **Neither** **Disagree** **Strongly Disagree**

I don't think the residential area has environmental hazards.

Don't know

Prefer not to answer

19. Ranging from very well to not at all, how well do you think your responses to the survey questions on environmental conditions and your experiences with them **reflect the experiences and opinions of most other community members**? (read responses aloud and circle one response below)

Very well **Somewhat** **Very little** **Not at all**

Don't know

Prefer not to answer

[continued on next page]

20. Ranging from very well to not at all, how well do you think your responses to the survey questions on relocation, rezoning, and revitalization **reflect the opinions of most people in your household**? (circle one response below)

Very well **Somewhat** **Very little** **Not at all**

Don't know

Prefer not to answer

IAP if respondent lives alone

21. Ranging from very well to not at all, how well do you think your responses to the survey questions on relocation, rezoning, and revitalization **reflect the opinions of most other community members**? (circle one response below)

Very well **Somewhat** **Very little** **Not at all**

Don't know

Prefer not to answer

22. In years, **how long have you lived in this CURRENT residence**? (read responses aloud and circle one response)

Less than 1 year

1-5 years

6-10 years

11-15 years

16-20 years

21-30 years

More than 30 years

Don't know

Prefer not to answer

[continued on next page]

23. Is there **anything else** that you want to tell us related to the topics in this survey? (write the response in the space below and read back for accuracy)

Thank you very much for participating! We appreciate your time and your responses are very important.

AFTER SURVEY

- Ask respondent if they would like a copy of the Route 9 Corridor Master Plan. If so, we can have one mailed to them after survey project is done in late August.
    - On a separate page, write physical address or email address if they want a copy of the plan.
    - You can also provide the web address if they want to view it electronically:
        - http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf
- Give the respondent envelope with informed consent and $10 bill.
- Note the date of survey completion with disposition on survey, and then note on sampling frame “done” for the address. Next, separate the address page from the survey and place each in their respective folders.

INFORMATION ABOUT THE STUDY

Title of Project: Eden Park and Hamilton Park Community Survey

Principal Investigator(s): Victor W. Perez, PhD

You were invited to participate in a research study. This form tells you about the study including its purpose, what you were asked to do if you decided to take part, and the risks and benefits of being in the study. Please read the information below and ask us any questions you may have by contacting Dr. Perez.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to provide a current picture of any concerns that local Eden and Hamilton Park residents may have about environmental pollution or contaminants in their community, if any. Also, this study measures the desire to relocate among residents in each community and tries to understand their level of agreement or disagreement with some of the potential rezoning, revitalization, and relocation possibilities in the Wilmington Area Planning Council's (Wilmapco)[1] Route 9 Corridor Master Plan.[2]

You are one of approximately 150 participants in this study. You were asked to participate because you are at least 18 years of age and the householder (or adult, if no householder) of a residential property in either Eden or Hamilton Park.

WHAT WERE YOU ASKED TO DO?

As part of this study you were asked to answer a voluntary, anonymous survey that measures several things, including any environmental concerns that you may have, any desire to relocate that you may have, length of residence, homeownership status, and agreement or disagreement with some proposed changes to the future of the community, among a few other questions. The survey should have taken about 20 minutes to complete at your residence (or local library) and you were offered $10 cash for your participation.

WHAT WERE THE POSSIBLE RISKS AND DISCOMFORTS?

Possible risks of participating in this research study included some emotional and psychological risk because it could have brought up difficult experiences that you may have been dealing with for some time, including the possibility of difficult social and environmental conditions and the idea of human health and community impacts from those conditions.

Because we are doing a survey, some residents might encounter these topics for the first time and feel some concern about them and/or want to know more. We designed the survey in a way that included input from locals and others familiar with the area, but not everyone who lives here may have the same history with or understanding and feelings about the area. The survey only serves to capture the opinions and attitudes of all householders regarding its topics to give an overall picture of the communities' experiences and stances

[1] http://www.wilmapco.org/
[2] See the plan in full at http://www.wilmapco.org/Rt_9/Report/Rt9CMP_lowres.pdf

towards these issues. The survey itself may motivate you to ask questions about these topics more, or it may not, depending on many different factors. This is a potential impact of doing surveys on community issues that is unavoidable.

With any research, there is some risk of breach of confidentiality to the data. In other words, there is always the possibility (however small) of your responses being connected to you. We think that the chance of this happening is very, very small because the survey is anonymous and does not ask for any personally identifying information, and the survey only uses your address to recruit you to participate – it does not connect your address to your responses. When we are doing the survey, too, we do it in a way to keep your responses separated from your address. Also, we will only be reporting the results at the group level, which helps to protect your identity and your residential address.

As we mentioned before beginning the survey, right now there are no funds available for relocation. The survey is trying to get a current picture of how people feel about some of the issues that at least some residents have voiced to get a better idea of how each householder feels about the community in which they live.

WHAT ARE THE POTENTIAL BENEFITS?

We feel that a direct benefit to you included an opportunity to share your voice about these issues and to be involved in research that may play a part in how future changes in the community (if any) are made.

HOW WILL CONFIDENTIALITY BE MAINTAINED? WHO MAY KNOW THAT YOU PARTICIPATED IN THIS RESEARCH?

The survey is an anonymous survey, meaning that you provided no personally identifiable information with your responses. Also, we only used an address list to come to your home and let you decide who the "householder" or adult would be to answer the survey, if you wanted to answer it at all (because it is voluntary). We also took steps during the actual survey to make sure that your address is not connected to your survey, which cannot be connected to you.

Paper copies of the surveys and the addresses will be kept separate after the survey is done. We will keep them in separate folders, detached, meaning that an address cannot be connected to a survey. The only identifying information on the survey is if it was done in Eden Park or Hamilton Park, and nothing else.

The paper copies of surveys and address sheets will be destroyed after we have entered all of the survey data into our computer program to analyze it. Once we have done that, we will shred all the paper copies of the surveys and addresses and only have the electronic, anonymous data left over to examine. The electronic data will be kept for 3 years on a password-protected computer that belongs to Dr. Perez.

The research results will be presented to the local communities and to other locally involved groups early on after the study is completed, as desired. The full, detailed results will be in a report that will be provided to New Castle County, which will be a public document that anyone can access.

We will present the results of survey questions that let you speak in your own words verbatim – that is, word for word. Keep in mind that all of the data are anonymous and will be presented in a way that protects your identity, so we will remove any information from these responses that may refer to a person or residence. The actual data will not be shared with anyone outside of UD – we only will share the results.

The confidentiality of your records will be protected to the extent permitted by law. Your research records may be viewed by the University of Delaware Institutional Review Board, which is a committee formally designated to approve, monitor, and review biomedical and behavioral research involving humans. Electronic records relating to this research (as noted above) will be kept for at least three years after the research study has been completed.

The New Castle County Department of Land Use funded this study.

WERE THERE BE ANY COSTS TO YOU FOR PARTICIPATING IN THIS RESEARCH?

There were no costs associated with participating in the study.

DID YOU RECEIVE ANY COMPENSATION FOR PARTICIPATION?

You were offered $10 cash for your participation in this study.

DID YOU HAVE TO TAKE PART IN THIS STUDY?

Taking part in this research study was entirely voluntary. You did not have to participate in this research. If you chose to take part, you had the right to stop at any time. If you decided to stop taking part in the research, there was nor will be any penalty nor loss of benefits to which you are otherwise entitled. Your decision to stop participation, if you did before completing the survey, will not influence current or future relationships with the University of Delaware.

WHO SHOULD YOU CALL IF YOU HAVE QUESTIONS OR CONCERNS?

If you have any questions about this study, please contact the Principal Investigator, Victor W. Perez, PhD, at 302-831-6232 or victorp@udel.edu.

If you have any questions or concerns about your rights as a research participant, you may contact the University of Delaware Institutional Review Board at hsrb-research@udel.edu or (302) 831-2137.

Hello! The University of Delaware (UD) will be doing a survey in your residential community this summer, sometime between late June and August. The people doing the survey will be wearing UD shirts and will have identification while they are in the community. We just wanted to let you know that we were coming before we start. Thank you!

UNIVERSITY OF DELAWARE

325 Smith Hall
18 Amstel Ave.
Newark, DE 19716

Hello! Recently, researchers from the University of Delaware (UD) were at your residence to do a community survey, but we could not contact anyone. If you would like to hear more about the possibility of doing a survey, please call Dr. Perez at 302-831-6232. Thank you!

UNIVERSITY OF DELAWARE

325 Smith Hall
18 Amstel Ave.
Newark, DE 19716

APPENDIX B

EDEN/HAMILTON PARK CIVIC ASSOCIATION

Dr. Perez, from the University of Delaware and the New Castle County will be visiting each house along with members of our civic association on Tuesday, July 17, 2018, and continue through Wednesday, Thursday, and Friday, 11 AM (weather permitting).

Cell phone: [redacted]

Pastor McDuffy

APPENDIX C

Eden Park Community Ambient Air Quality Study

Preliminary Data Evaluation

&

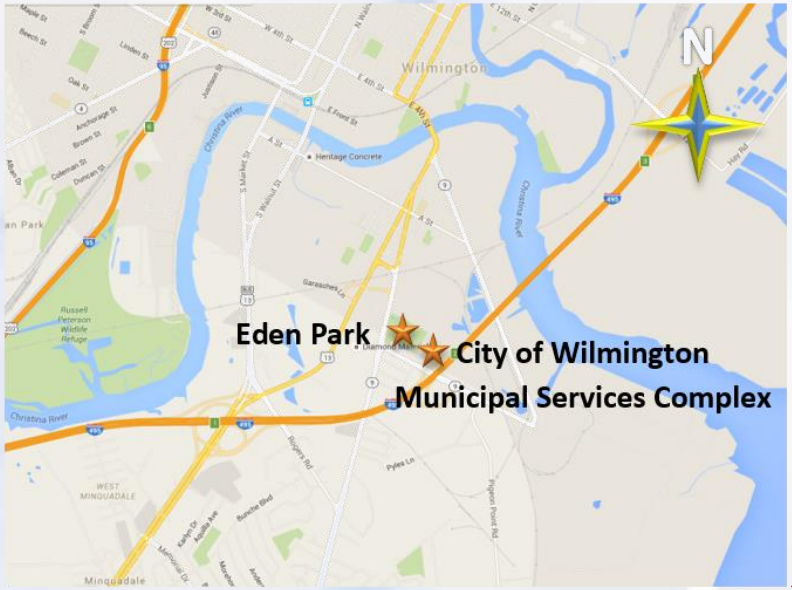
PM Advance

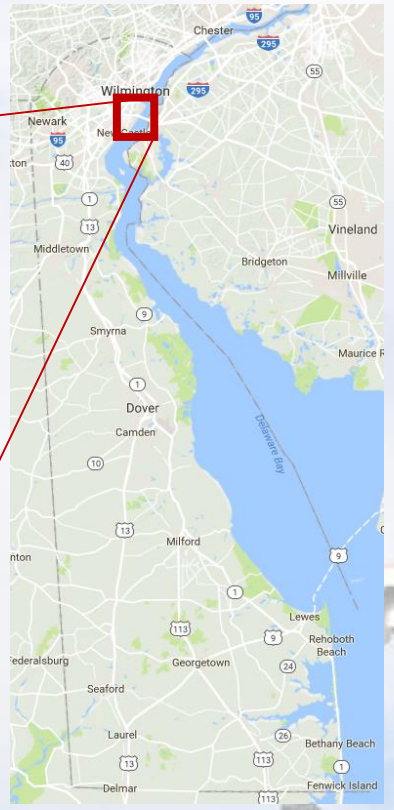
Presented by: DNREC Division of Air Quality

February 27, 2017

MMP Eden Park Study: Project Planning

Site Selection

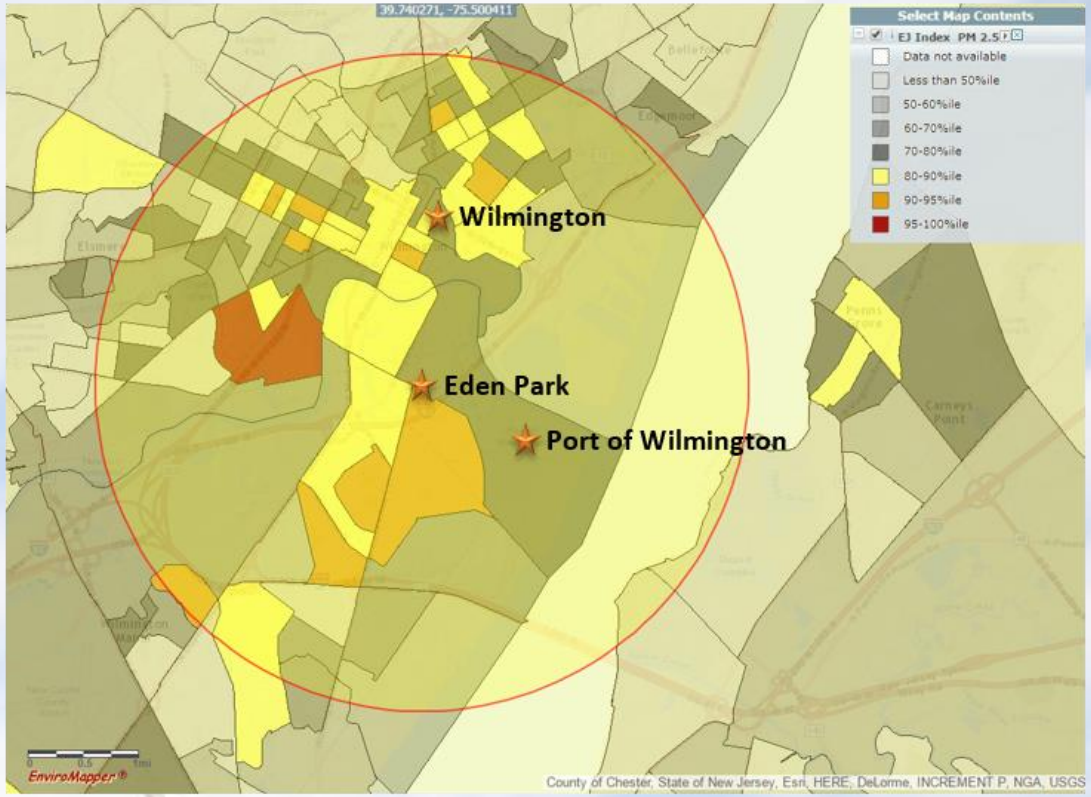




Location of MMP and Eden Park

Community Concerns

Fugitive Dust



EPA's Environmental Justice Screening Tool Map for $PM_{2.5}$ EJ Index surrounding Eden Park
Circle marks a 3 mile radius surrounding the community (Locations are approximate)

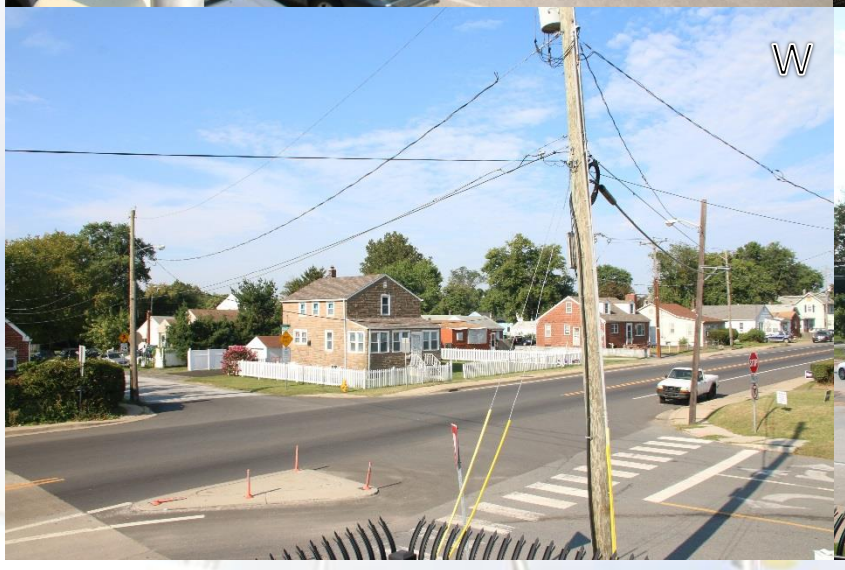
Objectives:

Primary Objective: Investigate local ambient air concentrations of certain pollutants to evaluate the local conditions

Secondary Objective: Determine if permanent monitoring sites are representative of local conditions or whether there is need for local monitoring

MMP Eden Park Study: Equipment Pictures

MMP Eden Park Study: Compass Quadrant Views from Roof of MMP

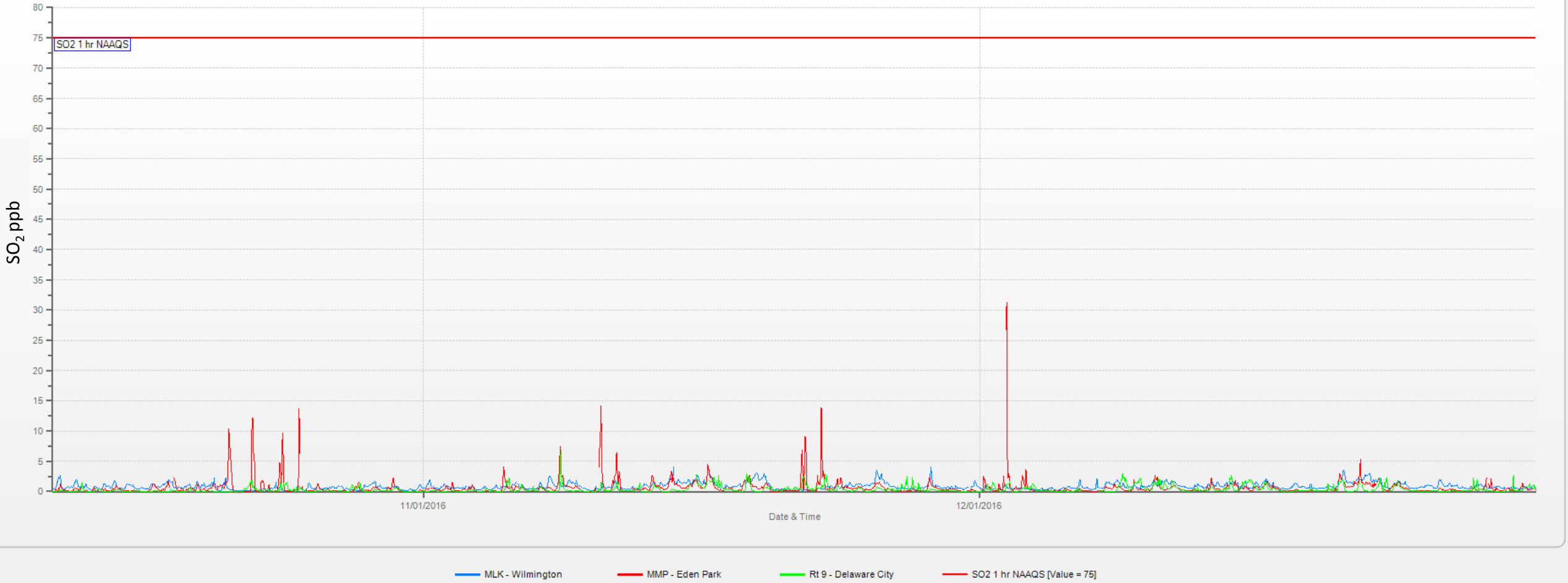


MMP Eden Park Study: Equipment Setup Pictures

MMP Eden Park Study: Equipment Picture Updates

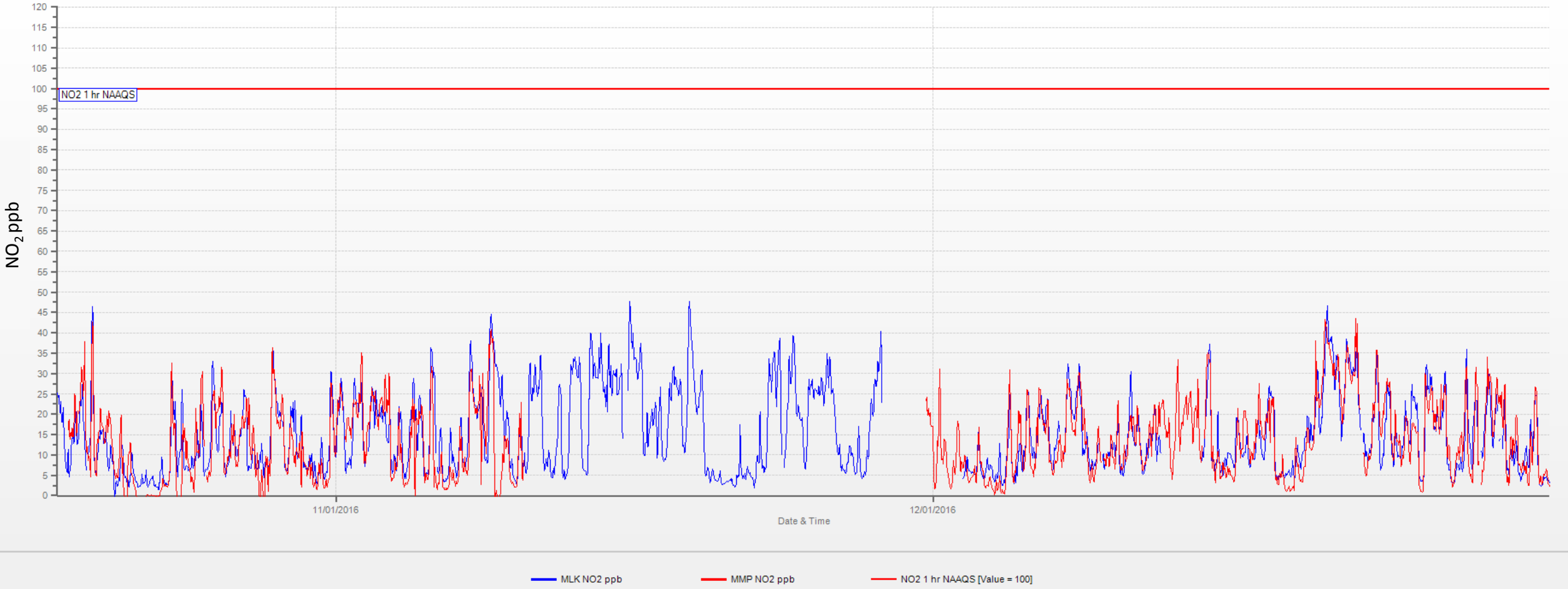
MMP Eden Park Study: Preliminary SO_2 Data

Sulfur Dioxide (SO_2) hourly average concentrations at the MMP and permanent sites in Wilmington and Delaware City.
All readings below the 1 hour Standard of 75 parts per billion (ppb).



MMP Eden Park Study: Preliminary NO_2 Data

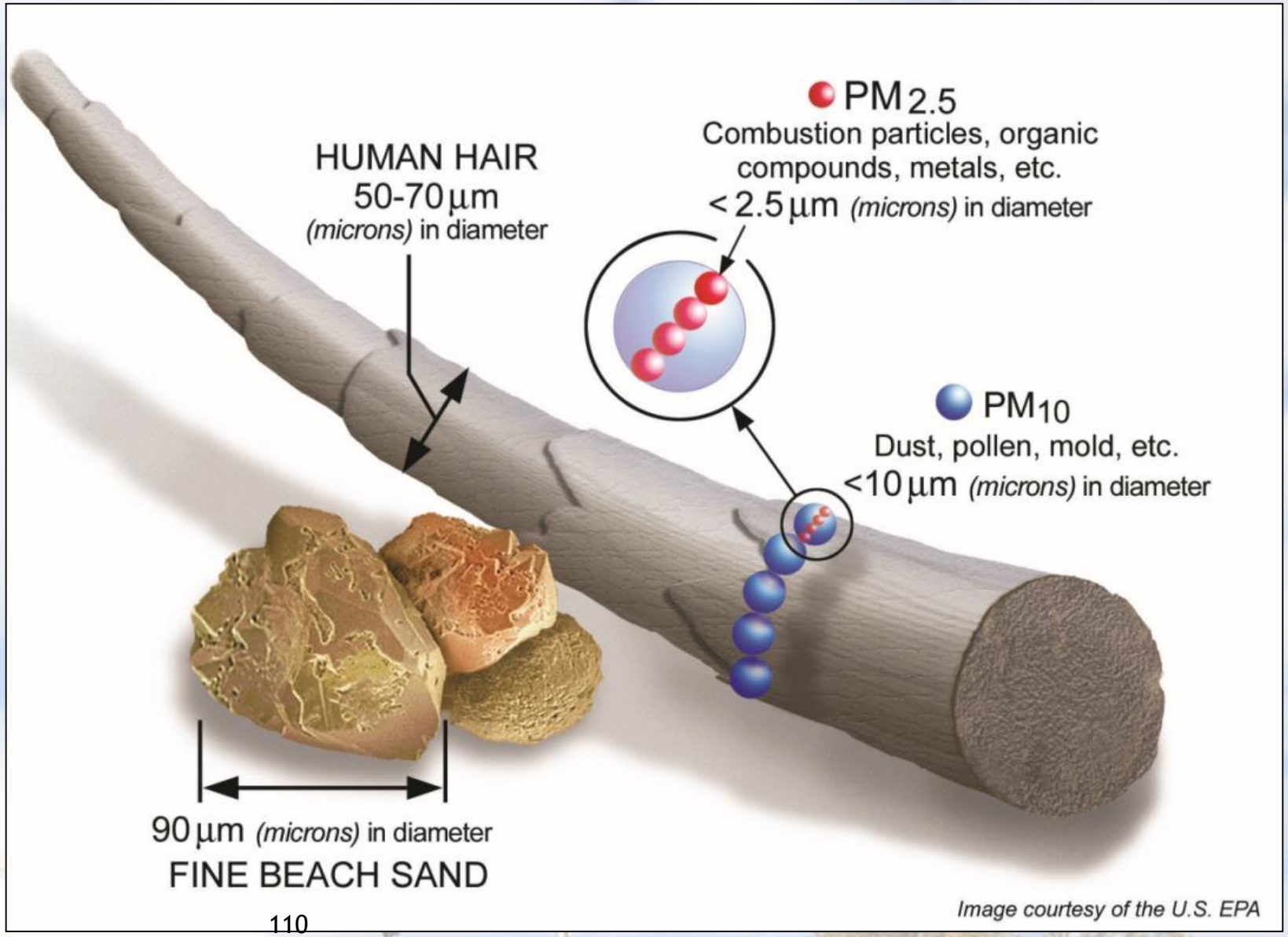
Nitrogen Dioxide (NO_2) hourly average concentrations at the MMP and Wilmington site.
All readings below the 1 hour Standard of 100 ppb.



MMP Eden Park Study: Particulate Matter Background

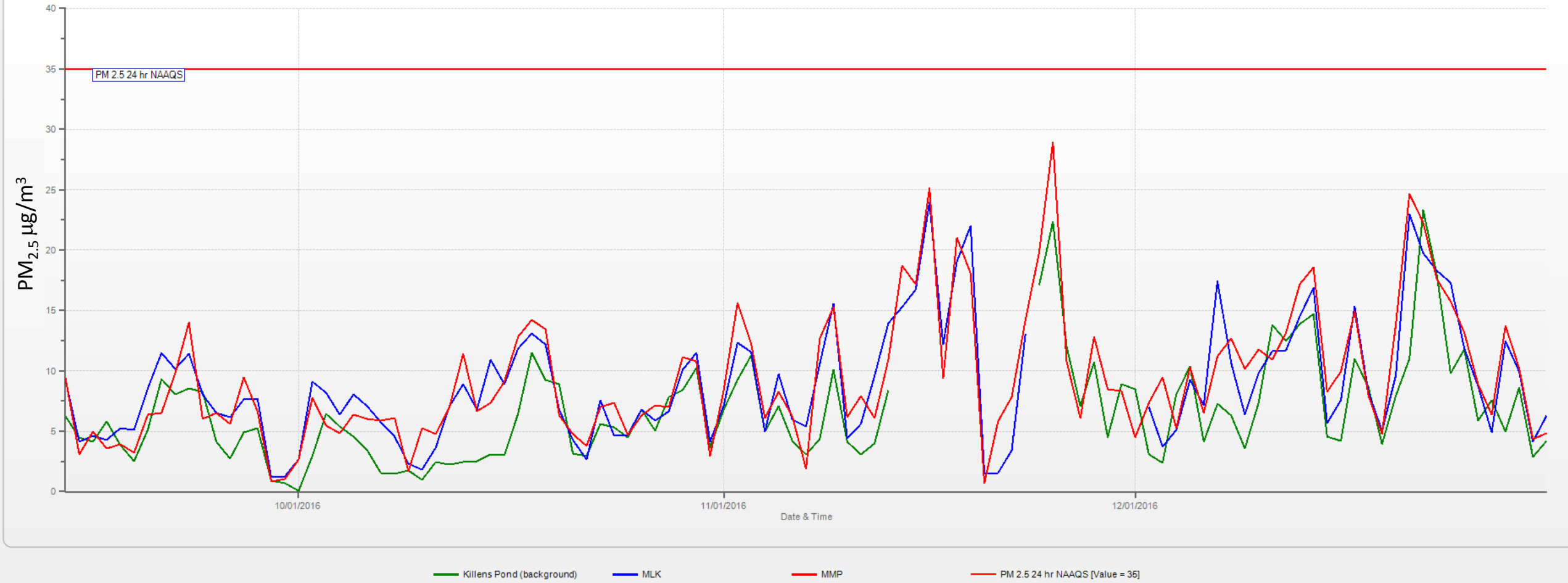
Sources of PM

- Roads
- Construction Sites
- Fires
- Smokestacks
- Automobiles and Trucks
- Industries
- Agricultural Activities



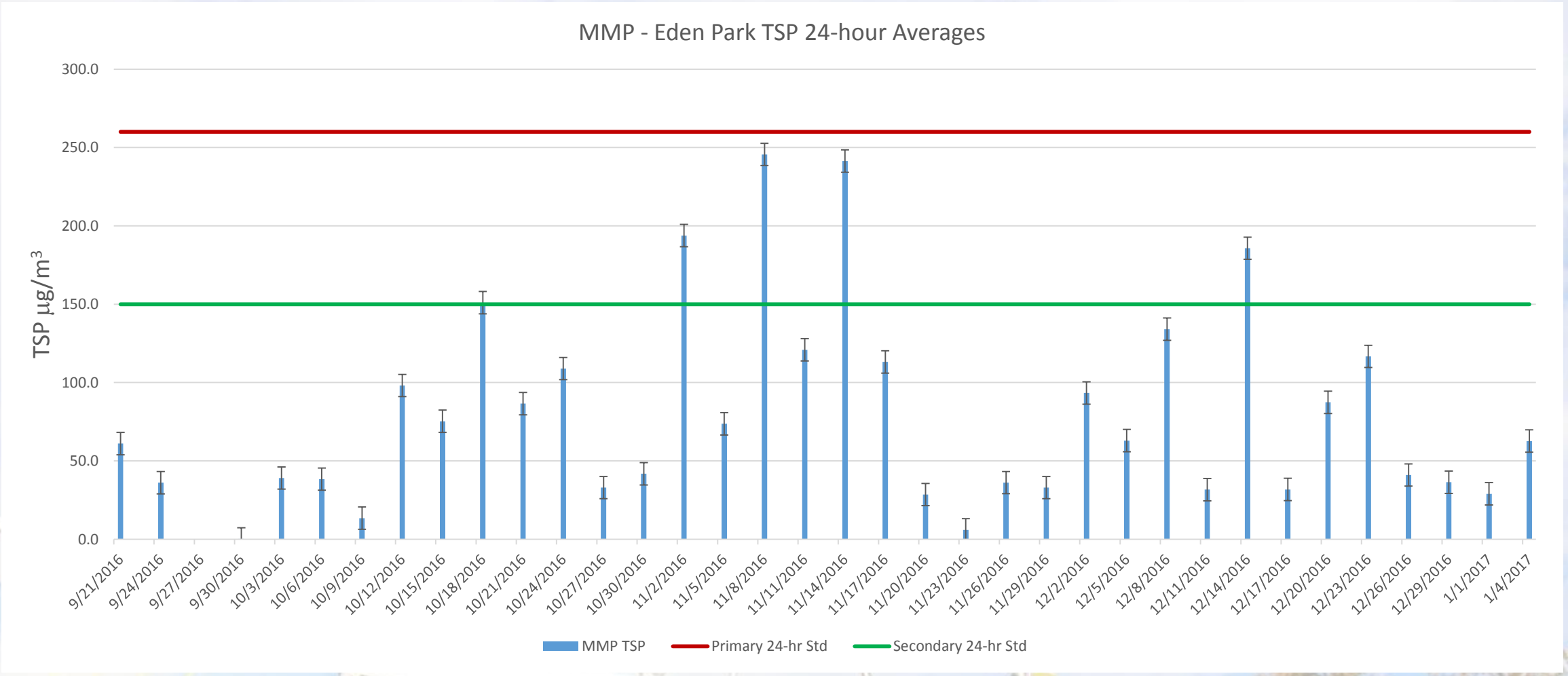
MMP Eden Park Study: Preliminary $PM_{2.5}$ Data

Particulate Matter at 2.5 microns in diameter ($PM_{2.5}$) 24 hour average concentrations at the MMP, Wilmington and Kent County sites. All readings below the 24 hour Standard of 35 micrograms per cubic meter ($\mu g/m^3$).

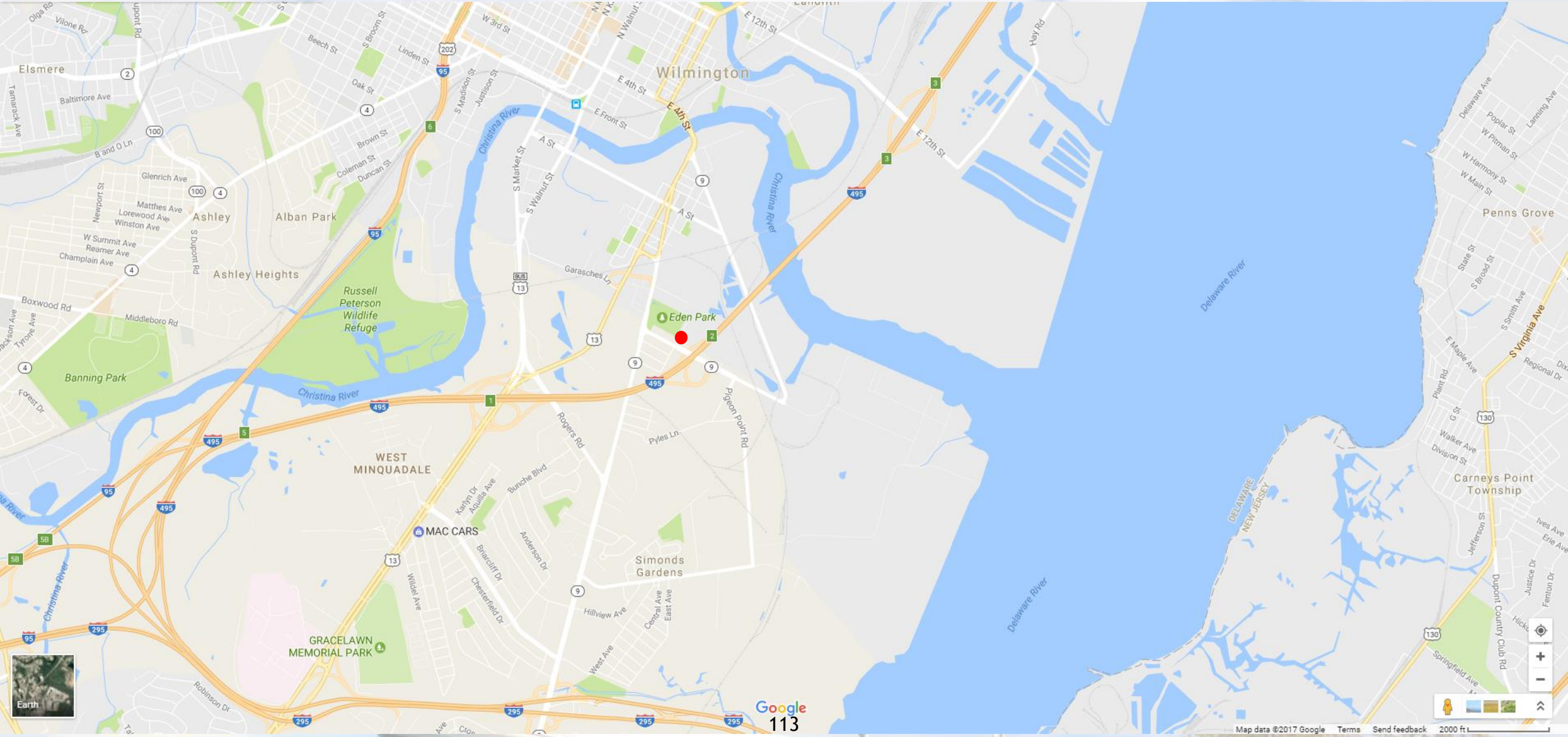


MMP Eden Park Study: Preliminary TSP Data

MMP 24 hour average Total Suspended Particulate (TSP) concentrations.
Delaware Primary and Secondary Standards shown.



MMP Eden Park Study: Map



MMP Eden Park Study: Summary

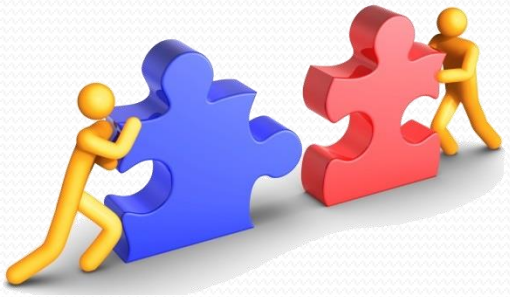
Data collection and evaluation is currently on going since September 2016

Preliminary data evaluation indicates the following:

- TSP levels have met or exceeded the State Secondary standard 5 times.
- Other criteria pollutant values are consistent with sites in urban environments and values are below their respective standards.

PM Advance

- A collaboration between EPA and state air quality agencies to reduce PM pollution
- Proactive program - helps states that meet the EPA PM standards continue to improve air quality
- Mission of Delaware PM Advance: Work together with communities and industry to reduce particulate matter emissions and protect public health and welfare
- Inform community groups about grant opportunities
- Focus on voluntary methods



Current PM Advance Projects

- Monitoring Particulate Matter in Eden Park Using the Moveable Monitoring Platform (MMP)
- DAQ's Participation in Route 9 Corridor Master Plan
- Diesel School Bus Replacement

Future Projects/Activities

- Use MMP to identify new areas where we can work with local communities to find solutions to particulate matter problems (after Eden Park study is completed)
- Develop web page for PM Advance Program – late March
- Seek public input on proposed PM Advance projects and activities – through website
- Diesel Emission Reduction Program

Contact Information

Renae Held

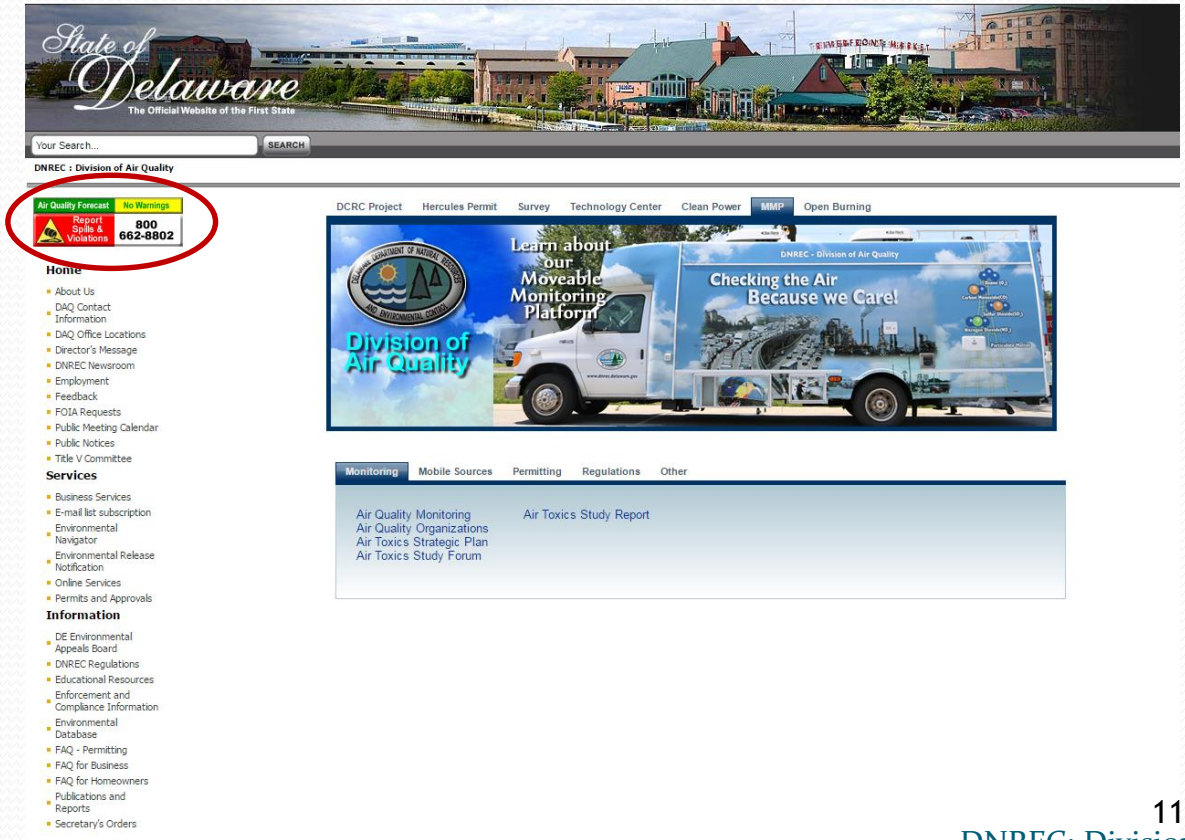
renae.held@state.de.us

302-739-9402

Complaints and More Information

Complaint line numbers:

Toll Free: 1-800-662-8802, Local: 1-302-739-9401, #367 for Verizon Wireless customers



Division of Air Quality Website:
http://www.dnrec.delaware.gov/Air/Pages/Default.aspx

APPENDIX D

SUMMARY OF THE INVOLVEMENT OF DNREC'S SITE INVESTIGATION AND RESTORATION SECTION AT THE HAMILTON PARK/PYLES LANE SITE

March 2018

Soil investigation and remediation efforts have been conducted in the Hamilton Park/Pyles Lane community for a number of years, and due to funding and logistical constraints, is being performed in phases. Beginning in 2002 and 2003, DNREC-SIRS launched a proactive effort to identify the former locations of historical tannery operations in the Wilmington area, as the tanning process involved the practice of applying a solution which contained high concentrations of arsenic to the animal hides, in order in order to remove the hair, resulting in high concentrations of arsenic remaining in the soil. On these former tannery properties, arsenic was detected in soils at concentrations upwards of multiple hundreds of parts per million, as compared to Delaware's default background standard of 11 parts per million. In response to the initial belief of the presence of a tannery facility pre-dating the Hamilton Park neighborhood property, between 2002 and 2003, DNREC's Site Investigation and Restoration Section (SIRS) collected soil samples on the properties in order to evaluate whether or not remedial actions were warranted to eliminate any direct contact risk to residents posed by exposure to soil contaminated by the historical operations. Shortly thereafter, it was discovered that an error was made in cross-referencing historical maps of the neighborhood with present-day maps, and there was no information to confirm that tannery operations had ever occurred within the Hamilton Park neighborhood. However, a deed search did reveal that there was a metal foundry business previously located on a large parcel in the rear of the neighborhood.

The analysis of the initial soil samples collected in the neighborhood did identify the presence of concentrations of arsenic in soil on some properties that were above the default background standard of 11 ppm, but they were not of the magnitude of the concentrations that had been found on the former tannery properties. The range of arsenic concentrations detected in the neighborhood during the initial round of sampling was between less than 1 ppm, to 81 ppm, with the highest concentrations discovered on the former metal foundry property.

Since the original sampling event, there have been hundreds of additional soil samples collected on the properties in the neighborhood. There have been detections of arsenic in soil around 100 ppm on a couple of properties directly adjacent to the former metal foundry property. In addition to arsenic, there have been elevated concentrations of other metals, namely lead, and also polycyclic aromatic hydrocarbons (or PAHs), also detected in soil. It is important to note that metals are naturally-occurring in soil, and were also a component of house paints back in the time when many of the neighborhood homes were originally constructed, and therefore, all detections may not be the result of a direct hazardous substance release into the soil. Also, PAHs are highly prevalent in the environment, especially in urban areas, due to their presence in asphalt and car exhaust, for example. The concentrations of metals and PAHs has varied widely

across the neighborhood; therefore, more intensive sampling is being performed on each property to delineate the portions which warrant remediation and those portions that do not.

The former metal foundry property, which was previously wooded, was purchased in 2007 by a private party interested in building a single-family house. The party contracted with an environmental consultant and worked with DNREC-SIRS to perform a comprehensive environmental investigation, during which soil and groundwater samples were collected. The results of the investigation indicated that a remedial action for soils was warranted to eliminate a direct contact exposure to the existing soils at the property by the residents. The selected remedial action was to install a soil cap, comprised of soils meeting residential (unrestricted) use standards, placed atop a marker fabric delineating the presence of contaminated soil beneath it. The soil cap was installed, and the home constructed on the property. DNREC-SIRS issued a Certification of Completion of Remedy (COCR) for the Site in 2009.

Since 2009, environmental investigations and remediation efforts conducted throughout the remainder of the neighborhood have revealed that some of the properties in the neighborhood have likely been filled to some extent with some of the waste products from the metal foundry operations, a practice which was commonly utilized pre-environmental regulation. While not present on a majority of the properties remediated to date, during DNREC-SIRS' remediation efforts, dark, gritty material and also solid material has been discovered on some properties beginning at around 1.5 feet below ground surface (bgs) and extending to as deep as 5 feet bgs. This material has been found to contain elevated concentrations of PAHs.

The general scope of the soil remediation taking place on the properties is the removal, and off-site disposal, of soil to varied extents within the top two feet bgs, and is based on the sampling results for each particular property. The excavations are then backfilled with soil meeting residential use requirements and the properties' landscaping features are restored to substantially similar conditions as existed prior to construction. To date, investigation and remediation has been completed on residences with a Hamilton Street address and a Pyles Lane address. Right now, the future phasing of the remaining work involves completing remediation efforts on North Street based on the soil sampling results obtained in 2016. Once the remediation is complete on North Street, DNREC-SIRS intends to perform investigation and remediation on the remaining South Street properties, followed by the remaining Center Street properties.

In addition to the former foundry property, the properties within the Hamilton Park neighborhood that have been remediated thus far are: 3 South Street, 5 South Street, 7 South Street, 8 South Street, 10 South Street, 7 Center Street, 16 Center Street, 20 Center Street, 100 Center Street, 102 Center Street, 103 Center Street, 3 North Street, 5 North Street, 8 North Street, 10 North Street, 14 North Street, 19 North Street, 22 North Street, 23 North Street, 8 Pyles Lane 10 Pyles Lane, 12 Pyles Lane, 22 (W.) Pyles Lane, 23 Pyles Lane, 41 Pyles Lane, 43 Pyles Lane, 47 Pyles Lane, 49 Pyles Lane, 53 Pyles Lane, 55 Pyles Lane, 57 Pyles Lane, 59 Pyles Lane, 63 Pyles Lane, 9 Hamilton Street, 102 Hamilton Street, 103 Hamilton Street, 105 Hamilton Street, and 107 Hamilton Street.

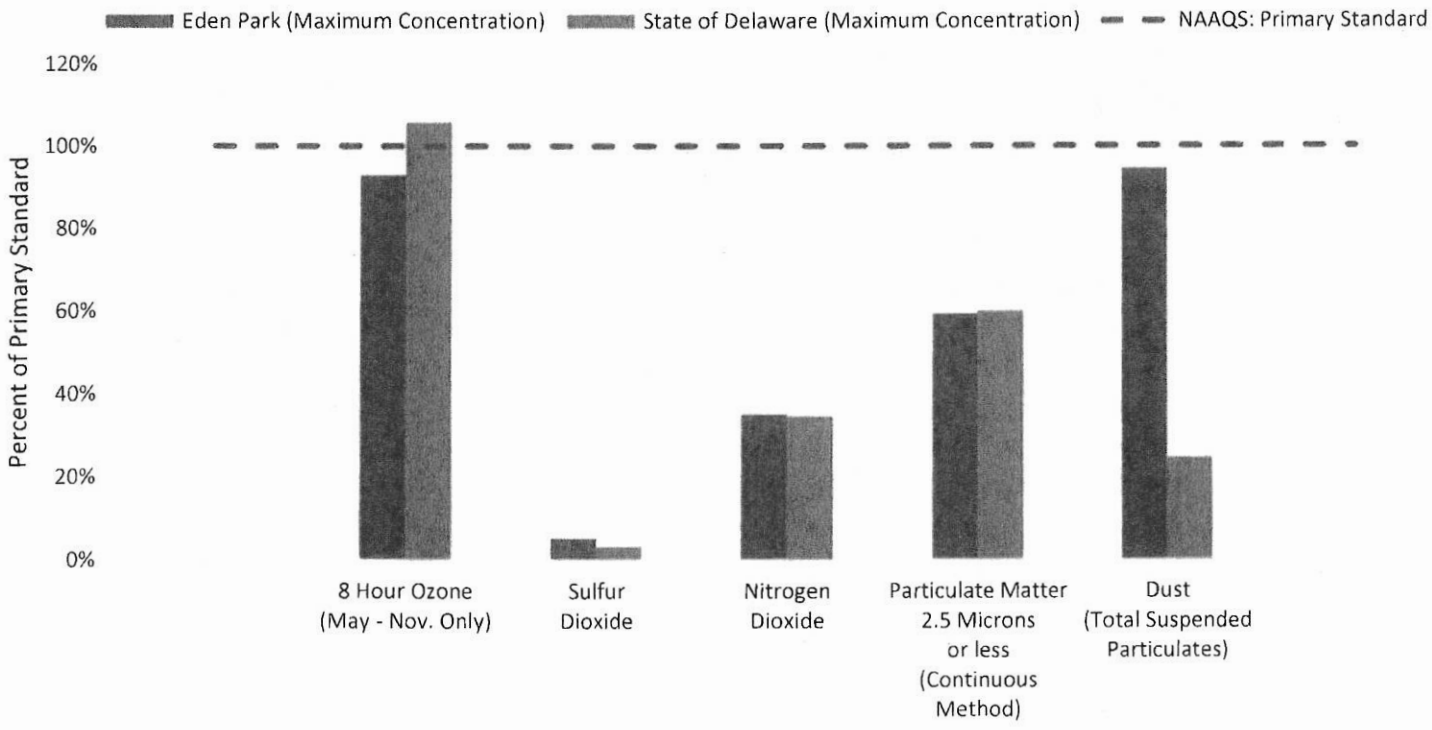
Eden Park Community Ambient Air Quality Study

Project Summary

In September of 2016, the Division of Air Quality deployed its Moveable Monitoring Platform (MMP) to address local air quality concerns in the community of Eden Park. Eden Park is located just outside the city limits of Wilmington along Route 9 and Terminal Avenue. The closest permanent monitoring site is the Division's most advanced air quality monitoring station located in Wilmington.

The community was primarily concerned with large airborne "dust" particles and their effects. Monitoring efforts with the MMP have concentrated on quantifying the "dust" referred to as Total Suspended Particulates (TSP). Air sampling results indicate significantly higher levels of TSP compared to the only other TSP sampler at the monitoring site in Wilmington. The state of Delaware maintains the older National Ambient Air Quality Standards (NAAQS) for TSP. So far 8 samples taken at the MMP have indicated concentrations that exceeded the secondary standard, which protects environmental and public welfare. Primary standards protect public health and no exceedance of the TSP primary standard has been recorded. Current NAAQS standards are based on smaller particle size classes of Particulate Matter (PM) 10 and 2.5 microns or less, to better protect public health. These smaller particle sizes were monitored at the MMP on a continuous basis and no exceedances of their primary standards have been recorded.

Data for all other pollutants monitored are comparable to data from the statewide monitoring network, particularly data from the nearby Wilmington site. No exceedances of the NAAQS standards have been recorded at the MMP for any other pollutants monitored. The chart below compares highest pollutant concentrations monitored at the MMP from October 2016 through November 2017 compared to the highest concentrations recorded at other state sites as they relate to their individual primary standards. Statewide, only Ozone continues to exceed its primary standard. Monitoring at Eden Park is on-going.



APPENDIX E

Themes from Exploratory Field Research at Health Hook Up Fair
June 27, 2017

Background

Melissa Archer and Victor Perez, from the University of Delaware, performed exploratory research to determine common themes of environmental pollution concerns from local Rt. 9 residents who attended the Health Hook Up fair on June 27, 2017. This event, held in front of the Bowlerama on New Castle Ave., drew people from a variety of communities in the local area. Additionally, Archer and Perez also asked individuals that attended how interested they were in the Division of Air Quality's (DAQ) mobile air testing unit's presence in the area, its testing/sampling of air quality, and the results of the testing.

By situating themselves with the Wilmapco and the DAQ exhibitor tables, as well as talking to a few individuals sitting elsewhere at the event, Archer and Perez were able to identify some general concerns from the individuals that they spoke to. The survey questions that they asked were recorded by Archer and Perez themselves on handheld clipboards and paper surveys, and took no (nor asked for) identifying information from individuals (i.e., all data are completely anonymous). Additionally, even if a respondent provided some information about the community they resided in, this information was redacted from the survey.

Each survey was built using topics from the research of Cohen and colleagues (2012).[1] In short, Cohen and colleagues (2012) performed a health and environmental concerns survey in Richmond, CA, and Archer and Perez created 4 questions that were based on that general research approach. The questions were used as a loose guide to direct data collection, as some respondents may or may not have had environmental concerns. However, given the history of the area and a significant amount of outreach work done by Wilmapco while developing their Rt. 9 Corridor Plan, we were confident many residents would have environmental pollution concerns and experiences. The questions that we asked included:

- Generally, are you concerned about any environmental pollution in the area, and, if so, what?
- What are your experiences to make you concerned?
- What do you think the sources of pollution are?
- What would you like done about the sources of pollution?
- How interested are you in the DAQ mobile unit's presence in the area, its testing/sampling approach, and the results of the testing?

General themes we identified are presented here. Archer and Perez separately examined the results and summarized the findings, while Perez collated Archer and Perez's individual effort for this brief report. Please note that this exploratory research survey was completely anonymous, and is not intended as research evidence for dissemination or to contribute to a wider body of knowledge, nor can it be generalized to any specific population. The sample consisted of only 25 persons and is not intended to represent any single community or the larger

[1] Cohen, Alison, Andrea Lopez, Nile Malloy, and Rachel Morello-Frosch. 2012. "Our Environment, Our Health: A Community-Based Participatory Environmental Health Survey in Richmond, California." *Health Education & Behavior* 39(2):198-209.

population in the area. The purpose was to help generate some preliminary information to build more specific research instruments for use along Rt. 9 and in specific communities in the future.

Summarized Findings

General Concern for Environmental Pollution

- Most respondents (24) expressed concern for environmental pollution (broadly defined)
- Air quality; ground/soil quality
- Dust and dust toxicity
- Odor
- Trash/litter
- Chemicals
- Cancer
- Arsenic in soil; combustible chemicals in soil; lead in soil
- Close to landfill
- Water pollution
- Concerns for children playing in areas with waste and dumped materials

Experiences with Environmental Pollution

- Dust on clothing and cars; dust blowing across street from Diamond Materials
    - Cars covered in dust again after cleaning the next day, even within a few hours
- Trash and garbage in yards and streets
- Cars and traffic along major routes
- Odors (smells) from gases in the air
- Bronchitis; asthma; sinusitis/sinus; itchy eyes; lungs
    - Made worse by cumulative irritants including pollution and other seasonal allergies
- Some people stay in their house to avoid air pollution
- Can't dig due to combustible soil
- Unable to enjoy nature (can't swim in Brandywine); quality of life considerably diminished
- Can't hang clothes outside to dry (odor taints clothing)

Sources of Environmental Pollution

- Facilities in the area
    - Recycling center
    - Edgewood Plant
    - Diamond Materials
    - Industrial plants
- Marine Terminal 5
- Development/buildings and other things being built in the area
- Residents dumping trash and littering (and no fines for trash)
- Cars; diesel truck emissions
- Delaware City air pollution traveling to area

Interventions to Address Environmental Pollution

- "What can we do" (normalization of environmental pollution)
- Area could be cleaner; seems "out of control"
- Fewer cars
- People need money to pay for waste removal
- Not always sure what to do; want to learn more on what can be done
- Enforce clean air laws; more regulations on industry
    - Tried getting plant (i.e., Diamond Materials) closed and a barrier for dust but was not successful; cover dirt and other materials to prevent from blowing
    - Spraying materials piles only to have it dry out and blow into community
    - It shouldn't be in a residential community
- Move the Trinity Trucking Facility
- Some residents want to move; one owns home and wants to pass it on to family, but concerned now with the environmental issues
- DNREC has done some cleanup in individual yards

Interest in Mobile Unit, Testing, and Results

- Most respondents (20) expressed interest in the unit and the testing results
    - Only a few (5) expressed little interest
- Mobile unit important; move to locations where there is dust
- Residents (or people in general?) can only do so much, so more testing needed
- Can truck move around regularly?
- Mobile unit is coming in late, after many years of dealing with these issues
- Pamphlets to disseminate information in the community, but email and mail were most frequent responses; some get alerts; some said telephone; some said website

<u>General Themes</u>

In all, most people didn't spend a great deal of time talking to us, but several were very emphatic about the issues and sharing their experiences. This is common in communities with environmental justice issues, as the experiences of many residents with environmental pollution become normalized, with a handful of residents becoming charismatic leaders of community movements or at least more civically engaged to address the issues. Getting more community members involved and maintaining that involvement is a challenge, but the DAQ can try to increase community engagement through a continued presence in the community and outreach, as well as making a strong effort to disseminate results from the mobile unit to all members of the community whenever they are available. This will not only strengthen the relationship between the state and the community members, but enhance the authenticity of the efforts by the DAQ to help improve the community's quality of life and the health of the residents.

In general, people believe they live in an area with environmental hazards of various types, and that these hazards impact their quality of life, health, and the lives of their fellow residents and children. The DAQ should spend considerable time studying residents' shared experiences because this will help to reveal how the different communities come to collectively construct their understanding of their environmental risks. Many of the embodied experiences of residents show that they must incorporate and adapt to local environmental hazards in their routine lives, including hanging clothes to dry, staying inside, and cleaning their cars.

Some respondents expressed the belief that things are getting worse, but also that they have had these burdens for quite some time. A general theme to help address these issues involved stricter regulations and enforcement of environmental laws on the industries they understand as the major sources of pollution, in addition to somehow lessening the burden of traffic in the area, which causes air quality and noise pollution issues. Thus, working with community members to better understand their beliefs about exposure pathways and the dosage of pollution that they experience can help bring both parties (i.e., community members and local, city, and state officials) to a more similar understanding, which can lead to practical mitigation strategies.

Lastly, two major components of any community health/environmental health assessment include a thorough and detailed understanding of community cohesion, combined with a solid grasp of *recreancy.*[2] Lynn (2017) defines recreancy as "[arising] when it is believed that institutional actors (including public sector agencies and their employees) are not carrying out their responsibilities at a level commensurate with the level of societal trust the institutional actors possess" (pp.321-322). During our brief field survey, most people did not take the opportunity to discuss how they felt about living in the community in positive ways, nor did they directly discuss collective efficacy to address these problems in positive ways. Though our questions were framed from a "concerns" perspective, our impression from this work is that the community cohesion and collective efficacy to address environmental burdens is weak, though we have heard anecdotal evidence in other settings that this has partly to do with a lack of outreach about these issues. We strongly encourage the DAQ to look deeply into how community ties and community cohesion impact resident beliefs about the possibilities to address air quality and other environmental issues in the area. Furthermore, we would also encourage the DAQ to enhance the level of faith the community has for it to work on their behalf, as some residents expressed the belief that only now are state agencies beginning to address these issues, even though the various communities' experiences have been known about for some time.

[2] Lynn, Kevin. 2017. Rising Recreancy: Flood Control and Community Relocation in Houston, TX, from an Environmental Justice Perspective." *Local Environment* 22(3):321-334.