The East Bay Greenway Health Impact Assessment

September 10, 2007

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Prepared For:
Urban Ecology

Funded By:
The California Endowment

Executive Summary

Health Impact Assessment (HIA) was applied to the East Bay Greenway Project proposed by Urban Ecology. HIA is an emerging discipline that evaluates the impact of specific policies and projects on health, where health is defined broadly as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The HIA process typically includes the steps of Screening, Scoping, Analysis, Reporting, and Monitoring. This report describes the process used in these steps and the results of this HIA.

Project Description and Scope of HIA

The Greenway project proposes to build twelve miles of walking and biking paths under the elevated BART tracks between Oakland and Hayward. The residents of the communities that this project would serve are of low socio-economic status, are mostly minority, and have high rates of chronic diseases such as diabetes and obesity. In this HIA, we analyzed the potential health impacts of the proposed Greenway in the areas of physical activity, social cohesion, greening the landscape, and reducing motor vehicle use and we investigated the main potential barrier to use – safety concerns.

Potential Health Benefits of the East Bay Greenway

Primary benefit: Increased physical activity

Physical activity plays a vital role in maintaining health, preventing disease, improving mental health, and in increasing lifespan. This fact is well established, yet many people do not get enough exercise. Lack of pedestrian- and bicycle-friendly streets and trails is recognized as one of the leading systemic causes for failure to achieve minimum recommended amounts of physical activity in urban environments in the United States. The communities the Greenway will serve lack sufficient parks and trails and therefore there is potential that building the Greenway will lead to more people being more active and to associated positive health outcomes.

Secondary benefits: Social connection, more natural greenspace, reduced car use

- Creation of a local outdoor space where residents of a community can get to know one another and socialize by exercising together, exercising regularly at similar times, or sitting together outside. Parks are places that can increase social cohesion. Studies have shown that social interactions can increase lifespan, improve mental health, and reduce crime and its associated health outcomes.
- Creation of additional landscaped "green" space in the urban environment. Proximity to and views of pleasant landscaping can reduce stress and speed recovery from illness and can promote environmental stewardship. Proper design, maintenance and budgeting are necessary components for an open space that is and remains pleasant to be in and to view. These factors will therefore determine the extent to which the Greenway has this positive impact.
- Reduced motor vehicle use, as people may choose to walk or bike instead of drive. This could have several positive health impacts related to improving air quality, reducing noise, and reducing motor vehicle related accidents. Having trails can promote walking and biking to neighborhood destinations such as stores, schools, churches and friends. Having alternatives to large, busy roads may achieve this.

Barriers to realizing health benefits

Simply building the additional trails may not result in the desired increase in physical activity. Potential barriers to use include safety concerns, excessive noise (e.g., from BART), poor air quality, and/or lack of: maintenance, convenient access, awareness, programming, necessary amenities, or connectivity to other destinations or trails. Additionally, none of the secondary benefits described are foregone conclusions. Open space can also invite undesirable activities, such as drug dealing and use, which may lead to feelings of fear and to stress and can therefore lead to increased social isolation. If the Greenway landscaping is not maintained, the space could return to its current state which, in places, can be described as blight. Finally, the extent to which a transportation mode shift occurs depends on many factors including the connectivity of the new Greenway to existing walking/biking routes and desired destinations, awareness of the existence of the Greenway, and safety/perceived safety of the Greenway. Overcoming these barriers is possible and a number of potential mitigations involving both design and programming of the space are proposed in this report.

Perhaps most importantly, if the Greenway is unsafe or is perceived to be unsafe, people may not use it and the potential health benefits will not be realized. Moreover, if the Greenway is unsafe, it could have negative health consequences including increased physical injury as a result of vehicle related accidents and violent crime, increased fear, stress, isolation and mental health issues as a result of crime, and decreased physical activity as a result of fear of violence. Pedestrian and bicycle safety and violent crime data near the Greenway are examined. It is imperative that the plan for the Greenway address safety concerns. Numerous potential mitigations to these concerns are proposed.

Conclusion

Through the HIA process, the potential positive health impacts of the East Bay Greenway and potential barriers to achieving these benefits were identified. The Greenway project presents an opportunity in land use that could be very beneficial to the health of residents who live near the route. The potential to increase physical activity, build social cohesion, encourage people to drive less, and create a landscaped, natural space all could lead to improved health outcomes. These positive health impacts include but are not limited to:

- reducing overweight, obesity, and diabetes;
- improving mental health;
- reducing cardiovascular disease;
- reducing pedestrian and bicycle related injuries;
- reducing osteoporosis;
- lengthening lifespan.

As detailed in this report, there are many ways in which the likelihood of these positive health outcomes can be increased through optimal design and programming. The main obstacle to achieving these positive health outcomes center on safety. Safety issues would deter use and be an impediment to achieving the positive health outcomes described. However, with proper attention to safety issues in the design and programming of the Greenway, these potential obstacles can be avoided.

The East Bay Greenway Health Impact Assessment

Introduction

Health Impact Assessment (HIA) is an emerging discipline that evaluates the impact of specific policies and projects on health, where health is defined broadly as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. HIA analyses can inform decision makers and planners as they make choices for the communities in which they work. Many countries are using HIA to develop public policy and land use projects in such ways that they can promote health and thereby improve quality of life and reduce healthcare costs. In several places across the United States, health officials, planners, academics, developers, and non-profit organizations have also begun using these methods and tools to promote changes to the built environment that improve health and reduce health inequities.

HIA was applied to the East Bay Greenway Project ("the Greenway") proposed by Urban Ecology. Urban Ecology is proposing to build roughly twelve miles of pedestrian and biking trail, potentially with other amenities, under the elevated Bay Area Rapid Transit (BART) tracks from East Oakland, through San Leandro, through the unincorporated areas of Ashland and Cherryland, to Hayward. This corridor has been neglected and is currently both dangerous and uninviting, containing no open space or landscaping. It is hoped that the Greenway could become a route used by residents to get to jobs, schools and homes, and a destination for recreational opportunities. The route passes through diverse communities; several are poor communities of color that lack access to good recreational facilities and have disparately high rates of diseases like diabetes, obesity and asthma. A more complete description of the project by Urban Ecology can be found in Appendix A.

This report describes the application of HIA to the Greenway project. First, the context for the project is described. Next, the various steps for conducting an HIA – screening, scoping, analysis and recommendations are detailed. Outputs of the HIA are then given, and finally, findings of the HIA are summarized in the conclusion.

Background

The fact that physical activity plays a vital role in maintaining health and preventing disease, in improving mental health, and in increasing lifespan, is well established. Still, over half of adults and over one third of high school students do not get as much exercise as the Surgeon General recommends. While individuals must take some responsibility for this, there are important systemic causes that must be confronted as well. Lack of pedestrian- and bicycle-friendly streets and trails is now recognized as one of the leading systemic causes for failure to achieve minimum amounts of physical activity in urban environments in the United States.

The absence of walkable and bikable streets and trails leads to several health-related consequences which are summarized here and discussed in more detail below. Motor vehicles are used more, even for short trips. Lack of physical activity results in shortened

lifespan; an increased incidence of diabetes, high blood pressure, and colon cancer; an inability to control weight; impairment of mobility in the elderly; and lack of physical activity increases feelings of depression and anxiety and hinders psychological well-being. Additionally, more driving leads to more vehicle-related accidents that injure or kill pedestrians, bicyclists, and car drivers and passengers. Driving also contributes to other vehicle-related issues including air pollution, noise pollution, and global warming, all of which have health consequences. The presence of pedestrian and bicycle friendly streets and trails has been shown to improve health outcomes.

The systemic causes of the absence of walkable and bikable streets and trails are many and are complex. There is a lack of comprehensive urban planning and/or a lack of enforcement of plans, regulations, and guidelines as a result of lack of funding or political will. Limitations with the Environmental Impact Assessment (EIA) process exist with respect to its ability to promote walking and biking and discourage driving. There is an unwillingness to ensure that developers pay their fair share to build and maintain urban infrastructure. Also, public safety issues often arise from a lack of economic and other types of opportunity. Finally, there is a shortage of government funding to maintain existing infrastructure.

Many of these issues can be addressed through better public policy. Several US cities were planned with appropriate trails and parks, including New York City. Several urban pedestrian and bicycle friendly street and trail projects have been completed recently or are underway, including:

- The Highline Project, which is reusing 1.5 miles of inactive elevated railway in Manhattan by redeveloping it into public open space[1];
- The Evergreen Cemetery Jogging Path in Boyle Heights California, built when neighborhood residents came together to advocate for the improvement of sidewalks around a cemetery that the were using because there were no parks available[2];
- The Atlanta Beltline, which involves the conversion of a 22-mile loop of railroad that encircles downtown and midtown Atlanta, to increase greenspace, improve transit, connect neighborhoods and foster livable communities[3]; and
- The Emerald Necklace Park Network, a vision for a 17 mile loop of parks and greenways connecting 10 cities and nearly 500,000 residents along 2 rivers in Los Angeles[4].

The populations living in the communities that the Greenway would cross are diverse; Table 1 shows some statistics regarding the economic and racial diversity and has statistics for Alameda County overall as a comparison. Table 2 shows relevant health-related statistics in these communities and Alameda County. Different communities have different health issues, but rates of overweight and diabetes are relatively high in many of them.

It is important to note that land use around the proposed Greenway varies. Some sections run through dense urban residential settings, some through less dense residential areas, and some through industrial districts. Some sections pass near schools, while others pass

Table 1: Some statistics about economic status and race in the communities through which the Greenway will cross. (source: Community Assessment, Planning and Education (CAPE), Alameda County Public Health Department (ACPHD) (2007))

	Lower San Antonio	Fruitvale	East Oakland	San Leandro	Ashland	Cherry-land	Hayward	Alameda County
% poverty	27.7	22.6	25.5	6.4	14.3	12.3	10	11
Median household income ($)	32,035	43,023	41,204	51,081	54,919	42,880	51,177	55,946
% with High School or more education	52.6	55.6	57.0	80.9	72.8	66.7	75.1	82.4
% unemployment	9.9	12.1	13.9	5.2	6.1	9.0	6.3	5.5
% families with children with single mothers	17.5	30.6	36.1	20.1	33.1	20.1	19.6	20.4
% Latino	36.5	45.6	38.5	20.1	32.5	41.7	34.2	19.0
% African American	18.3	21.2	49.7	9.6	19.6	9.5	10.6	14.6
% White	7.3	8.2	3.7	42.3	26.9	35.7	29.2	40.9
% American Indian	0.2	0.6	0.3	0.5	0.8	0.4	0.4	0.4
% Asian & Pacific Islander	34.2	21.4	5.6	23.5	15.7	9.2	20.5	20.9
% Other	0.3	0.2	0.2	0.2	0.3	0.2	0.5	0.3
% Multi-race	3.3	2.7	2.1	3.8	4.4	3.3	4.6	3.9

near commercial districts. Some sections run parallel to railroad tracks that are very infrequently used and other sections run parallel to major roadways.

The Health Impact Assessment Process

The HIA process typically includes the steps of Screening, Scoping, Analysis, Reporting, and Monitoring.

- *Screening* involves deciding whether or not to conduct a HIA on a particular project.
- *Scoping* is when people involved in the HIA – public health officials, community members, planners, etc. – decide what to analyze (e.g., which health impacts) and how (which methods to employ).
- *Analysis* of impacts uses existing data and qualitative and quantitative research to estimate the magnitude and direction of potential effects on health status or determinants of health status.
- *Reporting* can take the form of a written report or public testimony.
- *Monitoring* describes the process of examining the impact of HIA on decision making and the actual effects of the policy decision on health determinants and health status.

Table 2: Health statistics in the communities through which the Greenway will cross. All rates are per 100,000. (source: CAPE, ACPHD (2007))

	Lower San Antonio	Fruitvale	East Oakland	San Leandro	Ashland	Cherry-land	Hayward	Alameda County
All cause mortality rate	772	874	1,133	717	736	1,043	767	703
Percent overweight children	NA	NA	NA	37.2	NA	NA	45.3	30.5
Diabetes mortality rate	33.9	41.4	40.3	20.0	NA	40.2	30.4	21.6
Asthma hospitalization rate	175	248	363	147	NA	NA	186	157
Heart Disease mortality rate	189	188	248	144	148	199	167	147
Depression hospitalization rate	119	170	190	171	NA	NA	182	169
Unintentional injury mortality rate	33.8	34.2	43.0	24.2	35.5	33.0	27.7	24.5
% Low birth weight baby	6.7	6.0	7.7	6.9	7.0	6.2	6.8	7.1

Within this general framework, the practice of HIA can vary greatly with regards to the breadth of issues analyzed, research methods employed, relationship of HIA to regulatory EIA, role of policy makers, stakeholders and the public in the analysis, and ways the assessment is used to influence policy. This report covers the steps of Screening, Scoping, Analysis and Reporting.

Health Impact Assessment: Screening

The objective of screening is to determine the relevance and value of an HIA in a particular context. Typical issues analyzed during screening include an estimate of the magnitude of the health impacts, timing of the project, availability of data, feasibility of successful completion of the project, and likelihood that the HIA can impact the project positively.

This HIA was solicited by the proponent of the Greenway, Urban Ecology, a non-profit that uses urban design, land use planning, and policy reform to help communities plan and build neighborhoods that are ecologically healthy, socially just, and economically fair. By providing a walking and biking trail, UE judged that the Greenway project could be a step toward addressing one of the systemic causes of the disproportionately high rates of diseases, like diabetes and obesity, in these communities. The HIA project was proposed when the concept of the Greenway had been developed, but prior to the finalization of many of the project details. The Alameda County Public Health

Department already had much of the data needed for the project available and it was believed that additional data could be obtained as needed. If the Greenway plan could address the needs and concerns of local residents, the chances that the final product will serve its purpose and lead to improved health outcomes will be greatly increased. This project was chosen for a Health Impact Assessment in order to highlight the potential positive impacts the Greenway could have on health, but, equally importantly, to uncover and suggest mitigations for potential barriers that would hinder the project from reaching its full positive health impact. UE also felt that the HIA would be complimentary to the EIR required under state law for this project.

Health Impact Assessment: Scoping

The objectives of the scoping phase were to delineate:

- how the Greenway might positively or negatively impact determinants of health;
- what questions must be answered to fully assess those impacts;
- what potential mitigations to the negative impacts might be; and
- what studies could be carried out to answer the questions;

and to prioritize the impacts on health determinants for further study.

Urban Ecology recruited Human Impact Partners as a consultant to conduct the HIA and successfully sought funding from The California Endowment for this effort. HIP outlined a process consistent with time and funding constraints to focus the scope and activities of the HIA. For scoping, this process involved developing and using two frameworks for collecting input from various stakeholders.

First, a scoping worksheet was prepared to gather input, ideas and feedback from Public Health officials in Alameda County, Public Health officials from other parts of the country involved in similar types of projects, city planners and elected officials. From this process 15 community health determinants (see Table 3) were identified for examination. Relevant information about the Greenway was recorded for each health determinant and then candidate questions for further research, candidate mitigations and design, and research tasks and methods were listed. HIP staff drafted the document and then solicited input on the document via email, phone calls and meetings from: Phil Olmstead and Katherine Melcher (Urban Ecology), Kimi Watins-Tart, Mark Woo and Alex Desautels (Alameda County Department of Public Health), Lucy Wicks (the office of Alameda County Supervisor Nate Miley), Jason Patton (City of Oakland Community and Economic Development Agency), Andy Dannenberg and Candace Rutt (Centers for Disease Control), and Dior Hildebrand (Los Angeles Department of Health Services).

Many interesting questions, ideas, recommendations and strategies were brought forward in this process (see Appendix B for the full document). Some of these were:

- Increased physical activity is the main positive health impact of the project, but increased social interaction and reduced motor vehicle use (i.e., reduced air and noise pollution and reduced traffic-related injuries) would also have positive health impacts;

Table 3: The community health determinants included in the HIA scoping process.

- Housing: adequate shelter; affordability; physical hazards; displacement/ dislocation; disinvestment/ blight
- Air Quality: pollutants in outdoor air and indoor air; environmental tobacco smoke
- Noise: environmental; occupational
- Safety: violent crime; property crime; fire hazards; traffic hazards; (lighting?)
- Social Networks: contact with and support from friends and family
- Nutrition: food costs; food quality; food safety; proximity of food resources
- Parks and Natural Space: park quality; park services; park access
- Private Goods and Services: quality and proximity of financial institutions; childcare services; health services
- Public Services: quality and proximity of health services
- Transportation: access to jobs, goods, services and educational resources; non-motorized travel; vehicle miles
- Social Equity: proportion of the population living in relative poverty; attitudes towards/ stereotypes of minority racial, social and ethnic groups; segregation of residences
- Livelihood: security of employment; wages and income; benefits and leave; job hazards; job autonomy; economic diversity
- Water Quality: contaminants in drinking water; infectious agents in drinking water; recreational water quality
- Education: school quality; school proximity
- Democratic process: degree and quality of participation in public decision making; government accountability

- Pedestrian safety and safety from crime are the largest potential barriers to the Greenway successfully improving health outcomes. A safety plan is a necessary component of the planning process;
- The Greenway should be designed with amenities and activities that are desired by the community and that serve the populations that might use it (e.g., universal design principles to allow access for all); community input from a variety of perspectives (e.g., parents with strollers) into the amenities is important;
- Ensuring that the Greenway is connected to other paths (e.g., bike routes) and to destinations (e.g., schools) is important for its use, as is ensuring good access to it;
- Ensuring that the project helps the underserved communities through which it runs, for example by correcting inequitable distribution of parks, is vital.

The second scoping exercise took the form of a community meeting focused on the health impacts of the Greenway. Twelve residents of the communities through which the project would run participated. In that meeting, some of the connections between the Greenway and Health were introduced and the discussion focused on elaborating on those connections and others of interest to the community, on barriers to achieving the potential positive impacts, and on requirements for people to use the Greenway. Pathway diagrams similar to those shown in Figures 1 through 4 were used to prompt the discussion. A complete description of the meeting is included in Appendix C.

Much of the discussion with residents focused on the barrier that safety concerns – mainly safe road crossings but also crime safety – would present. Residents also weighed in on potential mitigations to these concerns. Community members discussed ways to increase physical activity as part of the project and considered this to be an important health-related outcome. The potential of the Greenway to reduce motorized vehicle trips was discussed, but participants raised questions as to whether this would be an outcome in reality, as people might drive to the Greenway and some areas near the Greenway contain few destinations to which residents would *want* to walk. The role the project could play in building social cohesion was met with some skepticism, but nonetheless design concepts to enhance this possibility were raised. In addition, participants confirmed that health benefits of living near green environments could be an important impact of the project.

As a result of the scoping work described here, a decision was made to focus the assessment on the four potential positive impacts – increased physical activity, greening of the landscape, reduced motor vehicle use, and increased social cohesion – and the main barrier to use – safety.

Health Impact Assessment: Analysis

The Analysis phase of the HIA was carried out by generating diagrams of the causal pathways, i.e., the pathways that would connect new trails to health outcomes, based on relationships known from the literature. The proposed Greenway plan was then evaluated as to how it might interact/influence with those pathways qualitatively. Finally, recommendations for design and for mitigations were developed based on this evaluation. Analysis of the Greenway's potential effects on physical activity, greening of the landscape, motorized vehicle use, and social cohesion as well as on the barrier that safety presents are summarized here with evidence from the literature and recommendations regarding potential mitigations/enhancements.

Physical Activity and the East Bay Greenway

The Greenway is being proposed in order to increase the amount of open space available to residents and to increase walking and bicycling on the part of residents, with the primary goal of increasing physical activity. An increase in physical activity has been associated with many positive health outcomes that include preventing disease, improving mental health, and prolonging life. Figure 1 depicts some of these established relationships.

Table 4 contains information about the parks available to the residents near the proposed Greenway, as compared to a national standard. This data shows clearly that the communities that are near the Greenway have fewer parks. The neighborhoods through which the proposed East Bay Greenway runs lack sufficient access to trails and parks. While the National Recreation and Park Association's Standard of Excellence recommends having more than 6 acres of parks per 1000 people and the City of Oakland

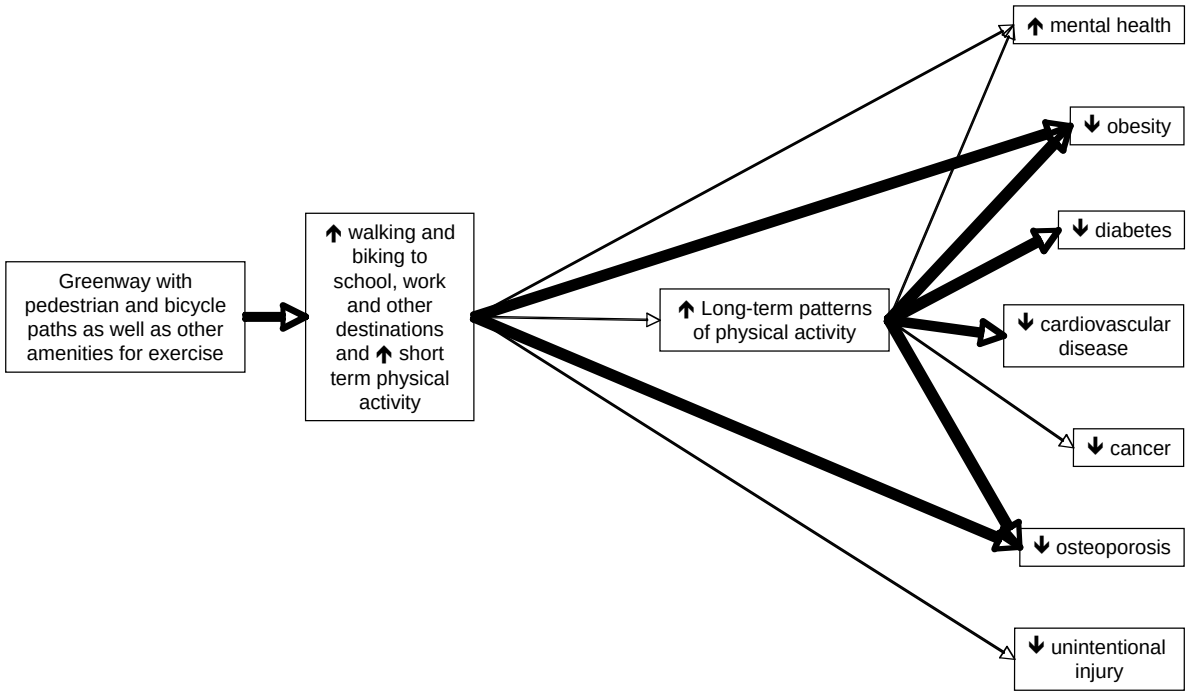

Figure 1: The health pathways connecting the proposed East Bay Greenway with improved health that are associated with increased physical activity. Connections in bold are those best documented.

recommends at least 4 acres per 1000 residents, the areas around the Greenway have between 0.6 (Fruitvale and Ashland) and 2.1 (Elmhurst) acres per 1000 people.

While this data shows that there is a clear need for additional open space and parks in the communities near the Greenway, simply building the additional trails may not result in the desired increase in physical activity. The design and programming of the space will greatly influence its use. Barriers to its use include safety concerns (see below), excessive noise (e.g., from BART), poor air quality, and/or lack of maintenance, convenient access, awareness, programming, necessary amenities, or connectivity to other destinations or trails.

Below, the health evidence base is reviewed briefly and strategies for maximizing the potential of the Greenway with regard to physical activity are suggested.

Physical Activity: Health Evidence Base

In 1996 the U.S. Surgeon General concluded that regular physical activity improves health. The Surgeon General's report [5] found that exercise prolongs life and prevents diabetes, high blood pressure, and colon cancer; that exercise controls weight, improves mobility in the elderly, and prevents falls; and that exercise reduces feelings of depression and anxiety and promotes psychological well-being.

Table 4: Park distribution in Alameda County. (Source: CAPE, ACPHD (2007))

Community	**Acres of Park / 1000 People**
San Antonio	0.8
Fruitvale	0.6
Central East Oakland	0.9
Elmhurst	2.1
San Leandro	1.3
Ashland	0.6
Cherryland	0.9
Hayward	2.0
Oakland	5.4
National Recreation and Park Association's Standard of Excellence	>6.0

The Center for Disease Control (CDC) recommends that adults should either engage in moderate exercise (e.g., walking briskly) for at least 30 minutes 5 days a week or in vigorous exercise (e.g., jogging) for at least 20 minutes 3 days a week. Children should get some combination of moderate and vigorous exercise for at least one hour a day. Nationally, about 30% of physically active people report exercising in public parks[6]. In a study about Los Angeles, active people who live within two miles of a park are more likely to exercise in the parks (34%) than at home (21%), at private clubs (6%), or at other locations (4%), although many people (35%) reported exercising in more than one location[7]. Most (81%) users of a park live within 1 mile of it. People living within one mile of the park were four times as likely to visit the park once per week or more[7].

Several studies have found that trail users have more than a 50% increased chance of meeting the CDC recommendations for exercise describe above[8, 9]. Additionally, adding biking paths increases the number of people who ride. In San Francisco, the number of cyclists increased dramatically after bike lanes were added or lanes were widened along several streets. For example there was a 144% increase on Valencia Street and a 259% increase on Fell Street [10]. Supervised activities and more amenities (e.g., lighting or playgrounds) increase park use. Basketball courts and baseball fields are used only 5% of the time unless there are supervised games. When there are, use increases to about 35% and 70%, respectively[7].

Physical Activity: Strategies for Maximizing the Potential

The construction of a Greenway, by itself, may improve the exercise opportunities of local residents, many of whom are people of color with low incomes. However, the design of the project and other factors will influence the degree to which it is successful in doing so. Some of the potential barriers to use are listed above. Some potential ways to increase the amount of physical activity people get on the Greenway include:

- Ensuring that people feel safe getting to and from the Greenway and on it (see Safety section below);
- Ensuring that noise is not a deterrent to use;
- Designing physical activity amenities likely to be used by local population and not available elsewhere;
- Programming structured activities for the Greenway to draw low income and at risk groups, such as coordinated bike rides or walks;
- Separating biking and walking paths;
- Designing the Greenway to minimize maintenance costs, for example by using native plants;
- Including educational outreach at schools, churches, and senior centers after Greenway is complete that includes information on the benefits of physical activity and on proper use (e.g., biking rules);
- Using universal design principles to allow access for all;
- Including water fountains, bike racks, shade areas, and 1/4 mile markers;
- Surveying walkers, runners, bicyclists, children on tricycles, skateboarders, rollerbladers, elderly in wheelchairs, parents with strollers, dog walkers and any other potential users of the park as to their needs and desires.

Social Cohesion and the East Bay Greenway

One of the secondary positive benefits of creating the Greenway could be the creation of a local outdoor space where neighbors and residents of the same community can get to know one another and socialize by exercising together, by exercising regularly at similar times, or by sitting together outside. Studies have shown that social networking and interactions can increase lifespan, improve mental health, and reduce crime and its associated health outcomes. Figure 2 depicts these relationships.

Parks are known to be places that can increase social cohesion (see below) and, conversely, the dearth of parks in the neighborhoods near the Greenway may be leading to social isolation. Therefore, there is the potential that the building the Greenway will

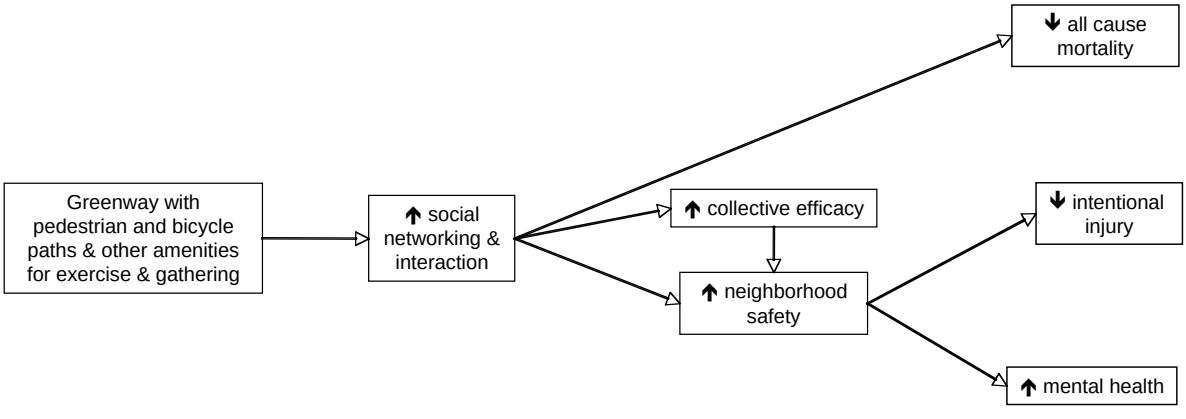

Figure 2: The health pathways connecting the proposed East Bay Greenway with improved health that are associated with increased social cohesion.

promote social cohesion. Proper design and programming can increase the likelihood of this. Anecdotal evidence suggests that the nearby Greenway after which this project is modeled – the Ohlone Greenway that runs from Berkeley to Richmond – does increase cohesion.

However, increased social cohesion is not a foregone conclusion. Open space can also invite undesirable activities, such as drug dealing and use, which may lead to feelings of fear and to stress and can therefore lead to increased social isolation. The northern part of the Greenway passes through a neighborhood that recently closed a park due to crime and fear of crime. Still, it is important to note that some of the residents of even this neighborhood remain optimistic about the potential of the Greenway to promote cohesion and pride in the neighborhood.

Below, the evidence base is reviewed briefly and strategies for maximizing the potential of the Greenway to create social cohesion are suggested.

Social Cohesion: Health Evidence Base

Parks can result in increased social cohesion and collective efficacy, which is a combination of social cohesion and the willingness to help others[11, 12]. Observations of vegetated areas with trees and grass indicated that green spaces contained on average 90% more people. In addition, 83% more people were involved in social activities in green spaces vs. barren spaces[13].

Social relationships are a source of emotional and material support. Support, perceived or provided, can buffer stressful situations, prevent feelings of isolation, and contribute to self-esteem[14]. The lowest rates of suicide occur in societies with the highest degrees of social integration, while more suicides occur in societies undergoing dislocation and loosening of social bonds[15]. In Alameda County in 1979, researchers found that people who lacked ties to others were 1.9 to 3.1 times more likely to die during the follow-up period than those who had many contacts[16]. More recently, people with self-reported severe lack of social support were 2.19 times more likely to report fair or poor health[17].

Other studies have shown that: patients with more social support recover faster after hospitalization from heart disease[18]; social support has been found to moderate anxiety and depression resulting from witnessing community violence[19]; and social support was a predictor of abstinence from opiate use over time and can bolster the maintenance of abstinence in substance abuse control[20]. Social networks may also explain why living in first generation immigrant communities appears to be protective of health. In a recent study, living in high-density Mexican-American Neighborhoods reduced the risk of stroke, cancer, and hip fracture by two-thirds for older Mexican immigrants[21].

Social cohesion can lead to improved health outcomes indirectly as well. Knowing ones neighbors can lead to perceived safety and thereby increase likelihood of physical activity and walking. Additionally, regular walking has been associated with a perception of having active neighbors[22].

Social Cohesion: Strategies for Maximizing the Potential
To ensure that the Greenway helps build social cohesion, the project could:

- Include design elements to encourage gathering such as plazas, spaces for parents with kids, benches positioned for encouraging interaction (not linear arrangements), and tables with checkerboards etched on to them;
- Consider "Adopt-a-trail" programs to maintain the trail and build social capital;
- Capitalize on existing programming (e.g., sports) in the neighborhoods it passes through, by expanding that programming or creating new programs that are complementary;
- Work with government on incentives and zoning to encourage creation of social spots (e.g., coffee shops) adjacent to the trail and discourage the siting of liquor stores nearby.

Greening the Landscape and the East Bay Greenway
Another secondary positive benefit of creating the Greenway would be the creation of additional landscaped "green" space in the urban environment. Proximity to and views of pleasant landscaping can reduce stress and speed recovery from illness and can promote environmental stewardship and values. These relationships are shown in Figure 3.

The landscape design of the Greenway will determine the extent to which it has this positive impact. Proper design, maintenance and budgeting are necessary components of an open space that is and remains pleasant to inhabit and to view. If the Greenway is not maintained, the space could return to its current state which, in places, can be described as blight.

Below, the evidence base is reviewed briefly and strategies for maximizing the potential of the Greenway with regard to increasing contact with nature are suggested.

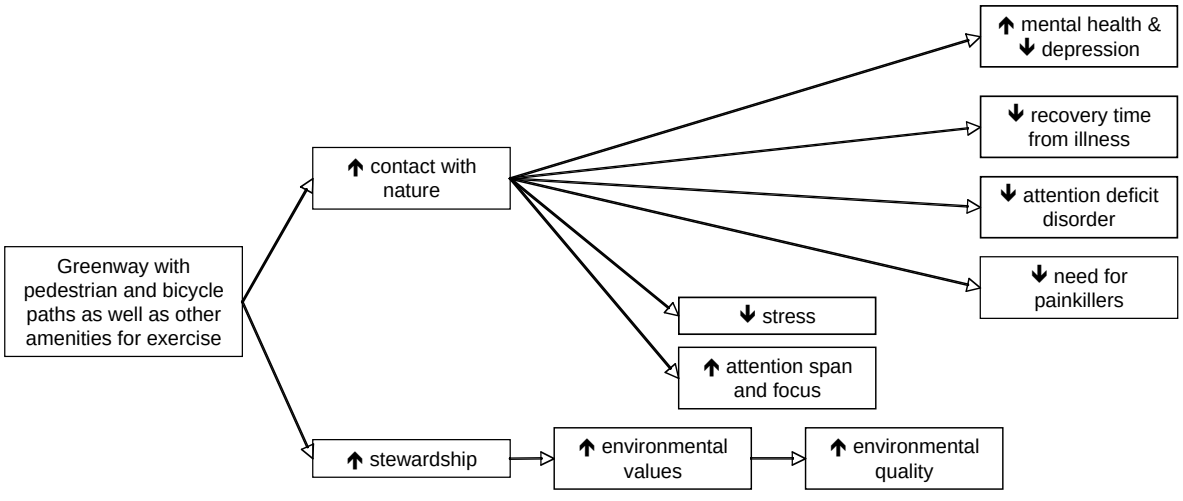

Figure 3: The health pathways connecting the proposed East Bay Greenway with improved health that are associated with increased contact with nature.

Greening the Landscape: Health Evidence Base
Contact with nature has been shown to provide escape from the stresses of everyday life. Relief from fast-paced urban environments can improve health by reducing stress and depression and improving the ability to focus, pay attention, be productive, and recover from illness[23]. Spending time in parks can reduce irritability and impulsivity as well as promote intellectual and physical development in children and teenagers. A study in Chicago showed that people living in a housing project who had some green space near them performed better in their ability to manage major life issues, procrastinated less, found their issues to be less difficult, and reported their issues to be less severe and long-standing than those who lived in barren surroundings[24]. People dissatisfied with their available green spaces have 2.4 times higher risk for mental health issues[25]. Furthermore, researchers in Chicago have found that children with Attention Deficit Disorder function better than usual after activities in green settings and that the "greener" a child's play area, the less severe their ADD symptoms[26].

It has also been demonstrated that patients in hospitals with views of trees had shorter stays and less need for painkiller than those with views of brick walls[27]. People living in greener environments also had fewer self-reported health issues than those who lived in less green settings[28].

Greening the Landscape: Strategies for Maximizing the Potential
To ensure that the Greenway is built as and remains a place where people have views and contact with nature, several strategies could be employed, including:

- Use of indigenous plants and other design elements to maximize landscaping and minimize maintenance costs;
- Design of a maintenance plan and ensuring that the budget for maintenance is covered;
- Starting "Adopt-a-trail" programs to maintain the trail.

Reduced Motor Vehicle Use and the East Bay Greenway
Reducing motor vehicle use would be a benefit of the Greenway as people may choose to walk or bike instead of drive. This could have several positive health impacts related to improving air quality, reducing noise, and reducing motor vehicle related accidents. Figure 4 shows these relationships.

Having trails can promote walking and biking to neighborhood destinations such as stores, schools, churches or friends. Having alternatives to large, busy roads may, by itself, achieve this. The extent to which this transportation mode shift occurs will depend on many factors including the connectivity of the new Greenway to existing walking/biking routes and to desired destinations, awareness of the existence of the Greenway, and safety/perceived safety of the Greenway.

Below, the evidence base is reviewed briefly and strategies for maximizing the potential of the Greenway with regard to reduction of motor vehicle use are suggested.

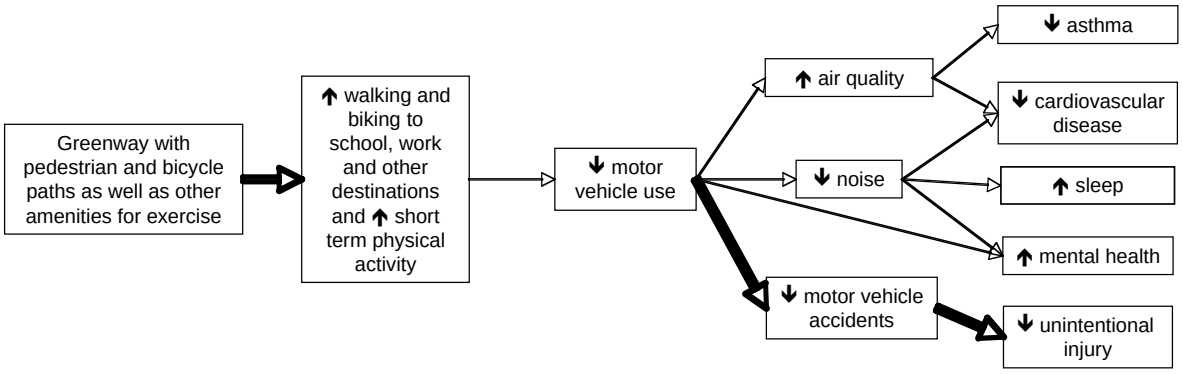

Figure 4: The health pathways connecting the proposed East Bay Greenway with improved health that are associated with reducing motor vehicle use. . Connections in bold are those best documented.

Reduced Motor Vehicle Use: Health Evidence Base

With the availability of the Greenway, a transportation shift away from motor vehicles towards walking and biking could be expected. The potential health benefits of this, aside from the increases in physical activity and social cohesion described previously, are derived from the reduction of vehicle exhaust, vehicle noise, and vehicle-related accidents.

Motor vehicle exhaust is responsible for a large share of air pollution in California[29]. Air pollution from vehicles, including particulate matter, nitrogen oxides, carbon monoxide and volatile organic compounds, can result in human health problems including respiratory and cardiovascular disease. More than 60,000 deaths each year in the US are attributed to air polluted with PM 2.5 (particulate matter with a diameter of less than 2.5 microns)[28]. Health effects associated with short-term exposure to PM 2.5 include: increased hospital admission and ER visits for cardiovascular diseases and respiratory diseases, non-fatal heart attacks, premature death in people with heart and lung disease, and lung function changes especially in children and people with lung diseases such as asthma. Vehicle emissions burden people living in high traffic roadways: proximity to roadways is associated consistently with respiratory disease and lung function impairment[30]. Air pollution (PM 2.5, nitrogen oxide, "soot") is associated with physician-diagnosed asthma, wheezing, ear/nose/throat infections, and cold/flu in children[31].

Traffic is a significant source of environmental noise and traffic noise exposure has been related to hypertension[32] and heart disease[33, 34]. Noise is also related to delays in learning in children[35], to sleep disturbance[36], and to hearing impairment[37]. Noise exposure can also cause stress and annoyance[38].

A reduction in vehicles on the road will reduce the number of motor vehicle related accidents and thereby reduce pedestrian and bicyclist injuries and fatalities, as well as injuries and fatalities of drivers. Most of these health benefits are discussed in the section below on safety, but those related specifically to changes in the number of vehicles on the

road are discussed here. Vehicle volume has been associated with the number of pedestrian injuries in several studies[39-42]. It is important to note, however, that pedestrian volume is also associated with the number of pedestrian injuries[43, 44].

Reduced Motor Vehicle Use: Strategies for Maximizing the Potential
The degree to which walking or biking on the Greenway is chosen instead of driving depends on many factors, including safety, connections to desired destinations and other paths/trails, and education/awareness and incentives. Safety related mitigations are discussed in the section below focused on that issue. Non-safety related strategies that could be used to maximize the reduction in motor vehicle use include:

- Working with other neighboring project sites to complete safe routes;
- Connecting the Greenway to interiors of neighborhoods with enhanced bike lanes and sidewalks so that it is easy to connect to the Greenway from one's home;
- Working with planning staff in the various jurisdictions to connect the Greenway to redevelopment projects;
- Performing outreach to local schools about the Greenway as a walking/biking route to school;
- Performing outreach to local employers about the Greenway and about bike friendly policies.

Safety and the East Bay Greenway
If the Greenway is unsafe or is perceived to be unsafe, people may choose not to use it and the potential health benefits described in the preceding sections will not be realized. Moreover, if the Greenway is unsafe, it could have negative health consequences including increased physical injury as a result of vehicle related accidents and violent crime, increased fear, stress, isolation and mental health issues as a result of crime, and decreased physical activity as a result of fear of violence. It is imperative that the plan for the Greenway address safety concerns.

Safety: Existing Conditions
Because of the significance of safety, research into the existing conditions in the areas surrounding the Greenway with respect to these issues was conducted. The areas around the Greenway have significant counts of pedestrian and bicycle injuries and fatalities as well as high rates of assault.

Figures 5 and 6 show maps of the pedestrian injuries/fatalities and bicycle injuries/fatalities in motor-vehicle related accidents in the part of Alameda County near the Greenway, which is shown in pink. There are four pedestrian injury hotspots, depicted by the green ovals, and four bicycle injury hotspots, depicted by blue ovals. Three of each of these are adjacent to the Greenway and the pedestrian and bicycle injury hot spots overlap significantly. The hotspots are detailed in the maps in figures 7, 8 and 9. Within a half mile buffer, there were 34 pedestrians killed, 531 pedestrians injured, 5 bicyclists killed and 279 bicyclists injured between 1996 and June 2006. It is possible that the Greenway could prevent a significant portion of these injuries and deaths if it becomes the chosen route by many pedestrians and bicyclists, replacing the busy

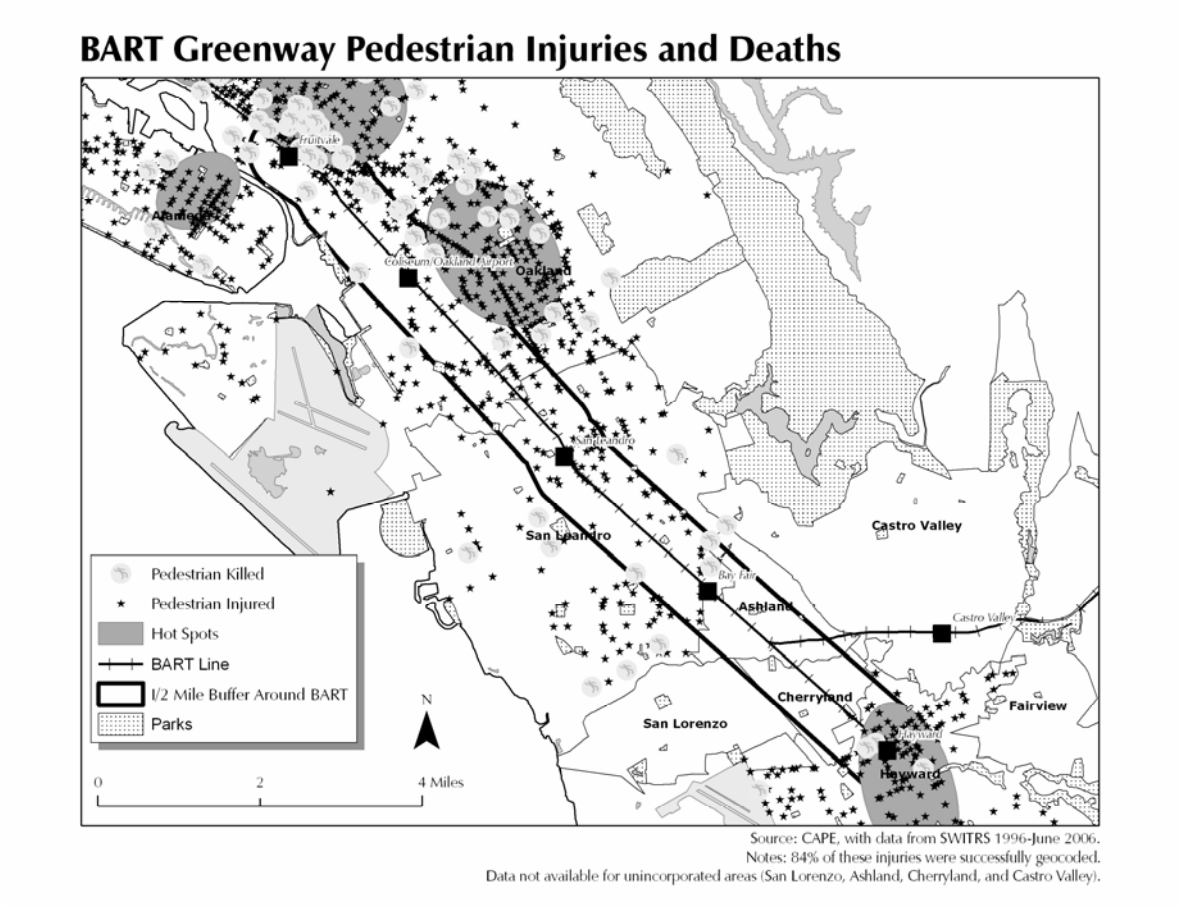

Figure 5: A map of the pedestrian injuries and fatalities in the area of Alameda County near the Greenway. Hot spots for injuries are shown in the shaded ovals. A half mile buffer around the Greenway is shown with bold lines.

roadways, and if it is designed and built in such a way as to minimize the traffic-related accidents experienced by users of the Greenway.

Table 5 shows police data on homicides and assaults within a half mile buffer of the Greenway in 3 of the 4 jurisdictions that it would run through. Data was not available from the San Leandro Police Department. The data shows that, especially in Oakland, rates of these crimes are significant. Violent crime rates in general vary by jurisdiction as well. Oakland's police department reports the highest rates in the county at 1,421 violent crimes per 100,000 residents, while Hayward's rate is 452 violent crimes per 100,000 and the unincorporated area covered by the Alameda County Sheriff's department reports a rate of 372 violent crimes per 100,000[45]. Fear of violent crime could deter use of the Greenway and it is therefore important that the Greenway is designed to the extent possible to minimize the potential for crime (e.g., with clear sight lines and with call boxes) and that a program to deter crime be created for it (e.g., park rangers).

Safety: Health Evidence Base

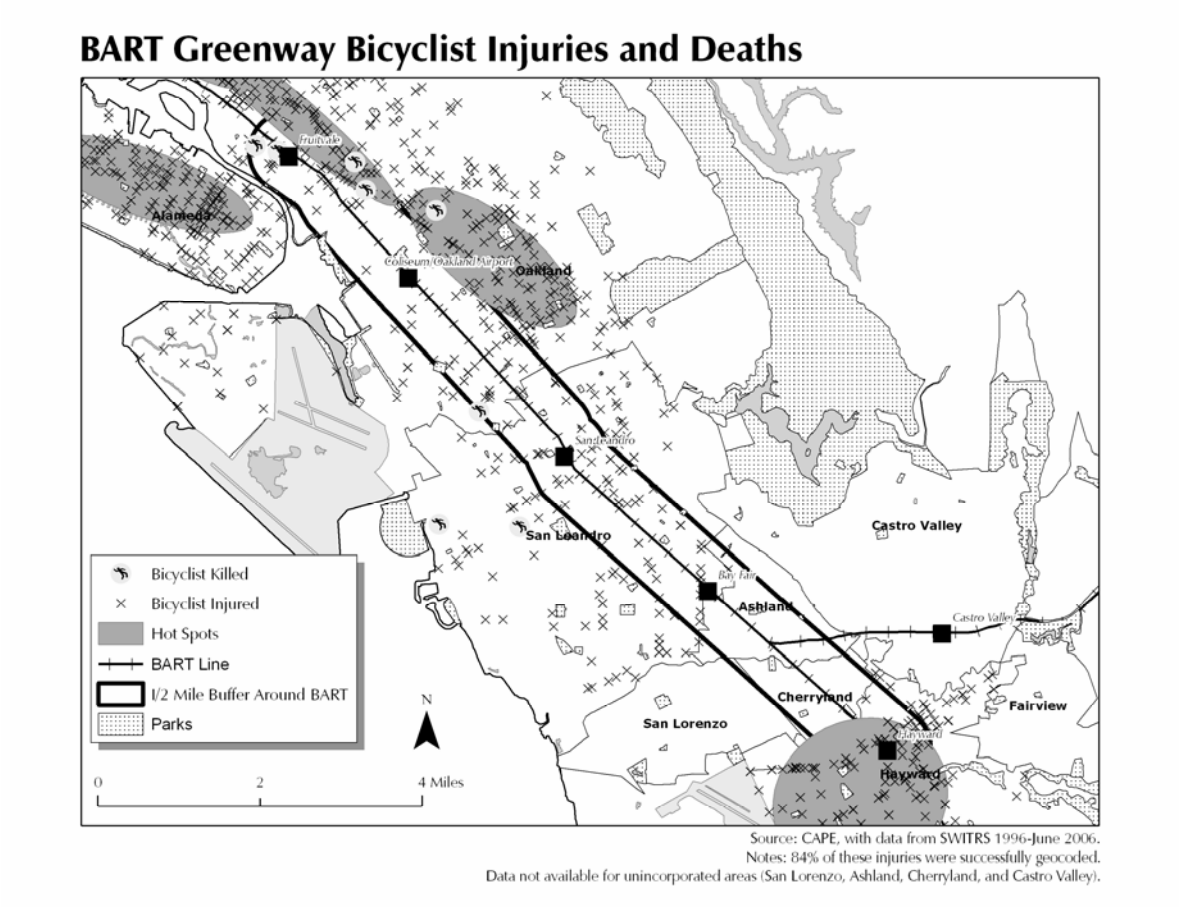

Figure 6: A map of the bicycle injuries and fatalities in the area of Alameda County near the Greenway. Hot spots for injuries are shown in the shaded ovals. A half mile buffer around the Greenway is shown with bold lines.

Many studies have linked the amount an individual walks with actual or perceived safety, where safety includes both freedom from crime and freedom from pedestrian injury. For a review see [46]. A 1999 CDC study found that fear of lack of safety reduced physical activity most in those over 65, women, and minorities[47].

Accidents between motor vehicles and pedestrians or bicyclists can cause injury, disability and death. As described above, high traffic volumes and high pedestrian volumes lead to higher rates of pedestrian injuries. In addition, vehicle speed predicts severity of pedestrian injuries. With vehicle speeds below 20 mph the probability of serious or fatal injury is less than 20%; with speeds above 35 mph, most injuries are fatal or incapacitating[48]. In a study in New Zealand, the risk of child pedestrian injury was 3.6 times higher if the vehicles were traveling at high speeds[39].

Intersection design, road design, pedestrian facilities and lighting affect pedestrian injury risk. Roadway width also predicts pedestrian injuries[49]. Complexity of roadway systems is related to higher pedestrian injury[50]. High density of curb parking was

associated with increased risk for childhood pedestrian injury in a New Zealand study; in areas with curb parking, the risk of injury was over 8 times higher than in areas without curb parking[40]. Another study in Orange County, California also showed a higher risk of pedestrian injury in neighborhoods with over 50% of the curb occupied by parked vehicles[44]. According to a report based on studies of 8 intersections, roundabouts reduce injuries by 70% on single land urban roads that have stop signs[51]. Traffic calming in residential areas is a proven strategy that reduces traffic accidents by 15%[52].

Violent crime in a community impacts physical and mental health. Assault and other types of violence can lead to fatal and non-fatal injuries. Witnessing, experiencing, and living in proximity to areas of crime can cause behavioral and emotional problems[53, 54], and also cause fear, stress, unsafe feeling and poor mental health[25].

Safety: Strategies for Maximizing the Potential

Based on the data above and on interviews with residents and experts familiar to the communities near the Greenway, the most significant obstacle to the success of the Greenway in reaching its goals are related to safety – traffic-related safety and safety from crime. There are many potential strategies for ensuring safety from traffic-related injury and from crime. Many potential solutions are systemic and beyond the scope of this Greenway project, so only those that can be influenced by the proposed project are discussed here. Potential mitigations to traffic safety issues that can lead to pedestrian and bicyclist injuries or fatalities include:

- Ensure road crossings are safe and not a source of increased pedestrian/bicyclist accidents. Efforts should be focused on intersections that currently have many accidents, hotspots shown in the maps in figures 5 through 9, and parts of the Greenway where vulnerable populations (e.g., children) are expected to be heavy users. Traffic calming to lower traffic speeds near the Greenway could greatly enhance safety. Additionally, traffic lights with countdown pedestrian signals, curb bulbs, center medians and other such measures could be used;
- Disallow curbside parking near the Greenway intersections;

Table 5: Crime Data: Homicides and assaults within a ½ mile of the Greenway. (Sources: Police and Sheriff's Departments in these jurisdictions and CAPE, ACPHD)

Area	Population	Data Year(s)	Homicides #	Homicides Rate	Assaults #	Assaults Rate
Unincorporated (Ashland/ Cherryland)	15,600	2006	0	0/100,000	100	641/100,000
Hayward	2,835	2004-2006	0	0/100,000	108	1270/100,000
Oakland	39,300	2004-2006	21	17.8/100,000	741+	628+/100,000

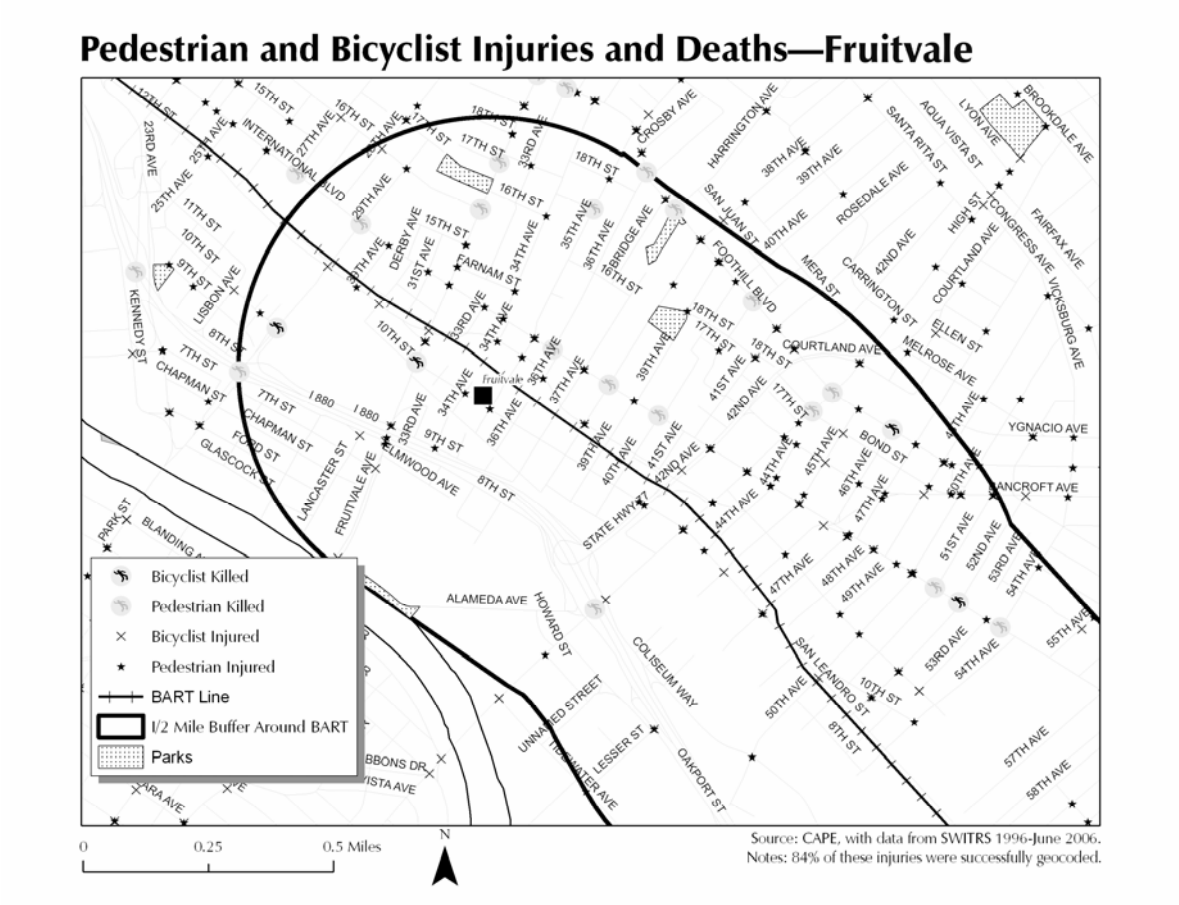

Figure 7: A map of the pedestrian and bicycle injuries and fatalities in the area of near the Fruitvale injury hotspot. A half mile buffer around the Greenway is shown with bold lines.

- Ensure adequate lighting on the roadways as well as proper tree maintenance so lighting sources are not blocked;
- Ensure proper sight lines;
- Ensure proper separation and/or integration with city streets;
- Partner with bike groups to teach bike safety at schools and community centers;
- Create a buffer zone – a wide strip of grass for example – between the Greenway and neighboring streets that run parallel to the Greenway trails;
- Separate trails for bikes and pedestrians to avoid collisions between those modes.

Potential mitigations to crime include:

- Start an Urban Park Rangers program to patrol the Greenway;
- Organize neighborhood watch groups;
- Increase police presence and police bike patrol;
- Start a bike group and/or walking group safety patrol;
- Coordinate with NCPC in areas in which they are active;
- Ensure adequate lighting on the trails;

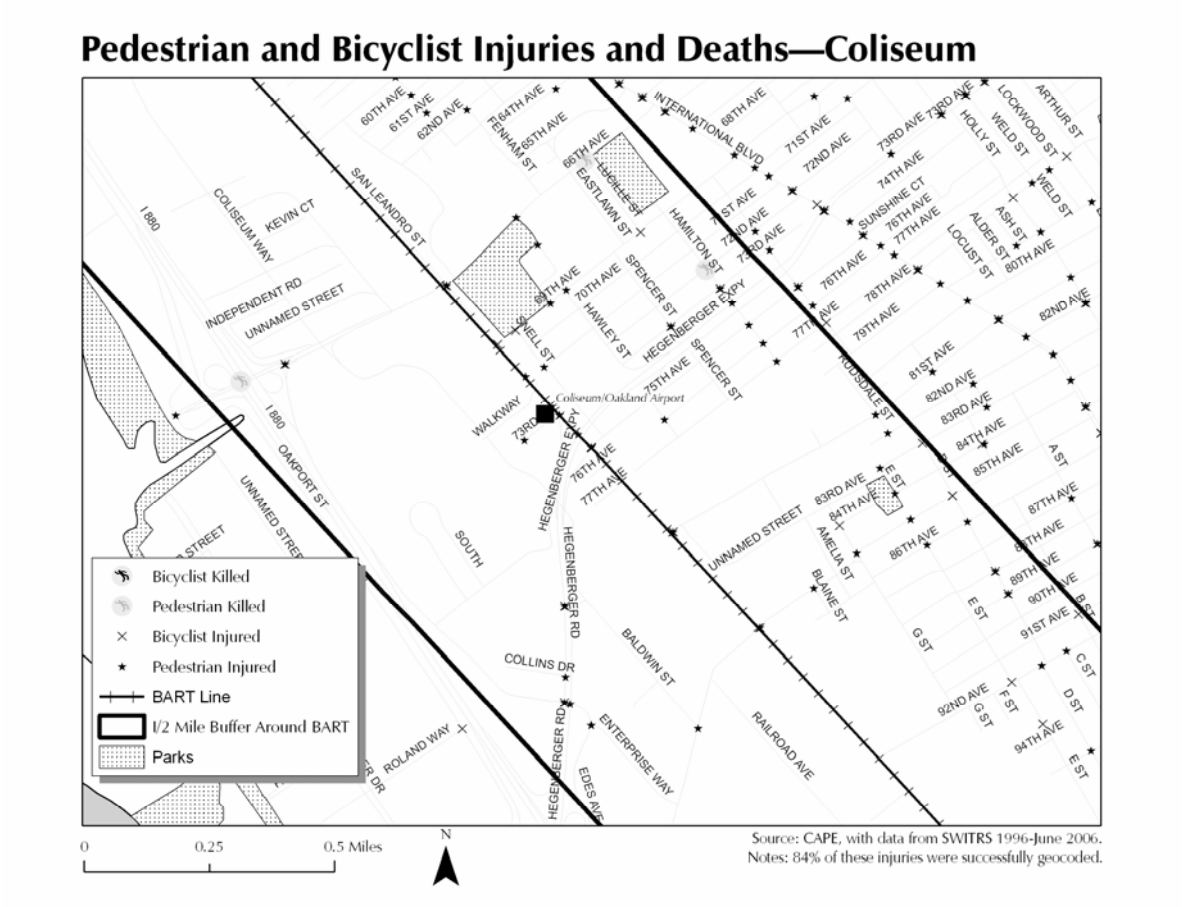

Figure 8: A map of the pedestrian and bicycle injuries and fatalities in the area of near the Coliseum injury hotspot. A half mile buffer around the Greenway is shown with bold lines.

- Ensure proper sight lines and "eyes on street";
- Install call boxes;
- Install cameras;
- Ensure police buy-in during the design process;
- Include strategies to build social cohesion described above;
- Work with government on incentives and zoning to encourage creation of social spots (e.g., coffee shops) adjacent to the trail and discourage the siting of liquor stores nearby.

Conclusion

Through the HIA process, the potential positive health impacts of the East Bay Greenway and potential barriers to achieving those were identified. The Greenway project, as proposed, presents an opportunity in land use that could be very beneficial to the health of residents who live near the route, many of whom are poor, are people of color, and currently suffer from health inequities. The Greenway's potential to increase physical activity, build social cohesion, encourage people to drive less, and create a landscaped,

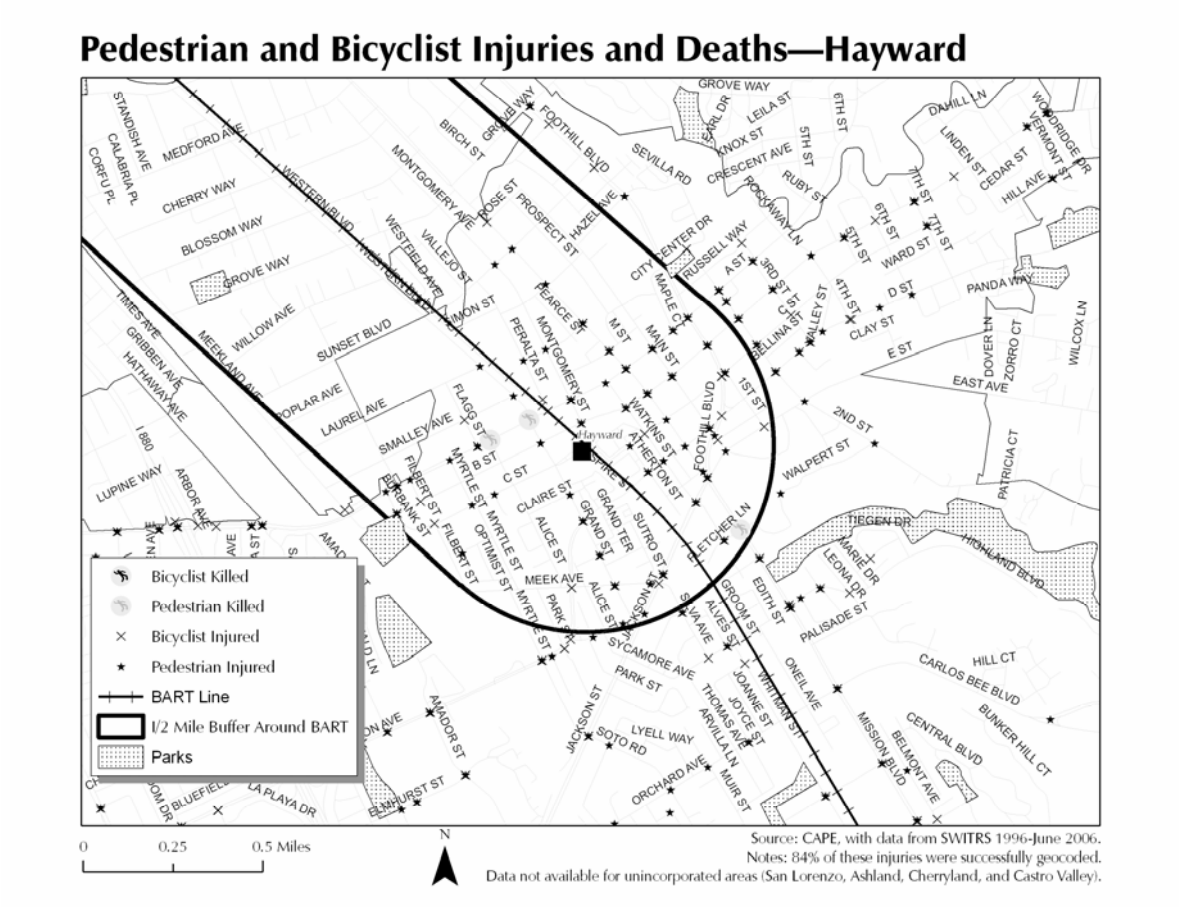

Figure 9: A map of the pedestrian and bicycle injuries and fatalities in the area of near the Hayward injury hotspot. A half mile buffer around the Greenway is shown with bold lines.

natural space all could lead to improved health outcomes. These positive health impacts include but are not limited to reducing overweight, obesity, and diabetes, improving mental health, reducing cardiovascular disease, reducing pedestrian and bicycle related injuries, reducing osteoporosis, and lengthening life span. As detailed in this report, there are many ways in which the likelihood of these positive health outcomes can be increased through optimal design and programming.

The main obstacle to achieving these positive health outcomes center on safety issues, both safety from crime and from motor vehicle related accidents. Safety issues would deter use and be an impediment to achieving the positive health outcomes described above. However, with proper attention to safety issues in the design and programming of the Greenway, these potential obstacles can be avoided.

Acknowledgements
We would like to thank the following people:

- Don Neuwirth, Phil Olmstead and Katherine Melcher from Urban Ecology for all their help and input into this project;
- many people at the Alameda County Public Health Department, especially Matt Beyers (who provided the data and the maps used in this report), Alex Desaulets, and Sandra Witt;
- others who gave us input into our scoping document: Kimi Watins-Tart and Mark Woo (Alameda County Department of Public Health), Lucy Wicks (the office of Alameda County Supervisor Nate Miley), Jason Patton (City of Oakland Community and Economic Development Agency), Andy Dannenberg and Candace Rutt (Centers for Disease Control), and Dior Hildebrand (Los Angeles Department of Health Services); and
- Kim Gilhuly for her work on the health evidence base used in much of this report.

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Appendix A: Project Description by Urban Ecology

Appendix B: HIA Scoping Worksheet

	Health determinant	Examples of conditions and changes that affect health determinant	Facts about East Bay Greenway	Candidate Questions for HIA	Candidate Mitigations and Design Strategies	HIA Research Methods and Tasks
1	**Parks and Natural Space:** park quality; park services; park access	•Regular physical activity reduces risk of heart disease, diabetes, osteoporosis, and obesity, reduces blood pressure, relieves symptoms of depression and anxiety, and prevents falls in the elderly; •Access to places for physical activity can increase the frequency of physical activity; •Views of trees enhance recovery of surgical patients	•Increases parks from less than 0.8 acres per 1000 people to ? (recommended is 4 per 1000 in Oakland); •Landscaping will increase greenery; •Increases walkability and bikability; •Increases access to other regional park resources (Bay Trail, Union Point Park); •Includes additional amenities for recreation use	How many people can be expected to use the park? In what ways? From what neighborhoods/income levels? What changes in physical activity of Oakland residents can be predicted from park use? Does the greenway impact areas with disproportionately higher rates of disease related to lack of physical activity? Will the greenway design include facilities and programs desired by residents? How will the greenway design mitigate any barriers to park access and use? Will views of nature / greenery change for residents? Who will benefit from improved views? Do views benefit areas with disproportionately higher prevelence of stress related illnesses? Will the benefits include mental health related improvements? How far are people likely to come from to use the Greenway? What educational outreach will be done to inform local residents of the Greenway and of health benefits of exercise? Will universal design principles be used to ensure access by disabled, elderly, and children?	•See safety mitigations; •Design physical activity amenities likely to be used by local population and not available elsewhere; •Consider structured activities for the Greenway to draw low income & at risk groups, such as coordinated bike rides or walks; •Design to minimize maintenance costs; •Consider educational outreach program after Greenway is complete (at schools, churches, senior centers, etc.); •Use universal design principles to allow access for all; •add waterfountains, bike racks, shade area, 1/4 mile markers; •get input from: walkers, runners, bicyclists, children on tricycles, skateboarders, rollerbladers, elderly in wheelchairs, mothers with baby strollers, dog walkers.	Identify existing parks in areas and assess their amenities and use; Survey area residents on existing park use and demand for recreational resouces; Survey area residents on barriers to use of Greenway and potential ammenities, conditions, and programs that would encourage use; Investigate demographics near Greenway; Identify maintainance plans and budgets; Compare budets to budgets for Ohlone Greenway upkeep; Identify programs and practices used to generate use on other Greenways; Compare and contrast the proposed Greenway with successful greenway projects

2	**Safety:** violent crime; property crime; fire hazards; traffic hazards	•Physical injury; •Indirect effects of crime include fear, stress, and poor mental health; •Fear of violence inhibits walking behavior	•Proposing Urban Park Rangers for safety enforcement; •Greenway provides alternative path to pedestrians and bicyclists and keeps them off busy roads; •Will "activate" many areas where large tracts of land are abandoned	What is the existing prevelence of crime in the areas adjacent to the Greenway? Will the Greenway create new opportunities for crime? Does Greenway design add elements to deter crime? Will adjacent residents be able to view activities on the Greenway/Will Greenway users provide "eyes" on? Will fear of crime deter use of Greenway for all or some populations? Will the greeway provide safer routes for pedestrian and bicycles than current routes? How will the greenway affect traffic injuries ? Will the greenway provide a safe place to play for children? Have adequate resouces been provided for long term upkeep and maintainance? Will the Greenway be used by skateboarders and pocket motorcyclists and will this lead to an increase in accidents? Are accidents between pedestrians and bicycles likely to be a problem? Are there certain physical characteristics of the space that will make them more or less safe (e.g. being near isolated industrial areas)? Will police buy into project? Will the Greenway be used as an escape route for crime?	•Urban Park Rangers? What is feasibility of doing something like Urban Park Rangers? •Organized neighborhood watch groups? •Additional police presence and police bike patrol?;•Coordinate with NCPC in areas that they are active in; •Ensure road crossings are safe and not a source of increased pedestrian/bicyclist accidents; •Ensure adequate lighting; •Ensure proper sight lines and "eyes on street"; •Call boxes?; •cameras?; •Ensure proper separation and/or integratioon with city streets; •Partnership with bike groups to teach bike safety; •Bike group safety patrols?; •Walking Group safety patrols?; •ensure police buy-in from start	Map crime statistics in the area; Survey neighbors and police about existing crime; Investigate safety concerns, safety measures, and crime incidents associated with the Oholone Greenway; Map pedestrian/bicycle related accidents on roads near Greenway; Study locations/types of pedestrian/bicyclist accident associated with other Greenways (and look at mitigations being proposed in El Cerito); look at literature about whether "parks invite crime"

3	**Transportation:** access to jobs, goods, services and educational resources; non-motorized travel; vehicle miles	•Sidewalks, bicycle lanes, parks and open space facilitate physical activity reducing heart disease, diabetes, obesity, blood pressure, and osteoporosis, symptoms of depression, anxiety, and falls in the elderly	•Will provide walking and biking paths; •Will provide better and increased connections to transit facilities (BART, AC Transit)	How will the greenway affect the number and mode of travel trips? What destinations are within walking/biking distances that are of interest to neighborhood residents (e.g. schools, industrial jobs, etc.)? Will the Greenway help to provide continuous routes to these destination? Will the Greenway help complete the local bike route network? How will people access the Greenway? Will access be equitable for all adjacent neighborhoods? Will local governement and local employers put in place bike-friendly policies (e.g., showers, advanced green lights for bikes, bike racks)?	•Work with other neighboring project sites to complete 'safe' routes; •Working with BART to incorporate Greenway in new station plans; •Consider connecting the Greenway to interiors of neighborhoods with enhanced bike lanes and sidewalks so that it is easy to connect to the Greenway from one's home; •observe some sites (e.g., schools) near Greenway at peak traffic times to look at additional traffic needs (e.g., crosswalks); •place objects of interest (e.g., art) at intervals and signage about those points of interest to encourage walking further; •outreach to local employers about Greenway and bike friendly policies.	Assess bike and ped environmental quality on adjacent properties; identify and map access points and 'desire' lines; Research other destinations (e.g. schools) and complete paths to those; Research bike routes that this can connect to.
4	**Education:** school quality; school proximity	•Children commuting to school have less sleep, less exercise, and greater exposure to vehicle pollution	•Plan is to be able to use Greenway to get to neighborhood schools; •Potential to provide additional open space for schools; •Plan to include educational opportunies along Greenway (interpretive signage, history)	See transportation; Will the Greenway provide a resource for school physical activity programs? Will the Greenway provide safe alternative walking and biking routes to schools? Will the Greenway be able to take advantage of existing school parks? What kind of liability issues will come up with shared use at schools? Will schools want to share costs of upkeep and additional lighting? Will the Greenway provide a resource to special needs students?	•See transportation; ensure that parks have equipment for special needs children	See transportation; Survey school administrators, PE teachers and parents about Greenway; research what amenities might be used by special needs students

5	**Air Quality:** pollutants in outdoor air and indoor air; environmental tobacco smoke	•Proximity to busy roads leads to increased exposure to vehicle emissions that exacerbate respiratory disease and increase cardio-pulmonary mortality	•Trails near BART and busy city streets and industrial areas	Will changes in transport modes result in effects on regional air quality? Will users of the trail suffer adverse health effects from vehicle emmissions on roads (including trucks) adjacent to Greenway, from industrial emissions? Will additional "greening" of area lessen air quality impacts?	•Additional "greening" of corridor; •landscape canopy to improve air quality	Measure air quality or model air quality based on traffic (in EIR?)
6	**Noise:** environmental; occupational	•Chronic noise exposure harms sleep, temperament, hearing, and blood pressure; •Noise might discourage exercise	•Trails near BART and busy city streets and industrial areas	Will changes in transport modes due to the Greenway affect area traffic noise? Cumulatively, will transport noise result in adverse health impacts for park users? Will BART train noise discourage use? Will noise from activity on Greenway affect neighbors negatively?	Noise buffers e.g. berms where noise is an issue? (will these buffer vertical noise)?	Measure noise levels at trail locations in general and particularly in areas of concern (in EIR?)
7	**Social Networks:** contact with and support from friends and family	•Social contact across ethnic and class groups ensures equitable access to public health and educational services		Will the greenway serve to facilitate social contact and interaction? With Redevelopment soon underway in East Oakland and possibly in Eden, will demographics along the Greenway shift? If so, should that be considered?	•add design elements to encourage gathering (e.g., tables with checkerboards etched on to them); •capitalize on existing programming (e.g., sports); •consider working with government on incentives and zoning to encourage creation of social spots like coffee shops adjacent to the trail (and not bars)	Observe patterns of use in similar areas of existing Greenways? Identify characterisitics of high-use sites and low-use sites for other Greenways? Identify opportunity sites for public gathering spaces? Identify uses that may support public gathering?
8	**Nutrition:** food costs; food quality; food safety; proximity of food resources	•Proximity to good nutrition source can reduce risk of chronic disease (e.g., obesity)		Does Greenway increase access to food/higher quality food? Can zoning near Greenway be changed to encourage farmers markets, farmer market mobile trucks, green groceries, and community gardens, and to discourage fast food, alcohol and tobacco outlets?	Appropriate site for farmer's markets? Community gardens? Discuss zoning changes with local government?	Map food outlets and neigborhood buisiness districts in relation to Greenway

9	**Private Goods and Services:** quality and proximity of financial institutions; childcare services; health services	•Timely access to primary health services prevents serious hospitalizations; •Quality childcare increases childhood educational and job outcomes		Does Greenway increase access to necessary goods and services, e.g. by providing safe walking and biking access to a business district or safer walking and biking to public transit? Can the Greenway be used to stimulate services in places where there aren't many goods/services?	•Look at Redevelopment planning along the corridor for Oakland to see if there are opportunities to connect the Greenway with approved projects; •investigate whether locating goods/services along the Greenway in Redevelopment areas is a possibility; •encourage bicycle shops near trail	Map food outlets and neigborhood business districts in relation to Greenway
10	**Public Services:** quality and proximity of health services	•Timely access to primary health services prevents serious hospitalizations		Does Greenway increase access to public services? Will emergency services be able to access the Greenway?	•create plan for emergency service (e.g., ambulance) access to Greenway	Document public services near Greenway
11	**Housing:** adequate shelter; affordability; physical hazards; displacement/ dislocation; disinvestment/ blight		Lots of new housing development along BART corridor, Greenway will work to integrate with new developments	Will the greenway increase the quality of housing on adjacent parcels? Will Greenway affect housing prices? If so, who will benefit? Will Greenway lead to additional displacement of low-income residents through Gentrification? What are ways to ensure that Gentrification does not occur? Are there homeless encampments currently on the sections of the Greenway? If so, how will the issue be handled sensitively without harming homeless residents?	•Work with groups that provide services to the homeless if displacement is likely to be an issue.	Survey developers in Oakland and AC County about open space and value to developments; Inquire about fee for maintenance

12	**Social Equity:** proportion of the population living in relative poverty; attitudes towards/ stereotypes of minority racial, social and ethnic groups; segregation of residences; degree of inequalities in income or wealth		•Greenway to run through many poor and majority minority areas	Does Greenway help correct inequity in park and transportation access? Does the community want the Greenway? Will the community feel ownership of the Greenway?	•Consider "adopt a trail" program to maintain segments and build social capital	How much would access to parks and transportation for these poor and minority groups increase?
13	**Livelihood:** security of employment; wages and income; benefits and leave; job hazards; job autonomy; economic diversity; wealth			Will the Greenway change property values/wealth for owners of adjacent parcels? Who will benefit? Will the Greenway provide new job training opportunities for youth or young professionals? Can contracts for upkeep or other Greenway associated contracts ensure local hiring?		Survey developers and homeowners associations
14	**Water Quality:** contaminants in drinking water; infectious agents in drinking water; recreational water quality			Will the Greenway reduce run off and increase absoprtion of water? Will the Greenway affect drainage? Will these environmental effects affect health?	•Consider including semi-permeable surfaces in Greenway for water absorption	Research "green streets" and low maintenance storm water management methods and relation to health
15	**Democratic process:** degree and quality of participation in public decision making; government accountability		UE outreach to include residents in planning process	What is the best way to engage the community and ensure that they take pride in the project? In addition to community meetings, should there be some effort to go door-to-door and survey people? Can community members be involved in final decision making process, not just early on for input?		

Appendix C: Community Meeting Notes
East Bay Greenway Health Impact Assessment
Community Meeting Notes
May 8, 2007

Urban Ecology hosted a focus group on May 8th at the San Leandro Public Library for residents throughout Alameda County on the relationship between health and the East Bay Greenway – a proposed ped/bike path under the BART tracks from Oakland to Hayward.

The objectives of the session were to:

- Review the relationship between the proposed Greenway and the health of the communities adjacent to the Greenway;
- Identify priority community health concerns;
- Identify pathways through which the project will affect community health concerns, positively or negatively;
- Identify barriers to achieving the potential positive health impacts of the Greenway and mitigations for addressing those barriers;
- Review, augment, and prioritize the issues raised in the draft expert scope for the Greenway HIA.

About a dozen residents participated in the 1.5 hour discussion. The session followed the following agenda:

- Short review of the Greenway Project;
- Introduction to the connections between the Greenway and Health (using the pathway diagrams);
- Discussion of the connections between the Greenway and Health, including barriers to achieving the positive health outcomes and potential mitigations;
- Discussion of future work.

Urban Ecology started with meeting with a short review of the Greenway project. Dr. Rajiv Bhatia and Jonathan Heller from Human Impact Partners led the subsequent health discussion.

Health Connections – overview

- Rajiv gave a brief overview of HIAs, their role, and potential impacts on development projects
- Rajiv outlined some of the key connections between health and the Greenway project, including: physical activity, reduced motor vehicle use, social networking, and children/accidents/environment.
- Residents were asked to comment on the connections identified by HIP with regards to their validity and relevance to the context as well as to ID additional health connections. The discussion that followed integrated both the discussion on connections, but also concerns, opportunities, desires, solutions, possible

strategies, and needs for research and planning. The comments are organized below by domains: safety, non-motorized transportation, physical activity, and social cohesion.

- SAFETY
  - Safe x-ings to the Greenway and, especially surrounding streets – create a "buffer" zone between Greenway and streets (one specific concern was about a freeway on-ramp near the Greenway and whether it would limit access to the Greenway.)
  - Adequate lighting needed
  - Ensure proper mix of uses – ideally have separated use between bike and pedestrian; role of dogs within Greenway?
- PHYSICAL ACTIVITY:
  - Increase physical activity in coordination with better education (e.g., biking rules)
  - Noise along corridor – improve sound barriers
- GREENING
  - Increase in plants and landscaping; capture the benefits of "greening"
- NON-MOTORIZED TRANSPORTATION
  - Greenway might actually cause an increase in vehicle trips to parts of Greenway
  - Use of Greenway to walk to businesses questioned – parts of corridor have little business on them now; mainly industrial. Would businesses locate close to Greenway in future?
- SOCIAL COHESION
  - Social cohesion was seen as a priority b/c it could affect safety, but not a top priority

Health Connections – barriers/strategies to implementing a "healthy" Greenway

- What is required for people to use the Greenway?
  - Safe x-ings and access (including railway x-ings)
  - Parking near Greenway to increase access
  - Benches/rest areas
  - Restrooms – there was some debate as people wondered if they could be maintained, kept safe
  - Exercise facilities
  - Dog runs
  - Lighting
  - Small plazas or places for people to sit
  - Separated paths for bikes and pedestrians
  - Sports facilities and playgrounds? If there is room and it is a good fit…
  - Park uses vs. trail uses – potential room for both more active and passive uses on Greenway; needs to be carefully thought out
  - Design to maximize "eyes on the street"
  - Water fountains
  - Good connections to schools, parks, neighborhoods, businesses

- Local/indigenous plants and landscaping (low maintenance)
- Community gardens – must realize that this is a very localized activity
- Education/stewardship
  - Can there be a role for youth and local neighborhoods?
- Design Greenway to facilitate social networking – plazas, space for parents w/ kids (design benches for interacting, not linear benches)
- Organized programming for Greenway
- ID and incorporates points of interest and history of corridor – interpretive signage
- Walking/biking to school using Greenway – makes sense in some areas
- Concerns about skateboards, rollerblading, scooters

At the end of the session, participants were asked to prioritize connections:

- Safety was the top priority;
- Others (non-motorized traffic, greening, and physical activity) were also considered significant and important to health by most participants;
- Value of greenway as a site of building social cohesion resonated least.

Participants identified one additional domain: intrinsic and health value of natural areas (greening).

Potential Future work for HIP and Urban Ecology:

1. What are the benefits/challenges of the Ohlone Greenway? How has it impacted property value, crime, physical activity in that area?
2. How much space does the Greenway really have to play with? What can be really done in a relatively small right-of-way? There were concerns that right-of-way is just too small to do anything substantial.
3. What are the trade-offs between the Greenway and other efforts to improve open space? Will this Greenway diminish other open space requirements?
   a. San Leandro downtown study
   b. How will this be factored into the city's measurement of open space?
   c. Concerns about the Greenway providing an "out" for the cities in their open space requirements
4. Assessing and strategizing multiple concerns and domains about safety: safe access as a barrier to use; concerns about safety of users from traffic and physical violence; concerns related to safety concerns from air and noise pollution. The following list of safety-related issues could be researched:
   a. Assaults
   b. Motor vehicle accidents
   c. Ped-vehicle and bicycle-vehicle accidents
   d. Traffic volumes
   e. Intersection quality (x-ings)
   f. Lighting
   g. Noise levels
   h. Point sources of air pollution