

Wonderland Creek Diagonal Highway to Winding Trail

Community and Environmental Assessment Process Report



DRAFT November 2012

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EXECUTIVE SUMMARY

The Wonderland Creek project extends from Winding Trail in the north to the Diagonal Highway in the south. The purpose of the project is to provide flood mitigation and improved trail connections in the project reach including a pedestrian and bicycle underpass at 28th Street.

The existing 100-year floodplain along the project reach extends far beyond the creek banks, particularly on the south and west side of the channel, and includes numerous structures. One structure (2800 Kalmia) is located within the existing High Hazard Zone. A flood mitigation master plan completed in 2009 recommends this reach as a high priority for flood improvements. A multi-use path exists along Wonderland Creek from 26th Street to 30th Street including an underpass at the Diagonal Highway. An underpass does not currently exist at 28th Street. The Greenways Master Plan and Transportation Master Plan show a proposed pedestrian and bicycle underpass at Wonderland Creek and 28th Street. A CEAP was approved in Oct. 2010 for the reach just downstream. The project will extend a multi-use path from Foothills Parkway to 30th Street. This project is currently under design and is anticipated to be constructed in 2015.

Project alternatives fall into two categories, flood improvements and trail connections. Three flood mitigation alternatives are presented. The first flood mitigation alternative (F1) would make improvements to contain the High Hazard Zone (defined by the city as the drainage area where depth and velocity pose a threat to life and safety) and is estimated to cost \$4.2 million to design and construct. This alternative would result in one structure no longer being located in the High Hazard Zone and 16 structures no longer located in the 100-year floodplain (293 dwelling units). The second flood mitigation alternative (F2) would provide 100-year flood flow containment and eliminate the flood risk for 100 structures (338 dwelling units) at a cost of \$5.42 million. Both flood mitigation alternatives would result in similar impacts to the riparian area. The third alternative was developed to minimize disruption of the riparian area between Kalmia Avenue and the Diagonal Highway. It is similar to F2 from Winding Trail to Kalmia Avenue but would include construction of a high flow bypass pipeline between Kalmia Avenue and the Diagonal Highway. The 32 feet wide by five feet high pipeline would convey flows that exceed the existing channel capacity in this reach. Construction of the pipeline culvert would avoid impacts to this reach of the open channel but would require acquisition of easements, significant construction impacts to multi-family access roads and parking and relocation of utilities. The cost of this alternative is \$7.5 million.

The two trail connection alternatives are nearly identical with the exception that the first alternative (T1) would maintain the existing at-grade crossing of Kalmia Avenue. The second alternative (T2) would provide a pedestrian and bicycle underpass crossing of Kalmia Avenue. The second alternative is estimated to cost an additional \$203,000 if coupled with the High Hazard Containment flood mitigation alternative, \$60,000 if coupled with the 100-year Containment alternative and \$395,000 if coupled with the high flow bypass flood mitigation alternative.

The staff recommendation is the 100-year Containment flood mitigation alternative (F2) and Kalmia Underpass (T2) alternative. The 100-year Containment alternative would provide greater flood protection by limiting the 100-year event flows to the main channel, removing 100 structures (338 dwelling units) from the floodplain designation. The Kalmia Underpass

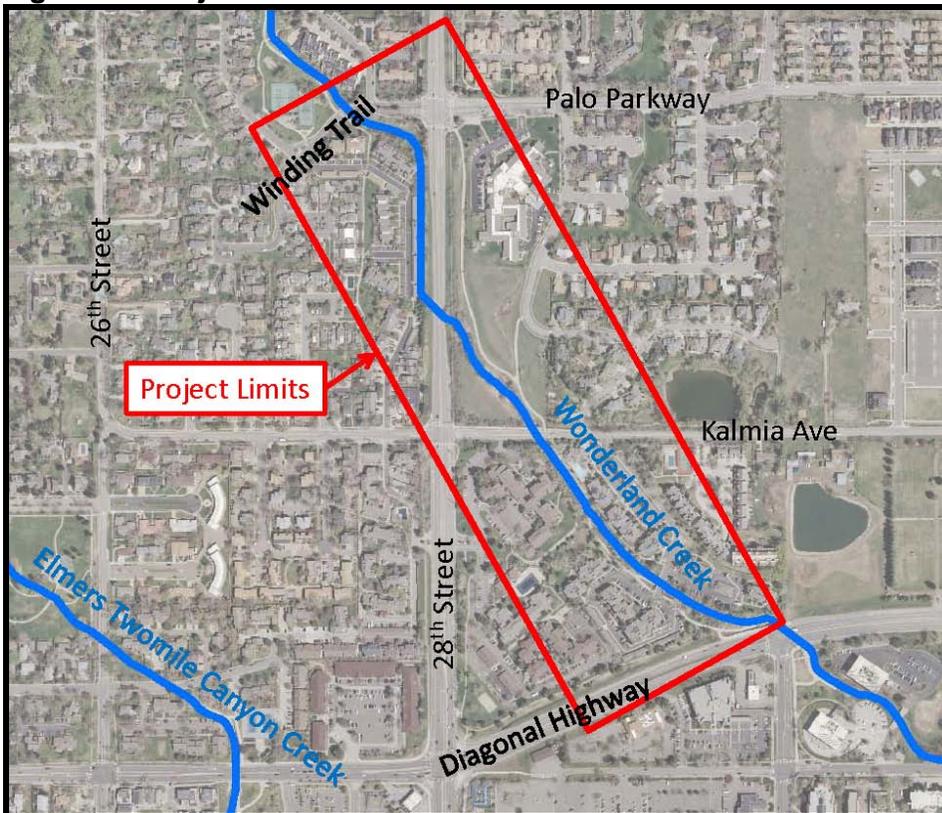
alternative would provide a grade-separated crossing at Kalmia Avenue, reducing pedestrian and bicycle conflicts with vehicular traffic. Total estimated design and construction cost of the recommended alternatives is \$5.48 million. Completed comments from the Oct. 11, 2012 open house indicate a preference (12-3) for these alternatives. It is, however, recognized that construction of either of the flood mitigation alternatives would result in substantial impacts to the riparian area, particularly between the Diagonal Highway and Kalmia Avenue. As a result, every effort will be made during the design phase to minimize impacts to the existing riparian area and provide mitigation including a careful evaluation to save trees and replanting lost vegetation with native species.

The city was awarded a Transportation Improvement Program (TIP) grant for \$900,000 and the Urban Drainage and Flood Control District (UDFCD) has currently committed \$250,000. Funding is shown in the Greenways and Flood Utilities CIP for years 2013 to 2015 totaling \$5,465,000 for this project reach.

1.0 DESCRIPTION AND LOCATION OF THE PROJECT

The Wonderland Creek 28th Street Greenways Improvement Project extends from Winding Trail in the north to the Diagonal Highway in the south (**Figure 1.0**). The purpose of the project is to provide flood mitigation and improved trail connections in the project reach including a proposed pedestrian and bicycle underpass at 28th Street.

Figure 1.0 Project Location



2.0 BACKGROUND, PURPOSE AND NEED FOR THE PROJECT

In 2009, the city completed a flood mitigation study for Fourmile Canyon Creek and Wonderland Creek. Stream segments along both creeks were evaluated to identify flood mitigation alternatives including no mitigation, high hazard zone mitigation and 100-year containment mitigation. This project reach was identified for flood mitigation.

The existing 100-year floodplain along the project reach extends far beyond the creek banks, particularly on the south side of the channel, and includes 28 structures (337 dwelling units). One structure (2800 Kalmia) is located within the existing High Hazard Zone. **Figure 2.1** presents existing floodplain conditions. Due to the high cost of constructing flood mitigation improvements, City Council felt that projects should focus on high hazard containment unless substantial outside funding can be secured.

A multi-use path exists along Wonderland Creek from 26th Street to 30th Street including an underpass at the Diagonal Highway. An underpass does not currently exist at 28th Street. A project is under design to extend the multi-use path along Wonderland Creek from 30th Street to Foothills Parkway with construction anticipated in 2015. The Greenways Master Plan and Transportation Master Plan show a proposed pedestrian and bicycle underpass at Wonderland Creek and 28th Street. **Figure 2.2** presents the existing path system in the project area.

The city was awarded a Transportation Improvement Program (TIP) grant for \$900,000 and the Urban Drainage and Flood Control District (UDFCD) is providing \$250,000 towards this project. Funding is shown in the Greenways and Flood Utilities 2012-2017 CIP for flood mitigation, a multi-use path connection and environmental restoration for this project reach. Total available project funding is \$5,465,000 through 2016.

The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. The purpose of the CEAP is to assess potential impacts of conceptual project alternatives in order to inform the selection and refinement of a preferred alternative. The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing a project against the policies outlined in the Boulder Valley Comprehensive Plan and department master plans.

Figure 2.1: Existing Conditions Floodplains

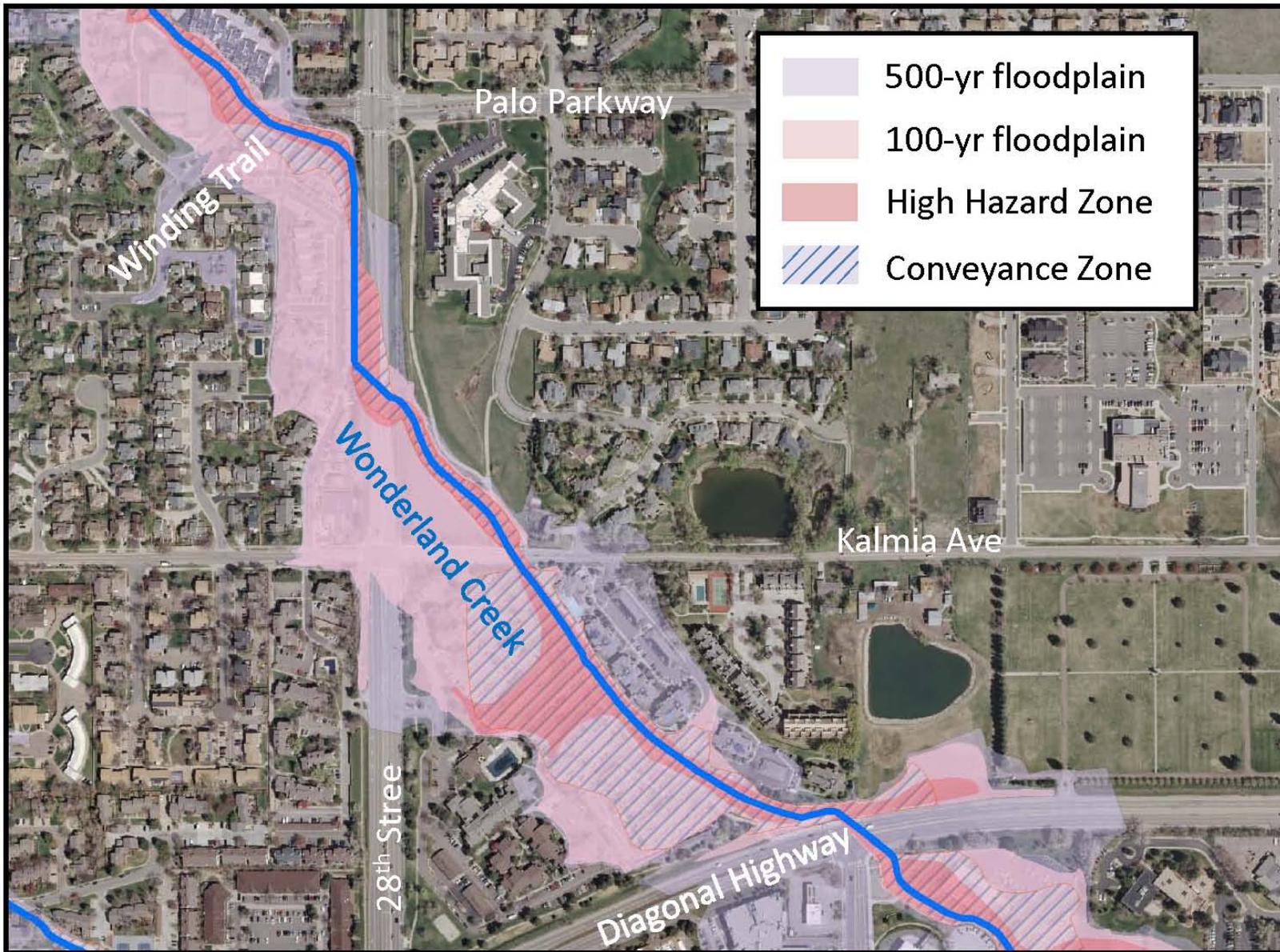
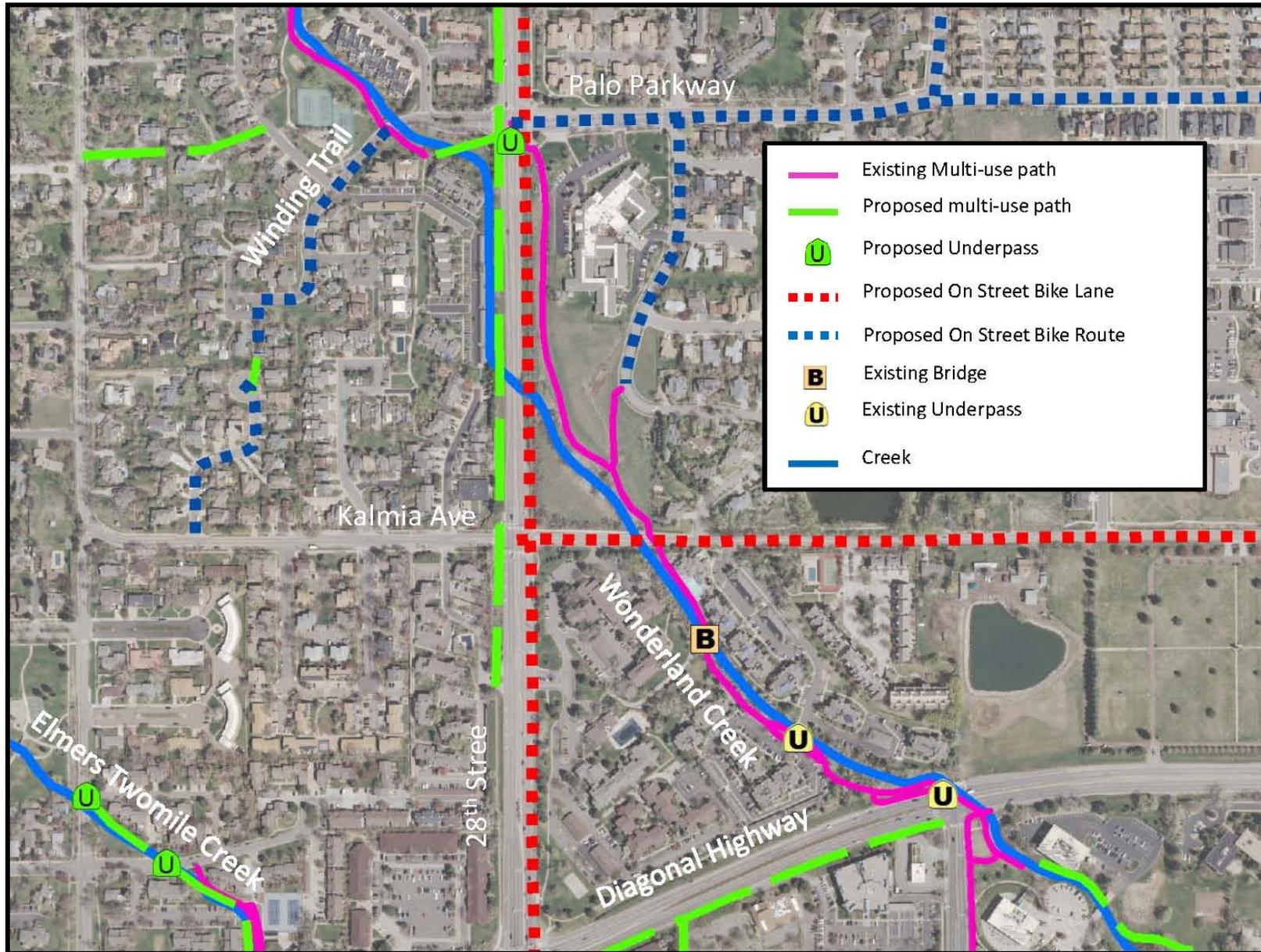


Figure 2.2: Existing and Proposed Connections (Adopted in City Master Plans)



3.0 DESCRIPTION OF PROJECT ALTERNATIVES AND SUMMARY OF MAJOR ISSUES

Description of Project Alternatives

Project alternatives fall into two categories, flood improvements and trail connections.

Flood Improvements

The flood improvements category has three alternatives. The first alternative would make channel improvements required to contain the High Hazard Zone (F1); the second alternative would make channel improvements required to provide 100-Year Containment (F2) and the third alternative (F3) would include channel improvements upstream of Kalmia Avenue but provide a high flow bypass pipeline to convey flow between Kalmia Avenue and the Diagonal Highway. The High Hazard Zone is defined by the city as the drainage area where depth and velocity of water during a 100-year flood pose a threat to life and safety. It should be noted that the city cannot construct only the upstream portion of this project (Kalmia Avenue to Winding Trail) without constructing the downstream segment also because of the need to avoid downstream negative impacts to the floodplain.

F1 (High Hazard Zone Containment)

Proposed improvements for this alternative would limit the High Hazard Zone (HHZ) to the channel, resulting in one structure no longer in the HHZ and 16 structures no longer in the 100-year floodplain (292 dwelling units). Concept-level cost for this alternative is \$4.2 million (no purchase of easements is required). **Figure 3.1** presents the HHZ Containment alternative. **Figure 3.2** shows the structures that would no longer be located in the 100-year floodplain under this alternative.

This alternative would include the following items:

- Construct a bridge and pedestrian / bicycle underpass at 28th Street (20' W x 9' H) with upstream channel transition and low-flow trail crossing
- Construct an approximately 200 feet-long pedestrian trail and low-flow trail crossing between 28th Street and Winding Trail
- Construct an approximately 715 feet-long, seven feet deep overflow channel from 28th Street to the existing open channel
- Add an additional box culvert to increase conveyance capacity (5'W x 6'H) to the existing Kalmia Avenue crossing (construction of a pedestrian and bicycle underpass would require a larger structure – see Trail Improvements below)
- Install a culvert (6'W x 2'H) on the south side of Kalmia Avenue under 28th Street to provide cross drainage from west to east under 28th Street
- Replace an existing pedestrian crossing located approximately 400 feet downstream of Kalmia Avenue with a clear span bridge
- Replace a fire access crossing located approximately 400 feet upstream of Highway 119 (Diagonal Highway) with 40feet-long twin box culverts (20'W x 9'H)
- Construct two 2.5 feet-high stepped boulder walls along the south channel bank from Kalmia Avenue to Highway 119 (Diagonal Highway)

F2 (100-Year Containment)

Proposed improvements for this alternative would limit the 100-year floodplain to the channel, resulting in 28 structures no longer in the 100-year floodplain (337 dwelling units). The concept-level cost for this alternative is \$5.42 million (purchase of easement is not required). **Figure 3.3** presents the 100-year Containment alternative. **Figure 3.4** shows the structures that would no longer be located in the 100-year floodplain under this alternative.

This alternative would include the following items:

- Replace the existing Winding Trail Bridge with a new culvert or bridge sized to convey 100-year event flows
- Construct an approximately 200 feet-long pedestrian trail and low-flow trail crossing between 28th Street and Winding Trail
- Construct three two-foot high channel drop structures upstream of 28th Street
- Construct a bridge and pedestrian / bicycle underpass at 28th Street (20' W x 9' H)
- Construct a pedestrian / bicycle underpass at 28th Street and low-flow trail crossing at the downstream side
- Construct an approximately 750 feet-long, nine feet deep overflow channel between 28th Street and Kalmia Avenue
- Construct five two-foot deep drop structures in the lower half of the channel segment between 28th Street and Kalmia Avenue
- Add an additional box culvert (5' W x 6' H) to increase conveyance capacity at the existing Kalmia Avenue crossing (construction of a pedestrian and bicycle underpass would require a larger structure – see Trail Improvements below)
- Replace an existing pedestrian crossing located approximately 400 feet downstream of Kalmia Avenue with a clear span bridge
- Construct an approximately 1,200 feet-long, stepped boulder wall channel between Kalmia Avenue and Highway 119 (Diagonal Highway) including five two-foot high drop structures
- Replace a fire access crossing located approximately 400 feet upstream of Highway 119 (Diagonal Highway) with a new 80 feet-long box culvert 80 feet (20' W x 9' H)

F3 (High Flow Bypass Pipeline)

A third flood mitigation alternative was developed to avoid disrupting the riparian area between Kalmia Avenue and the Diagonal Highway. As shown on **Figure 3.5**, both alternatives F1 and F2 would require construction of a new channel the full width of the existing drainage easement (50 feet wide) and therefore result in similar impacts to the riparian area. This third alternative would construct a bypass pipeline to convey 100-year event flood waters that exceed the capacity of the existing open channel between Kalmia Avenue and the Diagonal Highway. The 100-year flood flow is 2,244 cfs and the existing channel can convey 800 cfs without overtopping the banks and cause flooding. The bypass pipeline would convey the difference in flow of 1,444 cfs between the 100-year event flow and the open channel conveyance capacity. A twin 16 feet wide by five feet high box culvert would be constructed from just upstream of Kalmia Avenue to just upstream of the Diagonal Highway. The pipeline would be constructed under driveways and parking areas located in parcel 2800 Kalmia Avenue, require a 50 feet wide easement and require relocating a sanitary sewer line and water lines. The remainder of the features associated with this alternative is identical to the 100-year Containment Alternative (F2) from Winding Trail to

Kalmia Avenue. The estimated cost of this alternative is \$7.5 million (\$4.9 million for the pipeline portion of the project). **Figure 3.6** presents this alternative.

Trail Improvements

Two alternatives are presented for trail improvements. The alternatives are nearly identical with the exception that the first alternative (T1) would maintain the existing at-grade crossing of Kalmia Avenue and the second (T2) would provide a pedestrian and bicycle underpass crossing of Kalmia Avenue. **Figure 3.7** presents alternative T1; **Figure 3.8** presents alternative T2.

T1 (At-grade crossing of Kalmia)

This alternative would maintain the existing at-grade crossing at no additional project cost.

T2 (Kalmia Underpass)

This alternative would include a pedestrian and bicycle underpass at Kalmia Avenue. This would require removing, lowering and replacing approximately 200 feet of trail on the north side of the channel upstream of Kalmia Avenue, constructing a pedestrian and bicycle underpass at Kalmia Avenue and ramps to Kalmia Avenue. The additional cost to construct the underpass is approximately \$203,000 if coupled with the High Hazard Containment Alternative, \$60,000 if coupled with the 100-Year channel alternative and \$395,000 if coupled with the high flow bypass pipeline alternative.

Table 3.1 presents a summary comparison of project alternatives. **Table 3.2** presents a summary of major issues related to the alternatives. The greatest impact from this project would be from the construction of the flood mitigation alternatives. The reach from Winding Trail to Kalmia Avenue includes sparse vegetation that includes invasive species. Construction of the new channel in this reach would result in an overall enhancement of habitat and aesthetics.

Construction of a new channel (alternatives F1 and F2) between Kalmia Avenue and the Diagonal Highway would result in disruption of approximately 1.3 acres of riparian habitat. This narrow, forested corridor (50 feet wide) contains habitat typically used by urban tolerant species including migratory and nesting birds, roosting raptors, mammals of all sizes such as deer, fox, raccoons and rabbits. The impact of removing this habitat will not result in eliminating species, as these species are found in other urban parcels, however, it does reduce the amount of habitat available to urban tolerant species. The corridor would be planted with native species following construction and would grow to full coverage over time. Construction of the high flow bypass pipeline alternative (F3) would avoid disrupting the habitat in this area but at a much greater cost. The bypass pipeline alternative would also cause temporary disruption to parking and access to adjacent properties and require purchase of easements.

Table 3.1: Project Alternatives Summary Comparison

Alternatives	Concept-Level Cost Estimate ¹	Major Differences Between Alternatives
F1 (HHZ Containment)	\$4,200,000	<ul style="list-style-type: none"> • Removes one structure from the High Hazard Zone and 16 structures from the 100-year flood designation (292 dwelling units) • Requires drainage ditch and culvert on south side of Kalmia from 28th Street
F2 (100-Yr Containment)	\$5,420,000	<ul style="list-style-type: none"> • Removes 28 structures (337 dwelling units) from the 100-year floodplain designation at a higher cost than Alt. F1 • Requires replacing Winding Trail crossing • Requires channel drop structures and larger bypass channel and channel between Kalmia and the Diagonal Highway • Requires removing and lowering 200 feet of trail upstream of Kalmia
F3 (100-Yr Containment with Bypass Pipeline)	\$7,476,000	<ul style="list-style-type: none"> • Removes 28 structures (337 dwelling units) from the 100-year floodplain designation at a higher cost than Alt. F1 or F2 • Requires replacing Winding Trail crossing • Requires removing and lowering 200 feet of trail upstream of Kalmia • Requires construction of a twin 16' x 5' box culvert from Kalmia to Diagonal Highway
T1 (At-grade crossing of Kalmia)	\$0	<ul style="list-style-type: none"> • Maintains existing at-grade crossing of Kalmia
T2 (Kalmia Underpass)	\$203,000 (with HHZ Alt.) \$60,000 (with 100-Yr Alt.) \$395,000 (with Pipeline Alt.)	<ul style="list-style-type: none"> • Provides a pedestrian and bicycle underpass at Kalmia

Table 3.2: Issues Summary

Alternative	Issues			
	Greatest Flood Protection	Impacts	Safest Trail	In Approved Plan
F1: High Hazard Containment (\$4,200,000)		Similar habitat impacts to HHZ alt.		X
F2: 100-Year Containment (\$5,420,000)	X	Similar habitat impacts to 100-yr alt.		X
F3: 100-Yr Containment with Bypass Pipeline (\$7,476,000)	X	Least riparian impacts, greatest construction impacts to access and parking		X
T1: At-Grade Kalmia Crossing (\$0)		X		X
T2: Kalmia Underpass (\$203,000 with HHZ Alt., \$60,000 with 100-Year Alt. and \$395,000 with High Flow Bypass Pipeline Alt.)			X	

Figure 3.1: High Hazard Zone Containment (F1)

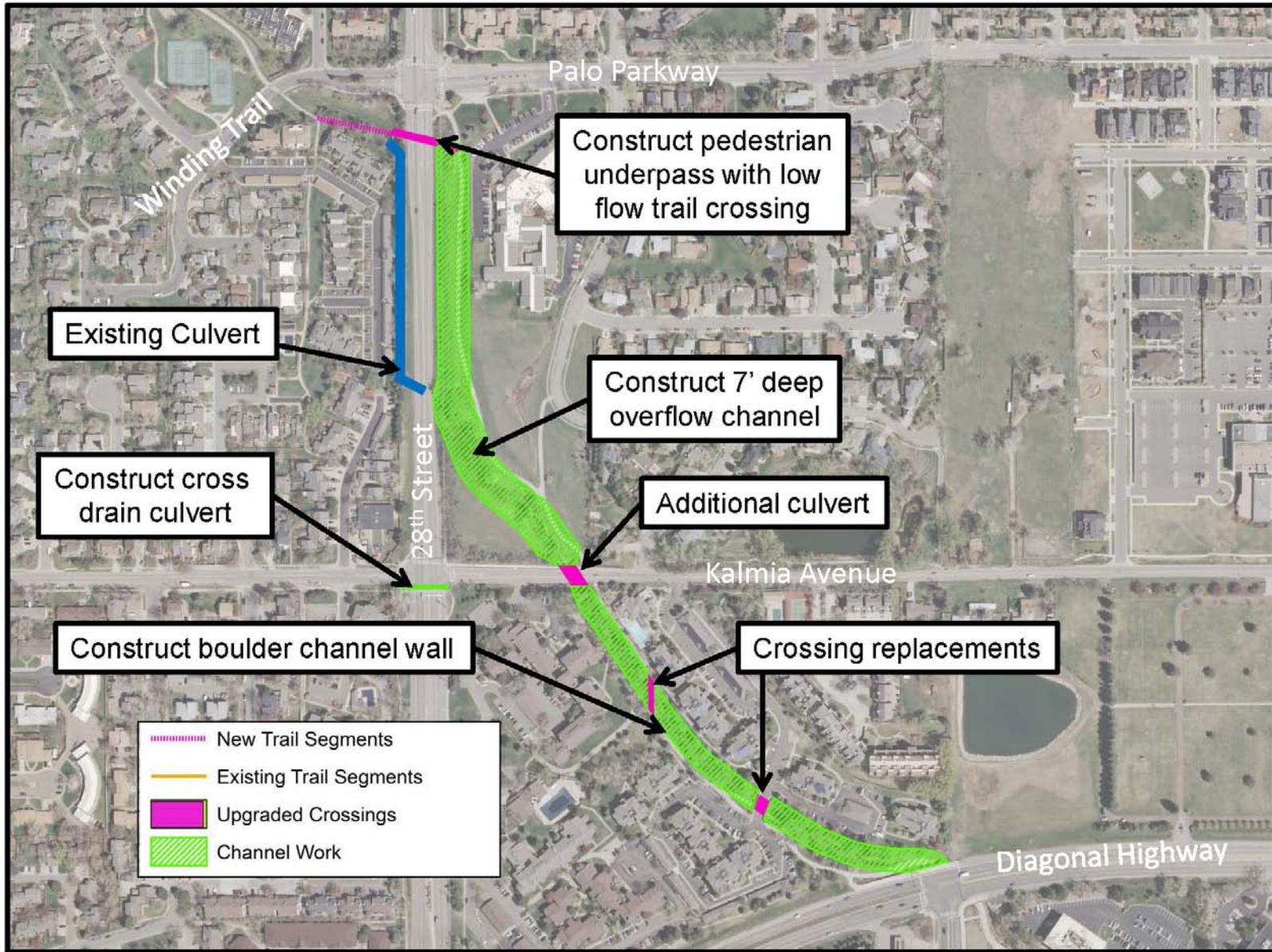


Figure 3.2: HHZ Containment (F1) Structures No Longer in Floodplain

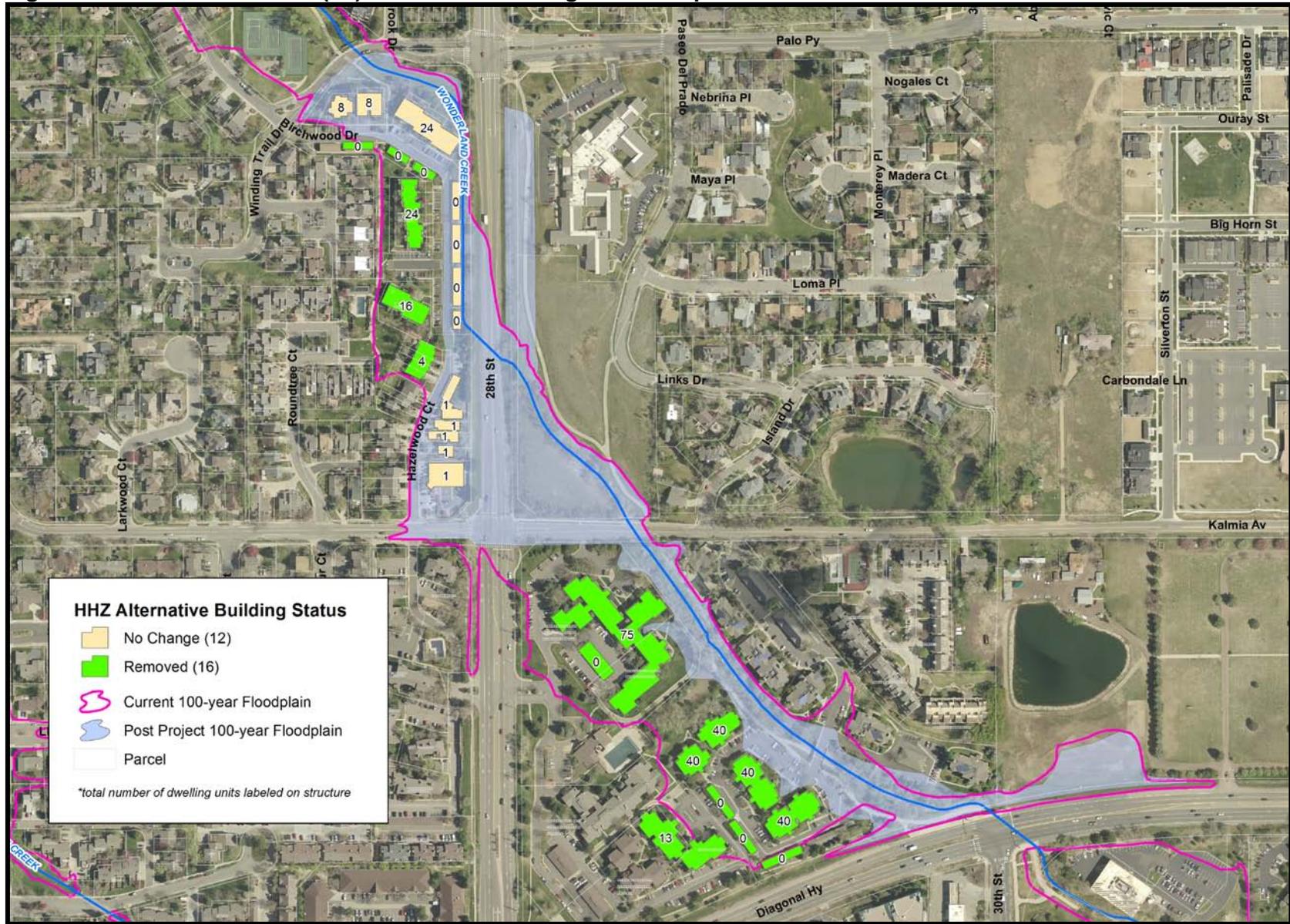


Figure 3.3: 100-Year Containment (F2)

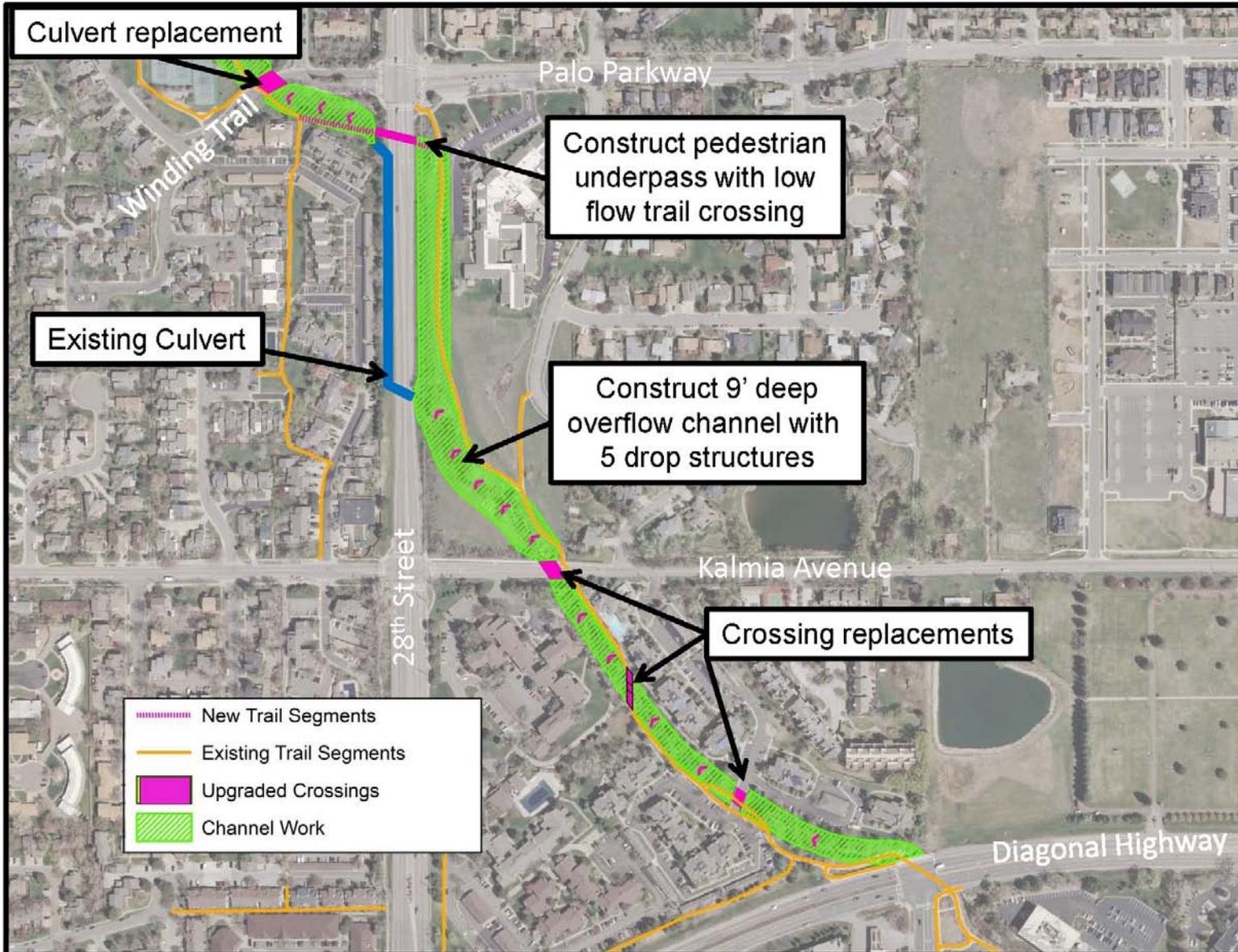


Figure 3.4: 100-Year Alternative (F2) Structures No Longer in Floodplain

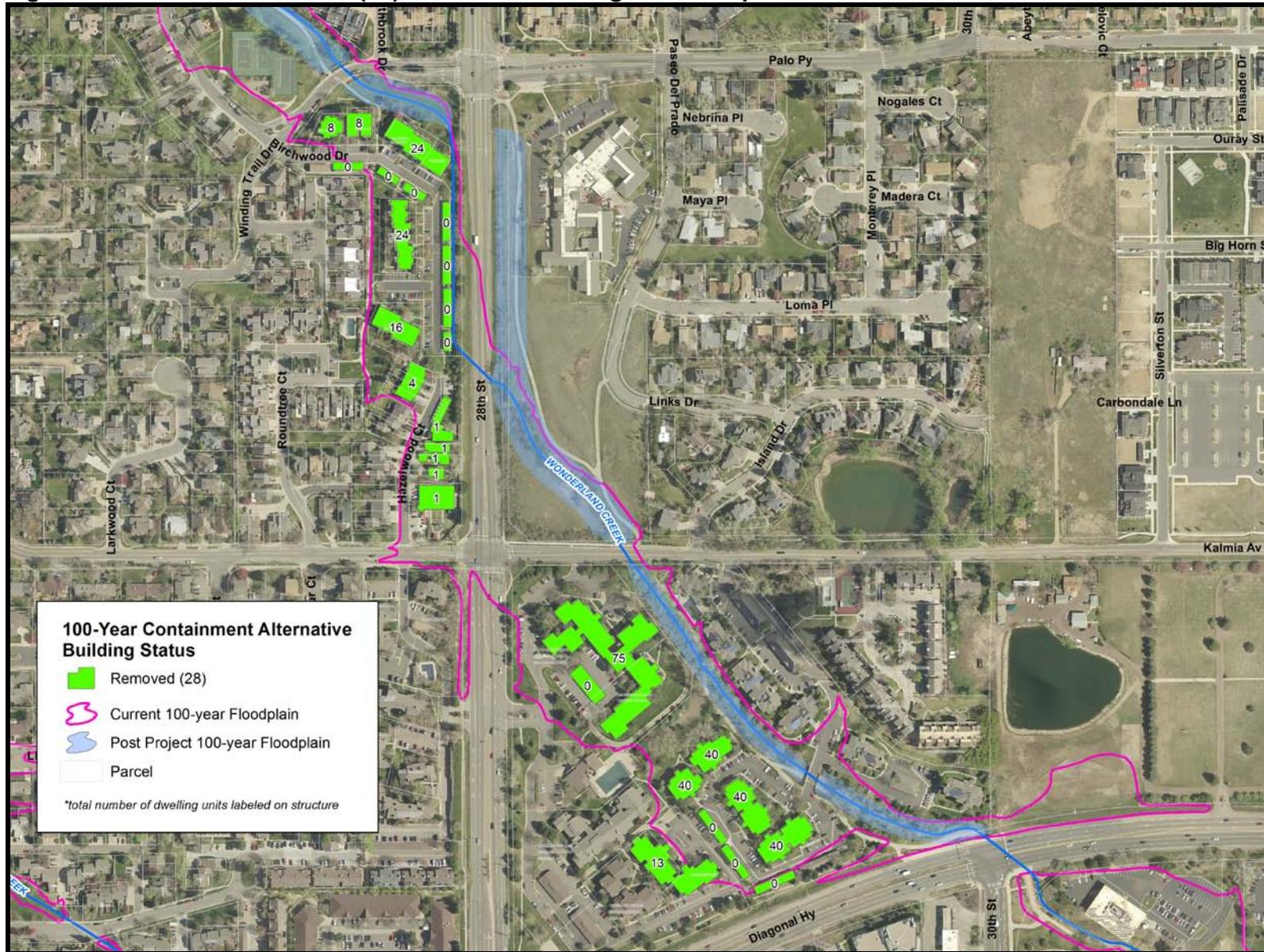


Figure 3.5: Diagonal Highway to Winding Trail Segment

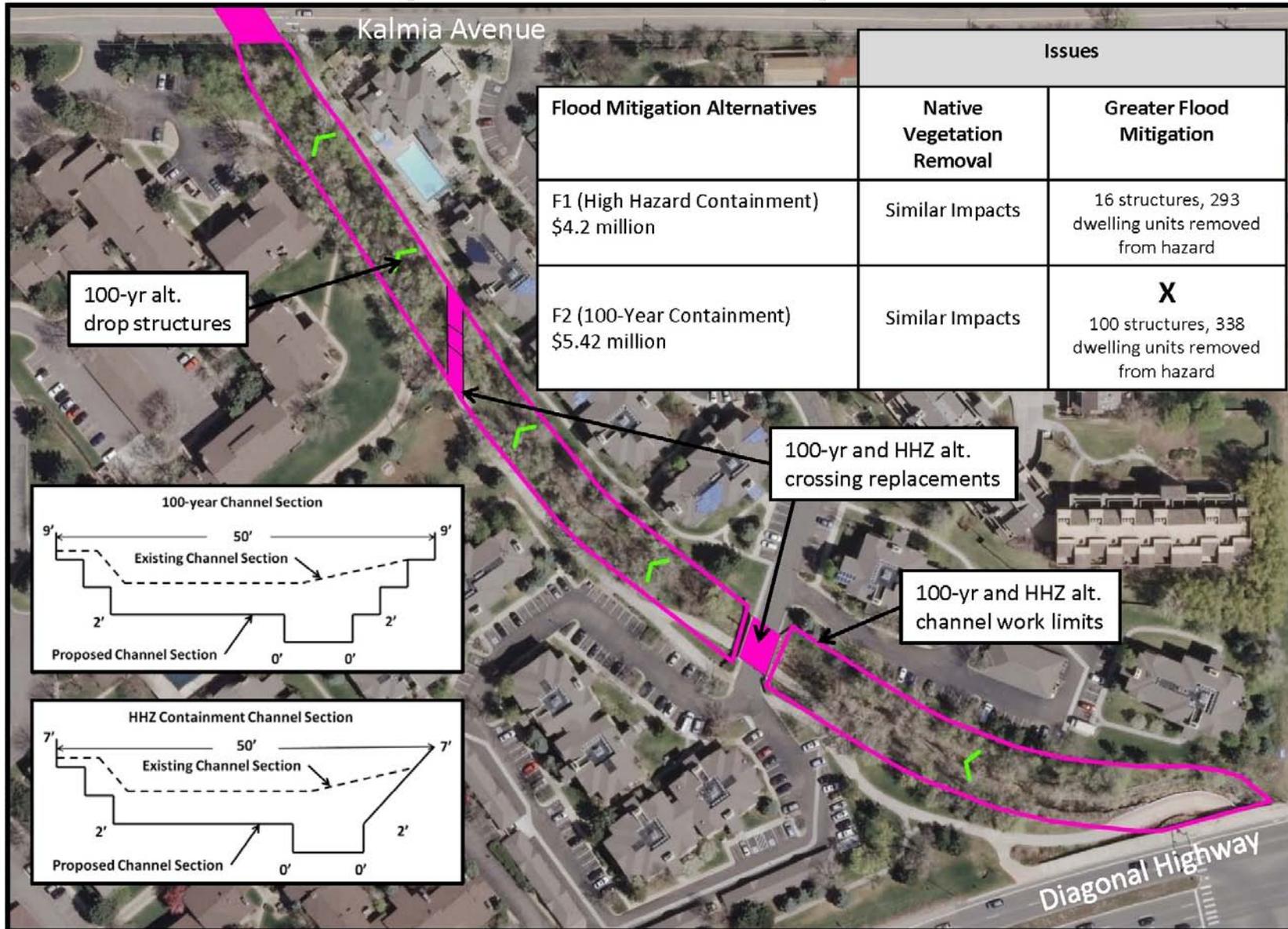


Figure 3.6: 100-Year Containment Bypass Pipeline Alternative (F3)

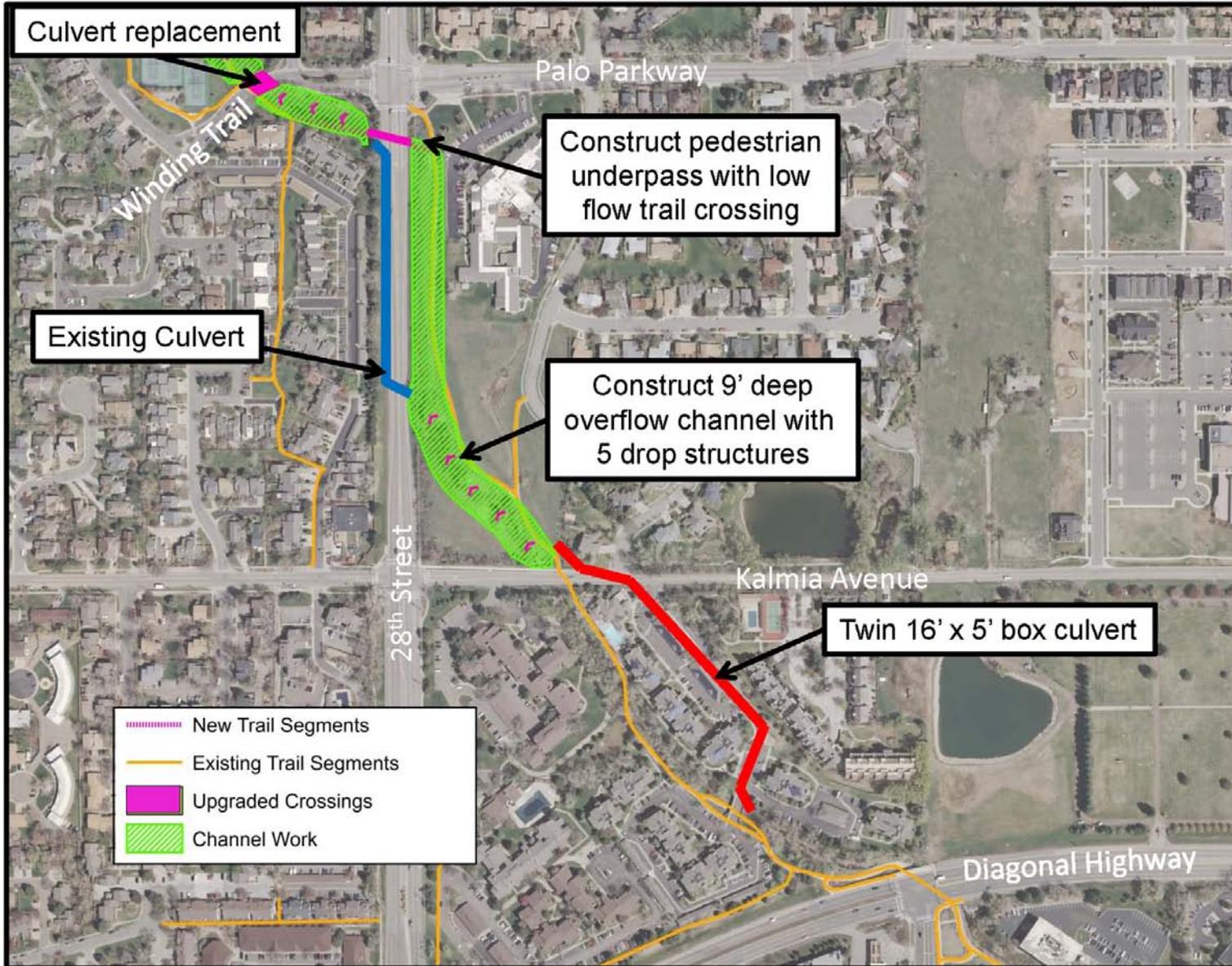


Figure 3.7: At-Grade Kalmia Crossing Trail Connection Alternative (T1)



Figure 3.8: Kalmia Underpass Trail Connection Alternative (T2)



4.0 PERMITS, WETLANDS PROTECTION AND HABITAT ENHANCEMENT

Construction of the project components may require the following permits:

- Colorado Department of Public Health and Environment Colorado Stormwater Discharge Permit (Construction Activity General Permit and Stormwater Management Plan)
- City of Boulder Floodplain Development Permit
- City of Boulder Wetlands Permit
- United States Army Corps of Engineers 404 Wetlands Permit
- Colorado Department of Public Health and Environment Colorado Construction Dewatering Permit
- City of Boulder construction dewatering discharge agreement

All proposed improvements are located within the city and therefore a County Areas and Activities of State Interest 1041 Review Application will not be required.

A comprehensive Greenways Riparian Habitat Assessment was completed in 1999 as part of the Greenways Master Plan. The riparian habitat was evaluated based on the quality of vegetation (native or non-native), the vegetative structure and the quality of the habitat based on the presence of bird species. Each stream reach was rated for each of these criteria, with a rating of very poor to excellent. Wonderland Creek within the proposed project area received the following ratings:

- Bird habitat – poor
- Vegetative structure - good
- Native plant habitat - poor
- Aquatic Habitat - poor to fair
- Streambed - poor to fair
- Channel Morphology - poor
- Bank Stabilization - fair
- Vegetative Bank Stability - fair to good

The Greenways Master Plan also ranked each of the six Greenways objectives for each stream reach for the purpose of balancing conflicting interests at the time a project is being undertaken. Each objective was given a low to high rank based on specific criteria outlined in the Master Plan. Wonderland Creek within the proposed project area received the following rankings:

- Habitat: High
- Water Quality: Medium
- Transportation: High
- Recreation: Low
- Flood: High

The proposed flood improvement will impact wetlands and waters of the U.S. The city's wetland regulations require evaluating alternatives that would reduce wetland impacts. Avoiding impacts to approximately 1.3 acres of riparian area in this reach could be avoided by constructing a high flow bypass pipeline. This pipeline would convey flows that exceed the existing open channel capacity at a cost of an additional approximately \$2 million (\$2.5 million if coupled with an underpass at Kalmia Avenue). Construction of the 32 feet wide by 5 feet high pipeline would require purchase of easements and extensive impacts to the residential units located at 2800

Kalmia Avenue. The pipeline would also increase long-term maintenance costs. Every effort will, therefore, be made during the design phase to minimize impacts to the existing riparian area and provide mitigation including a careful evaluation to save trees and replanting lost vegetation with native species.

5.0 PREFERRED PROJECT ALTERNATIVE

The following presents staff recommendations.

Flood Mitigation

The 100-year Containment Channel Alternative (F2) for flood mitigation is recommended. It would provide the greatest level of flood protection by limiting the 100-year event flows to the main channel, removing 28 structures (337 dwelling units) from the floodplain designation. Completed comments from the Oct. 11, 2012 open house indicate a preference (12-3) for these alternatives.

It is, however, recognized that construction of the flood mitigation alternative would result in substantial impacts to the riparian area, particularly between the Diagonal Highway and Kalmia Avenue (approximately 1.3 acres of riparian area would be disturbed). The 1999 Greenways Habitat Assessment rated the stream reach from the Diagonal Highway to Winding Trail as follows:

- Bird habitat - poor
- Vegetative structure - good
- Native habitat - poor

Every effort will, however, be made during the design phase to minimize impacts to the existing riparian area and provide mitigation including a careful evaluation to save trees and replant lost vegetation with native species.

The estimated conceptual-level construction cost for this alternative is \$5.42 million. The incremental cost (\$1.22 million) to construct the 100-year containment channel alternative instead of the high hazard zone alternative will pay for itself in the reduction in flood insurance paid by property owners over a 30-year mortgage and the reduced risk of flood damage. Avoiding impacts to this segment of the stream can be accomplished by construction of the high flow bypass pipeline alternative (F3). This alternative, however, would cost an additional \$2 million dollars (\$2.5 million if coupled with an underpass at Kalmia Avenue) and would require acquisition of easements. Construction of this alternative would also result in extensive impacts to the multi-family residential units located at 2800 Kalmia Avenue including access drives, parking areas and water and sewer facilities.

Trail Connections

The underpass at Kalmia Avenue Alternative (T2) is recommended. This alternative would provide a grade-separated crossing at Kalmia Avenue, reducing pedestrian and bicycle conflicts

with vehicular traffic. The public overwhelmingly (12-3) preferred this alternative as noted on comment sheets received from the open house. Five additional e-comments stated support for an underpass at Kalmia Avenue as of Nov. 16, 2012. The additional estimated conceptual-level construction cost for this alternative is \$60,000.

6.0 PUBLIC INPUT

Staff conducted an open house on October 11, 2012 that presented three projects located in northeast Boulder (Wonderland Greenways Improvement Project – Foothills Parkway to 30th Street, Wonderland Creek Greenways Improvement Project – Diagonal Highway to Winding Trail and Foothills Parkway – Diagonal Highway to Valmont Road). The open house was advertized via a mailing of 4,035 post cards and the meeting was advertized on the project web site. In addition, emails were sent to people who had provided contact information for the Wonderland Creek Foothills Parkway to 30th Street Greenways Improvement Project.

Thirty nine people attended and 14 comment sheets were submitted relating to this CEAP. The following provides a summary of the written comments:

- Three people listed the High Hazard Containment Alternative (F1) as their first choice
- Twelve people listed the 100-year Containment Alternative (F2) as their first choice
- Three people listed the Kalmia At-Grade Crossing Alternative (T1) as their first choice
- Twelve people listed the Kalmia Underpass Alternative (T2) as their first choice

It should be noted that the third flood mitigation alternative was considered following the Oct. 11, 2012 open house as a result of city staff interest in identifying an alternative that had less of an impact on riparian habitat. A summary of the open house public comments is provided as **Attachment 1**.

7.0 STAFF PROJECT MANAGER

The project is managed by Kurt Bauer (Engineering Project Manager) with support from Annie Noble (Greenways Coordinator) and Marni Ratzel (Transportation Planner II). Project coordination will occur during design of the 28th Street underpass to ensure compatibility and connectivity with the multi-use path extension proposed for the west side of 28th Street. Debbie Ritter (Transportation) is project manager for the 28th Street multi-use path extension project.

8.0 OTHER CONSULTANTS OR RELEVANT CONTACTS

Conceptual level design for project elements was taken from the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011). Engineering services supporting the Plan were provided by Belt Collins West. Centennial Engineering provided cost estimates for the 100-year containment flood mitigation alternative in support of a grant submittal. Muller Engineering developed the bypass pipeline alternative and will provide engineering design of selected project features.

9.0 GOALS ASSESSMENT

1) Using the Boulder Valley Comprehensive Plan and department master plans, describe the primary city goals and benefits that the project will help to achieve:

a) Community Sustainability Goals – How does the project improve the quality of economic, environmental and social health with future generations in mind?

The project's proposed trail components will help to achieve Boulder Valley Comprehensive Plan's Sustainability Framework Policies by working to extend the built environment mobility grid, help create a sustainable urban form, enhance quality of life within the city and reduce greenhouse gas emissions. The proposed flood mitigation component will work to mitigate geologic and natural hazards by reducing the flood hazard along Wonderland Creek.

b) BVCP Goals related to:

■ Community Design

The project's proposed trail components match the BVCP Sustainable Urban Form Definition by extending the pedestrian and bike-friendly mobility grid.

■ Facilities and Services

The proposed project includes transportation and flood improvements. These facilities further the BVCP Utility and Parks and Trails policy goals.

■ Environment

The proposed trail components will work to encourage more people to use alternative modes of transportation, thereby reducing greenhouse gas emissions.

The city values wildlife and wildlife habitat as identified in the BVCP: The city recognizes the intrinsic value of wildlife in both the urban and rural setting. The city will practice wildlife management to minimize conflicts with residents and urban land uses while identifying, preserving and improving appropriate habitat for wildlife in the urban area. It is recognized that construction of the recommended flood mitigation alternative would result in impacts to the riparian area. The segment from Winding Trail to Kalmia Avenue is currently sparsely vegetated and includes numerous invasive species. The recommended alternative would result in planting of native species and enhancement of habitat in this reach. The reach between Kalmia Avenue and the Diagonal Highway would result in disturbance of approximately 1.3 acres of riparian area. This reach was noted in the 1999 Greenways Habitat Assessment as having poor bird and native habitat but good vegetative cover (it contains mature and thick vegetation). No threatened or endangered species are known to inhabit this reach but it does support urban wildlife. An evaluation of the feasibility of leaving this segment of stream intact and bypassing high flows in a pipeline (alternative F3) proved prohibitively expensive. Every effort will, however, be made during the design phase to minimize impacts to the existing riparian area and provide mitigation including a careful evaluation to save trees and replant lost vegetation with native species.

- **Economy**
This project will help to create a strong and complete transportation system – noted in the BVCP as necessary for a thriving economy - by enhancing the pedestrian and bicycle trail system.
- **Transportation**
The proposed trail components will work to encourage more people to use alternative modes of transportation, thereby reducing greenhouse gas emissions, a goal of the BVCP and the Climate Action Plan.
- **Housing**
The proposed flood mitigation improvements will reduce the flood risk for up to 100 structures (338 dwelling units) located along Wonderland Creek.
- **Social Concerns and Human Services**
The proposed underpasses at 28th Street and Kalmia Avenue will reduce pedestrian and bicycle conflicts with vehicles, thus improving safety. The flood mitigation improvements will greatly reduce the flood risk along Wonderland Creek.

c) Describe any regional goals (potential benefits or impacts to regional systems or plans?)
This project will work to complete (and enhance) the regional mobility grid by extending the multi-use path system as presented in the North Boulder Subcommunity, Transportation and Greenways Master Plans.

- 2) Is this project referenced in a master plan, subcommunity or area plan? If so, what is the context in terms of goals, objectives, larger system plans, etc.? If not, why not?
The proposed pedestrian and bicycle underpass at 28th Street and Wonderland Creek is shown in both the Greenways Master Plan and the Transportation Master Plan. The proposed underpass at Kalmia is, however, not shown in these plans. A key goal of all three plans is to provide and improve pedestrian and bicycle connections where they are needed but currently missing or substandard. The flood mitigation measure proposed with this project is identified as a priority in the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan. Completion of this project will fulfill these important plan components.
- 3) Will this project be in conflict with the goals or policies in any departmental master plan and what are the tradeoffs among city policies and goals in the proposed project alternative? (e.g. higher financial investment to gain better long-term services or fewer environmental impacts)
The city values and supports the protection of wildlife habitat. The recommended flood mitigation alternatives will impact existing riparian habitat, particularly between Kalmia Avenue and the Diagonal Highway. Avoiding impacts to approximately 1.3 acres of riparian area in this reach could be avoided by constructing a high flow bypass pipeline. This pipeline would convey flows that exceed the existing open channel capacity at a cost of an additional approximately \$2 million (\$2.5 million if coupled with an underpass at Kalmia Avenue). Construction of the 32 feet wide by 5 feet high pipeline would require purchase of

easements and extensive impacts to the residential units located at 2800 Kalmia Avenue. The pipeline would also increase long-term maintenance costs. As a result, the open channel 100-year containment alternative is recommended. All efforts will be made during the design phase to keep as many existing trees as possible, construct as natural a channel as possible and include extensive native plantings. Habitat enhancements will be included as part of the design to enhance what the 1999 Greenways Habitat Assessment defined as poor bird and native species habitat in this reach.

- 4) List other city projects in the project area that are listed in a departmental master plan or the CIP.

The Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan recommends construction of flood improvements downstream along Wonderland Creek to Foothills Parkway. A project is currently funded and underway to design these improvements including extension of the multi-use path from Foothills Parkway to 30th Street. A multi-use path is proposed to be constructed on the west side of 28th Street from Iris Avenue to Yarmouth Street. This project would link to the proposed 28th Street and Fourmile Canyon Creek underpass. Private residential developments are proposed along Kalmia Avenue. A multi-family development (Wonderland Creek Townhomes) is proposed for the northeast corner of 28th Street and Kalmia Avenue. A second residential development is proposed for a currently vacant parcel located at 3015 Kalmia Avenue.

- 5) What are the major city, state and federal standards that will apply to the proposed project? How will the project exceed city, state or federal standards and regulations (e.g. environmental, health, safety or transportation standards)?

The project has received federal TIP funding and will need to comply with all grant requirements. In addition, the project's trail system components will be designed to meet or exceed ADA requirements, meet or exceed city and national standards for the development of bikeway facilities, meet or exceed the city's wetland ordinance requirements, include habitat enhancements, meet or exceed Urban Drainage and Flood Control District standards and comply with all required city, state and federal permits.

- 6) Are there cumulative impacts to any resources from this and other projects that need to be recognized and mitigated?

The project will result in temporary impacts to water bodies regulated by the city and habitat during construction that will be fully mitigated based on compliance with the city's wetland ordinance.

10.0 IMPACT ASSESSMENT

The following checklists table identifies potential short and long-term impacts from the project alternatives.

- ++ indicates a high positive effect or improved condition
- + indicates a positive effect or improved condition
- indicates a negative effect or impact
- indicates a high negative effect or impact
- O indicates no effect

Checklist questions are answered following each table for all categories identified as having a potential + or - impact. The preferred alternative components are highlighted in yellow. Individual alternatives were ranked against each other in the following table.

Project Title: Wonderland Creek Diagonal Highway to Winding Trail Project	Alternatives				
	Flood Mitigation			Trail Connections	
	F1 (HHZ Only)	F2 (100-yr)	F3 (High Flow Bypass Pipeline)	T1 (At-grade)	T2 (Underpass)
A. Natural Areas or Features					
a. Construction activities	O	O	-	O	O
b. Native vegetation removal	--	--	-	O	-
c. Human or domestic animal encroachment	O	O	O	O	O
d. Chemicals (including petroleum products, fertilizers, pesticides, herbicides)	O	O	O	O	O
e. Behavioral displacement of wildlife species (due to noise from use activities)	O	O	O	O	O
f. Habitat removal	--	--	-	O	-
g. Introduction of non-native plant species in the site landscaping	O	O	O	O	O
h. Changes to groundwater or surface runoff	O	O	O	O	O
i. Wind erosion	O	O	O	O	O
2. Loss of mature trees or significant plants?	--	--	-	O	-
B. Riparian Areas / Floodplain					
1. Encroachment upon the 100-year, conveyance or high hazard flood zones?	+	++	++	O	O
2. Disturbance to or fragmentation of a riparian corridor?	O	O	O	O	O
C. Wetlands					
1. Disturbance to or loss of a wetland on site?	--	--	-	O	-
D. Geology and Soils					
1. a. Impacts to unique geological or physical features?	O	O	O	O	O
b. Geological development constraints?	O	O	O	O	O
c. Substantial changes in topography?	O	O	O	O	O

d. Changes in soil or fill materials on the site?	0	0	0	0	0
e. Phasing of earth work?	0	0	0	0	0
E. Water Quality					
1. Impacts to water quality from any of the following?					
a. Clearing, excavation, grading or other construction activities	0	0	0	0	0
b. Change in hardscape	0	0	0	0	0
c. Change in site ground features	0	0	0	0	0
d. change in storm drainage	0	0	0	0	0
e. change in vegetation	0	0	0	0	0
f. change in pedestrian and vehicle traffic	0	0	0	0	0
g. pollutants	0	0	0	0	0
2. Exposure of groundwater contamination from excavation or pumping?	0	0	0	0	0
F. Air Quality					
a. From mobile sources?	0	0	0	0	0
b. From stationary sources?	0	0	0	0	0
G. Resource Conservation					
1. Changes in water use?	0	0	0	0	0
2. Increases or decreases in energy use?	0	0	0	0	0
3. Generation of excess waste?	0	0	0	0	0
H. Cultural / Historic Resources					
1. a. Impacts to a prehistoric or archaeological site?	0	0	0	0	0
b. Impacts to a building or structure over fifty years of age?	0	0	0	0	0
c. impacts to a historic feature of the site?	0	0	0	0	0
d. Impacts to significant agricultural land?	0	0	0	0	0
I. Visual Quality					
1. a. Effects on scenic vistas or public views?	-	-	0	0	0
b. Effects on the aesthetics of a site open to public view?	0	0	0	0	0
c. Effects on views to unique geological or physical features?	0	0	0	0	0
D. Changes in lighting?	0	0	0	0	0
J. Safety					
1. Health hazards, odors or radon?	0	0	0	0	0
2. Disposal of hazardous materials?	0	0	0	0	0
3. Site hazards?	+	++	++	0	+
K. Physiological Well-being					
1. Exposure to excessive noise?	0	0	0	0	0
2. Excessive light or glare?	0	0	0	0	0
3. Increase in vibrations?	0	0	0	0	0
L. Services					
1. Additional need for:					
a. Water or sanitary sewer services?	0	0	0	0	0
b. Storm sewer / flood control features?	+	++	++	0	0
c. Maintenance of pipes, culverts and manholes?	-	-	--	0	0
d. Police services?	0	0	0	0	0

e. Fire protection services?	0	0	0	0	0
f. Recreation or parks facilities?	0	0	0	0	0
g. Library services?	0	0	0	0	0
h. Transportation improvements / traffic mitigation?	0	0	0	+	+
i. Parking	0	0	-	0	0
j. Affordable housing?	0	0	0	0	0
k. Open space / urban open land?	0	0	0	0	0
l. Power or energy use?	0	0	0	0	0
m. Telecommunications?	0	0	0	0	0
n. Health care / social services?	0	0	0	0	0
o. Trash removal or recycling services?	0	0	0	0	0
M. Special Populations					
1. Effects on:					
a. Persons with disabilities?	0	0	0	0	0
b. Senior population?	0	0	0	0	0
c. Children or youth?	+	++	++	+	++
d. Restricted income persons	0	0	0	0	0
e. People of diverse backgrounds (including Latino and other immigrants)?	0	0	0	0	0
f. Neighborhoods	+	++	++	+	++
g. Sensitive populations located near the project (e.g. schools, hospitals and nursing homes)?	0	0	0	0	0
N. Economy					
1. Utilization of existing infrastructure?	0	0	0	0	0
2. Effect on operating expenses?	0	0	0	0	0
3. Effect on economic activity?	0	0	0	0	0
4. Impacts to businesses, employment, retail sales or city revenue?	0	0	0	0	0

11.0 CHECK LIST QUESTIONS

Note: The following questions are a supplement to the CEAP checklist. Only checklist items having a – or + anticipated impact have questions answered.

A. Natural Areas

b. Native Vegetation

Flood mitigation measures would require removing native vegetation within an approximately 50-foot wide cross section (approximately 1.3 acres of riparian area) located between Diagonal Highway and Kalmia). Both the flood alternatives would result in similar impacts as the cross sections are similar in width (the 100-year alternative is, however, two feet deeper). Removal of vegetation would be much more extensive from Kalmia to the Diagonal Highway.

Avoiding impacts to approximately 1.3 acres of riparian area in this reach could be avoided by constructing a high flow bypass pipeline. This pipeline would convey flows that exceed the existing open channel capacity at a cost of an additional approximately \$2 million (\$2.5 million if coupled with an underpass at Kalmia Avenue). Construction of the 32 feet wide by 5 feet high pipeline would require purchase of easements and extensive impacts to the residential units located at 2800 Kalmia Avenue. The pipeline would also increase long-term maintenance costs. As a result, the open channel 100-year containment alternative is recommended. All efforts will be made during the design phase to keep as many existing trees as possible, construct as natural a channel as possible and include extensive native plantings. Habitat enhancements will be included as part of the design to enhance what the 1999 Greenways Habitat Assessment defined as poor bird and native species habitat in this reach.

f. Habitat Removal

The 1999 Greenways Habitat Assessment rated the project stream reach as poor for bird habitat and native species. A multi-use trail already exists along the project corridor and wildlife that currently use the corridor are acclimated to the human environment. The project will temporarily remove habitat during construction (see b. above). Disturbed areas will be planted with native vegetation and over time will provide improved habitat.

2. Describe the potential for disturbance to or loss of mature trees or significant plants. – See below

If the potential impacts have been identified, please provide any of the following information that is relevant to the project:

- A description of how the proposed project would avoid, minimize or mitigate identified impacts
- A habitat assessment of the site, including: 1) a list of plant and animal species and plant communities of special concern found on the site; 2) a wildlife habitat evaluation of the site
- Map of the site showing the location of any Boulder Valley Natural Ecosystem, Boulder County Environmental Conservation Area, or critical wildlife habitat – Not Applicable

A comprehensive Greenways Riparian Habitat Assessment was completed in 1999 as part of the Greenways Master Plan. The riparian habitat was evaluated based on the quality of vegetation (native or non-native), the vegetative structure and the quality of the habitat based on the presence of bird species. Each stream reach was rated for each of these criteria, with a

rating of very poor to excellent. Wonderland Creek within the proposed project area received the following ratings:

- Bird habitat – poor
- Vegetative structure - good
- Native plant habitat - poor
- Aquatic Habitat - poor to fair
- Streambed - poor to fair
- Channel Morphology - poor
- Bank Stabilization - fair
- Vegetative Bank Stability - fair to good

The Greenways Master Plan also ranked each of the six Greenways objectives for each stream reach for the purpose of balancing conflicting interests at the time a project is being undertaken. Each objective was given a low to high rank based on specific criteria outlined in the Master Plan. Wonderland Creek within the proposed project area received the following rankings:

- Habitat: High
- Water Quality: Medium
- Transportation: High
- Recreation: Low
- Flood: High

Species that use riparian corridors in developed areas are typically common species tolerant of human encroachment. As a result, although diverse, most plant and wildlife species in urban riparian areas are not unique or uncommon. The city's proposed project would not affect any unique or significant natural resources, but there would be impacts to regulated resources including Wonderland Creek and its riparian areas. The impacts would be addressed through the Clean Water Act Section 404 and City of Boulder Wetland permitting processes. In the event an active raptor nest is present, should an alternative be constructed, the city would comply with the MBTA.

The proposed flood mitigation measures would require removing existing trees and vegetation, particularly from Kalmia Avenue to the Diagonal Highway. The reach from Winding Trail to Kalmia Avenue is currently sparsely vegetated and includes a number of invasive species. Construction of the recommended flood mitigation improvements will enhance the habitat in this reach. Approximately 1.3 acres of densely vegetated riparian area would be disrupted to construct the recommended flood mitigation improvements from Kalmia Avenue to the Diagonal Highway. All efforts will be made during the design phase to keep as many existing trees as possible, construct as natural a channel as possible and include extensive native plantings. Habitat enhancements will be included as part of the design to enhance what the 1999 Greenways Habitat Assessment defined as poor bird and native species habitat in this reach. There are no known sensitive species in the project corridor.

B. Riparian Areas / Floodplains

1. Describe the extent to which the project will encroach upon the 100-year, conveyance or high hazard flood zones – See below

2. Describe the extent to which the project will encroach upon, disturb, or fragment a riparian corridor (this includes impacts to the existing channel of flow, stream banks, adjacent riparian

zone extending 50 feet out from each bank, and any existing drainage from the site to a creek or stream) – See below

If potential impacts have been identified, please provide any of the following information that is relevant to the project:

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts to habitat, vegetation, aquatic life or water quality
- A map showing the location of any streams, ditches and other water bodies on or near the project site
- A map showing the location of the 100-year flood, conveyance, and high hazard flood zones relative to the project site

Figure 2.1 presents existing floodplain conditions. Both flood mitigation alternatives would require construction within the riparian area. The High Hazard Containment alternative would reduce the flood risk for one structure currently located in the High Hazard Zone and 16 structures currently located in the 100-year floodplain (293 dwelling units). The 100-Year Containment alternative would reduce the flood risk for one structure currently located in the High Hazard Zone and 100 structures currently located in the 100-year floodplain (338 dwelling units). Construction of project elements located within the wetlands buffer would be fully mitigated based on the City of Boulder’s wetland permit.

C. Wetlands

1. Describe any disturbance to or loss of a wetland on site that may result from the project. – See below

If potential impacts have been identified, please provide any of the following information that is relevant to the project:

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A map showing the location of any wetlands on or near the site. Identify both those wetlands and buffer areas which are jurisdictional under city code (on the wetlands map in our ordinance) and other wetlands pursuant to federal criteria (definitional).

The proposed flood mitigation alternatives would directly impact wetlands. The city’s wetland regulations require evaluating alternatives that would reduce wetland impacts. Avoiding impacts to approximately 1.3 acres of riparian area in this reach could be avoided by constructing a high flow bypass pipeline. This pipeline would convey flows that exceed the existing open channel capacity at a cost of an additional approximately \$2 million (\$2.5 million if coupled with an underpass at Kalmia Avenue). Construction of the 32 feet wide by 5 feet high pipeline would require purchase of easements and extensive impacts to the residential units located at 2800 Kalmia Avenue. The pipeline would also increase long-term maintenance costs. Work and corresponding mitigation would be done in compliance with the city’s wetland permit requirements.

I. Visual Quality

1.a. Effects on scenic vistas or public views:

Approximately 1.3 acres of densely vegetated riparian area would be disrupted to construct the recommended flood mitigation improvements from Kalmia Avenue to the Diagonal Highway. Multi-family residential units, particularly those located on 2800 Kalmia Avenue, along with trail

users currently enjoy this fully grown riparian area. All efforts will be made during the design phase to keep as many existing trees as possible, construct as natural a channel as possible and include extensive native plantings. Over time, this riparian area will grow to maturity but may not be as dense as current conditions.

L. Services

1. Describe any increased need for the following services as a result of the project:

b. Storm sewer / flood control features

The proposed flood mitigation measures would greatly reduce the flood risk along Wonderland Creek. The 100-year Containment Alternative would eliminate the 100-year flood risk to 100 structures (338 dwelling units).

c. Maintenance of pipes, culverts and manholes

The proposed project flood mitigation infrastructure will require period maintenance. This maintenance cost is shared with the Urban Drainage and Flood Control District.

d. Police services – The proposed 100-year Containment flood mitigation alternative would eliminate overtopping of 28th Street and Kalmia Avenue during a 100-year storm event, increasing safe access for emergency vehicles.

2. Describe any impacts to any of the above existing or planned city services or department master plans as a result of this project (e.g. budget, available parking, planned use of the site, public access, automobile / pedestrian conflicts, views) – A pedestrian and bicycle underpass at 28th Street and Wonderland Creek is shown in the Greenways Master Plan and the Transportation Master Plan. An underpass at Kalmia is not, however, shown in either of these plans. Flood improvements along Wonderland Creek are shown in the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan. The 100-year containment alternative is recommended if substantial outside funding is secured.

M. Special Populations

1. Describe any effects the project may have on the following special populations:

f. Sensitive populations located near the project (e.g. adjacent neighborhoods or property owners, schools, hospitals, nursing homes) – See below

If potential impacts have been identified, please provide the following:

- A description of how the proposed project would avoid, minimize, or mitigate identified impact
- A description of how the proposed project would benefit special populations

Both of the proposed project trail connection alternatives would provide a safer pedestrian and bicycle crossing of 28th Street. Alternative T2 would also provide a grade-separated trail crossing at Kalmia Avenue. The proposed 100-year Containment flood mitigation alternative would eliminate overtopping of 28th Street and Kalmia Avenue during a 100-year storm event, increasing safe access for emergency vehicles.

ATTACHMENT 1
SUMMARY OF PUBLIC COMMENTS FROM OPEN HOUSE

**Wonderland Creek CEAP Diagonal Highway to Winding Trail
Open House Thursday October 11, 2012**

COMMENTS

39 people attended the open house. 21 indicated interest in the Wonderland Diagonal Highway to Winding Trail project, 31 the Wonderland Foothills Parkway to 30th Street and 24 the Foothills Parkway Diagonal to Valmont project (some did not indicate a specific project interest on the open house sign in sheet).

14 completed comment sheets were returned for the Wonderland CEAP Diagonal Highway to Winding Trail project. The following provides a summary of the comments:

FLOOD IMPROVEMENT OPTIONS

Please rank in order of preference the following flood mitigation alternatives (1 being your first choice, 2 your second choice):

F1 (High Hazard Containment) F2 (100-Year Containment)

3 people listed F1 as their #1 choice
0 people listed F2 as their #2 choice

12 people listed F2 as their #1 choice
0 people listed F2 as their #2 choice

Comments on the flood mitigation alternatives:

- ‘We need to build now for the 100-yr flood that is certain to happen.’
- ‘Helpful to residents of Aspen Grove’
- ‘F2 may remove my home from the 100-yr flood zone, along with many other structures – this is good thinking!!’
- ‘Aspen Grove Condominium Association (164 units and meets monthly – David Hawes 303-667-1437) would welcome a presentation. Primarily interest is removal from flood.’
- ‘100-yr is way to go. Worth the extra cost.’
- ‘Include 28th Street underpass. Add raised cross walk over Winding Trail (at trail crossing). Include Winding Trail culvert replacement.’
- ‘The underpass at 28th and Winding Trail is FANTASTIC!!!. Thank you!’

TRAIL IMPROVEMENT OPTIONS

Please rank in order of preference the following trail improvement options (1 being your first choice, 2 being your second choice):

T1 T2
(Kalmia At-Grade Crossing) (Kalmia Underpass)

3 people listed T1 as their #1 choice
2 people listed T2 as their #2 choice

12 people listed T2 as their #1 choice
1 person listed T2 as their #2 choice

Comments on the trail improvement options:

- ‘I am strongly in favor of the underpass at Kalmia. This is a tricky crossing for cyclists. Cars are coming down the hill fast and bikes up quickly with little visual contact. This also greatly improves connectivity between the eastern parts of town with paths and those who live west of 28th. The underpass at 28th Street is absolutely necessary. It would make for a safer and more pleasing crossing. Also creates for greater connectivity. Excellent plan. I think it is important to have a raised crossing or speed bump across Winding Trail. This is a major through route for many, including kids riding to and from Centennial Middle School. Cars come into the neighborhood quickly and the turn greatly reduces visibility.’
- ‘Kalmia is already busy to/from Calvary Church and Northfield Commons. New construction at Kalmia Estates will make at-grade crossing very hazardous. Also need bike path on Kalmia, curbs, gutters and sidewalks on south side of street for pedestrians.’
- ‘Safer for pedestrians / has a grade crossing existing which is hazardous. Visit often across Kalmia.’
- ‘Would make crossing Kalmia safer and add continuity to bike path (people would not have to stop to check for oncoming traffic.’
- ‘Kalmia is a dangerous crossing now and will only get worse. Put in underpass.’
- ‘I ride the at-grade crossing daily. There are often near misses because the cars race down the hill before reaching the crossing. An underpass will substantially increase safety for everyone at Kalmia. An at-grade crossing at Kalmia mixes cyclists and drivers, hampering traffic and endangering lives.’
- ‘The crossing with the ‘uphill’ grade on the bike path is hard to navigate.’
- ‘As a bike/walk commuter who uses this spot daily: I’d love an underpass but I can live with the cheaper alternative because car drivers are very considerate.’

- ‘Current at-grade crossing has very poor sight lines for car traffic to see trail users (vegetation, grade changes). With recent and continuing housing development, Kalmia traffic has increased dramatically. An underpass will permit much safer routes to school (direct link to Centennial Middle School).’

I LIVE:

Directly adjacent
to the project

Outside the direct
project area