



APPENDIX C: STUDY REACH MAPS, SUMMARIES, AND RECOMMENDATIONS

This appendix provides summary information and maps for each of the fully-assessed study reaches. Maps include vegetation community types and locations of features such as litter areas, storm drain outfalls, culvert crossings, access trails, artificial bank treatments, and erosion areas. A brief description and selected photographs are also provided, along with tables summarizing stream channel data and vegetation characteristics. For each study reach, a table is also provided that lists appropriate types of improvement measures for the reach and describes where within the reach the measures should be applied. Measures identified for implementation at the reach-scale will typically require additional detailed site-level design work and engineering to determine specific locations and combinations of treatment techniques.

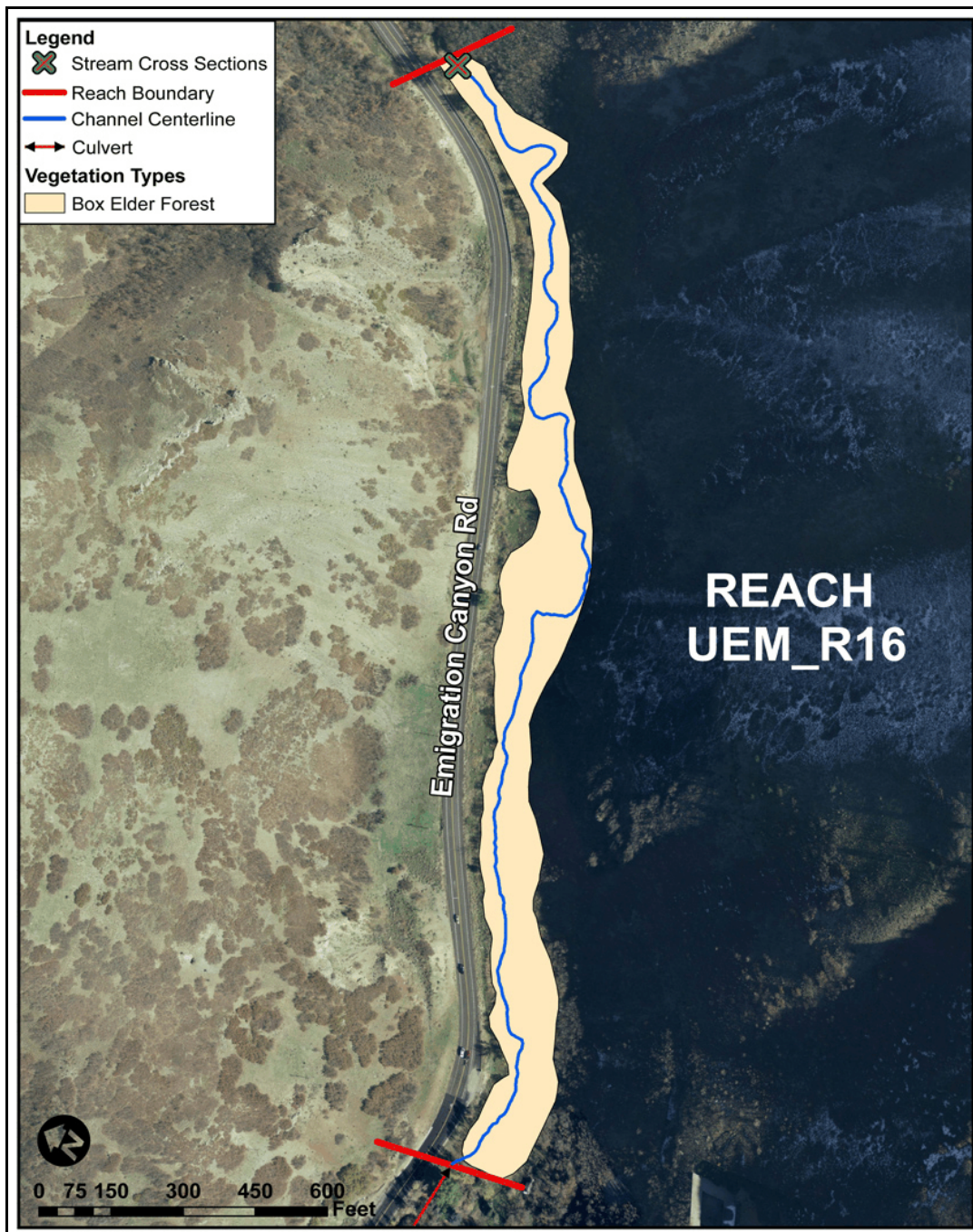
Within each recommendations table, higher-priority items are identified, and approximate cost estimates for these items are provided in Appendix D. In general, measures such as bank stabilization and grade control are identified as “higher-priority” only in study reaches where erosion is particularly severe and/or where erosion threatens developed infrastructure. In other study reaches, the disturbance associated with heavy equipment access to install stabilization measures may not be justified. Also, there are benefits to allowing the natural riverine processes of erosion and deposition to occur to the extent acceptable. That said, the recommendations and prioritizations included in this appendix are not intended to be exhaustive; as priorities evolve and funding becomes available for specific study reaches or treatment techniques, it may be appropriate to implement measures not included in the tables or not currently identified as higher-priority items.

The summaries in this appendix are not intended to comprehensively provide all the information collected for each study reach; rather, they are meant as a reference that provides a brief characterization and overview of existing conditions, issues, and recommendations for each assessed study reach.



REACH UEM_R16: BELOW EMIGRATION TUNNEL SPRING

The reach, in Emigration Canyon, is in relatively natural condition. Lateral width is confined by the steep hillside to the south and the road to the north. Some low floodplain surfaces are present; however, root zone scour may indicate some degree of bed incision. The stream was dry at the time the reach was assessed. Vegetative structure is excellent in this reach, with native canopy, shrub, and understory layers present.



Issues affecting riparian function:

- bed incision (minor)
- low bank/root zone erosion
- seasonal lack of water flow
- invasive species (Siberian elm - minor amount)

Constraints/opportunities:

- partially publicly owned
- potential to lower/reconnect floodplain surfaces or create side-channels to enhance habitat
- long, uninterrupted reach



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
2864	0.02	soil/sand and silt	boulder/cobble	abundant	occasionally present	absent	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Forest	76-100+	26-50	26-50	moderate	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	none	high	none

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Explore instream flow opportunities ^a	watershed-scale
Invasive plant removal ^a	within vegetation type(s)
Revegetation - shrub layer	within vegetation type(s)
Revegetation - understory layer	within vegetation type(s)
No-trespassing signage	reach-scale
Grade control	reach-scale
Bank stabilization	reach-scale

^a Higher-priority item; see Appendix D for estimated cost.

Priorities identified by stakeholders:

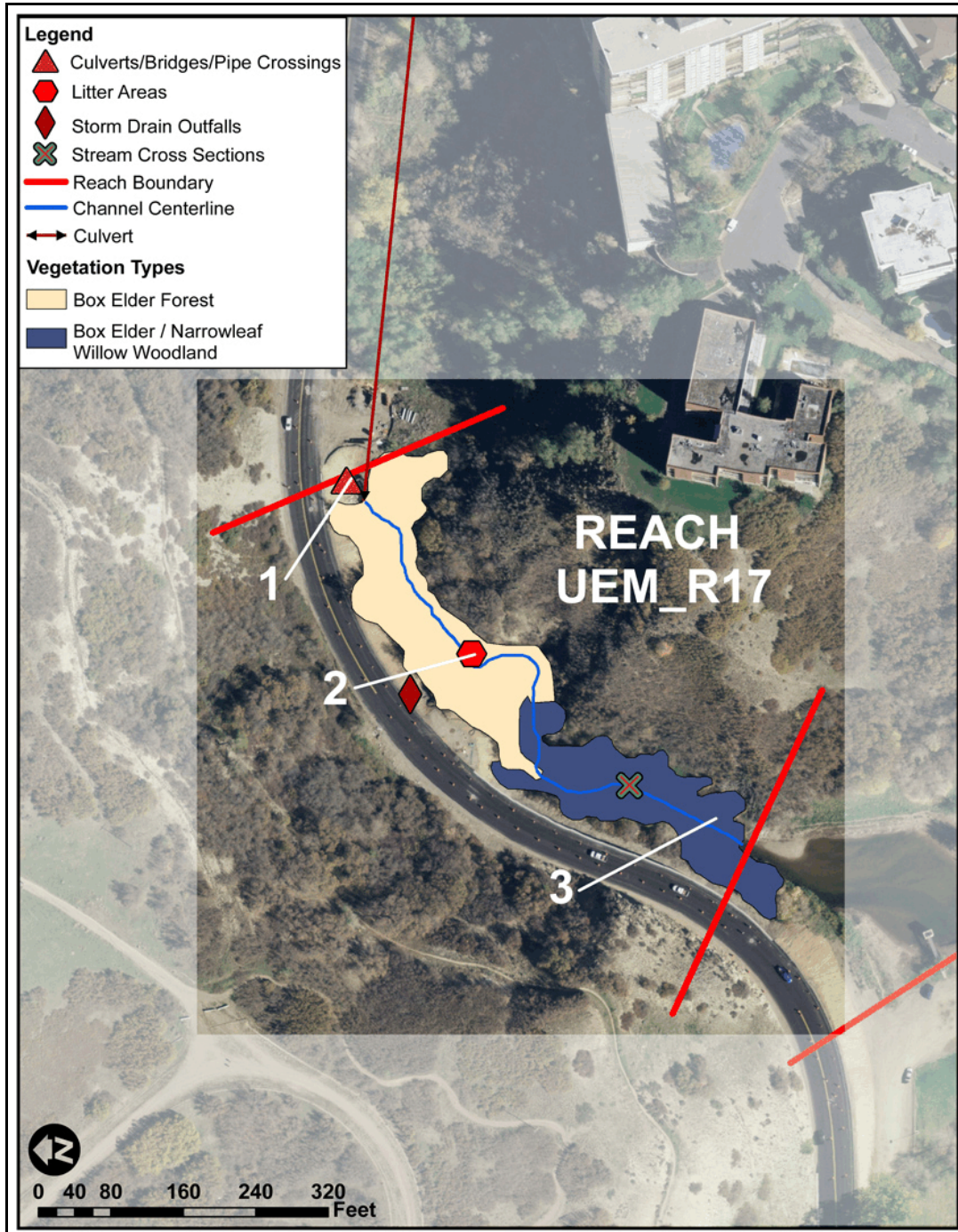
- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply





REACH UEM_R17: ABOVE DEBRIS BASIN

This reach begins at the outlet of a long culvert. The downstream end of the reach is affected by sediment deposition and the backwater from the debris basin. Human and dog access trails have affected some streambank areas just upstream of the basin. Emigration Canyon Road constrains the corridor on the north.



- Issues affecting riparian function:**
- eroded access trails
 - dog use
 - backwater effect/ sedimentation limits understory vegetation
 - trash (minor)
 - limited understory cover

- Constraints/ opportunities:**
- publicly owned
 - potential may exist to daylight a portion of the culverted section upstream





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
681	0.021	gravel/sand/silt	cobble/gravel	abundant	abundant	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder / Narrowleaf Willow Woodland	51-75	26-50	1-5	none	moderate
Box Elder Forest	76-100+	26-50	6-25	low	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	none	high	none

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Revegetation - understory layer ^a	within vegetation type(s)
Access control/ trail stabilization ^a	point 3 on map
Stream cleanup ^a	points 1 and 2 on map
Invasive plant removal	within vegetation type(s)
Revegetation - shrub layer	within vegetation type(s)
Grade control	reach-scale
Bank stabilization	reach-scale
Culvert replacement/outlet protection	point 1 on map

^a Higher-priority item; see Appendix D for estimated cost.

Priorities identified by stakeholders:

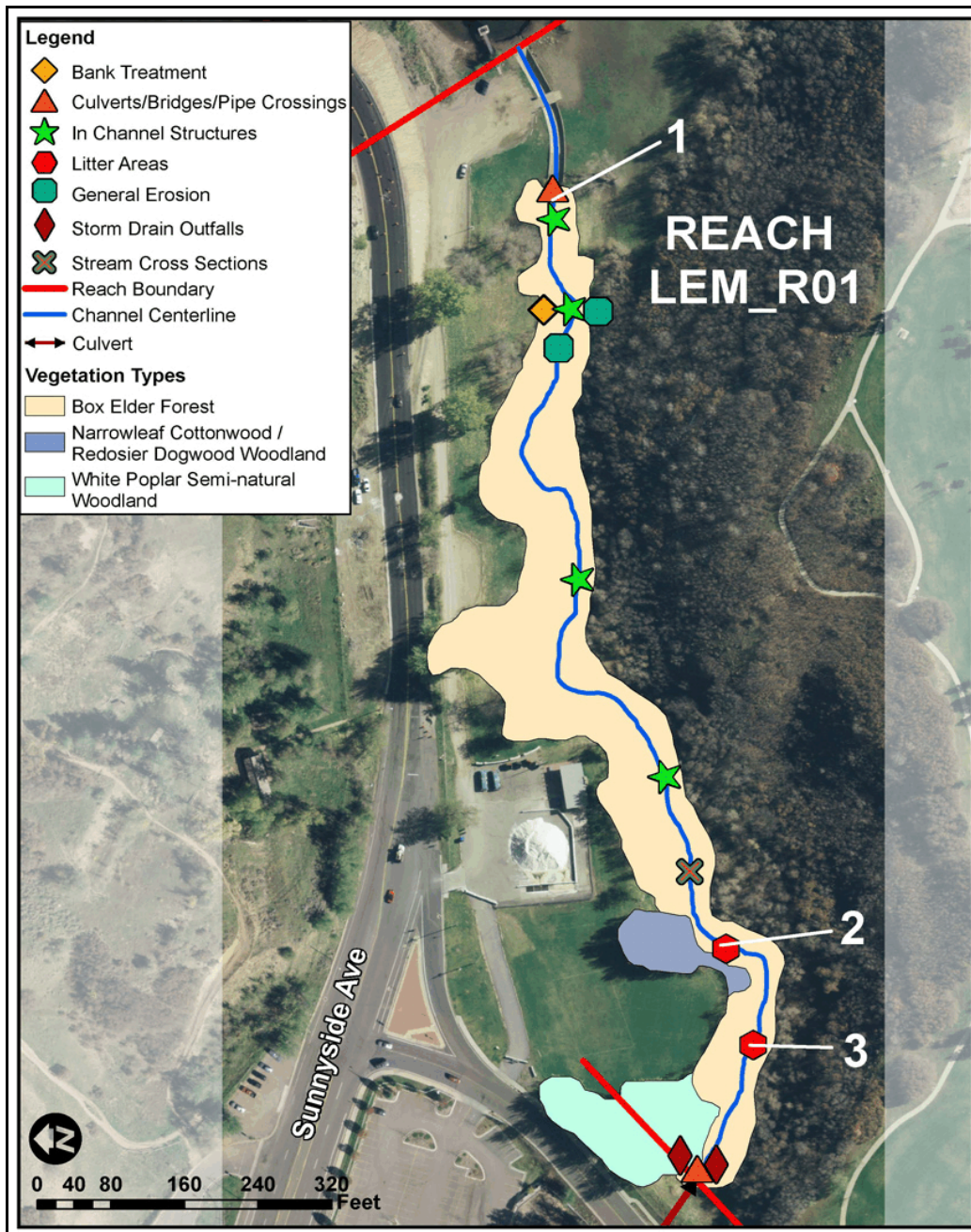
- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply





REACH LEM_R01: ROTARY GLEN PARK

This reach, located in Rotary Glen Park below the debris basin, is in generally good condition. The reach includes rip-rap grade control structures and a stream gaging weir. Some low bank erosion/root zone scour is evident. Vegetation cover in the understory, shrub, and canopy layers is generally good, but in one area the understory is comprised of nonnative invasive species.



- Issues affecting riparian function:**
- bed incision
 - low bank/root zone erosion
 - eroded access trails and dog use (minor)
 - understory dominated by nonnative species
 - invasive species (Siberian elm, broadleaved pepperweed, lesser burdock)
 - trash

- Constraints/opportunities:**
- good access to channel from right (north) bank
 - publicly owned
 - minimal infrastructure



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
1284	0.018	soil with few cobbles	cobble	abundant	abundant	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
White Poplar Semi-natural Woodland	76-100+	26-50	26-50	moderate	moderate
Box Elder Forest	76-100+	51-75	26-50	moderate	moderate
Narrowleaf Cottonwood / Redosier Dogwood Woodland	76-100+	26-50	26-50	high	moderate

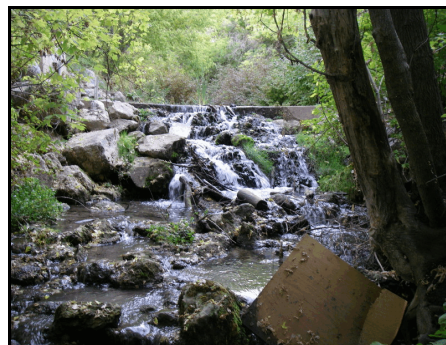
EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	none	low	none

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Silt removal from debris basin pipe outlet	point 1 on map
Mechanized trash removal ^a	points 2 and 3 on map
Stream cleanup ^a	reach-scale
Invasive plant removal ^a	within vegetation type(s)
Restoration of native understory plants ^a	within vegetation type(s)
Bank stabilization	reach-scale
Grade control	reach-scale
Access Control ^a	reach-scale

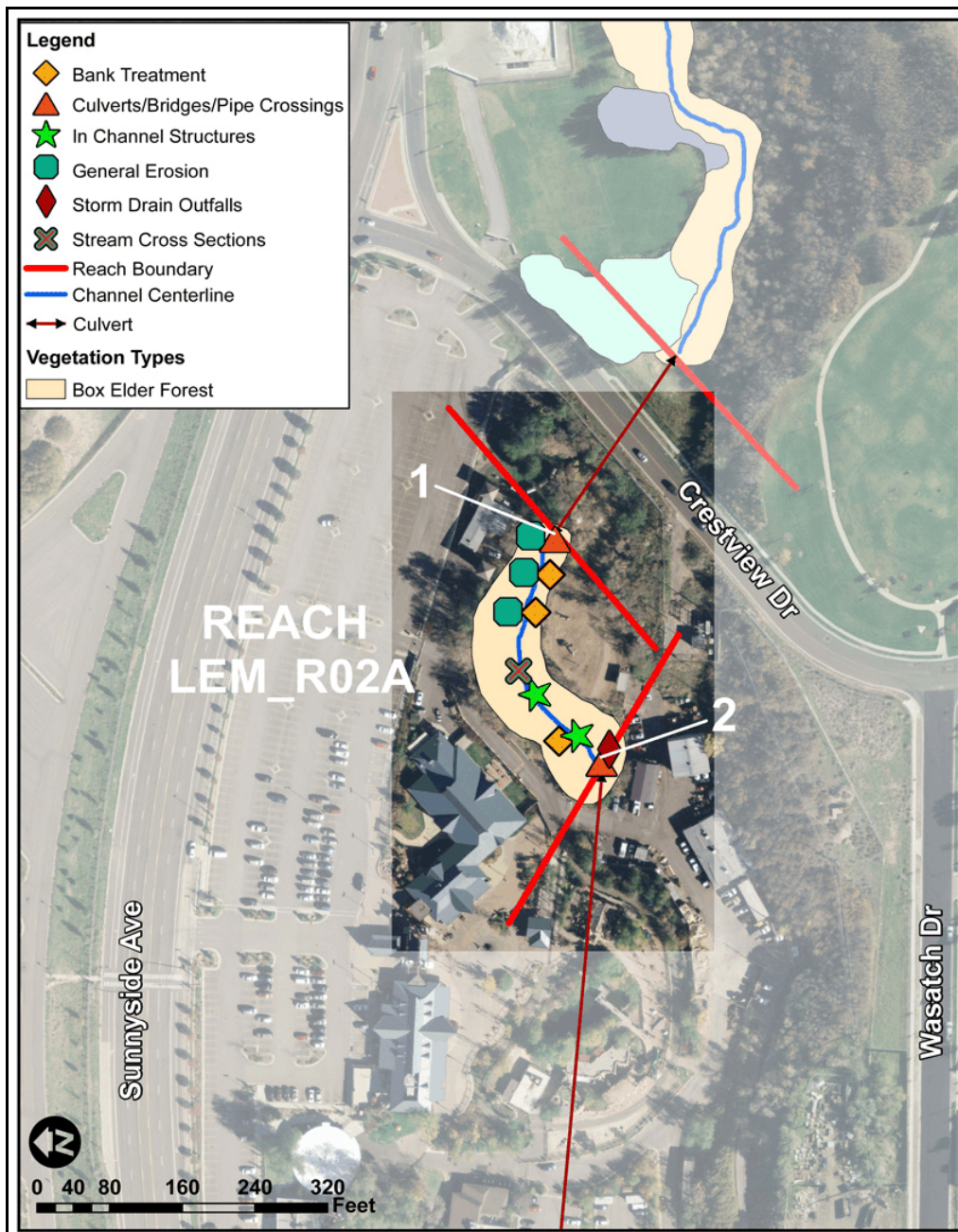
^a Higher-priority item; see Appendix D for estimated cost.





REACH LEM_R02A: UPPER HOGLE ZOO

This is a short stream reach that is part of a zoo display/train ride that depicts the Old West with sets and mannequins. The reach includes several grade control structures and some toe protection logs that were installed as part of an improvement project completed about 10 years ago. However, root zone scour and bank erosion are still evident, especially along the steep left bank that slopes up to animal pens. A stream gaging weir is present in this reach.



Issues affecting riparian function:

- scour/erosion at culvert outlet
- bed incision
- failing bank revetment
- low bank/root zone erosion
- lack of shrub cover
- understory dominated by nonnative species
- invasive species (periwinkle, lesser burdock)

Constraints/opportunities:

- animal pens within 20 feet of left (south) bank
- connectivity limited by short reach length and 1,174-foot-long culvert downstream
- zoo location offers educational opportunities
- potential may exist to daylight culverted section downstream



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
290	0.007	soil with sand/silt	cobble/gravel	abundant	absent	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Forest	51-75	26-50	51-75	moderate	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	low	high	moderate

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement/outlet protection ^a	point 1 on map
Bank stabilization ^a	reach-scale
Grade control ^a	reach-scale
Revegetation - shrub layer	within vegetation type(s)
Invasive plant removal ^a	within vegetation type(s)
Restoration of native understory plants ^a	within vegetation type(s)
Storm drain improvement ^a	point 2 on map

^a Higher-priority item; see Appendix D for estimated cost.

Priorities identified by stakeholders:

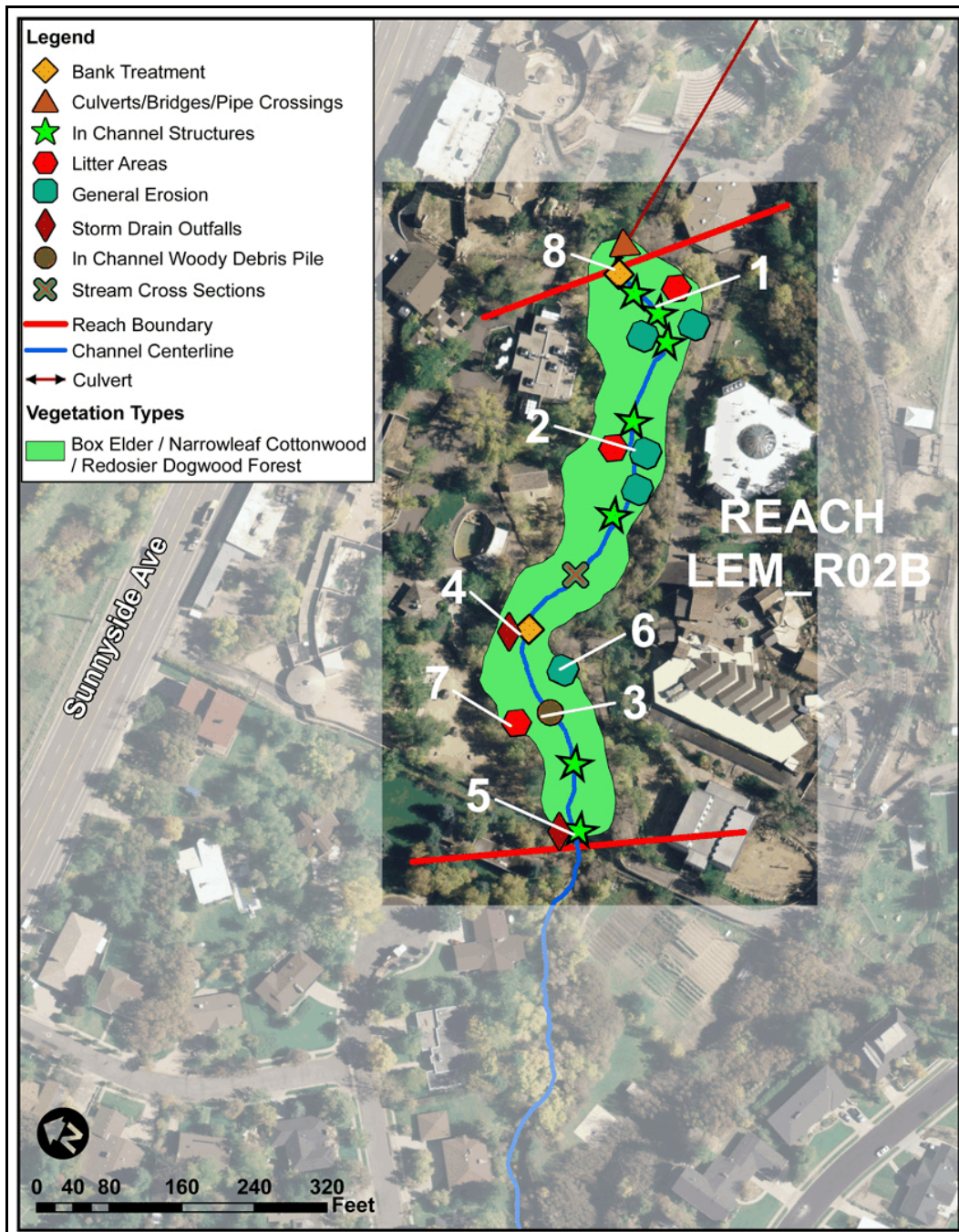
- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply





REACH LEM_R02B: LOWER HOGLE ZOO

This reach, located in the western part of Hogle Zoo, is deeply entrenched between tall, steep slopes that lack understory vegetation and show evidence of erosion in many areas. Several debris jams and cemented rip-rap grade control structures are present. The culvert outlet at the top of the reach and other in-channel structures are generally in poor condition. Animal waste on slopes may be a water quality concern.



- Issues affecting riparian function:**
- scour/erosion at culvert outlet
 - bed incision
 - failing in-channel infrastructure
 - failing bank revetment
 - low bank/root zone erosion
 - invasive species (Siberian elm, lesser burdock)
 - trash
 - lack of understory cover
 - storm drain outfall erosion
 - concentrated runoff/rilling





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
734	0.033	soil with some cobble	boulder with some cobble	occasionally present	abundant	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder / Narrowleaf Cottonwood / Redosier Dogwood Forest	76-100+	26-50	6-25	moderate	dense

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	moderate	moderate	moderate

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Mechanized trash removal ^a	points 1, 2, and 3 on map
Storm drain outlet protection ^a	points 4 and 5 on map
Runoff management ^a	points 6 and 7 on map
Culvert replacement/outlet protection ^a	point 8 on map
Stream cleanup (general) ^a	reach-scale
Revegetation - understory ^a	within vegetation type(s)
Biotechnical slope stabilization ^a	reach-scale
Comprehensive bank stabilization ^a	reach-scale
Grade control ^a	reach-scale
Invasive plant removal ^a	within vegetation type(s)

^a Higher-priority item; see Appendix D for estimated cost.

Constraints/opportunities:

- tall, steep banks limit access/ visibility of channel
- zoo infrastructure limits floodplain width
- zoo location offers educational opportunities
- good connectivity (~2,000 feet to next downstream culvert)
- potential may exist to daylight culverted section upstream

Priorities identified by stakeholders:

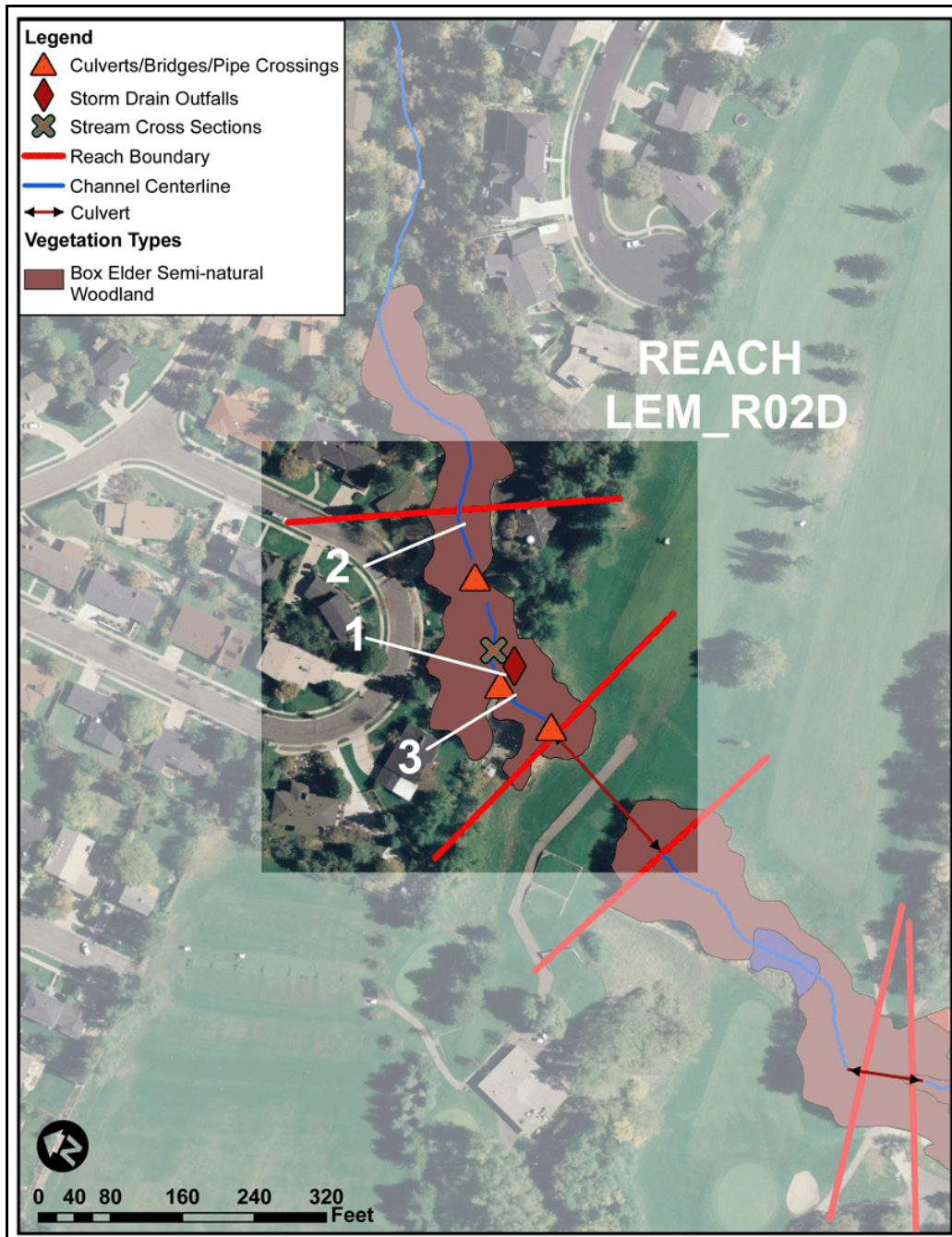
- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply





LEM_R02D: ABOVE BONNEVILLE GOLF COURSE

This is a short reach that has many pools and contains some low floodplain surfaces. A wide span open-bottom arch culvert is present at a pathway crossing in the middle of this reach and is in good condition. Backfill around an apparently new storm drain outlet is bare and unvegetated. Elevated exposed utility pipes cross the channel within this reach.



Issues affecting riparian function:

- poor revegetation/stabilization practices
- low bank/root zone erosion
- failing bank revetment
- invasive species (Siberian elm, lesser burdock)
- lack of understory cover
- lack of shrub cover

Constraints/opportunities:

- good connectivity (~2,000 feet to next upstream culvert)
- access to channel is reasonably good





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
277	0.015	soil with sand/silt	boulder/cobble	occasionally present	occasionally present	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	6-25	1-5	moderate	sparse

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	low	moderate	low

Priorities identified by stakeholders:

- instream flows
- general study area priorities (habitat, water quality, bank stability) also apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Storm drain outfall improvement ^a	point 1 on map
Revegetation of bare fill ^a	point 1 on map
Revegetation - understory/shrub ^a	within vegetation type(s)
Mechanized trash removal ^a	point 2 on map
No-trespassing signage	point 3 on map
Invasive plant removal/control ^a	within vegetation type(s)

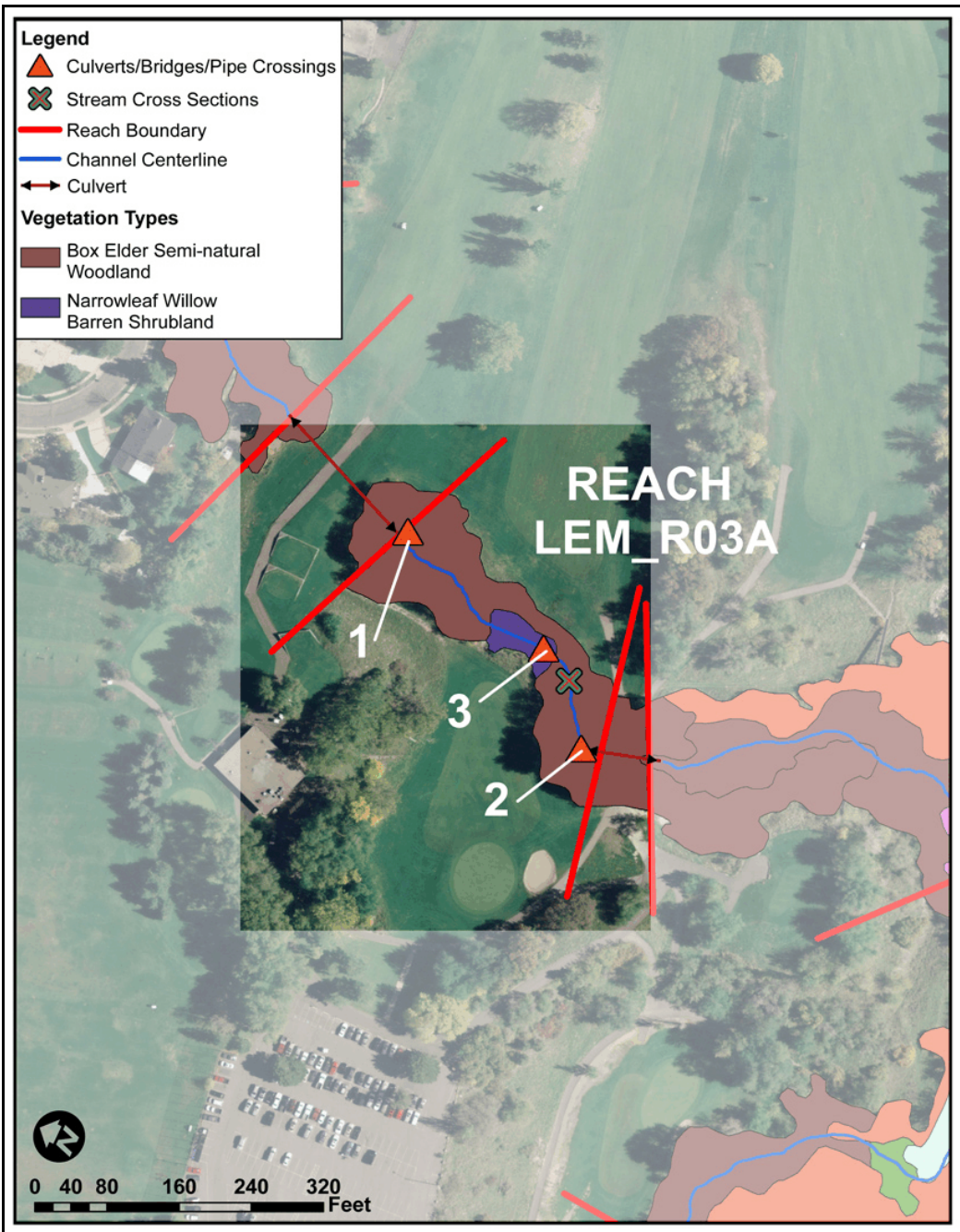
^a Higher-priority item; see Appendix D for estimated cost.





REACH LEM_R03A: BONNEVILLE GOLF COURSE - UPPER

This reach contains a high amount of large woody debris and subsequently the potential for debris jams is high. There are a number of pipes and irrigation-related items in the channel. The culvert outlet at the top of the reach is in poor condition, and the inlet at the bottom of the reach shows evidence of deposition/debris accumulation. Tree cover is lacking in the central portion of the reach.



- Issues affecting riparian function:**
- scour/erosion at culvert outlet
 - deposition/clogging at culvert inlet
 - terrace erosion
 - lack of understory cover
 - lack of shrub cover
 - lack of tree cover
 - invasive species (Siberian elm)
 - precarious in-channel irrigation pier

- Constraints/opportunities:**
- minimal infrastructure
 - replacement of upstream culvert with bridge would reestablish connectivity to long section of uninterrupted channel
 - publicly owned
 - access to channel is reasonably good



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
341	0.018	soil	gravel/sand/silt	occasionally present	abundant	abundant	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	0	0	high	moderate
Narrowleaf Willow Barren Shrubland	0	76-100+	0	none	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
Northwest Bank	Southeast Bank	Northwest Bank	Southeast Bank
none	low	none	low

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement/outlet protection ^a	point 1 on map
Culvert replacement ^a	point 2 on map
Redesign of irrigation pipe system/ removal of in-channel pier ^a	point 3 on map
Revegetation - understory/ shrub/ canopy ^a	within vegetation type(s)
Removal of invasive plants ^a	within vegetation type(s)
Grade control	reach-scale
Bank stabilization (general)	reach-scale

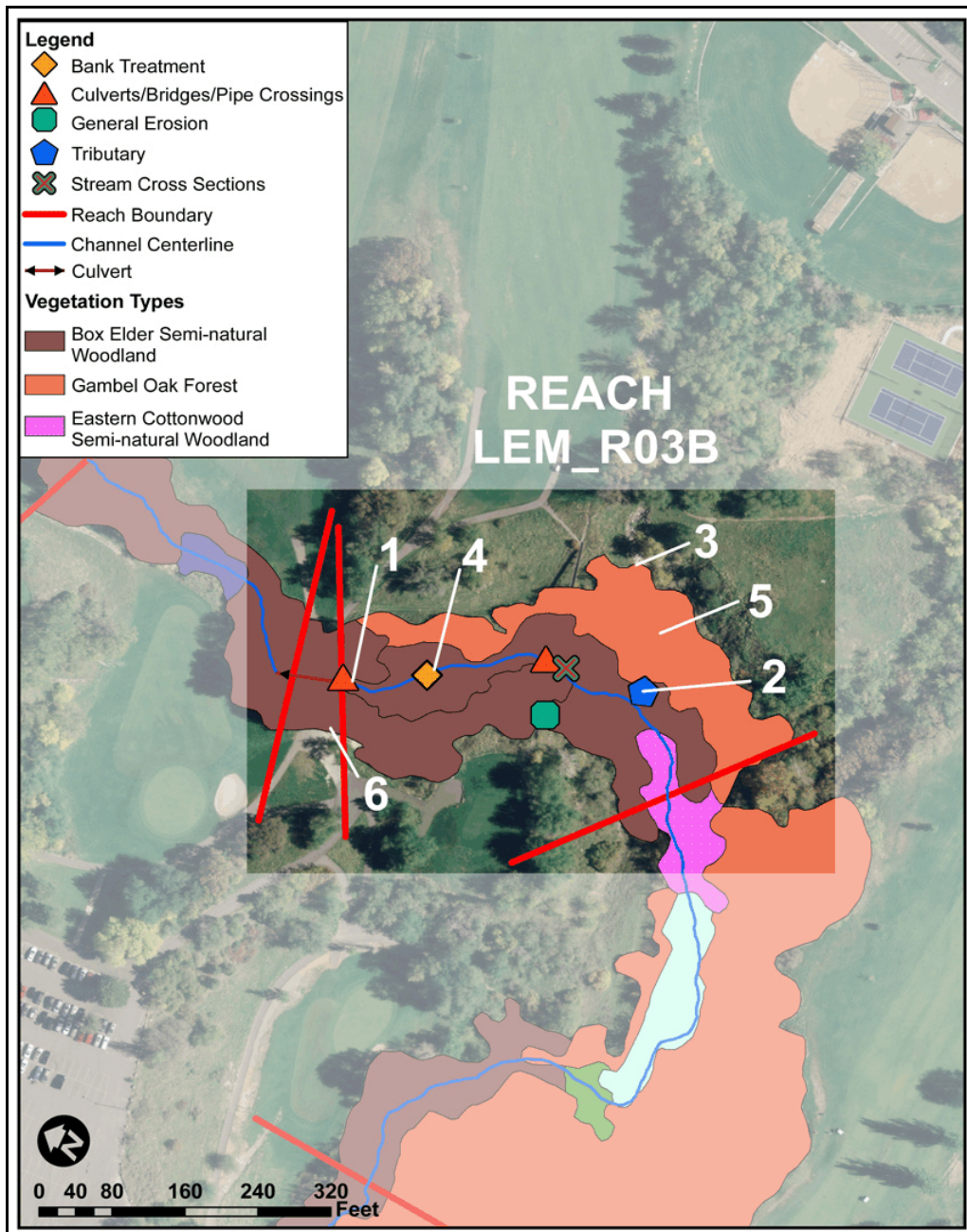
^a Higher-priority item; see Appendix D for estimated cost.





REACH LEM_R03B: BONNEVILLE GOLF COURSE - SUSPENSION BRIDGE

This reach is affected by an actively head-cutting storm outfall gully that enters from the east. Broken concrete pipe is present in the gully. The culvert outlet at the top of the reach is in poor condition, with scour and bank erosion evident. The streambed is noticeably silty, likely from the sediment generated in the eroding gully. A suspension bridge for golf carts crosses high above the channel in this reach. Channel width is relatively narrow.



- Issues affecting riparian function:**
- scour/erosion at culvert outlet
 - low bank/root zone erosion
 - excessive sediment from headcut/storm outfall gully
 - terrace erosion
 - storm drain outfall erosion
 - lack of understory cover
 - lack of shrub cover
 - invasive species (Siberian elm, Russian olive, cheatgrass)
 - trash

- Constraints/opportunities:**
- reach is within a large area of intact forest
 - minimal infrastructure
 - publicly owned



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
451	0.023	soil with gravel	boulder/cobble	occasionally present	abundant	absent	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Gambel Oak Forest	76-100+	0	76-100+	high	moderate
Box Elder Semi-natural Woodland	76-100+	6-25 / 0	26-50 / 0	high	moderate
Eastern Cottonwood Semi-natural Woodland	76-100+	76-100+	26-50	moderate	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
West Bank	East Bank	West Bank	East Bank
none	none	low	low

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement/outlet protection ^a	point 1 on map
Stabilization/ grade control in storm outfall gully ^a	points 2 and 3 on map
Mechanized trash removal ^a	points 4 and 5 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - understory/shrub ^a	within vegetation type(s)
Barrier installation to contain sand trap sand ^a	point 6 on map
Bank stabilization (general)	reach-scale

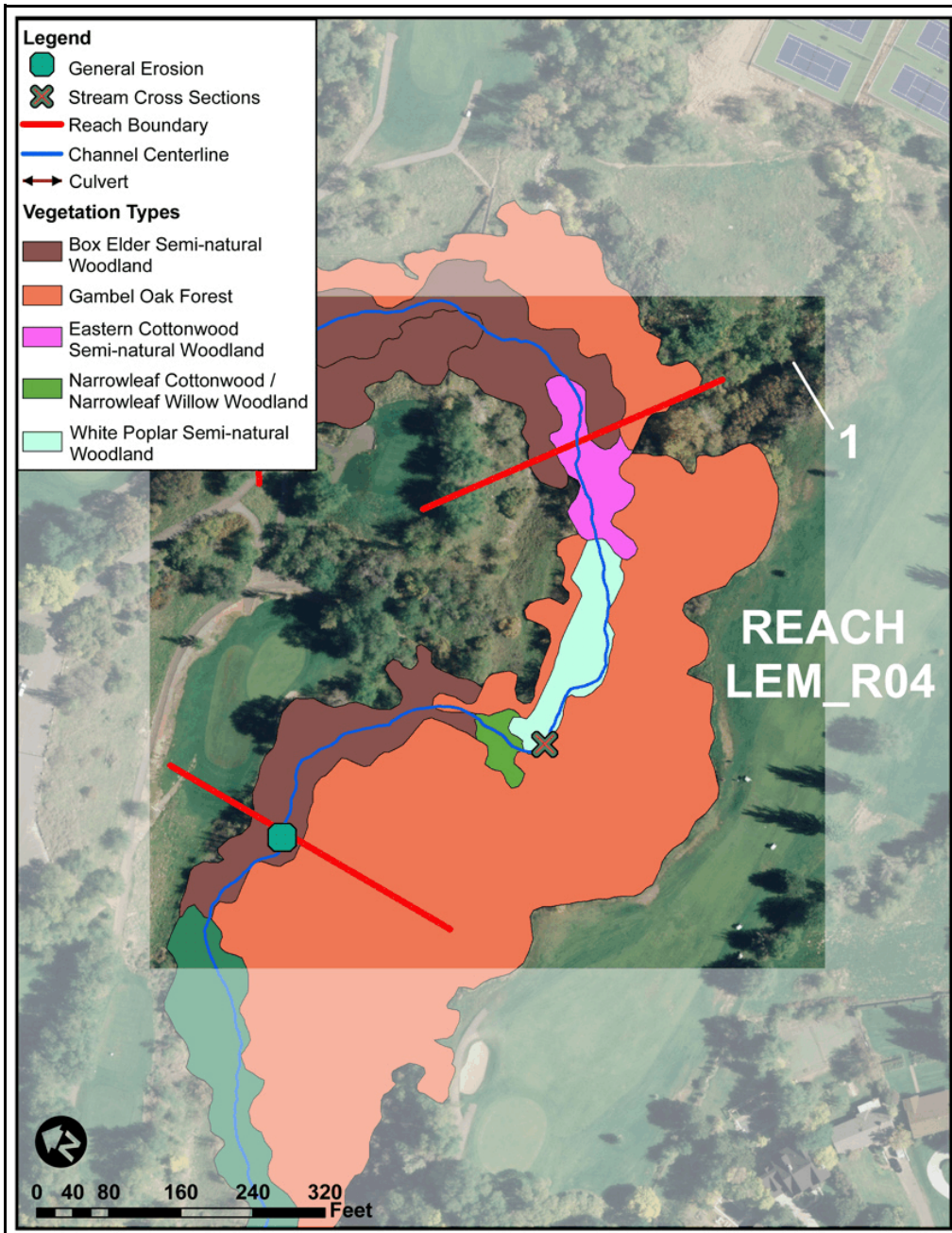
^a Higher-priority item; see Appendix D for estimated cost.





LEM_R04: BONNEVILLE GOLF COURSE - BELOW STORM OUTFALL GULLY

This reach is in a relatively natural condition, with no culverts and no noted in-channel structures. Tall, vertical, bare banks are present in several locations where the stream has eroded into high terraces associated with Lake Bonneville deposits. A second actively head-cutting storm outfall gully enters the stream at the top of this reach. Some active, low floodplain areas are present.



Issues affecting riparian function:

- sediment from headcut/storm outfall gully
- storm drain outfall erosion
- terrace erosion
- low bank/root zone erosion
- lack of understory cover
- lack of shrub cover
- invasive species (Siberian elm, Russian olive, myrtle spurge)

Constraints/opportunities:

- reach is within a large area of intact forest
- no developed infrastructure in corridor
- publicly owned



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
768	0.029	soil	boulder with gravel	occasionally present	occasionally present	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Eastern Cottonwood Semi-natural Woodland	76-100+	76-100+	26-50	moderate	moderate
White Poplar Semi-natural Woodland	76-100+	6-25	0	none	moderate
Gambel Oak Forest	51-75	0	6-25	moderate	moderate
Narrowleaf Cottonwood / Narrowleaf Willow Woodland	26-50	51-75	0	none	sparse
Box Elder Semi-natural Woodland	76-100+	26-50	0	high	sparse

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	none	none	none

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Stabilization/ grade control in storm outfall gully ^a	point 1 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - understory/shrub ^a	within vegetation type(s)
Bank stabilization (general)	reach-scale

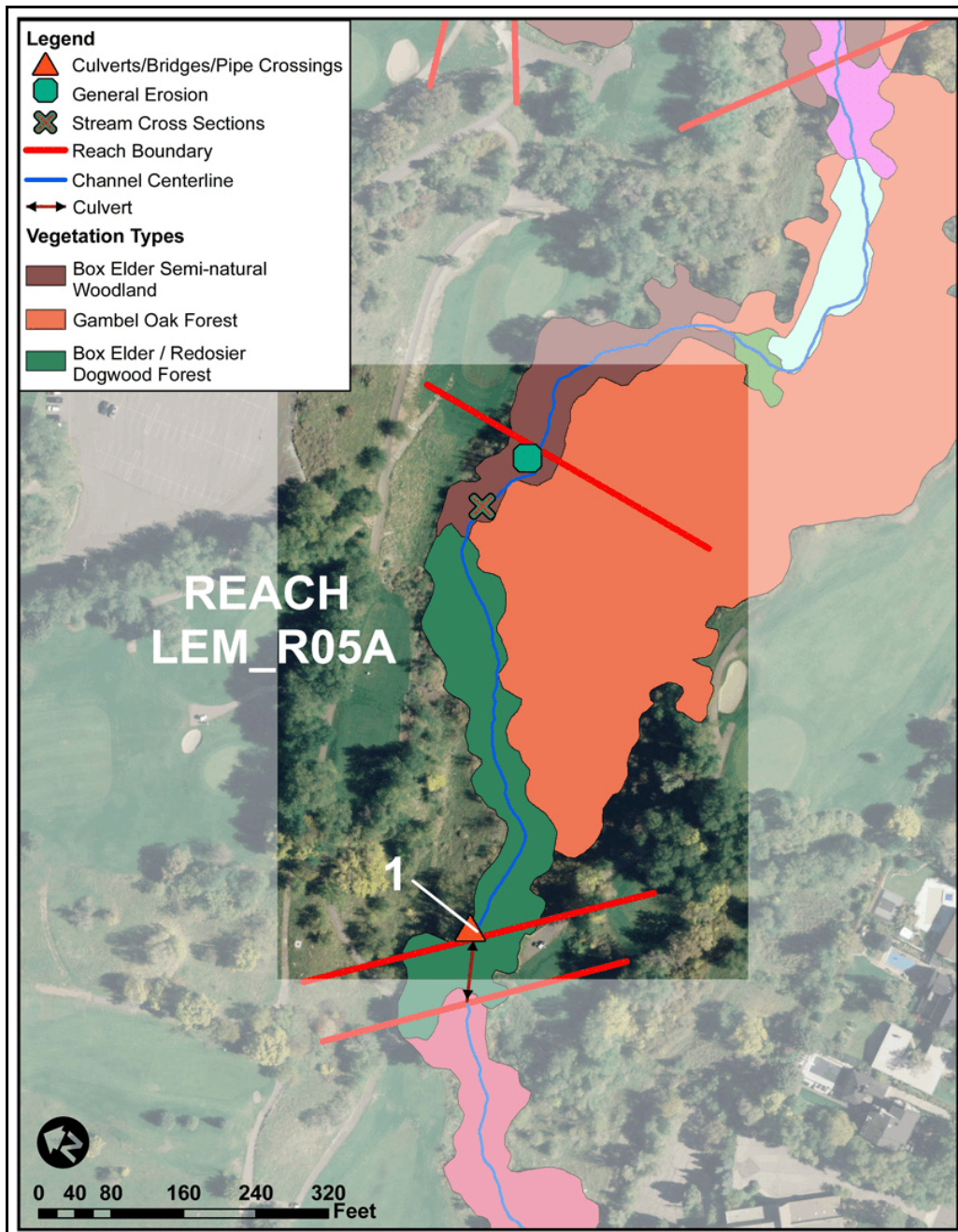
^a Higher-priority item; see Appendix D for estimated cost.





LEM_R05A: BONNEVILLE GOLF COURSE - OAK FOREST

This reach is similar in character to LEM_R04. The stream continues to be adjacent to a large area of intact Gambel oak forest. Erosion of tall Bonneville terrace deposits is evident, and vegetative understory cover is lacking. The culvert inlet at the bottom of the reach is being affected by a debris jam immediately above the inlet. Siberian elm and Russian olive are significant components of the tree community in this reach.



- Issues affecting riparian function:**
- terrace erosion
 - low bank/root zone erosion
 - debris jam at culvert inlet
 - lack of understory cover
 - invasive species (Siberian elm, Russian olive, myrtle spurge)

- Constraints/opportunities:**
- reach is within a large area of intact forest
 - minimal infrastructure
 - publicly owned





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
615	0.016	soil with some boulders	boulder with sand/silt	occasionally present	abundant	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	26-50	0	high	sparse
Box Elder / Redosier Dogwood Forest	51-75	26-50	0	high	dense
Gambel Oak Forest	51-75	0	6-25	moderate	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	none	low	low

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement ^a	point 1 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - understory ^a	within vegetation type(s)
Revegetation - shrub	within vegetation type(s)
Bank stabilization (general)	reach-scale

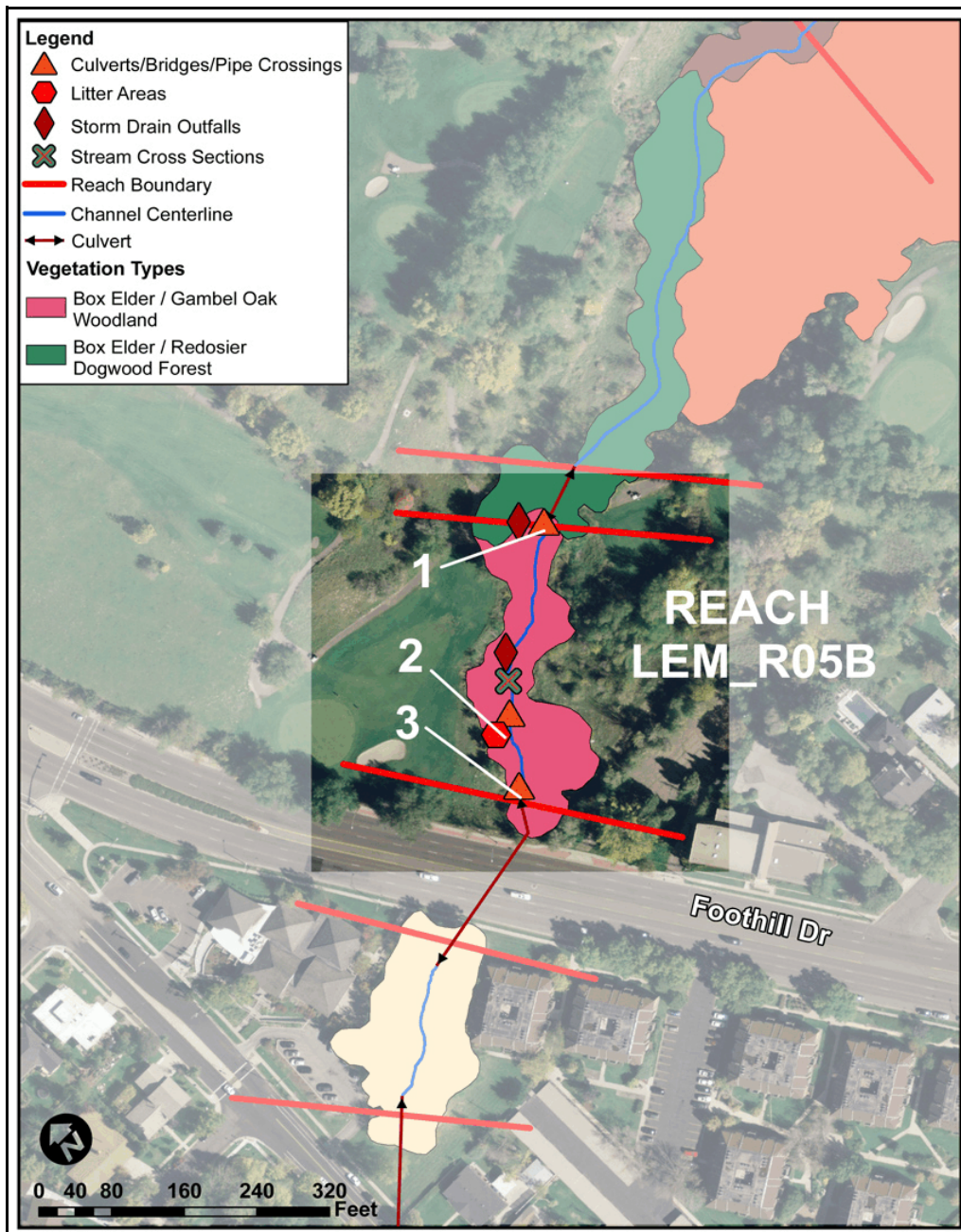
^a Higher-priority item; see Appendix D for estimated costs.





LEM_R05B: BONNEVILLE GOLF COURSE - ABOVE FOOTHILL DRIVE

In this reach, the stream is no longer confined by Bonneville terrace deposits, and terrace erosion is not evident. Woody debris continues to be abundant in the channel and on the banks. Trash, including an old couch, was observed in this reach. The culvert outlet at the top of the reach has a cracked headwall and the concrete apron is being scoured/undercut. An elevated exposed utility pipe crosses the channel in this reach.



- Issues affecting riparian function:**
- scour/erosion at culvert outlet
 - low bank/root zone erosion
 - invasive species (Siberian elm)
 - trash
 - storm drain outfall erosion (minor)
 - limited understory cover

- Constraints/opportunities:**
- minimal infrastructure
 - publicly owned
 - good access to channel





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
317	0.027	soil, some cobble	cobble/gravel	absent	abundant	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder / Gambel Oak Woodland	76-100+	51-75	0	moderate	dense

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	none	low	none

Priorities identified by stakeholders:

- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement/outlet protection ^a	point 1 on map
Revegetation - understory ^a	within vegetation type(s)
Invasive plant removal ^a	within vegetation type(s)
Stream cleanup ^a	point 2 on map
Bank stabilization (general)	reach-scale
Storm drain outlet protection ^a	point 3 on map

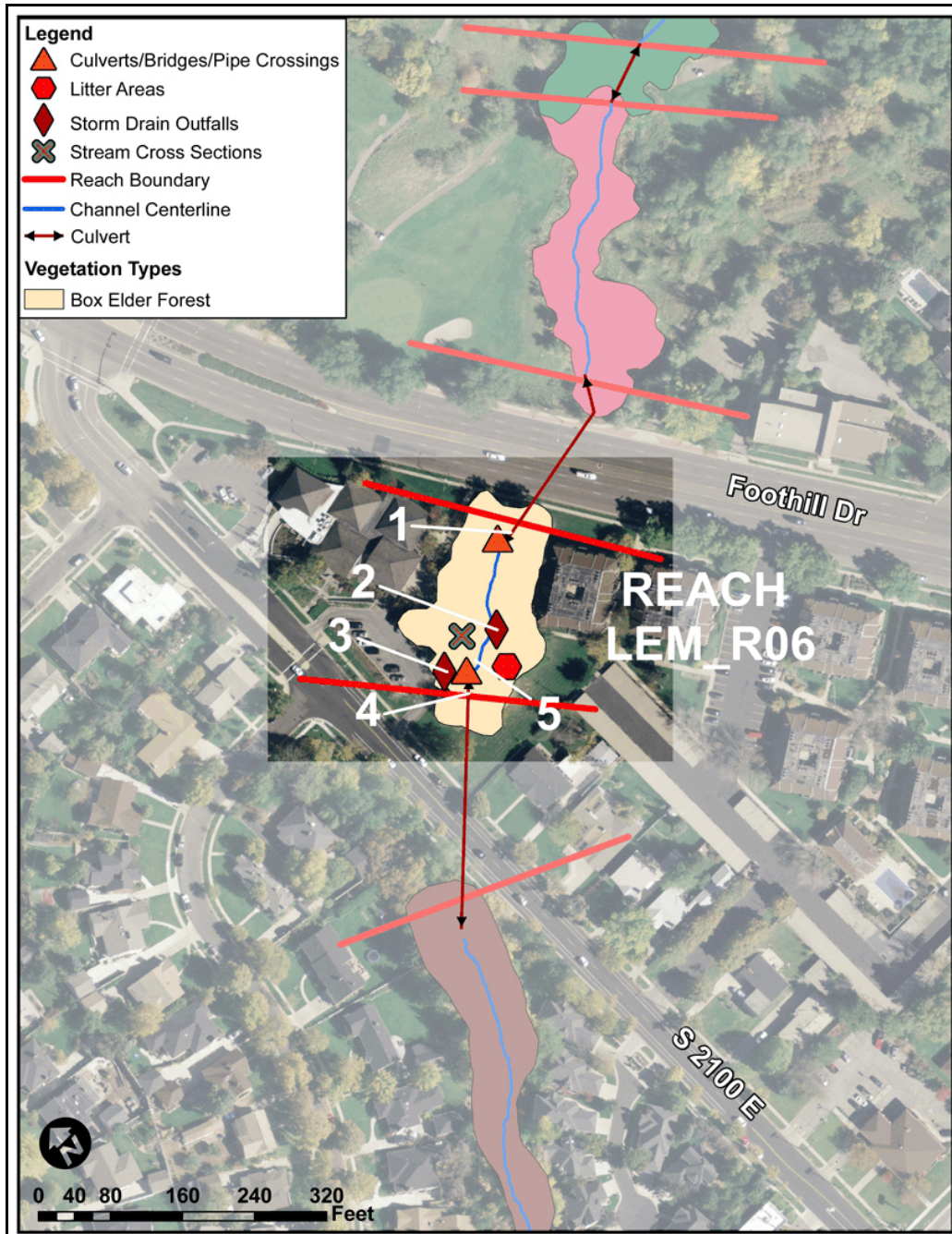
^a Higher-priority item; see Appendix D for estimated costs.





REACH LEM_R06: FOOTHILL DRIVE TO 2100 EAST

This is a short reach between culverts. The stream runs adjacent to the public library and foot traffic has created areas of bare ground and compacted soil. Understory vegetation is lacking, and erosion is present at two storm drain outfalls in the reach. The slopes above the culvert outlet at the top of the reach are steep and lack vegetation.



Issues affecting riparian function:

- storm drain outfall erosion
- low bank/root zone erosion
- eroded access trails
- limited shrub cover
- lack of understory cover
- concentrated runoff/rilling
- trash

Constraints/opportunities:

- access to channel from north side is reasonably good
- north side is publicly owned
- location near library offers educational opportunities
- potential may exist to daylight part of culverted section downstream



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
155	0.029	soil with some cobble	boulder/cobble/gravel	occasionally present	occasionally present	abundant (gravel)	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Forest	76-100+	6-25	0	none	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	low	moderate	moderate

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Storm drain outlet protection ^a	points 2 and 3 on map
Runoff management ^a	points 3 and 4 on map
Revegetation - understory ^a	within vegetation type(s)
Biotechnical slope stabilization ^a	point 1 on map
Bank stabilization (general) ^a	reach-scale
Revegetation - shrub ^a	within vegetation type(s)
Access control/ trail stabilization ^a	reach-scale
Stream cleanup ^a	point 5 on map

^a Higher-priority item; see Appendix D for estimated costs.

Priorities identified by stakeholders:

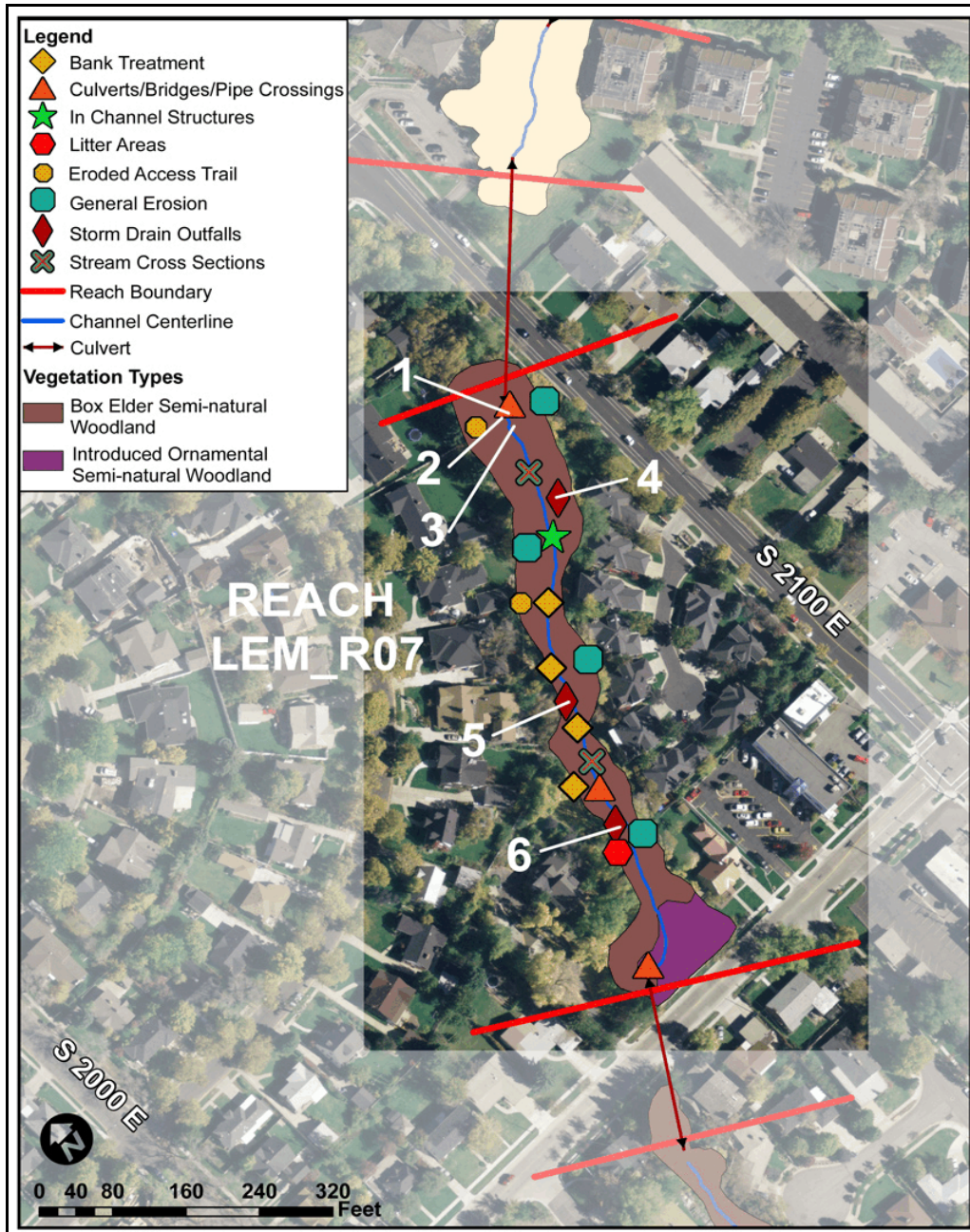
- no reach-specific items identified
- general study area priorities (habitat, water quality, bank stability) apply





REACH LEM_R07: 2100 EAST TO 1300 SOUTH

Channel and bank conditions in this reach are affected by landscaping and bank stabilization features (terracing, rock walls, etc.) constructed on individual nearby residential properties; many of the features are in disrepair due to continued erosion. English ivy and periwinkle vines dominate the understory vegetation. Severe bank erosion and scour are evident at the 2100 East culvert outlet; during storms the flow velocities exiting the culvert are extremely high.



- Issues affecting riparian function:**
- scour/erosion at culvert outlet (severe)
 - storm drain outfall erosion
 - bed incision
 - failing bank revetment
 - low bank/root zone erosion
 - eroded access trails
 - understory dominated by nonnative species
 - invasive species (periwinkle, English ivy)
 - terrace erosion

- Constraints/opportunities:**
- dense infrastructure and steep, tall banks limit access to channel



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
674	0.023	cobble/gravel	gravel/sand/silt	occasionally present	absent	absent	minor

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Introduced Ornamental Semi-natural Woodland	6-25	6-25	76-100+	high	absent
Box Elder Semi-natural Woodland	51-75	6-25	76-100+	majority	sparse

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
Northwest Bank	Southeast Bank	Northwest Bank	Southeast Bank
low	moderate	high	high

Priorities identified by stakeholders:

- streambank stability
- instream flows
- protection of private property from trespassing
- general study area priorities (habitat, water quality) also apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Culvert replacement/outlet protection ^a	point 1 on map
Comprehensive bank stabilization ^a	reach-scale
Comprehensive grade control ^a	reach-scale
Biotechnical slope stabilization ^a	point 2 on map
Access control/trail stabilization ^a	point 3 on map
Storm drain improvement ^a	points 4, 5, and 6 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - canopy layer	within vegetation type(s)
Revegetation - shrub layer ^a	within vegetation type(s)
Restoration of native understory plants ^a	within vegetation type(s)
No trespassing signage ^a	near 1300 South

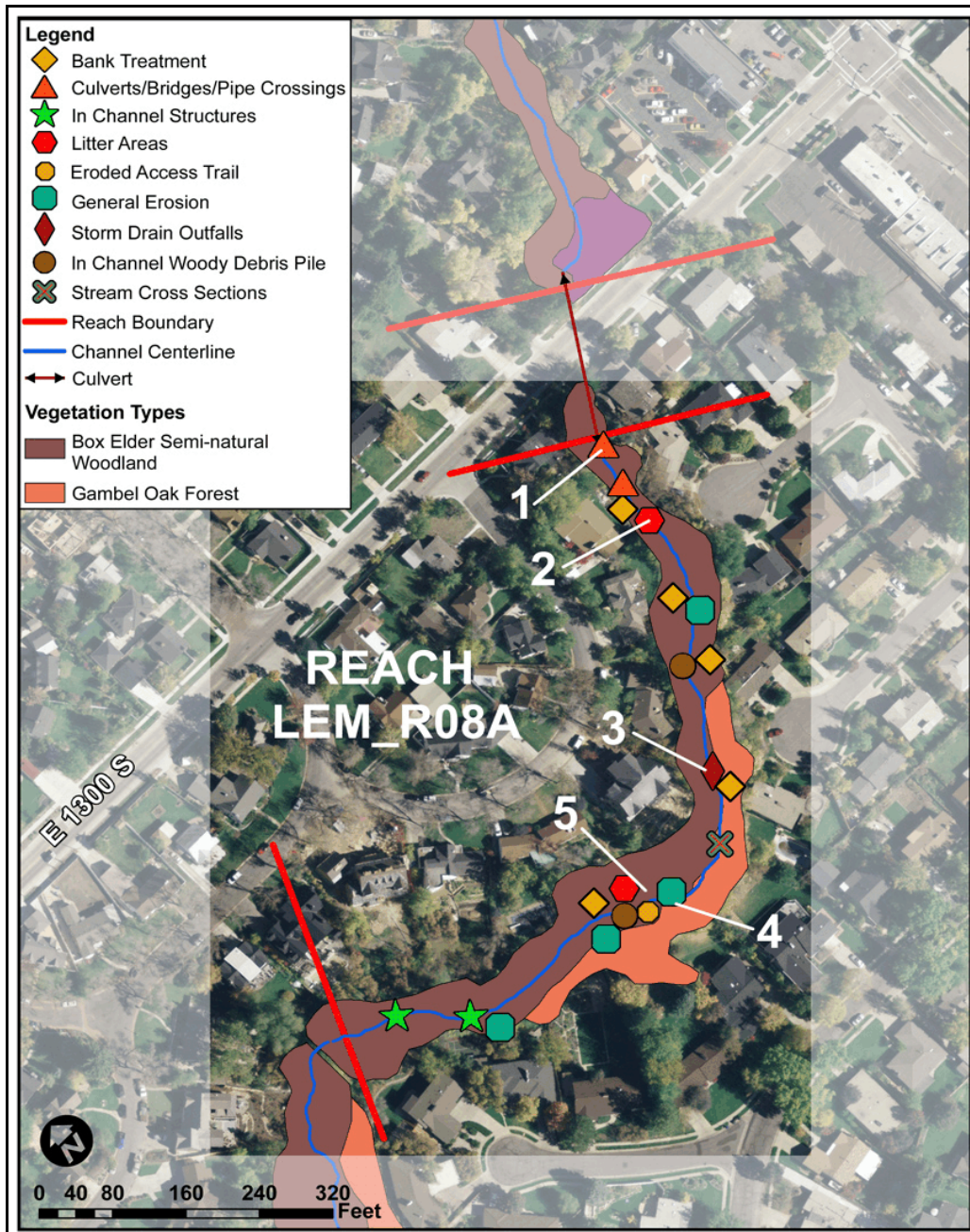
^a Higher-priority item; see Appendix D for estimated costs.





REACH LEM_R08A: 1300 SOUTH TO 1900 EAST - UPPER

Emigration Creek continues through a residential area in this reach. Channel and floodplain conditions have been altered by development and structures (patios, rock walls, decks, etc.). Continued bank erosion poses a risk to fences, sheds, and other infrastructure. There have been various attempts at bank stabilization, but many of the revetment features are failing.



- Issues affecting riparian function:**
- storm drain outfall erosion
 - bed incision
 - terrace erosion
 - failing bank revetment
 - low bank/root zone erosion
 - eroded access trails
 - invasive species (Rampion bellflower, Tree of heaven, periwinkle, houndstongue)
 - scour/erosion at culvert outlet
 - understory dominated by nonnative species

- Constraints/opportunities:**
- dense infrastructure and steep, tall banks limit access to channel



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
988	0.025	soil with some gravel	cobble/gravel	occasionally present	absent	occasionally present	none

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	51-75	26-50	high	moderate
Gambel Oak Forest	76-100+	26-50	51-75	majority	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
moderate	moderate	high	high

Priorities identified by stakeholders:

- streambank stability
- instream flows
- protection of private property from trespassing
- general study area priorities (habitat, water quality) also apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Comprehensive bank stabilization ^a	reach-scale
Comprehensive grade control ^a	reach-scale
Invasive plant removal ^a	within vegetation type(s)
Restoration of native understory plants ^a	within vegetation type(s)
Storm drain improvement ^a	point 3 on map
Stream cleanup ^a	points 2 and 5 on map
Mechanized trash removal ^a	points 2 and 5 on map
Culvert replacement/outlet protection ^a	point 1 on map
Access trail stabilization ^a	point 4 on map
Revegetation - understory layer	within vegetation type(s)
No trespassing signage ^a	near 1300 South

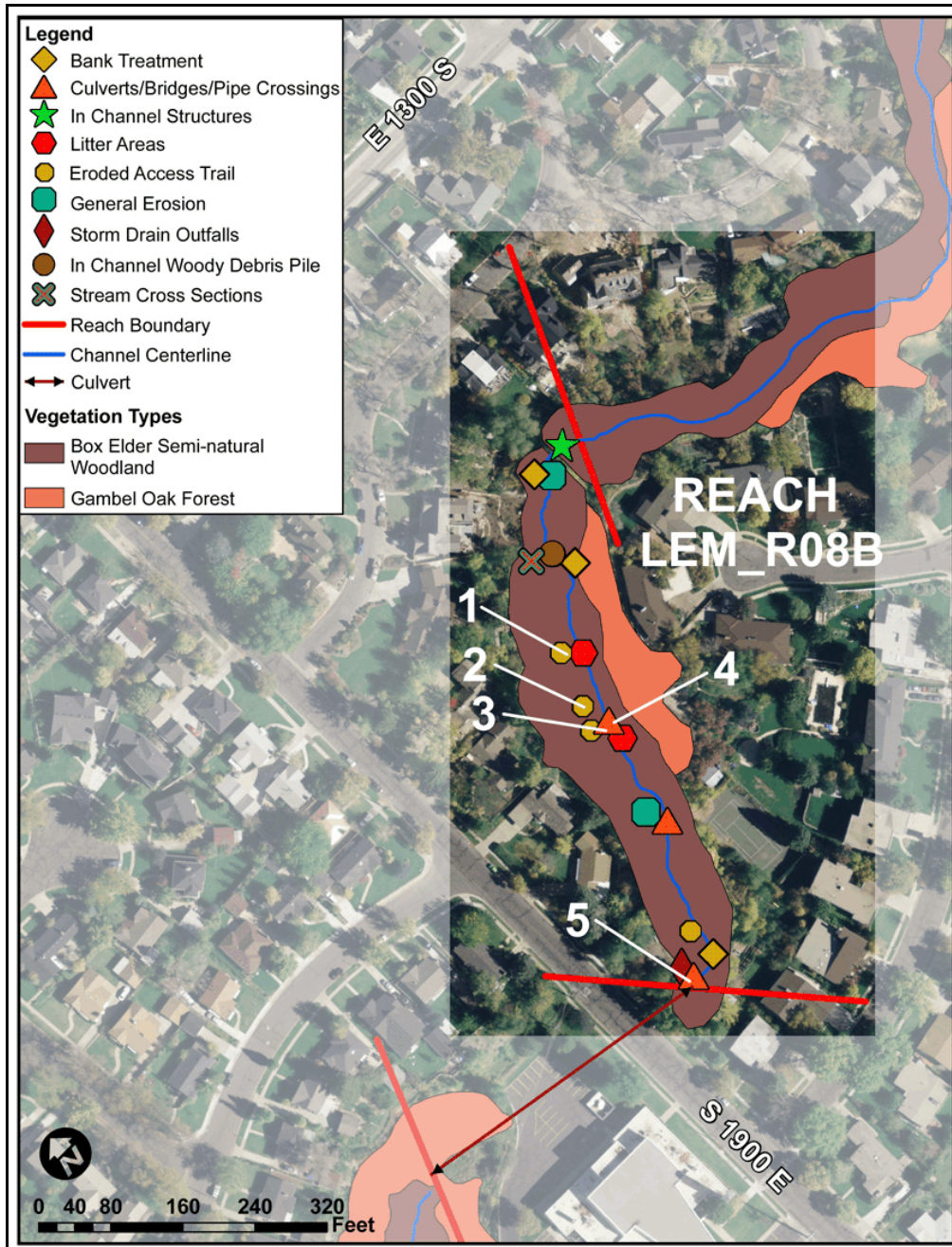
^a Higher-priority item; see Appendix D for estimated cost.





REACH LEM_R08B: 1300 SOUTH TO 1900 EAST - LOWER

Much of this reach is influenced by a clay/root mass layer that confines low flow into a small and deeper channel. The culvert inlet at the bottom of the reach appears to clog occasionally, leading to some sediment deposition and flooding concerns. As with the reach upstream, residential development and bank stabilization attempts have altered channel and bank conditions. Terrace erosion and low bank/root scour are present. Nonnative plants dominate the understory vegetation.



Issues affecting riparian function:

- low bank/root zone erosion
- bed incision
- invasive species (Rampion bellflower, periwinkle, ivy, burdock)
- failing bank revetment
- terrace erosion
- eroded access trails
- storm outfall erosion
- deposition/clogging at culvert inlet
- limited shrub cover

Constraints/opportunities:

- dense infrastructure and steep, tall banks limit access to channel





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
677	0.020	soil with some cobble/gravel	cobble/sand	occasionally present	absent	absent	significant

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	6-25	51-75	majority	sparse
Gambel Oak Forest	76-100+	26-50	51-75	majority	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
Northwest Bank	Southeast Bank	Northwest Bank	Southeast Bank
low	low	high	high

- Priorities identified by stakeholders:**
- streambank stability
 - instream flows
 - protection of private property from trespassing
 - reduction of flooding risk near 1900 East culvert inlet
 - habitat for wildlife and birds
 - water quality

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Stream cleanup ^a	point 4 on map
Invasive plant removal ^a	within vegetation type(s)
Restoration of native understory plants ^a	within vegetation type(s)
Storm drain improvement ^a	point 5 on map
Comprehensive bank stabilization ^a	reach-scale
Comprehensive grade control ^a	reach-scale
Access stabilization ^a	points 1, 2, and 3 on map
Culvert replacement ^a	point 5 on map
No trespassing signage ^a	near 1900 East

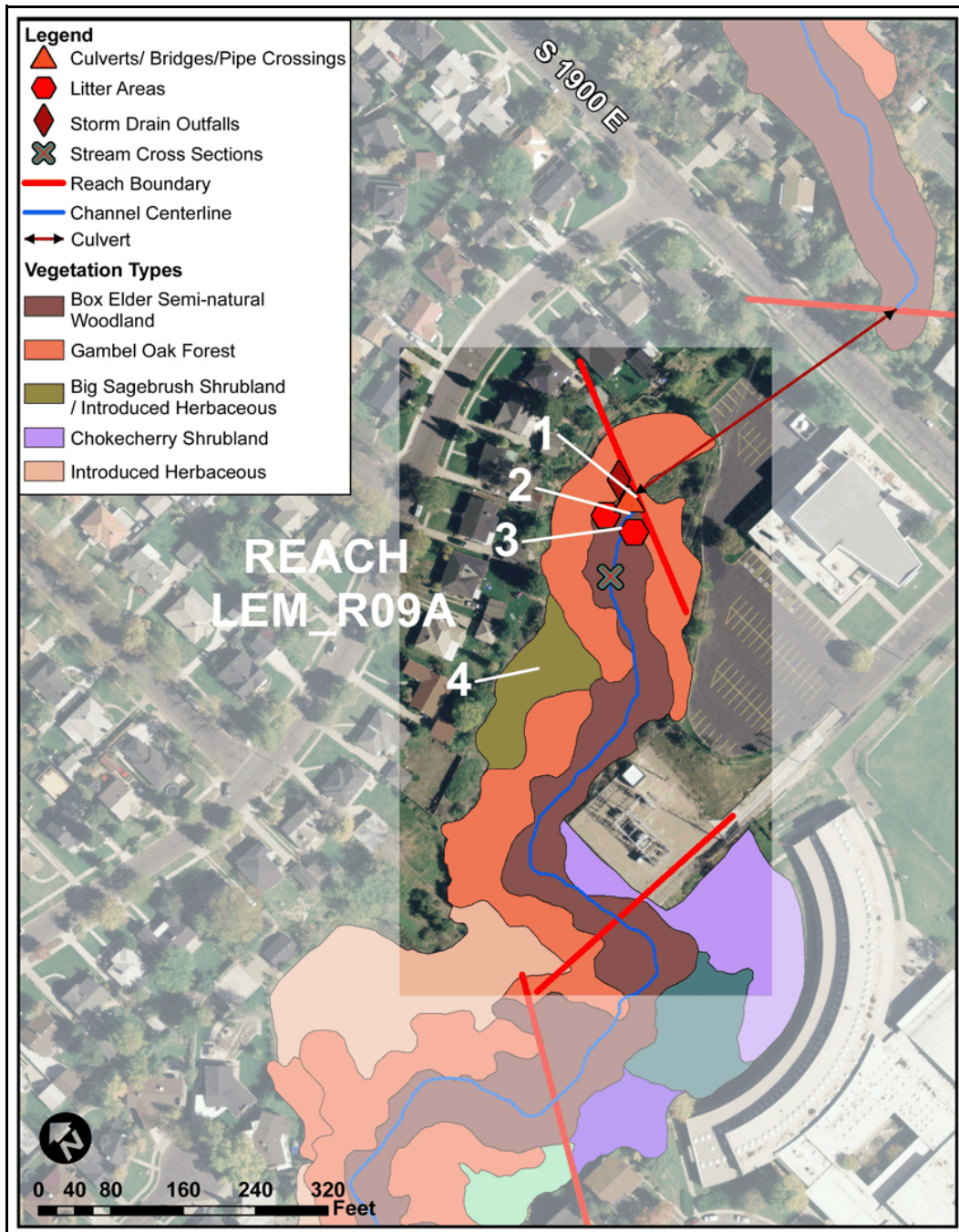
^a Higher-priority item; see Appendix D for estimated cost.





REACH LEM_R09A: BELOW 1900 EAST

In this reach, development has encroached into portions of the south side floodplain. The channel contains a lot of silty material, and some streamside trees have a silt layer at the base of their trunks. A clay/ root mat layer affects channel and bank conditions through most of the reach, and appears to inhibit understory growth. Trout were observed in the reach, which historically included a meander bend to the east that has been culverted (Figure 3.6).



- Issues affecting riparian function:**
- terrace erosion
 - invasive species (myrtle spurge, Russian olive)
 - trash and yard waste
 - lack of understory cover

- Constraints/opportunities:**
- potential may exist to daylight a portion of the culverted section upstream
 - part of a long section of channel uninterrupted by culverts
 - connected to a relatively large contiguous area of green space





REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
579	0.024	soil with larger particles	cobble/gravel	occasionally present	abundant	occasionally present	significant

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	76-100+	0	moderate	moderate
Gambel Oak Forest	76-100+	26-50	51-75	low	moderate
Big Sagebrush Shrubland / Introduced Herbaceous	0	6-25	76-100+	majority	absent

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	moderate	low	high

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Revegetation - understory layer ^a	within vegetation type(s)
Invasive plant removal ^a	within vegetation type(s)
Storm drain improvement ^a	point 1 on map
Stream cleanup ^a	points 2 and 4 on map
Mechanized trash removal ^a	point 3 on map
Culvert replacement/outlet protection ^a	point 1 on map
Revegetation - shrub layer	within vegetation type(s)
Bank stabilization	reach-scale
Grade control	reach-scale

^a Higher-priority item; see Appendix D for estimated cost.



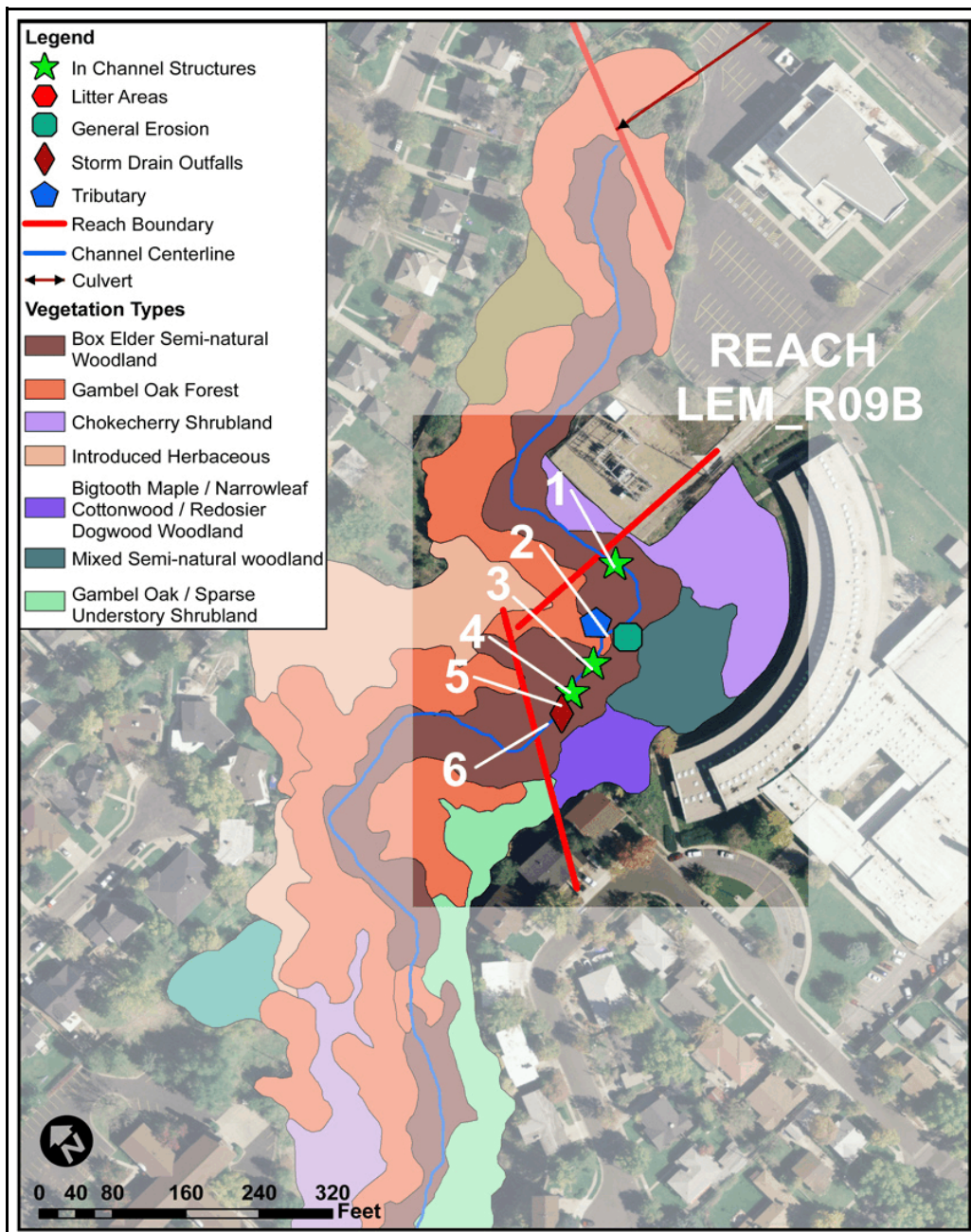
Priorities identified by stakeholders:

- shade
- stream health
- invasive species
- native fish
- land and wildlife
- habitat for birds and wildlife including deer and fox
- water quality and instream flows
- streambank stability
- removal of grass waste from streambank areas



REACH LEM_R09B: NEAR CLAYTON MIDDLE SCHOOL

Several concrete in-channel drop structures trap debris and create pools in this reach. The purpose of these structures is unclear and they are in generally poor condition. The lawn area of the school extends all the way to the channel, stream banks have been compacted from heavy foot traffic, and understory and shrub cover are correspondingly poor. Historically the channel followed a longer meander closer to the current school building location (Figure 3.6).



- Issues affecting riparian function:**
- failing in-channel structures
 - eroded access trails
 - compaction from foot traffic
 - lack of understory cover
 - invasive species (Russian olive, myrtle spurge)
 - trash

- Constraints/opportunities:**
- location offers educational/ interpretive opportunities
 - part of a long section of channel uninterrupted by culvert
 - connected to a relatively large contiguous area of green space
 - potential to reconnect broader natural floodplain on south bank



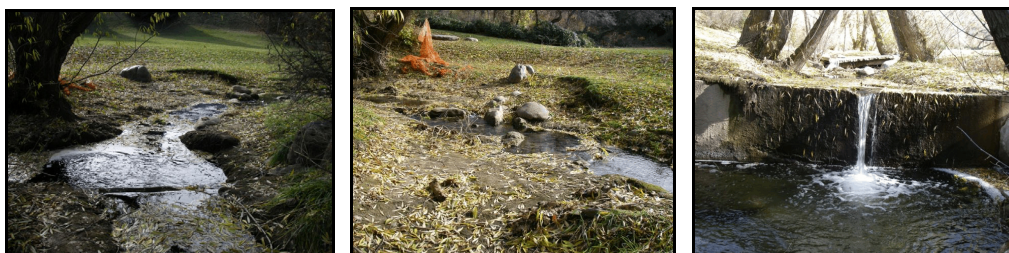
REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
264	0.050	soil with cobble gravel	cobble with sand/silt	abundant	absent	absent	minor

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	76-100+	0	moderate	moderate
Gambel Oak Forest	76-100+	26-50	51-75	low	moderate
Chokecherry Shrubland	76-100+	26-50	0	moderate	dense
Mixed Semi-natural Woodland	6-25	0	76-100+	none	absent
Bigtooth Maple / Narrowleaf Cottonwood / Redosier Dogwood Woodland	76-100+	6-25	0	none	dense

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
none	none	none	low

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Revegetation - understory layer ^a	within vegetation type(s)
Access control ^a	point 2 on map
Storm drain improvement ^a	point 5 on map
No-trespassing signage ^a	point 6 on map
Stream cleanup ^a	reach-scale
Removal/improvements to in-channel concrete structures ^a	points 1, 3, and 4 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation (shrub layer)/buffer creation ^a	within vegetation type(s)
Bank stabilization	reach-scale
Grade control	reach-scale

^a Higher-priority item; see Appendix D for estimated cost.



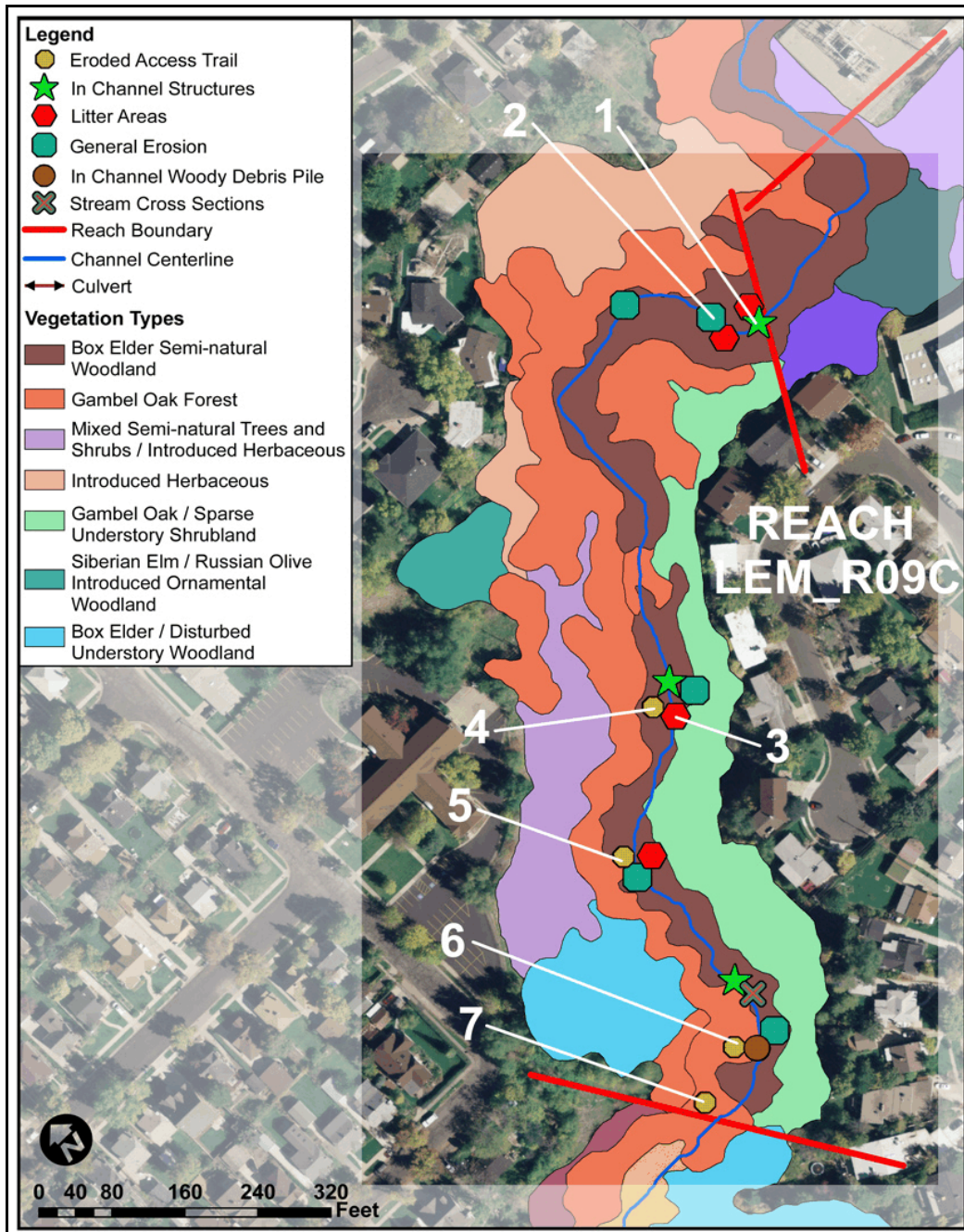
Priorities identified by stakeholders:

- protection of private property
- invasive plant removal
- preservation/restoration of overhanging banks
- land restoration
- general study area priorities (habitat, water quality, bank stability) also apply



REACH LEM_R09C: ABOVE WASATCH HOLLOW PARK

This reach has numerous tall vertical banks where the channel has meandered into terrace deposits; this bank erosion does not currently pose a risk to infrastructure. A clay/ root mat layer affects channel and bank conditions along much of the reach, resulting in poorly defined banks in some locations. Portions of this reach are impacted by trash and eroding trails associated with trespass/ recreational use. Weeds are also a significant problem.



- Issues affecting riparian function:**
- terrace erosion
 - eroded access trails
 - invasive species (Russian olive, Siberian elm, various noxious weeds)
 - limited understory cover
 - trash and yard waste

- Constraints/ opportunities:**
- power lines present in the channel and corridor
 - part of a long section of channel uninterrupted by culverts
 - connected to a relatively large contiguous area of green space
 - lower part of reach has low, accessible floodplain



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
1248	0.021	soil with gravel	cobble to silt	occasionally present	occasionally present	occasionally present	present - significant

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Gambel Oak Forest	76-100+	26-50/0	51-75/26-50	low/majority	absent/sparse/moderate
Box Elder Semi-natural Woodland	76-100+	51-75/76-100+	6-25/0	moderate	dense/moderate
Gambel Oak / Sparse Understory Shrubland	76-100+	26-50	26-50	moderate	dense
Introduced Herbaceous	0	0	76-100+	majority	absent
Mixed Semi-natural Trees and Shrubs / Introduced Herbaceous	6-25	0	76-100+	majority	absent
Box Elder / Disturbed Understory Woodland	76-100+	0	76-100+	majority	moderate
Siberian Elm / Russian Olive Introduced Ornamental Woodland	76-100+	0	76-100+	majority	absent

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
Northwest Bank	Southeast Bank	Northwest Bank	Southeast Bank
none	low	low	moderate

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Stream cleanup ^a	points 1, 2, and 3 on map
Mechanized trash removal ^a	points 1 and 2 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - understory layer ^a	within vegetation type(s)
No-trespassing signage ^a	reach-scale
Bank stabilization	reach-scale
Grade control	reach-scale
Access control/ trail stabilization ^a	points 4, 5, 6, and 7 on map
Replacement/improvements to in-channel rock/debris dams ^a	points 1 and 3 on map

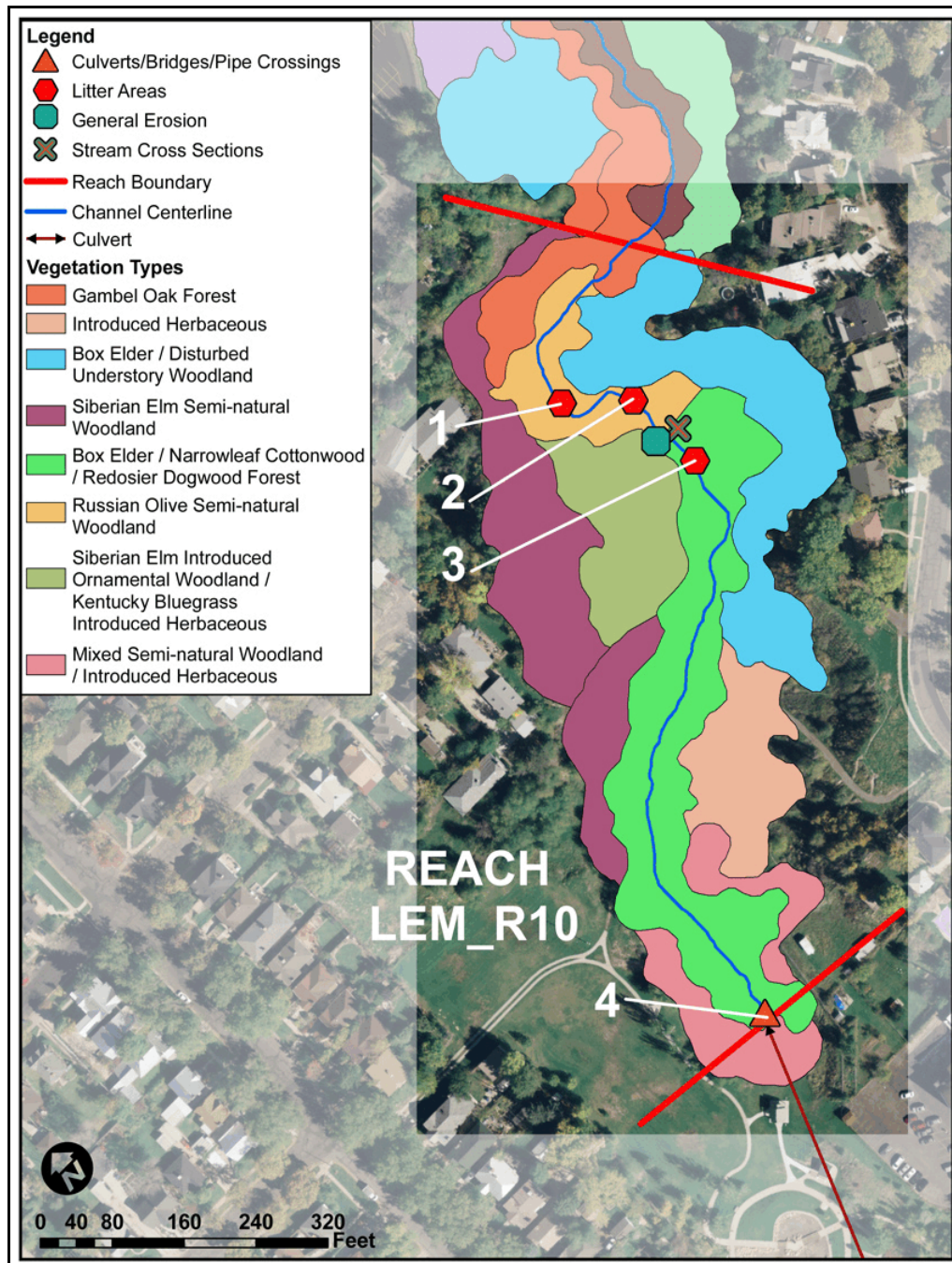
^a Higher-priority item; see Appendix D for estimated cost.

- Priorities identified by stakeholders:**
- protection of private property from trespassing and illicit activities
 - preservation/enhancement of sinuosity and lateral connectivity
 - historical restoration
 - fish and wildlife habitat restoration
 - streambank protection
 - runoff protection
 - water quality improvement



REACH LEM_R10: WASATCH HOLLOW PARK

This reach is heavily used for recreation by people and dogs, which has affected bank stability and understory vegetation growth. Understory vegetation is further limited by sediment deposition that occurs when the downstream culvert inlet clogs. Failing bank revetment is present in some areas of the reach, as is root zone scour. Fill material has encroached into portions of the floodplain. Russian olive is a dominant species in the upper part of the reach.



Issues affecting riparian function:

- invasive species (Russian olive, Siberian elm, various noxious weeds)
- eroded access trails
- heavy dog use
- failing bank revetment
- low bank/root zone erosion
- terrace erosion
- backwater effect/ sedimentation limits understory vegetation
- lack of understory cover
- limited shrub cover

Constraints/opportunities:

- park location offers educational/ interpretive opportunities
- part of a long section of channel uninterrupted by culverts
- connected to a relatively large contiguous area of green space
- heavy recreational use makes access control challenging



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
1121	0.012	soil	cobble/gravel	occasionally present	absent	occasionally present	minor

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder / Narrowleaf Cottonwood / Redosier Dogwood Forest	76-100+	6-25	0	none	sparse
Gambel Oak Forest	76-100+	26-50	51-75	low	moderate
Russian Olive Semi-natural Woodland	76-100+	51-75	0	high	dense
Siberian Elm Semi-natural Woodland	76-100+	0	51-75	majority	moderate
Box Elder / Disturbed Understory Woodland	76-100+	6-25	51-75	high	sparse
Siberian Elm Introduced Ornamental Woodland / Kentucky Bluegrass Introduced Herbaceous	6-25	0	76-100+	high	absent
Introduced Herbaceous	0	0	76-100+	majority	absent
Mixed Semi-natural Woodland / Introduced Herbaceous	26-50	6-25	76-100	majority	sparse

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
Northwest Bank	Southeast Bank	Northwest Bank	Southeast Bank
none	none	low	low

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Stream cleanup ^a	points 1, 2, and 3 on map
Mechanized trash removal ^a	points 2 and 3 on map
Invasive plant removal ^a	within vegetation type(s)
Culvert replacement ^a	point 4 on map
Access control/ trail stabilization ^a	reach-scale
Revegetation - understory layer ^a	within vegetation type(s)
No-trespassing signage ^a	reach-scale
Revegetation - shrub layer ^a	within vegetation type(s)
Bank stabilization ^a	reach-scale
Grade control	reach-scale
Floodplain re-establishment ^a	reach-scale

Priorities identified by stakeholders:

- protection of private property
- recreation and open space
- preservation/restoration/enhancement of sinuosity and lateral connectivity
- historical restoration and signage
- habitat for wildlife/birds
- water quality/instream flows
- streambank stability

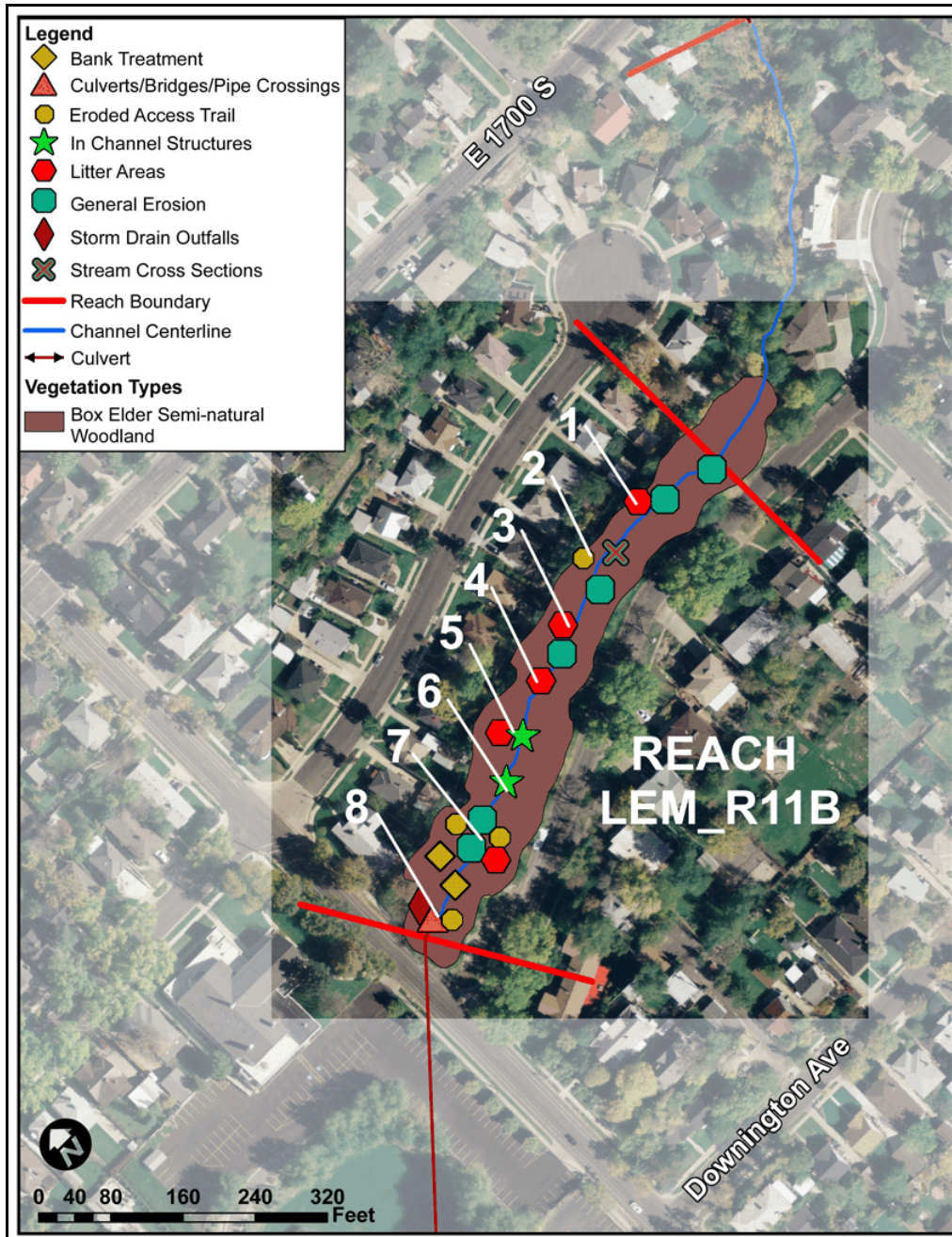


^a Higher-priority item; see Appendix D for estimated cost.



REACH LEM_R11B: ABOVE 1500 EAST

The channel in this reach appears incised and possibly straightened/channelized, with a narrow canal-like shape. The stream is tightly confined between residential homes on the north and Blaine Avenue to the south. The culvert inlet at the bottom of the reach clogs periodically. A metal grate-style trash rack spans the channel in the middle of the reach, and captured debris and sediment are regularly dredged from the channel in this location. Trash is prevalent in the reach.



Issues affecting riparian function:

- storm outfall erosion
- bed incision
- low bank/root zone erosion
- failing bank revetment
- low bank/root zone erosion
- terrace erosion
- eroded access trails
- lack of shrub cover
- invasive species (Siberian elm)
- trash

Constraints/opportunities:

- publicly owned on south bank
- relatively good access from the south bank
- tightly confined by infrastructure
- potential may exist to daylight part of culverted section downstream



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
614	0.020	soil with cobble	cobble/gravel	absent	occasionally present	absent	minor

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Semi-natural Woodland	76-100+	0	6-25	moderate	moderate

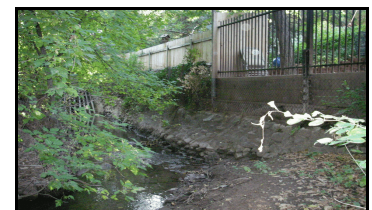
EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	low	high	high

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Stream cleanup ^a	points 1, 3, 4, and 5 on map
Mechanized trash removal ^a	points 4, 5, and 7 on map
Revegetation - shrub layer ^a	within vegetation type(s)
Storm drain improvement ^a	point 8 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - understory layer ^a	within vegetation type(s)
Grade control ^a	reach-scale
Bank stabilization ^a	reach-scale
Access control/ trail stabilization ^a	points 2, 6, and 8 on map
Culvert replacement ^a	point 8 on map
No-trespassing signage	reach-scale

^a Higher-priority item; see Appendix D for estimated cost.

Priorities identified by stakeholders:

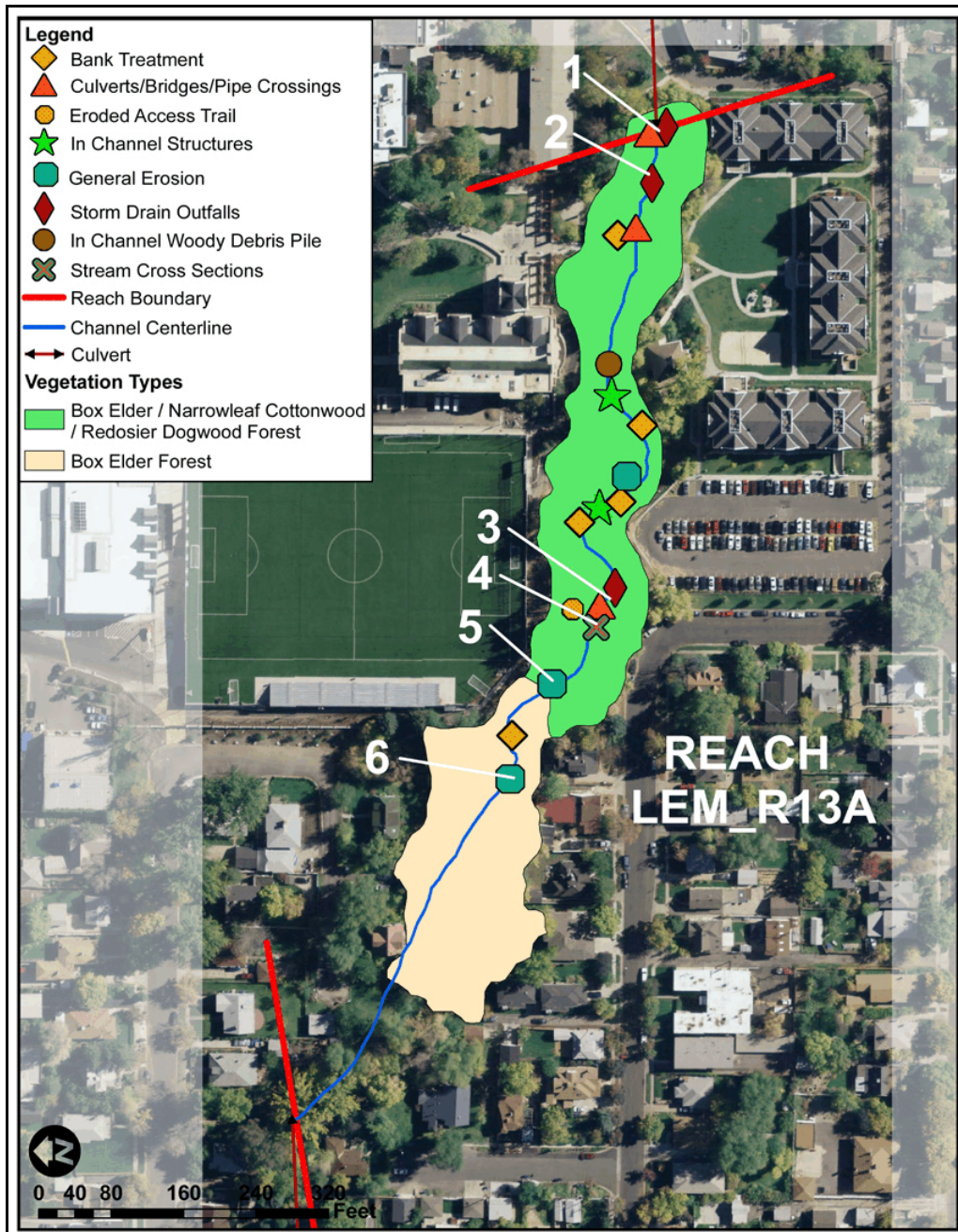
- streambank stability
- weed control
- trash cleanup
- concerns about illicit activities
- general study area priorities (water quality, habitat) also apply





REACH LEM_R13A: WESTMINSTER COLLEGE

The upper part of this reach has many access areas and bare-dirt trails. Terrace erosion and root scour are evident. Boulder bank revetment was installed in various parts of the reach as part of a stabilization project completed in 2008. That project also involved installation of interpretive signs and some native shrub/ tree plantings, as well as construction of a concrete stage adjacent to the channel.



Issues affecting riparian function:

- eroded access trails
- storm drain outfall erosion
- low bank/root zone erosion
- terrace erosion
- limited shrub cover
- understory dominated by nonnative species
- scour/erosion at culvert outlet
- invasive species (periwinkle, ivy, Siberian elm)

Constraints/opportunities:

- location offers educational opportunities
- highly urbanized hydrology
- confined by development



REACH CHARACTERISTICS							
LENGTH (feet)	SLOPE (feet/feet)	BANK MATERIAL	BED MATERIAL	FLAT FLOODPLAIN SURFACES	WOODY DEBRIS IN CHANNEL	BAR DEPOSITS	CLAY/ROOT MAT INFLUENCE
1304	0.024	soil	cobble/gravel	abundant	occasionally present	occasionally present	present

VEGETATION CHARACTERISTICS					
COMMUNITY TYPE	PERCENT COVER			INVASIVE SPECIES CLASS	WOODY DEBRIS ON BANKS
	Canopy	Shrub	Understory		
Box Elder Forest	76-100+	6-25	6-25	moderate	sparse
Box Elder / Narrowleaf Cottonwood / Redosier Dogwood Forest	76-100+	6-25	26-50	high	moderate

EXISTING INFRASTRUCTURE			
WITHIN 50 FEET OF AHWL		WITHIN 50-100 FEET OF AHWL	
North Bank	South Bank	North Bank	South Bank
low	low	high	high

Priorities identified by stakeholders:

- removal of invasive plants
- installation of a bridge at the 1300 East crossing
- general study area priorities (habitat, water quality, streambank stability) also apply

RECOMMENDATIONS	
IMPROVEMENT MEASURE	LOCATION
Storm drain improvement ^a	points 1, 2, and 3 on map
Culvert replacement/outlet protection ^a	point 1 on map
Invasive plant removal ^a	within vegetation type(s)
Revegetation - shrub layer ^a	within vegetation type(s)
No-trespassing signage ^a	point 6 on map
Bank stabilization ^a	reach-scale
Access control/ trail stabilization ^a	points 1 and 4 on map
Restoration of native understory plants ^a	within vegetation type(s)
Revegetation - understory layer ^a	within vegetation type(s)
Grade control	reach-scale
Removal of obsolete silt fence ^a	point 5 on map

^a Higher-priority item; see Appendix D for estimated cost.



