



## Item No. 19 Town of Atherton

### **ATHERTON CHANNEL DISTRICT – REGULAR AGENDA**

**TO: HONORABLE MAYOR AND CITY COUNCIL  
CHAIR AND DISTRICT BOARD MEMBERS  
GEORGE RODERICKS, CITY MANAGER**

**FROM: ROBERT OVADIA, PUBLIC WORKS DIRECTOR**

**DATE: MARCH 20, 2019**

**SUBJECT: DISCUSSION OF DRAINAGE MASTER PLAN PROJECTS  
SPECIFIC TO THE ATHERTON CHANNEL DISTRICT AND  
DISCUSSION/DIRECTION ON NEXT STEPS FOR SPECIAL  
DISTRICT FUNDING**

#### **RECOMMENDATION**

Discuss and provide direction regarding next steps for special district funding.

#### **BACKGROUND**

On February 20, 2019, the Board received a presentation of regarding funding options to address maintenance and capital needs for the Atherton Channel District. As a result of that meeting, the Board requested additional information regarding the capital needs associated with the projects identified in the Town-wide Drainage Study Update dated April 2015.

#### **ANALYSIS**

The Town-wide Drainage Study Update recommended improvements totaling over \$41 million, measured in 2014 dollars. These improvements were classified into 5 tiers and were located throughout the Town. The Council began funding improvements through the Capital Improvement Program, funded primarily with General Fund and Special Parcel Tax Funds.

The following Table summarizes the funding needs identified in the Drainage Study Update by Tier and Drainage Area. Tier I Projects are the highest priority projects and improvements identified would mitigate flooding problems that could create significant life and safety issues. Tier 5 Projects represent previously recommended projects but the issues in these areas have not been observed recently. The full list of recommended projects along with a project location map is provided as Attachment 1 to this report. The summary table below divides the projects up by drainage area.

<b>Drainage Area</b>	<b>Tier 1</b>	<b>Tier 2</b>	<b>Tier 3</b>	<b>Tier 4</b>	<b>Tier 5</b>	<b>Total</b>
<b>Atherton Channel</b>	\$ 6,137,000	\$ 4,678,820	\$ 3,123,000	\$ 9,139,820	\$ 372,000	<b>\$ 23,450,640</b>
<b>Selby Lane</b>		\$ 2,553,000		\$ 2,458,000	\$ 1,254,000	<b>\$ 6,265,000</b>
<b>El Camino</b>		\$ 1,134,000		\$ 7,511,000		<b>\$ 8,645,000</b>
<b>Bay Road</b>					\$ 1,946,000	<b>\$ 1,946,000</b>
<b>Other</b>		\$ 254,000		\$ 784,000	\$ 17,000	<b>\$ 1,055,000</b>
<b>Total</b>	<b>\$ 6,137,000</b>	<b>\$ 8,619,820</b>	<b>\$ 3,123,000</b>	<b>\$ 19,892,820</b>	<b>\$ 3,589,000</b>	<b>\$ 41,361,640</b>

As shown in the table above, the improvements identified in the Atherton Channel Drainage area constitute almost 57% of the improvements recommended town-wide. The cost estimates above *do not include* the costs associated with any stormwater detention, treatment or green infrastructure improvements that may desired or required pursuant to the Municipal Regional Stormwater Permit.

The presentation by Tim Siefert, of NBS, on February 6, 2019, outlined several funding options to address capital needs of the District, including Property Related Fees, Special Parcel Tax, and Special Benefit Assessments. A summary of these options is as follows:

- Property Related Fees – Assessment should be based on benefit analysis. Can prove proportionality of benefit to property rather than direct benefit. Would require a 2/3 affirmative vote of property owners.
- Special Parcel Tax – Fee does not need to be benefit based but should use reasonable metrics for establishing the assessment. Requires a 2/3 voter (not property owner) approval.
- Special Benefit Assessment – Assessments must be supported by a detailed engineer's report prepared by a registered professional engineer. The report should include a description of the improvements or services to be financed through the special assessment, the proposed district boundaries, and a description of the special benefit which each parcel receives as a result of the assessment. Requires a public hearing and may be implemented based on a review of protest ballots – cannot be enacted if 50% + of ballots received protest the assessment.

Also available is the option of a general tax, which may be used for any governmental purpose. Majority voter approval is required for new or increased general taxes.

Staff is requesting feedback and direction on the type of funding option or options that the Board would like staff to pursue further, if at all at this time. As the fees will be either based on, or correlated with, benefit, it is also important to identify the initial capital projects to factored into the analysis.

Staff does not expect the Council to identify specific projects at this time; however, if the Council desires staff to pursue priority projects with a specific funding mechanism, staff will return with the necessary consultant requests for proposal to begin those processes.

### **POLICY FOCUS**

The Council's policy discussion should focus on revenue options and strategies for the Atherton Channel District.

### **PUBLIC NOTICE**

Public notification was achieved by posting the agenda, with this agenda item being listed, at least 72 hours prior to the meeting in print and electronically. Information about the project is also disseminated via the Town's electronic News Flash and Atherton Online. There are approximately 1,200 subscribers to the Town's electronic News Flash publications. Subscribers include residents as well as stakeholders – to include, but be not limited to, media outlets, school districts, Menlo Park Fire District, service providers (water, power, and sewer), and regional elected officials.

### **FISCAL IMPACT**

None at this time.

### **COMMISSION/COMMITTEE FEEDBACK/REFERRAL**

This item \_\_\_ has or X has not been before a Town Committee or Commission.

- Audit/Finance Committee (meets every other month)
- Bicycle/Pedestrian Committee (meets as needed)
- Civic Center Advisory Committee (meets as needed)
- Environmental Programs Committee (meets every other month)
- Park and Recreation Committee (meets each month)
- Planning Commission (meets each month)
- Rail Committee (meets every other month)
- Transportation Committee (meets every other month)

### **ATTACHMENTS**

1. Town Wide Drainage Study Update Table 6-1: Summary of Recommended Drainage Improvement Projects
2. Town Wide Drainage Study Update Figure 6-1: 2014 Prioritized Improvement Projects
3. Town Wide Drainage Study Update Table 6-2: Background for Recommended Projects

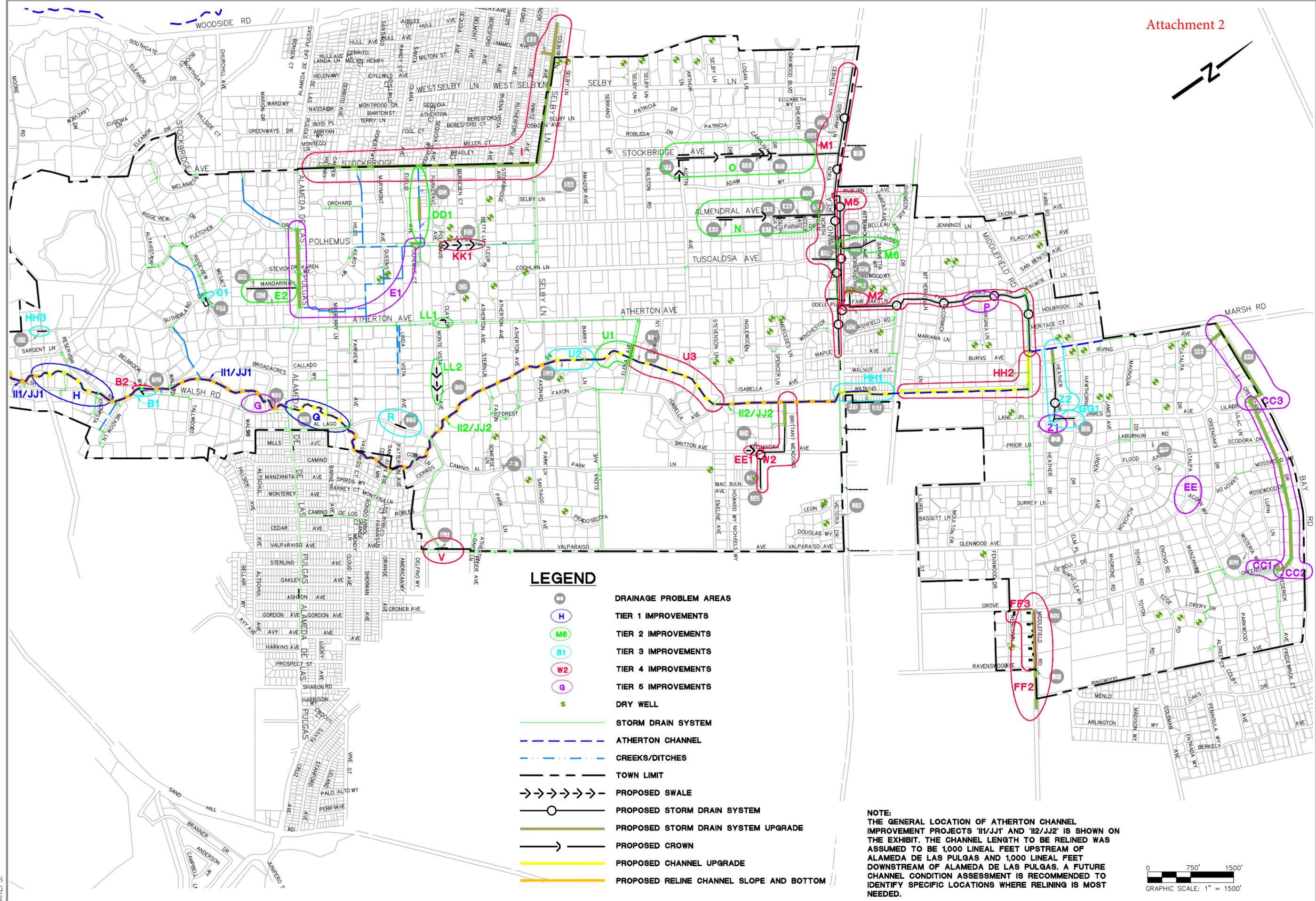
**TABLE 6-1  
TOWN OF ATHERTON DRAINAGE STUDY  
SUMMARY OF RECOMMENDED DRAINAGE IMPROVEMENT PROJECTS**

ID No.	Description	Total Cost, \$
<b>TIER 1</b>		
H	SF Waterline/Reservoir Channel Reline & Erosion Control	2,360,000
Q	Alameda De Las Pulgas/Camino Al Lago Upgrade Existing Channel <sup>a</sup>	1,467,000
II1	Reline Channel Slopes (Upstream of Alameda de las Pulgas)	2,000,000
JJ1	Reline Channel Bottom (Upstream of Alameda de las Pulgas)	310,000
<b>Tier 1 Subtotal</b>		<b>6,137,000</b>
<b>Tier 1 Subtotal (Rounded)</b>		<b>6,140,000</b>
<b>TIER 2</b>		
II2	Reline Channel Slopes (Alameda de las Pulgas to El Camino Real)	2,000,000
JJ2	Reline Channel Bottom (Alameda de las Pulgas to El Camino Real)	310,000
U1	Barry/Elena Upgrade Channel	2,300,820
E2	Mandarin SD System	322,000
M6	El Camino/Lloydden Storm Drainage System	254,000
DD1	Polhemus/Euclid/Parker Upgrade Backyard Ditch and Culvert	2,179,000
LL1	Clay Drive Storm Drain System and Barrier	52,000
N	Almendral Concrete Swale and Regrade	437,000
O	Stockbridge Concrete Swale and Regrade	697,000
LL2	Monte Vista Concrete Swale	68,000
<b>Tier 2 Subtotal</b>		<b>8,619,820</b>
<b>Tier 2 Subtotal (Rounded)</b>		<b>8,620,000</b>
<b>TIER 3</b>		
U2	Barry/Elena Upgrade Channel	1,700,000
HH1	Watkins South Channel & Culvert	625,000
B1	Belbrook/Walsh Storm Drainage System & Swale	79,000
Z2	Heather Storm Drainage System and Upgrade	473,000
GG1	James and Hawthorne Storm Drainage System	131,000
HH3	Reservoir Road Regrade and Crown	58,000
C1	Sutherland/Ridgeview Storm Drainage System	34,000
R	Linda Vista/Camino Al Lago Regrade Intersection	23,000
<b>Tier 3 Subtotal</b>		<b>3,123,000</b>
<b>Tier 3 Subtotal (Rounded)</b>		<b>3,120,000</b>

**Table 6-1 (cont.)  
Town of Atherton Drainage Study  
Summary of Recommended Drainage Improvement Projects**

ID No.	Description	Total Cost, \$
<b>TIER 4</b>		
HH2	Watkins/Middlefield Channel & Culvert	5,734,000
U3	Barry/Elena Upgrade Channel	2,300,820
M1	El Camino Real Storm Drainage System	2,348,000
M5	El Camino Real Storm Drainage Force Main & Pump Station	5,163,000
M2	Fair Oaks Lane Storm Drainage System	138,000
W2	Mac Bain/Alejandra/Brittany SD System and Upgrade	713,000
B2	Belbrook/Walsh Upgrade Culvert with Erosion Control	338,000
I	Selby/Stockbridge Upgrade Storm Drainage System	2,371,000
FF2	Middlefield East Upgrade Existing Storm Drainage System	629,000
FF3	East Middlefield Barriers and Backflow Preventers	17,000
V	Por Los Arboles/Valparaiso Regrade Intersection	22,000
EE1	Alejandra Swale	32,000
KK1	Polhemus/Fleur Swale Improvement and Perforated Underdrain	87,000
<b>Tier 4 Subtotal</b>		<b>19,892,820</b>
<b>Tier 4 Subtotal (Rounded)</b>		<b>19,890,000</b>
<b>TIER 5</b>		
E1	Alameda/Mulberry/Polhemus Upgrade Boxes & Ex. SD System	1,254,000
G	Broadacres Upgrade Culvert	350,000
CC2	Greenoaks Upgrade Existing Storm Drainage System	1,191,000
CC3	Bay Road Upgrade Existing Storm Drainage System	710,000
P	Virginia/Fair Oaks Regrade Intersection	17,000
Z1	Heather Swale	22,000
CC1	Greenoaks Swale	24,000
EE	Catalpa/Acorn Regrade Intersection	21,000
<b>Tier 5 Subtotal</b>		<b>3,589,000</b>
<b>Tier 5 Subtotal (Rounded)</b>		<b>3,590,000</b>

<sup>a</sup> Project Q is located on school district property, not within Town ROW



LEGEND	
	DRAINAGE PROBLEM AREAS
	TIER 1 IMPROVEMENTS
	TIER 2 IMPROVEMENTS
	TIER 3 IMPROVEMENTS
	TIER 4 IMPROVEMENTS
	TIER 5 IMPROVEMENTS
	DRY WELL
	STORM DRAIN SYSTEM
	ATHERTON CHANNEL
	CREEKS/DITCHES
	TOWN LIMIT
	PROPOSED SWALE
	PROPOSED STORM DRAIN SYSTEM
	PROPOSED STORM DRAIN SYSTEM UPGRADE
	PROPOSED CROWN
	PROPOSED CHANNEL UPGRADE
	PROPOSED RELINE CHANNEL SLOPE AND BOTTOM

**NOTE:**  
 THE GENERAL LOCATION OF ATHERTON CHANNEL IMPROVEMENT PROJECTS '111/JJ1' AND '112/JJ2' IS SHOWN ON THE EXHIBIT. THE CHANNEL LENGTH TO BE RELINED WAS ASSUMED TO BE 1,000 LINEAL FEET UPSTREAM OF ALAMEDA DE LAS PULGAS AND 1,000 LINEAL FEET DOWNSTREAM OF ALAMEDA DE LAS PULGAS. A FUTURE CHANNEL CONDITION ASSESSMENT IS RECOMMENDED TO IDENTIFY SPECIFIC LOCATIONS WHERE RELINING IS MOST NEEDED.



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DESIGNER: NFE	MGR: DR

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 JOB NUMBER **SJB037500**

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

AREA	LOCATION	PROBLEMS	SOLUTIONS
<b>Tier 1</b>			
<p>H – SF Waterline/Reservoir Channel Reline &amp; Erosion Control</p>	<p>Atherton Channel north of I-280 between San Francisco Water Line and Reservoir Road.</p>	<ul style="list-style-type: none"> <li>The major problem is channel erosion. The channel bottom is about a foot lower than the existing channel lining and the side slopes have eroded nearby to the trees.</li> <li>Standing water can cause mosquito breeding problems. Picture was taken during a very dry week. The bottom of the channel has eroded below original elevation</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>2001 Photo</p> </div> <div style="text-align: center;">  <p>2013 Photo</p> </div> <div style="text-align: center;">  <p>2013 Photo</p> </div> </div>	<ul style="list-style-type: none"> <li>Re-grade channel bottom to eliminate ponding and repair eroded channel side slope/embankment.</li> </ul>
<p>Q – Alameda de las Pulgas/Camino Al Lago Upgrade Existing Channel</p>	<p>Areas adjacent to Atherton Channel from Alameda de las Pulgas to Camino Al Lago.</p>	<ul style="list-style-type: none"> <li>Existing metal arch box culvert crossing the Las Lomitas School and channel is under capacity for 10-year event.</li> <li>The school is located in the major flow path.</li> <li>Because of flow overtopping Alameda de las Pulgas in December of 2012, school classrooms were flooded. Location of overtopping is at the low point of the road.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>Reduction of demand will be difficult to attain due to the contributing surface area upstream of the existing Alameda de las Pulgas box culvert. Watershed areas are 74 percent off-site of Town limit and 26 percent within the Town limit.</li> <li>The school is lower than the road, see photo below</li> </ul> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	<ul style="list-style-type: none"> <li>Upgrade the existing metal arch box culvert and the channel to increase capacity.</li> <li>Alternative to upsizing existing box culvert and channel is to install a 3 foot wall along south side of the property and force the higher flows to be diverted through the parking lot and into the road to Camino Al Lago. To reduce the amount of runoff on the diverted flow path, install a bypass inlet and pipe system along the parking lot and downstream channel at Camino Al Lago.</li> <li>The bypass piping system can be combined with regional detention basin for 10-year flood protection.</li> <li>This alternative leaves the existing culvert in place. Recommend inspection of existing pipe to determine the stability of the system.</li> </ul>
<p>III – Reline Channel Slopes, Phase 1</p>	<p>Atherton Channel</p>	<ul style="list-style-type: none"> <li>The channel side lining has cracks and holes, see 2013 photo.</li> </ul> <div style="text-align: center;">  </div>	<ul style="list-style-type: none"> <li>Restore the sides of the channel. Assume total channel length of 1000 lineal feet is in need of repair.</li> <li>Channel to be repaired excludes sections where other channel improvement projects are identified.</li> <li>Expand the life expectancy of the channel.</li> <li>This project would be phase 1 of two projects. Phase 1 would restore channel areas most needing improvement upstream of Alameda de las Pulgas.</li> <li>To identify specific locations most needing improvements, a condition assessment of the existing channel is recommended prior to design of channel improvements.</li> </ul>

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

AREA	LOCATION	PROBLEMS	SOLUTIONS
JJ1 – Reline Channel Bottom, Phase 1	Atherton Channel	<ul style="list-style-type: none"> <li>The channel bottom lining has cracks and holes, see 2013 photos.</li> <li>Life expectancy of the channel has been exceeded.</li> </ul> 	<ul style="list-style-type: none"> <li>Regrade the bottom of the channel. Assume total channel length of 1000 lineal feet is in need of repair.</li> <li>Channel to be repaired excludes sections where other channel improvement projects are identified.</li> <li>This project would be phase 1 of two projects. Phase 1 would restore areas most needing improvement upstream of Alameda de las Pulgas.</li> <li>To identify specific locations most needing improvements, a condition assessment of the existing channel is recommended prior to design of channel improvements.</li> </ul>
<b>Tier 2</b>			
II2 – Reline Channel Slopes, Phase 2	Atherton Channel	<ul style="list-style-type: none"> <li>The channel side lining has minor cracks and holes</li> </ul>	<ul style="list-style-type: none"> <li>Restore the sides of the channel. Assume total channel length of 1000 lineal feet is in need of repair.</li> <li>Channel to be repaired excludes sections where other channel improvement projects are identified.</li> <li>Expand the life expectancy of the channel.</li> <li>This project would be phase 2 of two projects and would address areas from Alameda de las Pulgas to El Camino Real.</li> <li>To identify specific locations most needing improvements, a condition assessment of the existing channel is recommended prior to design of channel improvements.</li> </ul>
JJ2 – Reline Channel Bottom, Phase 2	Atherton Channel	<ul style="list-style-type: none"> <li>The channel bottom lining has cracks and holes</li> <li>Exceeded the life expectancy of the channel.</li> </ul>	<ul style="list-style-type: none"> <li>Regrade the bottom of the channel. Assume total channel length of 1000 lineal feet is in need of repair.</li> <li>Channel to be repaired excludes sections where other channel improvement projects are identified.</li> <li>This project would be phase 2 of two projects and would address areas from Alameda de las Pulgas to El Camino Real.</li> <li>To identify specific locations most needing improvements, a condition assessment of the existing channel is recommended prior to design of channel improvements.</li> </ul>
U1 – Barry/Elena Upgrade Channel	Atherton Channel from Barry Lane to Isabella Avenue	<ul style="list-style-type: none"> <li>The project was divided into three phases. The first phase would address areas identified as the worst channel condition.</li> <li>The major problem is overtopping of the channel and flooding basements and properties.</li> <li>The Atherton Channel from upstream of Barry Lane and Elena to Isabella Avenue is undersized for higher flows.</li> <li>Channel is deteriorating.</li> </ul>	<ul style="list-style-type: none"> <li>This is the first part of the three phased improvement project.</li> <li>Inspect the condition of the channel and determine areas that need significant repair.</li> <li>Maintain the capacity of the channel by installing a U-shape concrete channel.</li> </ul>
E2 – Mandarin Storm Drainage System	Areas adjacent to Mandarin Way starting from cul-de-sac to Alameda de las Pulgas and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>The major problem is a large amount of runoff flows through the back property.</li> <li>Flooding on property occurs because the property is a flow path and a low point.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>There is no release point for this area, such as a storm drainage system, to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>Create a release point by installing a storm drainage system along Mandarin Way and connecting to an existing storm drainage system along Alameda de las Pulgas.</li> <li>Combined storm system with localized detention system.</li> </ul>

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

AREA	LOCATION	PROBLEMS	SOLUTIONS
M6 – El Camino/Lloyd Storm Drainage System	Areas adjacent to El Camino Real and upstream tributary flow paths that contribute flows to this area	<ul style="list-style-type: none"> <li>The major problem is the backflow in the pipe surcharges and causes flooding in the back of property.</li> <li>There is no release point for this area, like a storm drainage system to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>Create a release point by installing a storm drainage system starting from an existing inlet and connecting to a new storm drainage system along El Camino Real and Lloyd Drive that bubbles out into the curb and gutter.</li> </ul>
DD1 – Polhemus/Euclid/Parker Upgrade Backyard Ditch and Culvert System	Areas adjacent to the existing box culverts crossing Alameda de las Pulgas, Mulberry Lane and Polhemus Avenue and an existing culvert along the back property of lot #68. Existing storm drainage system along Alameda de las Pulgas from Fletcher Drive to an existing ditch.	<ul style="list-style-type: none"> <li>Existing ditch and culvert is eroding and under capacity.</li> <li>Flooding in the ditch behind the house and in the north street frontage because the area is very flat.</li> <li>Flooding the house and front of yard because the road is very flat and the area is a low point.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing box culverts and storm drainage system to increase capacity.</li> </ul>
LL1 – Clay Drive Storm Drain System and Barrier	North side of Atherton Avenue and Clay Drive intersection	<ul style="list-style-type: none"> <li>During the major storm event in December 2012, runoff from Atherton Avenue flowed into Clay Drive towards the back of the cul-de-sac.</li> <li>Flooding on driveway was a foot deep.</li> <li>Atherton Avenue existing storm drainage system is undersized.</li> </ul>	<ul style="list-style-type: none"> <li>Create a release point by installing a storm drainage system between low point of the intersection and connect to existing system along Atherton Avenue.</li> <li>Install a barrier like a hump before entering Clay Drive, which would prevent water from entering from the street.</li> </ul>
N – Almendral Concrete Swale and Regrade	Areas adjacent to Almendral Avenue from lot #75 Almendral Avenue to Northgate Street and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>There are several low points along the road especially at the intersections. The road has a slight crown. All these low points have a tendency to flood and have no release point.</li> <li>The water flows across the road and accumulates on a property that is low, resulting in the basement flooding.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale on low point and on all the intersections along the easterly side of Almendral Avenue from lot #75 to Northgate crossing the intersection to create a flow path.</li> <li>Regrade the crown of the road to prevent the water from flowing across the road. This creates several flow paths with smaller flow.</li> <li>Connect the swales to the new storm drainage system along El Camino Real for a release point.</li> </ul>
O – Stockbridge Concrete Swale and Regrade	Areas adjacent to Stockbridge Avenue from Austin Avenue to Nora Way and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>There are several low points along the road especially at the intersections and the road has a slight crown. All these low points flood and have no release point.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale at the intersections along Stockbridge Avenue from Austin Avenue to Nora Way to create a flow path.</li> <li>Regrade the crown of the road to prevent the water from flowing across the road. This creates several flow paths with smaller flow.</li> <li>Connect the swales to the new storm drainage system along El Camino Real for release point.</li> </ul>
LL2 – Monte Vista Concrete Swale	Areas adjacent to Monte Vista Avenue from midpoint to Atherton Channel and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Flooding into driveway and stagnant water along open ditch adjacent to the street (when it is not raining).</li> <li>Breeding ground for mosquitos.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale at the northerly side of Monte Vista Avenue to establish the flow path or a gravel swale with underdrain and storm drain pipe to discharge into Atherton Channel.</li> </ul>
<b>Tier 3</b>			
U2 – Barry/Elena Upgrade Channel	Atherton Channel from Barry Lane to Isabella Avenue.	<ul style="list-style-type: none"> <li>The major problem is overtopping of the channel and flooding of basements and properties.</li> <li>The channel along Atherton Channel from Barry to Elena is undersized for the 10-year flow.</li> </ul>	<ul style="list-style-type: none"> <li>Phase 2 of the three phased improvements.</li> <li>Increase capacity of the channel by installing a U-shape concrete channel.</li> </ul>
HH1 – Watkins South Channel & Culvert	Atherton Channel from El Camino Real to Station Lane.	<ul style="list-style-type: none"> <li>The major problem is the box culvert crossing El Camino Real is undersized for the 10-year event.</li> <li>The box culvert (covered on top) from El Camino Real to Station Lane is undersized.</li> </ul>	<ul style="list-style-type: none"> <li>Increase capacity of the box culvert only for higher than 10-year event condition. Require inspection and maintenance of eroding sections of channel (assumed 25 percent of the total length of this section of the channel).</li> <li>Replace existing inlet into open curb inlet at the intersection of El Camino and Watkins to prevent blockage.</li> </ul>

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

<b>AREA</b>	<b>LOCATION</b>	<b>PROBLEMS</b>	<b>SOLUTIONS</b>
B1 – Belbrook/Walsh Storm Drainage System & Swale	Intersection of Walsh Road and Belbrook Way	<ul style="list-style-type: none"> <li>• Flooding on the northwest and southeast corners of the intersection because of low points.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• There is no release point for this area, similar to a storm drainage system, to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a storm drainage system from the low points and discharge to Atherton Channel.</li> <li>• Install concrete swales to direct flow into the new storm drainage system.</li> </ul>
Z2 – Heather Storm Drainage System and Upgrade	Areas adjacent to James Avenue starting from Middlefield to Heather Drive and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• Flooding on property and streets because it is along the flow path and at a low point. Water flows along Middlefield and Heather Drive and accumulates onto the lot along James Avenue.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• There is no release point for this area, similar to a storm drainage system, to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a storm drainage system from the low point of the property to Heather Drive and connecting to an existing storm drainage discharge pipe into Atherton channel. This discharge pipe should be upgraded.</li> </ul>
GG1 – James and Hawthorne Storm Drain System	Intersection of James Avenue and Hawthorne Drive and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• Intersection floods very quickly.</li> <li>• The intersection is a sag area along James Avenue and flows coming from adjacent areas from Middlefield Road and Hawthorne Drive converge at this intersection.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a storm drainage system from the low point of the intersection connecting to the proposed system along Heather Drive and into the existing storm drainage discharge pipe into Atherton Channel.</li> </ul>
HH3 – Reservoir Road Regrade and Crown	Reservoir Road cul-de-sac	<ul style="list-style-type: none"> <li>• Standing water and debris along swale in front of property.</li> </ul> 	<ul style="list-style-type: none"> <li>• Install storm drain system with inlets upstream and downstream of property (bubbler system) or extend rock trench drain swale further upstream.</li> </ul>
C1 – Sutherland/Ridgeview Storm Drainage System	Areas adjacent to Mesa Court, Sutherland Drive, and Ridgeview Drive that release the upstream tributary flows into this path.	<ul style="list-style-type: none"> <li>• The intersection of Sutherland Drive and Ridgeview Drive floods.</li> </ul>	<ul style="list-style-type: none"> <li>• The intersection is near the low point of the watershed from Ridgeview Drive, Sutherland Drive, and Mesa Court. Flows coming from Mesa Court are not captured before flowing into Ridgeview Drive. Recommend installing inlets at the corners of the intersection to reduce the flow into the sag section of Ridgeview Drive near the detention structure.</li> </ul>
R – Linda Vista/Camino Al Lago Regrade Intersection	Westerly side of Camino Al Lago and Linda Vista Avenue intersection	<ul style="list-style-type: none"> <li>• The intersection has an existing concrete swale set too low with no defined release point. The northeast corner floods and the soil erodes because of ponding.</li> </ul>	<ul style="list-style-type: none"> <li>• Regrade the existing concrete swale at the same alignment as the edge of pavement creating a continuous flow path.</li> </ul>
<b>Tier 4</b>			
HH2 – Watkins/Middlefield/Marsh Channel & Culvert	Atherton Channel from Station Lane to Bay Road.	<ul style="list-style-type: none"> <li>• The major problem is the box culverts in Middlefield and Watkins are undersized.</li> <li>• The channel along Watkins from Station Lane to Middlefield Road is undersized.</li> </ul>	<ul style="list-style-type: none"> <li>• Channel and box culvert at Marsh Road from Middlefield Road to Bay Road is in final design (not included in this project).</li> <li>• Increase capacity of the box culverts. Add parallel box culvert to increase capacity of existing box culvert.</li> <li>• Increase capacity of the channel by installing a U-shape concrete channel.</li> <li>• Install side channel detention at park.</li> <li>• Decrease peak flow upstream.</li> </ul>
U3 – Barry/Elena Upgrade Channel	Atherton Channel from Barry Lane to Isabella Avenue.	<ul style="list-style-type: none"> <li>• Phase 3 consists of the balance of channel improvement for side and bottom improvements.</li> <li>• The major problem is overtopping of the channel and flooding basements and properties.</li> <li>• The Atherton Channel from upstream of Barry and Elena to Isabella has 10-year capacity but is undersized for higher flows.</li> <li>• Channel is deteriorating.</li> </ul>	<ul style="list-style-type: none"> <li>• This is the third element of the three phased improvement project.</li> <li>• Balance of the channel not repaired from U2 improvement project.</li> <li>• Maintaining the capacity of the channel by installing a U-shape concrete channel for 10-year event.</li> </ul>

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

AREA	LOCATION	PROBLEMS	SOLUTIONS
M1 – El Camino Real Storm Drainage System	Areas adjacent to El Camino Real starting from Maple Avenue to Selby Lane and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• The major problem is a large amount of water flows through houses and neighboring properties.</li> <li>• Flooding on property and streets.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• There is no release point for this area, similar to a storm drainage system, to carry large amounts of flow.</li> <li>• Based on 1986 Drainage Map, El Camino Real flow path drainage system is a channel/ditch with 12-inch culvert through streets. The existing condition does not show the ditch, the shoulder is completely paved and a very shallow swale section or in some places no swale exists.</li> </ul>	<ul style="list-style-type: none"> <li>• Install a storm drainage system along El Camino Real from Maple Avenue to Selby Lane. This includes sub-systems collecting runoff from the low point of the side streets.</li> <li>• Requires coordination with Caltrans.</li> </ul>
M5 – El Camino Real Storm Drainage Force Main and Pump Station	Starting from the new gravity storm system (M1) at the intersection of El Camino Real and Wilburn Avenue, the new force main is routed along El Camino Real, Fair Oaks Lane, and Middlefield before discharging into Atherton Channel.	<ul style="list-style-type: none"> <li>• There is no release point for Project M1, similar to a storm drainage system, to carry large amounts of flow.</li> <li>• The major flow path slopes into Redwood City. There is no facility to connect the new gravity storm drainage system.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a pump station that discharges to Atherton channel.</li> </ul>
M2 – Fair Oaks Lane Storm Drainage System	Areas adjacent to Fair Oaks starting from cul-de-sac to El Camino Real and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• The major problem is the old dry well is overflowing and causing flooding in the front yard up to the foundation of the house.</li> <li>• Flooding on streets because the street is a low point.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• There is no release point for this area, similar to a storm drainage system, to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a storm drainage system starting from existing dry wells and connecting to a new storm drainage system along El Camino Real.</li> </ul>
W2 – Mac Bain/Alejandra/Brittany Storm Drainage System and Upgrade	Areas adjacent to Mac Bain Avenue cul-de-sac starting from the cul-de-sac to Alejandra Avenue to Brittany Meadows and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• The major problem is that the dry wells are saturated.</li> <li>• Flooding on property and streets because the street is a flow path or a low point.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• There is no release point for this area, similar to a storm drainage system to carry large amounts of flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a release point by installing a storm drainage system that starts from the existing dry wells and is routed along the property line into Alejandra Avenue and Brittany Meadows, connecting to an existing discharge pipe to Atherton channel. Discharge pipe should be upgraded.</li> </ul>
B2 – Belbrook/Walsh Upgrade Culvert with Erosion Control	Intersection of Walsh Road and Belbrook Way.	<ul style="list-style-type: none"> <li>• The existing Atherton channel culvert crossing Belbrook Way is under capacity.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> <li>• Erosion problem along downstream end of the channel.</li> </ul> 	<ul style="list-style-type: none"> <li>• Upgrade existing box culvert to increase capacity.</li> <li>• Provide erosion control.</li> </ul>
I – Selby/Stockbridge Upgrade Storm Drainage System	Areas adjacent to Stockbridge Avenue from Hillary Lane to Selby Lane and Selby Lane from Stockbridge Avenue to Himmel Avenue.	<ul style="list-style-type: none"> <li>• Existing storm drainage system is under capacity.</li> <li>• Flooding at intersection.</li> <li>• Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrade existing storm drainage system along Stockbridge Avenue and along Selby Lane.</li> </ul>

**TABLE 6-2  
TOWN OF ATHERTON DRAINAGE STUDY  
BACKGROUND INFORMATION FOR RECOMMENDED PROJECTS**

<b>AREA</b>	<b>LOCATION</b>	<b>PROBLEMS</b>	<b>SOLUTIONS</b>
FF2 – Middlefield East Upgrade Existing Storm Drainage System	Areas adjacent to Middlefield Road from Oak Grove Avenue to Ravenwood Avenue and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Existing storm drainage system is under capacity at the connection point off-site of Town limit.</li> <li>Intersection floods regularly.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing storm drainage system to increase capacity.</li> </ul>
FF3 –Middlefield East Barriers and Backflow Preventers	Areas adjacent to Middlefield Road from Oak Grove Avenue to Ravenwood Avenue and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Existing storm drainage system is under capacity at the connection point off-site of town limit.</li> <li>Intersection floods regularly.</li> <li>Floods private property and driveways.</li> </ul>	<ul style="list-style-type: none"> <li>Install hump/barrier along frontage of properties.</li> <li>Provide backflow preventers in existing storm drain connection from the properties to prevent backwater into private property storm drain system.</li> </ul>
V – Por Los Arboles/Valparaiso Regrade Intersection	Westerly side of Valparaiso Avenue and Por Los Arboles intersection.	<ul style="list-style-type: none"> <li>Flooding on street.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale at the intersections along Valparaiso Avenue and Por Los Arboles to create a flow path.</li> <li>Connect swale to existing storm drainage system along Por Los Arboles.</li> </ul>
EE1 – Alejandra Swale	Areas adjacent to Alejandra Avenue to Brittany Meadows and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Ponding at the area where the gravel meets the paved road.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale at the intersections along Alejandra Avenue and connect to proposed storm drain system.</li> </ul>
KK1 – Polhemus/Fleur Swale Improvement and Perforated Underdrain	South side of Polhemus Avenue between Polhemus Avenue and Fleur Place.	<ul style="list-style-type: none"> <li>Standing water at intersection and ditch.</li> </ul>	<ul style="list-style-type: none"> <li>Regrade existing swale/ditch to remove low points and install underdrain due to flat slope.</li> </ul>
<b>Tier 5</b>			
E1 – Alameda/Mulberry/Polhemus Upgrade Boxes and Existing Storm Drainage System	Areas adjacent to the existing box culverts crossing Alameda de las Pulgas, Mulberry Lane, and Polhemus Avenue and an existing culvert along the back property of lot #68. Existing storm drainage system along Alameda de las Pulgas from Fletcher Drive to an existing ditch.	<ul style="list-style-type: none"> <li>Existing box culverts and storm drainage system are under capacity.</li> <li>Flooding in the ditch behind house and in the north street frontage because the area is very flat.</li> <li>Flooding the house and front of yard because the road is very flat and the area is a low point.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing box culverts and storm drainage system to increase capacity.</li> </ul>
G – Broadacres Upgrade Culvert	Areas adjacent to the existing Atherton channel box culvert crossing Broadacres Road.	<ul style="list-style-type: none"> <li>Existing box culvert is under capacity.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing box culvert to increase capacity.</li> </ul>
CC2 – Greenoaks Upgrade Existing Storm Drainage System	Areas adjacent to Greenoaks Drive from Frederick Avenue to Lilac Drive and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Existing storm drainage system is under capacity.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing storm drainage system to increase capacity.</li> </ul>
CC3 – Bay Road Upgrade Existing Storm Drainage System	Areas adjacent to Bay Road from Lilac Drive to Atherton Channel and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>Existing storm drainage system is under capacity.</li> <li>Flooding on streets and storm drain in front of house #372 backs up during heavy rain.</li> <li>Increases in runoff flow rates due to the change from pervious to impervious surfaces have not been mitigated.</li> </ul>	<ul style="list-style-type: none"> <li>Upgrade existing storm drainage system to increase capacity.</li> </ul>
P – Virginia/Fair Oaks Regrade Intersection	Easterly side of Fair Oaks Lane and Virginia Lane intersection	<ul style="list-style-type: none"> <li>Flooding at southeast corner of Fair Oaks Lane and Virginia Lane intersection. This is a low point with no release point.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale along easterly side of Fair Oaks Lane crossing the intersection to create a flow path.</li> </ul>
Z1 – Heather Swale	Easterly side of James Avenue and Heather Avenue intersection	<ul style="list-style-type: none"> <li>Flooding on property and streets because it is along the flow path and a low point. Water flows along Middlefield and Heather Drive and accumulates onto the lot along James Avenue.</li> </ul>	<ul style="list-style-type: none"> <li>Install a concrete swale on the intersections along James Avenue to create a flow path.</li> <li>Connect swale to a new storm drainage system along Heather Avenue for release point.</li> </ul>

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TOWN OF ATHERTON DRAINAGE STUDY  
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AREA	LOCATION	PROBLEMS	SOLUTIONS
CC1 – Greenoaks Swale	Areas adjacent to Greenoaks Drive and Frederick Avenue intersection and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• Driveway floods at Lot #2 Frederick.</li> <li>• The area is a low point with no release.</li> </ul>	<ul style="list-style-type: none"> <li>• Install a concrete swale at the intersections along Greenoaks Drive to create a flow path.</li> <li>• Connect swale to an existing storm drainage system along Greenoaks Drive to create a release point.</li> </ul>
EE – Catalpa/Acorn Regrade Intersection	Areas adjacent to Catalpa Drive and Acorn Way intersection and upstream tributary flow paths that contribute flows to this area.	<ul style="list-style-type: none"> <li>• Southeast corner of Catalpa Drive and Acorn Way has drainage problems.</li> </ul>	<ul style="list-style-type: none"> <li>• Install a concrete swale at the intersections along Catalpa Drive to create a flow path.</li> </ul>