

F.0 APPENDIX F – MANAGEMENT MEASURES EVALUATION

F.1 Management Measures Assumptions and Summary Sheets

Alternative Name:	Septic Replacement
Description:	Replacement of old and malfunctioning On-site Sewage Facilities (OSSFs) with new units that meet current standards.
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	
<i>Soil Suitability</i>	SSURGO Soil Survey for Hood County. Depth to Bed Rock, Minimum Depth to Restrictive Layer
<i>Applicable Treatment Methods</i>	30 TAC §285.91 Table 13 Pretreatment Method: Septic or Aerobic Treatment Disposal Method: Drainfield, Drip Emitters, Spray Distribution, or Leaching Chambers
<i>Required Area for Disposal</i>	30 TAC §285 Design Discharge 240 gpd/system Soil Absorption 0.2 to 0.38 gpd/sq-ft (sandy clay to sand) Application Rate Irrigation 0.064 Absorptive Rate 0.2 gpd/sq-ft for Drip Emitters and Leaching Chambers <i>1200 ft² for Conventional Drainfield (not in clays), drip emitters, and leaching chambers (not in clays, some reduction allowed for water saving devices)</i> <i>3750 ft² for Spray Application</i>
Capital Cost Assumptions:	<i>Source: Austin Water Utility</i>
<i>Construction Cost</i>	Cost to install pretreatment tanks and related necessary components. Cost to install disposal field and all necessary components.
<i>Land Costs</i>	Appraisal Value of average lot if more area needed and available for disposal fields. Did not apply in all cases.
<i>Design & Administrative</i>	Estimated - engineering judgement. Assumed \$2,500 per system, regardless of type.
<i>Contingency</i>	none included
O&M Cost Assumptions:	<i>Source: Austin Water Utility</i> Periodic pumping of tanks, both aerobic and septic Maintenance contracts required for spray application and holding tanks Electrical use for spray application and drip emitters Additional equipment and repairs for spray application and drip emitters
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	25 years
<i>Interest Rate Assumption:</i>	10%
	Weighted cost of capital, assuming return to inflationary trend within 5 years
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives considered for the specific subdivision.
Percent Pollutant Reduction:	
<i>Watershed Model</i>	75% of septic potential removed Resultant %reduction of bacteria for watershed considering all sources

Alternative Name:	OSSF (Septic) Replacement				
Alternative ID:	Rolling Hills Shores – Downhill Along Cove	Rolling Hills Shores - Uphill	Oak Trail Shores Section 1	Oak Trail Shores Section 2	Oak Trail Shores Section 3
Conceptual Design Assumptions:					
<i>Average Lot Size</i>	< 6,000 ft ²	0.75 acres	14,000 ft ²	10,000 ft ²	10,000 ft ²
<i>Soil Suitability</i>	Null, in floodplain	Some areas have adequate depth to bedrock and restrictive layer for conventional septic tank/drainfield systems.	Significant areas have adequate depth to bedrock and restrictive layer for conventional septic tank/drainfield systems.	Depth to bedrock and restrictive layer as well as proximity to canals makes poor suitability for conventional systems.	Significant areas have adequate depth to bedrock and restrictive layer for conventional septic tank/drainfield systems in northwest portion, remaining soils not suitable for conventional system.
Applicable Treatment Methods					
<i>Holding tanks</i>	Holding tanks	Assume 1/2 can utilize conventional systems, remaining half spray distribution with pretreatment.	Conventional Septic Tank and Drainfield	septic tanks with Spray Distribution aerobic tanks with Drip Emitters	conventional septic/drainfield in NW septic tanks with Spray Distribution aerobic tanks with Drip Emitters
Required Area for Disposal					
<i>Required Area for Disposal</i>	N/A – Waste must be pumped and trucked off-site	Conventional Drainfield 1200 ft ² Spray Distribution 4404 ft ²	Conventional Drainfield 1200 ft ²	Spray Distribution 4404 ft ² Drip Emitters 1200 ft ²	Conventional Drainfield 1200 ft ² Spray Distribution 4404 ft ² Drip Emitters 1200 ft ² Leaching Chambers 1200 ft ²
Capital Costs:					
<i>Construction Cost</i>	holding tank	average (assuming 1/2 spray, 1/2 drainfield) septic; aerobic tanks drainfield spray application;	septic tank drainfield	average (assuming 1/2 spray, 1/2 drip emitter) septic; aerobic tanks spray application; drip emitter field	average (assuming 1/2 spray, 1/4 conventional, 1/8 drip emitters, 1/8 leaching chambers) septic; aerobic tanks drainfield; spray application; drip emitter field; leaching chamber field
Land Costs					
<i>Land Costs</i>	None Some permitting fees may apply. Not included here.	None	None	None	None
Annual O&M Costs:					
<i>Pumping and trucking (annual)</i>	Pumping and trucking (annual)	average (assuming 1/2 spray, 1/2 drip emitters) Periodic pumping of tanks, both aerobic and septic Maintenance contracts required for spray application Electrical use for spray application Additional equipment and repairs for spray application	Periodic pumping of septic tanks	average (assuming 1/2 spray, 1/2 drip emitter) Periodic pumping of aerobic and septic tanks Maintenance contracts required for spray application and drip emitters Electrical use for spray application and drip emitters Additional equipment and repairs for spray application and drip emitters	average (assuming 1/2 spray, 1/4 conventional, 1/8 drip emitters, 1/8 leaching chambers) Periodic pumping of aerobic and septic tanks Maintenance contracts required for spray application and drip emitters Electrical use for spray application and drip emitters Additional equipment and repairs for spray application and drip emitters
Equivalent Annual Cost Analysis:					
<i>Equivalent Annual Cost Index:</i>		0.49	0.38	0.73	0.50
Percent Pollutant Reduction:		46%			
				41%	
				Sections not modeled separately.	

	OSSF (Septic) Replacement Long Creek	Sky Harbor	Port Ridglea East
Alternative Name:	OSSF (Septic) Replacement	Sky Harbor	Port Ridglea East
Alternative ID:	Long Creek	Sky Harbor	Port Ridglea East
Conceptual Design Assumptions:			
<i>Average Lot Size</i>	26,000 ft ²	15,250 ft ²	10,900 ft ²
<i>Soil Suitability</i>	Depth to bedrock and restrictive layer as well as proximity to canals makes poor suitability for conventional systems.	Significant land could be suitable for conventional drainfields	“Null” for both depth to bedrock and depth to restrictive layer Septic tank absorption field suitability “Very Limited”
Applicable Treatment Methods	septic or aerobic tanks with Spray Distribution aerobic tanks with drip emitters	ASSUME 1/4 CAN UTILIZE CONVENTIONAL systems, half spray distribution (septic or aerobic tanks), 1/8 drip emitters (aerobic tanks), 1/8 leaching chambers	Replace conventional systems with aerobic tanks with drip emitters
Required Area for Disposal		Conventional Drainfield 1200 ft ² Spray Distribution 4404 ft ² Drip Emitters 1200 ft ² Leaching Chambers 1200 ft ²	Drip Emitters 1200 ft ²
Capital Costs:			
Construction Cost	average (assuming 1/2 spray, 1/2 drip emitter) septic; aerobic tanks spray application; drip emitter field	average (assuming 1/2 spray, 1/4 septic/drainfield, 1/8 drip emitter, 1/8 leaching chamber) septic; aerobic tanks drainfield; spray application; drip emitter field; leaching chamber field	assuming all drip emitters with aerobic pretreatment aerobic tanks drip emitter field
Land Costs	None	None	None
Annual O&M Costs:			
Equivalent Annual Cost Analysis:			
<i>Equivalent Annual Cost Index:</i>	0.80	0.57	1.00
Percent Pollutant Reduction:	Negligible watershed reduction.	9%	75%

Alternative Name:	Low Pressure Wastewater Collection System
Description:	Removal of OSSFs, replacement with low pressure collection system
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>LP collection system per vendor design guidelines; TCEQ Chap. 217; SDR-21 pressure class PVC</p> <p>200 gal/connection/day</p> <p>30 Amp/240V dedicated circuit available at each site</p> <p>Assumed TDH (Total Dynamic Head) <185'; design goal is operating pressure below 60 psi.</p> <p>Average flowrate at each pump set at 11 gpm.</p> <p>Lines to be installed in existing ROW; infrequent conflicts with other utilities, driveways, mailboxes, etc.</p> <p>Relief valve assemblies not included (no analysis done to determine need)</p> <p>Easements required from service tap to grinder pump would be granted at no cost</p> <p>Capacities and costs assume service to each platted lot, whether occupied or not.</p> <p>Lift station capacity determined by peak flows (TCEQ CH 217, Subchap B).</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	<p>LP system includes: grinder pump/tank (station); control panel; lateral assembly; saddle tap to main; bedding material; force main; asphalt repair</p> <p>3-phase power is assumed to be available at lift station and plant sites</p>
<i>Design & Administrative</i>	<p>Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)</p>
<i>Contingency</i>	<p>Given multiple uncertainties at this stage, 20% assumed and added to construction cost.</p>
O&M Cost Assumptions:	
	<p>Maintenance will be performed under contract, monthly fee assessed</p> <p>Pump equipment replacement at year 10, partial equipment (other than pump) replacement at year 21</p> <p>Power cost calculated at \$0.11/kWh and +/- 9 kWh/month</p>
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	<p>25 years</p> <p>10%</p>
<i>Interest Rate Assumption:</i>	<p>Weighted cost of capital assuming inflationary trend</p>
<i>Equivalent Annual Cost Index:</i>	<p>Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.</p>

Alternative Name:	Mixed Collection System: Gravity and Low Pressure
Description:	Removal of OSSFs, replacement with mixed low pressure and gravity collection system
Pollutant addressed:	Bacteria
Conceptual Design Assumptions:	<p>LP collection system per vendor design guidelines; TCEQ Chap. 217; SDR-21 pressure class PVC</p> <p>200 gal/connection/day</p> <p>30 Amp/240V dedicated circuit available at each site</p> <p>Assumed TDH <185'; design goal is operating pressure below 60 psi.</p> <p>Average flowrate at each pump set at 11 gpm.</p> <p>Lines to be installed in existing ROW; infrequent conflicts with other utilities, driveways, mailboxes, etc.</p> <p>Relief valve assemblies not included (no analysis done to determine need)</p> <p>Easements required from service tap to grinder pump would be granted at no cost</p> <p>Capacities and costs assume service to occupied lots only.</p> <p>Lift station capacity determined by peak flows (TCEQ CH 217, Subch B).</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	<p>LP system includes: grinder pump/tank (station); control panel; lateral assembly; saddle tap to main; bedding material; force main; asphalt repair</p> <p>8" PVC Gravity main assumed; slope assumed consistent with surface grade; concrete 4' dia manholes assumed at change in direction and every 400'</p> <p>3-phase power is assumed to be available at lift station and plant sites</p>
<i>Design & Administrative</i>	<p>Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)</p>
<i>Contingency</i>	<p>Given multiple uncertainties at this stage, 20% assumed and added to construction cost.</p>
O&M Cost Assumptions:	<p>Maintenance will be performed under contract/monthly fee assessed</p> <p>Pump equipment replacement at year 10, partial equipment (other than pump) replacement at year 21</p> <p>Power cost calculated at \$0.11/kWh and +/- 9 kWh/month</p>
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	25 years
<i>Interest Rate Assumption:</i>	10%
	Weighted cost of capital assuming inflationary trend
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

Alternative Name:	Local Wastewater Treatment (Package Plant/MiniWastewater)
Description:	Removal of OSSFs, replacement with a collection system to a package treatment plant
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>Serves an individual subdivision or an aggregation of subdivisions</p> <p>Collection by low pressure or mixed system</p> <p>Treats up to 0.5 MGD</p> <p>200 gal/connection/day</p> <p>Plant capacity determined by permitted flows (TCEQ CH 217, Subchapter B).</p> <p>Steel construction</p> <p>Plant location not tied to specific property, but "prototypical, neutral property" based on total dynamic head pumping limits</p> <p>Assumed treatment limits: CBOD-10, TSS-15, NH3-2, DO-4, P-2</p> <p>Treated wastewater discharged into lake, or immediate tributary to lake after disinfection</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	<p>3-phase power is assumed to be available at lift station and plant sites</p> <p>Wastewater Treatment Plant is assumed to be steel package plant with limits as described above. Price includes sitework/yardwork/electrical and foundation.</p>
<i>Land Costs</i>	Purchase of land for plant site assumed at 3 times taxroll appraised value due to limitations on pumping (total dynamic head) that will restrict site selection (ie. lack of substitutability).
<i>Design & Administrative</i>	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)
<i>Contingency</i>	Given multiple uncertainties at this stage, 20% assumed and added to construction cost.
O&M Cost Assumptions:	<p>Includes labor, chemicals/materials, equipment replacement</p> <p>Power cost calculated at \$0.11/kWh and +/- 9 kWh/month</p> <p>Maintenance will be performed under contract/monthly fee assessed</p>
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	25 years
<i>Interest Rate Assumption:</i>	10%
<i>Equivalent Annual Cost Index:</i>	Weighted cost of capital assuming inflationary trend
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

Alternative ID:	RHS-LP-Local	RHS FP-LP-Local
Alternative Name:	Rolling Hills Shores, Low Pressure System, Local Treatment	Rolling Hills Shores Floodplain, Low Pressure System, Local Treatment
Service Area	Rolling Hills Shores and Hidden Valley Estates	Residences in floodplain in Rolling Hills Shores
Collection		
<i>Number of Connections</i>	299 (103 residences and 196 non-floodplain lots)	103
<i>Lift Station</i>	Not considered to be required for chosen treatment site.	Not considered to be required for chosen treatment site.
Wastewater Treatment		
<i>Treatment Facility</i>	Package Plant	Package Plant
<i>Treatment Flows</i>	0.09 MGD	0.03 MGD
Equivalent Annual Cost Index:	0.64	0.65
Pollutant Percent Reduction:	62%	62%

Alternative ID:	OTS-LP-Local	LC-LP-Local
Alternative Name:	Oak Trail Shores, Low Pressure System, Local Treatment	Long Creek, Low Pressure System, Local Treatment
Service Area	Oak Trail Shores	Long Creek
Collection		
<i>Number of Connections</i>	1985	95
<i>Lift Station</i>	Assumed flow from 875 connections to be lifted: 1.05 MGD, 3,300 ft force main	Not considered to be required for chosen treatment site.
Wastewater Treatment		
<i>Treatment Facility</i>	Package Plant	Package Plant
<i>Treatment Flows</i>	0.596 MGD	0.03 MGD
Equivalent Annual Cost Index:	0.55	0.59
Pollutant Percent Reduction:	54%	100%

Alternative ID:	SH-LP-Local	HH-LP-Local
Alternative Name:	Sky Harbor, Low Pressure, Local Treatment	Indian Harbor, Low Pressure, Local Treatment
Service Area	Sky Harbor	Indian Harbor
Collection		
<i>Number of Connections</i>	629	1909
<i>Lift Station</i>	Assumed flow from 215 connections lifted: 0.258 MGD, 5,250 ft force main	Assumed flow from 790 connections lifted: 0.948 MGD, 6,000 ft force main
Wastewater Treatment		
<i>Treatment Facility</i>	Package Plant	Package Plant
<i>Treatment Flows</i>	0.189 MGD	0.573 MGD
Equivalent Annual Cost Index:	0.42	0.25
Pollutant Percent Reduction:	13%	100%

Alternative ID:	NB-II-LP-Local	PRE-LP-Local
Alternative Name:	Nassau Bay II, Low Pressure, Local Treatment	Port Ridgley East Low Pressure Local Treatment
Service Area	Nassau Bay II	Port Ridgley East
Collection		
<i>Number of Connections</i>	123	248
<i>Lift Station</i>	Not considered to be required for chosen treatment site.	Not considered to be required for chosen treatment site.
Wastewater Treatment		
<i>Treatment Facility</i>	Package Plant	Package Plant
<i>Treatment Flows</i>	0.037 MGD	0.074 MGD
Equivalent Annual Cost Index:	0.28	0.28
Pollutant Percent Reduction:	98%	100%

Alternative ID:	RHS-Mixed-Local	OTS-Mixed-Local	SH-Mixed-Local
Alternative Name:	Rolling Hills Shores, Mixed Collection, Local Treatment	Oak Trail Shores, Mixed Collection, Local Treatment	Sky Harbor, Mixed Collection, Local Treatment
Service Area	Rolling Hills Shores and Hidden Valley Estates	Oak Trail Shores	Sky Harbor
Collection			
<i>Number of Connections</i>	299 (103 residences and 196 non-floodplain lots)	1985	629
<i>Low Pressure Connections</i>	288	849	215
<i>Gravity Connections</i>	11	1136	414
<i>Lift Station</i>	Not considered to be required for chosen treatment site.	Lift flow from 849 connections: 1.36 MGD, 3,300 ft force main	Lift flow from 215 connections: 0.258 MGD, 1,800 ft force main
<i>Force Main</i>			
Wastewater Treatment			
<i>Treatment Facility</i>	Package Plant	Package Plant	Package Plant
<i>Treatment Flows</i>	0.09 MGD	0.596 MGD	0.189 MGD
Equivalent Annual Cost Index:	0.67	0.38	0.42
Pollutant Percent Reduction:	62%	54%	13%

Alternative ID:	HI Mixed Local	NB II Mixed Local
Alternative Name:	Indian Harbor, Mixed Collection, Local Treatment	Nassau Bay II, Mixed Collection, Local Treatment
Service Area	Indian Harbor	Nassau Bay II
Collection		
<i>Number of Connections</i>	1909	123
<i>Low Pressure Connections</i>	1119	65
<i>Gravity Connections</i>	790	58
<i>Lift Station</i>	Lift flow from 989 connections: 1.187 MGD, 6,000 ft force main	Lift flow from 123 connections: 0.148 MGD, 4,150 ft force main.
<i>Force Main</i>		
Wastewater Treatment		
<i>Treatment Facility</i>	Package Plant	Package Plant
<i>Treatment Flows</i>	0.573 MGD	0.037 MGD
Equivalent Annual Cost Index:	0.24	0.34
Pollutant Percent Reduction:	0.997	0.982

Alternative ID:	RHS & OTS_Local_Treatment	RHS to OTS_Local_Treatment	NB2 & PRE_Local_Treatment	NB2 to PRE_Local_Treatment
Alternative Name:		Rolling Hills Shores, Hidden Valley Estates, The Cliffs of Lake Granbury, Indian Hills, The Live Oaks, Lake Granbury Harbor, Arrowhead Shores, Lake Granbury Estates, Country Hill Acres, Oak Trail Acres, Oak Hills, Oak Trail Shores		Nassau Bay II, Nassau Bay, Sandy Beach, Wildwood, Holiday Estates, Summerland, Port Ridglea, Port Ridglea East, Sierra Blanca, Oak Grove Farm, Sierra, Lake at Timber Cove, Timber Cove, Montego Bay
Service Area	Rolling Hills Shores, Hidden Valley Estates, and Oak Trail Shores		Nassau Bay II and Port Ridglea East	
Collection				
<i>Number of Connections</i>	2,284	5,404	359	1,251
<i>Low Pressure Connections</i>	1,137	2,929	359	1,251
<i>Gravity Connections</i>	1,147	2,475	0	0
<i>Lift Station</i>	Assume 2 required.	Assume 4 required.	Assume 0 required.	Assume 2 required.
<i>Force Main</i>	5.2 miles	5.2 miles	None required.	2 miles
Wastewater Treatment				
<i>Treatment Facility</i>	Package Plant	Package Plant	Package Plant	Package Plant
<i>Treatment Flows</i>	0.69 MGD	1.74 MGD	0.43 MGD	1.0 MGD
Equivalent Annual Cost Index:	0.56	0.33	0.65	0.54
Pollutant Percent Reduction:	Equals human (septic) contribution from both areas	Equals human (septic) contribution from all areas	Equals human (septic) contribution from both areas	Equals human (septic) contribution from all areas

Alternative Name:	Regional Wastewater Treatment
Description:	Removal of OSSFs with a collection system to a regional wastewater treatment plant; Service for subdivisions along Lake Granbury not provided by centralized wastewater treatment
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>Serves residents along Lake Granbury without centralized wastewater treatment</p> <p>Subdivisions/local entities provide wastewater collection and tie into extended trunklines to reach City of Granbury's proposed 10 MGD plant north of Granbury or Acton MUD's existing plant on east side of lake.</p> <p>Collection by low pressure or mixed system</p> <p>200 gal/connection/day used to determine treatment flows</p> <p>Lift station location not set to specific property, but governed by total dynamic head (TDH) limits</p> <p>Package plants constructed for interim treatment may be converted to lift stations to tie into regional plants</p> <p>Assumed treatment limits: CBOD-10, TSS-15, NH3-2, DO-4, P-2</p> <p>Treated wastewater discharged into lake, or immediate tributary to lake after disinfection</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	<p>Collection system not included; determined separately.</p> <p>3-phase power is assumed to be available at lift station and plant sites</p> <p>Wastewater treatment plant cost assumes concrete facilities, sitework, yardwork, electrical and foundation.</p>
<i>Land Costs</i>	Purchase of land for plant site assumed at 3 times taxroll appraised value due to limitations on TDH that will restrict site selection (ie. lack of substitutability).
<i>Design & Administrative</i>	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)
<i>Contingency</i>	Given multiple uncertainties at this stage, 20% assumed and added to construction cost.
O&M Cost Assumptions:	<p>Includes labor, chemicals/materials, equipment replacement</p> <p>Maintenance will be performed under contract/monthly fee assessed</p> <p>Power cost calculated at \$0.11/kWh and +/- 9 kWh/month</p>
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	50 years
<i>Interest Rate Assumption:</i>	10%
<i>Equivalent Annual Cost Index:</i>	Weighted cost of capital assuming inflationary trend
	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

Alternative ID: Alternative Name:	RHS & OTS_Regional	RHS to OTS_Regional	Sky Harbor_Regional
Service Area	Rolling Hills Shores, Hidden Valley Estates, and Oak Trail Shores	Rolling Hills Shores, Hidden Valley Estates, The Cliffs of Lake Granbury, Indian Hills, The Live Oaks, Lake Granbury Harbor, Arrowhead Shores, Lake Granbury Estates, Country Hill Acres, Oak Trail Acres, Oak Hills, Oak Trail Shores	Sky Harbor
Collection			
<i>Number of Connections</i>	2,284	5,404	629
<i>Low Pressure Connections</i>	1,137	2,929	242
<i>Gravity Connections</i>	1,147	2,475	387
<i>Lift Station</i>	Assume 2 required.	Assume 4 required.	Assume 1 required.
<i>Force Main</i>	2.5 miles	2.5 miles	0.61 miles
Wastewater Treatment			
<i>Treatment Facility Destination</i>	City of Granbury	City of Granbury	City of Granbury SE WWTP
<i>Treatment Flows (\$3/Gallon Capital Recovery)</i>	0.69 MGD	1.74 MGD	0.75 MGD
<i>Connection Fee (each)</i>			
Equivalent Annual Cost Index:	0.35	0.26	0.30
Pollutant Percent Reduction:	Equals human (septic) contribution from all areas	Equals human (septic) contribution from all areas	Equals human (septic) contribution from all areas

Alternative ID: Alternative Name:	NB2 & PRE_Regional	NB2 to PRE_Regional	Indian Harbor_Regional	Indian Harbor & neighbors_Regional
Service Area	Nassau Bay II and Port Ridglea East	Nassau Bay II, Nassau Bay, Sandy Beach, Wildwood, Holiday Estates, Summerland, Port Ridgle, Port Ridglea East, Sierra Blanca, Oak Grove Farm, Sierra, Lake at Timber Cove, Timber Cove, Montego Bay	Indian Harbor	Indian Harbor, Ports O'Call, Island Village, Comanche Harbor, Comanche Point, The Hills of Granbury, Knob Hill, Mountain View
Collection				
<i>Number of Connections</i>	359	1,251	1,243	2,788
<i>Low Pressure Connections</i>	359	1,251	477	781
<i>Gravity Connections</i>	0	0	766	2,007
<i>Lift Station</i>	Assume 1 required.	Assume 3 required.	Assume 1 required.	Assume 1 required.
<i>Force Main</i>	3 miles	3 miles	1.36 miles	1.36 miles
Wastewater Treatment				
<i>Treatment Facility Destination</i>	Acton MUD DeCordova	Acton MUD DeCordova	Acton MUD New Facility	Acton MUD New Facility
<i>Treatment Flows (\$3/Gallon Capital Recovery)</i>	0.43 MGD	1.0 MGD	1.49 MGD	3.35 MGD
<i>Connection Fee (each)</i>	\$3,143	\$3,143	\$3,143	\$3,143
Equivalent Annual Cost Index:	0.65	0.54	0.70	0.60
Pollutant Percent Reduction:	Equals human (septic) contribution from all areas	Equals human (septic) contribution from all areas	Equals human (septic) contribution from all areas	Equals human (septic) contribution from all areas

Alternative Name:	Cove Dynamics: Dredge and Fill
Description:	Improve water movement through coves to encourage "flushing" of pollutants
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	
<i>Dredge</i>	Dredging or deepening a channel increases the volume of water in the canal allowing more dilution and provides a path for improved conveyance to the main lake body. Dredge method assumed as excavation from a small barge. Dredged material hauled off-site, up to 10 miles.
<i>Partial Fill</i>	The cove/canal is partial filled. Areas of water in sections of the canal/cove are replaced with earthen material, reducing the path of runoff to exit. This requires acquiring and hauling suitable PI material for backfill and compaction. Backfill elevation is assumed as one foot greater than the average water depth. Backfill would be level with ground. Backfill is graded to drain.
<i>Partial Fill with Dredge</i>	The cove/canal is partially filled. The channel is dredged in the remaining open sections.
<i>Partial Fill with Dredge and additional outlet (s)</i>	The cove/canal is partially filled, an additional outlet to cove/canal is created, and a channel is dredged in the remaining open sections.
<i>Complete Fill</i>	The cove/canal is completely filled with soil, eliminating the water way.
Capital Cost Assumptions:	
Construction Cost	Fill materials (soils) hauled from offsite where net fill required. Assumed 10 mi round trip. Includes dredge, fill placement, compaction, and dewatering.
	Outlet construction requires land acquisition, land clear and grub, pavement removal, excavation, culvert, backfill and compaction, road repair.
Land Costs	Purchase of land for outlet(s) at taxroll appraised value Lease of land for temporary spoils disposal and dewatering.
Design & Administrative	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% Permitting costs associated with dredging and filling within waterway not included (e.g., USACE Section 404)
Contingency	Given multiple uncertainties at this stage, 20% assumed.
O&M Cost Assumptions:	
<i>Dredge</i>	Assumed maintenance dredging every 5 years
<i>Partial Fill</i>	N/A
<i>Partial Fill with Dredge</i>	Assumed maintenance dredging every 5 years
<i>Partial Fill with Dredge and construct additional outlet (s)</i>	Includes culvert maintenance, bank stabilization, guard rails; Assume maintenance dredging within 5 years
<i>Complete Fill</i>	N/A
Equivalent Annual Cost Analysis:	
Lifespan Assumption:	
<i>Dredge</i>	5 years
<i>Partial Fill</i>	75 years
<i>Partial Fill with Dredge</i>	10 years
<i>Partial Fill with Dredge and additional outlet (s)</i>	10 years
<i>Complete Fill</i>	100 years
Interest Rate Assumption:	10% Weighted cost of capital assuming inflationary trend
Equivalent Annual Cost Index:	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

Alternative ID:	RHS-Fill	RHS-Partial Fill	RHS- Dredge	RHS -Dredge&PartialFill
Alternative Name:	Fill	Partial Fill	Dredge	Dredge and Partial Fill
Service Area	Rolling Hills Shores	Rolling Hills Shores	Rolling Hills Shores	Rolling Hills Shores
Construction Details and Assumptions:	Fill entire cove, assume 4' fill depth	Fill sections of cove, assume 4' fill depth	Dredge channel in cove from lake to shore Dredged Channel dimensions: 3' depth, 20' width, 1190' length Dredge method: excavation from a barge Haul 2,644 cy dredge spoils from site Purchase 1 acre spoils site for dredge spoils	Dredge channel in cove from lake to shore Dredged channel dimensions: 3' depth, 20' width, 1190' length Dredge method: excavation from a barge Haul 2,644 cy dredge spoils from site Fill sections of cove, assume 4 ft fill depth Haul 187,800 cy of fill material to site Purchase 1 acre spoils site for dredge spoils
Equivalent Annual Cost Index:	0.62	0.53	0.28	0.76
Pollutant Percent Reduction:	N/A	0%	4%	0

Alternative ID:	RHS -Dredge&PartialFill&Outlet	BWS-Dredge 1	BWS-Dredge 2
Alternative Name:	Dredge, Partial Fill and Outlet	Dredge to 6ft	Dredge to 8ft
Service Area	Rolling Hills Shores	Blue Water Shores	Blue Water Shores
Construction Details and Assumptions:			
	Dredge channel in cove from lake to shore	Dredge channel in cove from lake to shore	Dredge channel in cove from lake to shore
	Dredged channel dimensions: 3’ depth, 20’ width, 1940 ft length	Dredged channel dimensions: 2’ depth, 71’ width, 1000 ft length	Dredged channel dimensions: 4’ depth, 71’ width, 1000 ft length
	Dredge method: excavation from a barge	Dredge method: excavation from a barge	Dredge method: excavation from a barge
	Fill sections of cove, assume 4 ft fill depth	Haul 5,260 cy dredge spoils from site	Haul 10,519 cy dredge spoils from site
	Haul 187,800 cy of fill material to site	Purchase 1 acre spoils site for dredge spoils	Purchase 1 acre spoils site for dredge spoils
	Outlet: Excavate channel: 20' width, 300' length, 5' depth		
	Remove road, place culvert, repair road, land acquisition		
	Haul 5,422 cy dredge and excavated spoils from site		
	Purchase 1 acre spoils site for dredge spoils		
Equivalent Annual Cost Index:	0.91		
Pollutant Percent Reduction:	86%	30%	45%

Alternative ID:	OTS-Fill	OTS-Partial Fill	OTS-Dredge	OTS-Dredge&Outlet
Alternative Name:	Fill	Partial-Fill	Dredge-	Dredge and Outlet
Service Area	Oak Trail Shores	Oak Trail Shores	Oak Trail Shores	Oak Trail Shores
Construction Details and Assumptions:	Fill entire cove, 3-5' fill depth	Partial fill of cove, 3-5' fill depth	Dredge channel in cove from lake to shore	Dredge channel in cove from lake to shore
	Haul 20,132 cy of fill material to site	Haul 7,780 cy of fill material to site	Dredged channel dimensions: 3' depth, 20' width, 1,245' length	Dredged channel dimensions: 3' depth, 20' width, 1,245' length
			Haul 6,260 cy of fill material to site	Haul 6,260 cy of fill material to site
			Purchase 1 acre spoils site for dredge spoils	Outlets: Excavate north and south outlets: 25' width, 4' depth, 921' total length
				Remove road, place culvert, repair road, land acquisition for both outlets
				Haul 9,415 cy dredge and excavation spoils from site
				Purchase 1 acre spoils site for dredge spoils
Equivalent Annual Cost Index:	0.04	0.04	0.99	0.35
Pollutant Percent Reduction:	N/A	0%	30%	65%

Alternative Name:	Cove Circulation - Intake-Discharge Circulation System
Description:	Water circulation in cove is increased by pumping water from lake to top of cove fingers, reducing stagnation and bacteria accumulation.
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>Submersible pumps intake water and discharge at the end of canals. Sediment intake is reduced by a pump filter.</p> <p>Pumps work at 70% efficiency. Pumps is sized to circulate cove volume.</p> <p>PVC pipes with mechanical restraining joints convey water from pumps and discharge at top of cove. Pipes lay at the bottom of lake.</p> <p>Discharge is dissipated with a control device.</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	Includes pump, pump filter, intake station frame, pump electrical system, and pvc pipes with mechanical restraining joints
<i>Land Costs</i>	None
<i>Design & Administrative</i>	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)
<i>Contingency</i>	Given multiple uncertainties at this stage, 20% assumed and added to construction cost.
O&M Cost Assumptions:	
	Includes bi-weekly backflushing of filter media, pump repair, pipe repair, labor, and materials/incidental supplies
	Power cost calculated at \$0.11/kWh and +/- 9 kWh/month
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	15 years
<i>Interest Rate Assumption:</i>	10%
	Weighted cost of capital assuming inflationary trend
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

Alternative ID:	PRE Circulation	SH Circulation	IH Circulation
Alternative Name:	Intake-Discharge Circulation System	Intake-Discharge Circulation System	Intake-Discharge Circulation System
Service Area	Port Ridgle East	Sky Harbor	Indian Harbor
Construction Details and Assumptions:			
<i>Conveyance</i>	6" to 18" diameter PVC pipes, 7010 LF	12" to 24" diameter PVC pipes, 5591 LF	9" to 24" diameter PVC pipes, 5060 LF
	Pipe velocity 3-6 fps	Pipe velocity 3-6 fps	Pipe velocity 3-6 fps
<i>Pump</i>	18 hp pump (west section) and 10 hp pump (east section)	64 hp pump	27 hp pump
	System sized for 4 day water turnover rate.	System sized for 4 day water turnover rate.	System sized for 4 day water turnover rate.
Equivalent Annual Cost Index:	0.30	0.25	0.21
Pollutant Percent Reduction:	30%	39%	33%

Alternative ID:	BWS Circulation	OTS Circulation
Alternative Name:	Intake-Discharge Circulation System	Intake-Discharge Circulation System
Service Area	Blue Water Shores	Oak Trail Shores
Construction Details and Assumptions:		
<i>Conveyance</i>	6" diameter PVC pipe, 955 LF	6" diameter PVC pipes, 2571 LF
	Pipe velocity 3-6 fps	Pipe velocity 3-6 fps
<i>Pump</i>	4 hp pump	6 hp pump
	System sized for 4 day water turnover rate.	System sized for 4 day water turnover rate.
Equivalent Annual Cost Index:	0.20	0.20
Pollutant Percent Reduction:	38%	39%

A.1 Management Measures Assumptions and Summary Sheets

Alternative Name:	Offsite Drainage Bypass
Description:	Pet/wildlife waste and pesticides on ground surface are picked up in rainfall runoff. Direct surface run-off away from cove by providing an channel to intercept runoff from uphill and force to drain at location away from cove.
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>Drainage ditch is a v-shaped channel constructed along the road (in the easement) and toward the lake, as best suited by topography.</p> <p>Drainage ditch is sized to convey runoff from frequent rainfall events (up to the 5 year event). Channel size limited by available land.</p> <p>Small diameter drainage pipes is required to provide conveyance under driveways.</p> <p>Culverts are required to provide conveyance under roads.</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	<p>Channel excavation and 10 mile haul</p> <p>Install driveway pipes and repair driveways; assume 1 driveway per lot; assume driveway width less than 30 ft (30 ft drainage pipe length)</p> <p>Remove road, install culvert, repair road; assume 30 ft culvert length</p> <p>Seeding</p>
<i>Design & Administrative</i>	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)
<i>Contingency</i>	Given multiple uncertainties at this stage, 20% assumed and added to construction cost.
O&M Cost Assumptions:	Sediment maintenance every 3 years, 3x/year mowing, culvert and drainage pipe cleanout
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	50 years
<i>Interest Rate Assumption:</i>	10%
	Weighted cost of capital assuming inflationary trend
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

A.1 Management Measures Assumptions and Summary Sheets

Alternative Name:	Wet Ponds
Description:	Wet ponds capture and detain runoff before reaching Lake Granbury coves/canals to allow for settlement of pollutants, wet plant uptake and microbiological degradation.
Pollutant Addressed:	Bacteria
Conceptual Design Assumptions:	<p>Implement water quality controls to treat watersheds draining to the polluted areas of the lake. Large watersheds may require several controls in series.</p> <p>Pond design based on TCEQ Wet Basin guidelines: removal of 80% of total suspended solids (TSS). Assumed natural areas/landscaped areas have a runoff coefficient of 0.03.</p> <p>Sediment forebay holds 15-25% of permanent pool volume and at least 3 ft deep. Water quality volume based on average annual rainfall of 33 inches. Permanent pool volume is 1.2 times the water quality volume. Permanent pool average depth of 4 to 6 ft. Outflow structure drains the water quality volume in a minimum of 24 hours.</p> <p>Wet ponds are shallow ponds effective in removing pollutants for drainage areas between 10 acre to 640 acres through settling and biological uptake by plants. Appropriate for drainage areas where a continual or nearly continual base flow is present to sustain vegetation growth. Make up water must be provided if no continuous flow is available.</p>
Capital Cost Assumptions:	
<i>Construction Cost</i>	Includes general allowances for mobilization, staging, testing; clear and grub land, excavation, haul (10 mi round trip), vegetation/planting allowance, erosion/sedimentation controls, maintenance items (concrete pads, driveway apron), outfall weir/structure and misc. drainage appurtances.
<i>Land Costs</i>	Two times the appraised value due to site specific locations
<i>Design & Administrative</i>	Engineering, Surveying, Permitting, Construction Administration, Contract Administration Total 20% (added to construction cost)
<i>Contingency</i>	Given multiple uncertainties at this stage, 20% assumed and added to construction cost.
O&M Cost Assumptions:	
	Remove sediment accumulation every 20 years
	Maintenance every 5 to 7 years or when 50% of forebay capacity is silted
	Annual cost of routine maintenance is approx 3% of construction cost
Equivalent Annual Cost Analysis:	
<i>Lifespan Assumption:</i>	25 years
<i>Interest Rate Assumption:</i>	10%
	Weighted cost of capital assuming return to inflationary trend within 5 years
<i>Equivalent Annual Cost Index:</i>	Ratio of Equivalent Annual Cost for this alternative compared to the maximum Equivalent Annual Cost of all alternatives.

A.1 Management Measures Assumptions and Summary Sheets

Alternative ID:	SH-Wet Ponds	RHS-Wet Ponds	Walnut Creek - Detention Ponds	OTS-Drainage Bypass	RHS-Property Buyout
Alternative Name:	Catchment Basins	Catchment Basins	Catchment Basins	OffSite Drainage Bypass	Property Buyout
Service Area	Sky Harbor	Rolling Hills Shores	Walnut Creek	Oak Trails Shores	Rolling Hills Shores
Construction Details and Assumptions:	<p>Twelve ponds, sizes range from 0.5 to 2.5 acres, with assumed 3ft depth.</p> <p>Location of ponds determined by topography and a drainage limit of 640 acres. Ponds may require make up water source if not continuous flow available.</p> <p>Ponds designed to remove 80% TSS</p>			<p>V-shaped channel along the east side of Green Brook St 213 lots identified within the 100-yr floodplain</p> <p>12.5 ft top width, and 2 ft depth, 3:1 (H:V) side slopes</p> <p>Outfalls to north and south of canal</p> <p>Contains runoff from the 2-year and 5-year rainfall events</p>	
Equivalent Annual Cost Index:	0.82	0.32	0.16	0.07	0.35
Pollutant Percent Reduction:	65%			51%	62%

F.2 Management Measures Evaluation Matrices Summarized by Area

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Lake Wide	Regional Wastewater Treatment	varies	10-15 yrs	varies	varies	
	Vegetative Filter Strips		<1 yr			
	Septic Maintenance and Education		<1 yr			
	Urban Education on Fertilizer Application		1-2 yrs			
	Pet Waste Education		<1 yr			
	Livestock/Range Management Education		1-2 yrs			
	Feral Hog Education Program/Bounty		2-5 yrs			
	Waterfowl Breeding Control Program		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Long Creek and Long Creek Subdivision 95 units	Local Centralized Wastewater Treatment - Independent ¹	99%	2-5 yrs	0.59	0.59	Subdivision below monitoring point
	Regional Wastewater Treatment ¹	99%	10-15 yrs			Inefficient considering distance and number of lots
	Septic System Replacement ¹	75%	<1 yr	0.80	1.06	Subdivision below monitoring point
	Vegetative Filter Strips		<1 yr			Site specific
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Area Conservation Plan and Education for small acreage land owners		2-5 yrs			
	Livestock/Range Management Education		1-2 yrs			
	Waterfowl Breeding Control Program		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

1 - Long Creek Subdivision Only, does not consider upper watershed

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Rolling Hills Shores 196 uphill + 103 floodplain units	Cove Dynamics: Dredge, Partial Fill, Add Outlet	86%	2-5 yrs	0.91	1.06	Does not address source(s)
	Regional Wastewater Treatment (include neighboring areas)	62%	10-15 yrs	0.26	0.42	
	Local Centralized Wastewater Treatment-Aggregate	62%	5-10 yrs	0.33	0.54	
	Property Buy-Out	62%	1-2 yrs	0.35	0.57	Removal of tanks
	Regional Wastewater Treatment	62%	10-15 yrs	0.35	0.57	
	Local Centralized Wastewater Treatment - Independent	62%	2-5 yrs	0.67	1.08	
	Septic System Replacement Uphill	46%	<1 yr	0.49	1.06	future repairs
	Catchment for Upper Watershed	30%	2-5 yrs	0.32	1.07	
	Vegetative Filter Strips	5%	<1 yr	0.05	0.90	
	Cove Dynamics: Dredge	4%	1-2 yrs	0.28	6.99	Does not address source(s)
	Cove Dynamics: Partial Fill	0%	1-2 yrs	0.53	-	Does not address source(s)
	Cove Dynamics: Fill	-	1-2 yrs	0.62	-	Does not address source(s)
	Cove Dynamics: Partial Fill & Dredge	0%	2-5 yrs	0.76	-	Does not address source(s)
	Septic Maintenance and Education			<1 yr		
	Pet Waste Education			<1 yr		
	Septic Management (records, inspectors)			1-2 yrs		
	Livestock/Range Management Education			1-2 yrs		
	Waterfowl Breeding Control Program			1-2 yrs		

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Arrowhead Shores 354 units	Regional Wastewater Treatment (include neighboring areas)	99%	10-15 yrs	0.26		
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Urban Education on Fertilizer Application		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)	
Oak Trail Shores 1,653 units	Cove Dynamics: Dredge, Add Outlet	65%	2-5 yrs	0.84	1.29	Does not address source(s);	
	Regional Wastewater Treatment (include neighboring areas)	54%	10-15 yrs	0.26	0.48		
	Local Centralized Wastewater Treatment - Aggregate	54%	5-10 yrs	0.33	0.62		
	Regional Wastewater Treatment	54%	10-15 yrs	0.35	0.66		
	Local Centralized Wastewater Treatment - Independent	54%	2-5 yrs	0.38	0.71		
	Drainage Re-route	51%	<1 yr	0.07	0.14		
	Septic System Replacement	Section 1	41%	<1 yr	0.38	0.94	
		Section 3			0.73	1.81	
		Section 2			0.50	1.24	
	Cove Circulation: Intake/Discharge	39%	1-2 yrs	0.20	0.51	Infrastructure may impede navigation; Does not address source(s)	
	Cove Dynamics: Dredge	30%	1-2 yrs	0.57	1.91	Does not address source(s)	
	Septic Maintenance and Education			<1 yr			
	Pet Waste Education			<1 yr			
Septic Management (records, inspectors)			1-2 yrs				
Waterfowl and Wildlife Feeding Ordinances			1-2 yrs				

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Sky Harbor 629 units	Catchment Basins	65%	2-5 yrs	0.82	1.25	
	Cove Circulation Systems (Fountains, etc)	39%	1-2 yrs	0.25	0.64	May impede navigation
	Regional Wastewater Treatment	13%	10-15 yrs	0.30	2.37	
	Local Centralized Wastewater Treatment - Independent	13%	2-5 yrs	0.42	3.33	
	Septic System Replacement	9%	<1 yr	0.57	6.03	
	Septic Maintenance and Education			<1 yr		
	Pet Waste Education			<1 yr		
	Livestock/Range Management Education			1-2 yrs		
	Waterfowl and Wildlife Feeding Ordinances			1-2 yrs		
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs		

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Water's Edge	Urban Education on Fertilizer Application		1-2 yrs			
	Pet Waste Education		<1 yr			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Indian Harbor 1,243 units	Regional Wastewater Treatment	99%	10-15 yrs	0.60	0.61	
	Cove Circulation Systems (Fountains, etc)	33%	1-2 yrs	0.21	0.65	May impede navigation
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Urban Education on Fertilizer Application		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Nassau Bay II 123 units	Regional Wastewater Treatment	98%	10-15 yrs	0.54	0.55	
	Regional Wastewater Treatment (include neighboring areas)	98%	10-15 yrs	0.65	0.66	
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Urban Education on Fertilizer Application		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Port Ridglea East 236 units	Regional Wastewater Treatment (include neighboring areas)	99%	10-15 yrs	0.54	0.54	
	Regional Wastewater Treatment	99%	10-15 yrs	0.65	0.65	
	Septic System Replacement	75%	<1 yr	1.00	1.34	Small lots, large number of homes with waterfront property Navigation
	Cove Circulation Systems (Fountains, etc)	30%	1-2 yrs	0.30	1.00	
	Septic Maintenance Pump-out pilot program		<1 yr			
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Urban Education on Fertilizer Application		1-2 yrs			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs			
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs		

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)
Walnut Creek and DeCordova Estates 1,573 units	Catchment Basin	2%	2-5 yrs	0.16	7.88	Work with golf course to redesign pond features; may not address source(s)
	Vegetative Filter Strips		<1 yr			Site specific
	Septic Maintenance and Education		<1 yr			
	Pet Waste Education		<1 yr			
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs		
	Livestock/Range Management Education			1-2 yrs		
	Feral Hog Education Program/Bounty			2-5 yrs		

Area	BMP Alternative		% Reduction Bacteria	Time to Implement	Equivalent Annual Cost index	Cost/Reduction Ratio	Feasibility (Constraints/Considerations)	
Blue Water Shores 357 units	Cove Dynamics:	Dredge 8 ft	45%	1-2 yrs	0.96	2.13		
	Cove Circulation System: Intake/Discharge		38%	1-2 yrs	0.20	0.54		
	Cove Dynamics:	Dredge 6ft	30%	1-2 yrs	0.50	1.68		
	Septic Maintenance and Education (Neighboring Communities)				<1 yr			
	Pet Waste Education				<1 yr			
	Waterfowl and Wildlife Feeding Ordinances				1-2 yrs			
	Collection System Sewage Line - Maintenance				1-2 yrs			