

# Lake Granbury WPP Alternatives Analysis

6 – DISCUSSION OF MANAGEMENT  
MEASURES, CONSTRAINTS AND INPUT  
Stakeholder Meeting  
September 3, 2009

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## Summary of Areas

- Rolling Hills Shores
- Oak Trail Shores
- Long Creek
- Sky Harbor
- Indian Harbor
- Nassau Bay II
- Port Ridglea East
- Blue Water Shores
- Walnut Creek

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## Incorporating Stakeholder Inputs

- PROCESS
  - Deliver draft materials (DONE)
  - Gather input and comments (IN-PROGRESS)
  - Revise materials per input and comments (OCTOBER)
- Final product: one evaluation matrix for each area of interest
- The goal today is to gather input leading to creation of the final evaluation matrices.**

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## Weighting of Evaluation Criteria

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## Comments on weighting approaches

- Weighting of evaluation criteria
  - All draft materials assume equal weighting for
    - Bacteria % reduction
    - Time to implementation
    - Cost index
  - Suggestions received to date
    - General consensus was that the bacteria reduction is the most important factor.
    - Others stated that cost would be important as well.
    - Evaluate the ratio of Bacteria % reduction to Cost index
    - 60/20/20
    - 5/2/4 (from conceptual example)
  - Resolution: Today, specify approach for evaluating measurement measures.

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## Methods for Evaluating Management Measures

- How do we compare management measures?
  - A. Equal Weighting of Selection Criteria
  - B. Weighting by importance of Selection Criteria
  - C. Sort Measures by Importance of Selection Criteria
    - Bacteria % Reduction
    - Cost Index
    - Time to Implement

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## Potential to develop a ranking system for Alternatives Evaluation

Stakeholder Input

Quantitative ← Less Suitable → More Suitable

Factor Weight	Factor	Rating Scale					Score	
		0	1	2	3	4		
1	Watershed %Reduction	0%	1-20%	21-40%	41-60%	61-80%	80-100%	3
1	Time to Implement	>15 years	10-15 years	5-10 years	2-5 years	1-2 years	<1 year	4
1	Annual Cost Index	0.65-1.0	0.35-0.64	0.27-0.34	0.19-0.26	0.07-0.18	<0.06	2

Total Score 9

Factor Weight	Factor	Rating Scale					Score	
		0	1	2	3	4		
5	Watershed %Reduction	0%	1-20%	21-40%	41-60%	61-80%	80-100%	15
2	Time to Implement	>15 years	10-15 years	5-10 years	2-5 years	1-2 years	<1 year	8
4	Annual Cost Index	0.65-1.0	0.35-0.64	0.27-0.34	0.19-0.26	0.07-0.18	<0.06	8

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Total Score 31

## Equal Weighting (1/1/1)

Area	BMP Alternative	Weighting	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index	Score	Feasibility (Constraint Considerations)	
			1	1	1			
Example	Septic System Replacement		45%	<1 yr.	0.32	2	Future repairs, floodplain, limited types	
	Local Centralized Wastewater Treatment - Independent		55%	3-5 yrs.	0.25	2		
	Local Centralized Wastewater Treatment-Appropriate		55%	3-5 yrs.	0.21	3		
	Regional Wastewater Treatment		64%	6-10 yrs.	0.17	4		
	Regional Wastewater Treatment (include neighboring areas)		62%	4-10 yrs.	0.15	4		
	Septic Buy-Out		62%	1-2 yrs.	0.15	4	Public Deposition	
	Core Dynamics:						Does not address source(s); Flood storage; Property Rights	
	Core Dynamics:	Fill		10%	1-2 yrs.	0.32	2	Does not address source(s); Flood storage; Property Rights
	Core Dynamics:	Partial Fill		5%	1-2 yrs.	0.45	1	Does not address source(s); Flood storage; Property Rights
	Core Dynamics:	Dredge		10%	1-2 yrs.	0.30	0	Does not address source(s); Flood storage; Property Rights
	Core Dynamics:	Partial Fill & Dredge		0%	0-2.5 yrs.	0.78	0	Does not address source(s); Flood storage; Property Rights
	Core Dynamics:	Dredge, Partial Fill, Add Outlet		80%	0-2.5 yrs.	0.37	0	Does not address source(s); Flood storage; Property Rights
		Vegetative Filter Strips		12%	1-1 yr.	0.02	5	11
	Septic Maintenance and Education			1 yr.	0			
	Septic Management (leachate, inspectors)			1-2 yrs.	0			
	On-Water Education			1 yr.	0			
	Landscaping/Grass Management Education			1-2 yrs.	0			
	Waterfowl Breeding Control Program			1-2 yrs.	0			

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## General Stakeholder Comments and Resolutions

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## General Comments

- Evaluation Criteria
  - Comment: Include Long term sustainability
    - Resolution: No action necessary - incorporated into life cycle costs
  - Comment: Wording of evaluation criteria “Watershed % Reduction” not appropriate
    - Resolution: Change to “Bacteria % Reduction”
  - Comment: Can we determine what % reduction in each subdivision needs to be reached to meet stakeholder goals?
    - Response: Recognize significant constraints to this approach, bacteria are living organism with complex life cycles – difficult to predict accurate reductions in concentrations at specific locations

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## General Comments

- Suggestions:
  - Prioritize areas and alternatives for implementation planning and funding outreach.
    - Resolution: This will be addressed within the WPP.
  - Evaluate alternatives by subdivision and not comparatively to other subdivisions.
    - Resolution: The current approach is area specific; cost index will consider only cost alternatives within each subdivision.

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## General Comments On-site Sewage Facilities

- Septic Inspections
  - Comment: Hood County Health Dept. has limited staffing resources to perform detailed inspections for all subdivisions.
    - Only surficial inspections, snapshot in time
  - Resolution: A recommendation for enforcement of real estate inspections will be included in the WPP
- Life Span for Replacement of Septic Systems
  - Assumption: 25 yrs
  - Comments: 12 to 20 yrs to longer
  - Resolution: 20 years
- Terminology for Onsite Systems
  - Comments: Consistency between OWTS vs OSSF
  - Resolution: OSSF

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## General Comments

### Wastewater Collection Systems

- Power for wastewater collection systems
  - Assumption: 3-phase
    - Comments: May be optimistic for some areas.
    - Resolution: Based upon contacts, 3-phs power appears available in relevant areas. No changes are proposed.
  - Assumption: Cost \$0.11/kWh
    - Comment: Recently increased by 8%
    - Resolution: Continue with current assumption unless otherwise resolved.
- Time to Implement wastewater collections systems
  - Comment: Is time to implementation the same for all subdivisions?
  - Resolution: Reduce for Port Ridglea East and Nassau Bay II, considering plans already underway.

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## General Comments

### Wastewater Collection Systems

- Number of connections
  - Assumption: Equals the number of lots based on subdivision parcels
    - Comments: Some subdivisions have residences with double lots
    - Resolution: Today, determine appropriate ratio for each subdivision based on stakeholder input.

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## General Comments

### Package Plants

- General hesitation to recommend package plant alternatives because of the need for strong supervision.
- Need to consider capability of plant operator to quickly handle a problem.
  - Small plants typically do not have 24-hour, on-site supervision.
  - Small plants can develop problems in a matter of hours.

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## General Comments

### Cove Dynamics and Circulation

- Structures in coves and canals may constrain navigability
- Some of the water is too shallow to implement circulation features
- General preference to treat the source of bacteria and to reduce load
  - Improving dynamics can reduce concentration without providing load reduction

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## Summary Evaluation Matrices by Area

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## Evaluating measures in specific areas

- What are the constraints?
- What is unpalatable and why?

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## Lake-wide measures

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index	Score
Lake-wide	Regional Wastewater Treatment		10-15 yrs	1 varies	
	Vegetative Filter Strips		<1 yr	5	
	Septic Maintenance and Education		<1 yr	5	
	Urban Education on Fertilizer Application		1-2 yrs	4	
	Pet Waste Education		<1 yr	5	
	Livestock/Range Management Education		1-2 yrs	4	
	Feral Hog Education Program/Bounty		2-5 yrs	3	
	Waterfowl Breeding Control Program		1-2 yrs	4	
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs	4	

- Educational Measures
- Horse Farm Education (TSSWCB)
- Gray water education

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## Nassau Bay II

Area	BMP Alternative	Weighting ->		Equivalent Annual Cost Index	Score
		% Reduction Bacteria	Time to Implement		
Nassau Bay II	Local Centralized Wastewater Treatment - Independent				
	Local Centralized Wastewater Treatment - Aggregate	98%	5-10 yrs	2	0.28
	Regional Wastewater Treatment	98%	5-10-15 yrs	1	0.30
	Regional Wastewater Treatment (include neighboring areas)	98%	5-10-15 yrs	1	0.28
	Septic Maintenance and Education		<1 yr	5	
	Urban Education on Fertilizer Application		1-2 yrs	4	
	Pet Waste Education		<1 yr	5	
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs	4	

- Wastewater collection systems
  - 123 connections = # of lots
- Aggregate collection system with Port Ridglea East

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## Nassau Bay II - Comments

- Package facility is not feasible in this subdivision because of siting constraints.

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## Water's Edge

Subdivision	BMP Alternative	Weighting →	% Reduction	Time to	Equivalent	Score
			Bacteria	Implement	Annual Cost	
			1	1	1	
Water's Edge	Urban Education on Fertilizer Application			1-2 yrs	4	
	Pet Waste Education			<1 yr	5	
	Waterfowl and Wildlife Feeding Ordinances			1-2 yrs	4	

- How are we going to determine cost index for waterfowl control at Water's Edge?
- How many lots share the costs?

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## Water's Edge Comments

- No comments to date.

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## Indian Harbor

Area	BMP Alternative	Weighting →	% Reduction	Time to	Equivalent	Score		
			Bacteria	Implement	Annual Cost			
			1	1	1			
Indian Harbor	Local Centralized Wastewater Treatment - Independent		100%	5-2-5 yrs	3	0.24	3	11
	Regional Wastewater Treatment		100%	5-10-15 yrs	1	0.17	4	10
	Cove Circulation Systems (Fountains, etc)		33%	2-1-2 yrs	4	0.1	4	10
	Septic Maintenance and Education			<1 yr	5			
	Urban Education on Fertilizer Application			1-2 yrs	4			
	Pet Waste Education			<1 yr	5			
	Waterfowl and Wildlife Feeding Ordinances			1-2 yrs	4			

- Wastewater Collection Systems
  - 1909 connections = # of lots

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## Indian Harbor - Comments

- AMUD suggests it would be best to serve the entire subdivision plus surrounding communities (eg, Ports O' Call)
- Also sizing the collection system based on the number of parcels would be consistent with typical planning, given existing lot sizes.

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## Port Ridglea East

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index		Score
				Cost	Index	
Port Ridglea East	Septic System Replacement	75%	4 <1 yr	5	0.45	1
	Septic Maintenance Pump-out pilot program	0%	<1 yr	5		
	Local Centralized Wastewater Treatment - Independent	100%	5-2-5 yrs	3	0.28	2
	Local Centralized Wastewater Treatment - Aggregate	100%	5-5-10 yrs	2	0.28	2
	Regional Wastewater Treatment	100%	5-10-15 yrs	1	0.30	2
	Regional Wastewater Treatment (exclude neighboring areas)	100%	5-10-15 yrs	1	0.23	3
	Cove Circulation Systems (Fountains, etc)	30%	2-1-2 yrs	4	0.14	4
	Septic Maintenance and Education		<1 yr	5		
	Urban Education on Fertilizer Application		1-2 yrs	4		
	Pet Waste Education		<1 yr	5		
	Area Conservation Plan and Education for small acreage land owners		2-5 yrs	3		
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs	4		

- OSSF
  - Replace failing septic with aerobic tanks and drip emitter field
- Wastewater Collection Systems
  - 248 connections = # of lots
- Aggregate collection system with Nassau Bay II
- Cove Circulation
  - 4-day turn over

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## Port Ridglea East - Comments

- Notation of potential 100% reduction of bacteria is deceiving; revise and report as 99%

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## Blue Water Shores

Subdivision	BMP Alternative	Weighting	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index		Score
					Cost	Index	
Blue Water Shores	Cove Dynamics	30%	2-1-2 yrs	4	0.99	0	6
	Dredge 6 ft	45%	3-1-2 yrs	4	1.00	0	7
	Cove Circulation System: Intake/Discharge	38%	2-1-2 yrs	4	0.09	4	10
	Septic Maintenance and Education (Neighboring Communities)		<1 yr	5			
	Pet Waste Education		<1 yr	5			
	Waterfowl and Wildlife Feeding Ordinances		1-2 yrs	4			
	Collection System Sewage Line - Maintenance		1-2 yrs	4			

- Cove Dynamics
  - Only dredge canal with high E. coli observations
- Cove Circulation
  - 4-day residence time

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## Blue Water Shores - Comments

- No stakeholder comments were made
- This may be a lower priority area
- Main concern for this subdivisions for pet waste because of the proximity of homes to canals and the amount of impervious cover
  - Address with pet waste education

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## Walnut Creek – Possible Alternatives Matrix

Subdivision	BMP Alternative	Weighting ->	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index	Score
			1	1	1	
Walnut Creek	Catchment Basin			2-5 yrs	3	
	Vegetative Filter Strips			<1 yr	5	
	Septic Maintenance and Education			<1 yr	5	
	Pet Waste Education			<1 yr	5	
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs	3	
	Livestock/Range Management Education			1-2 yrs	4	
	Feral Hog Education Program/Bounty			2-5 yrs	3	

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## Walnut Creek - Comments

- Watershed Education Programs would be beneficial in this area.

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## Rolling Hills Shores

Area	BMP Alternative	Weighting ->	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index	Score			
			1	1	1				
Rolling Hills Shores	Septic System Replacement along Cove		46%	3	<1 yr	5	0.32	2	10
	Septic System Replacement Uphill		46%	3	<1 yr	5	0.22	3	11
	Local Centralized Wastewater Treatment - Independent		62%	4	2-5 yrs	3	0.30	2	9
	Local Centralized Wastewater Treatment-Aggregate		62%	4	5-10 yrs	2	0.19	3	9
	Regional Wastewater Treatment		62%	4	10-15 yrs	1	0.15	4	9
	Regional Wastewater Treatment (include neighboring areas)		62%	4	10-15 yrs	1	0.14	4	9
	Property Buy-Out		62%	4	1-2 yrs	4	0.15	3	12
	Fill		0%	0	1-2 yrs	4	0.20	2	6
	Partial Fill		0%	0	1-2 yrs	4	0.25	3	7
	Dredge		4%	1	1-2 yrs	4	1.00	0	5
	Partial Fill & Dredge		0%	0	2-5 yrs	3	0.73	0	3
	Dredge, Partial Fill, Add Outlet		86%	5	2-5 yrs	3	0.76	0	8
	Vegetative Filter Strips		5%	1	<1 yr	5	0.02	5	11
	Septic Maintenance and Education				<1 yr	5			
	Septic Management (records, inspectors)				1-2 yrs	4			
	Pet Waste Education				<1 yr	5			
	Livestock/Range Management Education				1-2 yrs	4			
Waterfowl Breeding Control Program				1-2 yrs	4				

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## Rolling Hills Shores - Comments

- Possible Alternative Investigation
  - Terrace or catchment for upper watershed

## Oak Trail Shores

Area	BMP Alternative	% Reduction Bacteria	Time to Implement	Equivalent Annual Cost Index		Score
				1	1	
Oak Trail Shores	Septic System Replacement					
	Section 1				0.17	
	Section 2				0.33	
	Section 3	41%	3<1 yr	5	0.23	4
	Local Centralized Wastewater Treatment - Independent	54%	3-5 yrs	3	0.16	4
	Local Centralized Wastewater Treatment - Aggregate	54%	3-5-10 yrs	2	0.19	3
	Regional Wastewater Treatment	100%	5-10-15 yrs	1	0.15	4
	Regional Wastewater Treatment (include neighboring areas)	100%	5-10-15 yrs	1	0.14	4
	Fill	0%	0-1-2 yrs	4	0.01	5
	Partial Fill	0%	0-1-2 yrs	4	0.01	5
	Dredge	30%	2-1-2 yrs	4	0.99	0
	Dredge, Add Outlet	65%	4-2-5 yrs	3	0.35	1
	Dredge, Add Outlet	51%	3<1 yr	5	0.03	5
	Septic Maintenance and Education		<1 yr	5		
	Septic Management (records, inspectors)		1-2 yrs	4		
Pet Waste Education		<1 yr	5			
Waterfowl and Wildlife Feeding Ordinances		1-2 yrs	4			

## Oak Trail Shores - Comments

- Alternatives to Investigate
  - Flush water through cove from offsite drainage
  - Flush more water through cove from pumping
- Number of Connections
  - Assumption: # of lots
  - Comment: Some are double lots
  - Response: Use number of parcels because of potential for future redevelopment

## Oak Trail Shores - Comments

- Filling the canal is not realistic and would only be moving the problem. Comments could be summarized in three points:
  - Are we going to look at greywater?
    - Response: Lake wide septic education, can include as focus for OTS.
  - Filling of canals would not be acceptable to residents/community
  - Treating the source is the ideal solution rather than diluting by improved circulation patterns.

## Long Creek

Area	BMP Alternative	Weighting ->	% Reduction	Time to	Equivalent	Score		
			Bacteria	Implement	Annual Cost			
			1	1	1			
Long Creek	Septic System Replacement <sup>1</sup>		75%	<1 yr	5	0.36	1	10
	Local Centralized Wastewater Treatment - Independent <sup>1</sup>		100%	5-2.5 yrs	3	0.28	2	10
	Regional Wastewater Treatment <sup>1</sup>		100%	5-10 yrs	2			
	Vegetative Filter Strips			<1 yr	5			
	Septic Maintenance and Education			<1 yr	5			
	Pet Waste Education				5			
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs	3			
	Livestock/Range Management Education			1-2 yrs	4			
	Waterfowl Breeding Control Program			1-2 yrs	4			
	Waterfowl and Wildlife Feeding Ordinances			1-2 yrs	4			

<sup>1</sup> Long Creek Subdivision Only, does not consider upper watershed

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## Long Creek - Comments

- Alternatives to Investigate
  - Watershed Management above monitoring point
    - Education should be top of priorities
    - Regional wastewater collection low priority because of remote location
- Other Comments:
  - 200-500 geese can be seen on the turf grass fields.
  - Septic systems are not a problem in this area
  - Slide 4 100% reduction refers to human sources in subdivision
  - Investigate septic pump-out and land application near Hwy 51.
  - Investigate turfgrass farm
    - use of compost/organic fertilizer?
  - Suggested that the Brazos Coalition sample at the creek outlet for comparison to current station.

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## Sky Harbor

Area	BMP Alternative	Weighting ->	% Reduction	Time to	Equivalent	Score		
			Bacteria	Implement	Annual Cost			
			1	1	1			
Sky Harbor	Septic System Replacement		9%	<1 yr	5	0.26	3	8
	Local Centralized Wastewater Treatment - Independent		13%	1-2.5 yrs	3	0.18	4	8
	Regional Wastewater Treatment		13%	10-15 yrs	1	0.13		
	Cove Circulation Systems (Fountains, etc)		39%	2-5 yrs	4	0.11	4	10
	Catchment Basin		65%	2-5 yrs	3	0.48	1	8
	Septic Maintenance and Education			<1 yr	5			
	Pet Waste Education			<1 yr	5			
	Area Conservation Plan and Education for small acreage land owners			2-5 yrs	3			
	Livestock/Range Management Education			1-2 yrs	4			
	Waterfowl and Wildlife Feeding Ordinances			1-2 yrs	4			

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## Sky Harbor - Comments

- Cove dynamics dredging option:
  - Assumption: 5 years until re-dredging
  - Comments: 5' sediment accumulation in 30 years
  - Resolution: 15 years to re-dredging (evaluate other subdivisions case-by-case)
- Number of connections
  - Assumption: Number of connections = # lots
  - Comment: Many residences use double lots
  - Response: Assume connections for 75% of lots

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## Next Steps

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- October Meeting
  - Distribute revised materials, per input and comments
  - Decide alternatives to pursue

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## Questions or Comments?

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