

## Element B: Load Reductions

Load reductions are calculated for four priority action areas (Table B–1). For each reduction, a brief narrative about reasoning, assumptions, and calculations is provided, followed by reduction tables for each practice. In short, under these assumptions, the watershed could observe a 42.1% load reduction in bacteria, a 10.5% reduction in nitrogen, and a 12.1% reduction in phosphorous at the end of a 10-year implementation horizon. There is reason to believe that greater reductions could be achieved through the implementation of related practices (i.e., WWTP improvements), or improved implementation or higher participation rates.

**Table B- 1. Pollutant of concern by action area**

Projects	Bacteria	Nitrogen	Phosphorous
SSS Upgrades AA (09)	x	--	--
Pet Waste Pickup AA (18) & AA (19)	x	--	--
Green Infrastructure AA (24)	x	x	x
Stormwater Wetlands AA (24)	x	x	x

### Load Reductions from Action Area (09) SSS Upgrades and Improvements

For this load reduction, the focus is on the repair of sanitary sewer system (SSS) infrastructure to reduce the number of SSOs leakages and spills into the environment. SSOs are typically due to failures from cracking of lines from age, accumulation of fats and grease, clogging from rags and foreign objects, and penetration by tree roots. These failures occur in neighborhoods and along streets, and from there, raw sewage flows into drainage conveyances and eventually the bayou. Actions for this load reduction include replacement of damaged or corroded lines, the point repair of lines at specific locations, man hole cover upgrades, and the repair of pump or lift stations. These repairs combined, together with improved monitoring technologies, can bring an aging collection system into proper working order and reduce the number of SSO discharges.

For an estimate of load reduction of indicator bacteria from SSS improvements, the reductions are based on SSO discharge figures from the City of La Marque, which is participating in TCEQ's Sanitary Sewer Overflow Initiative (SSOI) program. Other communities like Texas City and Hitchcock have a very similar development style and age, which likely translates to comparable collection system characteristics and comparable SSO discharge volumes across much of the watershed. Loads and load reductions can be calculated by pro-rating SSO volumes by population in each AU. This approach points to a known data gap--actual discharge volumes--which could be addressed in part by other WPP action areas.

From April 2011 to March 2013, the City of La Marque reported an estimated 100,000 gallons of SSO discharges. It is assumed that these overflows are from the public side of the collection system, versus private property sewage lines connecting into the public system (see discussion section below). La Marque has a population of approximately 15,141 residents, compared to 22,008 in the Highland and Marchand Bayous watershed. Pro-rated by population in incorporated areas, that is, areas likely serviced

by a central collection system, results in an average SSO discharge of 73,356 gallons per year in the watershed. Using a low to high range of average concentrations of indicator bacteria in untreated sewage, loads and load reductions can be estimated from these discharges. SSO discharges from the collection system are assumed for purposes of this plan to be a regular leak into the environment, although heavy rainfall events can result in sporadic and high volume discharges. Similarly, stormwater infiltration from the environment and into the collection system can overwhelm the system's treatment plant, resulting in the untreated discharge of hundreds of thousands of gallons from a single event.

**Repair Activities.** Using estimates of the City of La Marque SSOI upgrade program, we can approximate the types of repairs and potential load reductions achieved from those repairs. The City estimates from its system survey that approximately 25 line points needs major repair, 9350 linear feet (lf) of broken or corroded line needs replacement, and approximately 20 lift stations need upkeep at a cost of \$1.4 million dollars over 10 years and servicing approximately 15,000 residents (La Marque Meeting Minutes, Jan 2015). Assuming these repair characteristics hold for the entire watershed, these figures translate to the following watershed-wide repair figures (Table B-2).

**Table B- 2. Sanitary Sewer System Repairs**

Activity	La Marque (pop. 15,141)	Watershed Wide (pop. 22,008)
Points with major repairs	25	36.7
Line replacement (lf)	9,350	13,718
Lift stations repaired or replaced	20	29

**Rate of effectiveness.** The City of La Marque SSOI upgrade program utilizes a 10 year program timeline. Ten percent progress per year would result in a complete repair of the system, yet not all needed repairs can be initially known and new failures will continue to occur elsewhere over the course of ten years. Combining a 80% repair effectiveness with a 15% failure rate over ten years, results in a net effective rate of 65% over 10 years, or 6.5% per year using the above repair program. Using these assumptions about repair activities and load reduction, we calculate the following 10 year load reduction of indicator bacteria per AU, utilizing both the low- and high-end bacteria concentrations.

### Calculation assumptions

- 1) Reductions assume a 10 year implementation horizon
- 2) Low *E. coli* concentration of  $1.05 \times 10^7$  and a high value of  $1.05 \times 10^8$  CFUs per 100mL
- 3) A bacteria conversion factor of 0.278 *Enterococcus* per *E. coli*.
- 4) Effective rate of volume reduction is 65% for ten years, or 6.5% per year.
- 5) Unreported SSOs from the collection system and from private lines are not factored, but are a known source.
- 6) Wastewater treatment plant SSO discharges are not factored, but are a known source.
- 7) All populations in incorporated areas are assumed to be serviced by a collection system and not on OSSF. GIS was used to allocate population by AU and incorporated areas; see load reduction table, Table B-3 below.

## Calculations

Low assumption Load per Gallon SSO =  $(1.0 \times 10^7 \text{ CFU } E. coli / 100\text{ml}) * (0.278 \text{ Enterococcus}/E. coli) * (100\text{mL}/0.0264172\text{gal}) = 1.05 \times 10^8 \text{ CFU Enterococcus/gallon}$

High Assumption Load per Gallon SSO =  $(1.0 \times 10^8 \text{ CFU } E. coli / 100\text{ml}) * (0.278 \text{ Enterococcus}/E. coli) * (100\text{mL}/0.0264172\text{gal}) = 1.05 \times 10^9 \text{ CFU Enterococcus/gallon}$

Effective reduction rate = (effective repair rate) – (new failure rate) = (80%) – (15%) = 65%

Indicator Bacteria Load Reduction = (Load per gallon) \* (Effective rate of volume reduction)

Percent Reduction = (Load Reduction) / (Total Load)

Loads and reductions are allocated on a pro-rated share of the incorporated population in each AU (Table B–3).

**Table B- 3. Bacteria load and reductions by assessment unit**

	Total	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Population (incorporated)</b>	22,008	9,243	61	2,919	1,957	1,508	6,320
<b>Share of Population</b>	100%	42.0%	0.3%	13.3%	8.9%	6.9%	28.7%
<b>Share of SSO Gallons per year</b>	73,356	30,808	203	9,729	6,523	5,026	21,066
<b>Annual Load Entero from SSO (Low Concentration) (CFU/Gallon = <math>1.05 \times 10^7</math>)</b>	7.70E+11	3.23E+11	2.13E+09	1.02E+11	6.85E+10	5.28E+10	2.21E+11
<b>Annual Load Entero from SSO (High Concentration) (CFU/Gallon = <math>1.05 \times 10^9</math>)</b>	7.70E+13	3.23E+13	2.13E+11	1.02E+13	6.85E+12	5.28E+12	2.21E+13
<b>Annual Load Entero from SSO (in Billion CFUs) (Low Concentration)</b>	770.24	323.49	2.13	102.16	68.49	52.78	221.19
<b>Annual Load Entero from SSO (in Billion CFUs) (High Concentration)</b>	77023.8	32348.7	213.5	10215.9	6849.1	5277.7	22118.8
<b>Assumed 10-year Net Effectiveness of Action Area (xx) activities</b>	65%	65%	65%	65%	65%	65%	65%

	Total	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Bacteria load reduction (in Billions of CFUs) after 10 years (Low Concentration)</b>	-500.7	-210.3	-1.4	-66.4	-44.5	-34.3	-143.8
<b>Bacteria load reduction (in Billion CFUs) after 10 years (High Concentration)</b>	-50065.5	-21026.7	-138.8	-6640.4	-4451.9	-3430.5	-14377.2
<b>Total <i>Entero</i> Load from all sources in Billions of CFUs (source Table: A-8)</b>	422,534	175,635	5,396	44,646	54,349	41,936	100,573
<b>Action Area as percent reduction in load after 10 years (Low Concentration)</b>	0.12%	0.12%	0.03%	0.15%	0.08%	0.08%	0.14%
<b>Action Area as percent reduction in load after 10 years (High Concentration)</b>	11.85%	11.97%	2.57%	14.87%	8.19%	8.18%	14.30%

### Discussion of load reduction: SSS

The location of SSS repair activities will be prioritized by cities, public works, or MUDs based on competing priorities, resources, and urgency of the repair. In any given year certain neighborhoods will see substantial improvements to their collection system, while other neighborhoods may see no action until years later. From the perspective of a water quality monitoring program in each AU, progress may appear irregular, where some AUs attain large reductions while others realize none. The goal is that after 10 years, SSS repair activities will have been undertaken across most or all AUs, and that the 65% percent net effectiveness will be realized along with associated load reductions.

The reported SSO figures of 100,000 gallons between 2011 and 2013 are for discharges from the public side of the collection system, and do not factor in leakages and failures in private lines that connect into the collection system. La Marque estimates that SSO discharges from the public side of the collection system may represent only 40% of system wide leakages, meaning that private property lines may constitute 60% of all discharges. Improving private maintenance of private lines could have a substantial impact on the watershed's water quality, possibly accounting for more than a doubling in load reductions from this source. These private lines and their contribution are not included as an action area in this load reduction section. Other action areas may address the impact of private lines.

### Load Reductions from Action Area (06) Fats, Oils, Grease and Wipes

For this load reduction, the focus is on educating homeowners on the impacts of fats, oils, grease, and wipes on their plumbing and the larger collection system for the community. It is assumed here that through education efforts a fraction of homeowners will recognize issues with their home plumbing and see to it that their system is repaired at their personal expense. This reduction depends on a chain of

particular events, such that a fraction of homeowners will receive educational material, a fraction of them will recognize an issue with their system, and a fraction will take action to have their pipes cleared or replaced. While the number of homes may be small, the impact on reducing the volume of raw sewage leaking from private lines could be large.

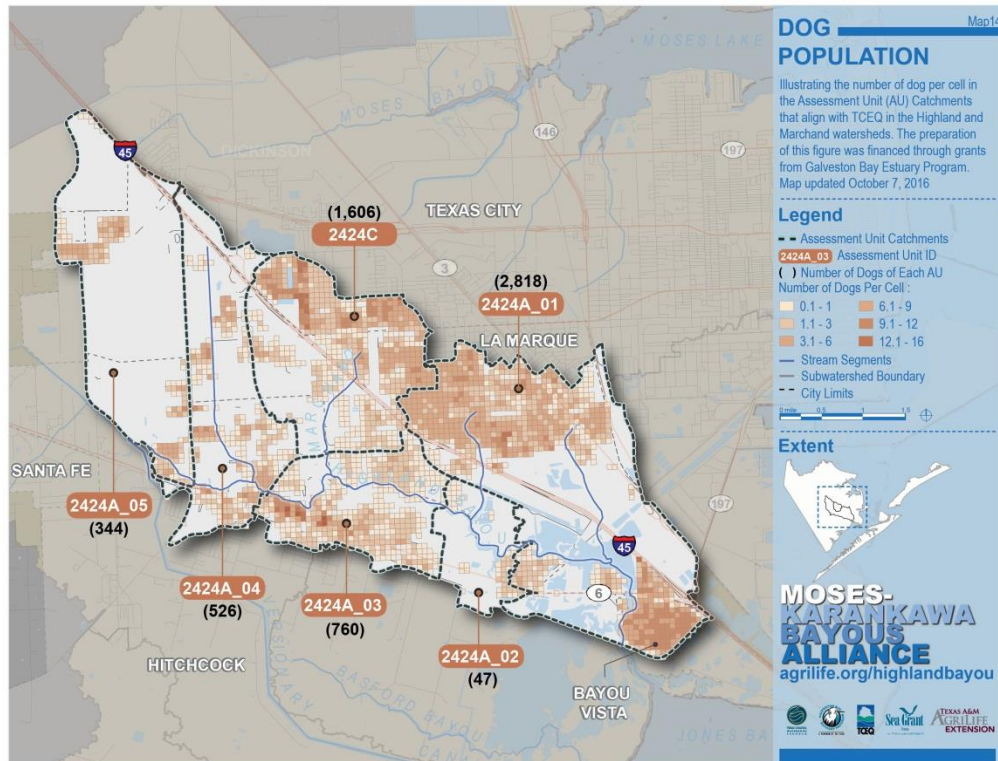
No attempt is made here to estimate the potential reduction in SSO volumes from private lines connecting to the main collection system. Several key figures are missing, namely a likely estimate for the number of homes with failing private lines, and the volume flowing from the average failure. For total volume of leakages from private lines, an estimate can be made here based on figures from the La Marque study (see above). Pro rating the losses reported in La Marque, and applying the 60% volume figure for private lines, there may be over 110,034 gallons of raw sewage leaking from private lines. Applying the reduction assumptions from SSOI improvements to the potential volume reduction from private lines could result in a net reduction of almost 20% across the watershed.

Through a combination of reporting and homeowner education, it is possible that failing private lines could be identified. However, this is no legal enforcement mechanism to compel a private home owner to upgrade their system. The most compelling reason for a homeowner is likely the most immediate: overflowing bathrooms and foul odors from the lawn.

### **Load Reductions from Action Area (18) and Action Area (19) Pet Waste Pickup**

For this load reduction, the focus is on pet owner education and behavior change about pet waste pickup. Pet waste, particularly dog waste, left on a lawn or any outdoor area will eventually be washed away via stormwater and into local waterways, contributing to the Bayou's bacteria load. Through education about the impact and importance of pet waste on water quality, it is assumed that pet owners will act responsibly and pick up their pet's waste and dispose of it in garbage. Most cat waste is collected in a litter box and disposed of in the garbage.

Using figures on ownership rates from the American Veterinary Medical Association (AVMA) and GIS analysis, the project team estimated the dog population by AU (see Map-14 and Table B-4 below). The AVMA (2012) estimates that 36.5 percent of households own dogs, and that of owning households have an average of 1.6 dogs. This results in a blended rate of .584 dogs per household. Using these ownership rates and load reduction estimates from pet waste pickup participation rate, and load reduction can be calculated for this Action Area. The National People and Pets survey found that around 44 percent of dog owners stated that they 'always' or 'sometimes' pick up their dog's waste. For this analysis, we assume 40% percent of owners pick up dog waste.



Map-14. The number of dogs per Assessment unit

### Calculation Assumptions

- 1) Reductions assume a 10 year implementation horizon
- 2) The average dog produces  $5.0 \times 10^9$  fecal coliform per day
- 3) A bacteria conversion factor of 0.278 *Enterococcus* per *E. coli*, and a bacteria conversion factor of 0.63 *E. coli* per fecal coliform.
- 4) Only 40% of dog waste is picked up; 60% is assumed left outdoors
- 5) A 20% increase in pick up rates over ten years, i.e., 48% pick up rate and 52% leave rate
- 6) 100% of bacteria in fecal waste left outdoors will end up in the bayou.

### Calculations

Dogs per household = (36.5% of households own dogs) \* (1.6 dogs / owning household) = 0.584 dogs / household (Source AVMA, 2012)

Dogs in watershed = (0.584 dogs / household) \* (10,040 households in watershed) = 5,863 dogs in watershed

Effective load reduction rate = (current load-future load) / (current load) =  $60\% - 52\% / 60\% = 13.6\%$

Load Reduction of Indicator Bacteria in Billions =  $(5.0 \times 10^9 \text{ fecal coliform/dog / day}) * (0.63 \text{ } E. coli / \text{fecal coliform}) * (0.278 \text{ } Enterococcus / E. coli) * (365 \text{ days / year}) * (13.6\% \text{ effective reduction through increased pick up rates}) * (1/1,000,000,000) * (5,963 \text{ dogs in watershed}) = 24,987 \text{ load reduction of indicator bacteria in billions for entire watershed.}$



Table B-4 allocates the dog population and load reduction by AU (from GIS analysis using DUs by AU) and shows the allocation of indicator bacteria load reduction and bacteria load reduction as percent of total indicator bacteria load in the watershed and by AU.

**Table B- 4. Bacteria load and reductions by assessment unit**

	Total	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Est. Dog Population</b>	5,863	2,707	46	731	505	331	1,544
<b>Percent Allocation by AU</b>	100%	46.2%	0.8%	12.5%	8.6%	5.6%	26.3%
<b>Load <i>Entero</i> in Billions from all sources</b>	422,534	175,635	5,396	44,646	54,349	41,936	100,573
<b>Action Area Load Reduction in Billions</b>	24,987	11,537	196	3,115	2,152	1,411	6,580
<b>Action Area Load Reduction as percent of all sources, year 2026</b>	5.9%	6.6%	3.6%	7.0%	4.0%	3.4%	6.5%

### Discussion of Load Reduction: Pet Waste Pickup

The cost of education is comparatively low to other practices and the return on load reductions is potentially high. Several critical facts will determine whether or not bacteria reductions will exceed or fall short of estimated figures, apart from participation rates. Very little literature exists on the amount of fecal coliform in dog waste, with one study cited by numerous publications on the topic of dog waste, Van der Wel's 1995 journal publication "*Dog Pollution.*" A study by the University of Nevada Cooperative Extension analyzing dog waste around Lake Tahoe found that "fresh feces contained an average of 50 million CFU/gram with a range of two million to 200 million CFU/g." The wide range was "attributed to the highly variable nature of dog food, digestive health and diets" (p.3) (UNV fact sheet, 2008). 23 million was used for calculations in this WPP (see assumptions above).

Bacteria are living organisms and need certain conditions to live and replicate. It is likely that temperature and weather conditions play a significant role on the fate of bacteria as it is transported to waterways from the point of deposition outdoors, and that some amount may never reach the waterway. For example, dry conditions may degrade bacteria quickly. While estimates of dog populations or pick-up rates may reasonably vary by 20 or more percentage points from national averages, the differences in bacterial concentration and the transport dynamics could impact loadings by orders of magnitude.

### Load Reductions from Action Area (24) Green Infrastructure and Stormwater Wetlands

For this load reduction, activities focus on implementing GI practices and SWW. These stormwater management practices mimic natural features by slowing the flow of water and allowing it time to infiltrate into the ground. Load reductions are achieved through a combination of ground infiltration and plant uptake. GI refers to a range of stormwater management practices and includes here grassed swales, dry and wet infiltration basins, porous pavements, bioretention areas, and sand or vegetated filter strips,

and SWW. SWW are constructed ponds that integrate natural wetland vegetation. SWW are also referred to as artificial wetlands or constructed wetlands. In addition to providing water quality benefits, they provide aesthetic value. The rule of thumb for sizing SWW is 1% of the area draining into it.

Load reductions are estimated as two calculations, once for GI and once for SWW (Table B-5; Table B-6). It is assumed that to achieve load reductions, these practices will be implemented in or near existing development over a 10 year implementation horizon. It is also assumed that approximately 20% of runoff load from existing development will be intercepted by these practices. Existing development includes pollutant load values from land use classes referred to as road, commercial, industrial and all residential classes (0-16 DUA). No single GI approach is prescribed here. Rather, the WPP assumes that communities and developers will select from among these options as warranted by site conditions, thus an average figure from all practices is utilized for percent removal rates. Based on figures from over 30 studies, the average percent removal for all practices is 41% for nitrogen, 43% for phosphorous, and 54% for bacteria.

**Table B- 5. Percent reduction for pollutants of concern by Green Infrastructure practice**

Green Infrastructure Practice	N	P	Bacteria
<b>Grassed Swale</b>	38%	33%	--
<b>Infiltration Basin</b>	54%	60%	82%
<b>Infiltration Trench</b>	56%	58%	82%
<b>Permeable Pavement</b>	69%	59%	--
<b>Bioretention Areas</b>	51%	66%	52%
<b>Water Quality Inlets</b>	11%	6%	5%
<b>Sand and Organic Filter Strips</b>	37%	49%	49%
<b>Vegetated Filter Strips</b>	24%	19%	33%
<b>Dry Detention Basin</b>	32%	29%	67%
<b>Wet Detention Basin</b>	36%	52%	62%
<b>Average Percent Removal Across All Practices</b>	41%	43%	54%

**Table B- 6. Percent reduction for pollutants of concern for Stormwater Wetlands**

Green Infrastructure Practice	N	P	Bacteria
<b>Stormwater Wetlands</b>	35%	47%	72%

For sources and methods regarding these practices, please see Appendix D, Stormwater Best management Practices (BMP) Factsheets.



## Calculation Assumptions

- 1) Reductions assume a 10 year implementation horizon
- 2) Management practices intercept 20% of existing runoff load
- 3) Loads and Load reductions do not factor in future growth
- 4) GI load reduction values
  - a. 41% reduction for nitrogen
  - b. 43% reduction for phosphorous
  - c. 60% reduction for bacteria
- 5) Stormwater Wetland load reduction values
  - a. 35% reduction assumed for nitrogen
  - b. 47% reduction for phosphorous
  - c. 72% reduction for bacteria
- 6) Intercepted runoff loads are based on loads from developed acreages

## Calculations

Load mass reduced from developed areas= (load from developed areas) \* (Load intercept rate) \* (percent removal)

Percent reduction in total load = (Load Reduction mass from developed areas) / (Existing load from all areas)

**Table B- 7. Nitrogen load reductions from GI practices by assessment unit**

Nitrogen Load Reduction from GI practices	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load (lbs) from Existing Development in AU</b>	42,377	17,963	452	4,481	5,345	3,859	10,277
<b>Load Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		41%	41%	41%	41%	41%	41%
<b>Load Reduction (lbs)</b>	3,475	1,473	37	367	438	316	843
<b>Total Load for AU</b>	61,304	21,650	1,734	6,657	8,912	9,602	12,749
<b>Percent Reduction for AU</b>	5.7%	6.8%	2.1%	5.5%	4.9%	3.3%	6.6%

**Table B- 8. Phosphorus load reductions from GI practices by assessment unit**

Phosphorous Load Reductions from GI Practices	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load (lbs) from Existing Development in AU</b>	5,773	2,517	63	633	685	488	1,387
<b>Load Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		43%	43%	43%	43%	43%	43%

Phosphorous Load Reductions from GI Practices	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load Reduction (lbs)</b>	496	216	5	54	59	42	119
<b>Total Load for AU</b>	8,568	3,041	250	944	1,240	1,351	1,742
<b>Percent Reduction for AU</b>	5.8%	7.1%	2.2%	5.8%	4.8%	3.1%	6.8%

Table B- 9. *Enterococcus* load reductions from GI practices by assessment unit.

<i>Enterococcus</i> Load Reductions from GI Practices	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load (billions) from Existing Development in AU</b>	407,529	172,757	4,384	42,985	51,437	37,332	98,634
<b>Load Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		54%	54%	54%	54%	54%	54%
<b>Load Reduction (billions)</b>	44,013	18,658	473	4,642	5,555	4,032	10,652
<b>Total load (billions) for AU</b>	422,535	175,635	5,396	44,646	54,349	41,936	100,573
<b>Percent Reduction for AU</b>	10.4%	10.6%	8.8%	10.4%	10.2%	9.6%	10.6%

Table B- 10. Nitrogen load reductions from stormwater wetlands by assessment unit

Nitrogen Load Reductions from Stormwater Wetlands	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load (lbs) from Existing Development in AU</b>	42,377	17,963	452	4,481	5,345	3,859	10,277
<b>Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		35%	35%	35%	35%	35%	35%
<b>Load Reduction (lbs)</b>	2,966	1,257	32	314	374	270	719
<b>Total Load for AU</b>	61,304	21,650	1,734	6,657	8,912	9,602	12,749
<b>Percent Reduction for AU</b>	4.8%	5.8%	1.8%	4.7%	4.2%	2.8%	5.6%

Table B- 11. Phosphorus load reductions from stormwater wetlands by assessment unit

Phosphorous Load Reductions from Stormwater Wetlands	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load (lbs) from Existing Development in AU</b>	5,773	2,517	63	633	685	488	1,387
<b>Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		47%	47%	47%	47%	47%	47%

<b>Load Reduction (lbs)</b>	543	237	6	60	64	46	130
<b>Total Load for AU</b>	8,568	3,041	250	944	1,240	1,351	1,742
<b>Percent Reduction for AU</b>	6.3%	7.8%	2.4%	6.3%	5.2%	3.4%	7.5%

**Table B- 12. *Enterococcus* load reductions from stormwater wetlands by assessment unit**

<i>Enterococcus</i> Load Reductions from Stormwater Wetlands	All AUs	2424A_01	2424A_02	2424A_0 3	2424A_04	2424A_05	2424C_01
<b>Load (billions) from Existing Development in AU</b>	407,529	172,757	4,384	42,985	51,437	37,332	98,634
<b>Intercept Rate</b>		20%	20%	20%	20%	20%	20%
<b>Removal Rate</b>		72%	72%	72%	72%	72%	72%
<b>Load Reduction (billions)</b>	58,684	24,877	631	6,190	7,407	5,376	14,203
<b>Total load (billions) for AU</b>	422,535	175,635	5,396	44,646	54,349	41,936	100,573
<b>Percent Reduction for AU</b>	13.9%	14.2%	11.7%	13.9%	13.6%	12.8%	14.1%

### Discussion of Load Reduction: GI and SWW

Load reduction and load reduction costs will vary by the specific practice utilized. An average value for all practices was utilized here. Effectiveness of the practices will depend on proper implementation, sizing, and siting. Implementation will be voluntary and undertaken by local public entities, private land owners, or developers. To reiterate, these load reductions are achieved by installing these management measures in a way that intercepts flow from existing developed areas, and not new development. For purposes of water quality monitoring in the basin, load reductions will be offset by load increases from future development in the watershed. One way to stay a step ahead of this offsetting dynamic is for municipalities to update their subdivision ordinance and site plan reviews to either require these practices as a condition of development or ensure that codes do not inadvertently prohibit developers from utilizing these practices.

## Cumulative Load Reductions from All Practices

### Bacteria

The following table shows estimated indicator bacteria load reductions from the implementation of all load reduction practices (Table B-13). The high value bacteria concentration for SSO discharges are utilized in this table. It is possible that in ten years, through the adoption of the practices and repair programs, that the watershed could see a 42% reduction in bacteria from today's load values. Because of a lack of flow data, it is not possible to estimate if these load reductions would result in the bayou's removal from the 303(d) list.

**Table B- 13. Estimated *Enterococcus* load reductions from four priority action areas by assessment unit**

<i>Enterococcus</i> Load in Billions	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Total Estimated Load</b>	422,534	175,635	5,396	44,646	54,349	41,936	100,573
<b>Load Reduction from SSOI improvements (high bacteria concentration value)</b>	50,065	21,027	139	6,640	4,452	3,430	14,377
<b>Load Reduction from Pet Waste Pick Up Program</b>	24,991	11,537	196	3,115	2,152	1,411	6,580
<b>Load Reduction from Green Infrastructure</b>	44,012	18,658	473	4,642	5,555	4,032	10,652
<b>Load Reduction from Stormwater Wetlands</b>	58,684	24,877	631	6,190	7,407	5,376	14,203
<b>Load Reduction from All Practices</b>	177,752	76,099	1,439	20,587	19,566	14,249	45,812
<b>Reduction as Percent of Total Load</b>	42.1%	43.3%	26.7%	46.1%	36.0%	34.0%	45.6%

## Dissolved Oxygen

Table B-14 shows estimated cumulative load reductions in nitrogen and phosphorous from the implementation of proposed GI practices and SWW. It is possible that in ten years, through the adoption of these practices, that that watershed could see a 10.5% reduction in nitrogen and a 12.1% reduction in phosphorous. While a reduction in nutrients would be a positive trend, the reduction's impact on the levels of DO is unknown. It is important to keep in mind that the 303(d) listing is for low DO and not for specific nutrients.

**Table B- 14. Cumulative load reductions in nitrogen and phosphorus from green infrastructure practices and stormwater wetlands**

Nitrogen (lbs)	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Total Estimated Load</b>	61,204	21,650	1,734	6,557	8,912	9,602	12,749
<b>Load Reduction from Green Infrastructure</b>	3,474	1473	37	367	438	316	843
<b>Load Reduction from Stormwater Wetlands</b>	2,966	1257	32	314	374	270	719
<b>Total Load Reduction</b>	6,440	2730	69	681	812	586	1562
<b>Reduction as Percent of Total Load</b>	10.5%	12.6%	4.0%	10.4%	9.1%	6.1%	12.3%
Phosphorous (lbs)	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Total Estimated Load</b>	8,568	3,041	250	944	1,240	1,351	1,742
<b>Load Reduction from Green Infrastructure</b>	495	216	5	54	59	42	119

Phosphorous (lbs)	All AUs	2424A_01	2424A_02	2424A_03	2424A_04	2424A_05	2424C_01
<b>Load Reduction from Stormwater Wetlands</b>	540	237	6	60	64	43	130
<b>Total Load Reduction</b>	1,035	453	11	114	123	85	249
<b>Reduction as Percent of Total Load</b>	12.1%	14.9%	4.4%	12.1%	9.9%	6.3%	14.3%