

Initial Economic Assessment of BMPs for Improved Water Quality in the Eagle Mountain Watershed

- Review of BMPs
- Assumed Adoption Levels
- Review of Costs
- Ranking of BMPs



Dr. Jason L. Johnson

Associate Professor & Extension Economist

Texas A&M University & Texas AgriLife Extension

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BMPs and Eligibility within Eagle Mountain Watershed

| | | Eligibility in Watershed |
|----|--|--------------------------|
| 1 | Conversion of Cropland to Grass/Hay | 17,509 acres |
| 2 | Fert. Mgt. 25% red. In P, split applications | 17,509 acres |
| 3 | Establish Filter Strips | 17,509 acres |
| 4 | Establish Grassed Waterways | 3,503 acres |
| 5 | Terracing | 8,646 acres |
| 6 | Prescribed Grazing | 50,162 acres |
| 7 | Pasture Planting – reseeding | 50,162 acres |
| 8 | Critical Pasture Planting – shaping | 190,580 acres |
| 9 | Grade Stabilization – gully plugs | 203,703 acres |
| 10 | Prescribed Burning | 64,247 acres |
| 11 | Brush Management | 32,123.5 acres |
| 12 | Phase II Urban Stormwater BMPs | 1 project |

BMPs and Eligibility within Eagle Mountain Watershed

| | | Eligibility in Watershed |
|----|---|--------------------------|
| 13 | Voluntary Urban Nutrient Mgt. | 1 project |
| 14 | Required Urban Nutrient Mgt. | 1 project |
| 15 | Herbicide Application – Riparian Corridor | 49.5 miles |
| 16 | Riparian Buffer Strips – Med. Erosion Areas | 288.3 miles |
| 17 | Riparian Buffer Strips – Critical Areas | 52.2 miles |
| 18 | Wetland Development – West Fork Trinity | 1 project - 121.31 acres |
| 19 | Wetland Development – Walnut Creek | 1 project – 8.34 acres |
| 20 | Hypolimnetic Aeration | 1 project |
| 21 | P Inactivation with Alum | 1 project |
| 22 | WWTP – Level I to Level II | ALL WWTPs |
| 23 | WWTP – Level I to Level III | ALL WWTPs |
| 24 | FP Sites – New Ponds Big Sandy/Salt Creek | 1 project – 13/4 ponds |

Adoption Rates of BMPs

| | | Adoption Rates | | |
|----|--|----------------|-------------|----------|
| | | Current | Most Likely | Marginal |
| 1 | Conversion of Cropland to Grass/Hay | 0% | 25% | 25% |
| 2 | Fert. Mgt. 25% red. In P, split applications | 90% | 100% | 10% |
| 3 | Establish Filter Strips | 0% | 25% | 25% |
| 4 | Establish Grassed Waterways | 20% | 30% | 10% |
| 5 | Terracing | 20% | 30% | 10% |
| 6 | Prescribed Grazing | 10% | 30% | 20% |
| 7 | Pasture Planting – reseeding | 5% | 10% | 5% |
| 8 | Critical Pasture Planting – shaping | 30% | 40% | 10% |
| 9 | Grade Stabilization – gully plugs | 25% | 50% | 25% |
| 10 | Prescribed Burning | 1% | 5% | 4% |
| 11 | Brush Management | 10% | 30% | 20% |
| 12 | Phase II Urban Stormwater BMPs | 0% | 50% | 50% |

Adoption Rates of BMPs

| | | Adoption Rates | | |
|----|---|----------------|-------------|----------|
| | | Current | Most Likely | Marginal |
| 13 | Voluntary Urban Nutrient Mgt. | 10% | 15% | 5% |
| 14 | Required Urban Nutrient Mgt | 10% | 70% | 60% |
| 15 | Herbicide Application – Riparian Corridor | 0% | 5% | 5% |
| 16 | Riparian Buffer Strips – Med. Erosion Areas | 5% | 10% | 5% |
| 17 | Riparian Buffer Strips – Critical Areas | 0% | 10% | 10% |
| 18 | Wetland Development – West Fork Trinity | 0% | 100% | 100% |
| 19 | Wetland Development – Walnut Creek | 0% | 100% | 100% |
| 20 | Hypolimnetic Aeration | 0% | 100% | 100% |
| 21 | P Inactivation with Alum | 0% | 100% | 100% |
| 22 | WWTP – Level I to Level II | 0% | 100% | 100% |
| 23 | WWTP – Level I to Level III | 0% | 100% | 100% |
| 24 | FP Sites – New Ponds Big Sandy/Salt Creek | 0% | 100% | 100% |

BMP 1 Cropland Conversion of Cropland to Grass

Eagle Mountain

| | | |
|---|----------|--------|
| Hay Establishment Cost | \$165.80 | YR 0 |
| Foregone Income (no crop during Est.) | \$41.20 | YR 1 |
| Foregone Income (Crop to Grass) per acre: | \$25.20 | Annual |
| Cropland Annual Incentive Payment per acre: | \$20.00 | Annual |

BMP 2 Cropland Fert./Nutrient Mgt. 25% red. in P w/ Split applications

Eagle Mountain

| | | |
|---|-------------|---|
| Educational Program Costs | \$15,000.00 | YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45 |
| Cropland - per acre soil test (\$15/40) | \$0.375/ac | Annual |
| Cropland - Additional Cost one trip/split app | \$10.00 | Annual |
| Cropland Annual Incentive Payment per acre: | \$20.00 | Annual |

BMP 3 Cropland Filter Strip

Eagle Mountain

| | | |
|--|-------------|---|
| Foregone Income (Crop to Grass) per acre: | \$41.20 | Annual 1 ac. for 21 ac. unit |
| Cropland Annual Incentive Payment per acre: | \$20.00 | Annual, 1 acre for 21 acres |
| Educational Program Costs | \$15,000.00 | YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45 |
| Filter Strip/Waterway est. cost 1 acre of 21 | \$127.00 | YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45 |

BMP 4 Cropland Grassed Waterway

Eagle Mountain

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|--|-------------|--|
| Foregone Income (Crop to Grass) per acre: | \$41.20 | Annual 1 ac. for 41 ac. unit Cropland Annual |
| Incentive Payment per acre: | \$20.00 | Annual, 1 acre for 41 acres |
| Educational Program Costs | \$15,000.00 | YR 0, 10, 20, 30, and 40 |
| Filter Strip/Waterway est. cost 1 acre of 41 | \$127.00 | YR 0, 10, 20, 30, and 40 |
| Shaping waterways cost 1 acre of 41 | \$900.00 | YR 0, 10, 20, 30, and 40 |

BMP 5 Cropland Terracing

Eagle Mountain

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| Terracing Est. cost 1 acre of 21 ac. cropland unit | \$5900.00 | YR 0, 10, 20, 30 and 40 |
| Incentive Payment per acre: | \$20.00 | Annual, 1 acre for 21 acres |
| Terracing - added labor/fuel cost, cropland | \$5.00 | Annual, for all 21 acres |
| Educational Program Costs | \$15,000.00 | YR 0, 10, 20, 30, and 40 |

BMP 6 Pasture & Range Prescribed Grazing

Eagle Mountain

| | | |
|---|-------------|---|
| Fence construction per mile | \$10,000 | YR 0 |
| Pond construction, 1.5 per 500 ac.@ (3000*\$1.70) | \$7,650.00 | YR 0, 1 per 500 acre unit |
| Pastureland Annual Incentive Pmt per acre | \$5.60 | Annual, all 500 acres in unit |
| Pond clean out, 1.5 per 500ac @ (1500*\$8.30) | \$18,675.00 | YR 26, 1 per 500 acres in unit |
| Educational Program Costs | \$15,000.00 | YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45 |

BMP 7 Pasture & Range Pasture Planting

Eagle Mountain

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|---|-------------|---|
| Reseeding Pastureland, per acre, 1 per 10 acres | \$60.00 | YR 0, 10, 20, 30, and 40 |
| Pastureland Annual Incentive Pmt per acre | \$5.60 | Annual, all 10 acres in unit |
| Educational Program Costs | \$15,000.00 | YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45 |

BMP 8 Pasture & Range Critical Pasture Area Planting

Eagle Mountain

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|--|-------------|------------------------------|
| Shape one gully & seed, Est. <u>grassway</u> , 1 of 41 ac. | \$1,000.00 | YR 0, 10, 20, 30, and 40 |
| Pastureland Annual Incentive Pmt per acre | \$5.60 | Annual, all 41 acres in unit |
| Educational Program Costs | \$15,000.00 | YR 0, 10, 20, 30, and 40 |

BMP 9 Pasture & Range Grade Stabilization - gully plugs

Eagle Mountain - 20 structures

| | | |
|---------------------------------|----------|--------------|
| Gully Plug, cost per structure, | \$14,850 | YR 0, and 25 |
|---------------------------------|----------|--------------|

BMP 10 Pasture & Range Prescribed Burning

Eagle Mountain

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|--|---------|---|
| Prescribed burning costs per acre 200 ac. unit | \$11.34 | YR 0, 10, 20, 30, and 40, all 200 acres |
| Restricted grazing, fuel load & re-growth, per ac. | \$8.00 | YR 0, 10, 20, 30, and 40, all 200 acres |

BMP 11 Pasture & Range Brush Management

Eagle Mountain

Brush mgt costs, 75% mech, 25% chem, per ac. \$143.75 YR 0, 10, 20, 30, and 40, all 20 acres

BMP 12 Urban Phase II Urban Stormwater BMP's

Eagle Mountain

Urban Stormwater BMP practices \$1,793,994.00 Annual all years 1 - 50

BMP 13 Urban Voluntary Urban Nutrient Mgt.

Eagle Mountain

Cont. Ed. Program, Urban Nut. Mgt. \$250,000.00 Annual all years 1 - 50

Supplemental Property Owners Soil Testing \$30,000.00 Annual all years 1 - 50

BMP 14 Urban Required Urban Nutrient Mgt. in 2000 ft. buffer strips

Eagle Mountain

Cont. Ed. Program, Urban Nut. Mgt. \$250,000.00 YR 0

Legal costs w/ development of Req. Nut. Mgt. \$100,000.00 YR 0

Annual Ed. Program, Req. Nut. Mgt. \$25,000.00 Annual all years 1 - 50

Annual Soil Testing, Req. Nut. Mgt. \$15,000.00 Annual all years 1 - 50

Salary for Inspector, Req. Nut. Mgt. \$50,000.00 Annual all years 1 - 50

BMP 15 Channel Herbicide Application to Riparian Corridor

Eagle Mountain

Herbicide & Application, 73.33 ac./mile, \$36/ac \$2,640.00 YR 0, 5, 10, 15, 20, 25, 30, 35, 40, and 45
each mile, 150 ft. buffer width

BMP 16 Channel Riparian Buffer Strips - Medium Erosion Areas

Eagle Mountain

Fence construction \$20,000.00 YR 0, 20, and 40; two miles per buffer mile
Waterway planting for riparian strips \$5,000.00 YR 0, 20, and 40
Pasture Annual Incentive Pmt/ ac - 73.33 ac/mi. \$5.60 Annual all years 1 - 50

BMP 17 Channel Riparian Buffer Strips - Only in Critical Areas

Eagle Mountain - 52.2 miles (10% most likely adoption rate) = 5.22 miles

Structure development, fencing, planting, per mile \$1,000,000.00 YR 0, per mile of critical ripar. buffer

BMP 18 Channel Wetland Development - West Fork Trinity (121.31ac.)

Eagle Mountain - 122.31 ac. West Fork Trinity

Land Costs, West Fork Trinity, per ac. \$10,000.00 YR 0
Legal Costs, wetland development \$150,000.00 YR 0
Wetland, Land Work, per acre \$35,000.00 YR 0
Wetland, Diversion structure \$2,000,000.00 YR 0
Wetland, Reentry structure \$1,000,000.00 YR 0
Wetland Development, Annual Maintenance \$100,000.00 Annual, YR 1 - 50
Capital Replacement, dredging in YR 30 per ac. \$9700.00 Every 10 Yrs, YR 10, 20, 30 and 40

BMP 19 Channel Wetland Development - Walnut Creek (8.34 ac.)

Eagle Mountain - 8.34 ac. Walnut Creek

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|--|----------------|------------------------------------|
| Land Costs, Walnut Creek, per ac. | \$15,000.00 | YR 0 |
| Legal Costs, wetland development | \$150,000.00 | YR 0 |
| Wetland, Land Work, per acre | \$35,000.00 | YR 0 |
| Wetland, Diversion structure | \$2,000,000.00 | YR 0 |
| Wetland, Reentry structure | \$1,000,000.00 | YR 0 |
| Wetland Development, Annual Maintenance | \$100,000.00 | Annual, YR 1 - 50 |
| Capital Replacement, dredging in YR 30 per ac. | \$9700.00 | Every 10 Yrs, YR 10, 20, 30 and 40 |

BMP 20 Reservoir Hypolimnetic Aeration

Eagle Mountain

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|--------------------------------------|--------------|--------------|
| Hypolimnetic Aeration, Capital Costs | \$150,000.00 | YR 0, 20, 40 |
| Hypolimnetic Aeration, Annual O&M | \$25,000.00 | YR 1 - 50 |

BMP 21 Reservoir P Inactivation with Alum

Eagle Mountain

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|--------------------------|----------------|--------------------------|
| P Inactivation with Alum | \$3,426,562.00 | YR 0, 10, 20, 30, and 40 |
|--------------------------|----------------|--------------------------|

BMP 22 Point Source WWTP from Level I to attain Level II quality status

Eagle Mountain - 11 WWTPs

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|---|----------------|-------------------|
| WWTP Level I to Level II, Initial Costs | \$1,029,710.43 | YR 0 |
| WWTP Level I to Level II, Annual O&M | \$ 99,508.93 | Annual, YR 1 - 50 |

BMP 23 Point Source WWTP from Level I to attain Level III quality status

Eagle Mountain - 11 WWTPs

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|--|-----------------|-------------------|
| WWTP Level I to Level III, Initial Costs | \$10,618,561.99 | YR 0 |
| WWTP Level I to Level III, Annual O&M | \$ 390,433.19 | Annual, YR 1 - 50 |

BMP 24 FP Sites FP Sites - New Ponds in Big Sandy and Salt Creek sites

Eagle Mountain

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|---|-------------|-----------------------------|
| FP Construction Costs, \$ per surface area acre | \$31,550.00 | YR 0, 386 area acres total |
| FP Site Pond clean out, \$ per surface area ac. | \$77,020.00 | YR 26, 386 area acres total |

Initial Estimates – Ranking of BMPs

| | | Annual \$ per kg. of P reduced |
|----|---|--------------------------------|
| 9 | Grade Stabilization – gully plugs | \$5.55 |
| 3 | Establish Filter Strips | \$6.39 |
| 4 | Establish Grassed Waterways | \$9.65 |
| 15 | Herbicide Application – Riparian Corridor | \$15.37 |
| 14 | Required Urban Nutrient Mgt. | \$27.06 |
| 5 | Terracing | \$53.39 |
| 1 | Conversion of Cropland to Grass/Hay | \$55.31 |
| 20 | Hypolimnetic Aeration | \$62.43 |
| 10 | Prescribed Burning | \$72.62 |
| 21 | P Inactivation with Alum | \$110.92 |
| 18 | Wetland Development – West Fork Trinity | \$162.10 |
| 24 | FP Sites – New Ponds Big Sandy/Salt Creek | \$204.82 |

Initial Estimates – Ranking of BMPs

| | | Annual \$ per kg. of P reduced |
|----|--|--------------------------------|
| 7 | Pasture Planting – reseeding | \$209.35 |
| 6 | Prescribed Grazing | \$215.65 |
| 11 | Brush Management | \$285.78 |
| 13 | Voluntary Urban Nutrient Mgt. | \$389.18 |
| 22 | WWTP – Level I to Level II | \$416.69 |
| 12 | Phase II Urban Stormwater BMPs | \$421.33 |
| 2 | Fert. Mgt. 25% red. In P, split applications | \$441.45 |
| 19 | Wetland Development – Walnut Creek | \$475.42 |
| 17 | Riparian Buffer Strips – Critical Areas | \$998.83 |
| 8 | Critical Pasture Planting – shaping | \$1,005.37 |
| 23 | WWTP – Level I to Level III | \$1,153.13 |
| 16 | Riparian Buffer Strips – Med. Erosion Areas | \$1,431.70 |




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