# ALBIZIA EMERGENCY TREE MITIGATION AND MANAGEMENT PLAN

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- **E – "Albizia Mitigation Plan for East Hawaii" dated May 2015 power point presentation by Dr. Flint Hughes, Ms. Springer Kaye, & Franny Brewer.**

## A. COST ANALYSIS FOR EACH JURISDICTION:

### A.1 – HELCO COST ANALYSIS AND SUMMARIES:

| ALBIZIA TREE MANAGEMENT SUMMARY<br>HELCO - HAWAII ELECTRIC LIGHT CO., LTD.<br>December 2015 | | | | | | |
|---|---|---|---|---|---|---|
| HELCO<br>CORRIDOR NAME or I.D:<br>(Length in Miles or<br>Size of Location in Acres) | | No. 1<br>PIIHONUA<br>7400<br>12 Mile or<br>93 Acres | No. 2<br>NANAWALE<br>6500<br>29 Miles<br>or 214 Acres | No. 3<br>LEILANI<br>8700<br>18 Miles<br>or 131 Acres | No. 4<br>KAUMANA<br>9200<br>2 Miles<br>or 16 Acres | TOTAL:<br>61 Miles or<br>454 Acres<br>TOTAL<br>COSTS: |
| ALBIZIA COST INFORMATION | YEAR 1 | $790,977 | $1,714,234 | $1,040,148 | $127,781 | $3,673,140 |
| | YEAR 2 | $560,160 | $1,221,214 | $742,563 | $92,725 | $2,616,662 |
| | YEAR 3 | $380,327 | $837,265 | $510,850 | $65,465 | $1,793,907 |
| | YEAR 4 | $256,712 | $573,580 | $351,769 | $46,801 | $1,228,862 |
| | YEAR 5 | $194,876 | $442,055 | $272,503 | $37,581 | $947,015 |
| | TOTAL TREE MANAGEMENT COST: | $2,183,052 | $4,788,348 | $2,917,833 | $370,353 | $10,259,586 |

| HELCO | LOCATION NO. | 1 | PIIHONUA 7400 | | | WAILUKU SWITCHING STATION TO HCPC | | | | 12 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (12 Miles) = | 93 | HDZ ( 7 Miles) = | 72 | LDZ (5 Miles) = | 21 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 29 | | 29 | | 29 | | 29 | | 29 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $4,350 | | $4,481 | | $4,615 | | $4,753 | | $4,896 | $23,095 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 36 | 57 | 22 | 71 | 11 | 82 | 4 | 89 | 0 | 93 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $683,172 | $103,455 | $422,200 | $133,479 | $217,433 | $158,279 | $74,652 | $177,307 | $0 | $189,980 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $790,977 | | $560,160 | | $380,327 | | $256,712 | | $194,876 | $2,183,052 | Annual Cost adjusted for 3% Annual Inflation. |

| HELCO | LOCATION NO. | 2 | NANAWALE 6500 | | | PGV TO KAUMANA SWITCHING STATION | | | | 29 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (29 Miles) = | 214 | HDZ ( 15 Miles) = | 154 | LDZ (14 Miles) = | 60 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 29 | | 29 | | 29 | | 29 | | 29 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $4,350 | | $4,481 | | $4,615 | | $4,753 | | $4,896 | $23,095 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 77 | 137 | 46 | 168 | 23 | 191 | 8 | 206 | 0 | 214 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $1,461,229 | $248,655 | $903,040 | $313,694 | $465,065 | $367,584 | $159,672 | $409,155 | $0 | $437,159 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $1,714,234 | | $1,221,214 | | $837,265 | | $573,580 | | $442,055 | $4,788,348 | Annual Cost adjusted for 3% Annual Inflation. |

| HELCO | LOCATION NO. | 3 | LELANI 8700 | | | PGV to Keaau ( Puna Sugar, Milo Street) | | | | 18 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (18 Miles) = | 131 | HDZ ( 9 Miles) = | 93 | LDZ (9 Miles) = | 38 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 29 | | 29 | | 29 | | 29 | | 29 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $4,350 | | $4,481 | | $4,615 | | $4,753 | | $4,896 | $23,095 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 47 | 85 | 28 | 103 | 14 | 117 | 5 | 126 | 0 | 131 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $882,431 | $153,368 | $545,342 | $192,740 | $280,851 | $225,384 | $96,426 | $250,590 | $0 | $267,607 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $1,040,148 | | $742,563 | | $510,850 | | $351,769 | | $272,503 | $2,917,832 | Annual Cost adjusted for 3% Annual Inflation. |

| HELCO | LOCATION NO. | 4 | KAUMANA 9200 | | | Kaumana Switching Station to Wailuku Hydro | | | | 2 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (2 Miles) = | 16 | HDZ ( 1 Miles) = | 11 | LDZ (1 Miles) = | 5 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 29 | | 29 | | 29 | | 29 | | 29 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $4,350 | | $4,481 | | $4,615 | | $4,753 | | $4,896 | $23,095 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 6 | 11 | 3 | 13 | 2 | 14 | 1 | 15 | 0 | 16 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $104,374 | $19,058 | $64,503 | $23,742 | $33,219 | $27,631 | $11,405 | $30,642 | $0 | $32,685 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $127,781 | | $92,725 | | $65,465 | | $46,801 | | $37,581 | $370,353 | Annual Cost adjusted for 3% Annual Inflation. |

# A.2 – STATE HIGHWAYS COST ANALYSIS AND SUMMARIES:

| ALBIZIA TREE MANAGEMENT SUMMARY<br>STATE HIGHWAYS DIVISION<br>DECEMBER 2015 | | | | | | | |
|---|---|---|---|---|---|---|---|
| STATE HIGHWAYS CORRIDOR NAME or I.D:<br>(Length in Miles or Size of Location in Acres) | | No. 1<br>PUAINAKO<br>RTE 200<br>1 Mile or 9 Acres | No. 2<br>HAWAII BELT ROAD<br>ROUTE 19<br>15 Miles<br>or 117 Acres | No. 3<br>KEAAU-PAHOA RD<br>ROUTE 130<br>25 Miles<br>or 169 Acres | No. 4<br>MAMLAHOA HWY<br>ROUTE 11<br>15 Miles<br>or 87 Acres | No. 5<br>HILO AIRPORT ACCESS ROAD<br>2 Miles<br>or 14 Acres | TOTAL:<br>58 Miles or<br>395 Acres<br>TOTAL COSTS: |
| ALBIZIA COST INFORMATION | YEAR 1 | $97,314 | $1,091,367 | $1,254,395 | $453,409 | $106,389 | $3,002,874 |
| | YEAR 2 | $68,415 | $763,500 | $903,136 | $346,809 | $77,762 | $2,159,622 |
| | YEAR 3 | $45,888 | $507,835 | $629,812 | $264,356 | $55,516 | $1,503,407 |
| | YEAR 4 | $30,386 | $331,786 | $442,419 | $208,526 | $40,303 | $1,053,420 |
| | YEAR 5 | $22,606 | $243,228 | $349,454 | $181,944 | $32,820 | $830,052 |
| | TOTAL TREE MANAGEMENT COST: | $264,609 | $2,937,716 | $3,579,216 | $1,455,044 | $312,790 | $8,549,375 |

| STATE OF HAWAII | LOCATION NO. | 1 | PUAINAKO ROUTE 200 | | | | Kanoelehua to Kawili Street | | | | 1 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (29 Miles) = | 9 | HDZ ( 15 Miles) = | 9 | LDZ (14 Miles) = | 0 | TOTALS: | | | | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 25 | | 25 | | 25 | | 25 | | 25 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $3,750 | | $3,863 | | $3,978 | | $4,098 | | $4,221 | | $19,909 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 5 | 5 | 3 | 6 | 1 | 8 | 0 | 9 | 0 | 9 | | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $85,397 | $8,168 | $52,775 | $11,778 | $27,179 | $14,730 | $9,332 | $16,957 | $0 | $18,385 | | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $97,314 | | $68,415 | | $45,888 | | $30,386 | | $22,606 | | $264,609 | Annual Cost adjusted for 3% Annual Inflation. |

| STATE OF HAWAII | LOCATION NO. | 2 | HAWAII BELT ROAD ROUTE 19 | | | | Wailuku to Hakalau | | | | 15 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (15 Miles) = | 117 | HDZ ( 12 Miles) = | 102 | LDZ (3 Miles) = | 15 | TOTALS: | | | | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 25 | | 25 | | 25 | | 25 | | 25 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $3,750 | | $3,863 | | $3,978 | | $4,098 | | $4,221 | | $19,909 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 51 | 66 | 31 | 86 | 15 | 102 | 5 | 112 | 0 | 117 | | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $967,827 | $119,790 | $598,117 | $161,520 | $308,030 | $195,827 | $105,757 | $221,931 | $0 | $239,007 | | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $1,091,367 | | $763,500 | | $507,835 | | $331,786 | | $243,228 | | $2,937,717 | Annual Cost adjusted for 3% Annual Inflation. |

| STATE OF HAWAII | LOCATION NO. | 3 | KEAAU-PAHOA ROAD 130 | | | Keaau to Kalapana | | | | 25 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (25 Miles) = | 169 | HDZ ( 13 Miles) = | 110 | LDZ (12 Miles) = | 58 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 25 | | 25 | | 25 | | 25 | | 25 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $3,750 | | $3,863 | | $3,978 | | $4,098 | | $4,221 | $19,909 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 55 | 114 | 33 | 136 | 17 | 153 | 6 | 164 | 0 | 169 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $1,043,735 | $206,910 | $645,028 | $254,245 | $332,190 | $293,644 | $114,052 | $324,269 | $0 | $345,233 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $1,254,395 | | $903,136 | | $629,812 | | $442,419 | | $349,454 | $3,579,215 | Annual Cost adjusted for 3% Annual Inflation. |

| STATE OF HAWAII | LOCATION NO. | 4 | MAMALAHOA ROUTE 11 | | | Keaau to Mountain View | | | | 15 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (15 Miles) = | 87 | HDZ ( 4 Miles) = | 34 | LDZ (11 Miles) = | 53 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 25 | | 25 | | 25 | | 25 | | 25 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $3,750 | | $3,863 | | $3,978 | | $4,098 | | $4,221 | $19,909 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 17 | 70 | 10 | 77 | 5 | 82 | 2 | 85 | 0 | 87 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $322,609 | $127,050 | $199,372 | $143,574 | $102,677 | $157,701 | $35,252 | $169,175 | $0 | $177,723 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $453,409 | | $346,809 | | $264,356 | | $208,526 | | $181,944 | $1,455,044 | Annual Cost adjusted for 3% Annual Inflation. |

| STATE OF HAWAII | LOCATION NO. | 5 | HILO AIRPORT ACCESS | | | Kanoelehua to Terminal | | | | 2 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (2 Miles) = | 14 | HDZ ( 1 Miles) = | 9 | LDZ (1 Miles) = | 5 | | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | | |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | | |
| TIME Req'd @ 1 .0 hour/mile | 25 | | 25 | | 25 | | 25 | | 25 | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $3,750 | | $3,863 | | $3,978 | | $4,098 | | $4,221 | $19,909 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 5 | 10 | 3 | 11 | 1 | 13 | 0 | 14 | 0 | 14 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $85,397 | $17,243 | $52,775 | $21,125 | $27,179 | $24,358 | $9,332 | $26,874 | $0 | $28,599 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $106,389 | | $77,762 | | $55,516 | | $40,303 | | $32,820 | $312,790 | Annual Cost adjusted for 3% Annual Inflation. |

# A.3 – COUNTY OF HAWAII COST ANALYSIS AND SUMMARIES:

**ALBIZIA TREE MANAGEMENT SUMMARY**
**COUNTY OF HAWAII ROAD**
**December 2015**

| COUNTY OF HAWAII CORRIDOR NAME or I.D: (Length in Miles or Size of Location in Acres) | | No. 1 PUAINAKO EXTENS RTE 200 5 Miles or 22 Acres | No. 2 KAHAKAI BLVD 6 Miles or 28 Acres | No. 3 POHOIKI ROAD 5 Miles or 18 Acres | No. 4 KAPOHO ROAD RTE 132 8 Miles or 37 Acres | No. 5 LEILANI AVE 4 Miles or 25 Acres | No. 6 WAIANUENUE 2 Miles or 8 Acres | No. 7 RAILROAD AVE 7 Miles or 30 Acres | No. 8 MAKUU 8 Miles or 37 Acres | No. 9 HILO LANDFILL 4 Miles or 21 Acres | TOTAL: 49 Miles or 226 Acres TOTALCOSTS: |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALBIZIA COST INFORMATION | YEAR 1 | $204,169 | $266,545 | $145,423 | $342,947 | $261,100 | $67,206 | $270,175 | $342,947 | $202,354 | $2,102,866 |
| | YEAR 2 | $143,122 | $186,157 | $103,826 | $240,104 | $180,549 | $48,010 | $189,896 | $240,104 | $141,253 | $1,473,021 |
| | YEAR 3 | $95,525 | $123,465 | $71,437 | $159,912 | $117,688 | $33,064 | $127,316 | $159,912 | $93,600 | $981,919 |
| | YEAR 4 | $62,760 | $80,285 | $49,200 | $104,699 | $74,335 | $22,804 | $84,252 | $104,699 | $60,776 | $643,810 |
| | YEAR 5 | $46,292 | $58,549 | $38,121 | $76,934 | $52,421 | $17,693 | $62,635 | $76,934 | $44,249 | $473,828 |
| | TOTAL TREE MANAGEMENT COST: | $551,868 | $715,001 | $408,007 | $924,596 | $686,093 | $188,777 | $734,274 | $924,596 | $542,232 | $5,675,444 |

| COUNTY OF HAWAII | LOCATION NO. | 1 | PUAINAKO ROUTE 200 | | Komahana to Kaumana | | | | 5 Miles Total |
|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (5 Miles) = | 22 | HDZ (35 Miles) = | 19 | LDZ ( 2 Miles) = | 3 | TOTALS: | | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | YEAR 2 | YEAR 3 | | YEAR 4 | YEAR 5 | | | |
| SURVEY INSPECT CYCLE: | Annually | Annually | Annually | | Annually | Annually | | | |
| TIME Req'd @ 1 .0 hour/mile | 8 | 8 | 8 | | 8 | 8 | | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | $1,236 | $1,273 | | $1,311 | $1,351 | $6,371 | | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 10 | 13 | 6 | 16 | 3 | 19 | 1 | 21 | 0 | 22 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $180,282 | $22,688 | $111,414 | $30,472 | $57,378 | $36,874 | $19,700 | $41,748 | $0 | $44,942 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $204,169 | | $143,122 | | $95,525 | | $62,760 | | $46,292 | | $551,868 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 2 | KAHAKAI BLVD. | | Pahoa Bypass to Government Beach Road | | | | 6 Miles Total |
|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (6 Miles) = | 28 | HDZ (4 Miles) = | 25 | LDZ ( 2 Miles) = | 3 | TOTALS: | | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | YEAR 2 | YEAR 3 | | YEAR 4 | YEAR 5 | | | |
| SURVEY INSPECT CYCLE: | Annually | Annually | Annually | | Annually | Annually | | | |
| TIME Req'd @ 1 .0 hour/mile | 8 | 8 | 8 | | 8 | 8 | | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | $1,236 | $1,273 | | $1,311 | $1,351 | $6,371 | | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 13 | 16 | 8 | 21 | 4 | 24 | 1 | 27 | 0 | 28 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $237,213 | $28,133 | $146,597 | $38,324 | $75,498 | $46,694 | $25,921 | $53,053 | $0 | $57,198 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $266,545 | | $186,157 | | $123,465 | | $80,285 | | $58,549 | | $715,001 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 3 | POHOIKI ROAD | | Kapoho Road to Pohoiki | | | | 5 Miles Total |
|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (5 Miles) = | 18 | HDZ (2 Miles) = | 13 | LDZ ( 3 Miles) = | 5 | TOTALS: | | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | YEAR 2 | YEAR 3 | | YEAR 4 | YEAR 5 | | | |
| SURVEY INSPECT CYCLE: | Annually | Annually | Annually | | Annually | Annually | | | |
| TIME Req'd @ 1 .0 hour/mile | 8 | 8 | 8 | | 8 | 8 | | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | $1,236 | $1,273 | | $1,311 | $1,351 | $6,371 | | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 7 | 12 | 4 | 14 | 2 | 16 | 1 | 17 | 0 | 18 | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $123,351 | $20,873 | $76,231 | $26,359 | $39,259 | $30,905 | $13,479 | $34,410 | $0 | $36,770 | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $145,423 | | $103,826 | | $71,437 | | $49,200 | | $38,121 | | $408,007 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 4 | KAPOHO ROUTE 132 | | | Pahoa Bypass to Kalapana-Kapoho Road | | | | 8 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (8 Miles) = | 37 | HDZ ( 5 Miles) = | 32 | LDZ (3 Miles) = | 5 | | | | TOTALS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | COMMENTS: |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | |
| TIME Req'd @ 1 .0 hour/mile | 8 | | 8 | | 8 | | 8 | | 8 | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | | $1,236 | | $1,273 | | $1,311 | | $1,351 | $6,371 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 16 | 21 | 10 | 27 | 5 | 32 | 2 | 35 | 0 | 37 Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 3% Annually Adjusted. |
| TOTAL COST per METHOD | $303,632 | $38,115 | $187,645 | $51,223 | $96,637 | $62,002 | $33,179 | $70,209 | $0 | $75,584 |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $342,947 | | $240,104 | | $159,912 | | $104,699 | | $76,934 | $924,596 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 5 | LEILANI AVENUE | | | Pahoa-Kalapana to Pohoiki Road | | | | 4 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (4 Miles) = | 25 | HDZ (4 Miles) = | 25 | LDZ ( 0 Miles) = | 0 | | | | TOTALS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | COMMENTS: |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | |
| TIME Req'd @ 1 .0 hour/mile | 8 | | 8 | | 8 | | 8 | | 8 | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | | $1,236 | | $1,273 | | $1,311 | | $1,351 | $6,371 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 13 | 13 | 8 | 18 | 4 | 21 | 1 | 24 | 0 | 25 Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 3% Annually Adjusted. |
| TOTAL COST per METHOD | $237,213 | $22,688 | $146,597 | $32,715 | $75,498 | $40,918 | $25,921 | $47,103 | $0 | $51,070 |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $261,100 | | $180,549 | | $117,688 | | $74,335 | | $52,421 | $686,093 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 6 | WAIANUENUE AVENUE | | | Kaumana to Lahi Street | | | | 2 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (2 Miles) = | 8 | HDZ (1 Miles) = | 6 | LDZ ( 1 Miles) = | 2 | | | | TOTALS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | COMMENTS: |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | |
| TIME Req'd @ 1 .0 hour/mile | 8 | | 8 | | 8 | | 8 | | 8 | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | | $1,236 | | $1,273 | | $1,311 | | $1,351 | $6,371 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 3 | 5 | 2 | 6 | 1 | 7 | 0 | 8 | 0 | 8 Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 3% Annually Adjusted. |
| TOTAL COST per METHOD | $56,931 | $9,075 | $35,183 | $11,591 | $18,119 | $13,671 | $6,221 | $15,271 | $0 | $16,342 |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $67,206 | | $48,010 | | $33,064 | | $22,804 | | $17,693 | $188,776 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 7 | RAILROAD AVENUE | | | Nanawale to Makuu Drive | | | | 7 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (7 Miles) = | 30 | HDZ (4 Miles) = | 25 | LDZ ( 3 Miles) = | 5 | | | | TOTALS: |
| YEAR: Beginning FY 2016 | YEAR 1 | | YEAR 2 | | YEAR 3 | | YEAR 4 | | YEAR 5 | COMMENTS: |
| SURVEY INSPECT CYCLE: | Annually | | Annually | | Annually | | Annually | | Annually | |
| TIME Req'd @ 1 .0 hour/mile | 8 | | 8 | | 8 | | 8 | | 8 | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | | $1,236 | | $1,273 | | $1,311 | | $1,351 | $6,371 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 13 | 18 | 8 | 23 | 4 | 26 | 1 | 29 | 0 | 30 Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 3% Annually Adjusted. |
| TOTAL COST per METHOD | $237,213 | $31,763 | $146,597 | $42,063 | $75,498 | $50,545 | $25,921 | $57,020 | $0 | $61,284 |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $270,175 | | $189,896 | | $127,316 | | $84,252 | | $62,635 | $734,273 Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 8 | MAKUU DRIVE | | | Keaau-Pahoa to Ala Heiau Road | | | | 8 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (8 Miles) = | 37 | HDZ (5 Miles) = | 32 | LDZ ( 3 Miles) = | 5 | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | YEAR 2 | YEAR 3 | | YEAR 4 | | YEAR 5 | | | |
| SURVEY INSPECT CYCLE: | Annually | Annually | Annually | | Annually | | Annually | | | |
| TIME Req'd @ 1 .0 hour/mile | 8 | 8 | 8 | | 8 | | 8 | | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | $1,236 | $1,273 | | $1,311 | | $1,351 | | $6,371 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 16 | 21 | 10 | 27 | 5 | 32 | 2 | 35 | 0 | 37 | | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $303,632 | $38,115 | $187,645 | $51,223 | $96,637 | $62,002 | $33,179 | $70,209 | $0 | $75,584 | | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $342,947 | | $240,104 | | $159,912 | | $104,699 | | $76,934 | | $924,596 | Annual Cost adjusted for 3% Annual Inflation. |

| COUNTY OF HAWAII | LOCATION NO. | 9 | HILO LANDFILL ROAD | | | Glover Quarry to Landfill Site | | | | 4 Miles Total |
|---|---|---|---|---|---|---|---|---|---|---|
| AREA: (Miles coverted to ACRES ) | Total Area (4 Miles) = | 21 | HDZ (3 Miles) = | 19 | LDZ (1 Miles) = | 2 | | | TOTALS: | COMMENTS: |
| YEAR: Beginning FY 2016 | YEAR 1 | YEAR 2 | YEAR 3 | | YEAR 4 | | YEAR 5 | | | |
| SURVEY INSPECT CYCLE: | Annually | Annually | Annually | | Annually | | Annually | | | |
| TIME Req'd @ 1 .0 hour/mile | 8 | 8 | 8 | | 8 | | 8 | | | |
| ANNUAL SURVEY INSPECT COSTS: @ $ 150/Hr, Adjusted Annually 3% | $1,200 | $1,236 | $1,273 | | $1,311 | | $1,351 | | $6,371 | 3% Annually Adjusted. |
| TREATMENT METHOD: Rate of Removal & Chemical Area | HDZ REMOVAL 50% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 30% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 15% Area | LDZ Area by CHEMICAL | HDZ REMOVAL 5% Area | LDZ Area by CHEMICAL | HDZ REMOVAL (NONE) | LDZ Area by CHEMICAL | | Removal Area is only within the Area of Concentration. |
| PROJECTED SIZE OF AREA (Acres) | 10 | 12 | 6 | 15 | 3 | 18 | 1 | 20 | 0 | 21 | | Areas as determined by Survey Inspections. |
| COST per ACRE for Each: | $18,977 | $1,815 | $19,546 | $1,869 | $20,133 | $1,926 | $20,737 | $1,983 | $21,359 | $2,043 | | 3% Annually Adjusted. |
| TOTAL COST per METHOD | $180,282 | $20,873 | $111,414 | $28,603 | $57,378 | $34,948 | $19,700 | $39,765 | $0 | $42,899 | | |
| **TOTAL COST EACH YEAR:** (Survey + Removal + Chemical) | $202,354 | | $141,253 | | $93,600 | | $60,776 | | $44,249 | | $542,232 | Annual Cost adjusted for 3% Annual Inflation. |

# B. LOCATION TABLES FOR EACH JURISDICTION:

## B.1 HELCO LOCATION, MILE & ACRE TABLE:

| HELCO LOCATION OF ALBIZIA TREES & CONCENTRATIONS: | | | | | |
|---|---|---|---|---|---|
| LOCATION NO. | **HELCO CORRIDOR NAME or I.D:** | **TERMINI: From Where to Where?** | **TOTALS: LENGTH(Miles) Total Area(Acres)** | **HDZ (High Density Zone) @ 10.3 Acres/Mile** | **LDZ (Low Density Zone) @ 4.24 Acres/Mile** |
| 1 | PIIHONUA 7400 | Wailuku Switching Station to HCPC (Wailuku river to Pepeekeo) | 12 Miles 93 Acres | 7 Miles 72 Acres | 5 Miles 21 Acres |
| 2 | NANAWALE 6500 | PGV to Kaumana Switching Station (Akolea Rd -. Kaumana Dr. intersection) | 29 Miles 214 Acres | 15 Miles 154 Acres | 14 Miles 60 Acres |
| 3 | LEILANi 8700 | PGV to Keaau (puna sugar, Milo st.) | 18 Miles 131 Acres | 9 Miles 93 Acres | 9 Miles 38 Acres |
| 4 | KAUMANA 9200 | Kaumana switching station to Wailuku Hydro (Akolea rd Kaumana intersection to Wainuenue) | 2 Miles 16 Acres | 1 Mile 11 Acres | 1 Mile 5 Acres |
| | | **TOTAL MILES & ACRES:** | 61 Miles 454 Acres | 32 Miles 330 Acres | 29 Miles 124 |

## B.2 – STATE HIGHWAYS LOCATION, MILE & ACRE TABLE:

| STATE HIGHWAYS LOCATION OF ALBIZIA TREES & CONCENTRATIONS: | | | | | |
|---|---|---|---|---|---|
| LOCATION NO. | **STATE HIGHWAYS CORRIDOR NAME or I.D:** | **TERMINI: From Where to Where?** | **TOTALS: LENGTH(Miles) Total Area(Acres)** | **HDZ (High Density Zone) @ 8.48 Acres/Mile** | **LDZ (Low Density Zone) @ 4.84 Acres/Mile** |
| 1 | PUAINAKO ROUTE 200 | Kanoelehua Kawili | 1 Mile 9 Acres | 1 Mile 9 Acres | 0 Mile 0 Acres |
| 2 | HAWAII BELT ROAD ROUTE 19 | Wailuku Hakalau | 15 Miles 117 Acres | 12 Miles 102 Acres | 3 Miles 15 Acres |
| 3 | KEAAU PAHOA ROUTE 130 | Keaau to Kalapana | 25 Miles 168 Acres | 13 Miles 110 Acres | 12 Miles 58 Acres |
| 4 | MAMALAHOA ROUTE 11 | Keaau to Mountain View | 15 Miles 87 Acres | 4 Miles 34 Acres | 11 Miles 53 Acres |
| 5 | HILO AIRPORT ACCESS | Kanoelehua to Terminal | 2 Miles 14 Acres | 1 Mile 9 Acres | 1 Mile 5 Acres |
| | | **TOTAL MILES & ACRES:** | 58 Miles 395 Acres | 31 Miles 264 Acres | 27 Miles 131 Acres |

B.3 – COUNTY OF HAWAII LOCATION, MILE & ACRE TABLE:

| COUNTY OF HAWAII LOCATION OF ALBIZIA TREES & CONCENTRATIONS: | | | | | |
|---|---|---|---|---|---|
| LOCATION NO. | **COUNTY OF HAWAII CORRIDOR NAME or I.D:** | **TERMINI: From Where to Where?** | **TOTALS: LENGTH(Miles) Total Area(Acres)** | **HDZ** (High Density Zone) @ 6.30 Acres/Mile | **LDZ** (Low Density Zone) @ 1.45 Acres/Mile |
| 1 | PUAINAKO ROUTE 200 | Komohana<br>Kaumana | 5 Miles<br>22 Acres | 3 Miles<br>19 Acres | 2 Miles<br>3 Acres |
| 2 | KAHAKAI BLVD. | Pahoa Bypass<br>Government Beach Raod | 6 Miles<br>28 Acres | 4 Miles<br>25 Acres | 2 Miles<br>3 Acres |
| 3 | POHOIKI ROAD | Kapoho Road to Pohoiki | 5 Miles<br>18 Acres | 2 Miles<br>13 Acres | 3 Miles<br>5 Acres |
| 4 | KAPOHO ROUTE 132 | Pahoa Bypass to Kalapana | 8 Miles<br>37 Acres | 5 Miles<br>32 Acres | 3 Miles<br>5 Acres |
| 5 | LEILANI AVENUE | Pahoa-Kalapana to Pohoiki Road | 4 Miles<br>25 Acres | 4 Miles<br>25 Acres | 0 Miles<br>0 Acres |
| 6 | WAIANUENUE AVENUE | Kaumana to Lahi Street | 2 Miles<br>8 Acres | 1 Mile<br>6 Acres | 1 Mile<br>2 Acres |
| 7 | RAILROAD AVENUE | Nanawale to Makuu Drive | 7 Miles<br>30 Acres | 4 Miles<br>25 Acres | 3 Miles<br>5 Acres |
| 8 | MAKUU DRIVE | Keaau-Pahoa Road to Ala Heiau Road | 8 Miles<br>37 Acres | 5 Miles<br>32 Acres | 3 Miles<br>5 Acres |
| 9 | HILO LANDFILL ROAD | Glover Quarry to Landfill | 4 Miles<br>21 Acres | 3 Miles<br>19 Acres | 1 Miles<br>2 Acres |
| | | **TOTAL MILES & ACRES:** | 49 Miles<br>226 Acres | 31 Miles<br>196 Acres | 18 Miles<br>30 Acres |

## C. ARTICLE DATED AUGUST 24, 2015 by Timothy Hurley:

http://www.staradvertiser.com/newspremium/20150824_albizia_trees_can_damage_houses_and_take_out_power_lines.html?id=322656401

*Page 1 of 3 Aug 24, 2015 05:05:01PM MDT*

**Hawaii News from the Honolulu Star-Advertiser - Albizia trees can damage houses and take out power lines - Hawaii News - Honolulu Star-Advertiser** StarAdvertiser.com

**Albizia trees can damage houses and take out power lines**

A non-native tree causes big pilikia when hit by heavy wind, damaging houses and taking out power lines

By Timothy Hurley

POSTED: 1:30 a.m. HST, Aug 24, 2015

One year after Tropical Storm Iselle toppled hundreds of albizia trees and caused millions of dollars of

damage in Puna, the fast-growing tree species remains a major threat not only on Hawaii island, but

across the state.
Despite making progress against the non-native tree over the past year, officials say perhaps more than a
million of them are spread across the islands and remain easy targets for any powerful storms that may be
headed our way.
Most of these trees — notorious for their shallow roots and brittle yet heavy branches — are found in the
forest where trunks and limbs will fall harmlessly to the ground. But some — maybe too many — will crash
down on roads, power lines, yards and houses, officials warn.
With another storm bearing down on the islands and a busy hurricane season expected through
November, some folks are feeling a bit uneasy.
“We’re still vulnerable,” U.S. Forest Service scientist Flint Hughes said last week. “There will be more
storms. It’s just a matter of time. It’s just a matter of where and when. It would behoove us to do what we
can to be safer.”
When Tropical Storm Iselle slammed into Puna last August, fallen albizia trees left neighborhoods
devastated by blocked roads, downed power lines and damaged homes. Scores of residents were trapped
without water and power.
“When the power is out for one night, it can be romantic, maybe even fun,” said state Sen. Russell
Ruderman (D, Puna). “When the power is out for one week, it’s a really stressful thing.”
An estimated 90 percent of the tree damage caused by the powerful wind and rain of Iselle was blamed on
albizia trees, resulting in a public cost of more than $20 million.
Puna has been dealing with the albizia hazard for decades, and Ruderman was sounding the alarm about
the safety threat even before Iselle caught the attention of the rest of the state.
Despite 11 bills in last year’s state Legislature asking for funds to tackle the problem, none of the proposals
was approved, including a $3 million request from Ruderman, who was trying to underwrite the state’s
portion of a multiagency control plan.
Before the session was over, lawmakers did give $1.5 million to the Department of Transportation to take
care of hazardous trees along state highways.

“I’m thankful for what we got, but it doesn’t begin to address the problem,” Ruderman said.

The albizia was introduced to Hawaii in 1917 by Hawaii botanist Joseph Rock, who thought the
fast-growing trees would help restore the state's declining forest watersheds. In the following decades,
territorial foresters planted 140,000 albizia trees across the state, along with other alien trees such as the
eucalyptus and African tulip.
Albizias are among the fastest-growing trees in the world, known to rise up an inch a day and reach 100
feet in 10 years in wet lowland forests. The largest trees are estimated at 150 feet with trunks 48 inches in
diameter and massive limbs that break easily in storms or with age.
Because the trees grow so fast, the wood is brittle and weak. Heavy branches can drop with no warning,
even from healthy trees.
A full-grown albizia is a graceful and majestic tree that towers above the landscape. Some of the top-heavy
canopies are so large, they can shade an area of more than a half-acre.
But over time these trees became a nuisance as they spread into residential areas and around roads and
near power lines. Quite a number line the H-3 freeway between Kaneohe and Kailua, for instance.
In Manoa the Lyon Arboretum recently removed 12 trees that towered over main trails because they
threatened the many endangered, rare and irreplaceable plants growing below. A second phase of removal
will begin next year.
Springer Kaye, manager of the Big Island Invasive Species Committee, said representatives of more than
40 agencies met in May 2013 to talk about the growing albizia problem.
"It was clear that the public stakeholders recognized the cost of albizia," she said. What wasn't clear, she
added, is whether political leaders understood the cost.
Are lawmakers taking the problem seriously?
"That's an excellent question," she said. "There is a perception that this is only a rural problem. But the
reality is this is happening everywhere where the environment is wet. They're creeping in. If I was a
legislator in Manoa, Kaneohe and Wahiawa, I would pay attention to this."
Following Iselle, representatives from state and federal agencies, prompted by U.S. Sen. Brian Schatz,
came together to prepare a plan to address the problem on Hawaii island.
The plan starts with clearing the roadways and power corridors and then moves to other areas. The
estimated cost: $6 million a year.
Despite a funding shortfall, much progress has been made, according to Kaye:

» Some 300 acres of the albizia forest have been treated with the herbicide Milestone, with 33,000 trees
being removed.
» About 300 miles of road affected by hazardous albizia have been identified and mapped.
» Hawaii Electric Light Co. has cleared 30 miles of power lines.
» The state DOT has cleared sections of Highways 130 and Highway 220.

» The state DOT has cleared sections of Highways 130 and Highway 220.
» The Hawaii Invasive Species Council recognized albizia as one of the state's top 10 invasive species and
allocated $100,000 to an overseas search for a natural predator, perhaps an insect, that will target the tree.
» University of Hawaii at Hilo researchers have conducted tests using unmanned aircraft to take aerial
imagery to help with management efforts.
» The Big Island Invasive Species Committee has trained 300 people over the last three months to report
and treat albizia trees in and near their own East Hawaii neighborhoods.
» Six workshops on the albizia problem were held at the recent Hawaii Conservation Conference in Hilo,
attended by conservation officials from around the state.
Hughes, the Forest Service
scientist, said there's a long way to go, but new research has allowed officials
to refine techniques and make inroads toward effective, economical and safe ways to attack the problem.
"We can control this if it is made a priority," he said.
"Something can be done," said Kaye, the Big Island Invasive Species Committee manager. "These trees
went unmanaged for decades. Now we're just getting started and making a huge amount of progress. We
can do it together."
But Ruderman warned that significant funding will be necessary in Puna and elsewhere to come to grips
with a problem that is growing "exponentially."
"Whatever the cost to control albizia, it's going to be much less than the cost of the cleanup," he said. "And
every year we wait, controlling it will cost much more."

## D. “AFTER ISELLE: A PLAN FOR MITIGATION OF ABIZIA HAZARDS ACROSS EAST HAWAII BY BIISC (BIG ISLAND INVASIVE SPECIES COMMITTEE) DATED MAY 2015.

# DRAFT

Plan Document compiled by

Big Island Invasive Species Committee (BIISC)

May 2015

## Albizia Mitigation Technical Working Group Contributors and Stakeholders

**State of Hawaii**

Department of Land and Natural Resources

- Division of Forestry and Wildlife
- Land Division
- State Parks

Department of Transportation

State Department of Defense

University of Hawaii

- College of Tropical Agriculture and Human Resources
- Pacific Cooperative Studies Unit
- Big Island Invasive Species Committee

Department of Hawaiian Homelands

**Hawaii County**

Hawaii County Civil Defense Hazard Mitigation Program

Department of Public Works

Department of Water Supply

**Hawaiian Electric Light Company**

**US Forest Service Institute of Pacific Islands Forestry**

**Kamehameha Schools**

**Private Subdivisions/Community Associations of Puna**

# Table of Contents

## Executive Summary

Hundreds of miles of massive, weak, and brittle albizia trees line the roads of East Hawaii, threatening electrical lines, homes, and access for residents and emergency responders. Following Tropical Storm Iselle in late summer 2014, much of lower Puna was left for days and weeks without power due to downed albizia. A technical working group came together at the behest of US Senator Brian Schatz to develop actionable solutions. More than 40 stakeholders provided input to identify top priority hazard areas and ways to address them. The group focused on identifying innovative methods of control to maximize cost savings and create an economically feasible plan to mitigate albizia across large landscapes.

The highest priority areas for control were identified by October of 2014, and a comprehensive strategy for mitigation laid out. The model used by the technical working group drew heavily from the highly successful interagency, community-based demonstration project carried out in the Black Sands/Keau'ohana Forest Reserve area of lower Puna during 2013/2014. Cost for control of albizia stands along the identified high-priority corridors is estimated at $6.65 million, with the need to pursue targeted funding for the plan a crucial task.

This plan document presents the strategy and priority infrastructure projects identified by the Technical Working Group, focusing on public rights of way, and may be considered a "Phase 1" planning document. This plan will be expanded to address secondary mitigation needs as funding becomes available, and can serve as a model for other islands seeking an economically feasible approach to mitigating the threat of albizia.

**The Proposed Plan: Target Highest Priority Areas in 2015-2016**

The technical working group's plan addresses the high priority areas with three distinct but overlapping and complementary components:

1. Physical removal (i.e., cutting down or "hard trimming" as described below) of all hazard trees bordering high priority public roads and primary transmission lines. Prioritization was based on number of residents served, road traffic (ADT) and availability of alternate routes. Only certified arborists may be contracted.

2. Chemical control of all non-hazard trees, saplings, and seedlings within, immediately adjacent to, and surrounding priority tree removal corridors. Volunteer labor will be utilized in this area to supplement labor by crews from BIISC and other agencies.

3. Community outreach and empowerment through provision of information, training, and supply of resources. Outreach staff will work with both landowners and key partners to secure access and communicate with residents in the communities.

The next tier of priority mitigation projects was also discussed. These include residential power lines and secondary roads. The 218 miles of private roads within subdivisions, which account for two-thirds of albizia-impacted roads in East Hawaii, are not addressed in this plan, in part due to the complexity and scope of the problem on private lands, as well as the scarcity of funds. The current plan focuses on community outreach to inform, coordinate, and support volunteer efforts, including efforts to secure funds for work on private roads and subdivisions.

**Estimated Costs for Implementation of Albizia Mitigation Plan : $6.65 million**

- $2.64 million to protect 18 miles of primary electrical transmission lines.
- $2.3 million to eliminate immediate safety hazards along 22.3 miles of county roads, including the Railroad-Maku'u Emergency Access Way.
- $1.4 million to eliminate immediate hazards along 10.8 miles of state highways.
- $300 thousand to provide community outreach and support and assistance in securing private landowner participation.

Background of Problem

Albizia (*Falcataria moluccana*) is a fast growing, nitrogen fixing tree introduced to Hawai'i in 1917 and later planted statewide to study its potential as a commercial timber tree and to replace denuded watershed lands lost to ranching and logging. Today, it is one of the most problematic invasive species affecting the Big Island. High growth rates – as much as 15' in a single year – result in rapid accumulation of massive trunks and branches that are weak, brittle, and break easily in mild wind or rain events. A shallow root structure that develops over lava substrate makes the large, top-heavy trees prone to toppling.

With these brittle trees growing as tall as 250 feet, expanding albizia populations pose a serious threat to Hawaii's natural environment and public safety. Albizia is prone to "sudden limb drop," where hidden weaknesses in the limbs can cause branches to fall even with no apparent disturbance. It is worth noting that albizia is remarkable among trees in presenting a predictable hazard despite lack of any visible defect in growth form or integrity. Arborists certified in risk assessment confirm that the natural state of an albizia is the brittle, breakage-prone structure, and that regardless of current size, any albizia within 250 feet of a structure should be considered a hazard. Outbuildings, fences, and cars are among the many common casualties of albizia limbs falling during minor wind events with 35 mph gusts, or during heavy rain in the absence of wind. Even before Tropical Storm Iselle, during which 30% of island residents lost electricity, residents regularly experienced loss of power and blocked roads due to falling albizia. When Iselle hit in August 2014, the destructive power of albizia was suddenly realized on a huge scale. Iselle was classified as tropical storm based on wind speeds, yet inflicted a level of damage comparable to a Category 3 hurricane due to the devastation wielded by the albizia trees that had come crashing down across Puna. Residents were trapped in their homes, dozens of houses were crushed or severely damaged, and hundreds lost electricity for weeks due to the destroyed power lines and poles.

The annual costs to taxpayers and utility customers from albizia impacts is high**.** HELCO, HDOT, and the County routinely contend with trees falling from private and public property onto roads and power lines. One agency reported spending $11,000 responding to a single one-day rain event involving albizia washing downstream into the highway. HELCO estimates that it spent $13.7M responding to damage from Iselle, and **t**he Hawaii Island branch of HDOT estimates that 90% of all received calls about fallen trees for the past several years have involved albizia trees. Costs to individual property owners from trees falling on to adjoining properties have not been compiled, but are assuredly in the millions of dollars.

Miraculously, even with all the extensive damage caused by falling albizia trees in residential areas during Hurricane Iselle, no fatalities occurred. We cannot and should not expect to be so fortunate during future storms if albizia stands are left to proliferate and grow across Hawaii Island landscapes. Satellite and roadside mapping shows that albizia has already spread to over 5,000 acres in the Puna district, with hundreds more acres in additional populations across the island. More than 300 miles of roads and

transmission lines are impacted by hazardous albizia, and hundreds of miles are lined with young trees that, if left untreated, will become pose serious hazards within a matter of a few years.

Like most invasive weeds, albizia ignores property boundaries and management jurisdiction, confounding the ability of any single entity to manage immediate hazards or halt its spread. Unique to albizia is its massive height, which creates the urgent need for cross-jurisdictional cooperation. Some state agencies and utilities are limited to work within respective right-of-ways (ROWs), which can be as narrow as 15'. However, with trees growing 200' or taller, the threat to roadways and power lines often comes from trees standing well outside the ROW. In the absence of cooperation and an integrated, well-coordinated approach to control this problem quite literally continues to multiply and grow.

Fortunately, particular aspects of albizia's biology make successful control and management of this tree entirely feasible. Extensive research has been done on the ecology and impacts of *Falcataria moluccana* in Hawaii (Appendix A), providing us with a comprehensive body of work to support the development of the management practices detailed in this plan.

Albizia seedlings, saplings, and even small trees are not able to tolerate being shaded by other vegetation. As long as a dense layer of ground vegetation (e.g., lawns, grasses, shrubs, ferns) is kept intact, a land manager can expect little or no recruitment by albizia seedlings or saplings to take place. This is extremely important when selecting a technique to manage a stand of trees. Clearing a stand of tall trees by bulldozer removes the suppressive understory vegetation, creating ideal conditions for albizia recruitment. Where, however, trees are cut down or chemically treated in place, and dense understory vegetation is left intact, albizia seedlings are poor competitors. When and where individual albizia samplings do succeed, they can be easily controlled while they are young and do not pose significant hazards.

Additionally, albizia trees are highly sensitive to the herbicide Milestone™(aminopyralid). Application of just few drops of Milestone™ has been demonstrated to kill trees over 200 ft. tall in a matter of days (Appendix B), including trees that lie fallen, but not killed, after a storm. This application can be made to trees left standing in natural areas, distant from infrastructure corridors, where risk to persons and property is greatly reduced. Albizia that have been cut down are also susceptible to stump treatment using triclopyr-based herbicides (e.g. Garlon 4, Remedy).

Albizia trees can therefore be cheaply and easily treated,. Reestablishment is readily constrained by recovering ground vegetation and casual vigilance (i.e., pulling or killing scattered samplings). Monitoring conducted since 2011, as well as the larger scale Black Sands/Keau'ohana project have demonstrated the effectiveness of this approach in controlling current and ongoing infestation of albizia.

## Albizia Mitigation Technical Working Group History

In May 2013, in response to growing concern amongst Puna and Hilo constituents, State Senator Russell Ruderman (District 2) convened a meeting of stakeholders to address the problem of albizia on the Big Island. Forty organizations were represented, each with albizia management experience, responsibilities, and concerns. This was the foundation of what would become the technical working group for mitigation albizia in East Hawaii.

At the meeting, the Big Island Invasive Species Committee (BIISC) presented plans for a small demonstration project in the lower Puna subdivision of Black Sands and surrounding areas of Keau'ohana Forest Reserve. The project was intended not only to demonstrate the effectiveness of large scale use of a new low-cost albizia treatment method, but also showcase the feasibility of taking a cooperative, interagency, community based approach to albizia hazard mitigation for an area including state, county, and private roads, residential and long distance transmission lines, homes, and high value native forest.

With support from the stakeholders group, and minimal funding, the albizia demonstration project moved forward in December, 2013. Partners providing in-kind support included the USFS Institute for Pacific Islands Forestry (IPIF), HELCO, DOFAW, the County Dept. of Public Works (DPW), and trained volunteer residents from the Black Sands subdivision. The demonstration project was more than halfway complete when Tropical Storm Iselle hit the Big Island in August 2014. Not one house in Black Sands reported significant damage due to falling albizia trees.

The damages and impacts to Puna residents elsewhere prompted the intervention of U.S. Senator Brian Schatz, and albizia stakeholders were again brought together and asked to form a technical working group. Stakeholders who participated in this Technical Working Group evaluated high priority areas based on a number of factors. Number of residents affected, role in access/egress to communities, route use by emergency services, and number of previous incidents/service calls due to albizia were all among the factors considered. Unsurprisingly, many identified areas overlapped. Routes which provided access for residents and emergency services into and out of affected areas were identified as highest priority. In the case of electrical service, high-power transmission lines were singles out as highest priority.

Weekly meetings were held throughout September and October of 2014, a preliminary plan of action focused on primary public infrastructure was developed, and the plan was presented to the county Emergency Management Team at a meeting with Sen. Schatz on October 22. Key aspects of the preliminary plan included best practices for the most efficient and economical approach to albizia control, a list of highest priority mitigation projects as determined by various stakeholders, community information needs, and detailed cost estimates that illustrated the significant funding needed to implement the plan.

Immediate funding was offered by the US Forest Service State and Private Forestry Program, which delivered $100,000 before the year's end, matched by FY15 funds from the Hawaii Invasive Species Council. County Councilman Greggor Ilagan contributed $30,000 in disaster relief contingency funds to initiate community participation in neighborhood-scale control efforts. In January 2015, Senator Ruderman introduced a bill to the Hawaii State legislature seeking an appropriation to fund the state highways portion of the plan, eventually appropriating $1.5 Mil per year for FY16 and FY17.

In May 2015, a draft of the final plan was presented to members of the technical working group for input and feedback.

## Demonstration Project: Keau'ohana Forest Reserve and the Black Sands Subdivision

Successful execution of the approach described in this plan was demonstrated in the Black Sands/Keauohana Forest albizia mitigation project. This project served as a test for many of the cost saving measures and innovative approaches to large-scale albizia control contained in this plan.

The demonstration project was initiated in 2013 by BIISC, working in coordination with the USFS Institute for Pacific Islands Forestry (IPIF), HELCO, DOFAW, the County Dept. of Public Works (DPW), and residents of the Black Sands subdivision in lower Puna. The project was nearing completion when the area was hit by Iselle, and the benefit was immediately apparent as Black Sands fared far better than its neighbors. Costs for the project, compiled in 2015, indicated that the project had come in at just under projections, at nearly $130,000 for 60 acres of albizia treated.

In many ways, the Black Sands subdivision exemplifies the albizia challenges faced by communities on the east side of the Big Island. The subdivision encompasses 77 acres of land in a remote section of lower Puna, bordered by the Keau'ohana Forest Reserve and undeveloped state land. Albizia stands ranged from dense forests of massive trees to sparsely distributed young trees and saplings in open areas. In all, the demonstration project sought to control albizia across 200 acres of residential, forest reserve and undeveloped land.

The participating agencies worked cooperatively to test new partnerships and techniques designed to control trees effectively while significantly reducing costs. Arborists were permitted to leave cut and chipped wood on site, avoiding significant transportation costs, and encouraged to explore creative trimming and pruning to remove the hazard, without necessarily removing the whole tree, referred to here as a "hard trim." Staff of both the county Department of Public Works Highways Division (DPW) and

DOFAW worked cooperatively to clear most of the Upper Puna Road access corridor, sharing resources in heavy equipment and skilled foresters. Working in partnership also resolved a long standing gap in understanding jurisdiction where this county road passed through hazardous trees in a state forest reserve. BIISC crews chemically treated thousands of standing trees in natural areas, thereby eliminating future hazards at a small fraction of the cost of removal. Volunteer labor from the community was used to maximize the area treated. Support from local legislators helped bolster the profile of the project, which made front page news in the Hawaii Tribune Herald.

Then, in August 2014, the project underwent a serious test in the form of Tropical Storm Iselle. While hundreds of Puna residents lined up for ice and water distribution, Black Sands Residents had power within the second day after the storm. The access road was blocked for only a few hours, and not one house reported significant damage.

As of May, 2015, the Black Sands/Keauohana Forest project is about 95% complete. The small, remaining stand on Upper Puna Road is scheduled for removal this summer, and a single residential block, infested with little fire ants, remains to be treated. Detailed costs and outcomes of this program as of Spring 2015 are found in Appendix C.

## Proposed Plan

The proposed albizia mitigation plan has three distinct but complementary components.

**1. Physical Removal of Hazard Trees**

Hazard trees are defined in this plan as those which pose an immediate threat to roads, structures, or power lines because of close proximity. Again, this definition applies solely to albizia, and does not imply other shade trees are necessarily also hazards. Physical removal of hazard trees requires special equipment and knowledge and must be performed by experienced certified arborists. In many cases, hazard trees can be given a “hard trim”, whereby limbs and branches that extend towards infrastructure are cut to: 1) eliminate the possibility that they would fall on such infrastructure, and 2) counterbalance the tree so that it is highly likely to fall away from said infrastructure. Following a “hard trim”, the tree may be killed with herbicide and allowed to fall apart safely. This “hard trim” approach can be done at a fraction of the cost that it would take to completely cut down a given tree.

**2. Chemical Control of Non-hazard Trees**

The ability to create buffer zones around high-priority corridors was identified as a necessity, or “game changer” by contributors to the technical working group. Generally, two types of trees fall into this category: large trees which do not yet pose an imminent hazard to infrastructure, and saplings which are

sprouting up throughout the corridor. These types of trees can be killed quickly and cheaply at an average cost of $2 to $5 per tree, or under $1,000 per acre.

**3. Community Outreach**

Outreach is critical for two reasons. First, informing communities and garnering community buy-in are key aspects of securing support for any emergency management plan. Additionally, the commitment of trained volunteers is needed for both hazard and non-hazard tree work, and for securing rights of entry for hazard tree removal, such that promotion and participant recruitment are integral aspects of plan implementation. Outreach personnel will serve as liaisons between the public and the participating agencies, and will work to secure landowner permission for entry to private property to treat hazard and non-hazard trees. BIISC is currently promoting its ACT (Albizia Control Team) project, in which volunteers are provided resources to identify and report hazardous trees to the appropriate authority or landowner, and organize to treat non-hazard trees with permission on public or private property.

**Innovations for Cost Savings**

One of the primary objectives for the technical working group was to identify cost controls. There has been a strong negative public reaction to the high cost of publicly funded tree removals that have occurred on Oahu, and the sheer scale of albizia infestation in East Hawaii necessitates a suite of techniques that substantially reduce the cost of albizia control.

Specific ways to reduce costs were identified by the technical working group and some of those methods demonstrated in the Keauohana/Black Sands project. For instance, removal of cut material from the premises may comprise 30%-50% of the total cost of a tree removal. DLNR has agreed that removal of albizia trees on state land surrounding Black Sands subdivision is unnecessary, and that felled trees can be left in place in those areas. This can greatly reduce the costs of tree removal.

Costs are further reduced by contracting arborists for stretches of road rather than individual trees, and including all trees within striking distance, rather than just those within the ROW. This is a key area where interagency cooperation is critical: by obtaining permission from all involved landowners and for any applicable right of ways all at once, costs for each hazard tree removed can be reduced. By dealing with the entire stand, future costs are immediately avoided.

Contracts may hold other hidden costs. Arborists in the state of Hawaii must be licensed (Class C contractor) and insured, but generally need not be bonded. So few arborists carry a bond that requiring one without necessity may limit the competitiveness of bids. Similarly, there is a temptation to include contingency costs for complex projects. While unusual cases exist where a sharp contingency fee is indicated, it is likely that the contractor will simply transfer the risk back to purchaser, and add the

potential contingency payment to the up front cost of the job. These hidden costs can raise costs minimally, or can double and triple the price of a contract.

Perhaps the most cost effective development developed during this planning and demonstration process is the low-cost method of killing non-hazard trees in natural areas developed by Dr. James Leary of the University of Hawaii at Manoa (Appendix B). This approach uses the herbicide Milestone™, a non-restricted use pesticide that has been reviewed and registered under the Reduced Risk Pesticide initiative of the U.S. Environmental Protection Agency. As noted previously, Milestone™ is highly effective against albizia trees. A minute, measured dose of undiluted herbicide is applied directly to the inner tissue of the tree at six inch intervals. At a cost of $2-$5 per tree, this method can be effectively and rapidly applied over large landscapes, as was done in in Keauohana Forest Reserve. Ease of use makes this method ideal for training volunteers who are dealing with large open areas around their communities.

Often these non-hazard trees – trees that do not pose a threat to infrastructure if they fall – account for the vast majority of trees within a project corridor. These trees can be killed quickly and easily to stop their encroachment into neighborhoods and eliminate their capacity to produce the seeds of future infestations. This approach can easily be tailored to involve and empower communities to address their local albizia infestations. In the process, volunteer labor significantly increases the amount of infested area that can be treated.

Volunteers are also recruited to track and report hazard trees, and are provided with resources to contact landowners with albizia and gain access permission. This volunteer participation effort increases the reach and effectiveness of outreach efforts, and with each tree successfully removed without legal intervention, reduces immediate costs to public agencies.

Finally, thoughtful consultation with arborists regarding the best way in which to address a given tree or set of trees – such as herbicide treatment, hard trim and herbicide, or felling--can lead to large-scale cost-savings. The suite of cost controls have resulted and are expected to result in savings of as much as 85% over alternative approaches.

**Prioritizing albizia hazard mitigation projects & future planning**

One of the great strengths of this plan was that it was created through the voluntary participation and work of a multitude of stakeholders, with input and expertise provided by specialists at all levels, from arborists to ecologists. The success of the approach detailed in this document has been demonstrated at a large scale in the Black Sands/Keau'ohana Forest Reserve Project. Support and guidance has been provided by legislators at the federal, state, and county levels.

While the areas detailed in this plan are limited to those considered highest priority, the methods and approach are expandable and can be applied in all foreseeable situations. For instance, private subdivision roads with high traffic remain an important secondary priority. The model detailed in this document can easily be enacted in those areas as soon as funding becomes available.

The same methods described in this plan can be used to address Residential streets and power lines are secondary priorities which need to be considered in future plans.

Maps of the identified first priority areas can be found in Appendix D.

## Overcoming Challenges

**1. Reluctant and Absentee Landowners**

The biggest challenge to working on private property is obtaining the cooperation of the owner. Although most residents are willing to participate, particularly if costs are covered, significant effort is expended in identifying and contacting them. Again, dedicated outreach efforts are key to overcoming this challenge. Volunteers from within the same communities are recruited to assist in identifying and notifying property owners with hazard trees. Neighbors can obtain permission from the property owner for volunteers to enter their property and treat the non-hazard trees. Templates for these contacts and guidance and assistance in tracking down absentee landowners are being provided by BIISC as part of the outreach component. Absentee landowners, who may reside on the mainland, US, or in foreign nations, present an additional challenge and expense. Less likely to be familiar with the dangers of albizia, or have trusted contacts within the community, these absent and unwittingly negligent landowners can be hard to contact or convince.

In response to the challenge, the County and State have each established authority to enter private property and mitigate hazards at the expense of the landowner if no action is taken after neighbors, and the agency, have each made good faith attempts to notify the landowner of their legal responsibility to mitigate the hazard. Through this plan, neighbors dealing with unresponsive landowners will be encouraged to thoroughly document the hazard as well as all communication with the landowner before claims are made under Section 20-2 of the Hawaii County code and/or Hawaii Revised Statutes 127A, Section 18, commonly known as “Act 76” (Appendix E).

The State Civil Defense Agency reports as many as half of all neighbor-to-neighbor complaints, primarily on Oahu, are resolved voluntarily by the landowner once the law is made clear, while Hawaii County reports about 20% voluntary compliance. The first tree removals under Act 76 began shortly after Iselle, due to funding provided by the legislature in 2014, though the law has been in place since 2009. Funding

for following up on these claims should be an integral part of future planning to address second level priorities.

The technical working group found most property owners demonstrate an active desire to remove hazard trees. There is a significant incentive for resident property owners to remove hazard trees that threaten their own and neighboring properties. Property values for lots with plentiful albizia are significantly lower than those without, as many buyers recognize the liability associated with the hazardous trees. However, for many in economically depressed lower Puna, cost remains the biggest barrier to removing hazard trees on their properties. A small number of homeowners may be eligible for low-cost loans and grants under the USDA rural development grant program, but securing funds to assist homeowners in the removal of hazard trees from private property should be considered a priority for future funding pursuits.

**2. Community Concerns Regarding Pesticide Use**

By far, strong community support exists for this plan, as seen in the positive response to the Black Sands demonstration project and the high demand by communities for BIISC training workshops that are ongoing into 2015. In fact, large-scale removal of albizia has been identified as a top priority by many residents of Puna and Hilo, prompting legislator involvement at both the County and State levels.

However, any action involving the use of pesticides can elicit some level of concern to be expressed by citizens. Reception of the plan as presented publicly throughout Puna has been overwhelmingly positive.

Direct outreach and transparency about the process are critical to maintaining public support. The extremely conservative method of herbicide application--as little as half a milliliter of herbicide dropped directly into a notch in the trunk—is significant in alleviating concerns about herbicide in the environment. At community meetings, information on Milestone™, including the product label, special local needs label, and Materials Safety Data Sheet, are provided, and information about the Reduced Risk EPA designation for the product is shared. Strong and open communication between albizia mitigation enactors and the public is a critical aspect of the plan.

**3. Endangered Species Protection**

Two endangered species, the Hawaiian Hawk and Hawaiian Hoary Bat, are known to be present in some of the vicinity of identified project areas, and previous research has indicated that these animals may nest in albizia. All precautions necessary to prevent negative impacts on these species will be taken.

Consultation with the USFWS is standard practice for tree maintenance activities along infrastructure corridors, and standard no-take procedures are well established. Felling of hazard trees must be avoided during the summer nesting and pupping season for the two species. Treatment of non-hazard trees, however, is expected to cause minimal disturbance of either species, as the defoliation is gradual over a number of weeks, and ample alternative vegetation and tree cover is available in the surrounding landscape. A summer break is therefore included in the timeline for hazard tree removal, but not for treatment of non-hazard trees.

## Proposed Budget

The specific projects listed in this plan were identified as highest priority by participating stakeholders, based primarily on considerations of the number of residents served, severity of albizia impacts to the corridor, and likelihood of securing operating funds. Sites with new, emerging stands of albizia, cost effective to control quickly, as well as mature infestation sites where significant maintenance and response costs are typically incurred were both included. Secondary roads and private roads within subdivisions were identified as additional priorities which need to be addressed in a later plan.

Hazard trees require removal by a certified arborist, and jobs are typically contracted out by responsible agencies. Costs were estimated by experienced foresters and private arborists in most cases, and extrapolated based on mapping and comparisons of sites where necessary. Costs of non-hazard tree control (including labor and materials) assume use of the incision point application method developed by Dr. James Leary, and are based on average expenses calculated form hundreds of staff hours of documented work. .

Complete treatment of stands of trees that threaten infrastructure, irrespective of land ownership, is a critical aspect of the program. BIISC, which regularly operates across land boundaries in controlling invasive weed species, assigns a time factor of 1 hour per acre to obtaining landowner permission. This formula was used in this plan to calculate costs for coordinating access and permission for the identified high-priority areas.

## Budget

### County Roads

| | | | | | | |
|---|---|---|---|---|---|---|
| Puainako Extension | Arborist fees | $ | 139,120 | | | |
| | Labor | $ | 74,864 | | | |
| | Materials | $ | 8,318 | | | |
| | Outreach/ Access Coordination | $ | 1,750 | | | |
| | | | | TOTAL | $224,052 | 2.5 miles |
| Kahakai Blvd | Arborist fees | $ | 345,225 | | | |
| | Labor | $ | 137,749 | | | |
| | Materials | $ | 15,305 | | | |
| | Outreach/Ac | $ | 19,425 | | | |
| | | | | TOTAL | $517,705 | 4.6 miles |
| Pohoiki Rd. | Arborist fees | $ | 393,000 | | | |
| | Labor | $ | 59,891 | | | |
| | Materials | $ | 6,655 | | | |
| | Outreach/Ac | $ | 2,575 | | | |
| | | | | TOTAL | $462,120 | 2 miles |
| Hwy 132 | Arborist fees | $ | 164,925 | | | |
| | Labor | $ | 125,771 | | | |
| | Materials | $ | 13,975 | | | |
| | Outreach/Ac | $ | 2,225 | | | |
| | | | | TOTAL | $306,895 | 4.2 miles |
| Leilani Ave | Arborist fees | $ | 86,250 | | | |
| | Labor | $ | 59,891 | | | |
| | Materials | $ | 6,655 | | | |
| | Outreach/Ac | $ | 3,750 | | | |
| | | | | TOTAL | $156,545 | 2 miles |
| Wainuenue Ave | Arborist fees | $ | 26,000 | | | |
| | Labor | $ | 57,645 | | | |
| | Materials | $ | 6,405 | | | |
| | Outreach/Ac | $ | 2,875 | | | |
| | | | | TOTAL | $92,925 | 1 miles |
| Railroad/Makuu | Arborist fees | $ | 345,225 | | | |
| | Labor | $ | 179,673 | | | |
| | Materials | $ | 19,964 | | | |
| | Outreach/Ac | $ | 6,050 | | | |
| | | | | TOTAL | $550,911 | 6 miles |
| | | **COUNTY ROADS** | | **TOTAL** | **$2,311,154** | **22.3 miles** |

## Budget

## State Highways

| | | | | | | |
|---|---|---|---|---|---|---|
| Puainako Street | Arborist fees | $ | 125,000 | | | |
| | Labor | $ | - | | | |
| | Materials | $ | - | | | |
| | Outreach/ Access Coordination | $ | 1,000 | | | |
| | | | | TOTAL | $126,000 | 0.5 miles |
| Highway 19: Hilo to Hakalau | Arborist fees | $ | 340,000 | | | |
| | Labor | $ | 101,815 | | | |
| | Materials | $ | 11,313 | | | |
| | Outreach/ Ac | $ | 3,750 | | | |
| | | | | TOTAL | $456,877 | 3.4 miles |
| Hwy 130: Keaau to Kalapana | Arborist fees | $ | 390,000 | | | |
| | Labor | $ | 116,787 | | | |
| | Materials | $ | 12,976 | | | |
| | Outreach/ Ac | $ | 3,545 | | | |
| | | | | TOTAL | $523,309 | 3.9 miles |
| Hwy 11: Keaau to Mt. View | Arborist fees | $ | 120,000 | | | |
| | Labor | $ | 29,945 | | | |
| | Materials | $ | 3,327 | | | |
| | Outreach/ Ac | $ | 909 | | | |
| | | | | TOTAL | $154,182 | 1 mile |
| Akoni Pule Hwy | Arborist fees | $ | 86,000 | | | |
| | Labor | $ | 15,300 | | | |
| | Materials | $ | 1,700 | | | |
| | Outreach/ Ac | $ | 1,525 | | | |
| | | | | TOTAL | $104,525 | 1 mile |
| Airport Access Rds and Property | Arborist fees | $ | 20,000 | | | |
| | Labor | $ | 9,882 | | | |
| | Materials | $ | 1,098 | | | |
| | Outreach/ Ac | $ | 1,000 | | | |
| | | | | TOTAL | $31,980 | 1 mile |
| | | | **State Highways TOTAL:** | | **$ 1,396,873** | **10.8 miles** |

**Budget**

**HELCO**

| | | Estimated | | Actual | |
|---|---|---|---|---|---|
| Piihonua 7400 | Arborist fees | $ 200,000 | | $ 224,000 | |
| | Labor | $ 49,410 | | $ 20,250 | |
| | Materials | $ 5,490 | | $ 2,250 | |
| | Outreach/ Ac | $ 1,000 | | $ 1,000 | |
| | | | **Act. TOTAL** | **$ 247,500** | |
| | | | Est. TOTAL | $ 255,900 | 1 mile |
| Nanawale 6500 | Arborist fees | $ 900,000 | | | |
| | Labor | $ 239,564 | | | |
| | Materials | $ 26,618 | | | |
| | Outreach/ Ac | $ 8,850 | | | |
| | | | TOTAL | $1,175,032 | 8 miles |
| Leilani 8700 | Arborist fees | $ 700,000 | | | |
| | Labor | $ 209,618 | | | |
| | Materials | $ 23,291 | | | |
| | Outreach/ Ac | $ 8,750 | | | |
| | | | TOTAL | $941,659 | 7 miles |
| Misc. Line Segmen | Arborist fees | $ 200,000 | | | |
| | Labor | $ 59,891 | | | |
| | Materials | $ 6,655 | | | |
| | Outreach/ Ac | na | | | |
| | | | TOTAL | $266,545 | 2 miles |
| | | | **HELCO TOTAL:** | **$2,639,136** | **18 miles** |
| | | | **Community Outreach** | **$ 300,380** | per year |
| | | | **Grand TOTAL:** | **$ 6,647,543** | **51.1** |

## Implementation Funds

Significant funding has been secured to initiate the first projects. Additional funds are needed.

To date, HELCO has committed to self-funding the removal of albizia along 18 miles of primary transmission lines impacted by albizia, estimated to cost $2.66 Million. $224,000 was expended to complete the removal work along the Pi'ihonua Transmission Line, in Hilo, the first project in this plan to be enacted and completed.

The state legislature has appropriated $1.5 Mil per year from the general fund for FY16 and FY17, to be used for implementation along state highways in Hawaii County. These funds are adequate to complete the top priority projects in East Hawaii as identified in this plan, and expand to new areas. In addition, this provides a valuable baseline resource to attract federal and private matching funds. HDOT identified at least $300,000 in the FY2015 budget, with the possibility of excess year-end maintenance funds becoming available as well.

Hawaii County has identified $200,000 in the FY2015 budget for mitigating hazardous trees along county roads. This leaves a gap of approximately $2.1 Mil needed to complete all high priority projects. Likely sources of funds are uncertain, but may include federal hazard mitigation grant program funds.

A combination of state, federal, and county funds totaling $230,000 has been provided to the Big Island Invasive Species Committee for chemical control of non-hazard trees and community education and training. Approximately 29,000 trees have been treated by staff and volunteers since Hurricane Iselle.

BIISC submitted a hazard mitigation grant (HMGP) to HI-EMA/FEMA for an additional $400,000 in federal funds to implement projects in the Hawaiian Shores-Leilani-Nanawale area. The proposal has cleared the pre-proposal phase and additional documentation of stakeholder costs related to albizia are needed to complete the full proposal process. Additional HMGP funds will be sought through a second RFP resulting from the lava flow emergency declaration. In both cases, the Hawaii Department of Land and Natural Resources will serve as the official applicant.

Routing of funds:

The majority of project costs are for hazard tree removal by private contractors. When possible, available funds should be funneled through the most direct route, with care to limit losses via overhead and transfer fees. Where existing exclusive contracts or contracts with undesirable terms might limit competitive pricing or complete implementation, alternative funding routes should be considered.

## E. "ALBIZIA MITIGATION PLAN FOR EAST HAWAII" DATED MAY 2015 POWER POINT PRESENTATION BY DR. FLINT HUGHES, MS. SPRINGER KAYE, & FRANNY BREWER


May 2015
Presented by Flint Hughes, USFS
Springer Kaye and
Franny Brewer, BIISC

## Technical Working Group

- May 2013: Stakeholders Meeting convened by state Sen. Russell Ruderman
- August 2014: Tropical Storm Iselle
- September 2014: Stakeholders meeting convened by US Sen. Brian Schatz
- September – October 2014 : weekly technical working group meetings
- October 22, 2014: Preliminary plan draft
- May 2015: Plan draft document

## Elements of Mitigation Plan

- Innovative, approaches for significant, long term cost savings
- High priority public infrastructure projects identified by HELCO, County DPW, and State HDOT
- Community engagement and support


## Hard Trim + Treatment

- Limbs which threaten structures are removed by certified arborist
- Trees are treated and left to stand in place
- Cut material left on site whenever possible
- Contract terms written with care
- Cost reduction by as much as 85%

Compared to $58,000 to remove one tree in Pacific Palisades

## General Approach:

1. Physical control of hazard trees using minimal, most cost effective, interventions
2. Chemical control of non-hazard trees in buffer zones
3. Outreach & volunteerism efforts
    1. Chemical control of small stature, non-hazard trees on private property
    2. Reporting of hazard trees, notification of property owners, urgency for removal

## Hard Trim + Treatment

- Limbs which threaten structures are removed by certified arborist
- Trees are treated and left to stand in place
- Cut material left on site whenever possible
- Contract terms written with care
- Cost reduction by as much as 85%

Compared to $58,000 to remove one tree in Pacific Palisades

## Milestone™ herbicide

- EPA Reduced Risk classification
- Low toxicity
- Minimal amount (0.5 mL per cut)
- $2-$5 per tree

## Long term impacts of treatment

- Recruitment is greatest where ground cover is disturbed

- Regrowth will be seen where stumps are cut and not treated

## Any Cover is Good Cover

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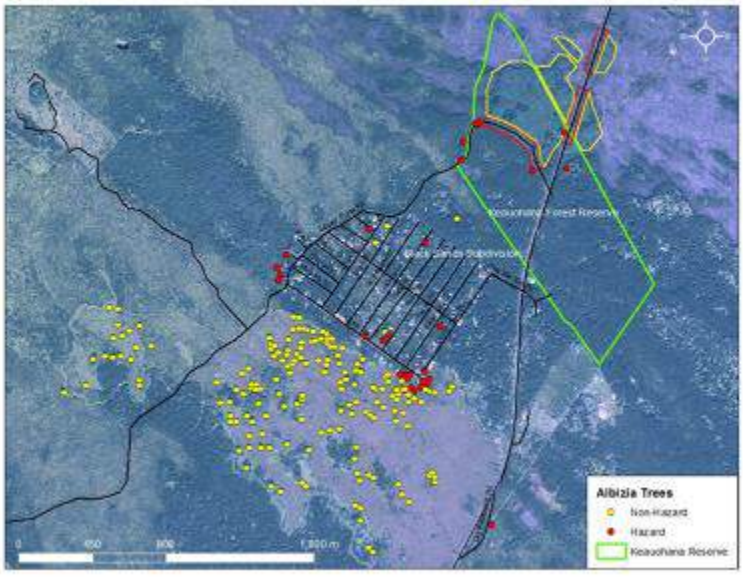
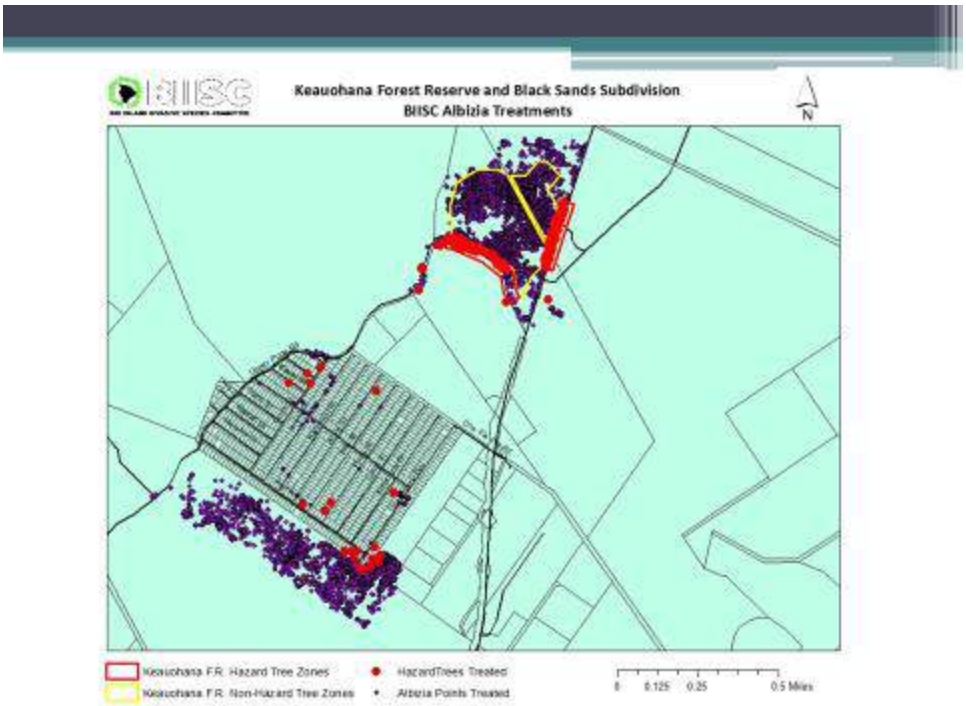
# Black Sands/Keau'ohana Demonstration Project

Hwy 130




BIISC
Keauohana Forest Reserve and Black Sands Subdivision
BIISC Albizia Treatments
N
Keauohana F.R. Hazard Tree Zones
Keauohana F.R. Non-Hazard Tree Zones
HazardTrees Treated
Albizia Points Treated
0 0.125 0.25 0.5 Miles


High Priority Infrastructure


## Prioritization of Potential Projects

- Clear Public Interest
- Number of residents served
- Feasibility
- Impact
- Ability to avoid future costs
- Lack of alternatives

## HELCO

### Primary Transmission Lines

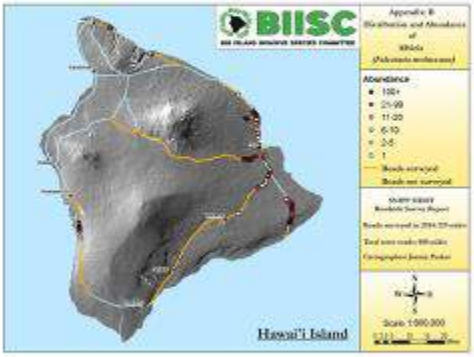
- Pi'ihonua 7400
- Nanawale 6500
- Leilani 8700
- Misc. line segments

## County

- Puainako Extension
- Kahakai Blvd.
- Pohoiki Rd.
- Hwy 132
- Leilani Ave
- Wainuenue Ave
- Railroad/Makuu

## HDOT

- Puainako St.
- Hwy 19: Hilo-Hakalau
- Hwy 130: Kea'au-Kalapana
- Hwy 11: Kea'au-Mt. View
- Akoni Pule Hwy
- Airport Access Roads



## Budget

- Grand Total: $6.65 Mil
- Average cost estimates at $124,210 per mile
- First completed project costs:
  - estimated: $255,900
  - actual: $247,500

## Outreach & Volunteer Efforts

## Community Groups with Active Albizia Control Programs

- Black Sands Subdivision
- Hawaiian Paradise Park
- Leilani Estates
- Hawaiian Beaches/Shores
- Nanawale Estates
- Piihonua

- Pending:
  - Ainaloa

## Funding

## Implementation Funds Secured

- **TOTAL: $3,980,000 over three years.**
- HELCO: Self-funding $2.6 Mil ($700,000+ spent to date in 2015)
- USFS: $100,000 (to BIISC) for control
- Hawaii County:
  - $300,000 annual highways
  - $30,000 Councilman Ilagan's contingency funds for community outreach.
- HDOT:
  - $300,000 annual trimming contract
  - $400,000 FY15 year end funds being encumbered
  - $1 Mil/year for State Civil Defense (HEMA) Act 76 mitigation work (in hand)

## Implementation Funds Anticipated

- State Legislature:
  - $1.5 Mil/year for two years to HDOT (FY16-17)
    - For Albizia Control
    - Understood to be for Hawaii County plan
- County Councilman Ilagan's contingency funds:
  - One position for community outreach (FY16)
- Gaps:
  - Funds that can be passed through to BIISC ground control teams
  - Funds for community outreach and property access
  - Funds for county hazard tree removal

## Related Funds Secured

Though not tied to projects under this plan, additional efforts to assist private landowners and document impact have been secured.

- State Legislature:
  - $1 Mil/year for State Civil Defense (HEMA) Act 76 mitigation work (in hand)
- Hawaii County:
  - $250,000 FY-16 for DPW Engineering to conduct "unsafe flora" (Section 20-2) work
- USFS State and Private Forestry Program
  - $160,000 over three years for ecological monitoring
- TOTAL: 1,410,000

## Implementation Funds Proposed

- FEMA Hazard Mitigation Grant Program:
  - BIISC pre-proposal scored at top
  - $400,000 for road/powerline project (Iselle funds)
  - Larger sum available via second proposal for Lava funds
- EQUIP, NRCS, HUD, CREP federal programs are other potential sources of funds

# Gaps

- Gaps:
  - Funds for tree removal on private roads and land
  - Funds that can be passed through to BIISC ground control teams
  - Funds for community outreach and property access
  - Funds for county hazard tree removal
  - Funds to remove hazards to school grounds