

## **APPENDIX A**

### **DELIVERY ORDER REPORTS**

**(available in the USACE project web site)**

## **APPENDIX B**

### **SUMMARY OF COMMENTS FROM GOVERNMENT AGENCIES AND NON-GOVERNMENTAL ORGANIZATIONS FOR THE FLORIDA KEYS CARRYING CAPACITY STUDY**

**Summary of Comments from Government Agencies and Non-Governmental Organizations for the Florida Keys Carrying Capacity Study, draft dated November 2001.**

GA/NGO Comments*	Summary of Comments
ELULC, Pg. 1, Blt. 1	What was the “framework” determined to be for the two scenario runs of the carrying capacity test model?
ELULC, Pg. 1, Blt. 2	In Sec. 2.3, Pg. 15, what is the correlation of carrying capacity threshold values? As an example, does the term “concern” mean “exceedence?”
ELULC, Pg. 2, Blt. 3	On Pg. 21, what is the justification for not considering sea level rise even “on the order of inches?” Water level differences have implications on the ability of terrestrial habitats to accommodate additional development impacts.
ELULC, Pg. 2, Blt. 4	In Sec. 3.1, Pg. 22, says the CCIAM “...serve as an analytical tool.” The text never explains how this tool is applied to “determine the ability of the...Keys... to withstand all impacts of additional land development.”
ELULC, Pg. 2, Blt. 5	On Pg. 24, study suggests wetland vegetation is an “absolute environmental restriction.” Federal, state ,and local rules allow wetlands to be impacted. Is it “assumed” the land will not be developed?
ELULC, Pg. 2, Blt. 6	On Pgs. 24-31, the analysis seems calculated to determine the results of various levels of population growth and development, but not the ability of the ecosystem to accommodate any additional impacts.
ELULC, Pg. 2, Blt. 7	In Sec. 3.2.2, Assumptions and Uncertainty, Pg. 32, refers to “...permissible location of new development (the ROGO point system)...” This ignores the many development opportunities allowed outside of ROGO.
ELULC, Pg. 2, Blt. 8	The assumption that the current FKAA CUP application for 30 MGD of potable water withdrawal is not a given. In fact, it is not likely to be approved.
ELULC, Pg. 2, Blt. 9	On Pg. 52, study states assumption that “stormwater pollutant reduction rates for future BMP installations in the Keys will be similar to...BMPs at non-Keys installations.” Next page identifies issue as an uncertainty.
ELULC, Pg. 2, Blt. 10	On Pg. 58, the Overview of Marine Module appears to conclude, “the available data is insufficient to develop assessment models” for sea grass propeller scarring (and other impacts). We recall a workshop agreement that the study could/should make conclusions about issues for which models could not be developed.
ELULC, Pg. 3, Blt. 11	On Pg. 60, the Terrestrial Module states the CCIAM “measures impacts from...development scenarios on terrestrial ecosystems....” It says nothing of determining the...ability of these ecosystems...to accommodate impacts.
ELULC, Pg. 3, Blt. 12	On Pg. 70, Table 3.21 ranks the top five community character/quality of life parameters. The study does not appear to use this information in making recommendations.
ELULC, Pg. 3, Blt. 13	On Pg. 71, two scenarios were selected: current conditions and Smart Growth. Assumptions of Smart Growth are not supported by facts; they appear unrealistic. Study should make clear such is true only if assumptions are carried out.
ELULC, Pg. 3, Blt. 14	What is the Smart Growth scenario? Clarify how this scenario was established. The description reads as a recommendation for a specific development scenario although the Study disavows this intention.
ELULC, Pg. 4, Blt. 15	On Pgs. 74-76, the Smart Growth scenario test results show dwelling unit and acreage increases. Are they appropriate and ecologically acceptable? How is “smart growth” defined? Is the development appropriate only if the assumptions are made true?
ELULC, Pg. 4, Blt. 16	Pg. 78 and Table 4.8 identify a specific number of parcels that are vacant and should be preserved. What criteria were used? Is the study concluding which parcels are critical to the carrying capacity?
ELULC, Pg. 4, Blt. 17	On Pg. 80-81, the study includes socioeconomic information on “commercial competition” and “affordable housing.” The study is supposed to determine “the ability of the...ecosystem...to withstand all impacts of additional land development....” These economic issues should be considered at the political level after the study is done.
ELULC, Pg. 4, Blt. 18	Does Table 4.10 show that the cost to existing taxpayers increases as the amount of development increases?

**Summary of Comments from Government Agencies and Non-Governmental Organizations for the Florida Keys Carrying Capacity Study, draft dated November 2001. (Continued)**

GA/NGO Comments*	Summary of Comments
ELULC, Pg. 4, Blt. 19	On Pgs. 87-90, there is an assumption that stormwater pollution load will decrease only under an additional growth scenario. Do we interpret correctly that only if there is additional development will government fund stormwater retrofit programs? Whose policy choice is this?
ELULC, Pg. 4, Blt. 20	The study states development has resulted in loss of one-half of the upland habitat, and that more habitat has been lost since 1995. Upland habitats have been "severely fragmented into numerous, smaller patches." Can an ecosystem lose one-half of its area and not have exceeded its carrying capacity for adverse impacts?
ELULC, Pg. 5, Blt. 21	On Pgs. 99 and 100, the study concludes that the Smart Growth scenario impacts on uplands are minimal. However, uplands scheduled for preservation in this scenario continue to be developed. Has the study identified hammocks that are close to a level of loss or fragmentation that would exceed an indicator threshold?
ELULC, Pg. 5, Blt. 22	Pg. 106 describes additional habitat loss for the Lower Keys marsh rabbit from the Smart Growth scenario. It does not describe if the loss is ecologically acceptable to the species.
ELULC, Pg. 5, Blt. 23	Conclusions, on Pgs. 109 and 110, leads off with "ecological functions in upland habitats may be depressed throughout the Florida Keys." It would appear as though the carrying capacity of upland habitats has been exceeded. Are there valid scientific conclusions to be drawn from the study?
ELULC, Pg. 5, Blt. 24	The Next Steps section does not say whether the study is going to run the tests to answer the question, or simply finalize the model.
ELULC, Pg. 6, Conclusion	We are greatly concerned the study is not going to determine the ability of the Florida Keys ecosystem to withstand all impacts of additional land development activities, as it is required to do. We are concerned the study team does not intend to answer the question directed to it by the Governor and Cabinet.
FFWCC, Pg. 1, Pgh. 1	On Pg. 60, Table 3.14 lists components of the terrestrial module. The CCIAM should also report acreage losses or gains for each major vegetative type, which constitutes habitat for listed wildlife species.
FFWCC, Pg. 1, Pgh. 2	On Pg. 63, Table 3.15 lists species to be addressed by the CCIAM and the model sources and habitat types used. The table has errors that may affect model results. Habitat designations for particular species need to be corrected.
FFWCC, Pg. 2, Pgh. 3	The table should include all cover types from the ADID data set used to model the areas of the Keys. All model constraints should be included for the reader to determine if they were constructed properly.
FFWCC, Pg. 2, Pgh. 4	On Pg. 63, the text and equation describing how the CCIAM assesses direct impacts on species richness needs to be rewritten to clarify how the information is calculated in the model.
FFWCC, Pg. 2, Pgh. 5	On Page 65, the Relative Habitat Degradation Index measures the degree of secondary impacts on species richness as a function of distance. The components and derivation of the equation need to be explained.
FFWCC, Pg. 2, Pgh. 6	On Pg. 68, the equation describes how the CCIAM uses indirect impacts to lower the species richness index. The derivation of the equation needs to be supported.
FFWCC, Pg. 2, Pgh. 7	On Pg. 68, Table 3.18 and the text are missing an essential piece of information that the Lower Keys marsh rabbit is highly endangered. The model should be constructed so no further loss of the rabbit is allowable in any scenario.
FFWCC, Pg. 3, Pgh. 8	On Pg. 69, Table 3.20 contains some misinformation on hammock patch-size requirements for forest interior birds. The white-eyed vireo and black-whiskered vireo are not forest interior birds for hammocks or for a patch size 0.2 ha.
FFWCC, Pg. 3, Pgh. 9	On Pgs. 96-106, model runs of habitat impacts are presented with many tables and figures, but virtually no discussion and interpretation of results. There is no tabulation of cover types and acreage lost up to the present day and likely to be lost to Smart Growth. The carrying capacity of the Florida Keys for endangered species seems already to have been exceeded. The reports should say so.

**Summary of Comments from Government Agencies and Non-Governmental Organizations for the Florida Keys Carrying Capacity Study, draft dated November 2001. (Continued)**

GA/NGO Comments*	Summary of Comments
FFWCC, Pg. 3, Pgh. 10	On Pg. 102, Table 4.20, and on Pgs. 105-106, Table 4.21 list changes to the species richness index due to direct and indirect impacts from Smart Growth, respectively. In some areas, there is a 5-10 percent decline in species richness with no interpretation of the significance.
FFWCC, Pg. 4, Pgh. 11	On Pg. 106, the Smart Growth scenario results in a net loss of 28 acres for the Lower Keys marsh rabbit. This is unacceptable. The scenario should be revised or the CCIAM reprogrammed to prevent such losses.
FFWCC, Pg. 4, Pgh. 12	On Pg. 106, the Smart Growth scenario implications to the white-crowned pigeon are unclear due to a reduction of habitat area and an increase in habitat patches. The extent of impact is not discussed although habitat loss and fragmentation are important threats.
FFWCC, Pg. 4, Pgh. 13	On Pgs. 63-63, Table 3.15 lists 16 vertebrates and a plant used to assess development impacts on the Keys carrying capacity. No information is given as to the anticipated impacts of Smart Growth on most of them. Impacts of habitat loss on population viability and on the carrying capacity of the Keys for each species should be characterized for each development scenario. The Key deer HCP results should be incorporated.
FFWCC, Pg. 4, Pgh. 14	On Pg. 107, the report indicates that habitat available to each forest interior bird species increased with Smart Growth due to conversion of vacant land to open space. This is not supported by information in Table 4.22 on Pg. 107, which shows losses of 67 and 68 percent for b-whiskered and w-eyed vireos, respectively. Other habitat gains for the n. flicker and both cuckoos are negligible and should be discussed. Clarify how the model handles the conversion of vacant land to open space.
FFWCC, Pg. 5, Pgh. 15	On Pg. 108, Table 4.23 summarizes changes in quality of life variables from current conditions to the Smart Growth scenario. The model forecasts no change to "conservation of existing habitat," but this is not supported by habitat loss for the marsh rabbit and by the many vagaries and ambiguities in the information presented. It is not safe to conclude that Smart Growth would produce no impacts on transitional habitat.
FFWCC, Pg. 5, Pgh. 16	On Pg. 110, the preliminary carrying capacity assessment of the Florida Keys concludes, "aspects of the terrestrial environment... may be near or at levels of concern." This conclusion does not do justice to all of the time, effort, and money that has been spent. The draft report should contain a comprehensive preliminary assessment of all facets of the carrying capacity of the Florida Keys.
OTFOF, Pg. 1, Pgh. 1	The operative rules call for the CCIAM to consider the findings adopted by the Commission that near shore water quality and the carrying capacity of the Key deer had been exceeded. Where are the threshold values?
OTFOF, Pg. 1, Pgh 2	The study was to determine the ability of the Keys ecosystem to withstand all impacts of additional development. The scenarios are hardly capable of showing the impacts of individual and cumulative development. This tool cannot be used on a daily basis as individual permit decisions are faced. Scientific literature cited is inadequate. On Pg. 22, if the CCIAM is not intended to be a predictive tool, then the value of the entire CCIAM process must be questioned.
OTFOF, Pg. 2, Pgh. 3	On Pg. 14, Item 3 refers to the effects of population changes on infrastructure, but not the resulting infrastructure cost. How does Smart Growth demonstrate the feasibility of the new growth? Existing and new growth must be tied to the ability to pay for the types of infrastructure.
OTFOF, Pg. 2, Pgh. 4	The future development potential of vacant land does not mention the 12,000-lot inventory of vacant, platted lots. Most of these lots cannot be built on and their value as restoration sites should be evaluated.
OTFOF, Pg. 2, Pgh. 5	A major infrastructure uncertainty is increased water availability. The CCIAM shows increasing population and expected increasing water allocations. The assumption defies the ongoing water withdrawal limitations and on Pg. 50, assumes another 30 mgd by 2004. Does the model account for greater cost and the threshold for environmental damage?
OTFOF, Pg. 3, Pgh. 6	Another uncertainty involves the stormwater assumption that BMP installations will perform well in the Keys. This is absurd and on Pg. 53, the lack of soil in the Keys calls into question the assumption.

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GA/NGO Comments*	Summary of Comments
OTFOF, Pg. 3, SpI. 1	On Pg. 63, Table 3.15 omits the endangered Schaus' swallowtail butterfly and an appropriate index to identify and protect rare habitat.
OTFOF, Pg. 3, SpI. 2	On Pg. 68, Item 3.7.3 notes that the Key deer was not considered due to the ongoing HCP, but the scenarios incorporate the findings of the HCP. It is not appropriate to include any findings of the HCP for the purpose of the CCIAM until all HCP review conditions are met.
OTFOF, Pg. 3, SpI. 3	On Pg. 72, there is a 20-year subdivision development assumption that up to 3,000 lots will be permitted. What is the basis, and what are the development constraints?
OTFOF, Pg. 3, SpI. 4	On Pg. 72, there is reference to an active program of water conservation, implying reuse. Pending legislation would exempt the county.
OTFOF, Pg. 4, SpI. 5	On Pg. 77-78, Tables 4.5 and 4.6 use incorrect permanent population numbers. The U.S. Census states nearly 80,000, yet CCIAM uses 64,550. This is unacceptable.
OTFOF, Pg. 4, SpI. 6	On Pg. 82-83, the Smart Growth scenario is given a total cost of \$597.6 million, but no clearIAM alone costs \$430.4 million. How is it possible the 20-year total cost in Table 4.11 is correct, realistic, or accurate?
OTFOF, Pg. 4, Closing	It is hardly reassuring to read the "...results suggests that aspects of the terrestrial environment... may be near or at levels of concern," without any commitment to address what are clearly flashing red lights. Unless measures are taken to identify "levels of concerns," the CCIAM will have failed to address the only purpose for which it was authorized.
WWFOC, Pg. 1, Pgh. 1	WWFOC fully endorses the ELULC and OTFOF letters and shares the serious concerns raised therein.
WWFOC, Pg. 1, Pgh. 2	WWFOC committed to ensuring this initiative successfully determines the ability of the Florida Keys ecosystem to withstand all impacts of additional land development activities.
WWFOC, Pg. 1, Pgh. 3	Particularly concerned by the way the model addresses water quality issues. The community is at a critical juncture regarding its ability to solve problems stemming from inadequate wastewater and stormwater treatment. The CCIAM should be a powerful tool to assess near shore waters and their capacity to withstand nutrient pollution. Presently, the model is significantly flawed with respect to water quality.
WWFOC, Pg. 2, SpC. 1	The CCIAM does not deal effectively with cumulative impacts of nutrient pollution on near shore waters. It confuses "concentration" with "loading." The real issue is the ongoing cumulative or incremental load of nutrients.
WWFOC, Pg. 2, SpC. 2	The marine ecosystem response to nutrient pollution does not appear to have been incorporated in the model. CCIAM assumes that impacts in receiving waters must be inconsequential.
WWFOC, Pg. 2, SpC. 3	By using average values for nutrient loading, CCIAM ignores rainfall-induced episodic fluxes and seasonal variation in the Key's population that are likely to have more impact on the marine ecosystem.
WWFOC, Pg. 2, SpC. 4	The CCIAM does not assess canals and other confined water bodies for water quality and ecological response. It does not address that they are waters of the state, and they are already substantially degraded.
WWFOC, Pg. 2, SpC. 5	The CCIAM does not address the concern that increased uptake of nutrients in expanding seagrass and algae beds may explain the absence of a pronounced increase in near shore water nutrient levels. This is expected to be unsustainable and may lead to localized collapse of ecosystem components.
WWFOC, Pg. 2, SpC. 6	Researchers have identified specific areas where negative trends in seagrass composition are already apparent. Keys-wide changes in inshore benthic communities associated with nutrient loading have not been found. However, seagrasses are known to respond to nutrient pollution on a decadal scale so a precautionary approach must be built into the model.
WWFOC, Pg. 3, Close	The substantive concerns raised by scientists and other commenters must be fully addressed before the model is further used.
USEPA, Pg. 1, Pgh. 1	"CCIAM is a good start.... In so far as it provides a framework that can readily accept improvements in the... science and databases."

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GA/NGO Comments*	Summary of Comments
USEPA, Pg. 1, Pgh. 2	In the "Integrated Water Module", "discharges of wastewater to the marine environment... incorporate a conservative modeling approach" but the use of "central values" appears inconsistent. Document algorithms and address uncertain nature of the data. On Pgs. 54 and 192, Tables 3.12 and 4.7 differ in total P.
USEPA, Pg. 1, Pgh. 3	The use of event mean concentrations for stormwater runoff, coupled to monthly mean rainfall volumes rather than storm events is not entirely "conservative." Ecological effects are better correlated with loadings that derive from extreme, maximum values of nutrient inputs (episodic events).
USEPA, Pg. 2, Pgh. 4	The model makes no provision for formal assessment of uncertainty. The CCIAM will not fulfill its potential as a planning tool until some means is provided to evaluate the reliability of a CCIAM prediction of a threshold exceedence.
USEPA, Pg. 2, Pgh. 5	Parameter sensitivity analysis would acknowledge that many of the model parameters derived from databases are not settled values derived from averaging, but are distributions whose uncertainties must be propagated into conclusions about the true proximity of IAV to important thresholds.
USEPA, Pg. 2, Pgh. 6	Better studies of the "current conditions" test results of the model are needed. The Water Module must be revised to accept background nutrient loads derived from the Atlantic and Gulf circulations. The wastewater flows and loads constitute an anthropogenic, incremental addition to an existing background concentration.
USEPA, Pg. 3, Pgh. 7	Authors do not make use of "accepted algorithms" for eutrophication modeling: instead, surveyed literature and decided <i>a priori</i> available science is inadequate. Why the reluctance to set graded thresholds for eutrophication damage to nearshore communities, given that all CCIAM estimates of marine ecological damage must <i>ipso facto</i> rely on these thresholds?
USEPA, Pg. 3, Pgh. 8	On Pg. 55, the assumption that inflow and infiltration is "insignificant" is not supported by the data.
USEPA, Pg. 3, Pgh. 9	Rates of groundwater flow have been quantified for only a few areas in the Keys. On Pg. 56, the "path of least resistance" of groundwater is a void in the limestone. What rate was used? On Pg. 57, a "conservative removal of 50 percent of phosphorous" by limestone does not accord with data.
USEPA, Pg. 4, Pgh. 10	On Pg. 85, the projected annual average total drinking water demand for current conditions may not be accurate because the FKAA has been pumping more water than allowed; it has requested capacity increased to 20+ mgd average and 24 mgd maximum.
USEPA, Pg. 4, Pgh. 11	It is more realistic for the study to include current allowable water withdrawal allocations, rather than a hypothetical volume. If permits are not granted where will the additional water come from?
USEPA, Pg. 4, Pgh. 12	A major oversight of the model ignores that canals are water bodies within the FKNMS and are waters of the state. Most exhibit degraded water quality and violations of water quality standards for DO and fecal coliform. Has the model been tested to see if it predicts the observed halo of increased nitrate concentrations surrounding the Keys?
USEPA, Pg. 4, Pgh. 13	There are major flow reversals, important in larval dispersal into Gulf-side waters, which increase the residence time of water adjacent to the Keys. Are the same diffusion characteristics used for both Atlantic and Gulf sides of the Keys?
USEPA, Pg. 4, Pgh. 14	On Pgs. 60 and 208, no clear justification is given for using P as fixed, single values for potential negative thresholds on marine community structure. If coral communities have a lower threshold for change, should seagrasses alone be used as the only indicator?
USEPA, Pg. 5, Pgh. 15	We fear that the conclusions of the model run, for Smart Growth using improved wastewater treatment, will be used as justification for additional growth because there is a 90 percent reduction in nutrient loading with growth.
USEPA, Pg. 5, Pgh. 16	How the prescribed upgrades in wastewater treatment will change the existing conditions needs to be quantified for the understanding of citizens and politicians in the Keys.
USEPA, Pg. 5, Pgh. 17	What different assumptions resulted in different loading estimates for the Stormwater Master Plan and Carrying Capacity Model.

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GA/NGO Comments*	Summary of Comments
USEPA, Pg. 5, Pgh. 18	We have significant concerns over a very important conclusion of this model run that “loads from the Florida Keys have a limited contribution to observed concentrations” when not much is known about nutrient cycling in this carbonate-dominated system.
USEPA, Pg. 5, Pgh. 19	Forqurean and Rutten concluded there is no relationship Keys-wide between land use and historic changes in benthic community structure, but they identified areas where trends may be apparent. Research is warranted.
USEPA, Pg. 6, Pgh. 20	The CCIAM has the potential to be an important contribution to rational evaluation of policy and development issues in the Keys. The failure to create formal treatment of uncertainties, sensitivities, and probabilistic elements of the decision metrics is a crippling deficiency that must be remedied.
FKAA, Pg. 1, Cmt. 1	Future sources of potable water may include an ASR process or a 2-5 mgd reverse osmosis plant. This would substantially increase the monthly water rate and reduce quality.
FKAA, Pg. 1, Cmt. 2	The Authority’s current SFWMD-permitted allocation is a PAD of 15.83 mgd and PMD of 19.19 mgd, which expires December 2005. The Authority’s current request for a revised permit is a PAD of 19.28 mgd and PMD of 22.99 mgd, which would be authorized through 2006.
FKAA, Pg. 2, Cmt. 3	SFWMD and FKAA’s technical modeling of increased withdrawals from the Biscayne Aquifer show the maximum withdrawal could not exceed 24 mgd. Additional required demands would most likely be met by withdrawals from the Floridan Aquifer and RO plants.
FKAA, Pg. 2, Cmt. 4	The FKAA has acted to reduce excessive water use through a revised rate schedule currently in the public hearing phase. Also, FKAA adopted a formal resolution requesting all municipalities and unincorporated Monroe County to adopt mandatory water conservation and irrigation ordinances.
FKAA, Pg. 3, Cmt. 5	There is “better data” available for potable water consumption/use rates from FKAA and SFWMD, which can be used to update the Integrated Water Module.
SFWMD, Pg. 1, Cmt. 1	Overall, the report makes a strong case for the “smart growth” scenario of very limited growth and capital programs to reduce pollutant loading. The “no growth” scenario might be desirable. The primary study value may be the comprehensive review of Keys’ databases. Some assumptions are questionable and they are discussed below.
SFWMD, Pg. 1, S.C. 1	The key to the stormwater element’s success will be in the future implementation of the BMP’s. Limiting growth in undeveloped segments of existing commercial, residential, and county-owned areas might be difficult. The study should state this.
SFWMD, Pg. 1, S.C. 2	In Section 3.3.6, how was the 5% per capita government expenditure IAV derived?
SFWMD, Pg. 1, S.C. 3	In Section 3.5.7, the literature cited as Corbett, <i>et al.</i> was not listed.
SFWMD, Pg. 1, S.C. 4	In Section 3.8, the input from residents about the importance of quality of life issues was not compiled with a scientific approach. The ranking in Table 3.21 must be used with caution.
SFWMD, Pg. 2, S.C. 5	It is unclear how the many uncertainties related to quality and accuracy of data affect the outcome of scenario analysis or the level of confidence in the results.
SFWMD, Pg. 2, S.C. 6	A reader could be misled that the analysis results are quantitative. It is not explained that the results are qualitative.
SFWMD, Pg. 2, G.W. 1	In Section 3.5.7, Pg. 57, a critical assumption that groundwater flows at a steady state is incorrect. Groundwater flows are influenced by meteorological conditions. Pulses into surface waters can result in more intense doses of pollutants to the near-shore environment, which can possibly overwhelm the assimilative capacity of the near-shore environment depressing DO and changing chemistry.
SFWMD, Pg. 2, G.W. 2	In Section 5.2, Pg. 110, a statement that pollutant loading in the Florida Keys may have slight effects on water quality in the FKNMS is unclear. While on a macro-scale this may be accurate, on a micro-scale water quality is degraded near shore. Validation of the pollutant modeling can be done by checking predicted values against actual values in the literature and monitoring programs.

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GA/NGO Comments*	Summary of Comments
SFWMD, Pg. 2, G.W. 3	The preceding G.W. 1 and G.W. 2 items need to be discussed and clarified. Without a more detailed assessment, it appears that the model will not be adequate to assess water quality impacts.
SFWMD, Pg. 2, P.W. 1	In Section 4.2.2, Population, the CCIAM does not consider significant contributors to the permanent, seasonal, functional and transient populations and it may underestimate future infrastructure needs of future populations.
SFWMD, Pg. 3, P.W. 2	In Section 4.2.2, Population, if this component does not consider major contributors to population growth, then those components dependant on the projected population, such as water demand and wastewater generation, will not provide an accurate evaluation.
SFWMD, Pg. 3 P.W. 3	In Section 4.2.5, Potable Water Component, the CCIAM does not consider significant contributors to potable water demand such as Key West or the Navy and will underestimate projected potable water demands.
SFWMD, Pg. 3, P.W. 4	In Section 4.2.5, Potable Water Component, the District Water Use staff is concerned by the assumed increase in withdrawal from the Florida City well field. Alternative diversified sources must be considered to reduce the reliance on the regional system. If acceptable alternative sources for fresh water are identified then increased potable water demands can be used in the model.
SFWMD, Pg. 4, W.C. 1	Wastewater reuse should be considered as the most reasonable source for offsetting the irrigation demand of future development on potable water. In addition, consideration should be given to FDEP feasibility comments on deep well injection for wastewater disposal.
SFWMD, Pg. 4, W.C. 2	The CCIAM measures ecosystem health by pollutant loading amounts and seagrass abundance. Both of these measures may be flawed based on scientific studies on water quality and qualitative observations on seagrasses.
SFWMD, Pg. 5, W.C. 3	The model has not been previously tested for an environment like the Keys and it appears to be too simple to be truly useful.
SFWMD, Pg. 5, W.C. 4	The model is not capable of predicting water quality impacts related to the sanitary quality of near shore waters. The model does not review the presence of human pathogens that have been found in canals nor the sporadic beach closings. By ignoring this, there is no measure of harm to humans that could or already does exist from pollutants.
SFWMD, Pg. 5, W.C. 5	The assumption about future growth meeting all current wastewater standards is not clearly stated for the reader. The report needs to be clear that this is the reason that more growth will result in lower pollutant loading.
SFWMD, Pg. 5, W.C. 6	Another scenario is needed to the study that assumes that "existing" methods of wastewater treatment will be used for future growth. This will provide a broader picture of the effects of development on the marine ecosystem.
SFWMD, Pg. 5, W.C. 7	In summary, it is recommended that the study be modified to include the effects on human health from canal eutrophication, human pathogens, and beach closings. The studies on seagrasses should not be the only other measure of marine health. The water quality model should be modified to measure the effects of nutrient and pollutant loading on nearshore and canal waters. Another scenario needs to be added which assumes that "existing" wastewater treatment methods will be used for future growth.
SFWMD, Pg. 6, G.W. 1	The groundwater component of the CCIAM did not address the availability of groundwater near the Florida City well field for potable supply.
SFWMD, Pg. 6, G.W. 2	The groundwater component did not address the freshwater lenses on the larger islands such as Big Pine Key, which is the primary source of freshwater to sustain the Florida Key deer. Consideration must be given to the impact of future land uses on these groundwater resources.
FKCC, Pg. 30, Pgh. (last)	Instead of using available information, common sense, local knowledge, and good professional judgment to create a useful product, the CCIAM set impossible standards and was ultimately reduced to addressing only a very small portion of Keys natural resource issues and problems.

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GA/NGO Comments*	Summary of Comments
FKCC, Pg. 31, Pgh. 1	The study framework does not seem to be calculated to provide the answer it is required to provide. The right questions weren't asked or answered. The Keys are not suffering from singular big problems today (like the old days of dredging and filling), just a myriad of small day to day impacts even more damaging, that agencies find difficult and unpopular to deal with.
FKCC, Pg. 31, Pgh. 2	The CCIAM suffers from an inexplicable inability to state frank conclusions about seemingly clear science and data. The CCIAM – despite the serious flaws described above – appears to validate this (Corps Letter Report 1999) previous observation – in particular for terrestrial habitats.
FKCC, Pg. 31, Pgh. 3	A responsible scientific conclusion, based on these findings, is that further loss of Keys native plant communities will compound many existing problems in the Keys (including degraded water quality), threaten the continued existence of many rare and endangered plants and animals, and further impoverish an already impoverished area.
FKCC, Pg 32, Pgh. 1	The Test CCIAM should not be used in its current form for a natural resource carrying capacity model or even as an analytical tool to attempt to assess impacts of development. There are way too many shortcomings....
FKCC, Pg. 32, Gen. Rec. 1	Acknowledge that for a number of reasons no more loss of native plant communities (upland or wetland) should occur in the Keys. For those that are absolutely necessary for public purposes, mitigation and restoration should be used to offset the resource loss.
FKCC, Pg. 32, Gen. Rec. 2	Abandon the hunt for absolute quantitative thresholds to use to determine if there are habitats and species at risk in the Keys. Use good professional judgment, expert judgment, common sense, local knowledge, all available information, and stakeholder consensus about all identifiable resource impacts (direct or otherwise) to chart a course for the future of the Keys.
FKCC, Pg. 32, Gen. Rec. 3	The pace of land acquisition should be greatly accelerated in the Keys, with all agencies and especially the CARL Program, much more actively involved and committed to assist with the Carrying Capacity Process.
FKCC, Pg. 32, Gen. Rec. 4	Building on what has gone before, a plan for large scale restoration and enhancement of Keys natural habitats should be developed as a means of increasing the extent of the unique Keys native plant communities and properly managing the numerous rare and endangered species in the Keys.

\* The acronyms used above are: ELULC – Environmental & Land Use Law Center, Inc.; FFWCC – Florida Fish and Wildlife Conservation Commission; OTFOF – 1,000 Friends of Florida; WWFOC – World Wildlife Fund and The Ocean Conservancy; USEPA – U. S. Environmental Protection Agency; FKAA – Florida Keys Aqueduct Authority; SWFMD – South Florida Water Management District; and FKCC – Florida Keys Citizens Coalition.

## **APPENDIX C**

### **FORMULAS**

## C.1 SOCIOECONOMIC MODULE

### C.1.1 Look-up Values (Coefficients)

Based on existing conditions as expressed in the Monroe County tax roll database and assumes no change in future ratios.

- (SE1) Multiplier to convert permanent population to functional population = 1.86. From the Monroe County population projection data (MCPD).
- (SE2) Multiplier to estimate seasonal population from permanent population = 0.32. It is the percentage of total housing units that are seasonal using 2000 census data.
- (SE3) Multiplier to estimate transient population from seasonal and permanent population = 0.54. It is the remainder of the 0.86 multiplier once the seasonal population is removed.
- (SE4) Persons per Household, per Planning Unit = Reported in 2000 census data. Refer to Table C.1.
- (SE5) Hotel/Motel Room Density = Obtained from the Monroe County land development regulations.
- (SE6) Gross Floor Area per Capita =  $\text{Gross Floor Area Demand} / (\text{Permanent Population} + \text{Seasonal Population})$   
  
where Gross Floor Area Demand is obtained from the 2000 Monroe County tax roll, the Permanent and Seasonal Population is from the census 2000.
- (SE8) Hotel Rooms per Transient Person = 0.197 and is obtained from the Monroe County tax roll, transient population is from (SE3). Refer to Table C.2.
- (SE 9) Employment per 1,000 square feet of Gross Floor Area = Calculated from Monroe County tax roll database and County Business Patterns. Refer to Table C.2.
- (SE 10) Hotel Employees per Room = Calculated from the County Business Patterns and Florida Statistical Abstracts. Refer to Table C.2.

- (SE 11) Per Unit Construction Costs = Refer to Table C.2. Based on square-foot construction cost of appropriate commercial construction from Means Construction Cost, a standard construction estimating source document.
- (SE 12) Per Unit Average Taxable Value = Refer to Table C.3. Based upon current taxable value of new single-family dwelling unit from Monroe County Property Appraiser database.
- (SE13) Average Price of House = Refer to Table C.3. Based upon sales data in the Monroe County tax roll database for a new single family dwelling unit.
- (SE 14) Percentage of permanent dwelling units = Reported in 2000 census data. Refer to Table C.1

**C.1.2 Population resulting from changes in residential land use**

- (SE 15) Permanent population = dwelling units \* PPH \* percentage of permanent DU.  
  
Where dwelling units are from the land use map generated by the scenario, PPH is from (SE 4), and percentage of permanent DU is from (SE 13)
- (SE 16) Seasonal population = (SE 15) \* (SE 2)
- (SE17) Functional population = (SE15) \* (SE1)
- (SE18) Transient population = (SE15) \* (SE3)

**C.1.3 Estimates of floor area resulting from changes in non-residential land use**

- (SE 18) Gross Floor Area = sum of the GFA  
  
where GFA is obtained for each non-residential land use in the land use map generated by the scenario
- (SE 19) Hotel/Motel Rooms = Hotel/Motel Acres \* Hotel/Motel Room Density  
  
where Hotel/Motel Acres are from the land use map generated by the scenario, Hotel/Motel Room Density is from (SE 5)

**C.1.4 Estimates of population required to support the non-residential development generated in a scenario**

(SE 20) Population required to support non-residential land use = Gross Floor Area/Gross Floor Area per Capita

where Gross Floor Area is generated from the scenario land use map, Gross Floor Area per Capita is from (SE 6)

(SE 21) population required to support hotels = (Hotel/Motel Rooms) / Hotel Rooms per Transient Person

where Hotel/Motel Rooms are from (SE 19), Hotel Rooms per Transient Person are from (SE 8)

(SE 22) Employees Required = (Gross Floor Area/1,000) \* Employment per 1,000 square feet of Gross Floor Area

where Gross Floor Area is generated from the land use map, Employment per 1,000 square feet of Gross Floor Area is from (SE 9)

**C.1.5 Cost of New Construction**

(SE23) New Residential Construction Cost = (Total New Dwelling Units \* Average Construction Cost per Dwelling Unit)

where Total New Dwelling Units is generated from the land use map, Average Construction Cost per Dwelling Unit is from (SE 11)

(SE24) New Construction Cost = New Gross Floor Area \* Construction Cost per square foot

where New Gross Floor Area is generated from the land use map, Construction Cost per square foot is from (SE 11)

(SE 25) New Hotel Construction Cost = New Hotel/Motel Rooms \* Construction Cost per Hotel Room

where New Hotel/Motel Rooms is from (SE 19), Construction cost per hotel room is from (SE 11)

**C.1.6 Taxable Value of New Construction**

(SE 26) Residential Taxable Value = (Total New Dwelling Units \* Average Taxable Value per Dwelling Unit)

where Total Dwelling Units is generated from the land use map, Average Taxable Value per Dwelling Unit is from (SE 12)

(SE 27) Nonresidential Taxable Value = (Nonresidential Gross Floor Area \* Average Taxable Value per square foot of Nonresidential Gross Floor Area)

here Nonresidential Gross Floor Area is generated from the land use map, Average Taxable Value per square foot of Nonresidential Gross Floor Area is from (SE 12)

(SE 28) otel Taxable Value = (Hotel/Motel Rooms \* Average Taxable Value per Hotel Room)

where Hotel/Motel Rooms are from (SE 19), Average Taxable Value per Hotel Room is from (SE 12)

**C.1.7 Socioeconomic Indicators**

(SE 29) Total Payroll = Employees Available \* Average Annual Wage per Employee for each land use type

where Employees Available is from (SE 21), Average Annual Wage per Employee for each land use type is from *County Business Patterns*.

(SE 30) Added New Construction Cost = New Residential Construction Cost + New Nonresidential Construction Cost

where New Residential Construction Cost is from (SE 22), New Nonresidential Construction Cost is the sum of (SE 23) and (SE 24)

(SE31) Added Taxable Value = Added Residential Taxable Value + Added Nonresidential Taxable Value – Taxable Value of Land Acquired

where Residential Taxable Value is from (SE 25), Nonresidential Taxable Value is the sum of (SE 26) and (SE 27) and taxable value of lands acquired is from the land use map

(SE32) Non-residential Population Ratio = (SE15) / (SE20)

(SE33) Hotel Population Ratio = (SE18) / (SE21)

## C.2 FISCAL MODULE

### C.2.1 Look-up Values (Coefficients)

- (F1) Fiscal Year 1999-2000 government jurisdiction expenditures = Obtained from the Annual Local Government Financial Reports 1999-2000. Refer to Table C.4.
- (F2) Annual debt service and operating expenditures required for 100,000 square feet of school system space obtained from Monroe County School Board.
- (F3) Wastewater and storm water facilities required to serve population obtained from GIS data layer.
- (F4) Per capita operating cost from Fiscal Year 1999-2000 government jurisdiction expenditures obtained from each jurisdiction.
- (F5) School capital and capital operating costs obtained from Monroe County School Board.

### C.2.2 Expenditure Computations

- (F6) Per Capita Government Expenditures = Fiscal Year 1999-2000 government jurisdiction expenditures/functional population  
  
where Fiscal Year 1999-2000 government jurisdiction expenditures are from (F1), functional population is from (SE17)
- (F7) Per Capita Government Expenditures Adjusted for Unfunded Liabilities = [Fiscal Year 1999-2000 government jurisdiction expenditures + Annual debt service and operating expenditures required for 100,000 square feet of school system space + Wastewater and storm water facilities required to serve population] / Functional Population  
  
where Fiscal Year 1999-2000 government jurisdiction expenditures are from (F1), Annual debt service is from (F2), Wastewater and storm water facilities required to serve population is from (F3), Functional Population is from (SE17)
- (F8) Allocation of Expenditures by Planning Area = [(Per capita operating costs from Fiscal Year 1999-2000 government jurisdiction expenditures \* Functional Population) + Per Capita Government Expenditures Unfunded Liabilities + School Capital and Capital Operating Costs + Water, wastewater and stormwater facilities fixed capital and capital operating expenditures] / Functional Population

where Per capita operating costs from Fiscal Year 1999-2000 government jurisdiction expenditures are from (F1), Functional Population is from (SE17), Per Capita Government Expenditures Unfunded Liabilities are from (F7), School Capital and Capital Operating Costs are from (F5), Water, wastewater and stormwater facilities fixed capital and capital operating expenditures are from (F3), Functional Population is from (SE17)

### C.3 INFRASTRUCTURE MODULE

#### C.3.1 Traffic Computations

(TR1) Median speed =  $-0.016 * ((\text{acres residential} + \text{acres tourist land uses}) / \text{miles of US-1 in planning unit}) + 49.973$

where  $-0.016$  is the slope of the regression, acres residential and acres tourist land uses per mile of US1 in planning unit is from the land use GIS layer,  $49.973$  is the intercept of the regression

(TR2) Level of Service C for entire US-1: 45 mph (LOS per segment varies – per FDOT)

#### C.3.2 Hurricane Evacuation Computations

(HE1) Calculations per Miller Hurricane Evacuation Model.

(HE2) Clearance Time = 24 hours

### C.4 INTEGRATED WATER MODULE

#### C.4.1 Weather Component

(IWM1) Precipitation = Average Rainfall for period ( $t$ ) at wastewater planning unit ( $pu$ ) (Table C.5).

#### C.4.2 Potable Water Component

##### C.4.2.1 Look up Values (Coefficients)

(IWM2) Existing Equivalent Dwelling Unit = Allocated at the parcel level using best professional judgment. Refer to Table C.6.

(IWM3) New Equivalent Dwelling Unit = Based upon land use map generated from scenario.

- (IWM4) Average Water Usage Rate = Calculated based upon water use records in the Monroe County Sanitary Wastewater Master Plan (CH2MHILL 2000) and from the City of Key West. Refer to Table C.6, units are gpd/EDU.
- (IWM5) Primary Supply of Water = 22 MGD. Design capacity and permitted withdrawal for South Miami-Dade County Water Plant obtained from the FKAA.
- (IWM6) Secondary Supply of Water = 3 MGD. Generated by FKAA's two reverse osmosis plants located on Stock Island (2 MGD) and Marathon Key (1 MGD). Used for emergency backup supply, only periodically operated.
- (IWM7) Permit Capacity = 15.83 MGD for average annual daily water use with a peak daily limitation of 19.19 MGD. Based upon the SFWMD permit for the South Miami-Dade County Water Plant.
- (IWM8) Conveyance Capacity of Pipeline Segment = Obtained from the FKAA. Refer to Table C.7, units are MGD.

**C.4.2.2 Potable Water Computations**

- (IWM9) Existing Potable Water Demand = Average Water Usage Rate \* Existing EDU \* 10<sup>-6</sup>  
where Average Water Usage Rate is from (IWM4), Existing EDU is from (IWM2)
- (IWM10) New Potable Water Demand = Average Water Usage Rate \* New EDU \* 10<sup>-6</sup>  
where Average Water Usage Rate is from (IWM4), New EDU is from (IWM3)
- (IWM11) Total Daily Potable Water Demand = Existing Potable Water Demand + New Potable Water Demand  
  
where Existing Potable Water Demand is from (IWM9) and New Potable Water Demand is from (IWM10)
- (IWM12) Percent of Primary Supply Consumed = (Total Potable Water Demand / Primary Supply of Water) \* 100  
  
here Total Potable Water Demand is from (IWM11), Primary Supply of Water is from (IWM5)
- (IWM13) Percent of Secondary Supply Consumed = (Total Potable Water Demand / Secondary Supply of Water) \* 100  
  
where Total Potable Water Demand is from (IWM11), Secondary Supply of Water is from (IWM6)

(IWM14)  $\text{Percent of Permitted Capacity Used} = (\text{Total Potable Water Demand} / \text{Permit Capacity}) * 100$

where Total Potable Water Demand is from (IWM11), Permit Capacity is from (IWM7)

(IWM15)  $\text{Percent of Pipeline Conveyance Capacity Used} = (\text{Total Potable Water Demand} / \text{Conveyance Capacity of Pipeline Segment}) * 100$

where Total Potable Water Demand is from (IWM11), Conveyance Capacity is from (IWM8)

### **C.4.3 Stormwater Component**

#### **C.4.3.1 Look up Values (Coefficients)**

(IWM16) 0.95 = Impervious area rainfall-runoff ratio, based upon Monroe County Stormwater Management Master Plan (CDM 2000).

(IWM17) % Impervious = Directly Connected Impervious Area, based upon Monroe County Stormwater Management Master Plan (CDM 2000).

(IWM 18) 0.10 = Pervious area rainfall-runoff ratio, based upon Monroe County Stormwater Management Master Plan (CDM 2000).

(IWM19) 1/12 = Inches to feet conversion factor

(IWM20) Event Mean Concentration (EMC) = Calculated based upon stormwater monitoring data from 17 Florida MS4 communities for the common pollutants of concern. Refer to Table C.8, units are milligrams per liter.

(IWM21) Removal Rates for Best Management Practices (BMP) were obtained from the Monroe County Stormwater Management Master Plan (CDM 2000). See Table C.9.

(IWM22) 0.20 = Fraction of rainfall resulting in recharge from pervious areas

(IWM23) 43,560 = Acre-feet to cubic feet conversion factor

(IWM24) 28.317 = Cubic feet to liters conversion factor

(IWM25)  $10^{-6}$  = Milligrams to kilograms conversion factor

(IWM26) 2.205 = Kilograms to pounds conversion factor

(IWM27)  $\text{Runoff Coefficient} = (0.95 * \% \text{ Impervious}) + [(1 - \% \text{ Impervious}) * 0.10]$

where 0.95 is from (IWM16), % Impervious is from (IWM17), 0.10 is from (IWM18)

### C.4.3.2 Stormwater Computations

(IWM28)  $\text{Runoff Volume} = (1/12) * \text{Precipitation} * \text{Runoff Coefficient} * \text{Acreage of sub-element}$

where (1/12) is from (IWM19), Precipitation is from (IWM1), Runoff Coefficient is from (IWM27), Acreage of sub-element is from the land use map generated by the scenario

(IWM29)  $\text{Stormwater Pollutant Load} = \text{EMC} * \text{Runoff Volume} * 43,560 * 28.317 * 10^{-6} * 2.205$

where EMC is from (IWM20), Runoff Volume is from (IWM28), 43,560 is from (IWM23), 28.317 is from (IWM24),  $10^{-6}$  is from (IWM25), 2.205 is from (IWM26)

(IWM30)  $\text{BMP Load Reduction} = \text{Stormwater Pollutant Load} * \text{Removal Rate} * (\text{Acreage associated with BMP} / \text{Total Acreage of Catchment})$

where Stormwater Pollutant Load is from (IWM29), Removal Rate is from (IWM21), Acreage associated with BMP is from the land use map generated by the scenario, Total Acreage of Catchment is from GIS Catchment data layer

(IWM31)  $\text{Pollutant Load} = \text{Stormwater Pollutant Load} - \text{BMP Load Reduction}$

where Stormwater Pollutant Load is from (IWM29) and BMP Load Reduction is from (IWM30)

(IWM32)  $\text{Pervious Acreage} = [(\text{Runoff Coefficient} * \text{Acreage of Land Use}) - (0.95 * \text{Acreage of Land Use})] / (0.10 - 0.95)$

where Runoff Coefficient is from (IWM27), Acreage of Land Use is from the land use map generated by the scenario, 0.95 is from (IWM16), 0.10 is from (IWM18)

(IWM33)  $\text{Recharge Volume} = (1/12) * \text{Pervious Acreage} * \text{Precipitation} * 0.20$

where Pervious Acreage is from (IWM32), Precipitation is from (IWM1), 0.20 is from (IWM22)

(IWM34)  $\text{Groundwater Recharge Pollutant Load} = \text{EMC} * \text{Recharge Volume} * 43,560 * 28.317 * 10^{-6} * 2.205$

where EMC is from (IWM20), Recharge Volume is from (IWM33), 43,560 is from (IWM23), 28.317 is from (IWM24),  $10^{-6}$  is from (IWM25), 2.205 is from (IWM26)

**C.4.4 Wastewater Component**

**C.4.4.1 Look up Values (Coefficients)**

(IWM35) Volume of Wastewater per EDU = Refer to Table C.6, units are gallons per day per EDU

(IWM36)  $n$  = Wasteshed number as defined by the GIS Wasteshed data layer

(IWM37) Daily Pollutant Concentration = Modeled pollutant. Refer to Table C.10, units are milligrams per liter

(IWM38) 8.345 = Milligrams per liter to pounds per day conversion factor

**C.4.4.2 Wastewater Computations**

(IWM39) Point Source Discharge Volume = Volume of wastewater per EDU \* (Existing Equivalent Dwelling Unit + New Equivalent Dwelling Unit) \*  $10^{-6}$

where Volume of Wastewater per EDU is from (IWM35), Existing Equivalent Dwelling Unit is from (IWM2), New Equivalent Dwelling Unit (IWM3),  $10^{-6}$  is from (IWM25)

(IWM40) Point Source Discharge Load = Point Source Discharge Volume \* Daily Pollutant Concentration \* 8.345

where Point Source Discharge Volume is from (IWM39), Daily Pollutant Concentration is from (IWM37), 8.345 is from (IWM38)

(IWM41) Total Daily Volume of Wastewater to Groundwater = Total Point Source Discharge Volume for all wastesheds and days

where Point Source Discharge Volumes by Treatment Method are from (IWM39)

(IWM42) Total Wastewater Pollutant Load to Groundwater = Total Point Source Discharge Load for all wastesheds and days

where Point Source Discharge Loads by Treatment Method are from (IWM40)

**C.4.5 Groundwater Component**

**C.4.5.1 Look up Values (Coefficients)**

(IWM43) Saturated Groundwater Treatment Reduction Factor = A treatment reduction factor of 50% for total phosphate applies only for the saturated zone of the groundwater system. Refer to Table 4.7.

(IWM44) Unsaturated Groundwater Treatment Reduction Factor = A treatment factor of zero was applied to the unsaturated zone due to lack of available data in the literature specific for the Florida Keys. Refer to Table 4.7.

**C.4.5.2 Groundwater Computations**

(IWM45) Treated Stormwater Pollutant Load = Groundwater Recharge Pollutant Load \* Saturated Groundwater Treatment Reduction Factor \* Unsaturated Groundwater Treatment Reduction Factor

where Groundwater Recharge Pollutant Load is from (IWM34), Saturated Groundwater Treatment Reduction Factor is from (IWM43), Unsaturated Groundwater Treatment Reduction Factor is from (IWM44)

(IWM46) Wastewater Effluent Pollutant Load = Wastewater Pollutant Load \* Saturated Groundwater Treatment Reduction Factor \* Unsaturated Groundwater Treatment Reduction Factor

where Wastewater Pollutant Load is from (IWM42), Saturated Groundwater Treatment Reduction Factor is from (IWM43), Unsaturated Groundwater Treatment Reduction Factor is from (IWM44)

(IWM47) Sum of the Treated Pollutant Loads per Wasteshed = Treated Stormwater Pollutant Load + Wastewater Effluent Pollutant Load

where Treated Stormwater Pollutant Load is from (IWM45), Wastewater Effluent Pollutant Load is from (IWM46)

(IWM48) Volume to Groundwater = recharge volume + Sum of Wastewater Volumes per Wasteshed

where recharge volume is from (IWM33), Sum of Wastewater Volumes per Wasteshed (IWM41)

## C.5 TERRESTRIAL MODULE

All of the terrestrial module components use GIS spatial overlay processes to analyze impacts to ecosystems and species. Summary statistics are generated by querying the resulting GIS layers and, where available, compared to specific thresholds. See Chapter 9 of the report for a full discussion of this module.

**TABLE C.1  
DWELLING UNITS AND PERSONS PER HOUSEHOLD IN THE FLORIDA KEYS**

<b>Planning Unit</b>	<b>% Permanent Dwelling Unit</b>	<b>Persons per Household</b>
Bahia Honda/Ohio Key	68.7	2.20
Bay Point	81.9	2.32
Big Pine Key	68.8	2.20
Big/Mid Torch Key	60.4	2.18
Boca Chica	83.6	2.38
Cudjoe Key	60.3	2.18
Key West	82.8	2.21
Little Torch Key	60.4	2.18
Long Key/Layton	39.1	2.00
Lower Matecumbe	51.5	1.89
Lower Sugarloaf	81.6	2.32
Marathon Primary	71.2	2.21
Key Colony Beach	39.1	2.00
Paed 15	51.9	2.29
Paed 16	53.2	2.04
Paed 17	69.9	2.30
Paed 18	70.7	2.34
Paed 19 And 20	68.8	2.35
Ocean Reef Club	33.3	2.86
Paed 21 and Paed 22	33.3	1.86
Plantation Key	62.2	2.20
Ramrod Key	60.2	2.18
Stock Island	92.1	2.59
Summerland Key	60.2	2.18
Upper Matecumbe	51.5	1.89
Upper Sugarloaf	81.5	2.32
Windley Key	51.5	1.89

**TABLE C.2  
SOCIOECONOMIC MODULE COEFFICIENTS BY LAND USE TYPE**

	Residential	Nonresidential						
	New Single Family Home	Commercial				Hotel/Motel	Industrial	
		Retail	Services	Office	Entertainment		Light	Heavy
Gross Floor Area per Capita (square feet)	N/A	52.65	10.58	11.22	4.73	0.1972	8.57	2.17
Employment per 1,000 square feet of Gross Floor Area	N/A	2.18	10.56	4.07	1.75	0.673	0.25	0.50
Per Unit Construction Costs (square feet)	\$173,500 <sup>4</sup>	\$59	\$59	\$82	\$77	\$43,600 <sup>5</sup>	\$42	\$54
Average Annual Wage per Employee	N/A	\$17,591	\$17,592	\$28,357	\$25,659	\$15,561	\$26,515	\$24,322

N/A = Not Applicable.

<sup>1</sup> Hotel/Motel Room Density.

<sup>2</sup> Hotel Rooms per Transient Person.

<sup>3</sup> Hotel Employees per Room.

<sup>4</sup> Based on the average construction cost of a 3BR/2B unit in the Florida Keys.

<sup>5</sup> Cost per Hotel Room.

**TABLE C.3  
PROPERTY VALUES**

Planning Unit	RESIDENTIAL (per new single family house)			NONRESIDENTIAL						
	Average Price of House	Median Housing Value	Average Taxable Value	Commercial Square Foot Taxable Value				Hotel Room Taxable Value	Industrial Square Foot Taxable Value	
				Retail	Services	Offices	Entertainment		Light	Heavy
Bahia Honda/ Ohio Key	\$145,775	\$138,000	\$138,095	\$66.60	\$89.73	\$123.21	\$90.55	\$71,029	\$106.46	\$123.41
Bay Point	\$185,227	\$146,000	\$169,671	\$91.18	\$48.00	\$125.63	\$104.79	\$56,935	\$127.15	\$123.41
Big Pine Key	\$145,775	\$138,000	\$138,095	\$66.60	\$89.73	\$123.21	\$90.55	\$71,029	\$106.46	\$123.41
Big/ Mid Torch Key	\$151,500	\$151,500	\$187,626	\$87.89	\$108.58	\$125.63	\$104.79	\$56,935	\$127.15	\$123.41
Boca Chica	\$175,110	\$137,500	\$289,235	\$87.02	\$70.48	\$534.73	\$142.81	\$56,935	\$90.22	\$123.41
Cudjoe Key	\$183,918	\$183,000	\$193,502	\$103.79	\$111.22	\$113.74	\$104.79	\$56,935	\$61.77	\$124.67
Key West	\$352,427	\$282,000	\$430,008	\$129.45	\$201.69	\$162.33	\$199.36	\$76,667	\$96.10	\$249.02
Little Torch Key	\$199,400	\$215,000	\$192,865	\$87.89	\$194.06	\$125.63	\$104.79	\$45,227	\$127.15	\$123.41
Long Key/ Layton	\$200,982	\$167,500	\$185,345	\$62.21	\$84.76	\$156.78	\$104.79	\$33,694	\$127.15	\$123.41
Lower Matecumbe	\$280,327	\$250,000	\$305,668	\$143.88	\$126.21	\$47.38	\$104.79	\$46,312	\$127.15	\$123.41
Lower Sugarloaf	\$235,055	\$237,000	\$296,689	\$104.52	\$108.58	\$125.63	\$104.79	\$63,651	\$127.15	\$123.41
Marathon Primary	\$286,875	\$237,000	\$283,553	\$77.59	\$97.70	\$118.03	\$63.50	\$51,040	\$97.25	\$120.27
Key Colony Beach	\$260,775	\$217,650	\$206,625	\$99.28	\$106.33	\$109.28	\$104.79	\$55,525	\$147.17	\$101.54
Paed 15	\$232,823	\$125,000	\$240,084	\$85.87	\$108.58	\$78.30	\$75.89	\$56,935	\$321.74	\$123.41
Paed 16	\$368,667	\$283,500	\$329,580	\$35.18	\$98.63	\$64.47	\$104.79	\$56,935	\$127.15	\$123.41
Paed 17	\$299,266	\$251,900	\$349,058	\$101.65	\$102.06	\$95.51	\$104.79	\$37,086	\$127.15	\$83.69
Paed 18	\$145,427	\$130,000	\$148,851	\$87.89	\$108.58	\$125.63	\$89.34	\$56,935	\$127.15	\$123.41
Paed 19 And 20	\$170,660	\$147,000	\$148,001	\$67.13	\$129.65	\$106.64	\$104.79	\$73,889	\$67.94	\$123.41
Ocean Reef Club/ Paed 21	\$344,917	\$239,500	\$255,230	\$74.16	\$94.46	\$98.12	\$126.16	\$56,935	\$127.15	\$123.41
Paed 22	\$380,000	\$380,000	\$304,552	\$102.84	\$108.58	\$125.63	\$104.79	\$56,935	\$127.15	\$123.41
Plantation Key	\$275,166	\$204,400	\$290,312	\$79.16	\$76.61	\$74.81	\$98.12	\$49,900	\$127.15	\$59.94
Ramrod Key	\$162,801	\$166,100	\$157,191	\$113.25	\$101.00	\$87.77	\$104.79	\$78,477	\$127.15	\$123.41
Stock Island	\$254,523	\$267,000	\$451,171	\$75.27	\$96.12	\$107.69	\$48.90	\$56,935	\$70.78	\$110.96
Summerland Key	\$273,467	\$270,000	\$235,724	\$114.06	\$157.14	\$124.18	\$104.79	\$56,935	\$112.81	\$123.29
Upper Matecumbe	\$326,342	\$190,000	\$398,555	\$89.68	\$99.22	\$72.62	\$50.47	\$45,825	\$127.15	\$123.41
Upper Sugarloaf	\$232,829	\$169,450	\$98,470	\$51.21	\$87.38	\$171.93	\$104.79	\$56,935	\$127.15	\$123.41
Windley Key	\$1,550,000	\$1,550,000	\$289,228	\$112.02	\$120.12	\$125.63	\$187.69	\$54,040	\$127.15	\$123.41

**TABLE C.4**  
**GOVERNMENT JURISDICTION EXPENDITURES FISCAL YEAR 1999-2000**

<b>Government Jurisdiction</b>	<b>Total Expenditures</b>
Marathon	\$802,394
Islamorada	\$17,199,690
Key Colony Beach	\$2,179,903
Key West	\$79,343,366
Layton	\$110,944
Monroe County	\$251,195,541
Florida Keys Mosquito Control	\$6,012,041
SFWMD	\$6,721,093
Florida Keys Aqueduct Authority	\$26,083,095
Monroe County Housing Authority	\$1,559,840
Monroe County School Board	\$85,366,337
Lower Florida Keys Hospital District	\$2,868,663

**TABLE C.5  
AVERAGE ANNUAL AND MONTHLY RAINFALL DATA**

Station	ID	Source	Study Area	Period of Record (years)	Annual Rainfall (decimal inches)							
					Average	Dry	Wet					
Key West	RS-2	SFWMD and EarthInfo	Key West	92	37.63	26.81	51.82					
Marathon	RS-4	SFWMD	Marathon Primary	26	35.07	22.78	55.01					
Long Key	RS-6	SFWMD	Long Key/Layton	20	40.50	29.47	55.17					
Lignumvitae	RS-7	EarthInfo	Lower Matecumbe	35	38.25	26.56	54.06					
Tavernier	RS-9	SFWMD	Tavernier PAED 15	63	41.26	25.40	59.42					
TPTS	RS-10	SFWMD	PAED 21	11	43.39	26.17	64.75					
Station ID	Avg.	Dry	Wet	Avg.	Dry	Wet	Avg.	Dry	Wet	Avg.	Dry	Wet
January			February			March			April			
RS-2	0.92	0.16	4.19	0.97	0.18	3.75	0.91	0.13	3.82	1.04	0.18	4.54
RS-4	1.17	0.23	5.36	1.25	0.27	2.98	0.89	0.12	4.07	0.74	0.12	3.92
RS-6	0.93	0.22	3.91	0.87	0.25	3.10	0.90	0.14	3.33	1.39	0.38	3.75
RS-7	0.85	0.15	3.95	0.81	0.13	3.18	0.48	0.04	3.97	0.59	0.04	5.37
RS-9	1.11	0.18	3.91	1.17	0.21	3.91	1.08	0.15	4.72	1.15	0.17	5.07
RS-10	1.68	0.46	6.98	0.87	0.11	6.76	1.72	0.67	4.16	0.38	0.02	7.14
May			June			July			August			
RS-2	2.10	0.43	6.34	3.36	1.00	9.44	2.86	1.09	6.80	3.99	2.01	7.68
RS-4	2.09	0.45	8.99	3.60	0.89	11.25	2.91	0.96	6.98	3.83	2.01	7.48
RS-6	2.69	0.69	7.95	2.30	0.74	5.79	3.29	1.10	7.59	5.37	2.74	9.91
RS-7	2.25	0.41	6.81	3.33	0.46	12.21	3.13	0.83	5.93	2.68	0.64	5.87
RS-9	3.00	0.94	8.47	4.71	1.43	13.54	3.40	1.32	7.68	4.40	1.96	8.64
RS-10	1.77	0.55	6.42	4.75	0.94	22.05	2.74	1.31	6.43	6.11	3.61	9.58
September			October			November			December			
RS-2	5.59	3.09	10.19	4.13	1.52	10.65	1.20	0.20	5.80	1.13	0.26	4.51
RS-4	5.15	1.58	11.53	5.06	2.49	9.71	0.94	0.22	4.08	1.14	0.32	4.22
RS-6	7.17	3.45	13.03	7.14	3.43	15.36	1.32	0.30	5.81	0.57	0.06	3.53
RS-7	3.16	0.29	13.70	3.79	0.58	10.39	0.65	0.06	4.53	0.64	0.07	3.85
RS-9	6.35	3.26	12.18	5.61	2.34	12.35	1.40	0.27	5.74	1.27	0.30	4.72
RS-10	5.14	3.19	8.29	5.89	1.80	15.24	1.54	0.27	8.40	1.39	0.39	4.86

**TABLE C.6  
ESTIMATED EQUIVALENT DWELLING UNITS**

<b>No.</b>	<b>Study Area</b>	<b>Average Water Usage Rate/ Wastewater Generation gpd/ EDU</b>	<b>Equivalent Dwelling Units</b>	<b>Existing Potable Water Demand/Total Wastewater Flow (MGD)</b>
1	Stock Island	168	3,009	0.51
2	Boca Chica	149	2,555	0.38
3	Bay Point	119	362	0.04
4	Lower Sugarloaf	181	754	0.14
5	Upper Sugarloaf	156	573	0.09
6	Cudjoe Key	110	1,770	0.19
7	Summerland Key	149	2,810	0.42
8	Big Torch/Middle Torch Key	200	102	0.02
9	Ramrod Key	146	526	0.08
10	Little Torch Key	135	853	0.12
11	Big Pine Key	132	4,040	0.53
12	Bahia Honda/Ohio Key	160	490	0.08
13	Marathon Primary	160	8,796	1.41
14	Marathon Secondary	172	2,167	0.37
15	Long Key/Layton	116	978	0.11
16	Lower Matecumbe	151	1,250	0.19
17	Upper Matecumbe	167	2,491	0.42
18	Windley Key	150	926	0.14
19	Plantation Key	158	4,118	0.65
20	Tavernier, PAED 15	125	2,115	0.26
21	Rock Harbor, PAED 16	115	2,528	0.29
22	PAED 17	155	3,302	0.51
23	PAED 18	134	3,080	0.41
24	PAED 19 & 20	143	3,373	0.48
25	PAED 22	160	0	0.00
26	PAED 21	160	205	0.03
27	Ocean Reef Club	112	2,602	0.29
	<b>SUBTOTAL AVERAGE</b>	<b>147</b>	<b>55,775</b>	<b>8.09</b>
28	Key West	132	32,350	4.27
	<b>GRAND AVERAGE</b>	<b>147</b>	<b>88,125</b>	<b>12.35</b>

**TABLE C.7  
CONVEYANCE CAPACITY OF PIPELINE**

<b>Transmission Main From</b>	<b>Transmission Main To</b>	<b>FKA Area</b>	<b>Pipe Diameter (inches)</b>	<b>Estimated Capacity (MGD)</b>
MM 130 (WTP)	MM 90	5	36	32.0
MM 90	MM 48	3, 4	30	22.5
MM 48	Key West City Limits	2, 3	24	14.5
Key West City Limits	End	1	18	8.0

**TABLE C.8  
SELECTED EVENT MEAN CONCENTRATIONS**

Parameter	EMC (mg/l)	EMC (10%)	EMC (90%)	EMC (mg/l)	EMC (10%)	EMC (90%)	EMC (mg/l)	EMC (10%)	EMC (90%)
LAND USE:	LDR			MDR			HDR		
Total Nitrogen	2.95	1.35	17.53	1.62	0.71	9.20	2.09	0.95	12.34
Total Kjeldahl Nitrogen	2.36	1.08	13.96	1.26	0.56	7.28	1.29	0.57	7.44
Nitrite and Nitrate	1.03	0.44	5.77	0.30	0.13	1.72	0.89	0.39	5.07
Total Phosphorus	0.39	0.17	2.27	0.46	0.20	2.64	0.32	0.14	1.88
Ortho-Phosphorus	0.21	0.10	1.25	0.25	0.11	1.43	0.19	0.09	1.11
Biochemical Oxygen Demand	9	4	54	12	5	71	15	6	79
Chemical Oxygen Demand	74	32	415	54	23	302	69	32	410
Total Suspended Solids	35	16	206	32	14	188	23	10	135
Total Dissolved Solids	134	61	794	92	40	525	287	103	1,336
Cadmium	0.0029	0.0013	0.0171	0.0013	0.0006	0.0073	0.0019	0.0008	0.0106
Copper	0.0185	0.0084	0.1092	0.0219	0.0100	0.1294	0.0639	0.0229	0.2966
Lead	0.0166	0.0076	0.0981	0.0157	0.0069	0.0898	0.0111	0.0049	0.0633
Zinc	0.0723	0.0331	0.4295	0.0580	0.0260	0.3375	0.0522	0.0230	0.2985
LAND USE:	COMMERCIAL			INDUSTRIAL			ROADWAYS		
Total Nitrogen	2.04	0.93	12.02	2.89	1.32	17.12	1.44	0.57	7.45
Total Kjeldahl Nitrogen	1.55	0.70	9.13	1.32	0.57	7.38	1.46	0.61	7.96
Nitrite and Nitrate	0.66	0.29	3.80	0.80	0.34	4.38	0.26	0.12	1.51
Total Phosphorus	0.32	0.15	1.92	0.44	0.20	2.57	0.26	0.12	1.57
Ortho-Phosphorus	0.17	0.08	1.03	0.22	0.10	1.30	0.08	0.03	0.45
Biochemical Oxygen Demand	25	9	123	11	5	61	8	4	49
Chemical Oxygen Demand	87	39	508	67	29	379	77	33	425
Total Suspended Solids	57	26	332	68	30	396	40	18	239
Total Dissolved Solids	233	95	1,239	172	79	1,020	132	59	766
Cadmium	0.0033	0.0015	0.0195	0.0071	0.0027	0.0355	0.0016	0.0007	0.0088
Copper	0.0193	0.0088	0.1141	0.0765	0.0253	0.3285	0.0170	0.0069	0.0895
Lead	0.0181	0.0080	0.1039	0.0621	0.0261	0.3392	0.0250	0.0069	0.0901
Zinc	0.1100	0.0503	0.6531	0.1302	0.0590	0.7658	0.0482	0.0220	0.2856

**TABLE C.9**  
**BMPs AND POLLUTANT REMOVAL RATES (%)**

<b>BMP</b>	<b>Description</b>	<b>TN</b>	<b>TP</b>
1	Extended Dry Detention	10	25
2	Wet Detention	30	45
3	Retention	95	95
4	Swales	20	40
5	Retention Swales with Wet Detention	74	80
6	Bioretention		77
7	Water Quality Inlets and Baffle Boxes	5	35
8	Infiltration Drainfields	83	65
9	Modular Treatment System (StormTreat <sup>®</sup> )	77	90
10	Porous Pavement	83	65
11	Sand Filters	21	33
12	Stormwater Wetlands	28	49
13	Alum Treatment	50	90
<b>BMP</b>	<b>Description</b>	<b>BOD</b>	<b>TSS</b>
1	Extended Dry Detention	25	85
2	Wet Detention	30	85
3	Retention	95	95
4	Swales	30	80
5	Retention Swales with Wet Detention	76	96
6	Bioretention		90
7	Water Quality Inlets and Baffle Boxes	25	80
8	Infiltration Drainfields		89
9	Modular Treatment System (StormTreat <sup>®</sup> )		99
10	Porous Pavement		89
11	Sand Filters	70	70
12	Stormwater Wetlands		67
13	Alum Treatment	75	90

**TABLE C.10  
MODELED POLLUTANTS**

<b>Treatment Method</b>	<b>BOD</b>	<b>TSS</b>	<b>TN</b>	<b>TP</b>
NO STRUCTURE	200	200	35	6
CESSPOOL	200	200	35	6
SEPTIC TANK	10	10	25	5
ATU	10	10	10	1
SUB-STD SEPTIC	140	85	32	6
FDEP SECOND	20	20	25	5
IQ/PART II	10	10	10	1
IQ/PART III	5	5	10	1
OWNRS	10	10	10	1
AWT	5	5	3	1
ADV SEC WWT	10	10	10	1
BAT	10	10	10	1

## **APPENDIX D**

### **PUBLIC INFORMATION AND INVOLVEMENT PLAN PREPARED BY THE MARKET SHARE COMPANY**

## **PIIP REPORT PREPARED BY THE MARKET SHARE COMPANY**

At the outset of the FKCCS public involvement efforts, The Market Share Company (TMSC) prepared a Public Information and Involvement Plan (PIIP) in accordance with the Florida Keys Carrying Capacity Study (FKCCS) Scope of Work. TMSC presented a draft for Study Team review within three weeks of date of award. Following three additional revisions, the Study Team approved the PIIP. TMSC has continuously referred to the approved PIIP for direction throughout the course of the Study.

### **1. Preparation of PIIP Plan**

The PIIP addressed the following issues:

- Informing the citizens of the Study
- Involving the community in the CCIAM development process
- Creating a Stakeholder's database
- Identifying and involving local media
- Creating a plan to identify and correct misinformation in local media and from the public
- Creating a Speakers Bureau
- Creating a Traveling Exhibit that contains educational information about the FKCCS
- Developing a productive relationship with local stakeholders
- Utilizing non-traditional public involvement methods and public outreach efforts to include avenues to reach traditionally non-verbal members of the community.

In accordance with the Scope of Work and as directed in the PIIP, the following draft of the PIIP Report summarizes all public information and involvement activities to date.

The program included the following components:

#### **A. Research**

For purposes of foundational background for the Study Team's research, sub-consultant R. Brooks White compiled a bibliography of previous public opinion surveys taken in the Florida Keys.

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**(1) Previous Public Survey Compilation**

All sources of public opinion surveys were researched, both public and private. The list contained 21 previous surveys. A digital version of the list was provided by TMSC. The Previous Public Survey Report (option #1) was not exercised.

The following areas of public surveys were researched: natural resources, wastewater, stormwater, water quality, ecosystems and species of concern, human infrastructure, transportation and hurricane evacuation, social environment, socio-economics, sustainable tourism, quality of life, community character, rate of growth and land use regulations.

In researching the availability of such studies, three methods were utilized to collect data. A list of special-interest organizations in the Florida Keys that may have had access to private studies was compiled and a request was sent out to each of these groups asking for their input. Secondly, a search was conducted on the Internet for references to possible surveys. Finally, local agencies were contacted including Monroe County libraries and local college libraries, county and municipal planning departments, Emergency Management, Federal Marine Sanctuary, United States Navy, various conservation organizations, chambers of commerce, tourism development groups, various departments of the state of Florida such as Transportation, Department of Community Affairs, Environmental Protection, Everglades Management, and the South Florida Water Management District.

For all previous surveys that were identified, the following information was captured: date, title, location, purpose, responsible agency of organization, current point of contact, approximate sample size and sample methodology.

Upon review of the list of previous public opinion surveys and the accompanying pertinent information, TMSC and the Study Partners made a professional determination that these surveys did not contain information that would be usable for the purposes of the study. This was determined by virtue of the following:

- The Final Management Plan survey was conducted in 1966 and contained outdated information.
- The Lower SE Florida Hurricane Evacuation Study survey was conducted in 1983 and contained outdated information.
- The Importance and Satisfaction Ratings by Recreating Visitors to the Florida Keys and Key West survey, the Occupancy and Travel Average Daily Rates survey, the Visitor Profile survey, the Origin and Destination survey, and the Gay and Lesbian Visitor survey were all conducted with tourists as the only people surveyed, leaving the data void of local community character.
- The Economic Contribution of Recreating Visitors survey and the Non-market Economic User Values survey were conducted with 73.5% of the responses coming from tourists, leaving the local community character data skewed.

- The Key West Citizen Poll survey consisted of a different question that was published daily in a newspaper that is mainly distributed to the Lower Keys and Key West. Not all of the phoned-in responses to the question were published. There was no control on the system to prevent the same individuals from calling in repeatedly on any given day.
- The Monroe County Sanitary Wastewater Master Plan, which was listed as a survey, was actually an inventory of wastewater facilities.
- The US One Arterial Travel Time and Delay Study was listed as a survey, but was actually an observation of automobiles at 24 locations throughout the Keys.
- The Socio-Economic Analysis of Alternatives had a sample size of only 16 people.
- The Water Quality Report survey had a sample size of only 300 people.
- The Noise Complaint Analysis of Air Traffic survey had a sample size of only 100 people. The only people surveyed were those calling in to complain.
- The Central Office Code Utilization survey listed its purpose as telephones and its sample size as not applicable.
- The Voter Survey of Tourism Impacts was mailed only to registered voters of Monroe County. Individuals who stated that they had not received their copy in the mail were given additional surveys. The survey was widely criticized by the business community because of the methodology used and because citizens felt the survey was worded in such a manner as to lead the person completing it to certain conclusions.
- The Comprehensive Plan, Appendix A survey, applied only to the Village of Islamorada.
- The Marathon Incorporation survey applied only to the city of Marathon.
- The Livable CommuniKeys Program Newsletters survey applied only to Big Pine Key and No Name Key.
- The Origin and Destination survey applied only to Big Pine Key and No Name Key.

**(2) Formal Random Public Survey**

The Formal Random Public Survey (option #2) was not exercised.

## **B. Media Program**

The media has served as the primary method through which TMSC has shared information regarding the FKCCS with the public.

### **(1) Media Contact**

TMSC developed and maintained a comprehensive list of media contacts within the community that included both print and broadcast, which was updated on a regular basis – see attachment #1. At the outset of media coordination efforts, TMSC informed all key members of the media about the FKCCS.

### **(2) Media Coordination**

Media coordination efforts also included the arrangement of press and radio opportunities for Study Team members prior to public meetings. Throughout the timeline of the Scope of Work, TMSC has served as the primary contact for media requests for the Study Team and has coordinated, documented and responded to all requests – see attachment #2.

### **(3) Newspaper Article Clipping Service**

As a vehicle for tracking applicable and significantly related issues, as well as identifying misinformation about the FKCCS, TMSC monitored and clipped 23 volumes of articles to date from all Keys' publications, including newsletters and special interest group publications. This service included but was not limited to the following publications:

- The Miami Herald
- The Key West Citizen
- Celebrate
- El Faro
- Solares Hill
- Island News (no longer in publication)
- Lower Keys Barometer
- Lower Keys Free Press Navigator
- Keynoter
- Free Press (Marathon)

- The Reporter (Tavernier)
- Upper Keys Independent
- Free Press (Islamorada)
- Free Press (Ocean Reef)
- The Breeze

This service included but was not limited to articles and editorials that addressed the following topics:

- Social Environment
- Land Use/Growth
- Tourism
- Transportation
- Stormwater
- Water Quality
- Wastewater
- Ecosystems
- Species of Concern
- Hurricane Evacuation
- Florida Keys Carrying Capacity Study

TMSC maintains an extensive library of clippings that reflect the diversity of issues, opinions, and community character that make up the Florida Keys. Copies of each clipping have been sent to the Study Partners on a weekly basis. The Study Team was notified by fax and e-mail of any articles or Letters to the Editor with misinformation about the FKCCS that required immediate response.

#### **(4) News Media Coverage**

Extensive research was performed to identify appropriate opportunities for the Study Team. Monroe County has no major television network affiliates. Radio interviews with study team members were coordinated to correspond with major milestones within the FKCCS. At the first series of public meetings, U.S. 1 Radio and SUN 103 conducted interviews. At the second series

of public meetings milestone, radio interviews were arranged with US 1 Radio and SUN 103. At the Scenario Development Workshop in June '01, radio interviews were arranged with U.S. 1 Radio and SUN 103.

In September 2001, the opportunity for the FKCCS to be the subject of a Waterways program was identified by TMSC and forwarded to the Study Partners. Waterways is a half-hour TV program with an environmental focus and 3 million viewers in South Florida, according to producer Erik Hutchins. Waterways Executive Producer Cheva Heck is the public relations spokesperson for the FKNMS. Waterways is broadcast in the Florida Keys on Channel 19 and also sent to approximately 50 different organizations including schools, according to Hutchins. Waterways is financed by the EPA, the FKNMS and the Everglades National Park, according to Hutchins. With the approval of Study Team members, the producer of the program has been given the appropriate contact information.

**(5) Identify and Correct Media Misinformation and Inaccuracies**

As a result of the strength and the execution of the PIIP, TMSC has rarely been called upon to correct media misinformation. To date, misinformation has appeared in the media only four times during the entire course of the Study. In each case immediate action was taken to correct it.

**(6) News Releases**

TMSC identified and developed news release story ideas in accordance with the Study's budgetary constraints. TMSC submitted each release for approval to the Study Team in a timely fashion. TMSC has written and distributed press releases and public notices. To date, 104 stories or references to the FKCCS have appeared in the local press including various chamber and other special interest organization newsletters.

**(7) Guest Editorial Columns**

TMSC was available to produce guest editorial columns as requested throughout the Study. To date, the Study Team has requested one guest editorial column, which was published in the local media on September 22, 2000. A copy of the editorial was forwarded to the Study Team in accordance with the Scope of Work.

**(8) Website**

TMSC reviewed the existing FKCCS Website and provided suggestions and recommendations to the Study Team in the PIIP. TMSC continues to monitor the Website as the Study progresses. At the request of the Study Team, TMSC has provided information for the FKCCS Website.

**(9) Video**

At the outset of the study, TMSC provided the Study Team with the cost of producing a basic educational video (option #4) and that option has not been exercised. More recently, TMSC has identified an opportunity to accomplish this through the Waterways television programming at no cost to the project.

**C. Meetings and Workshops**

TMSC provided support in the monitoring of local meetings on topics relevant to the Study. Agendas for meetings of the local government municipalities, chambers of commerce and special interest groups were reviewed for references to the FKCCS. TMSC set up and attended the Traveling Exhibit, which includes brochures and other printed materials, as requested by the Study Team.

**(1) Public Meetings**

The first series of public meetings were held in:

- Key Largo                      July 18, 2000
- Marathon                      July 19, 2000
- Key West                      July 20, 2000

As a result of the first series of public meetings an additional meeting and location was incorporated in the second series of public meetings to accommodate the diversity of needs within the Florida Keys.

The second series of public meetings were held in:

- Marathon                      March 20, 2001
- Islamorada                    March 21, 2001 (5:30 p.m.)
- Key Largo                      March 21, 2001 (7:30 p.m.)
- Key West                      March 22, 2001

A third series of public meetings will be held in January 2002.

- Marathon                      January 15, 2002
- Key Largo                      January 16, 2002

Key West

January 17, 2002

To accomplish the crucial goal of getting the word out to the general public and to engage minority communities, TMSC utilized the FKCCS Traveling Exhibit to announce public meetings at such areas as public housing facilities, libraries, and community banks. In addition to the traditional media outlets, news releases were also distributed to the community's only Spanish newspaper and to special interest groups for inclusion in their newsletters, such as the Gay and Lesbian Center and the Business Guild. TMSC also arranged for special interest groups to announce the dates of the FKCCS public meetings at their organization's meetings.

- (a) For each series of public meetings TMSC performed pre-meeting planning and logistics including procurement of meetings sites that did not require a rental fee, security from the Monroe County Sheriff's office and the hiring of Paul Clayton of Paul E. Clayton & Associates to serve as facilitator at the first and second series of public meetings. TMSC also provided support to the Study Team at the meetings.
- (b) TMSC created press kits and speaker cards for the FKCCS series of public meetings.
- (c) TMSC prepared an agenda with input and final approval from the Study Team for the series of public meetings.
- (d) TMSC prepared and published public notices for each series of public meetings pursuant to USACE and DCA requirements.
- (e) TMSC prepared and distributed press releases for each series of public meetings. A media kit was prepared for each series of public meetings, which also included a Fact Sheet and a Frequently Asked Question sheet — see attachment #3 and #4.
- (f) TMSC documented video and audio records of the meetings and provided minutes from the meetings in hard copy and electronic format. All tapes were turned over to the Study Team.
- (g) Following the meetings, TMSC provided the study team with a synopsis of public comments and concerns in accordance with the Scope of Work. At the public meetings, citizens were given a verbal and a written opportunity to voice their concerns. An extensive Comment Tracking System was created by TMSC to record this information. It is regularly updated.

## (2) Community Meetings

Throughout the duration of the Study, ample opportunities were developed by TMSC to provide an avenue for the Study Team to furnish information to the public and enhance public awareness

and understanding of the FKCCS. TMSC arranged for members of the Study Team to speak directly to community groups through the establishment of the FKCCS Speakers Bureau.

**(3) Study Team/Working Group Meetings**

In an effort to both advise the Study Team and working group members on public information and involvement activities and to ensure TMSC stayed up to date and informed on the progress of the Study, TMSC representatives have attended study team/working group meetings and participated in bi-weekly teleconference meetings as requested by the Study Team.

TMSC representatives have attended the following meetings:

March 22 and 23, 2000	Study Team Workshop
October 4, 2000	Working Group Meeting
November 15, 2000	Working Group Meeting
January 9 and 10, 2001	Technical Wrap-up Workshop
February 21, 2001	Working Group Meeting
June 19, 2001	Scenario Workshop
August 20, 2001	Scenario Follow-up Workshop
October 15, 2001	Scenario Workshop

In addition, the public was invited to a series of Scenario Development Workshop meetings held for local land planners. An opportunity for public questions and comments were provided at the end of each workshop. In addition to being publicized through press releases and PSAs in local media, meeting notices were mailed to approximately 6,000 stakeholders inviting them to attend the Scenario Development Workshop in October.

**(4) Government Meetings**

TMSC was available to attend all government meetings as directed by the Study Team and contacted Monroe County and all local municipalities to arrange receipt of commission meeting agendas on a monthly basis.

**D. Stakeholder Relations**

**(1) Mailing List**

TMSC developed a computerized stakeholder mailing list that consisted of individuals, elected officials, local, state, and federal government agencies, citizen groups, community organizations, and key members of minority communities that have an interest in the FKCCS and the future of the Florida Keys. The list is capable of being subdivided and sorted. It is updated on a regular basis and currently includes approximately 6,000 names and addresses.

**(2) Comment Tracking System**

TMSC has created a database for public comment and maintains a tracking system that records verbal and written comments from public meetings and during the public comment portion of workshops, meetings and Speaker Bureau presentations, written comments received by mail, email and on the FKCCS website, telephone comments and all other public input received on the FKCCS during the course of the Study. The Study Team has been provided with regular updates as comments are recorded in the Comment Tracking System. To date, the database contains 134 public comments. TMSC has also converted the database into HTML for use on the FKCCS Website.

**E. Public Information/Education/Awareness**

As stated in the beginning of this report, TMSC has identified FKCCS information to be exchanged and prepared public information materials to accomplish this goal. As part of the Public Information and Involvement Plan, TMSC was tasked with providing community character/quality of life information for the Florida Keys. In addition to the Comment Tracking System, Clipping Service and Stakeholder Database, TMSC developed a variety of methods to gather community character information for the FKCCS.

**(1) Information Exchange Program**

The PIIP plan identified public information objectives, information to be provided to and obtained from stakeholders, groups, or interests with whom information must be exchanged, circumstances that may affect the selection of public information techniques and methods utilized to accomplish these goals. Key issues of the Study were addressed in public information materials prepared by TMSC.

At the first series of public meetings, TMSC collected qualitative community character information — see attachment #5. From the qualitative information, which was provided by the public, TMSC developed a quantitative ranking system for 17 issues of public concern specific to the Keys in an attempt to establish and document an understanding of community character for inclusion in the Study — see attachment #6.

Technical advisors to the Study Team assisted the TMSC in the undertaking of the gathering community character information were Dr. Gary Machlis, visiting chief social scientist, National Park Service and Dr. Frank T. McAndrew of Knox College in Galesburg, IL.

Due to the FKCCS time frame, it was not possible for TMSC to produce and document the results of a formal, statistically valid survey. However, it is our professional opinion that while the information gathered does not reflect the opinions of every citizen in Florida Keys, it still provides a picture of community character issues and concerns.

**(2) Public Information Materials**

TMSC prepared public information materials in accordance with the Scope of Work and with the approval of the Study Team.

**(a) Brochures**

TMSC was tasked to develop three brochures at key progress points in the Study. The goal of the first brochure, of which 2000 copies were produced in August 2000, was to provide an introduction to the FKCCS. It served as a part of the FKCCS Traveling Exhibit and contained an overview of the FKCCS, an explanation of the purpose of the Study, biographies of the Study Team and information on how the public could become involved in the Study. See attachment #7.

The second brochure was produced by TMSC prior to the March 2001 series of public meetings. It contains information on the Study goal, the Study history, the CCIAM, the Routine Planning Tool, the opportunities for public involvement, the timeline, the FKCCS Website and the Study Team contact information. It was mailed to approximately 6,000 stakeholders as an announcement and invitation to attend the second series of public meetings. It has also served to update the general public on the progress of the Study as an integral part of the FKCCS Traveling Exhibit. See attachment #8.

The third brochure is projected for production immediately prior to the completion of the draft FKCCS report to summarize the Study process and results. It will continue to serve as an integral part of the FKCCS Traveling Exhibit and update the public on the progress of the Study.

**(b) Speaker's Bureau**

The FKCCS Speaker's Bureau was developed by TMSM to give the Study Partners an avenue of direct communication to the varied organizations throughout the Florida Keys that have an interest in the Study. Participating groups were civic organizations, homeowner's associations, Chambers of commerce, business organizations, service clubs, environmental groups and other special interest groups.

TMSM developed and maintained background information on these various community groups, which were used by speakers to tailor the message to the needs and interests of the organization they were addressing. Information included names, goals and locations of organizations, names of key individuals, number of members and the organization's concerns with the FKCCS, or views on matters of interest to the Study Team.

Each FKCCS speaker provided an introduction of the Study Team members and in-depth knowledge and brief history of the Study process at each presentation. During each opportunity, local relevance for each area was characterized. An explanation of the draft FKCCS report, including transfer of the model and Study outputs to the Florida Department of Community Affairs, Monroe County and incorporated areas was included. The speaker's mission was to educate and enhance public awareness. At the end of each session, there was an opportunity for questions and comments from the public.

See attachment #9 for Speaker's Bureau schedule and attachment #10 for Speaker's Bureau comparisons.

**(c) Traveling Exhibit**

The FKCCS Traveling Exhibit was designed for public information and outreach in a colorful, easy-to-read format that combines text with photography and handouts. A four-foot by three-foot, freestanding poster, it has been displayed at banks, libraries, government and civic meetings, events and festivals throughout the Florida Keys. Brochures and business cards for Study Team and the FKCCS Website address have accompanied the exhibit in its travels.

The Traveling Exhibit started touring in November 2000 and has maintained a consistent schedule for a one-week display at various locations throughout the Florida Keys. It has also been displayed at various trade shows, meetings, and festivals – see attachment #11.

The first Traveling Exhibit illustrated how the FKCCS was being done in order to maintain the beauty of the islands and the quality of life and to learn how much future land development the Florida Keys can sustain. It explained how the Monroe County Year 2010 Comprehensive Plan highlighted specific areas of the Florida Keys that have already exceeded carrying capacity thresholds. It also explained the goal of the Study, the objectives, the timeline, and what the Study will and will not do. It listed the products that will be the outcome of the Study including the CCIAM, the Geographic Information System Database and a literature database.

FKCCS categories were illustrated including ecosystems, species of concern, water quality, regional economy, fiscal impacts, community character, quality of life, population forecast, hurricane evacuation, wastewater, stormwater, traffic circulation and marinas, port and heavily traveled channels. The Traveling Exhibit also incorporated how the public could get involved, and Website and contact information for the FKCCS team.

The FKCCS Traveling Exhibit was updated in August 2001 to reflect progress made on the project. Additionally, the original format was re-evaluated and replaced with a sturdier display board that is capable of being changed without the need for full panel replacement and specialty printing services. This was presented to and approved by the Study Partners at the August Scenario Development Workshop.

The FKCCS will continue to be displayed throughout the Florida Keys and updated as needed in accordance with the Scope of Work.

**(d) Interpretive Booths**

One of the strengths of the FKCCS Traveling Exhibit is its ability to serve as a stand-alone communication tool. However, with the addition of a representative from TMSC and the series of FKCCS documents, it has provided additional opportunities for community outreach. When a representative from TMSC has accompanied the Traveling Exhibit, they brought with them the opportunity for public questions and to provide comments. Additionally, it has enabled the public to order copies of the documentation that supports the FKCCS.

**(e) Newsletters**

TMSC designed a newsletter format that included graphics, layout, and column headlines for the FKCCS that met with the criteria established in the Scope of Work. The first newsletter, produced in July 2000, contained the Study categories, public meeting information, background information on the Carrying Capacity Study and biographies of the Study Team members — see attachment #12.

The first newsletter was mailed to the entire Stakeholder List, which contained approximately 6,000 names. The timing of a second and third newsletter is dependent upon the completion of the draft CCIAM and the draft FKCCS report.

**(f) Hotline**

Option #5 was not exercised.

**2. PIIP Review and Update**

TMSC has prepared the draft PIIP plan in accordance with the Scope of Work and consults with the Study Team to obtain guidance for updating and adjusting the PIIP.

**3. PIIP Plan Execution**

TMSC has executed the activities specified in the approved PIIP and provided logistics and supplies to accomplish them. In summary, the TMSC has followed the Scope of Work and the PIIP to create an in-depth Public Information and Involvement Program for the FKCCS.

**4. PIIP Report**

TMSC has prepared a draft of the PIIP Report for submission in the Public Information/Involvement section of the FKCCS by the date specified in the Scope of Work. TMSC expects to receive comments from the Study Team and will provide final PIIP section for FKCCS report in accordance with the Scope of Work.

## **APPENDIX E**

## **GLOSSARY**

## Glossary

**Affordable Housing Index:** An index number that relates the cost of housing to average income for a community or planning unit. The value of the number expresses the ability of the median population to afford housing in the community.

**Algorithm:** A procedure for solving a mathematical problem in a finite number of steps.

**Arc Info:** A geographic information system (GIS) created and sold by Environmental Systems Research Institute (ESRI). This is the GIS software package being used in the Florida Keys Carrying Capacity Study.

**Assessment Variable:** See Variable (Assessment).

**Available Land:** The amount of land remaining available for a land use change or action in a scenario generation after all applicable constraints have been applied.

**Benefit-Cost Measure:** A ratio comparing the monetary returns or other benefits of a project or action to the costs of implementation. A value over 1 indicates that the benefits are greater than the associated costs.

**Best Management Practices (BMP):** Usually used in referring to stormwater or wastewater treatment practices, this is a set of practices or actions that represents the best available means of controlling flows or composition of discharge waters available for a particular land use or practice. It usually refers to non-structural low cost actions such as street sweeping, fertilizer application guidelines, or education programs.

**Boating Discharge:** Sanitary wastes generated on boats and discharged to the marine environment.

**Capital Improvements :** A permanent addition to the Town's physical assets including structures, infrastructure (sewer and water lines, streets), and other facilities such as parks and playgrounds. May include new construction, reconstruction or renovation that extends the useful life of these assets. The cost of land acquisition, design, construction, renovation, demolition, and equipment are all included when calculating capital expenditures.

**Capital Improvements Program:** A multi-year (usually 5-6 year period) scheduling of public physical improvements, based on studies of available fiscal resources.

**Carrying Capacity:** The amount of use an area, resource, facility or system can sustain without deterioration of its quality.

**Carrying Capacity Impact Analysis Model (CCIAM):** A GIS-based model developed to determine the ability of the Florida Keys ecosystem to withstand all impacts of additional land development activities.

**Carrying Capacity Criteria:** The standards by which the level of land development activities can be assessed (judged) so as to avoid (or at least minimize) further irreversible and/or adverse impacts to the Florida keys ecosystem.

**Carrying Capacity Framework:** A series of thresholds, limiting factors, and other criteria associated with the ecological, socioeconomic and human infrastructure components of the model. These criteria are used to evaluate the results of the analysis and to assess whether modeled scenarios fall within the established framework.

**Carrying Capacity Thresholds:** Three types of thresholds are considered and presented in their order of uncertainty from lowest level of uncertainty to highest:

- Government mandated thresholds – thresholds legislated by local, state, or federal agencies. (i.e. water quality standards),
- Environmental thresholds – a tolerance range for a species or resource, beyond which they are not sustainable (i.e. minimum viable population). See Sustainable Threshold below.
- Socio-economic thresholds – a tolerance range of some socio-economic measure which if exceeded would degrade quality of life (i.e. Affordable Housing Index). See Societal Thresholds below.

**Catch Per Effort Index:** Numerical index used in reporting success or efficiency in fisheries studies, indicating the number or pounds of fish caught per unit effort, such as per hour or per boat.

**Cesspit:** A method of collecting sanitary wastes, usually from single family residential units, similar to a septic tank, but with no finger system or leach field, and little to no treatment capability.

**Coefficient:** A numerical value within a formula or computation that expresses a relationship and is applied in a mathematical function.

**Cluster Development:** Refers to a residential development designed to preserve open space by grouping the homes on a portion of a property only, leaving the remainder as open space. Clustering also allows a developer to develop lots that are smaller than those specified in the zoning ordinance, provided that the land saved is reserved for permanent common uses such as open space or recreation.

**Community Character:** The distinguishing identity or elements of a place, neighborhood, or any other part of the Town. See also “Sense of Place”.

**Community Facilities Plan:** A plan, prepared in coordination with outside service providers, to set forth comprehensive policy and strategies regarding programming, cost, management, and performance measures of existing and planned community facilities, including infrastructure.

**Competitive Commerce Index:** An index number comparing the required commercial revenue to disposable income of a community or planning unit, used to estimate whether there is sufficient income to support commercial activities.

**Component:** A discrete subset of inputs, calculations, and outputs of a module. One or more components can create a CCIAM module. Please see module and element.

**Comprehensive Plan:** Refers to a plan, or any portion thereof, as adopted by a local government, to manage the quantity, type, cost, location, timing, and quality of development and redevelopment in the community.

**Concern Threshold:** A threshold value representing a decline in a resource parameter of a level of impact at which the significance of the impact requires attention. Generally, a decline of 10% is slight concern, 30% is moderate concern, and 50% is severe concern for CCIAM IAVs.

**Conservation Development:** An innovative form of residential development that reduces lot sizes so as to set aside a substantial amount of the property as permanently protected open space. Differs from Cluster Development in several ways, particularly in its higher standards for the quantity, quality, and configuration of the resulting open space.

**Conservative:** When used with regulatory standards or describing criteria, a term that refers to the most strict standard or the condition implying the greatest degree of a safety or buffer level.

**Contaminant:** A substance (in water for this study) that can have harmful properties and is not naturally occurring or occurs above natural background levels. For the Marine and Integrated Water Modules, this term refers only to the metals cadmium, copper, lead, and zinc.

**Contiguous Development:** A development or parcel of a designated type which is physically adjacent to a specified parcel or land use category.

**Cost of Services:** The cost for a governmental unit to develop infrastructure and other services to the local community.

**Coverage:** A map layer or digital version of a map in the GIS system, usually associated with one type of feature, such as Land Use.

**Criterion:** A regulatory water quality standard or level of concentration set by USEPA or DEP as the safe level of a constituent in water.

**Degradation:** The decline in the quality and/or ecological functions of an area.

**Demographic:** Relating to populations or population characteristics.

**Density:** The average number of dwelling units allocated per gross acre of land. The density ranges used in the model are adapted from FLUCCS as well as from the Monroe County Comprehensive Plan.

**Density, Gross:** The average number of families, persons or housing units allocated per gross unit of land.

**Density, Net:** The maximum density permitted to be developed per unit of land after deducting any required open space, easements and publicly dedicated rights-of-way.

**Developable Land:** Land available for development that is not constricted or precluded due to physical factors, regulatory restrictions, or public ownership, etc.

**Development:** The process of converting the land cover of a parcel to a different land cover of a higher use and/or intensity.

**Development Pattern:** The configuration or organization of the built environment. (= Development Configuration)

**Development Suitability Ranking:** A measure of the probability that a parcel will be developed relative to other parcels of the same type, based on the presence of development constraints such as wetlands or benefits such as proximity to infrastructure.

**Development Timing:** Related to the provision of public services and facilities to keep pace with and support growth as it comes on line.

**Development Type:** The kind or classification of an existing or proposed land use, such as residential or industrial.

**Direct Impact (Loss):** An impact that is caused by an action with no intermediate step, such as loss of habitat by clearing of land.

**Discharge:** In this study, a term referring to the amount and location of water leaving a wastewater treatment system or stormwater leaving a treatment system or unit of land, usually measured at a specific point (Discharge Point).

**Dwelling Unit:** One or more rooms physically arranged to create a housekeeping establishment for occupancy by one family only.

**Element:** An algorithm, coefficient, or data table that is used within a component. One or more elements can create a component. Please see module and component.

**End Point:** A point marking the completion of a process or stage of a process.

**Epiphyte:** A plant that grows on the surface of another plant, in this case algae which grows on seagrass leaves.

**Eutrophication:** The process of increasing productivity in a water body, eventually leading to senescence and decline of the ecosystem.

**Evacuation Capacity:** In this study, this refers to the ability of the highway system (i.e., US 1) to allow people to leave the keys in a given period of time, when hurricane warnings are issued.

**Event Mean Concentration:** A measure of the concentration of a material or contaminant in stormwater for a specific rainfall event, expressed as an average over time based on the mass concentration and volume and duration of flow over time.

**Exotics Species:** A (usually plant) species introduced into a community that is not normally a constituent of that community (= non-native species).

**Expert Judgment:** A qualified opinion made by a person or persons who are recognized as experts in the specific field of expertise and who are sufficiently familiar with local conditions and the relevant scientific literature to reduce the level of uncertainty.

**Extent:** The scope of an issue, or the range or areal extent of an activity or impact.

**Extent of Development:** A measure of the land area covered by residential, commercial, etc., developments.

**Feature Attribute Table:** A table in the GIS system used to store attribute information for a specific coverage feature class; a basic need for defining characteristics of polygons, points, etc.

**Field:** A term used to define the portion of a database that contains all the data entries for a specified item or parameter, such as all “Land Use Type” entries; analogous to a column in a data table.

**Fishing Pressure:** A measure of the number of fishermen or fishing effort in relation to the fish population in an area. Since fish population is seldom exactly known, this is often expressed as catch per unit effort, number of fishing days, or other more easily calculated level of angler activity in an area.

**Flood Zone:** As defined by FEMA and delineated in the Flood Insurance Rate Maps (FIRM).

**Floor Area Ratio:** The square footage of commercial space per capita. Also, the total floor area of all the buildings on a site, lot or parcel of land, divided by the gross area of the lot or parcel.

**Goal:** Refers to a concise but general statement of a community’s aspirations in addressing a problem or an opportunity, in terms of a desired state or process toward which implementation programs are oriented.

**Grid:** A raster-based type of geographic data set for use with the GIS system, based on x,y values.

This is an alternative method of presenting and analyzing data to the arc-based polygon methods in a GIS.

**Grid Cell:** In a GIS, the basic spatial element of a grid, representing a portion of the earth, in a grid-based data set. A group of cells forms a grid. Each grid cell has a value corresponding to the characteristics at that site, such as habitat type.

**Gross Floor Area:** The total commercial or industrial floor area (in square feet) for a facility or area.

**Groundwater:** The volume of water naturally occurring under the land surface.

**Groundwater Recharge:** The movement of surface water into the ground through percolation or direct means, eventually reaching the water table and replenishing the groundwater.

**Growth Capture Rate:** The percent of the total population growth of a region which is taken by a specific sub-area or community. The term is often used in relation to the effect of facilities in attracting population within a certain commute time.

**Growth Management:** A framework developed to address the provision of public facilities and services to support development.

**Growth Projection: (Alternative, Managed, Natural):** A prediction of the percentage or extent of new development of population, as derived from econometric models or other sources. In this study, Alternative Growth Projection refers to the growth prediction of a specified scenario; natural growth refers to projection of growth occurring in the absence of controls or specified conditions; and managed growth refers to growth under specific regulatory constraints.

**Habitat Conversion:** The change of natural habitat to different land uses through the process of clearing for residential, agricultural, or other land uses.

**Habitat Fragmentation:** The dividing of contiguous or whole habitat units, such as forest stands, into smaller units by the conversion of some parts of the habitat to other land uses.

**Historic Baseline:** The set of conditions in the Florida Keys, defining the natural ecosystem, prior to settlement by European colonists.

**Household:** A household includes all the persons who are current residents of a housing unit. The occupants may be a single family, one person living alone, two or more families living together, or a group of related or unrelated persons who share living arrangements.

**Housing Choice:** Refers to the availability of a variety of types and locations of housing. Housing can vary according to size (e.g., number of rooms or stories), styles (e.g., construction frame, etc.), type (e.g., single-family versus duplex or multi-family), location, price, and other characteristics.

**Housing Unit:** A house, an apartment, a mobile home or trailer, a group of rooms or a single room occupied as separate living quarters or, if vacant, intended for occupancy as separate living quarters.

**Hurricane Evacuation:** The movement of all permanent residents and visitors from the Florida Keys to a safe location on the mainland in anticipation of an approaching hurricane. In this study, this refers to evacuation along the road system.

**Hurricane Vulnerability Zone:** The designation of land areas by FEMA, based on elevation, referring to the potential for damage caused by hurricanes, usually based on water and wave impacts.

**Impact Assessment Tool:** A procedure, method, or model (such as CCIAM) which can be used to aid in the prediction or measurements of impacts from specific causes.

**Impact Assessment Variables (IAV):** (Indicator) environmental and socio-economic variables for which assessments will be conducted and final outputs provided. Generally these are outputs from each of the module components.

- **IAV Sustainable Thresholds:** Scientifically derived tolerance range of values, beyond which a natural resource or species is not sustainable.
- **IAV Concern Thresholds :** An impact that results in a 10% decline in the level of a IAV.
- **IAV Societal Thresholds :** A societal threshold is a scientifically derived tolerance range of values, beyond which changes are socially unacceptable.

**Impact, direct:** See Direct Impact.

**Impact, indirect:** See indirect impact.

**Income (Per Capita):** A measure of the average (usually annual) income of a community expressed by dividing the total income of the community by the population.

**Independent Population Projection:** An estimate that has been developed in response to documented demographic and economic trends and conditions, instead of a future physical development scenario.

**Indicator Species:** A plant or animal species for which the responses to a particular stimulus are well documented and which is also typical of other species responses in an area, which can be used as a measure or indicator of the extent of effects on an ecological community or group of species.

**Indirect Impact (Loss):** An impact that occurs as the result of an action, but which is not immediately caused by the action. An example would be loss of habitat for a road needed for a new development. This would be a direct impact of the road, but an indirect impact of the development.

**Infill Development:** Development of the remaining vacant or underutilized properties within a predominantly built-up residential neighborhood or nonresidential area.

**Infrastructure:** The basic facilities and equipment necessary for the effective functioning of the Town, such as the means of providing water service, sewage disposal, electric and gas connections, and the street network. For the CCIAM, adequate data is currently available only for water service and sewage.

**Input:** Data that are entered into the CCIAM.

**Intensity:** The degree to which land is used, generally measured by a combination of the type of land use and the amount of land devoted to that use.

**Integration:** The unification of individual modules within the CCIAM to create a holistic modeling approach, results, and tool.

**Intermediate Result:** A statistical or spatial output that is used in another calculation and is not an end-point in the CCIAM.

**Key Indicator Species:** Those indicator species which are considered to be most representative of the response of a community or which are the most sensitive and therefore provide early warning of effects.

**Land Use:** A description and classification of how land is occupied or utilized, e.g., residential, office, parks, industrial, commercial, etc.

**Level of Service:** The quality and quantity of existing and planned public services and facilities, rated against an established set of standards to compare actual or projected demand with the maximum capacity of the public service or facility in question.

**Location:** In the CCIAM Scenario Generator, this refers to an input condition specifying a geographic area of the study area in which a condition is to be applied.

**Look-Up Table:** A special tabular data file for the GIS containing additional attributes for features stored in an associated feature attribute table, or a table in which numeric item values are classified into categories.

**Lot:** A parcel of land occupied or intended for occupancy by an individual use, including a principal structure and any ancillary/accessory structures.

**Marine Environment:** The salt and brackish waters surrounding the Florida Keys and the organisms and communities within these waters, usually extending shoreward to the mean high tide line.

**Median Income:** Income distribution that is divided into two exactly equal parts, one having incomes above the median and the other having incomes below the median. For households and families, the median income is based on the distribution of the total number of units including those with no income.

**Methodology:** A set of rules and procedures for a given module.

**Minimum Viable Population:** The minimum number of individuals of a population or species within a defined area that is necessary to perpetuate the population or species without damage to the genetic line. This often sets the threshold criteria for survival of a species (and is the criteria used by USFWS to determine endangered status of a species).

**Mitigation:** Actions or measures taken to lessen, alleviate, or decrease the impacts or effects of certain development activities.

**Mixed Use:** Refers to development projects or zoning classifications that provide for more than one use or purpose within a shared building or development area. Mixed use allows the integration of commercial, retail, office, medium to high-density housing, and in some cases light industrial uses. These uses can be integrated either horizontally, or vertically in a single building or structure.

**Model:** A system of data, assumptions, and calculations used to represent and visualize reality. Please see Carrying Capacity Analysis Model.

**Module:** One of several major parts of the Carrying Capacity Analysis Model. A module is comprised of components. Please see component and element.

**Multifamily Residential Unit:** A structure containing three or more dwelling units.

**Net Buildable Area:** That portion of a parcel of land which is developable and is not (a) required open space; (b) required setbacks, or (c) required buffer yards.

**New Development:** Development that occurs in vacant or unoccupied land, as opposed to a change within already developed land.

**Nutrient:** A constituent in water that is necessary for or promotes growth of plants.

**Objective:** A clear and specific statement of planned results, derived from a goal, to be achieved within a stated time period.

**On-Site Treatment System:** A wastewater treatment system which is on the same lot or parcel of land in which the wastes are generated.

**Open Space:** Land devoted to uses characterized by vegetative cover or water bodies, such as agricultural uses, pastures, meadows, parks, recreational areas, lawns, gardens, cemeteries, ponds, streams, etc.

**Open Space Ratio:** Describes the percentage of the total gross area of a parcel that is devoted to open space.

**Output:** A result that is either used as an input to another CCIAM module or as an end-point in an analysis.

**Parameter:** A quantity or constant whose value varies with the circumstances of its application or is used as a referent for determining other variables.

**Parcel:** Any quantity of land and water capable of being described with such definiteness that its location and boundaries may be established and identified.

**Person-days:** A means of reporting total effort, expressed as the number of days spent by all persons in a particular activity.

**Planning Unit:** See Wastewater Planning Unit.

**Plat:** The official map or plan of a piece of land that has been divided into building lots.

**Platted Lot:** A lot that is identified on a plat approved by the local government and duly recorded in the municipality's public records.

**Policy:** The specific approach through which objectives are achieved.

**Polygon:** A multisided feature representing an area on a map, with the boundary of the polygon defined by arcs.

**Population Density:** The number of people or individuals within a specified unit area, such per acre.

**Population, functional:** The sum of permanent and temporary populations in the Florida Keys.

**Population, permanent:** That segment of the population that spends more than half of the year in the Florida Keys.

**Population, seasonal:** That segment of the population that stays in the Keys for 30-180 days usually during the summer or winter “seasons.”

**Population, temporary:** The sum of the transient and seasonal population.

**Population, transient:** That segment of the population that stays in the Florida Keys for less than 30 days; they are typically vacationers.

**Population Profile:** A characterization of the demographics or make-up of the population of a community, expressed in such factors as age groups, income levels, and other characteristics.

**Potable Water:** Water that is suitable and approved for human consumption (= drinking water).

**Potable Water Consumption:** The use or rate of water use.

**Public Land:** Refers to land owned by the municipalities in Monroe County, or any other governmental entity or agency thereof.

**Pre-processing:** Preliminary data manipulation prior to CCIAM runs.

**Prop Scar:** A groove or trail in the sea floor usually left by the propeller of a boat, and may also include impacts from the bow. These usually refer to trails left in seagrass beds, in which the seagrasses are killed or removed, leaving a “scar,” and decreasing the productivity of the bed.

**Qualitative:** A number that is not based on a discrete number or unit of measure. This is often an estimate and may be expressed on a relative scale of magnitude.

**Quantitative:** A measurement that is based on a number that has known, discrete units of measure.

**Recharge:** The movement of water through the ground and the groundwater.

**Record:** An entry in a database representing one entity. Analogous to a row in a tabular format.

**Redevelopment:** Refers to public and/or private investment made to re-create the fabric of an area that is suffering from physical, social or economic problems related to the age, type, and condition of existing development. Redevelopment can help to meet market needs for residential and/or commercial development in older parts of the Town.

**Regulatory Criteria/Standards:** Criteria used in setting IAV thresholds in the CCIAM model, which are published levels set by governmental agencies under laws or regulatory processes.

**Restoration:** The conversion of non-natural lands into natural areas.

**Retrofit:** The process of changing or adding facilities to an already constructed facility or existing land use development. For CCIAM, this usually refers to wastewater or stormwater treatment facilities.

**Rezoning:** Process by which the authorized uses of a property are changed or modified.

**Routine Planning Tool:** An Internet-based mapping tool to support daily planning activities in Monroe County.

**Runoff:** Rain water which moves across the land surface to exit a property or area (=stormwater runoff).

**Scarified:** Refers to an area of land that is cleared of native vegetation, or topographically modified such that the land is not presently in a successional sequence leading to the establishment of vegetative communities that were previously cleared or disturbed.

**Scenario:** A change in land use described by the location, type, extent, and configuration of the land use change. Changes in land use may include new development, redevelopment, and restoration.

**Scenario Generator:** A series of screens, buttons, and menus built within the CCIAM to assist the user in defining a land development scenario.

**Scenario Location:** The portion of the study area for which scenario inputs apply.

**Scenario Type:** The specific kind of land use change of a scenario. It can be development, redevelopment, or restoration.

**Script:** Computer code that is written to automate functions within the CCIAM.

**Seagrass:** A type of submerged vascular plant (as distinguished from algae) that can form dense stands or beds in shallow marine water that are important marine habitats and energy sources for marine animals. Turtle grass is the main seagrass species in the Keys.

**Season, Dry:** The portion of the year in which least rainfall occurs. For Monroe County, this is considered to be from June through November.

**Season, Wet:** The portion of the year in which most rainfall occurs. For Monroe County, this is considered to be from December through May.

**Seasonal Population:** See Population, Seasonal.

**Secondary Impact:** Similar to Indirect Impact, a type of impact which occurs only incidental to an action.

**Sense of Place:** The sum of attributes of a locality, neighborhood, or property that give it a unique and distinctive character.

**Sensitive Lands:** For the CCIAM, this refers to lands that have been identified by government or conservation groups as being of ecological sensitivity, which are proposed for possible public acquisition.

**Single Family Residential Unit:** A building, typically detached, containing one dwelling unit.

**Solid Waste:** Refers to garbage, refuse, sludges, and other discarded materials.

**Species-Weighted Area:** An alternative measure of stating the amount of impact through loss or degradation of an area, produced by multiplying the area of a habitat unit by a factor representing the number or proportion of species using that area. An area with more species use has a higher species-weighted area.

**Sprawl:** Refers to the unplanned or uncontrolled development of open/vacant land.

**Steady State:** A condition that changes only negligibly over time.

**Stormwater Management:** Refers to the natural and/or constructed features of a property which function to treat, collect, convey, channel, hold, inhibit, or divert the movement of surface water.

**Study Area:** The area within the statutorily defined limits of the FKCCS. This includes the non-mainland portion of Monroe County to the outer limits of the Florida Keys National Marine Sanctuary excluding those waters surrounding the Marquesas and Dry Tortugas. For traffic and evacuation study purposes, portions of US 1 on the mainland are included.

**Subdivision:** The division of a lot, tract or parcel of land into two or more lots, plats, sites, or other divisions of land for the purpose, whether immediate or future, of sale, rent, lease or building development for all types of land uses, located on an existing, new, widened, or extended street, and requiring the extension of municipal utilities or construction of private on-site systems. It includes re-subdivision and when appropriate to the context, relates to the process of subdividing or to the land or territory subdivided.

**Suitability:** The inherent or regulated capability of a parcel to support a particular land use. Suitability analysis is employed in the CCIAM to determine the fitness of a given tract of land for a specific use. In this case, the degree of suitability is assessed based on the following factors, for which data are currently available: (a) parcel size; (b) subdivision status (platted vs. non-platted); (c) type of land cover; (d) flood zone classification; (e) accessibility to infrastructure (specifically sewer and water); and (f) location with respect to areas of critical habitat (as defined in the Monroe County Comprehensive Plan).

**Support Population Estimate:** The number of people required to support a given land development scenario.

**Sustainability/Sustainable Growth:** A concept that encourages responsible management of human use of the natural and built environments to yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.

**Tax Revenue:** Revenue that is derived from various taxes by governmental agencies.

**Temporal scale:** Refers to a time period for an action or assessment; often relates to a recurring period.

**Terrestrial Environment:** The natural environment occurring above the mean high tide line, including embedded freshwater wetlands, and the terrestrial plant and animal communities and habitats.

**Time Period (Time Frame):** A measure of time duration. The CCIAM model can evaluate changes over 5, 10, and 20 year periods. Can also mean the frequency of time between recurring events.

**Threshold:** A point separating conditions that will produce a given effect from conditions of a higher or lower degree.

**Tourist Related Business:** Any business enterprise that relies mainly on tourist dollars as a source of income or sales.

**Transient Population:** See Population, transient.

**Type (Residential):** Characterization of housing choices according to occupancy (single family, multifamily) or construction (detached, attached).

**Underdeveloped Subdivision:** For the purpose of crafting restoration scenarios, “underdeveloped” subdivisions are defined as those that meet the following criteria: (a) are less than 33 percent developed; (b) are disturbed habitats; and (c) are located within no more than 300 feet of at least 10 acres of contiguous undisturbed habitat or of a publicly owned conservation area.

**Unfunded Liabilities:** The costs of facilities or actions that a government jurisdiction has responsibility for based on existing regulations or to meet some code or requirement, but which is currently not included in its budget and for which funds are not currently available to cover the item.

**Use:** The specific activity or function for which land, a building, or a structure is designated, arranged, occupied or maintained.

**Vacant Land:** All parcels with a PC code equal to 00, 10, 40, or 70 in the Monroe County Property Appraiser Tax Roll.

**Wasteshed:** The land area above a discharge point that includes all sources of wastewater discharging to that point. In this study, wastesheds have been defined with the same boundaries as watersheds.

**Wastewater:** Waste that is treated through some type of sanitary treatment system.

**Wastewater Planning Unit:** One of twenty-eight areas throughout the Florida Keys that were used in the Monroe County Sanitary Wastewater Master Plan analysis and documentation.

**Wastewater Treatment System:** A facility for processing sanitary wastewater by removing contaminants, nutrients, and pathogens. For example, central treatment systems, septic tanks, and cesspits.

**Water Clarity:** A measure of the transparency of water and a measure of the depth to which sunlight can penetrate water. Depth of sunlight penetration is a key factor in the distribution of seagrasses.

**Water Quality Criteria:** Regulatory criteria setting the maximum or minimum value of water constituents for specific purposes, either within water bodies (ambient water quality) or in a discharge stream (discharge criteria).

**Watershed:** A catchment area that is otherwise draining to a watercourse or contributing flow to a body of water.

**Zoning:** Regulatory mechanism through which the Town regulates the location, size, and use of properties and buildings. Zoning regulations are intended to promote the health, safety, and general welfare of the community, and to lessen congestion, prevent overcrowding, avoid undue concentration of population, and facilitate the adequate provision of transportation, water, sewage, schools, parks, and other public services.

## **APPENDIX F**

### **LIST OF ACRONYMS**

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## Acronyms

<b>ACSC</b>	Area of Critical State Concern
<b>ADID</b>	Advanced Identification of Wetlands
<b>AGR</b>	Agriculture (land use)
<b>AHI</b>	Affordable Housing Index
<b>ArcIMS</b>	Arc Internet Map Server
<b>ATU</b>	Aerated Treatment Units
<b>BAT</b>	Best Available Technology
<b>BEBR</b>	Bureau of Economic and Business Research
<b>BMP</b>	Best Management Practices
<b>BOD</b>	Five-Year Biological Oxygen Demand
<b>BPK</b>	Big Pine Key
<b>CARL</b>	Conservation and Recreational Lands
<b>CCC</b>	Criterion Continuous Concentration
<b>CCI</b>	Competitive Commerce Index
<b>CCIAM</b>	Carrying Capacity/Impact Assessment Model
<b>Cd</b>	Cadmium
<b>CDM</b>	Camp, Dresser, & McKee
<b>CMC</b>	Criterion Maximum Concentration
<b>COD</b>	Chemical Oxygen Demand
<b>COM</b>	Component Object Modeling
<b>CPUE</b>	Catch Per Unit Effort
<b>Cu</b>	Copper
<b>DCA</b>	Department of Community Affairs (Florida)

<b>DCIA</b>	Directly Converted Impervious Area
<b>DEP</b>	Department of Environmental Protection (Florida)
<b>DIN</b>	Dissolved Inorganic Nitrogen
<b>DO</b>	Dissolved Oxygen
<b>DOQQ</b>	Digital Orthophoto Quarter Quadrangle
<b>DOT</b>	Department of Transportation (Florida)
<b>DRI</b>	Development of Regional Impact
<b>DU</b>	Dwelling Unit
<b>DXF</b>	Digital Exchange File
<b>EAR</b>	Evaluation Appraisal Report
<b>EDU</b>	Equivalent Dwelling Unit
<b>EMC</b>	Event Mean Concentration
<b>EPA</b>	Environmental Protection Agency
<b>ESI</b>	Environmental Sensitivity Index
<b>FAC</b>	Florida Administrative Code
<b>FAR</b>	Floor Area Ratio
<b>FCT</b>	Florida Communities Trust
<b>FDOT</b>	Florida Department of Transportation
<b>FEMA</b>	Federal Emergency Management Agency
<b>FIRM</b>	Flood Insurance Rate Maps
<b>FIU</b>	Florida International University
<b>FKAA</b>	Florida Keys Aqueduct Authority
<b>FKCCS</b>	Florida Keys Carrying Capacity Study
<b>FKEC</b>	Florida Keys Electric Co-Op
<b>FKNMS</b>	Florida Keys National Marine Sanctuary

<b>FLUCCS</b>	Florida Land Use, Cover, and Forms Classification System
<b>FLUM</b>	Future Land Use Map
<b>FMRI</b>	Florida Marine Research Institute
<b>FRT</b>	Florida Reef Tract
<b>FSC</b>	Florida State Criterion
<b>GFA</b>	Gross Floor Area
<b>GIS</b>	Geographic Information Systems
<b>GUI</b>	Graphical User Interface
<b>HCP</b>	Habitat Conservation Plan
<b>HDR</b>	High Density Residential (land use)
<b>IAV</b>	Impact Assessment Variable
<b>IDW</b>	Inverse Distance Weighted
<b>IND</b>	Industrial (land use)
<b>IP</b>	Impact Probability
<b>IS</b>	Improved Subdivision
<b>IT</b>	Information Technology
<b>ITE</b>	Institute of Transportation Engineers
<b>KCB</b>	Key Colony Beach
<b>LDR</b>	Land Development Regulations
<b>LDR</b>	Low-Density Residential (land use)
<b>LOS</b>	Level of Service
<b>LRP</b>	Long Range Transportation Plan
<b>MC</b>	Monroe County
<b>MCPD</b>	Monroe County Planning Department
<b>MCRT</b>	Mean Cell Residence Time

<b>MDR</b>	Medium Density Residential (land use)
<b>Mg</b>	milligram
<b>mg/l</b>	milligram per liter
<b>MGD</b>	Million Gallons per Day
<b>MM</b>	Mile Marker
<b>MOU</b>	Memorandum of Understanding
<b>MPO</b>	Municipal Planning Organization
<b>MRFSS</b>	Marine Recreational Fisheries Statistical Survey
<b>MS4</b>	Municipal Separate Storm Sewer System
<b>N</b>	Nitrogen
<b>NOX</b>	Total Kjeldahl Nitrogen
<b>NO<sub>2</sub></b>	Nitrite
<b>NO<sub>3</sub></b>	Nitrate
<b>O&amp;M</b>	Operation & Maintenance
<b>OPEN</b>	Open Space (land use)
<b>OW</b>	Open Water (land use)
<b>OWNRS</b>	Onsite Wastewater Nutrient Reduction System
<b>P</b>	Phosphorous
<b>PAED</b>	Planning Area Enumeration District
<b>PAR</b>	Photosynthetically Active Radiation
<b>Pb</b>	Lead
<b>PC</b>	Property Code
<b>PIIP</b>	Public Involvement and Information Plan
<b>PPH</b>	Persons Per Household
<b>PUV</b>	Private, Upland Vacant (area)

<b>RD</b>	Road (land use)
<b>RDI</b>	Relative Degradation Index
<b>RFQ</b>	Request for Quote
<b>RHDI</b>	Relative Habitat Degradation Index
<b>ROGO</b>	Rate of Growth Ordinance
<b>RPT</b>	Routine Planning Tool
<b>RV</b>	Recreational Vehicle
<b>SAV</b>	Submerged Aquatic Vegetation
<b>SFRPC</b>	South Florida Regional Planning Council
<b>SFWMD</b>	South Florida Water Management District
<b>SOD</b>	Sediment Oxygen Demand
<b>SPA</b>	Sanctuary Preservation Area
<b>SRP</b>	Soluble Reactive Phosphorus
<b>Std. Dev.</b>	Standard Deviation
<b>TDP</b>	Total Dissolved Phosphorus
<b>TDS</b>	Total Dissolved Solids
<b>TKN</b>	Total Kjeldahl Nitrogen
<b>TN</b>	Total Nitrogen
<b>TP</b>	Total Phosphorous
<b>TRE</b>	Transferable ROGO Exemption
<b>TSS</b>	Total Suspended Solids
<b>UNA</b>	User Needs Assessment
<b>USACE</b>	United States Army Corps of Engineers
<b>USFWS</b>	United States Fish and Wildlife Service
<b>VBA</b>	Visual Basic for Applications

<b><math>\mu\text{g}</math></b>	Microgram
<b>WL</b>	Wetlands (land use)
<b>WQPP</b>	Water Quality Protection Program
<b>WW</b>	Wastewater
<b>Zn</b>	Zinc

## **APPENDIX G**

### **MAPS**





































