

**Task 1.0: Needs Summary
Technical Memorandum 1.1**



Prepared for:
Town of Orleans

Prepared by:
Stantec Consulting Services Inc.
5 LAN Drive, Suite 300
Westford, MA 01886

November 18, 2014

Sign-off Sheet

This document entitled Task 1.0: Needs Summary Technical Memorandum 1.1 was prepared by Stantec Consulting Services Inc. ("Stantec") for the account of Town of Orleans (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____
(signature)

Louis Soracco, PE

Reviewed by _____
(signature)

Garry McCarthy, PE

Table of Contents

| | |
|---|------------|
| EXECUTIVE SUMMARY | I |
| ABBREVIATIONS | II |
| 1.0 INTRODUCTION/PURPOSE/GOALS | 1.1 |
| 2.0 EXISTING INFORMATION | 2.1 |
| 3.0 INFORMATION SUMMARY | 3.1 |
| 3.1 NEEDS SUMMARY MATRIX | 3.1 |
| 3.2 NEEDS SUMMARY MAP | 3.1 |
| 4.0 OTHER TOWNS' NEEDS | 4.1 |
| 4.1 BREWSTER | 4.1 |
| 4.2 EASTHAM | 4.1 |
| 4.3 HARWICH/CHATHAM | 4.2 |
| 5.0 STAKEHOLDER RESPONSE/MISSING INFORMATION AND RESOLUTION OF UNCERTIANTY | 5.1 |
| 5.1 ADDITIONAL INFORMATION | 5.1 |
| 5.2 ADDITIONAL NEEDS | 5.1 |
| 6.0 CONCLUSIONS..... | 6.1 |
| 7.0 NEXT STEPS..... | 7.1 |
| 8.0 DECISIONS..... | 8.1 |
| LIST OF TABLES | |
| Table 1 – List of Existing Information..... | 2.1 |
| Table 2 – Needs Summary Matrix..... | 3.2 |
| Table 3 – Needs Certainty Discussion..... | 5.2 |
| LIST OF FIGURES | |
| Figure 1 – Needs Summary Map | 3.3 |
| Figure 2 – Certainty Curve* | 5.3 |
| LIST OF APPENDICES | |
| APPENDIX A | A.1 |
| A.1 Information Review Summaries | A.1 |
| APPENDIX B..... | B.1 |
| B.1 Stakeholder Comments and Responses | B.1 |

Executive Summary

Prior to the September 10, 2014 Stakeholder Workshop:

Stantec was selected by the Town of Orleans to assist in the development of an adaptive management plan for the Town's wastewater and septage management needs. The initial task for the wastewater and septage planning effort was to review the available information and documentation that has been completed to-date. Based on a review of this information, this technical memorandum was prepared to document a summary of the needs that were identified.

This document contains a list of the information that was reviewed, a needs summary matrix, and a needs summary map that organize the identified needs of the Town by watershed. The intent of this document is to present a Summary of the needs that have been identified, and participate in a discussion with the stakeholders to build consensus for which to base the remaining planning efforts in the form of an adaptive management plan.

In preparation for the workshop on September 10, 2014, we have also prepared a table (in Section 5) for use in the discussion to facilitate an understanding on what are clear needs versus what needs are unclear to the group, and what questions need to be answered to improve the clarity of the needs.

Several areas of this document have been left blank and are being reserved for the information that is gathered during the September 10, 2014 Stakeholder Workshop. This document will be finalized after the workshop.

Additions from the September 10, 2014 Stakeholder Workshop:

During and after the Stakeholder Workshop additional information was gathered regarding the water quality needs of the Town of Orleans. It was pointed out during the Workshop that additional water quality data is being collected and is available for review/analysis prior to finalizing decisions going forward. In addition, we have been able to further clarify the needs and intentions of the adjacent Towns, which will be pertinent in regional planning efforts. Additional Stakeholder comments can be found in Appendix B, and any future information/needs identified will be documented and addressed through the Adaptive Management Plan process.

Abbreviations

| | |
|-------|---|
| BOD | Biochemical Oxygen Demand |
| BOS | Board of Selectmen |
| CCC | Cape Cod Commission |
| CWMP | Comprehensive Wastewater Management Plan |
| DEP | Department of Environmental Protection |
| DIN | Dissolved Inorganic Nitrogen |
| DO | Dissolved Oxygen |
| DON | Dissolved Organic Nitrogen |
| DRI | Development of Regional Impact (by the CCC) |
| EOEA | Executive Office of Environmental Affairs |
| EPA | Environmental Protection Agency |
| GIS | Geographic Information System |
| GPD | Gallons Per Day |
| IMA | Inter-municipal Agreement |
| MEP | Massachusetts Estuaries Project |
| MEPA | Massachusetts Environmental Policy Act |
| mg/L | Milligrams Per Liter |
| NHESP | Natural Heritage Endangered Species Program |
| ppm | Parts Per Million (mg/L) |
| RFQ | Request For Qualifications |
| SMAST | The University of Massachusetts School of Marine Science and Technology |

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

| | |
|-------|--------------------------------------|
| TMDL | Total Maximum Daily Load |
| TTSTF | Tri-Town Septage Treatment Facility |
| TN | Total Nitrogen |
| WQAP | Orleans Water Quality Advisory Panel |

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Introduction/Purpose/Goals
November 18, 2014

1.0 INTRODUCTION/PURPOSE/GOALS

Over the last decade, the Town of Orleans and other parties have completed numerous studies, reports, plans and technical reviews, including a Comprehensive Wastewater Management Plan (CWMP), all aimed at defining and resolving the wastewater and septage management needs of the Town. However, for a number of reasons, including the high cost of implementation, residual questions regarding the scientific and/or engineering bases of the CWMP, emergence of promising alternative technologies and the update of the Cape-wide 208 planning process of the Cape Cod Commission (CCC), the CWMP has not proceeded forward.

In an effort to continue to move forward while the 208 plan was being updated, the Orleans Board of Selectmen (BOS) initiated a process to resolve outstanding questions, investigate additional management and technology options, and develop a revised CWMP that is consistent with the 208 Plan guidance, utilizes an “adaptive management” framework for implementation and, consequently, may be considered more affordable and therefore acceptable to the residents of Orleans.

To accomplish this, the consulting firm Stantec was selected through a formal request for qualifications (RFQ) process to utilize the information and planning completed to date to create a revised CWMP, including a formal adaptive management plan that will address all of the Town’s needs in a fiscally responsible manner. The first step in this process is to develop a consensus on the Town’s water quality and wastewater management needs.

It is the intent of this document to serve as the summary of the wastewater and septage management needs for the Town of Orleans. This task included no collection of new data, except for that information made available through studies done by the Town or by others during the last several years. This review of information and the associated discussion and review by the Water Quality Advisory Panel (WQAP) will identify points of uncertainty or disagreement where additional information and/or analyses will be needed to resolve. Such needed analyses or data collection, possibly involving pilot studies, will be accomplished as part of the Adaptive Management Plan associated with the revised CWMP. While some needed information or analyses will be important for future decision making, it appears that due to the extensive investigations, assessments and reviews done over the last 15 years, Orleans has a large portion of the information required to develop a viable, long-term plan for wastewater management which coordinates with the Updated 208 Plan using more robust financial analyses and incorporating innovative technologies.

The goal of this document and its revision, based on input from knowledgeable sources to be generated at the September 10, 2014 Stakeholder Workshop, is to define and establish a consensus on the Town’s needs upon which to base the revised CWMP and the associated adaptive management plan. To prepare for the public meeting, the existing information was



TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Introduction/Purpose/Goals
November 18, 2014

reviewed (See Section 2 for a list of documents reviewed to date), and a needs matrix was created to present what has been documented.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Existing Information
November 18, 2014

2.0 EXISTING INFORMATION

The existing information, which included reports, letters, plans, and presentations related to the Town's water quality needs, was reviewed to begin the process of determining what has been studied, and what the recommendations from each study were. The majority of the information that was reviewed can be found on the Town's web site. Some of the documents were obtained from external sources. Information from the Town's web site included documents from the BOS, the current CWMP, the Wastewater Steering Committee, and the Wastewater Validation Committee. A list of the documents that have been reviewed is presented in Table 1 below. Based on a review of this material, the needs were summarized and can be found in Section 3 of this document. Summary sheets have been prepared and submitted in Appendix A for those Documents **numbered in bold**. Documents not numbered in bold were reviewed but a Summary sheet was not required.

Table 1 – List of Existing Information

| No. | Document Title | Author | Date Published |
|-----------|---|------------------------------|--------------------|
| 1 | MEP Pleasant Bay System Final Report | Mass DEP/SMAS | May 2006 |
| 2 | Pleasant Bay System TMDL for Total Nitrogen | Mass DEP | May 2007 |
| 3 | MEP Little Namskaket Marsh Final Report | Mass DEP/SMAS | December 2008 |
| 4 | MEP Namskaket Final Report | Mass DEP/SMAS | December 2008 |
| 5 | MEP Rock Harbor Final Report | Mass DEP/SMAS | December 2008 |
| 6 | MEP Nauset Harbor Revised Draft Report | Mass DEP/SMAS | May 2012 |
| 7 | Technical Review of the MEP Nauset Harbor | RPS ASA | November 27, 2012 |
| 8 | MEP Tech. Team Response to RPS ASA | Mass DEP/SMAS | December 4, 2012 |
| 9 | The Coastal Impact of Ground Water Discharge | John M. Teal, WHOI | November 1983 |
| 10 | Part Three – Namskaket marsh the Potential Impact of the Proposed Disposal Area | John M. Teal, Anne E. Giblin | 1984 |
| 11 | Chatham WPCF Septage Evaluation Report | GHD | January 2013 |
| 12 | Cedar Pond Water Quality Management Plan Final Report | SMAS | July 2013 |
| 13 | Potential Decentralized Sewer Disposal Site Locations (Presentation) | Wright-Pierce | September 11, 2013 |
| 14 | Tri-Town Septage Treatment Facility Decommissioning Action Plan | Stantec | October 18, 2013 |
| 15 | Tri-Town Septage Facility Demo Plan (Presentation) | Stantec | October 28, 2013 |



TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Existing Information
November 18, 2014

| No. | Document Title | Author | Date Published |
|-----|---|--|------------------------------|
| 16 | Tri-Town Septage Treatment Facility Evaluation Cost Estimate Update | Stantec | February 5, 2014 |
| 17 | Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod | Barnstable County Wastewater Cost Task Force | April 2010 |
| 18 | Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod (presentation) | Wright-Pierce | July 14, 2010 |
| 19 | Engineering Review of CWMP | CH2M Hill | September 30, 2010 |
| 20 | Pleasant Bay Alliance Water Quality Monitoring Program | The Cadmus Group, Inc. | October 2011 |
| 21 | Final CWMP | Wright-Pierce | December 2010 |
| 22 | Evaluation of Freshwater Ponds | ENSR/AECOM | January 26, 2007 |
| 23 | Hydraulic Modeling Reports for Sites 241 | Wright-Pierce | February 2008 / January 2009 |
| 24 | Habitat Assessment Letter Report | LEC Environmental Consultants, Inc. | December 8, 2010 |
| 25 | EOEAA Certificate | EOEAA | July 10, 2009 |
| 26 | EOEAA Certificate Responses | Wright-Pierce | December 9, 2010 |
| 27 | Final MEPA Certificate | EEA | January 28, 2011 |
| 28 | March 1, 2011 presentation slides | CCC, USGS, Wright-Pierce | March 1, 2011 |
| 29 | Town Responses to March 1, 2011 Public Hearing | Town of Orleans/Wright-Pierce | March 11, 2011 |
| 30 | CCC Comments on Orleans CWMP/DRI (Presentation) | CCC | April 14, 2011 |
| 31 | Update on USGS Monitoring Activities, Namskaket Creek (Presentation) | USGS | April 20, 2011 |
| 32 | CWMP DRI Final Decision | CCC | October 13, 2011 |
| 33 | PDR on the Tech Review and Cost Analysis of CWMP Options | Weston & Sampson | September 2012 |
| 34 | Phase 1A – Downtown Sewer Alternative Preliminary Engineering Design & Cost Est. | Weston & Sampson | April 2013 |
| 35 | Tri-Town Septage Treatment Facility Evaluation | Wright-Pierce | August 2005 |
| 36 | Orleans Wastewater Regionalization Report | Wright-Pierce | December 2009 |
| 37 | Hydrodynamic Model of Chatham Harbor and Pleasant Bay Final Report | Applied Coastal Research and Engineering, Inc. | July 2008 |
| 38 | Pleasant Bay Water Quality Model Update and Scenarios | Applied Coastal Research and Engineering, Inc. | September 2008 |



TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Existing Information
November 18, 2014

| No. | Document Title | Author | Date Published |
|-----|---|---|--------------------|
| 39 | Inter-municipal Watershed Planning and TMDL Implementation to Restore Embayment Water Quality on Cape Cod | Mass DEP | November 2008 |
| 40 | Peer Review of the MEP Report on Pleasant Bay | Woods Hole Group | June 2009 |
| 41 | MEP Pleasant Bay Report Peer Review Findings | WMV&DC | August 4, 2009 |
| 42 | Minority Report – Wastewater Validation and Design Committee | Judy Scanlon, Member | August 26, 2009 |
| 43 | DEP Response to Orleans | Mass DEP | October 21, 2009 |
| 44 | Section 208 Update Final Draft | CCC | August 21, 2014 |
| 45 | Orleans Town-Wide Preliminary Stormwater Assessment | GHD | September 30, 2013 |
| 46 | Pleasant Bay Resource Management Update | Pleasant Bay Resource Management Alliance | March 2008 |
| 47 | Review and Interpretation of Orleans Freshwater Ponds Volunteer Monitoring Data | Fresh Water Quality Task Force | October 2007 |
| 48 | Pleasant Bay Fertilizer Management Plan | Horsley Witten Group | December 2010 |
| 49 | MEP Linked Watershed Embayment Model Peer Review | Scientific Peer Review Panel | December 30, 2011 |
| 50 | MEP Fertilizer Study | Mass DEP/SMASST | February 2005 |

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Information Summary
November 18, 2014

3.0 INFORMATION SUMMARY

Each of the documents listed in Table 1 of Section 2, were reviewed to determine if any water quality or wastewater management needs were documented. Many of these documents have been individually summarized and are included in Appendix A.

3.1 NEEDS SUMMARY MATRIX

To begin to build a consensus on the needs of the Town, we have organized the needs that were identified in the information from Section 2 of this report into a needs summary matrix (Table 2). The matrix is organized by watershed, sub-watershed and associated ponds. This approach was used to display the information so that both broad based and specific needs can be presented simultaneously. The last column on the right in the matrix has been reserved to incorporate the comments, additional information needs or studies and/or consensus generated in the September 10, 2014 Stakeholder Workshop.

3.2 NEEDS SUMMARY MAP

In addition to the needs summary matrix, we have developed a needs summary map (Figure 1) that utilizes the Town's GIS database to graphically present the same water quality needs that were identified in the matrix.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Information Summary
November 18, 2014

Table 2 – Needs Summary Matrix

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Information Summary
November 18, 2014

Figure 1 – Needs Summary Map

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Other Towns' Needs
November 18, 2014

4.0 OTHER TOWNS' NEEDS

Included in this planning effort is consideration of the needs of the adjacent towns of Brewster, Eastham, Harwich and Chatham. These towns share watersheds with Orleans and will play a part in protecting and restoring the water quality of those estuaries and ponds. In addition, there is the existing Tri-Town Septage Treatment Facility (TTSTF) located within the Town of Orleans and managed and operated under an Inter-municipal Agreement (IMA) between the three towns of Orleans, Brewster and Eastham. In several of the documents reviewed for this task, inter-town cooperation and coordination has been strongly encouraged to maximize water quality improvements and sharing of the financial burden. The information reviewed also acknowledges that both Brewster and Eastham are not as far along in their wastewater planning process as Orleans. However, the following summarizes the needs of the towns known to-date.

4.1 BREWSTER

The Town of Brewster is within the Pleasant Bay and Cape Cod watersheds, which include portions of the Pleasant Bay Estuary, and approximately 80 percent of the Namskaket Estuary. The Town's needs include septage collection and treatment, currently provided by the Tri-Town Septage treatment facility (TTSTF), pond remediation, remediation of failed Title 5 and non-compliant on-site systems and minimal commercial wastewater management. A small percentage of the Pleasant Bay watershed is contained within the Town of Brewster. The Town envisions that its responsibility for nitrogen reduction under the Pleasant Bay TMDL can be accomplished independently by the Town using locally-implemented decentralized and/or non-traditional technologies, and/or working in conjunction with the Town of Orleans in their planning efforts. Brewster's role and needs in protection and remediation of the Namskaket Estuary are being defined as part of a parallel analysis of the Namskaket Marsh system, and will be incorporated into the revised CWMP as that is developed. In addition, Brewster is interested in following the Town of Orleans' planning as it relates to possibly accepting Brewster's septage at either an existing or proposed septage receiving facility.

4.2 EASTHAM

The Town of Eastham is within the Nauset and Cape Cod Bay watersheds, which include portions of the Nauset and Rock Harbor Estuaries. Eastham's needs in these watersheds include remediation of pond impairments, septage collection and disposal (currently provided by local haulers and the TTSTF), remediation of failed Title 5 and other non-compliant on-site systems, economic and business wastewater needs in the commercial areas along Route 6 and remediation of nitrogen impairments to Nauset Marsh. The 2010 Orleans CWMP recommended conveyance of wastewater collected by Eastham to the proposed Orleans wastewater and septage treatment plant (WWTP).



TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Other Towns' Needs
November 18, 2014

4.3 HARWICH/CHATHAM

The towns of Harwich and Chatham are also contributors of nitrogen to the Pleasant Bay estuary. It will require action from these towns as well to achieve the nitrogen load reductions that will meet the TMDL threshold proposed by the MEP report.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Stakeholder Response/Missing Information and Resolution of Uncertainty
November 18, 2014

5.0 STAKEHOLDER RESPONSE/MISSING INFORMATION AND RESOLUTION OF UNCERTAINTY

The following section has been reserved to document the stakeholder response and input during the September 10, 2014 Stakeholder Workshop. This section will summarize:

- Additional existing information, reports or other documents that need to be acquired, reviewed and added to the summary of needs.
- Requirements for additional data collection for specific needs that are newly identified or for which conditions have changed.
- Specific important points of uncertainty with respect to data or analyses or instances of changed conditions that must be addressed through additional studies, evaluations, data collection or other means in specific watersheds.
- Consensus on the priority of needs identified.

5.1 ADDITIONAL INFORMATION

During the Stakeholder Workshop, it was pointed out that water quality monitoring for the freshwater ponds and salt water estuaries and bays is ongoing. Some members of the Panel would like to see this information used for updating the prior analyses prior to making final decisions. Based on the results of the uncertainty discussion in the following paragraph, some decisions can be made to allow the process to move forward using the existing information and analysis. However, where there has been uncertainty identified. The additional information can be used in the AMP process going forward so that the Town's decisions are based on the most recent data to reduce uncertainty.

Additional comments and Stakeholder response has been included in Appendix B.

5.2 ADDITIONAL NEEDS

During the Stakeholder Workshop a list of topics regarding needs and issues were discussed. For each topic the group (by majority consensus) ranked the level of certainty regarding the topic and the urgency of the topic. Table 3 is the list of topics from the meeting and the associated certainty and urgency. The same information is presented graphically in Figure 2. This information will be used as the basis for additional monitoring/study that will be incorporated into the AMP.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Stakeholder Response/Missing Information and Resolution of Uncertainty
November 18, 2014

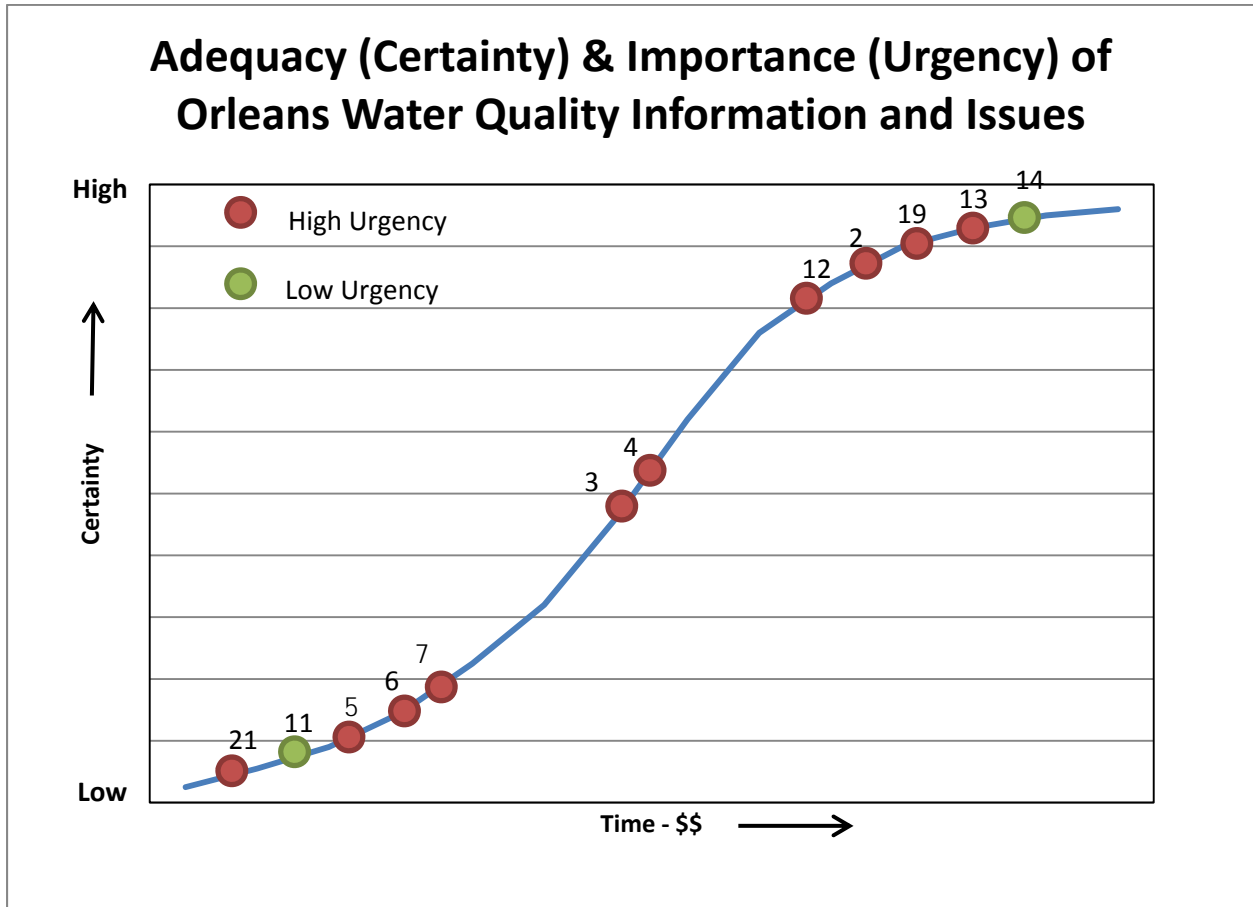
Table 3 – Needs Certainty Discussion

| No. | Topic | Certainty (High, Med, Low) / Urgency (High, Low) |
|-----|--|--|
| 1 | Identify varying conclusions or conflicting data | N/A |
| 2 | Update Pond Database | High Certainty, High Urgency |
| 3 | Cedar Pond/Rock Harbor/Nitrogen/UAA and Other Impacts to RHC | Medium Certainty, High Urgency |
| 4 | Nauset / Town Cove / ASA Report / MEP Report / N-Source | Medium Certainty, High Urgency |
| 5 | Increase in N in Town Cove | Low Certainty, High Urgency |
| 6 | MEP N-Balance | Low Certainty, High Urgency |
| 7 | Update MEP analysis with recent data | Low Certainty, High Urgency |
| 8 | Include Eastham Pond data in assessment of ponds in Orleans | |
| 9 | Eastham / Brewster evaluation on I/A systems | |
| 10 | More focus on freshwater ponds | |
| 11 | Cape Cod Bacteria TMDLs / closures | Low Certainty, Low Urgency |
| 12 | Current conditions vs. CWMP info | High Certainty, High Urgency |
| 13 | What is "Downtown Economic Center"? | High Certainty, High Urgency |
| 14 | What is water quality? | High Certainty, Low Urgency |
| 15 | Incorporating master plans | |
| 16 | Saline vs. freshwater ponds | |
| 17 | Nauset Marsh & Pleasant Bay data since 2005 | |
| 18 | CCNSS data | |
| 19 | Pleasant Bay nitrogen trends before MEP and impacts (projection on "Nauset" breaks | High Certainty, High Urgency |
| 20 | Hydrodynamic uncertainties in major estuaries | |
| 21 | Additional contaminants of concern | Low Certainty, High Urgency |

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Stakeholder Response/Missing Information and Resolution of Uncertainty
November 18, 2014

Figure 2 – Certainty Curve*



*This figure is a reproduction of the curve developed during the Stakeholder Meeting

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Conclusions
November 18, 2014

6.0 CONCLUSIONS

This section was not used in this technical memorandum.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Next Steps
November 18, 2014

7.0 NEXT STEPS

This section was not used in this technical memorandum.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Decisions
November 18, 2014

8.0 DECISIONS

Additional information and/or needs not documented in this TM may be identified after this document is finalized. Once this document is finalized, it is our intention for the additional information and/or needs identified be documented through the AMP process so that each item can be addressed.

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Appendix A
November 18, 2014

Appendix A

A.1 INFORMATION REVIEW SUMMARIES

TASK 1.0: NEEDS SUMMARY TECHNICAL MEMORANDUM 1.1

Appendix B
November 18, 2014

Appendix B

B.1 STAKEHOLDER COMMENTS AND RESPONSES