

<b>Wastewater Treatment Plant O&amp;M Manual Checklist for New Plants or Upgrades</b>	<b>Yes, No or N/A</b>
<b>Table of Contents</b>	
<b>Chapter 1 Introduction</b>	
A. Purpose of Manual	
i. Stand-alone manual or supplement / inclusion to an existing manual	
B. Project description	
i. New plant or upgraded components (list individual components if upgrade)	
ii. Plant type	
iii. Simplified schematic drawing showing plant layout	
<b>Chapter 2 Permits and Standards</b>	
A. Discharge permit requirements	
i. NPDES permit (effluent limitations table only)	
ii. State groundwater discharge permit if applicable	
iii. NPDES / State Water Discharge Permit Reporting of Non-Compliance / Spill Procedure (Reporting procedure can be found on website. Should be copied and inserted here)	
B. Monitoring and Record Keeping	
i. For NPDES permits copy and insert pages 6 thru 9 of NPDES Part II STANDARD CONDITIONS (January 2007 or most recent version) of NPDES permit to highlight Part II.C Monitoring Requirements and Part II. D. Reporting Requirements ( <i>links can be found on page 7 of this checklist</i> )	
<b>Chapter 3 Detailed Design Criteria</b>	
1. General description of influent wastewater	
i. Service area	
ii. Average daily design flow	
iii. Maximum daily flow	
iv. Peak hour flow	
v. Peak instantaneous flow	
vi. Domestic flow	
vii. Industrial flow	
viii. Commercial flow	
ix. Infiltration / inflow	
x. Design BOD and TSS concentrations and loadings	
xi. Septage volumes and loads	
xii. Wastewater characterization (for nutrient removal systems)	
xiii. Number and location of pumping stations	
2. Individual unit process design criteria and physical data	
Each unit process shall include the following:	
i. Unit process title	
ii. Equipment manufacturer(s)	
iii. Number and type of units	
iv. Design criteria	
v. Appropriate unit specific information as outlined below	
A. Influent / intermediate / effluent pumping	
i. Wet well dimensions and volumes	
ii. Level control system	
iii. Type of pump, manufacturer & number of units	

iv. Pump capacity GPM at TDH	
v. Range of flow	
vi. HP	
B. Influent and effluent flow measurement	
i. Type and manufacturer	
ii. Size	
iii. Flow range	
C. Headworks screening / comminution	
i. Type, manufacturer and number of units	
ii. Screen size	
iii. Capacity	
D. Grit removal	
i. Type, manufacturer & number of units	
ii. Tank dimensions & volumes	
iii. Type of pump, manufacturer and number of units	
iv. Pump capacity GPM at TDH, range of flow	
E. Septage handling	
i. Type, manufacturer and number of units	
ii. Tank dimensions & volumes in gallons	
iii. Pump capacity GPM at TDH, range of flow	
iv. Mixing devices	
v. Aeration system	
F. Primary clarification	
i. Type, manufacturer & number of units	
ii. Tank dimensions and volume in gallons	
iii. Weir length, each	
iv. Surface area, each	
v. Detention times @ design ADF	
vi. Surface overflow rate @ design ADF & peak hour flow	
vii. Sludge pump capacity GPM at TDH, range of flow	
viii. Scum pump capacity GPM at TDH, range of flow	
ix. Sludge/scum flow measurement	
G. Secondary or Advanced Treatment (activated sludge, IFAS, fixed film, RBC, lagoon, other)	
i. Type of process & number of units	
ii. Tank dimensions and volume in gallons	
iii. Detention time @ design ADF	
iv. BOD loading	
v. Design MLSS & MLVSS concentration	
vi. F/M ratio	
vii. SRT	
viii. Individual anaerobic / anoxic / aerobic compartment specifications	
ix. Aeration requirements	
x. Blowers - HP and capacity in SCFM	
xi. Mechanical aerators - HP, oxygen transfer rate	
xii. Mechanical mixers - HP	
xiii. Recycle pumping - type, capacity GPM at TDH, range of flow	
H. Secondary clarification	
i. Type, manufacturer & number of units	

ii. Tank dimensions and volume in gallons	
iii. Surface area, each	
iv. Detention time @ design ADF	
v. Design solids loading @ ADF & peak hour flow	
vi. Design surface overflow rate @ ADF & peak hour flow	
vii. Weir length, each	
viii. Design weir overflow rate @ ADF & peak hour flow	
ix. RAS withdrawal mechanism	
x. RAS withdrawal rate as % of flow	
xi. RAS pump capacity GPM at TDH, range of flow and flow measurement	
xii. WAS / scum pump capacity GPM at TDH, range of flow and flow measurement	
I. Effluent filtration or other tertiary treatment	
i. Type, manufacturer & number of units	
ii. Design flow capacity, MGD	
iii. Design solids loading per unit	
iv. Design hydraulic loading per unit	
v. Media surface area per unit	
vi. Tank dimensions and volumes in gallons	
vii. Backwash requirements	
J. Disinfection - Chlorination / Dechlorination	
i. Number of tanks	
ii. Tank dimensions and volumes in gallons	
iii. Detention time @ peak hour flow	
iv. Point of application chemical mixing type	
v. Chemical dose & pacing	
vi. Chemical storage tank dimensions, volumes and containment	
vii. Chemical metering pumps	
viii. Chlorine residual monitoring	
K. Disinfection - Ultra-Violet Light	
i. Type, manufacturer & number of units	
ii. Number of bulbs / banks	
iii. Number of channels	
iv. Dose requirements	
v. Dose pacing	
vi. Cleaning system	
vii. Transmittance / intensity monitoring	
viii. Back-up disinfection alternative if UV system fails (also discuss in Chapter 4)	
ix. Uninterruptable power supply	
L. Post aeration system	
i. Type & number of units	
ii. Final effluent D.O. limits	
iii. Tank dimensions and volume in gallons	
iv. Air requirements	
v. Number of diffusers	
vi. Blowers - HP and capacity in SCFM	
vii. D.O. monitoring and pacing	
M. Effluent disposal	
i. Surface water / groundwater	
ii. Outfall location / GPS coordinates	
iii. Dilution factor / receiving stream water quality classification	

iv. 7Q10	
v. Diffuser system	
vi. Gravity / Pumping	
vii. Drip dispersal	
viii. Spray irrigation	
ix. Rapid infiltration basins	
N. Plant Water System	
i. Type, manufacturer & number of units	
ii. Capacity	
O. Chemical feed systems for nutrient removal, solids handling, odor control, alkalinity, other	
i. Chemical name and purpose	
ii. Storage volumes and containment	
iii. Metering pumps	
iv. Number of units	
v. Dose pacing	
P. Odor control	
i. Type, manufacturer & number of units	
ii. Location of each unit	
Q. Solids handling (storage, thickening, dewatering, stabilization)	
i. Anticipated sludge quantities	
ii. Hydraulic capacity per unit	
iii. Solids loading per unit	
iv. Performance criteria per unit	
v. Sludge storage volumes	
vi. Sludge conveyance mechanisms	
vii. Sludge grinding mechanisms	
viii. Sludge stabilization criteria	
R. Generator / alternate power source	
i. Type & manufacturer	
ii. Fuel source and containment structure	
iii. Fuel storage volume	
iv. Fuel usage per hour	
v. Run time on a full tank	
vi. Fuel storage tank location(s)	
vii. List of equipment on standby power	
S. HVAC (Heating system, air handling & air conditioning units, supply & exhaust fans, unit heaters, etc.)	
i. Fuel	
ii. Capacities of each unit	
iii. Air flow / exchanges per area	
T. Fire protection and detection	
i. Monitoring, alarms and suppression system	
U. Other	
<b>Chapter 4 Detailed Unit Process Operations and Control</b>	
A. Plant layout schematic	
B. Detailed process flow diagram	

C. Hydraulic profile	
D. For <b>each</b> unit process identified in Chapter 3, provide the following:	
i. Description and function of unit and relationship to adjacent or related units	
ii. Location of unit(s)	
iii. Determination of how many units to run	
iv. Normal startup and shut down procedures	
v. Normal operating conditions and control settings	
vi. Normally open/normally closed valves and gates	
vii. Unit by-pass procedure	
viii. Tank draining procedure	
a. Anti-flotation protection for empty tanks	
b. Winterization and cold weather operation	
ix. Unit controls	
a. H/O/A functions and switch locations	
b. SCADA controls	
c. Operator adjustable / non-adjustable set points	
b. Power supply	
x. Alternate or emergency operation for equipment malfunction, process upset and loss of power	
xi. Laboratory monitoring and sampling requirements and locations	
xii. Process control strategy	
xiii. Expected unit performance	
xiv. Operational problems and troubleshooting guides	
xv. High flow procedures	
xvi. Operable / non-operable on generator power	
xvii. Alarm conditions	
xviii. Unit specific safety concerns and procedures (confined space?)	
xix. Unit diagrams	
xx. Unit process related formulas and example calculations	
xxi. Recommended spare parts	
xxii. On-line monitoring systems	
xxiii. Digital pictures where appropriate (black & white or color)	
<b>Chapter 5 Maintenance</b>	
A. List of all manufacturer's O&M manuals supplied as part of this project	
<b>Chapter 6 Safety</b>	
A. Health hazards	
B. Recommended immunizations	
C. Sewer gas dangers & confined space entry procedure	
D. General mechanical safety	
E. General electrical safety	
F. Fire extinguishers / usage, locations and maintenance	
G. Emergency shower/eyewash stations	
H. Recommended safety equipment	
I. MSDS sheets for bulk chemicals used in plant	
J. Chemical safety	
K. Lockout / tag out procedures	
L. Hot Work permit program	
M. Electrical arc-flash program	
N. AED supplied equipment / location if any	

<b>Chapter 7 Alarm &amp; Notification System</b>	
A. General description	
B. Complete list of alarm conditions	
C. Transmission system	
D. After hours alarm notification and response	
E. Routine testing of alarm systems	
F. Loss of notification system	
<b>Chapter 8 Electrical Systems</b>	
A. General description	
B. Power distribution	
C. Electrical system maintenance	
D. Backup power system	
<b>Chapter 9 SCADA System</b>	
A. General SCADA system overview	
B. Computer hardware	
i. Type	
ii. Number of computers and locations	
iii. Dedicated for SCADA or multipurpose	
iv. Laptops	
v. Remote capabilities	
vi. Maintenance and troubleshooting	
vii. Support	
C. SCADA software	
D. Using the system	
i. Components being monitored inclusive of pump stations	
ii. Telemetry devices	
iii. System capabilities	
iv. General operating directions	
v. Entering set points	
vi. Alarms and alarm acknowledgement	
vii. Data archiving	
viii. Trending, graphing and report generation	
ix. PLCs, remote terminal, local control panels, etc.	
x. Troubleshooting guide	
xi. Glossary	
xii. Example graphics screens	
xiii. System expandability	
xiv. Startup procedures	
xv. Back-up power supply	
xvi. Loss of phone line / transmission line - discuss back-up capabilities	
xvii. Data backup capabilities	
xviii. Authorization required to make changes	
E. SCADA system security and vulnerability	
i. Password protection	
<b>Chapter 10 Staffing</b>	
A. Engineer's recommended staffing plan with supporting documentation	
B. Grade of plant as determined by DES and operator certification levels required	

<b>Chapter 11 Utilities</b>	
A. Contact information for all utility suppliers	
B. Location of emergency shutoff valves for natural gas, propane and water supplies	
C. Location of main disconnect for electrical feed	
D. Location and size of propane tanks	
E. Location and size of fuel oil storage tanks	
F. Communications systems (telephone, cable, radio, etc.)	
G. Location of potable water backflow devices	
<b>Chapter 12 Emergency Response</b>	
A. Site specific emergency response plan, <b>OR</b>	
B. DES Emergency Response Planning Guide	
<b>Appendix</b>	
A. Major equipment suppliers and contact information	
B. Valve and gate schedule	
C. Sample forms	
i. Laboratory	
ii. Daily rounds	
iii. Process control	
iv. Solids handling	
v. Maintenance	
vi. State Monthly Operations Report (MOR)	
D. Other forms as required	
DES webpages for more information	
<i>NPDES / State Water Discharge Permit Reporting of Non-Compliance / Spill Procedure:</i>	
<a href="http://des.nh.gov/organization/divisions/water/wweb/documents/npdes_reporting.pdf">http://des.nh.gov/organization/divisions/water/wweb/documents/npdes_reporting.pdf</a>	
<i>Standard Engineering Construction Phase Contract</i>	
<a href="http://des.nh.gov/organization/divisions/water/wweb/st5700.htm">http://des.nh.gov/organization/divisions/water/wweb/st5700.htm</a>	
<i>Pump Station O&amp;M Manual Review Checklist</i>	
<a href="http://des.nh.gov/organization/divisions/water/wweb/documents/pump_station_checklist.pdf">http://des.nh.gov/organization/divisions/water/wweb/documents/pump_station_checklist.pdf</a>	
<i>ENV-Wq 700 STANDARDS OF DESIGN FOR CONSTRUCTION OF WWTFs</i>	
<a href="http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wq700.pdf">http://des.nh.gov/organization/commissioner/legal/rules/documents/env-wq700.pdf</a>	
<i>DES Generic Emergency Response Planning Guide</i>	
<a href="http://des.nh.gov/organization/divisions/water/wweb/documents/emergency-response-guide.pdf">http://des.nh.gov/organization/divisions/water/wweb/documents/emergency-response-guide.pdf</a>	
<i>NPDES Permit Part II Standard Conditions, January 2007</i>	
<a href="http://www.epa.gov/region1/npdes/permits/generic/PartIIfinal2007.pdf">http://www.epa.gov/region1/npdes/permits/generic/PartIIfinal2007.pdf</a>	
<i>WWTF O&amp;M Manual Review Checklist</i>	
<a href="http://des.nh.gov/organization/divisions/water/wweb">http://des.nh.gov/organization/divisions/water/wweb</a>	

## Directions for the Preparation of TREATMENT PLANT O&M Manuals

Any upgrades or new facility construction require that an Operation and Maintenance manual be provided as part of the project and approved by the New Hampshire Department of Environmental Services according to the following rules. This checklist is specific to wastewater treatment facilities only. There is a separate checklist for pump station work.

The New Hampshire Code of Administrative rules, Chapter Env-Wq 700 STANDARDS OF DESIGN AND CONSTRUCTION FOR SEWERAGE AND WASTEWATER TREATMENT FACILITIES, Part Env-Wq 708.08(a), requires that *“Operation and Maintenance Manuals providing information and guidance for day-to-day operation of the WWTP shall be submitted within 60 days following substantial completion of the construction of the WWTP”*. Part Env-Wq 708.08(b) lists, at a minimum, what should be included in an O&M manual. These rules apply to all projects, regardless of funding source.

The standard ENGINEERING CONSTRUCTION PHASE CONTRACT for Professional Services for Treatment Works, Part I.A.2.c, requires the *“Preparation of an Operation and Maintenance Manual for approval by the DIVISION. After DIVISION approval, the Engineer agrees to supply five (5) sets of the completed manual, one (1) of which will be for the DIVISION”*. More information can be found at [www.des.nh.gov](http://www.des.nh.gov).

### Manual Format

The attached Treatment Plant checklist provides a preferred format in terms of chapter arrangement and structure. Consultants are encouraged to follow this format as much as possible and are directed to contact DES to suggest an alternative format, if needed, to accommodate unique treatment plant requirements. Consultants should provide draft copies to the owner as well as DES for review.

The following items address the preferred format for both draft manuals and final copies:

- The manual should be assembled using a three ring binder for ease of updating
- Chapters should be separated with numbered tabs for ease of identification
- Double sided pages where feasible
- Manuals on CD will **not** be accepted for review.

The following conditions can be used to determine how extensive the manual must be:

- For new treatment plants, the manual must address all pertinent items in the checklist.
- For a significant upgrade involving an increase in capacity or multiple new major pieces of equipment, a complete new manual may be required. Contact DES Wastewater Operations for help in determining the extent of the manual.
- For minor upgrades consisting of a limited amount of equipment, such as a new sludge dewatering system, new disinfection, new screening, etc. that have a minimal effect on the overall plant, the manual may be developed as a stand-alone manual or may be incorporated as an addendum into the existing O&M manual. At a minimum, the manual or addendum must include the project description, design criteria of the upgraded equipment, system operation and control as it relates to the upgraded equipment, drawings or schematics, alarm and notification system, SCADA controls, safety as it relates to the upgraded equipment, references to manufacturers O&M manuals supplied as part of the project, and references to the existing O&M manual where appropriate.
- **For any upgrades to a treatment plant that does not already have an approved O&M manual on file, regardless of the significance of the upgrades, a new O&M manual will need to be developed incorporating all of the pertinent elements listed in this checklist.**
- In all cases, an up-to-date Emergency Response Plan, as outlined in Chapter 12 of the checklist, must be included in its entirety. If a site specific plan is not available, the generic DES Emergency Response Planning Guide shall be included.