Iowa Department of Natural Resources
Wastewater Section
Construction Permit Application
SCHEDULE G, Treatment Project Design Data
Exhibit 11C

DNR USE ONLY
Project No. _____
Permit No. _____

Date Prepared _____ Date Revised _____	Project Identity

1. Project Description

2. Design Flows	Present Year ( )			Design Year ( )	
Design Condition →	AWW (MGD)	MWW (MGD)		AWW (MGD)	MWW (MGD)
Domestic/Commercial Flow					
Industrial					
Flow					
Rated Flow					
Other Flow (specify)					
Infiltration/Inflow					
Total					
Flow					
Rated Flow					

Average Dry Weather Flow (ADW):
_____ MGD (present year)
_____ MGD (design year)

Peak Hourly Wet Weather Flow (PHWW):
_____ MGD (present year)
_____ MGD (design year)

Demographic Data:
Population _____ (present year)
Population _____ (design year)

3. Organic Design Loadings		Present Year ( )			Design Year ( )	
Design Condition→		Max. 30 day (#/day)	Max. Day (#/day)		Max. 30 day (#/day)	Max. Day (#/day)
Domestic/Commercial	BOD_5					
	TSS					
	TKN					
Industrial	BOD_5					
	TSS					
	TKN					
Other (Specify)	BOD_5					
	TSS					
	TKN					
Total	BOD_5					
	TSS					
	TKN					

4. Effluent Limitations		BOD_5		TSS		NH_3-N (most stringent month)		Other		Other	
		Avg	Max	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Operation Permit	mg/l										
Effluent Limits*	#/day										

*Date of Waste Load Allocation (WLA) determination: _____

**Effluent Limitations entered shall be the more stringent value between the existing NPDES Permit and the WLA or an approved antidegradation analysis

5. Major Industrial/Commercial contributors or Significant Industrial User:

Waste Contributors	Pre-Treat (Y/N)	Operation		Design Loadings						
				Flow		BOD5 #/day	Susp. Solids #/day	TKN #/day	Oil & Grease #/day	#/day
		Hrs/ Day	Days/ Week	Ave. MGD	Max. MGD					

6. SCHEDULE G SUPPLEMENTAL CHECKLIST MUST ACCOMPANY THIS FORM

Iowa Department of Natural Resources
Wastewater Engineering Section

SCHEDULE G SUPPLEMENTAL CHECKLIST/GUIDANCE DOCUMENT

Submittal and approval of design flows and organic loading for proposed wastewater treatment facilities is an integral step in the design of a new or expanded treatment facility. The following recommendations are intended to help provide estimates of design flows and organic loadings to address Section 14.4 of Chapter 14, thus expediting the design flow/loading approval process. It is the consulting engineer's responsibility to provide all relevant assumptions, calculations, justifications, and data to support the values entered into cells one through three of Exhibit 11C/Schedule G, Treatment Project Design Data.

THE FOLLOWING ITEMS (IF APPLICABLE) MUST ACCOMPANY ALL SCHEDULE G SUBMITTALS. CHECK YES IN THE BOXES BELOW IF INCLUDED. IF ITEMS ARE NOT APPLICABLE, N/A MUST BE CHECKED AND AN EXPLANATION PROVIDED. **IF NEITHER BOX IS CHECKED, SCHEDULE G WILL NOT BE ACCEPTED FOR REVIEW.**

YES N/A

☐ ☐ A summary table or spreadsheet should be prepared that shows the calculations used to determine the design loadings provided for ADW, AWW, MWW, PHWW, along with any equations/information used to determine peaking factors.

- Have a rational basis in the design flow and loading calculations submittal.
- Sewer replacement and/or new interceptors may cause peak instantaneous flows to increase rather than decrease.
- Avoid drought conditions when estimating ADW design flows. Dry weather in the context of the flow definition for ADW means no rainfall, but the groundwater conditions are normal.
- Compare seasonal water use records where appropriate and identify correlations.
- Consider sanitary sewer overflows, sewer surcharging and basement backups in estimating peak wet weather flows.
- Consider groundwater elevations and a wide variety of rainfall and wet weather events (including rapid snow melt) at high groundwater conditions when estimating wet weather flow equalization requirements.
- In the absence of continuous flow metering, assume that the ratio of PHWW/MWW without wet weather flow equalization could be 2 or more.
- Do not assume that equalization of wet weather flows to a level below AWW-30 is feasible.

☐ ☐ MOR Data provided from owner or DNR for treatment plants and pump stations.

- Design flows lower than the monitoring and reported data cannot be suggested without documented evidence and a valid written explanation.
- Consider at least 5 years of flow data or more as needed when projecting wet weather design flows.
- Use daily and monthly monitoring reports from the facility.
- Consider the reliability of operating records, locations for sampling and measurement, and degree of accuracy of flow monitoring and sampling.
- Consider installation of continuous flow monitoring and recording equipment where appropriate (lift stations, influent channels, etc.) to determine peak hour flows.

☐ ☐ Site exhibit delineating residential, commercial, and industrial areas with their corresponding acreages to support the design flows used. If exact flows/loadings are known for industrial areas are known, please provide the source/accuracy of the data. Census data or other relevant source shall be provided to support population growth or decline.

☐ ☐ Results of any Infiltration/Inflow studies performed to support proposed flow reduction

- Infiltration/inflow reduction cannot be suggested without valid data to support the assumptions.
- Elimination of inflow sources cannot be assumed to reduce infiltration.

☐ ☐ Any information regarding bypassing or compliance issues relevant to the project's design

- Include previous sanitary sewer bypasses when estimating present year and design year flows.

Instructions for Schedule G

1. **Project Description:** Explain the nature of the project in a concise statement.

2. **Design Year:** The design year shall be established in accordance with Section 14.4.4.1 of the Iowa Wastewater Facilities Design Standards.

   Domestic/Commercial: Includes waste volumes generated from residential, out of town students, and commercial contributors.

   Industrial: Includes waste volumes generated from industrial contributors.

   Other: If applicable, includes waste volumes generated from any other contributors such as: large commercial establishments, correctional institutions, hospitals, large restaurants, shopping centers, truck stops, or any other facility not covered under previous items. The design information for these facilities shall be given in Item 5.

   Infiltration: Includes water other than wastewater that enters the sanitary sewer system from the ground through defective pipe, pipe joints, and manholes.

   Inflow: Includes water other than wastewater that enters a sanitary sewer system from sources such as roof drains, foundation drains, yard drains, manhole covers, cross connections between storm sewers and sanitary sewers, catch basins, storm water runoff and other drainage structures.

   Average Dry Weather (ADW) Flow: The daily average flow when the groundwater is at or near normal and runoff is not occurring. The period of measurement and reporting for this flow should extend for up to 30 days.

   Average Wet Weather (AWW) Flow: The daily average flow for the wettest thirty (30) consecutive days for mechanical plants or the wettest 180 consecutive days for controlled discharge lagoons. The respective wettest consecutive (30 and 180) day flows may or may not coincide with precipitation events.

   The design of new wastewater systems to serve new collection systems shall be based on an average wet weather flow of 100 gallons per capita per day for residential and commercial flow. If applicable, add 20 gallons per capita per day for out-of-town students + industrial flows + large commercial operations.

   Maximum Wet Weather (MWW) Flow: The total maximum flow received during any 24 hour period. The MWW flow may or may not coincide with precipitation events. This column is not applicable to controlled discharge pond facilities.

   Peak Hourly Wet Weather (PHWW) Flow: The total maximum flow received during one hour of the day when the groundwater is high, runoff is occurring, and domestic, commercial, and industrial flows are at their peak. The domestic and commercial peak hour flow shall be based on actual monitoring or for new collection systems the use of peaking factors determined by the use of Appendix I, Chapter 12 of the Iowa Wastewater Facilities Design Standards.

   The PHWW flow shall be used to evaluate the effect of hydraulic peaks on the design of pumps, piping, clarifiers, and any other flow sensitive aspects.

   Rated Flow: Flows from industrial and commercial sources may vary significantly during a day, a week, or 30-days due to production patterns. In designing a facility, the flow rate which occurs during the time period of discharge must be considered. This flow rate is defined as rated flow. The purpose of the rated flows is to use them in designing mechanical plants so that they are capable of handling the higher flows during the period of discharge.

   Rated Flow (AWW): For mechanical plants, if the industrial contribution varies from week to week during a month, the design flow should be based on the average flow on the days when the industry is operating. This is reported as rated AWW flow. For example, if the industry operates 20 days of the 30-day month and has an average discharge of

100,000 gallons per day in a 30-day period, the rated AWW flow is 150,000 gallons per day. The design of mechanical plants must be based on the total rated flow.

Rated Flow (MWW): For mechanical plants, if the industrial contribution varies from day to day during a week, the design flow should be based on the average flow on the peak day during the period when the industry is operating. This is reported as rated MWW flow. For example, if the industry discharges of 10,000 gallons over eight hours of the twenty-four hours, the rated MWW flow is 30,000 gallons per day. The design of mechanical plants must be based on the total rated flow.

For Controlled Discharge Ponds: If the industrial contribution varies from day to day during a week, the design condition may be based on a weekly average. Rated AWW flow and rated MWW flow are not applicable to this method of treatment.

3. **Organic Design Loadings:** When an existing treatment works is to be upgraded or expanded, the organic design (BOD_5, TSS, and TKN) shall be based upon the actual strength of wastewater as determined from actual measurements with an increment for growth. This growth increment shall be based on the design criteria for new systems stated below or based on the analysis of available monitoring data. The industrial loadings shall be in accordance with Section 14.4.6.2 of the Iowa Wastewater Facilities Design Standards.

   Max. 30-day: The highest average organic loading received in a 30-day period.

   Max. Day: The highest daily organic loading received during a 24-hour day.

   Domestic waste treatment design to serve new collection systems shall be based on the basis of at least 0.17 pounds of BOD_5 per capita per day, 0.20 pounds of TSS (total suspended solids) per capita per day. Although not specified in the Design Standards, design TKN loading should be included in Schedule G. TKN loading criteria for domestic wastewater can be found in references such as Wastewater Treatment and Reuse, Metcalf & Eddy, 4^{th} Edition; and Table 2, Recommended Standards for Wastewater Facilities, 2004 Edition.

   When garbage grinders are used in areas tributary to a domestic plant, the design basis should be increased to 0.22 pounds of BOD_5 per day and 0.25 pounds of suspended solids per capita per day. Use references previously listed for TKN loading.

4. **Effluent Limitations:** Specify the effluent limitations that are issued by the Department in accordance with Section 14.3 of the Iowa Wastewater Facilities Design Standards. Specify the date of the most recent Waste Load Allocation (WLA) prepared by the Department. Please bear in mind that the NPDES Permit limits could be different from those in the WLA in certain cases and may supercede the WLA in the absence of an approved antidegradation analysis. The NPDES Permit shall determine the final effluent limits that the facility is expected to meet.

   NH3-N (most stringent month): List the most stringent numerical concentration and mass limit for a month listed in the WLA or NPDES permit (if water quality based limits apply to the treatment facility).

   Other: List any other parameter limitations listed in the WLA or the NPDES permit (e.g. heavy metals).

5. **Major Industrial Commercial Contributors:** Provide design information for all major industrial/commercial contributors in accordance with Subrule 567 IAC 60.2 (455B). Do not list production flows and loadings in this Section. List only the flows and loadings that will be received by and treated by the proposed wastewater treatment works under consideration. A “major industrial/commercial contributor” is a user of a treatment works that:
   a. Has a flow of 50,000 gallons or more per average workday.
   b. Has a flow greater than 5% of the flow or organic loading carried by the treatment works receiving the waste.
   c. Has in its waste a toxic pollutant in toxic amounts as defined in Standards and adopted by reference in Subrule 567 IAC 62.5 (455B).

d. Is found by the Department in connection with the issuance of the NPDES Permit to have a significant impact, either singly or in combination with other contributing industries, on that treatment works or upon the quality of the effluent from that treatment works.

Significant Industrial User: Provide design information for all significant industrial users in accordance with Federal Effluent and Pretreatment Standards as referenced in Subrule 567 IAC 62.4(3) (455B). Significant industrial user means:

a. All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, subchapter N; and
b. Any other industrial user that discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, non-contact cooling and boiler blowdown wastewater); contributes a process wastestream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating and pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Specify any other major parameters present in the waste contribution. If pretreatment is provided, answer "Y" for Yes in the second column; if pretreatment is not provided, answer "N" for No. Note that operation time includes time allocated to clean-up. For mechanical plants, if the industry's contribution varies from day to day during a week, the design loading should be based on a maximum day when the industry is operating and the industrial flows must be rated in accordance with the time period of discharge of such flows in arriving at the total rated flow.

Refer to DNR Form 542-3221 – Operating Permit Application - Treatment Agreement that can be found at http://www.iowadnr.gov/Portals/idnr/uploads/forms/5423221.pdf.

Average Flow: Represents the maximum 30-day average likely to occur in any year. Days when no discharge occurs should not be included in the average.

Maximum Flow: is the maximum single-day contribution during a peak period of operation.

6. **Supplemental Checklist:** Complete **Schedule G Supplemental Checklist** and provide all related documentation to support the proposed flows and loadings shown within cells one through three.

List of References:

1. Iowa DNR Wastewater Facilities Design Standards.
2. Recommended Standards for Wastewater Facilities, Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 2004 Edition.
3. Design of Municipal Wastewater Treatment Plants, WEF Manual of Practice 8.
4. Wastewater Engineering Treatment and Reuse, Metcalf & Eddy 4th Edition.
5. Gravity Sewer Design and Construction, Chapter 2 - Quantity of Wastewater, WEF Manual of Practice No. FD-5.
6. Existing Sewer Evaluation and Rehabilitation, WEF Manual of Practice FD-6.
7. Historical rainfall information available from the State Climatologist at http://mesonet.agron.iastate.edu/climodat/index.phtml.

Contact: Please contact Wastewater Engineering at 855-256-9287 if you have any questions or comments regarding Schedule G or the instructions.