

Schedule 18

Appendix 18M – Classification of Loads

SECTION A. GENERAL

A.1 Capitalized Terms

- A.1.1 Capitalized terms used in this Appendix 18M have the meanings set out in Schedule 18 – Technical Requirements or the Design Build Agreement.

SECTION B. CLASSIFICATION OF LOADS

B.1 General

- B.1.1 This Appendix 18M provides the requirements for prioritization for electrical loads. The information presented is intended to be used as a guideline for the programming of the load shedding and power management control systems for the facility.
- B.1.1.1 This Appendix 18M shall not define or impact the classification of loads, processes, equipment, etc. for redundancy requirements to eliminate single points of failure,
- B.1.2 The intent of the load classification is to achieve an automatic process restart within the plant after a utility power supply failure to re-establish process operation while avoiding overloading the generators, which might result in generator shutdown.
- B.1.2.1 The existing generators have existing load sequencing developed for the current infrastructure. The existing equipment load sequencing functionality shall be maintained which shall require the modification of existing load sequencing to maintain the overall plant load sequencing priorities across the existing and loads added as part of this Work. All new and existing loads being sequenced shall meet the load sequencing requirements specified.
- B.1.3 The generators are to be loaded sequentially with adjustable time delay periods between each load classification to ensure that generator dynamic performance is not affected.
- B.1.4 The plant will operate in a load classification configuration for the duration of the total utility power supply failure. The plant operators will have capability to manually initiate modifications to the generator operating loads through the selective shutdown and disabling of current operating loads and initiation of other loads in the plant as required within the available power.
- B.1.5 The following table provides a plantwide overview of the building services and process systems requiring power and their load classification priority level. The descriptors generally represent a process, as opposed specific individual loads. Each descriptor may be comprised of multiple pieces of equipment that is operated to achieve the required function. The management system must allow for all loads required to operate each process.
- B.1.6 Priority 1 loads are intended to be connected to the electrical system in such a way that they are always connected and available. The loads may be monitored by the PCS and generally do not require individual permissive from the PCS, or control by

- the load shedding/power management system. These loads are disconnected by local disconnect or operation of upstream Area E circuit breaker.
- B.1.7 Priority 2, 3 and 4 load steps are shown in a preliminary order of priority, but it shall be possible for the operator to adjust the order by use of the system HMI.
- B.1.8 Electrical systems shall be designed such that Priority 2, 3 and 4 loads can be controlled by the load management system by use of PLC control, remotely operable starter, contactor, circuit breaker, or similar, by interaction with an associated protection relay.
- B.1.8.1 For example, the digester mixing pump load can be shed by fast interaction between the management system and the VFD protection relay over Ethernet communications. Similarly, a process panelboard could be disconnected by the management system opening a contactor feeding the panelboard transformer.
- B.1.9 Each step shall be configured to include sub-steps to more precisely control generator loading of larger processes.
- B.1.9.1 For example, where the anaerobic digestion system is a group of 3 digesters, 6 mixing pumps, 6 recirculation pumps, 6 heat exchangers, and 6 transfer pumps, the load will be configured as sub-steps of one pump/unit at a time, which should allow partial process operation where system capacity is limited to a level below the full process power requirement.
- B.1.10 The load shedding and power management system will have a minimum of twenty load classifications per priority group configured. The system shall be readily adaptable to add or modify additional load classifications within each priority group.
- B.1.10.1 The intent is that as more systems are managed by the Area E infrastructure, the management system will be expandable. The intent is that each process area or building electrical room would be equipped with a panel to interact with local devices, as part of a wider networked and integrated system.
- B.1.11 Design Builder shall submit methodology of control and a complete list of load classifications with load sequencing calculations for the City to review in accordance with Schedule 5. It is in the sole opinion of the City to change the load classification as deemed required for re-establishing plant processes. Design Builder shall re-calculate the load demand based on City comments and resubmit for review.

Step	Area and/or function	Priority 1 Safety Back-up Loads	Priority 2 Critical Loads	Priority 3 Essential Loads	Priority 4 Non-Essential Loads
1.	Building Services				
1.1	Lighting and receptacles				X ¹
1.2	HVAC	X			
1.3	Standby generators controls and fuel systems	X			
1.4	UPS systems and associated loads (backup to battery systems)	X			
1.4.1	Fire alarm system	X			
1.4.2	Automatic fire protection system	X			
1.4.3	Gas detection systems	X			
1.4.4	PCS and instrumentation	X			
1.4.5	Communication/public address system	X			
1.4.6	Security systems and access control	X			
2.	Process Systems				
2.1	Digester gas flare stacks	X			
2.2	Raw sewage pumping	X			
2.3	Fine screening		X		
2.4	Grit removal		X		
2.5	Flushing water pumping – Parcel A		X		
2.6	Odour control – Parcel A		X		
2.7	Thermal hydrolysis		X		
2.8	Anaerobic digestion		X		
2.9	Digester gas storage		X		
2.10	Odour control – Parcel B		X		
2.11	Return pumping station – Parcel B		X		
2.12	Primary clarification			X	
2.13	Biological treatment			X	
2.14	Secondary clarification			X	
2.15	RAS/WAS collection and pumping			X	

Step	Area and/or function	Priority 1 Safety Back-up Loads	Priority 2 Critical Loads	Priority 3 Essential Loads	Priority 4 Non-Essential Loads
2.16	UV disinfection				X
2.17	Primary sludge pumping				X
2.18	Primary scum pumping and dewatering				X
2.19	Hauled wastewater receiving				X
2.20	Hauled leachate receiving				X
2.21	Hauled sludge receiving				X
2.22	Phosphorus release				X
2.23	Sludge screening				X
2.24	Intermediate dewatering				X
2.25	Liquid biosolids holding				X
2.26	Final dewatering				X
2.27	Biosolids storage and loading				X
2.28	Phosphorus recovery				X
2.29	Digester gas H2S removal and conditioning				X
2.30	Centrate treatment				X
2.31	Centrate equalization and pumping				X
2.32	Flushing water pumping – Parcel B				X
2.33	Process air supply				X
2.34	Chemical storage and distribution				X

Note 1: It is expected that building services panelboards will operate as a lumped load at each process area, such that it will not be possible for the management system to shed individual receptacle or light circuits that share a panelboard with Priority 1 loads such as UPS supplies.