

Appendix B - Maintenance alarm management matrix for a typical Crossrail station

I System	Alarm/ Alert Description	Classification		Cause of Alarm/ Alert						Data Acquisition System		Remote Monitoring location		Local Monitoring location		Priority (1-5)
		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
Room Temperature Monitoring	Critical Rooms-High temperature	x		x						x		x	x	x		1
	Critical Rooms- Low temperature	x		x						x		x	x	x		1
Platform Conditions	Platform High temperature	x				x				x		x	x	x		1
	Platform High Carbon Dioxide Concentration	x				x		x		x		x	x	x		1
Room Hydrogen Monitoring	Battery Room High Hydrogen Concentration	x			x			x		x		x	x	x		1
Refrigerant Leakage Monitoring	Refrigerant Leakage	x				x		x		x		x		x		2
Supply and Exhaust Air System (with recirculation)	Fan-Not in auto mode		x	x						x		x		x		4
	Heater- Not in auto mode		x	x						x		x		x		4
	Supply air temperature control		x	x						x		x		x		4
	Minimum Fresh Air Control		x			x				x		x		x		4
	Supply Fan Speed Control		x	x						x		x		x		4
	Extract Fan Speed Control		x	x						x		x		x		4
	Hours run limit		x					x		x		x		x		5
	Frost Protection		x					x		x		x		x		4
	Duty-standby fan monitoring		x	x						x		x		x		4
	Inverter- Not in auto mode		x	x						x		x		x		4
	Heater high temperature limit		x		x			x		x		x		x		4
	Chilled water out of range		x	x						x		x		x		4

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	Air filter dirty		x			x	x			x		x		x		5
	Fire interlock	x		x	x					x		x		x		2
	Consolidated system failure	x		x					x	x		x		x		2
Supply and Extract Air System (with no recirculation)	Fan-Not in auto mode		x	x						x		x		x		4
	Heater- Not in auto mode		x	x						x		x		x		4
	Energy Reclaim Device- Not in auto mode		x	x						x		x		x		4
	Supply air temperature control		x	x						x		x		x		4
	Supply Fan Speed Control		x	x						x		x		x		4
	Extract Fan Speed Control		x	x						x		x		x		4
	Hours run limit		x							x		x		x		5
	Frost Protection		x							x		x		x		4
	Duty-standby fan monitoring		x	x						x		x		x		4
	Inverter- Not in auto mode		x	x							x		x		x	4
	Heater high temperature limit		x		x			x			x		x		x	4
	Chilled water out of range		x	x							x		x		x	4
	Air filter dirty		x				x	x			x		x		x	5
	Fire interlock	x		x	x						x		x		x	2
	Consolidated system failure	x		x						x	x		x		x	2
Fresh Air System	Fan-Not in auto mode		x	x						x		x		x		4
	Heater- Not in auto mode		x	x						x		x		x		4
	Energy Reclaim Device- Not in auto mode		x	x						x		x		x		4
	Supply Fan Speed Control		x	x						x		x		x		4

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	Hours run limit		x				x			x		x		x		5
	Frost Protection		x				x			x		x		x		4
	Duty-standby fan monitoring		x	x						x		x		x		4
	Inverter- Not in auto mode		x	x						x		x		x		4
	Heater high temperature limit		x		x		x			x		x		x		4
	Chilled water out of range		x	x						x		x		x		4
	Air filter dirty		x			x	x			x		x		x		5
	Fire interlock	x		x	x					x		x		x		2
	Consolidated system failure	x		x					x	x			x	x		2
Air Extract System	Fan-Not in auto mode		x	x						x		x		x		4
	Energy Reclaim Device- Not in auto mode		x	x						x		x		x		4
	Extract Fan Speed Control		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		5
	Duty-standby fan monitoring		x	x						x		x		x		4
	Inverter- Not in auto mode		x	x						x		x		x		4
	Fire interlock	x		x	x					x		x		x		2
	Consolidated system failure	x		x					x	x			x	x		2
Dedicated Extract (Packaged Tw in Fan)	Fan- Not in auto mode		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		5
	Common fault	x		x			x			x		x		x		3
	Fire Interlock	x		x	x					x		x		x		2
Wall/ Roof mounted extract fan	Fan- Not in auto mode		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		5
	Common fault	x		x			x			x		x		x		3
	Fire interlock	x		x	x					x		x		x		2
Platform	Fan-Not in		x	x						x		x			4	

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
Smoke Extract and Ventilation Systems	auto mode															
	Extract Fan Speed Control		x	x							x	x				4
	Duty-standby fan monitoring		x	x							x	x				4
	Inverter- Not in auto mode		x	x							x	x				4
	Fire interlock	x		x	x						x	x				2
	Consolidated system failure	x		x					x		x		x			2
	Eastbound Manual Control by SOR	x		x	x						x		x		x	3
	Eastbound Manual Control by RCC	x		x	x						x		x		x	3
	Auto Control by Smoke Detection	x		x	x						x		x		x	3
	Westbound Manual Control by SOR	x		x	x						x		x		x	3
	Westbound Manual Control by RCC	x		x	x						x		x		x	3
	Emergency ventilation Manual Operation by SOR	x		x		x				x		x		x	x	3
	Emergency ventilation Auto enable	x		x		x				x		x		x	x	3
	Natural Ventilation enable		x	x		x				x		x		x	x	4
Smoke extraction system in operation	x		x		x					x	x	x		x	3	
Firefighting Staircase Pressurisation Systems	Fan-Not in auto mode		x	x							x					4
	Extract Fan Speed Control		x	x							x					4

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	Duty-standby fan monitoring		x	x							x					4
	Inverter- Not in auto mode		x	x							x					4
	Fire interlock	x		x	x						x					2
	Consolidated system failure	x		x					x		x			x		2
	Pressurisation system in operation	x		x							x			x		3
Air Release System	Fan-Not in auto mode		x	x							x					4
	Extract Fan Speed Control		x	x							x					4
	Duty-standby fan monitoring		x	x							x					4
	Inverter- Not in auto mode		x	x							x					4
	Fire interlock	x		x	x						x					2
	Consolidated system failure	x		x					x		x			x		2
	Air release system in operation	x		x							x			x		3
Fan Coil System	FCU- Not in auto mode		x	x						x		x		x		4
	Duty-standby fan monitoring		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		5
	Common fault	x		x			x			x		x		x		3
	Fire interlock	x		x	x					x		x		x		2
	Consolidated system failure	x		x					x	x		x		x		2
Close Control Unit	CCU- Not in auto mode		x	x						x		x		x		4
	Duty-standby fan monitoring		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		4
	Common fault	x		x			x			x		x		x		3
	Fire interlock	x		x	x					x		x		x		2
	Consolidated system failure	x		x					x	x		x		x		2
VRF	CCU- Not in		x	x						x		x		x		4

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	auto mode															
	Duty-standby fan monitoring		x	x						x			x			4
	Hours run limit		x				x			x			x			5
	Common fault	x		x			x			x			x			3
	Fire interlock	x		x	x					x			x			2
	Consolidated system failure	x		x					x	x			x			2
DX	DX- Not in auto mode		x	x						x			x			4
	Duty-standby fan monitoring		x	x						x			x			4
	Hours run limit		x				x			x			x			5
	Common fault	x		x			x			x			x			3
	Fire interlock	x		x	x					x			x			2
	Consolidated system failure	x		x					x	x			x			2
Primary Chilled Water System	Pump- Not in auto mode		x	x						x			x			4
	Hours run limit		x				x			x			x			5
	Chiller common fault	x		x			x			x			x			3
	Process Interlock	x		x						x			x			3
	Duty- standby pump monitoring		x	x						x			x			4
	Pump inverter not in auto mode		x	x						x			x			4
	Pressurisation system common fault	x		x			x			x			x			3
	Low water pressure		x	x						x			x			4
	High water pressure		x	x						x			x			4
	Chilled water temperature out of range		x	x						x			x			4
	Valve mismatch		x	x						x			x			4
Water Conditioner	x		x			x			x			x			3	

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	common fault															
	Pump exercise common fault	x		x			x			x		x		x		3
	Fire Interlock	x		x	x					x		x		x		2
	Consolidated system fault	x		x					x	x		x		x		2
Secondary Chilled Water Systems	Pump- Not in auto mode		x	x						x		x		x		4
	System differential pressure control		x	x						x		x		x		4
	Hours run limit		x				x			x		x		x		5
	Duty- standby pump monitoring		x	x						x		x		x		4
	Pump inverter not in auto mode		x	x						x		x		x		4
	High Chilled water return temperature		x	x						x		x		x		4
	Pump exercise common fault	x		x			x			x		x		x		3
	Fire Interlock	x		x	x					x		x		x		2
	Consolidated system fault	x		x					x	x		x		x		2
LV Power and Switchgear	Common fault for main incomers, switchgear and bus couplers	x		x			x			x		x	x	x		2
ATS	Common fault for main ATS	x		x			x			x		x		x		2
UPS ⁽⁹⁾	Common fault	x		x			x			x	x	x	x	x		2
	Rectifier fault		x	x			x			x	x	x	x	x		4
	SBS mains fault		x	x			x			x	x	x	x	x		4
	Battery Operation		x	x			x			x	x	x	x	x		4
	UPS Fan fault		x	x			x			x	x	x	x	x		4
	UPS Overload		x	x			x			x	x	x	x	x		4
	Battery high temperature		x	x			x	x		x	x	x	x	x		4

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
	Battery Disconnected		x	x	x					x	x	x	x	x		4
	External Manual Bypass enable	x		x						x	x	x	x	x		3
	Emergency stop button enable		x	x						x	x	x	x	x		4
Lighting Control	Communication loss	x		x					x	x		x		x		2
Electricity Metering	Excessive Consumption		x			x				x		x		x		4
	Meter readings mismatch		x			x				x		x		x		4
Potable Cold Water	High water level	x		x						x		x		x		3
	Low water level	x		x						x		x		x		3
	High Water Temperature		x	x	x			x		x		x		x		4
	Low Water Temperature		x	x				x		x		x		x		4
	Common fault	x		x				x		x		x		x		3
Non-potable water tank	High water level	x		x						x		x		x		3
	Low water level	x		x						x		x		x		3
	Common fault	x		x				x		x		x		x		3
Water Metering	Excessive Consumption		x			x						x		x		4
	Meter readings Mismatch		x			x						x		x		4
Sump Pump		x		x							x	x				3
Lift Sump Pump	Common fault	x		x						x		x		x		3
	High Water Level	x		x						x		x		x		3
Lift			x								x		x		x	4
Escalator			x								x		x		x	4
Trace Heating	Common fault	x		x				x		x	x	x	x	x		2
Foil Cushion Roof	Common fault	x		x				x		x		x		x		2

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		Alarm	Alert	Process related	Safety related	Environmental related	Equipment Protection	Personal Safety	System related	BMS	SCADA/ PLC	Maintenance Depot	Route Control Centre	BMS Workstation	SMS Workstation	
Water Leak Detection	Common fault	x				x	x			x		x		x		3
Standalone Condensate Pump	Common fault	x		x						x		x		x		3
Fire Control Panel	Common fault	x		x	x						x		x	x	x	2
Fire Alarm Interface	Common fault	x		x	x						x				x	2
BMS	Common fault			x					x	x		x	x	x		2
ECS for Critical Rooms	System fault	x							x	x		x	x	x		2