SECTION 29

WET FIRE SERVICES

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Version	Date	Authors	Summary of Changes
1	9 April 2013	Multitech for JCU	First Edition
2	30 September 2013	Manager, Infrastructure Services	Revised with JCU comments
	10/03/15	Manager, Infrastructure Services	Cross referenced with new sections
V3	02/07/18	Manager, Infrastructure Services	2018 general review update

29.0 WET FIRE SERVICES

This document is a sub-section of the James Cook University (JCU) Design Guidelines and is not to be read in isolation. Consultants and Contractors are required to comply with all sections of the JCU Design Guidelines.

29.1 Design Process Requirements

The consultant shall be held responsible / liable for ensuring that all works necessary for the complete installation and successful operation are included in the design and specifications. Specific deliverables are required at the end of each project stage, namely:

29.1.1 Approvals Required during Design

Approval shall be obtained from the JCU Estate Directorate, Deputy Director, Planning and Development in SD for the:

- Plant numbering sequence,
- The location, colour and construction of any proposed water storage tanks,
- Fire sprinkler systems and hydrant systems if not 'wet pipe' systems,
- Fire sprinkler control valve assemblies not located in an AS2118.1 compliant location readily accessible to the attending authority,
- The fire sprinkler service design not utilizing SSL pressure switches,
- The location, colour and design (type and duty)of fire booster installations,
- Location and design of fire pump room installations,
- Engineered solutions if the hydrant systems are not D.T.S in accordance with NCC,
- Requirements for fire hydrant coverage with intended fire main system design including any required booster pumps/water storage tanks,
- All above-ground hydrant valves if not Galvin, Dixon Fire or Tyco supplied,
- The fire hydrant design shall include only 'POTTER' pressure switches, installation of other equipment of equal or superior standard shall only be used after the approval,
- Requirements for fire hose reel requirements and location of the fire hose reels within the building, and the
- Fire hose reel designs if not 'Quell' Selector type, Wormalds Model 92-482P or Fire Master (Tyco) 'Exelgard' fire hose reels.

Approval shall be obtained from the JCU Estate Directorate, Deputy Director, Planning and Development in CD if the following are not included in specifications/Contract Documents:

- Full Hyena hydraulic calculations,

- The designing consultant does not ensure that before commencing any installations, Fire Services Contractors shall provide evidence to the JCU Estate Directorate, Deputy Director, Planning and Development that they are duly registered with the Fire Protection Contractors Registration Board of Queensland, and have such licences as required by State legislation.

- All commissioning testings shall not be performed in the presence of the JCU Estate Directorate, Deputy Director, Planning and Development, or nominated representative and all testing results shall be provided to the JCU Estate Directorate, Deputy Director, Planning and Development prior to inspection and approval by the QFES.

29.1.2 Site Infrastructure Connection Approvals

The Manager, Infrastructure Services is responsible for approving the Hydraulic Services Application (which is to be prepared and submitted to the Local Authority by the Hydraulic Design Consultant) on behalf of JCU, PRIOR to that submission.

Furthermore, the Manager, Infrastructure Services is responsible for approval of all connections to JCU's existing infrastructure, including fire water infrastructure. A single request to connect to the JCU site infrastructure is to be sent to the Manager, Infrastructure Services, at least 3 working days before the connection is required.

This request shall contain the following information;

- Form 15 or statement from designer that design meets code requirements
- Form 16 or statement from installer that installation has been done in accordance with design
- As built drawing of surveyed in-ground pipework, valves, hydrants and connection points to existing trunk lines.
- Certificate of Design Compliance as per 29.1.4 completed by the CD RPEQ Design Engineer.
- Hydraulic Commissioning Plan (including connection and testing procedure)
- Certificate of Installation Compliance
- Water pressure test results
- System commissioning test results
- Water supply network analysis with the above water demand and fire flow modelled.
- System commissioning and test results in compliance with legislation and codes

29.1.3 Schematic Design (SD) Report / Design Review

Report Content in addition to requirements of Section 30:

- Results of any Flow and Pressure testing on water main/s adjacent to the site and any requirements for pumps and tanks to supplement the mains water supply,

- Results of consultation with the local QFES officer and what their requirements will be for the project,

- A detailed list of the applicable standards, regulations and local authority requirements to which the project has to conform,
- A description of any required fire water supply requirements including any required booster pumps (for approval) and number thereof,
- Requirements for fire hose reel requirements and location of the fire hose reels within the building (for approval),
- A description of any required water storage requirement arrangements,
- Requirements for fire hydrant coverage together, and
- A drawing proving that the wet fire systems proposed will work i.e. showing water supply points, pipework sizing and required flows for the most remote hydrants or area of operation

29.1.4 Developed Design (DD) Report / Design Review

Report Content in addition to requirements of Section 30:

- A detailed description of:
  - wet fire services design including the required flows and pressures for the various services giving pipe and equipment sizing calculations, including water storage requirements, safety equipment, etc.
  - Provide Hyena calculations proving that the wet fire system will perform
  - Detail on loads and consumptions to existing services, including mains water
  - Statement on how the existing services will be impacted by these additional loads and any specify any required upgrades
  - Updated site water schematic, showing positions of all new valves and hydrants
- A report on:
  - Report on the wet fire service design including site connections, metering, backflow prevention, insulation, signage etc.

The Developed Design JCU RPEQ Certification Schedule below shall be completed by the DD Design Engineer and submitted for confirmation.

Project Name		
Project Number		
Date		
Company		
RPEQ Design Engineer Name		
RPEQ Licence Number		
Building Area (GFA)	sqm	
Building Area (UFA)	sqm	

Calculated Building Peak Fire Water Flow	l/s	
Calculated 24 hr Systems Peak Fire Water Flow Demand	l/s	
Fire Water Estimated Capital Investment (ex GST)	$	
Total number of Booster Pumps	No. Off	
Total number of Valves	No. Off	
Total number of Hydrants	No. Off	
Total number of Hose Reels	No. Off	
Any other plant and equipment requiring routine inspections	No. Off	
	Manager Infrastructure Services	
All specific design elements are included in the design	YES / NO	
Does the investment decision in SD Report include Life Cycle Costing	YES / NO	

29.1.5 Handover Requirements

Following commissioning, undertake a witness inspection of the operation. Ensure that the Consulting Engineer and JCU Manager, Asset Strategy and Maintenance and/or JCU Manager, Infrastructure Services (or representatives) are present.

As a minimum, prove to their satisfaction:

- Testing and commissioning of all wet fire systems were witnessed and signed off by an independent testing authority not associated with the hydraulic contractor.
- Testing is to be done to AS3500/AS2419 and AS2118 and other mandatory standards.

Following commissioning, undertake a witness inspection of the operation of the hydraulic systems. Ensure the JCU appointed Consultant hydraulic engineer and Manager, Infrastructure Services, or representative are in attendance.

As a minimum, prove to their satisfaction:

- Fire mode operation of systems
- Pump Duty / Standby operation and changeover
- Controls operation. Prove operation by amending set-points etc and observing operation. Prove alarm functionality.

Rectify any defects identified. Should re-inspection be required, the cost of consultants reinspections will be deleted from the contract sum.

In addition to Section 30, Operating and maintenance manuals must include as a minimum:

- Final certification from QFES
- Certification of any Fire Penetrations etc.

29.2 Wet Fire Equipment Requirements

JCU owns, operates and maintains all infrastructure services and all academic buildings on and within the campuses. The RPEQ consulting engineer shall take a long term investment and maintenance decision strategy when designing the systems.

The water supply for fire services shall be designed such they include a dedicated water service to each building isolated by double check valves located in an accessible approved position.

Wet fire services design shall include the requirement for a full campus water mains flow and pressure test specific to the project site, prior to the design of any wet fire service. Flow and pressure testing results should be verified by the installing contractor prior to the commencement of works.

Where required water storage tanks design shall meet the requirements of AS2419.1 & AS2118.1 respectively.

Within the wet fire services design; the location, colour and construction of water storage tanks shall be approved by the Deputy Director – Planning and Development, the Building Surveyor and QFES prior to design finalisation.

Where on-site water storage is required, the design shall ensure that the 'effective' capacity of the storage guarantees the total system/s demand for the required system/s duration.

Water storage tank configuration design shall be such that during maintenance at least 50% capacity is available for use at all times.

29.2.1 Identification of Equipment

Confirm the plant numbering sequence with JCU Estate Directorate, Deputy Director, Planning and Development prior to Contract Documentation. Prefix equipment with building number (xxx) for Townsville, the Cairns building number is an integral part of the sequence.

All items of equipment must be suitably identified with Traffolyte labels, minimum letter size to be 5mm and 0.5mm line thickness.

Generally all plant is to be numbered as follows (xxx is building identifier):

- Fire water pumps "xxx-FWP-1" Townsville or "FWP-xxx-1" Cairns

29.2.2 Fire Sprinkler Services

All fire sprinkler services shall be designed in accordance with the National Construction Code Part E1.5, Specification E1.5 & all applicable parts of AS2118.

Unless otherwise specified by the JCU Estate Directorate, Deputy Director, Planning and Development, fire sprinkler systems shall be 'wet pipe' systems.

The configuration of the various services shall be in accordance with the following;

Fire Sprinkler services:

- Residential Buildings AS2118.4
- All other areas AS2118.1
- Combined hydrant and sprinkler services AS2118.6

Fire sprinkler system design shall include a requirement for full Hyena hydraulic calculations to be submitted and reviewed by the JCU Estate Directorate, Deputy Director, Planning and Development prior to systems installation.

All fire sprinkler services design shall include provisions to allow for routine testing in accordance with the requirements of AS1851.

The designing consultant shall ensure that before commencing any installations, Fire Services Contractors shall provide evidence to the JCU Estate Directorate, Deputy Director, Planning and

Development that they are duly registered with the Fire Protection Contractors Registration Board of Queensland, and have such licences as required by State legislation.

Designs should ensure that all wet fire services, hydrant, hose reel & sprinkler be certified and tagged by a certified fire services equipment installer.

Wet fire services shall be designed such that preventative maintenance can be carried out in accordance with AS1851. Consideration shall be given to the availability of system consumables, replacement pipe, fittings, valves and any other item required.

Fire sprinkler services design shall be such that nothing about the way plant is designed when erected or installed makes it unsafe for the end user and furthermore ensuring that nothing about the way plant is commissioned makes it unsafe for the end user.

The consultant shall specify that the Fire Service Key required for all door locks and key switches shall be keyed to the 003 fire service key only.

Fire sprinkler control valve assemblies design shall ensure that they are located within a secure enclosure and fitted with anti-tamper devices to prevent unwanted system activation. Fire sprinkler control valve assemblies shall be located in an AS2118.1 compliant location readily accessible to the attending authority and additionally approved by the JCU Estate Directorate, Deputy Director, Planning and Development, Building Surveyor and the QFES prior to design finalisation.

All block plans must be provided as engraved traffolyte type and at least A2 (594 x 420mm) in size as a minimum.

All fire sprinkler designs shall nominate the required system duties as a basis for the system performance testing in accordance with the requirements of AS1851.1. All commissioning testings shall be performed in the presence of the JCU Estate Directorate, Deputy Director, Planning and Development, or nominated representative and all testing results shall be provided to the JCU Estate Directorate, Deputy Director, Planning and Development prior to inspection and approval by the QFES. Following the completion of the performance testing the QFES Community Safety Inspection Officers will conduct their proving tests as a process in the final certification of the systems.

Fire sprinkler systems shall be designed and installed such that system activation is relayed to the QFES or designated third party monitoring service.

The fire sprinkler service design shall include only SSL pressure switches, installation of other equipment of equal or superior standard shall only be used after the approval of the JCU Estate Directorate, Deputy Director, Planning and Development has been obtained.

29.2.3 Fire Extinguishers

Selection and location of fire extinguishers shall conform to AS 2444.

29.2.4 Booster Pumps

All large ticket fire pumps shall be designed as compression ignition type ‘Kelair’, ‘Prime Pumps’ or ‘Southern Cross’. Pump type and duty to be submitted to JCU Estate Directorate, Deputy Director, Planning and Development, for approval. Pump duties shall be designed such that the available flow and pressure of the pump shall be at least 20% greater than the system duty flow and pressure requirements to allow for pump redundancy.

Pressures relief valves shall be included within the design for all pumps and system pipework. All pumps systems shall be designed with mechanical seals only. All pressure gauge inclusions shall be designed with an isolation valve to enable service or replacement of the gauge.

Pumps are to be designed as two identical pump sets manifolded together with details of valve trains, pressure vessels and rated to supply flows complying with relevant Australian standard for the particular installation. Pumps are to be installed on a minimum of 150mm plinths with anti-vibration mounts the connections are to be, flexible and anti-vibration. Pumps are to be located in weatherproof ventilated structures and are to be designed with allowance for access, maintenance and replacement.

Generally the pumps duty will be Duty Call - Duty, Standby – Duty, Duty – Duty Stop. Pumps are to be clearly marked with manufacturer and duty pressure and flows. The consultant shall design all fire pumps installations fitted with a 'Pump-Run' and 'Pump-Fail' audible and visual notification and be external to the fire pumproom in a visible location. The prior notification signals shall also interface with both the BMS (Section 23) and security services.

Fire protection pump sets to comply with all required standards (AS2419, AS2118)

Where required, hydrant booster designs shall meet the requirements of AS 2419.1/2/3.

Within the wet fire services design the location, colour and design of fire booster installations shall be approved by the JCU Estate Directorate, Deputy Director, Planning and Development, Building Surveyor and the QFES prior to design finalisation.

Masonry construction is preferred to metal cabinets with wet fire services design.

29.2.5 Fire Pump Pumprooms

Pumps rooms and contained plant and equipment must be designed such that access for both operation and maintenance is available without obstruction and with consideration being given to available power sources, lighting and drainage.

The location and design of fire pump room installations shall be approved by the JCU Estate Directorate, Deputy Director, Planning and Development, Building Surveyor and the QFES prior to design finalisation.

29.2.6 Fire Hydrants

Determine extent of required fire hydrants system to NCC and AS2419/AS2941 in association with the Architect and the Building Certifier. Hydrant systems are to be D.T.S in accordance with NCC only.

Engineered solutions are not to be implemented without the written approval of the JCU Estate Directorate, Deputy Director, Planning and Development.

The SD report shall itemise requirements for fire hydrant coverage together with intended fire main system design including any required booster pumps/water storage tanks. Approval from the JCU Estate Directorate, Deputy Director, Planning and Development is required at SD prior to proceeding to DD.

Fire hydrant systems shall be designed to ensure that the system performance shall be sufficient to supply the flow and pressures at the applicable number of most remote hydrants for the building in accordance with AS2419.1 and QFES requirements.

Authority requirements for all wet fire services over and above the requirements of the relevant Australian Standards must be adhered to following consultation with the relevant QFES building assessment officer and included in the DD report.

Unless otherwise specified by the JCU Estate Directorate, Deputy Director, Planning and Development, hydrant systems shall be 'wet pipe' systems.

The water supply design for fire hydrant services shall be provided via a dedicated water service to the building isolated by double check valves located in an accessible approved position.

Hyena Hydraulic calculations shall be included in the SD and DD reports and reviewed by the University prior to systems installation.

All fire hydrant service designs shall specify that before commencing any installations, Fire Services Contractors shall provide evidence to the JCU Estate Directorate, Deputy Director, Planning and Development that they are duly registered with the Fire Protection Contractors Registration Board of Queensland, or have such licences as required by State legislation/the Building Certifier.

Fire hydrant service designs shall ensure a full site campus water mains flow and pressure test specific to the project site is obtained prior to the design of any wet fire service. Flow and pressure testing results must be verified by the installing contractor prior to the commencement of works.

Consideration shall also be made within the system design for the protection of any 'Open Yard' in accordance with the requirements of AS2419.1

Designs shall include anti-tamper/vandal proof device shall be fitted to all hydrant stand pipe and landing valves hydrants accessible to the public to ensure unwanted operation of the service.

The design shall specify that all stand pipes and any in-ground steel services are to be lagged with double wrapped denzo tape – or painted with an approved mastic coating - to a minimum 150mm above the surrounding finished surface level to stop any potential corrosion.

Where designs include fire hydrant enclosures consideration must be made for clear identification.

All fire hydrant designs shall allow for the provision of required block plans as engraved traffolyte type at least A2 (594 x 420mm) in size as a minimum.

All fire hydrant service design shall specify the requirements for the system performance test in accordance with the commissioning requirements of AS2419 in the presence of the Estate Directorate, Deputy Director, Planning and Development, or representative, and provide all testing results to the Estate Directorate, Deputy Director, Planning and Development prior to inspection and approval by the QFES. Following the completion of the performance testing the QFES Community Safety Inspection Officers will conduct their proving tests as a process in the final certification of the systems.

All fire hydrant service installations shall be certified and tagged by a certified independent fire services equipment installer.

Where designs include internal hydrants allowance must be made for the inclusion of a safe discharge point (Fire Test Drain) for the testing of the required number of most disadvantaged fire hydrants. All discharge points shall be fitted with the required number of 65mm round thread 'Type 6' QRFS compliant male couplings and shall be designed to discharge to the Stormwater drainage system.

Where available, fire hydrant services shall be designed such that all routine test and maintenance 'waste' water is recycled within the service or captured with the possibility of re-use by other permissible services.

Wet fire services shall be designed such that preventative maintenance can be carried out in accordance with AS1851. Consideration shall be given to the availability of system consumables, replacement pipe, fittings, valves and any other item required.

The fire hydrant service design shall include the provision for a Fire Service Key required for all door locks and key switches and shall be keyed to the 003 fire service key only.

All above-ground hydrant valves shall be designed as Galvin, Dixon Fire or Tyco supplied, installation of other equipment of equal or superior standard shall only be used after the approval of the JCU Estate Directorate, Deputy Director, Planning and Development has been obtained.

Any in-ground spring type hydrants shall be of the A.W.E. (Associated Water Equipment) 'Maxi Flow' nylon coated type and not to be installed with a boosted fire main.

The fire hydrant design shall include only 'POTTER' pressure switches, installation of other equipment of equal or superior standard shall only be used after the approval of the JCU Estate Directorate, Deputy Director, Planning and Development has been obtained.

29.2.7 Fire Hose Reels

Determine extent of required fire hose reels to NCC and AS 1221 and AS 2441 in association with the Architect and the Building Certifier.

The sketch design shall itemise requirements for fire hose reel requirements and location of the fire hose reels within the building.

Approval from the JCU Estate Directorate, Deputy Director, Planning and Development is required at SD prior to proceeding onto design documentation.

Fire Hose Reels are to be 36 metres in length. System design coverage shall be provided where required in accordance with Specification E1.5 of the NCC and AS2441.

All Hose reels are to be designed with a tested Gate Valve fitted to allow the removal of the fire hose reel for servicing and or replacement.

Extended swivel arms shall be allowed for with the design where hose reels are installed inside recessed areas, inside cupboards or cabinets.

Where fire hose reels are to be exposed to direct sunlight and weather and not otherwise housed in a suitable enclosure designs should include a purpose built cabinet/cupboard to be provided. Floor mounting brackets shall be utilised only where other forms of mounting/support are not available.

Where provided all fire hose reel cabinets and enclosures shall be designed to include visible signage in accordance with the requirements of AS2441.

Only brass screw nozzles shall be specified.

Fire hose reel designs shall ensure that only 'Quell' Selector type, Wormalds Model 92-482P or Fire Master (Tyco) 'Exelgard' fire hose reels shall be installed, installation of other equipment/reels of equal or superior standard shall only be used after the approval of the JCU Estate Directorate, Deputy Director, Planning and Development has been obtained.

29.2.8 Insulation

In all cases pipe insulation is to comply with the requirements of the NCC latest edition Section J for thermal properties for the relevant climate zone.

29.2.9 Interfaces with BMS and EMS

The wet services design is to include all required interfaces from the wet fire equipment & control panels to JCU's BMS, as specified in JCU Design Guideline Section 23 and to JCU's EMS, as specified in JCU Design Guideline Section 25.

This includes:

- All Water Meters
- Pumps – signals for pump run/stop, pump fail & high/low level alarms