GL-06: ACCEPTABLE SOURCES OF WATER SUPPLY FOR FIRE HYDRANT/SPRINKLER SYSTEMS. (BORES, DAMS, RIVERS, LAKES AND SEAWATER)

PURPOSE:
To highlight the important issues, related to acceptable sources of water supply for fire hydrant and fire sprinkler systems and to provide guidance when submitting building plan applications to the DFES for assessment.

INTRODUCTION:
Information is contained in AS 2419 Section 4 – Water Supplies, AS 2941 and AS 2118 regarding the use of acceptable water supplies suitable for firefighting purposes, however this guideline will provide additional assistance when preparing proposals for consideration by DFES. This document is a guide and shall not be used to create precedent for future projects. Notwithstanding this, each project will be assessed on a case-by-case basis.

COMMENT:
The information contained in AS 2419 relating to the acceptability of certain water supplies must be supported by documentation that demonstrates a level of reliability that can be compared with that of a service provided by a water supply agency. Reference to a Hydrogeology Report is a recognised means of demonstrating an appropriate level of water supply reliability.

1. QUALITY OF WATER
If the water contains dissolved or suspended matter likely to cause accumulation, pump materials shall be selected with due regard to the quality of water.

Where the water supply is obtained from an open source such as a river, pond or wet pit, a compatible, corrosion-resistant strainer shall be attached to the suction inlet and shall have a free area not less than four times the area of the suction entry.

Individual openings in the strainer shall be not greater than the pump impeller passage width, up to a maximum allowance of 8 mm by 8 mm.
Firefighting water may not to be required to be potable under the standards but it must be of suitable use now and in the future.

Confirmation that the water is free from corrosive, bacterial or other contaminants that may affect the operation of the pump, cause health issues in the future for firefighter or compromise the effective firefighting capabilities of the brigade. Items to consider but not limited to.

- **pH (potential of hydrogen)** both acidity and basicity.
- **Iron Bacteria** contamination
- **Biofouling** the accumulation of microorganisms, plants, algae, or animals on wetted surfaces.
- **Biofilm** an accumulation of by products that can reduce the efficiency of pumps.
- **Effluent** both animal and human.
- **Enterococci** although not harmful themselves, they can indicate a possible presence of harmful microorganisms such as bacteria, viruses and protozoa.
- **Escherichia Coli** or E. Coli for short infection causing bacteria
- **Amoebae** wide range of single celled animal which may cause infection
- **Surface litter** both natural and man made

2. **BORES - Reliability of Supply**

Bores are no longer considered acceptable primary water supplies for fixed fire protection installation pumpset systems and should not be used.

**Bores must be approved by the Local Government before they are installed.**

**Hydrogeology Report**

A hydrogeology report shall be submitted by the Building Surveyor and contain sufficient detail for DFES to assess a proposed or existing bore as a source of water for firefighting purposes. The following information must be included in the report:

- **Capacity** – Verification of the amount of water available from the bore.
  - The water supply shall be capable of supplying the maximum flow requirements
for the duration required by AS 2419 or AS 2118. This capacity must be available all year round.

- **Neighbouring Bores** - Neighbouring bores can interfere with the water level of the proposed bore.

  ◦ Ensure that the submitted hydrogeology report identifies any potential problem(s) from neighbouring bores.

**Pumps**

- Pumping to tanks - bore pump do not provide direct firefighting flow and pressure and are only intended to fill water storage tanks to the **full** capacity,

  ◦ The full capacity for fire hydrant systems is a minimum of 4 hours and for fire sprinklers as nominated within AS 2118 in accordance with the relevant sprinkler system hazard classification.

  ◦ Pumps downstream of the fire tank which provide firefighting pressures and flows shall comply fully with the requirements of AS 2419, AS 2118 and AS 2941.

  ◦ A bore is not considered to be a reticulated water supply; therefore a duty and stand-by pump must be provided as per Clause 6.2 of AS 2419.1 (or as amended).

(DFES interpretation of a reticulated water supply is a water supply from the Water Corporation (or other water utility) main, either connected directly to the hydrant installation or to a water tank(s) that will provide the required flow at a minimum 200kPa.)

  ◦ When used in conjunction with a sprinkler system, the number of pumps required will depend on the grade of water supply in accordance with BCA Specification E1.5 and AS 2118.1, Section 4 – Water supplies.

  ◦ **ALL** pumps referred to above, shall be maintained in accordance with the requirements of AS 1851 (or as amended).

  ◦ Refer to AS 2941 - Section 2 Water Supplies and Appendix B for additional requirements.

**SUMMARY REQUIREMENTS (for BORES):**

1. The reliability of bore water must consider the capacity of the bore, water quality and the
effects of neighbouring bores. These aspects must be addressed by submission of a hydrogeology report.

Note: Suitable connections and vehicle hardstand shall be provided in accordance with Guideline 11, AS2419 and DFES requirements.

3. Power supply to the pumps must be proven to be reliable and all pumps must be maintained to AS1851.

3. PRIVATE DAMS

Hydrogeology Report

A hydrogeology report shall be submitted by the building Certifier and contain sufficient detail for DFES to make an assessment of the proposed or existing dam as a source of water for firefighting purposes.

The following information must be included in the report.

- The water storage capacity of the dam (including the lowest mean level from a 25 year history)
- Likely rainfall and run-off.
- Other sources of infill (if any)
- Any domestic or commercial use throughout the year (if applicable)
- The minimum water supply capacity available for firefighting purposes.
- Estimated evaporation from the dam.
- Water quality
- Details of dam construction
- Water and Rivers Commission Licensing (when applicable)
- All dams to comply with the Australian Engineering standards for ‘Small Earth Wall Dams’ (when applicable)

Note: The water storage and run-off area must be on the building lot under consideration and under the direct control of the building owner.

Hard Standing

- Hard standing must be provided to the summer low water line so that DFES appliances can draft water from the dam. It may be necessary to provide a suction pit or other means of ensuring that the inlet to the pump does not become fouled.
- The hard standing must be as defined in AS 2419 and DFES Guideline 11 Site Planning and Fire Application Specifications
- A fixed suction point can be installed where it is not possible to provide hard
standing to the water’s edge. A pipe (as depicted in the diagram below) can be installed with a strainer attached to the submerged end of the pipe, and a Storz coupling 125mm and two 100mm male Camlock connection above ground. However the maximum practical vertical lift must not exceed 3m.

- Refer to DFES Built Environment Branch, Guideline 8 Hard Suction Connection.

**Fire Pumps**

- Because a static water supply is not considered to be a reticulated water supply, two fire pumps will be required and must comply with the requirements of BCA part E1.3 and AS 2419.1 and AS 2941.

**RIVERS, LAKES AND SEAWATER**

Generally the same provisions required for ‘private dams’ also apply to rivers, lakes and seawater however, the following additional guidelines apply:

- Where it is proposed to use rivers, lakes or seawater, there will be a requirement for the Building surveyor or consultant to contact the Department of Water and/or any other Department with regulatory powers over the body of water to be used, for approval as well as forwarding a *hydrogeology report* similar to the requirements for the use of private dams or bore.

- The law relating to the right to surface water is contained in the “Rights to Water and Irrigation Act 1914 (RIWI Act)”, administered by the Department of Water. The RIWI Act defines ‘Riparian Rights’ for those landholders where there is a water course flowing through their property or the property abuts the water-course. In
this situation the landholder has the right to take water for specific non-commercial purposes. Taking water in excess of Riparian Rights or for commercial use may require a license. The RIWI Act doesn’t specify the amount that can be taken as a Riparian Right, only the purpose for which it can be used.


• As for private dams, consideration needs to be given to the domestic and or commercial connection from the water source. Unlike dams, which are usually singularly owned, rivers and lakes may have a number of unrelated users of the water supply.

• A four-hour supply of water dedicated to firefighting must be available all year round for a hydrant service designed in accordance with AS2419 or if a combined system is proposed, a capacity in accordance with the requirements of AS 2118 for sprinklers, whichever is the greater.

• **Galvanic corrosion and electrolysis can be a major problem in firefighting systems using saltwater.**

• The use of seawater for firefighting will require fixtures, fittings and pump components that will not be adversely affected by corrosion through saltwater. Possibly high quality, stainless steel fittings should be used.

• The storage of seawater is not recommended as over time with the temperatures experienced in Western Australia, the seawater decomposes and the salinity increases.

• Seawater may also contain microscopic organisms that grow or multiple over time.

System designers and consultants are advised to liaise with DFES to ascertain any specific Fire Service requirements when considering the use of sea water for firefighting.

DFES will assess these proposals on a case by case basis and may not support if any other water source is available

<table>
<thead>
<tr>
<th>SUMMARY REQUIREMENTS for DAMS, RIVERS, LAKES and SEAWATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. A hydrogeology report is to be submitted addressing the reliability of water supplies.</td>
</tr>
<tr>
<td>2. Dams, rivers, lakes and seawater are not considered a ‘reticulated water supply’ therefore a fire hydrant installation will require two pumps installed to the requirements of AS 2419.1 and AS 2941.</td>
</tr>
<tr>
<td>3. Provision must be made for hard standing suitable for DFES pumping appliances to access the water supply.</td>
</tr>
<tr>
<td>4. Department of Water and/or other regulatory departments, approval must be obtained for using RIVERS or LAKES.</td>
</tr>
</tbody>
</table>
5. Use of seawater will require the use of fittings and pump components considered suitable to avoid corrosion of the firefighting system. Possibly stainless steel.
6. The build of silt and debris in Dams, Rivers, Lakes and the Ocean needs to be considered as to not foul the suction inlet strainer or suction intake pipework.
7. The buildup of surface litter both natural and manmade needs to be considered as to not foul the suction inlet strainer or suction intake pipework.
8. The facility to allow attending fire brigades to flush their equipment with fresh potable water.

REFERENCES:
Australian Standard 2118.1 - Automatic Fire Sprinkler Systems
Australian Standard 2419.1 - Fire hydrant installations
Australian Standard 2941 - Fixed fire protection installations - Pump set systems
Building Code of Australia - National Construction Code (BCA) Volume 1
Department of Environment & Conservation (WA) - Minimum Construction Requirements for
Department of Health - Water Bores in Australia
Department of Water (WA) - Bore Water
Department of Transport - Rights to Water and Irrigation Act 1914
Department

APPLICABLE LEGISLATION:
Building Act 2011
Building Regulations 2012 (as amended)