

15 April 2011

Mr M Keelty APM  
Reviewer - Perth Hills Bushfires  
Locked Bag 10  
Cloisters Square  
PERTH WA 6850

Dear Mr Keelty

Thank you for your letter of 28 March 2011 inviting the Water Corporation to make a written submission to the Perth Hills Bushfire Review and requesting our attendance at a hearing held on Tuesday, 12 April 2011. This submission was discussed during the hearing and is in three parts of follows:

- General commentary on the water supply system that services the affected area of Kelmscott/Roleystone and also on the water supply expectations the community should have during major bushfire incidents.
- Commentary, where relevant, on the five specific items highlighted as issues of interest in the Terms of Reference.
- Additional information requested following the hearing discussion on Tuesday, 12 April.

#### ***General Water Supply Comments***

The water supply system that supplies the Kelmscott/Roleystone area is shown in the schematic included as Attachment 1 - Armadale/Kelmscott Process Control Plan. This schematic shows that the Kelmscott and Roleystone areas are supplied via a pipe network incorporating five separate water supply tanks and a similar number of water pump stations. The two water supply tanks in the Kelmscott area are independent systems while the three tanks in the Roleystone area are configured in an integrated in-series set-up.

As can be seen by reviewing the contour map (refer Attachment 2), the area around Kelmscott and Roleystone covers some quite steep areas. The local topography means that the water pressure within the supply systems to these suburbs can vary quite significantly. Some parts of the system have maximum pressures of around 100 metres while the properties on the ridges have water pressure only just above our minimum Operating Licence requirement of 15 metres. The water supply system assets servicing the highest properties on the ridges are designed in accordance with our standards (DS 63). It should also be noted that these standards are consistent with those of other Australian major urban water authorities when supplying such high level customer zones.



While the source water for this area is generally from the Canning or Wungong Dams, it should be noted that the supply network for the Perth metropolitan area is an integrated system and there is capacity to draw water from multiple sources to supply most areas of the city. Bulk water can be drawn from the surface water dams located along the escarpment, from major groundwater reserves or from the existing desalination plant. This integrated system is soon to be further enhanced by a second desalination plant that will be integrated into the network. Given this high level of system flexibility, there is no link between our capacity to supply water to any specific area and the level of water stored in local bulk water storages. If the Canning or Wungong Dams are low, then water is simply drawn from groundwater reserves or the desalination facility. In fact, given the very low run-off into Perth's surface water storages last winter, reliance on these storages has been much less over this last summer.

Finally, we would like to highlight that while we make every effort to maintain water supply to areas during a bushfire event, we cannot guarantee supply. Due to the potential loss of power in such events, and/or due to extremely high demands that may be placed on the water supply system, there is high potential for the water supply to be either interrupted completely or be operating at significantly reduced pressure. We produced a joint working paper with FESA (refer Attachment 3) dealing with fire protection for urban fires and bushfires. From this joint work, FESA is aware of the risks to water supply and accepts that full fire flow requirements (as per design standards) would not be available 100% of the time at all locations. We provide advice on our website, as do FESA, regarding the inability to guarantee water supply during bushfire events and this advice is also incorporated into the FESA Checklist – Prepare to Actively Defend document (refer Attachment 4).

It is our belief that while the risk that the water supply may be interrupted is communicated on both websites, the awareness of this risk is not as well known within the community. More explicitly, we believe that the message should be strengthened to emphasise that homeowners should only stay if they have both alternative sources of water (eg pool, rainwater tank etc) and an alternative power supply. We will always do all that it possibly can to maintain supply but achieving that should be a bonus for property protection efforts rather than something that is to be relied upon.

### *Terms of Reference – Specific Issues*

The Terms of Reference for the review listed five specific items relating to bushfire risk management. We are not directly involved in all of these issues but we offer the following comments for consideration, where relevant.

- **Adequacy of current preventative measures**

In general, there are aspects for which we do not have any direct responsibility, except where it relates to our own land. We consider that our interaction with responsible agencies, such as the Department of Environment and Conservation (DEC), FESA and local government generally meets our needs in this area.

- **Impact of land use, environmental and building laws, practices and policies**

The issue of native vegetation clearing to achieve increased bushfire protection for critical assets can be complex. The *Bushfires Act* allows clearing around an asset with the extent of allowable clearing being determined by the relevant local government. Typical clearance distances are generally in the 3-5 metre range.

If we determine that this would be insufficient to adequately protect a critical asset, which is usually the case, then to clear a wider area requires an exemption or permit to ensure we are in compliance with the *Environmental Protection Act*. Obtaining an exemption or individual permits to clear can be cumbersome. Ideally, the owner of critical infrastructure should be accountable for ensuring their protection. As such, we consider that we should be responsible for the management of clearing for fire protection around our critical assets. The easiest way for this to be achieved is for us to be directed under the *Bushfire Act*, either by FESA, or the local government delegated bushfire officer, to clear a specific width around assets. We would need to agree some guidelines/justification criteria as to what constitutes reasonable clearance for asset protection of critical assets.

- **Actions by landowners, residents and tenants**

As a landowner, and also an owner of critical infrastructure, we are proactive in taking action to protect its critical assets from the threat of bushfire. Some of the key activities that we have in place include:

- Darling Escarpment Water Supply Plan (DEWS Plan) which is an awareness plan for the management of the water supply in a fire situation that has been prepared for the Corporation, FESA and DEC.
- Annual season briefings held for the DEC and FESA prior to summer
- Asset protection/grounds maintenance standards established for our assets based on the level of risk
- Major infrastructure assets have specific Fire Management Plans and Fire Prevention Systems (eg sprinklers, ember screens etc)
- A specific program of targeted asset protection grounds maintenance was carried out in the Darling Escarpment area during 2010/2011, and further work in this area is being planned
- New assets are designed to meet requirements of AS3959, relevant FESA guidelines and current industry practice for fire protection
- Representation on State, District and Interagency committees and working groups (eg District Emergency Management Committees, State Emergency Management Committee)

We consider that these processes are appropriate and robust, they are subject to regular continuous improvement reviews and particularly are subject to post incident reviews. Any lessons learnt from such post-incident debriefs are incorporated into our processes for the future.

- **Adequacy and effectiveness of information and communication campaigns**

As outlined in our general comments, we consider that the community needs to be much more aware that they cannot rely on reticulated water, if they decide whether to leave a property or stay and defend it. This advice needs to be part of any pre-bushfire season education campaign advice, and then also needs to be reinforced during any event. For instance, during an event, it could be incorporated into the regular update messages that FESA puts over the radio or incorporated into any mobile message processes that may be implemented. It is worth noting that the broader water industry across the whole of Australia believes that this is an issue that needs to be addressed. The water industry also considers that such a communication message should be lead by the relevant emergency agencies such as FESA with water agency support.

We would be pleased to work with FESA on a more robust communication plan on this issue.



- **Improvements in inter-government co-ordination**

Generally, we consider that the co-ordination of its activities with those of other agencies during bushfire incidents works well. Our incident management procedures are well established and key personnel have a strong working relationship with their various counterparts from the Police, Western Power, FESA and DEC. In this particular incident, we did not receive any incident notification from FESA. We became aware of the incident through the need to respond to one of our own asset alarms which resulted in an internal triggering of our incident management procedures. A formal notification from FESA would have triggered this internal action a little earlier. Normal FESA practice would be to notify us, however, there would be merit in making this notification process a formal requirement so that it is not overlooked under the pressure of an emergency.

*Additional Information Requested*

At the meeting on Tuesday, 12 April, we discussed the issues that we faced in terms of power loss to the Soldiers Road Water Pump Station (WPS) during the bushfire at Roleystone. You requested additional detail as to the amount of time that elapsed between the normal power supply being interrupted, and alternative power being provided by way of a generator. In addition, you also requested information relating to protocols and status of hydrant maintenance. The following is provided:

- **Power interruption details**

Power was lost to the Soldiers Road WPS at 1.28 p.m. It is estimated that some customers, particularly those closest to the tank, would have been without water between around 9.15 p.m and 11.15 p.m. At the time that power was lost, available storage under normal demand on the Peet Road Tank that this pump station supplies would have been about 28 hours supply (obviously less under the extreme demands caused by the bushfire but still expected to be around 8-9 hours) so resources were used at other more critical sites. At about 6.00 p.m arrangements were made to get a 380KVA generator to the site and power was available via the generator at 8.39 p.m. Due to other electrical wiring needs (some electrical bypass work was required which had not been initially anticipated), the generator could not be used to run the pumps and the water level in the tank continued to drop. As a result, our scheme operations staff identified and made arrangements for an alternative supply to the Peet Road Tank from our Canning Trunk Main. By the time this was implemented, it was around 11.00 p.m and by about 11.15 p.m the water level in the tank had risen sufficiently to return supply to customers.

- **Hydrant maintenance**

As discussed, FESA has responsibility for maintenance and inspection of hydrants. In the metropolitan area, FESA contract with the Corporation to carry out repairs they have detected via their inspections. Analysis of the work orders on our hydrant maintenance indicates that there are currently about 1,000 outstanding work orders. (Of the 1,000 outstanding work orders, only ten are in the escarpment area. We will take steps to ensure that these are actioned as soon as possible). About half of these jobs have been in our work order system from a few days through to six months. The remainder have been in the system in excess of six months. Many of the older jobs are of a low priority nature, or have been held over due to the customer impacts involved in system shutdowns to effect the repairs. Some more recent techniques to minimise shutdown impacts (line stops) are being considered for such instances. Over the last 12 months, we have been completing around 150 hydrant maintenance jobs per month, but with new work orders being received each month, the current completion rate would mean around 12 months to complete the backlog.


The information on outstanding work is reported to FESA at each quarterly stakeholder meeting and to date, FESA has not raised this as an issue of concern. The type of jobs can vary from quite minor through to a need for a hydrant to be replaced. When jobs are raised by FESA, they advise if they consider the issue is urgent. This information is then passed on to the relevant maintenance alliance contractor with the urgency identified and factored in to the work scheduling. In addition to the FESA priority ranking, some years ago we also gave an undertaking to FESA, that it would give priority to maintenance on hydrants which are located in the Darling Escarpment.

I trust that the information provided will assist in your review of the Kelmscott/Roleystone bushfire incident.

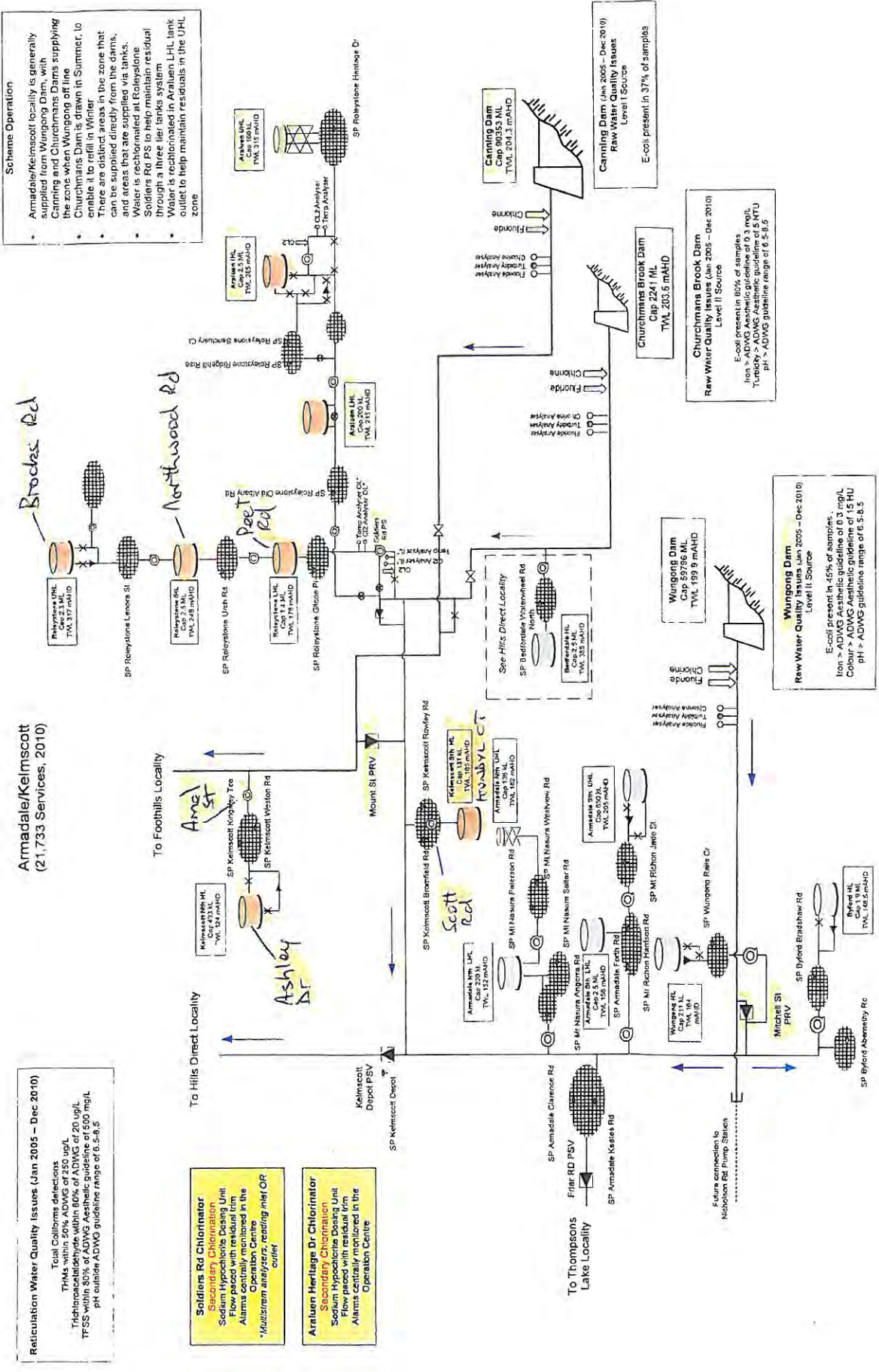
If you require any further information or clarification on the issues covered in this submission, please contact the Corporation's Manager Strategic Asset Management, Mr Russell Pascoe, on [redacted] who would be pleased to assist.

Yours sincerely

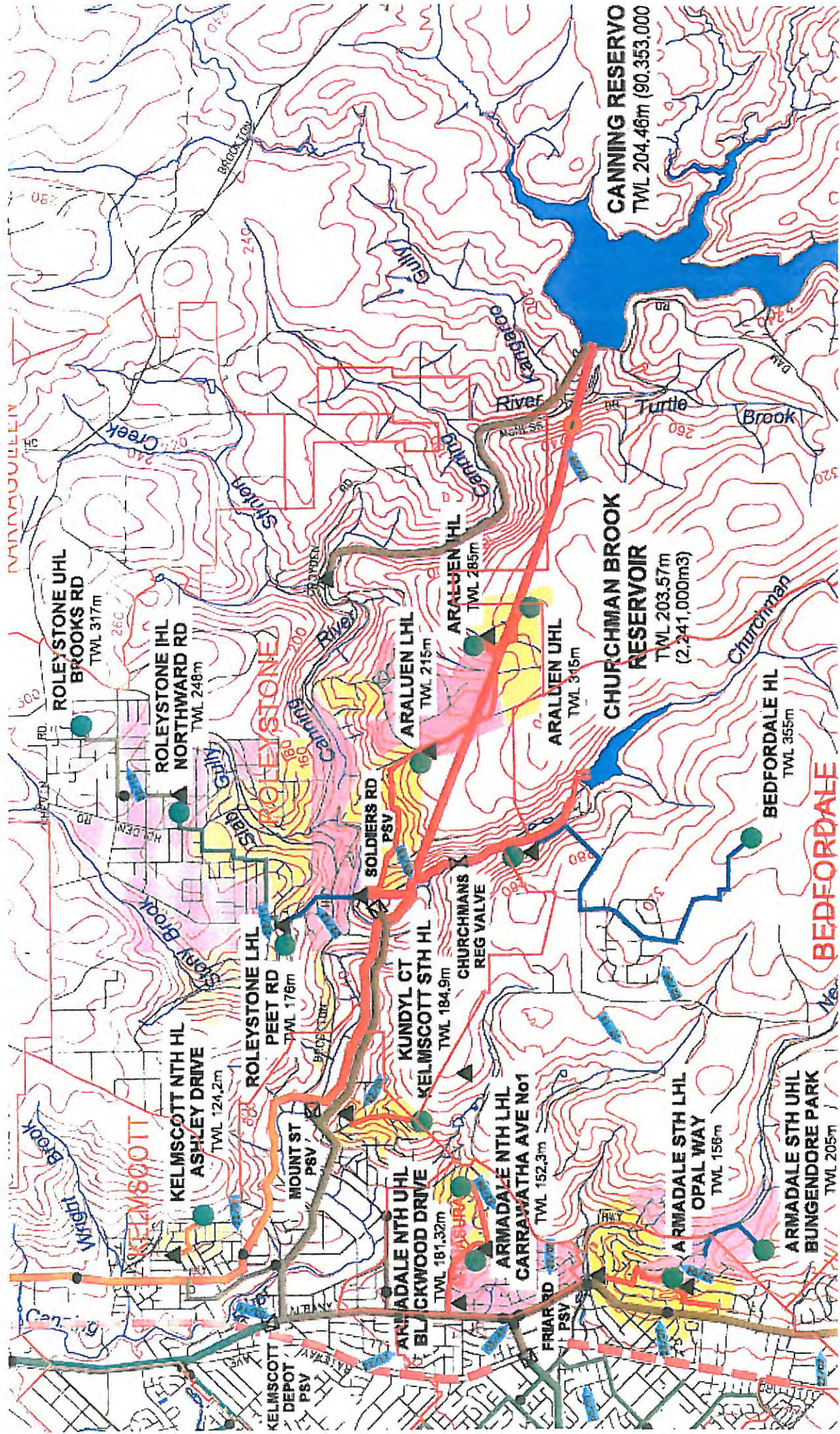


 Sue Murphy  
CHIEF EXECUTIVE OFFICER

- Attachment 1 – Armadale/Kelmscott Process Control Plan
- Attachment 2 – Contour plan of Kelmscott/Roleystone and surrounding areas
- Attachment 3 – Joint Water Corporation/FESA - Hydrants on Water Utility Mains Brochure
- Attachment 4 – FESA Checklist – Prepare to Actively Defend









*Supplying water to:*

- **HYDRANTS on Water Utility Mains**
- **BUILDING FIRE SERVICES**

Describing how the Water Corporation, Fire and Emergency Services Authority of Western Australia (FESA) work with land / property developers to make effective water supplies available for emergencies at least cost to the whole community.

## ***INTRODUCTION***

This information paper provides an overview of the processes and standards that enable the land and building development industries to provide effective water supply for fire protection.

These industries are a multi-faceted partnership between landowners, building owners, their consultants, Fire & Emergency Services Authority and the Water Corporation.

This information paper is aimed at broadening participants' awareness of the steps along the journey that forms this loose partnership.

At the end of the journey are hydrants on water utility mains and building fire services that provide water for emergencies at least cost to the whole community.



## LAND DEVELOPMENT PROCESS

1. The Land Developer prepares a subdivision proposal plan and submits it to the Western Australian Planning Commission (WAPC) through the Department for Planning & Infrastructure (DPI).
2. Department for Planning & Infrastructure refers the proposal to service providers for their recommendations on servicing conditions.
3. Recommendations about reticulated water supply are relatively high level and focus on capacity of the existing system to service the proposed development.
4. WAPC consider the recommendations from the service providers and determine the conditions to be imposed and the agency responsible for clearing the condition. Typical conditions related to emergency water supply are:
  - FESA are interested in adequate access to hydrants on water utility mains to protect each lot in the land development from fire. This is typically achieved by appropriate hydrant location and spacing depending on the level of risk.
  - The local government authority will apply bush fire management conditions in their respective areas of legislative jurisdiction, in situations where the land development is on an interface between urban and bush environments.
  - Water Corporation submits water supply conditions that cover both normal water use and fire protection requirements of the land development.
5. The Land Developer, or their agent, liaises directly with agencies responsible for clearing conditions to negotiate specific requirements for satisfying the conditions. In relation to water supply reticulation conditions the land developer engages an engineering consultant to design and construct the water supply reticulation for the subdivision (see the section on Subdivision Water Supply Design).
6. The Land Developer develops the land and constructs the works in accordance with the requirements of the servicing agencies.
7. On completion of the works and prior to lots being available for release on the market relevant servicing agencies provide clearance certificates for their relevant conditions of subdivision.

The Land Development process ends here and the Building Process begins. In broad terms the future events that need to be understood by people working in the land development process are:

1. Building plans and fire service designs are submitted to FESA (excluding standard residential housing).
2. Wherever possible, FESA will endeavour to test the water supply to buildings' fire services prior to the local government issuing a Certificate of Classification, which allows occupancy.
3. It remains the building owner's ongoing responsibility to provide fire systems (eg fire hydrants, sprinklers) within the building that comply with the approved design despite circumstances changing from year to year.
4. As part of their normal operations FESA periodically test the water supply available to hydrants on the water utility's mains.
5. It remains the Water Corporation's responsibility to provide the agreed supply to hydrants on water utility mains and the agreed supply to building fire services as circumstances change from year to year.



## STANDARDS

The Water Corporation delivers designs to the following standards to give FESA the confidence that their fire flow requirements are adequately addressed when the Water Corporation clears a water supply condition of subdivision.

### *Single Residential Development*

Network designs aim to provide 20 m head in the water utility main with a fire flow being drawn during maximum normal water demand with full availability of water system assets and power supply.

The Operating Licence issued to the Water Corporation requires a minimum of 15 m head in the Perth Metropolitan Area and 13 m head in country towns. The Operating Licence recognises that it is not possible to continue water supply for 100% of the time. Power failure has a significant impact on some parts of some water systems. These design targets result in most hydrants on Water Corporation mains providing much more than 20 m head for most of the time.

Where new designs result in street hydrants with less than 20 m head the standard used to test for acceptable water supply to protect single residential land developments is 13 m head at the base of a hydrant on a water utility main with 10 L/second being drawn from the hydrant. FESA appliances can operate at this head using special procedures.

### *Bush Fire Protection*

FESA and the Ministry for Planning & Infrastructure jointly published planning guidelines for bush fire protection. These guidelines require water to be delivered from hydrants located on water utility mains at the rate of 600 L/min for 4 hours.

Hydrants provided on water utility mains are used at wildfires for refilling fire fighting appliances and for the external protection of

structures. They are also used for the suppression of internal structural fires.

This requirement is substantially equivalent to the single residential design target.

### *Building Fire Services*

The capacity of water supply networks is predominantly established at the time of land development / subdivision. Building fire services are designed to Australian Standards at the time of constructing individual properties, which may be many years after land development. To ensure that appropriate water supply is available to building fire services nominal fire flow provisions are applied at the time of land development or rezoning of land that is being redeveloped.

The following nominal standards are applied at a single lot frontage of the location of land allocated for:

- **Schools** 20 L/sec
- **Community shopping centres / facilities** 20 L/sec
- **Major, regional shopping complex** 40 L/sec

Network designs aim to provide 20 m head in the water utility main with a fire flow being drawn during maximum normal water demand with full availability of water system assets and power supply.

Where it is impracticable for network designs to provide 20 head to fire protection systems within the property then further design consideration will be necessary by the builder's consultant.

High rise buildings and property redevelopments are treated on a case by case basis at the time of construction, as their extent is not predictable at the time of initial land development.

Extensive industrial or commercial zones have a nominal fire flow provision of 40 L/sec applied at the time of land development or rezoning of land that is being redeveloped.



## SUBDIVISION WATER SUPPLY DESIGN

The ability to supply adequate water flow and pressure for fires is governed by the location and size of water reticulation mains specified at the time of land subdivision. The Water Corporation uses a detailed design process to match water main sizes and locations to existing and future demands on the water supply network. The Water Corporation process is:

1. Receive the street and lot design from the land developer's consultant.
2. Identify larger reticulation main sizes (generally 150mm and above) and any key valve requirements in the proposed land development.
3. Maintain an outlook of existing and future customer demands on water supply networks.
4. Add a model of the local reticulation mains to the model of the water supply distribution network.
5. Apply 95<sup>th</sup> percentile customer demand to the model.
6. Evaluate and satisfy these conditions for residential lots:
  - Areas receiving less than 25 m head are cases needing explicit quantification of street hydrant capacity.
  - Quantify the head available at the most disadvantaged street hydrants with 0, 5, 10, 15, 20 and 25 L/sec flowing from the hydrant. Graph the results for discussion with FESA where necessary.
7. Evaluate and satisfy these conditions for lots within the land development proposed for schools, shops and multi-residential buildings larger than 500 m<sup>2</sup>:
  - Increase the size of local reticulation mains within the land development until each hydrant can supply 10 L/sec at 20 m head. Where this is impracticable, design the main sizes to supply each hydrant at 10 L/sec with no less than 13 m head in the street main.
  - Quantify the head available at street hydrants with 0, 5, 10, 15, 20 and 25 L/sec flowing from the hydrant. Graph the results for discussion with FESA where necessary.
  - Increase the size of local reticulation mains within the land development until each hydrant can supply the flows listed in the section Standards for Building Fire Services at 20 m head.
  - Document cases where this cannot be achieved and the reasons so that building service consultants can be advised during their design process.
8. Present the water system design to the land developer's consultant for detail design and implementation.
9. Discuss with the land developer's consultant any circumstances where their proposal cannot receive acceptable fire flows without substantial upgrading of existing water infrastructure. Include FESA in discussions on alternative solutions.



## **BUILDING PROCESS**

1. The Land Developer engages a consultant to coordinate water supply to the new building and fire protection within the building.
2. Consultant applies to Water Corporation for a fire service and advice on the water supply available to the fire service.
3. Water Corporation quantifies the water supply available under existing conditions to the building fire service.
4. Consultant designs the building's plumbing and fire-protection systems in accordance with the Building Code of Australia and referenced Australian Standards. The Standards allow the owner to provide pumps and tanks within the building in cases where the water utility cannot provide the head or flow required.
5. The Land Development Process provides nominal capacity in water utility mains to satisfy typical building fire service requirements. The Water Corporation will consider providing additional capacity to meet specific building fire-service requirements at the building owner's cost.
6. Consultant and Water Corporation work together to find the least cost combination of water utility upgrades and improved fire-protection infrastructure within the building.
7. Consultant submits the building proposal to the local government authority and a fire service proposal to FESA for approval.
8. Owner constructs new building.
9. Where possible, FESA inspect and test the building's fire system for compliance with Australian Standards and FESA operational requirements prior to the local government authority issuing a Certificate of Classification.
10. It remains the building owner's responsibility to ensure fire systems within the building continue to comply with the Australian Standards despite circumstances changing from year to year.
11. It is recommended that the building owner maintains the building's fire systems as per Australian Standard AS 1851.



## **BUILDING FIRE SERVICE DESIGN**

The Water Corporation process within Perth is described below. This process will be progressively adopted in country regional centres and towns supplied by the Water Corporation as resources permit.

1. Receive a fire service application from the building owner's consultant.
2. Confirm with the consultant the requested flow rate and head from the water utility main at the point of connection to the building fire service.
3. Add a model of the local reticulation mains to the model of the water supply distribution network.
4. Apply 95<sup>th</sup> percentile customer demand for the coming summer to the model.
5. Add the consultant's specified fire flow to the model.
6. Assess the ability to provide the specified flow at the specified head.
7. Identify (if needed) the size and cost of Water Corporation asset upgrades that satisfy the consultant's specification.
8. Advise the consultant of the available flow and pressure and upgrade costs.
9. Consultant continues the building fire service design:
  - Assess suitability of the Water Corporation flow and head (with or without upgrade)
  - Assess the design and cost required to meet the Australian Standards with internal facilities (tanks + pumps) in cases where Water Corporation upgrades are required.
  - Assess how future variation in the flow and head available from the water utility main will affect compliance with the Australian Standards.
  - Select a strategy of providing future capacity now or when it is required in the future.
  - Recommend the cheapest solution to the building owner.
10. Owner implements their chosen solution.

## HYDRANT TESTING

The lowest pressures and maximum customer demands typically occur in an urban water supply system in Western Australia at about 7am and 7pm on hot summer days.

Tests on hydrants on water utility mains and building fire services pressurised directly from water utility mains will give substantially different pressure readings throughout the year. Customer demand patterns are the main cause of the variation. Operational changes and system maintenance activities occur continuously within the Water Corporation's networks. Without the ability to place the results of a hydrant test in context with customer demand and system changes the results are of limited value.

Consultants testing flow and pressure available to existing building fire services are advised to not use the data for design purposes. Test results should only be used as additional background information.

FESA undertake a program of annual inspection of street hydrants predominantly for maintenance purposes. When FESA test hydrant flows and pressures they interpret the results in conjunction with operational predictions provided to them from the Water Corporation. These Water Corporation predictions are based on modelling of the entire water supply systems under peak summer loading.

In general water utilities across Australia are adopting computer simulation to evaluate hydrant capability in preference to field testing. Simulations are able to examine extreme water supply demand scenarios which field testing can only rarely capture. Field hydrant tests now take on the role of background checks instead of being the basis for design.



# CHECKLIST - PREPARE TO ACTIVELY DEFEND

## HAVE FIREFIGHTING EQUIPMENT READY

Consider what equipment you will need to actively defend your home.

- Hoses must be long enough to reach all parts of your house. Use metal hose fittings for taps as they are less likely to melt.
- Ladders for inside and outside the house. These need to be long enough so you can check your roof cavity and eaves.
- Knapsack or garden backpack spray to help you put out spot fires. If you decide to use a garden backpack make sure it has been cleaned out before using it in a bushfire.
- Metal rakes and shovels can be used to break up piles of burning material and for covering embers with sand.
- Cotton mops can hold a lot of water and can be used to put out embers.
- Buckets allow you to move water quickly and easily.
- Wet towels and blankets can be used under doors and windows to seal gaps. This will stop embers and smoke from coming inside your house.

## MAKE SURE THERE IS WATER

It is likely that you will lose water and power supplies during a bushfire. It is important you have an alternative water supply.

- Identify storage options that you could fill with water.

### You could use:

- Rubbish bins (wheelie bins) and storage bins
- Bath, laundry tub, sinks, basins and buckets
- Troughs or garden ponds
- Swimming pool, water tanks and dams if available

- A petrol, diesel or generator pump to draw water from dams, pools or a water tank.