1 GENERAL

1.1 RESPONSIBILITIES

Objective
Design requirement: Provide design, drawings and specification for the construction of an in-line pressure booster pump station(s) and ancillaries for a reticulated water supply system (either drinking or dual drinking/non-drinking) conforming to the requirements of WSA 03 and the Water Agency, as documented.

1.2 CROSS REFERENCES

General
Requirement: Conform to the following:
- 0010 Quality requirements for design.
- 0071 Water supply – reticulation (Design).
- 1341 Water supply – reticulation (Design).
- 1342 Water supply – pump stations (Construction).

1.3 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

Standards
AS 1657-1992 Fixed platforms, walkways, stairways and ladders—Design, construction and installation
AS/NZS 1680 Interior lighting
AS/NZS 1680.2:1997 Industrial tasks and processes
AS 2184-1985 Low voltage switchgear and controlgear. Moulded-case circuit breakers for rated voltages up to and including 600 V a.c. and 250 V d.c.
AS/NZS 3000:2007 Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3111:2009 Approval and test specification - Miniature overcurrent circuit-breakers
AS 3439 Low-voltage switchgear and controlgear assemblies
AS 3439.1-2002 Type-tested and partially type-tested assemblies
AS/NZS 4020:2005 Testing of products for use in contact with drinking water
AS 4041-2006 Pressure piping
AS/NZS 4158:2003 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes.
AS 60947 Low-voltage switchgear and controlgear
AS 60947.4.1-2004 Contactors and motor-starters - Electromechanical contactors and motor-starters
AS 60947.4.2-2004 Contactors and motor-starters - A.C. semiconductor motor controllers and starters
AS 61800 Adjustable speed electrical power drive systems
AS 61800.2-2004 General requirements - Rating specifications for low voltage adjustable frequency a.c. power drive systems
AS 61800.3-2005 EMC requirements and specific test methods
AS/NZS ISO 31000:2009 Risk management - Principles and guidelines
IEC 61643 Low-voltage surge protective devices
IEC 61643-11:2011 Surge protective devices connected to low-voltage power systems - Requirements and test methods
IEC 61643-12:2008 Surge protective devices connected to low-voltage power distribution systems - Selection and application principles

NSW Department of Commerce
Water Services Association of Australia (WSAA)
1.4 STANDARDS

General
Standard: To WSA 03 Part 1.

1.5 INTERPRETATIONS

Abbreviations
General: For the purposes of this worksection the following abbreviations apply:
- AICV: Automatic inlet control valves.
- CT: Current transformers.
- P&ID: Process and Instrumentation Diagram.
- PN: Nominal Pressure (megapascals x 10).
- PRV: Pressure Reducing Valve.
- PRelV: Pressure Relief Valve.
- PSV: Pressure Sustaining Valve.
- SCADA: Supervisory Control and Data Acquisition System.
- SCR: Silicon controlled Rectifiers.
- VS: Variable Speed Drive.
- WHS: Work Health and Safety.

Definitions
General: For the purposes of this worksection the definitions given in WSA 03 Part 0 and the following apply:
- Booster: In-line pressure booster pumping station used to increase the hydraulic gradient.
- Commissioning: Running of the plant and equipment to make sure flow through the pumping system, carrying out any necessary testing and adjustments until the plant is ready and suitable for normal starting and running under service conditions.
- Concept plan: A package of information provided to the designer by the Water Agency to allow the appropriate planning/design of major water system components to be performed.
- Designer: Person or firm responsible for a design output. Such person or firm may be accountable to a Project Manager or other person having responsibility under a contract or otherwise.
- Document: Record of information in written or graphical form.
- Pre-commissioning: Preparation of plant or equipment so that it is in a safe and proper condition and ready for commissioning and operation, including safety, electrical, mechanical and instrumentation.
- Service pressure: Internal pressure delivered at the point of connection to a customer’s installation at zero flow in the service pipe. This does not include surge pressure.
- Surge: A rapid fluctuation of pressure caused by flow alteration over a short period of time.
- Water Agency: An authority, board, business, corporation, Council or local government body with the responsibility for planning or defining, design, construction and maintenance requirements for a water supply and/or sewerage systems. This includes Local Water Utilities (LWU).
2 PRE DESIGN PLANNING

2.1 GENERAL

Water supply system
Reticulation: Conform to 0071 Water supply – reticulation (Design).

System concept plan: Prepare plan in conformance with WSA 03 clause 1.2.3.

Valving system
Concept plan: Consider the following valving systems in the concept plan:
- Pressure reducing valve installations to WSA 03 clause 6.3.
- Pressure sustaining valve installations to WSA 03 clause 6.4.

Future system expansion
Future capacity: Plan pump stations with sufficient capacity to operate for all existing and predicted development within the area to be served by the reticulation system. Consider water demand allowance and future demand estimations in conformance with WSA 03 clause 2.11.

2.2 BOOSTER SYSTEM

Booster planning considerations
General: During planning, avoid the use of pumping stations for the following:
- Hospitals.
- Heavy industry customers.
- Commercial or industrial customers on lots larger than 1 hectare.
- Existing customers in separate occupancies of multi-storey buildings if there is no agreement related to boosted supply.
- Parts of a supply network where the peak instantaneous un-boosted pressure is below 2 to 8 m head.
- Areas remote from maintenance works depots.

Concept design
Requirement: Provide a concept design for the proposed pumping station in conformance with WSA 03 clause 6.2.2 including the following:
- Design to optimise construction, operation and maintenance costs for the total life cycle of infrastructure and equipment.
- Risk analysis of total station failure and contingency plan including provisions for emergency bypass, mobile generator, stand-by pumping equipment and associated controls, spare pumps, maintenance and emergency access.
- Operating licence, customer contract and local zoning requirements.
- A maximum of 500 lots in the ultimate boosted zone.
- Fire fighting requirements.
- Environmental and WHS requirements.
- Remote monitoring, control and telemetered alarms.
- Reliability, maintainability, materials design, location, site selection, noise control, services, access, site drainage, landscaping, security, signage, supporting systems.

Modelling
Requirement: Model the system in conformance with WSA 03 clause 6.2.4 and the following:
- To satisfy flow and pressure requirements for current, future and ultimate conditions including receipt of basic water supply at times of power failure or other times when the booster is not operational.
- To predict the number of affected properties within the low pressure zone.

Life cycle costs
Evaluation: Complete a life cycle evaluation in conformance with WSA 03 clause 6.2.2.2.
Life cycle plan: Submit an asset life cycle plan noting renovation or replacement for items. Conform to typical asset design lives in WSA 03 Table 1.2 or submit other source documentation for design life.

2.3 SUBSIDISED SCHEMES

Funding
Government grant funds: If the works form part of a contract attracting Government grant funds, identify the following:
- Items which are not of the least cost option, that:
  - Are intended to have a much longer design life than the normal asset service life detailed in the Asset Management Guidelines of the *International Infrastructure Management Manual*.
  - Do not meet the project objectives and the requirements of the various Agencies for the least Net present value (NPV) but may become the preferred option for construction.
- Particular equipment which is procured without relevant competition through tendering.
- Duplication of equipment or unit processes in pump station configuration.

2.4 CRITICAL INFRASTRUCTURE PROTECTION

Concept plan
Asset categorisation: Address the asset categorisation in conformance with WSA 03 Table 1.1 and Appendix A. Provide a risk assessment of the final pump station design for consistency with the asset categorisation and the concept plan.

2.5 CONSULTATION

Council and other Authorities
General: Approval of design proposals is required from the following public authorities:
- Consulting authority: [complete/delete]
- Environmental impact statement (EIS): [complete/delete]

Public consultation
Requirement: [complete/delete]

Utilities services plans
Requirement: [complete/delete]

3 DESIGN

3.1 GENERAL

Responsibility
Concept plan: Review the concept plan and make sure the data listed by WSA 03 clause 1.2.5.1 is available.

Conflicting requirements: If there is conflict between this specification and the Water Agency requirements, seek clarification.

Requirements of design: Provide for in-line pressure booster pumping stations to increase pressure to the supply zones of the reticulation system, including the following:
- Conform with WSA 03 clause 1.2.5.2.
- [complete/delete]

3.2 HYDRAULIC DESIGN

General
System requirement: Conform to the hydraulic design requirements of *0071 Water supply – reticulation (Design)*.

Pressure and demand: Use the demand rates, operating pressures and design pressures determined from *0071 Water supply – reticulation (Design)* and WSA 03 clause 2.3, 3.2 and 3.6.
3.3 BOOSTER DESIGN

General
Design: Design boosters to WSA 03 clause 6.2.5 and to provide the following:
- Boost pressure only, not to be the only means of supplying pressure to services.
- Fire fighting capability: [complete/delete]
- Efficiency, particularly for low flows. Efficient flow and pressure: [complete/delete]
- Non-boosted gravity water supply pressure:
  - Minimum head and location: [complete/delete]
- Non-return valves to maximise flow to the maximum hour demands when the booster is inoperative.
- Mechanical design to Water Agency requirements.
Connections to the network: To WSA 03 clause 6.2.5.2.
Maximum flow and pressure requirements: Carry out hydraulic modelling to determine the pressure required at the booster discharge to provide the minimum zone pressure under the maximum minute demand conditions. Determine under maximum hour conditions the following:
- Required discharge pressure. Use this as the booster control.
- Minimum suction pressure and flow.
- Maximum duty Head and Flow (H, Q).
Minimum pressure boost conditions: Use historical pressure data to make sure stable operation without pump overload or cavitation.
Minimum flow conditions: Carry out risk analysis and design for zero flow conditions.
Booster configuration design: To WSA 03 appendix D.
Booster set and pump selection: Provide for minimum life cycle, deliver diurnal flows, peak or maximum hour flows, fire flows.
Equipment and devices: To WSA 03 clause 6.2.5.9.
Site specific requirements: To WSA 03 clause 6.2.5.10.
Pressure accumulator tank: To WSA 03 clause 6.2.7. Prepare an inspection and maintenance schedule to WSA 03 appendix E and manufacturer’s recommendations.

Pumps
Booster set and pump selection: Conform to WSA 03 clause 6.2.5.7 and the following:
- Standard pump specifications available in the WSA product specifications for configurations described in WSA 03 Appendix E.
- Provide identical pumps in the booster and interchangeable with other approved Water Agency makes/models.
- Design to the maximum duty land flow (H, Q) under the worst conditions.
- Number of pumps: < 4.
- Pump operation: ≤ 47.5 Hz.
- Temperature sensors for no-flow protection.
- Readily available in the market place.
- End suction centrifugal pumps: To WSA 130 or WSA 131 as appropriate.
- Submit proposals if using triple-pump system for approval.
- Select motors in conformance with WSA 131.
- Detail discharge connection including anchoring.
- Pump casing: To WSA 131 clause 3.4.2.
- Stop valves: To WSA 03 clause 8.2.5.
- Pump starters: To MOTOR STARTERS.
- Variable speed drives: To MOTOR STARTERS.
Hydraulic performance: Determine in conformance with WSA 03 clause 6.2.5.7 the required duty range of the booster set and individual pumps or pump combination, including the requirements for ancillary equipment.
Pump capacity: Calculate capacities of the pump unit from the intersection of the pump performance curve and the pipeline characteristic curve calculated at mid water level of the service reservoir involved with this duty point. Provide for the following:
- Delivery of the required transfer capacity over a period of 22 hours.
- Standby pumping capacity such that if one pump is out of service, the pump station will remain able to supply the required transfer capacity.
- Capability of the pump unit to operate near optimal efficiency within the range of operating conditions.
- Average and peak demand rate: To WSA 03 clause 2.8.3 (a).

Pump prime: If there is negative suction head at the pump inlet, make provision to facilitate priming of each pump.

Removal: To facilitate removal of the pumps for maintenance, provide for dismantling joints and valves in the pipework.

Surge control: Provide for appropriate surge control devices.

Certificate: Require verification that the Contractor’s proposed pumps conform to the design requirements.

Risk assessment
Requirement: Assess risk to AS/NZS ISO 31000 as part of the process for sizing pump stations and determining system configurations. Address the following:
- Relative needs for operating.
- Pumping requirements.
- Staging requirements.
- Maintenance requirements.

Commissioning plan
Requirement: Provide a commissioning plan in conformance with WSA 03 clause 6.2.3 including the following:
- Pre-commissioning procedures, including schedules, record sheets for each item of equipment and checklists.
- Commissioning procedures, including procedures, schedules, notice periods for independent testing.
- Handover requirements.
- Sign-off requirements.
- Supply documentation requirements at handover and sign-off.
- Documentation required to operate, maintain and resource the facility including equipment technical specifications, work-as-executed drawings, risk analysis, operation and maintenance manuals, resource requirements for ongoing operation of the facility.
- Following final design, update the commissioning plan in conformance with design documentation.

3.4 BOOSTER PIPEWORK AND MANIFOLDS

Design
General: To WSA 03 clause 6.2.5.8 and 6.2.6.
Individual booster pump pipework and manifolds: Size so that maximum velocities do not exceed the values in WSA 03 Table 6.1.
Booster equipment and devices: Size in conformance with PFD’s, P&ID’s and process data sheets.
Verification: Require verification by the manufacturer and supplier of all pumps, valves, pressure accumulator tanks that the products and materials supplied are approved by the Water Agency.
Protection: Protect above ground pipework and fittings, outside the station, from fire and impact.

3.5 POWER SYSTEM AND SUPPLY

General
Primary power supply requirements: [complete/delete]
Electrical design: To AS/NZS 3000 and WSA 03 clause 6.2.8.
Primary supply: Provide for 3 phase, 4 wire, 400V, 50Hz, MEN system with capacity to operate at full pumping load.

Fault level protection: Determine the prospective fault current and design the electrical protection to withstand the prospective fault current level of the incoming supply at the equipment location.

**Power supply security**

Requirement: Carry out a risk analysis for each station in relation to the reliability/security issues raised in WSA 03 clause 6.2.2.4 and clause 6.2.8.2.

Alternative power supplies: If required, consider the following:
- Duplicate power supplies.
- An emergency on-site power generator.
- Provision for the connection of a mobile diesel generator to the Water Agency requirements.
- Security requirements against theft of on-site generators and connections for mobile generators.

**Site supply**

General: Determine the primary power supply requirements in conformance with AS/NZS 3000 and WSA 03 clause 6.2.8.3.

Off site electrical services: Liaise and provide for all off-site electrical services as required by the local electricity distributors.

**Site specific substation**

Electricity distributor dedicated substation: If required for the pumping station, determine the following:
- Location of substation.
- Type of service.
- LV connection point and route of the distribution mains to the point of supply.
- Protection equipment, particularly any LV transformer output protection.
- Easement details.

LV transformer output protection: Provide for short circuit and overload protection at the transformer secondary supply using fault current limiting circuit breakers with adjustable overload and short circuit current setting features, where secondary output supplies are required to be installed by the electricity distributor.

Cascade protection: Include full discrimination and cascade protection with the electricity distributor’s incoming supply protection system and the downstream site protection devices.

**Customer owned substation**

HV customer service: If an HV supply is provided to the pumping station site, meet the requirements of the electricity distributor for the following:
- HV reticulation.
- HV protection.
- Transformer and LV protection: Set out LV facilities and LV transformer protection in electricity distributor dedicated substations.

**Electrical mains**

On-site electrical mains: Run on-site electrical mains underground between the electricity supply and the switchboard for the pumping station.

Point of Supply for LV sites: Conform to the following types:
- Pole mounted at the site boundary where from overhead supplies.
- A private underground termination enclosure at the site boundary, where from underground supply.
- Direct connected customer’s mains run underground from the electricity distributor’s connection point to the main switchboard.

Customer’s Mains: Provide for customer’s mains, associated services and all necessary fault and overload current protection equipment to AS/NZS 3000 Section 3, the local electricity distributor’s standards, the local Service and Installation Rules.

Minimum size of the customer mains: Conform to the following requirements:
- Current carrying capacity to suit the maximum demand with an excess current carrying capacity of 30% minimum.
- A voltage drop less than 1.5% of the maximum demand as calculated.
- Single core PVC/PVC cables or XLPE insulated cable.
- Pole termination method: Determine in consultation with the Local Supply Authority.

Protected customer’s mains: Provide for short circuit and overload protection, where required by the electricity distributor.

Electricity distributor’s service protective devices:
- Low voltage service protective devices: To AS/NZS 3000, the electricity distributor’s requirements and the supply authority service and installation rules.
- For service protective devices > 100 A: Provide for fault current limiting circuit breakers with adjustable overload and short circuit current facilities with full discrimination and cascade protection between the incoming supply protection systems and the downstream protection systems.

3.6 ELECTRICAL DESIGN

General

Automatic operation: Design the pump station for fully automatic operation in the unmanned condition.

Power and control cubicle

General: Document the power and control cubicles in conformance with AS 3439.1.

Inter-changeability: If more than one item of equipment is designed to perform a particular function, make sure that all such items of equipment are identical and completely interchangeable (e.g. pilot lights, pushbuttons, relays, etc).

Switchboard: Provide for installation in a visible location which is physically accessible above all areas at risk of flooding.

Ambient conditions: Determine the ambient conditions for the local area.

Switchboard construction form: Generally Form 2 to AS/NZS 3439.1. Segregate telemetry and communications equipment from the power and control sections of the switchboard.

Switchboard location:
- General: Locate switchboard on concrete plinth. Provide plinth details and physical protection.
- Flood prone areas: Locate switchboards above the flood level on suitable support structures. Detail switchboard support structures and location. Provide for suitable access facilities and working platform in front of switchboard for safe operation of the equipment.

Phase failure protection: Provide for electronic phase failure relay to monitor the incoming power supply, incorporating:
- Detection of undervoltage (80% of normal voltage).
- Voltage or phase angle imbalance.
- Reverse phase sequence.
- 10 A fuse protection for connection to the three supply phases.

Surge protection: Provide for Type I SPD shunt connected metal oxide varistor based SPDs between each phase and neutral at assembly incoming supply terminals, if required by the electricity distributor.

Surge protection devices: Conform to IEC 61643.11 and IEC 61643.12 and install to AS/NZS 3000 Appendix F.

Lighting requirements: To WSA 03 clause 6.2.8.9.

Power factor correction: Consider power factor correction requirements as set out in WSA 04 clause 7.2.9, the energy cost in running the pumping station and cost savings to justify the installation of power factor correction equipment.

Connection facilities for mobile diesel generators: In addition to the requirements of WSA 04 clause 7.2.7, consider incorporation of safeguards to prevent inadvertent simultaneous connection of mains and generator power. Where necessary, provide for mechanical interlocks and an isolation device or changeover switch to switch the mobile generator supply to the switchboard.

Anti-condensation heaters: Provide for thermostatically controlled anti-condensation heaters to weatherproof switchboards with an external surface area greater than 4 m² based on 40 watts/ m² of exposed surface area, where environmental conditions may cause condensation to occur within the switchboard. Provide for heaters of the black heater type, mechanically protected and able to be touched without harm.
Provide lightning and surge protection: To all incoming power supply and control power supply.

### 3.7 MOTOR STARTERS

**General:** Provide for electronic Variable Speed Drive (VSD) starters and motor control devices for the control of water booster pumps to AS 60947.4.2.

Each boost pump shall include the following electrical control and protection equipment:
- Circuit breaker rated to protect the pump submain and the motor,
- Hybrid VSD motor controller/starter.

**Circuit breakers**

**General:** Moulded case or miniature circuit breaker to AS/NZS 2184 and ASNZS 3111 and WSA 04 clause 8.8.8.2 or 8.8.8.3 as applicable.

**Selection:** Provide for full discrimination and cascade protection for overload and short circuit conditions.

**Hybrid VSD motor controller/starter**

**General:** Provide for hybrid VSD motor controller/starter to AS 60947.4.2 comprising:
- Main line contactor rated for the motor current.
- Electronic VSD starter and controller.
- Thermal overload protection.
- Thermistor protection of motor windings on motors nominally over 15kw.

**Main line contactor:** To AS/NZS 60947.4.1 and the following features:
- Block style electromagnetic, air break type generally from the one manufacturer.
- Rated duty: Intermittent class 12.
- Utilisation category: AC-3 or DC-3 as applicable.
- Mechanical durability: 10.
- Contact life: 1 million operations at AC-3 or DC-3 as applicable.
- Design: To allow for fitting of auxiliary contacts with rating (Ie) of 4 A at 240 Va.c.
- Electronic VSD starter and controller: Generally to AS/NZS 60947.4.2, AS 61800.2, AS 61800.3 and the following:
  - Functional features: To AS 61800.2 clause 3.
  - Automatic restart in the event of failure: Additional following features:
    - Breakaway torque adjustment.
    - Motor starting current limit adjustment.
    - Adjustable acceleration time.
    - Adjustable deceleration time.
    - Phase loss trip.
    - Shorted SCR trip.
    - Open circuit output trip.
    - Motor stalled trip.

**Thermal overload protection:** To AS/NZS 60947.4.1 and the following additional features:
- Single phase fault protection utilizing differential trip bar mechanisms operating at 60% of motor full load rating under single phasing conditions particularly for delta wound motors.
- Incorporated in motor protection design where thermistor protection is required.
- Manual reset on overload trip unless design conditions dictate automatic reset.

**Motors rated 45kW and above:** Provide for electronic motor protection relays in lieu of thermal overload protection relays to WSA 04 clause 8.8.8.6.

**Protection CTs:** Provide for protection CTs and connection of electronic motor protection relays to the secondary side of the CTs where motor currents do not allow for direct connection of the relays into the motor circuit.
3.8 CONTROL AND TELEMETRY SYSTEM

General
Control, telemetry and alarms: Document control, telemetry and alarm systems in conformance with WSA 03 clause 6.2.9, clause 6.2.10 and clause 6.2.11.
Booster pump variable speed drive control: Control the speed of the pump as set out in WSA 03 clause 6.2.9.3. Select equipment to achieve the required output from the booster set without reduction in service life of pumps.
Monitoring incoming power supply: Provide for continuous monitoring of the availability of the power supply at the station and the control power supply to WSA 03 clause 6.2.8.3.
Emergency power for telemetry system: Provide for a minimum 8 hour battery backup supply to the control and monitoring system to WSA 03 clause 6.2.8.5.
Selection of equipment and devices: To WSA 03 clause 6.2.9 and 6.2.10.
Instrumentation: Suitable to monitor flow, pressure, level, speed, voltage, current, power factor, hours run and any other suitable parameters. Connection to SCADA for monitoring and control including water pump station, reservoirs and tanks, control valves, flow meters and chambers.

3.9 PUMP STATION BUILDING

General
Requirement: Secure pump units in a purpose-designed building subject to the Development Approval (DA). Considerations include aesthetics, climate, acoustics, WHS, clearance for maintenance, trip hazards, confined spaces and ventilation.
Location: Consider site access, site maintenance and restoration, easement, power supply and working area when locating pump stations in road reserves or on private property.
Dimensions: Provide structure of dimensions to suit the selected equipment including support, handling and access.
Protection against flooding: Locate the floor of the pump station or top of pump well, as appropriate, 1 m above the 1 in 100 year flood level.

Structure
Structural design: Conform to the NATSPEC 03 Structure worksections relevant to the structure being designed.
Substructure: If below ground level, mount pumps on plinths and house in a single pump well. Provide for drainage to prevent flooding of the well.
Protection against flotation: Design pump wells against flotation, both during the construction/installation and operation under flood conditions designed as above. Provide a factor of safety of 1.25.

Ladders
Ladders: Conform to AS 1657.
Ladder landings: Set intermediate landings in wells to achieve the minimum head room clearance. Wherever possible, locate the landing adjacent to fittings and machinery requiring maintenance.
Ladder cages: Do not use on ladders in pump station wells.

Covers
General: Design for the possibility of site flooding ingress and overflow, and WHS requirements in providing for access and inspection covers.

Electrical requirements for Pump Station Buildings
General: Where the pumping equipment is installed within a pump station building, provide for the following:
- Fluorescent lighting within the building utilising sealed corrosion resistant lighting fittings with electronic ballasts.
- 10 A, 240 V switched power outlets. Quantity and location to suit pumping station requirements.
- 15 A, 240 V switched power outlet suitable for electric welding requirements.
- RCD protection to AS 3000 requirements.
Lighting switches and power outlets: Ironclad or high impact polycarbonate industrial type.

Conduits:
- Electrical accessories: Heavy duty UPVC conduit.
- Pumping equipment: Heavy duty conduit on tray or on cable ladder.

### 3.10 PRODUCTS AND MATERIALS

**General**

Products and materials: Conform to Water Agency product catalogues, WSA 03 Product and material information and guidance available and WSAA Product specifications from WSAA website [www.wsaa.asn.au](http://www.wsaa.asn.au)

Pressure piping: To AS 4041.

Requirement: Conform to the material requirements of 0071 Water supply – reticulation (Design).

**Differentiation of drinking and non-drinking pipe systems**

Identification: Determine the measures required to differentiate the drinking and non-drinking water supply to WSA 03 clause 4.2 and carry out risk assessment in conformance with the Australian guidelines for water recycling [at www.scew.gov.au/archive/water/index.html](http://www.scew.gov.au/archive/water/index.html). Include one or more of the following requirements:

- Pipes of different colours to WSA 03 Table 4.1 and AS/NZS 4158.
- Warnings printed on non-drinking water mains and/or sleeving.
- Marking tape.
- Marking of surface fittings.
- Identification markers and marker posts.
- Operating systems with a service pressure differential.
- Different pipe locations.
- Maintaining a minimum pipe separation.
- Use of different pipe materials for the drinking and non-drinking water mains.
- Testing of products for use in contact with drinking water: To AS/NZS 4020.

### 3.11 APPURTENANCES

**General valves**

Design: Document the requirement for valves in conformance with 0071 Water supply – reticulation (Design).

**Stop valves**

Design: To WSA 03 clause 8.2.5.

**Control valves**

AICV design: Document the location, type and size of valve in conformance with the Concept plan, WSA 03 clause 8.3.2 and the following:

- Make sure compatibility with the existing system, e.g. electrically or hydraulic actuated, fully modulating or two-state open/closed control.
- Nominate the most suitable valve for the application.

PRV's: Document the location, type and size of valve in conformance with the concept plan, WSA 03 clause 6.3 and 8.3.3.

PReIV's: Document the location, type and size of valve in conformance with the concept plan, WSA 03 clause 8.3.4.

Pump control valves: Document the location, type and size of electrically operated butterfly valve in conformance with the concept plan and WSA 03 clause 8.3.5.

PSV’s: Document the location, type and size of valve in conformance with the concept plan, WSA 03 clause 6.4 and 8.3.6.

Air valves: Design and document the requirement for air valves including the type, size and location to WSA 03 clause 8.4.

Non-return valves: Document the requirements for non-return valves including location, type, supports and size.
4 DOCUMENTATION

4.1 GENERAL

Design
Concept: Document the concept design and include in the concept plan for the water supply system.
Design review: Demonstrate conformance with the approved concept plan and WSA 03 clause 9.1.
Commissioning plan: Document and review the commissioning plan and pre-commissioning checklist for the pump station.
Project design documentation: Include project-specific information, such as the following:
- Location of pipelines, valves, hydrants, pipe materials, size pressure class, jointing methods and corrosion protection measures.
- Specifications for products, materials, site investigation and other technical matters.
- Document design assumptions and constraints.
Asset categorisation:
- Risk assessment of final design for consistency with asset categorisation of concept plan.
- Surge analysis and design for surges.
- PN of system components.

Specifications
Construction documentation: Prepare a project specific completed specification 1342 Water supply – pump stations (Construction).

Design certification
Requirement: Provide a signed and dated design certificate.

4.2 DRAWINGS

General
Design drawings: Provide design drawings to WSA 03 clause 9.2 and the following:
- Pipeline acronyms: Use the WSAA acronym’s provided at www.wsaa.asn.au.
- [complete/delete]

4.3 WORK-AS-EXECUTED

General
Work-as-executed drawings: Document the requirements for recording work-as-executed including GPS coordinate points. Provide an additional set of final construction drawings for this purpose.

Drawing format: [complete/delete]

Final certification of completed works: [complete/delete]