Engineering Construction Specification

C30 Water Supply – Reticulation and Pumping Station (Construction)

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This document is a modified version of AUS-SPEC 1341 Water supply – reticulation and 1342 Pumping station (Construction) October 2018 version

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1 General

1.1 Responsibilities

1.1.1 General

Requirement: Provide water supply transfer, distribution and reticulation works, as documented.
Requirement: Provide water supply pump stations as documented.

1.1.2 Precedence

Precedence: The technical requirements of, or any standard drawing provided by, the Water Agency, used in conjunction with and in conflict with this worksection, take precedence.

1.2 Cross references

1.2.1 General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- *C01 General requirements (Construction)*
- *C02 Quality management (Construction)*
- *C03 Control of traffic*
- *C04 Control of erosion and sedimentation (Construction)*
- *C06 Earthworks (Road reserve)*
- *C13 Road openings and restoration (Utilities)*
- *C29 Landscape - road reserve and street trees.*

1.3 Standards

1.3.1 General

Standard: To WSA 03.
WSC Standard Drawings: Refer to Council's standard drawings on the website.

1.4 Interpretation

1.4.1 Abbreviations

General: For the purposes of this worksection the following abbreviations apply:

- DI: Ductile iron.
- GRP: Glass reinforced plastic.
- PE: Polyethylene.
- PVC: Polyvinyl chloride.

1.4.2 Definitions

General: For the purposes of this worksection the definitions given in WSA 03 and the following apply:

- Inadequate foundation material: Material beneath or adjacent to the proposed drainage structures with insufficient strength to support the structure and loads on the structure, or material with characteristics that would adversely affect the performance or construction of the drainage structure.
- Section: A length of pipeline which can be effectively isolated for testing, e.g. by means of main stop valves.

- 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 system.
- Commissioning: Running of the plant and equipment to make sure there is flow through the pumping system, carrying out any necessary testing and making adjustments until it is ready and suitable for normal starting and running under service conditions.
- Electricity distributor: Any person or organisation that provides electricity from an electricity distribution system to one or more electrical installations. Includes distributor, supply authority, network operator, local network service provider, electricity retailer or electricity entity, as may be appropriate in the relevant jurisdiction.
- Pre-commissioning: Preparation of plant or equipment so that it is in a safe and proper condition and ready for commissioning and operation. It includes all aspects of plant operation such as safety, electrical, mechanical and instrumentation and testing of components.

1.5 Tolerances

1.5.1 General

Requirement: To WSA 03 clause 21.

1.5.2 Trench

Trench depth: To WSA 03 clause 13.9.1.

1.6 Submissions - Reticulation

1.6.1 Authority approvals

Requirement: Submit details of all authority approvals before commencing the works for which the approval is granted, including the following:

- Road openings: Submit an approved road opening permit before starting any works within a road or road reserve.
- Water supply, sewerage and stormwater drainage work: Obtain approval from Council under Section 68 of the NSW Local Government Act.
- Crossings: Submit approval for works from the relevant authority if a pipeline crosses a road, creek rail line, gas line or petroleum line.
- Temporary drainage: Submit approval from the relevant authority to dam up or divert existing watercourses.
- Dewatering: Submit approval from the appropriate authority for any discharge to sewers, stormwater drains or watercourses.
- Tree protection: Submit approval from tree owners for cutting roots over 60 mm diameter, tree removal or works under the tree canopy or within the root zone.
- Improved surfaces: Submit approval from land owners for excavation across improved surfaces.
- Underground services: Submit approval from relevant authority of excavation methods adjacent to existing underground services.
- Welding of steel pipelines: Submit approval from Water Agency before field welding flanges.
- Compaction: Submit approval from Water Agency for any proposed flooding compaction methods before starting compaction.

- Dual water supply testing: Submit an Inspection Test Plan (ITP) to the requirements of WSA 03 clause 15.1.2, approved by the Water Agency, before starting laying and jointing.
- Acceptance testing: Submit approval from Water Agency of completed acceptance testing before connecting new works to an existing water main.
- Surplus material: Submit approval from the property owner for the disposal of any surplus material on that property.

1.6.2 Execution details

Excavation support: Where trenching works cause ground instability, submit proposals to provide adequate permanent stability.
Inadequate foundation material: Submit details for providing adequate foundation where the bottom of an excavation is unable to provide the foundation required.
Installation of pipes: Submit details of proposed method of any required cutting and disposal of existing asbestos cement pipe.

1.6.3 Products and materials

Authorised products and materials: Submit certification that all products and materials used are authorised by the Water Agency before delivery to the works.
General: Submit product information for components of the water supply reticulation system. The contractor is to supply materials which are new (unless otherwise specified), free from defects and fit for purpose.
Temporary Storage of Materials; materials shall be stored to ensure the preservation of their quality and fitness for the Work. When considered necessary, they shall be placed on wooden platforms or other hard, clean surface.
Capping off; Cap off all open ends of pipes to prevent the entry of foreign matter into the pipework.
Product conformity: Submit current assessment of conformity to WSA TN-08 as follows:

- Certificates for all pipes, fittings, valves and hydrants and all materials and components. Identify the item and record the inspection and test records that verify conformance to the specification.

Recycled materials: Submit details of any recycled materials proposed for use.

1.6.4 Records

Work-as-executed: Submit work-as-executed details in conformance with **WORK-AS-EXECUTED**.

1.6.5 Variations

Alignment: Submit any proposals to adjust alignment or position to suit on-site measurements.
Trench excavation: Submit details of soil conditions discovered upon excavation, if inconsistent with design assumptions.

1.7 Submissions – Pumping Stations

1.7.1 Authority approvals

Requirement: Submit copies of documents submitted to the electricity distributor including:

- Application for connection.
- Notification of completion.

1.7.2 Certification

Electrical safety and earthing to water services: Submit electrical safety declaration verifying that works are safe to proceed.

1.7.3 Execution details

Underground cables: Submit the following:

- Cable route, 5 days before commencing construction.
- Calculations for supply cables and major submains to equipment, 10 days before installation.

1.7.4 Operation and maintenance manuals

Requirement: Submit 3 copies, with notice of commissioning.

1.7.5 Products and materials

Electrical and pump equipment: Submit proposal for all products and materials.
Switchboard: Submit manufacturer's certificate, before delivery.

1.7.6 Records

Commissioning: Submit a copy of signed and witnessed commissioning documents in **Commissioning schedule** as evidence of conformity to documented requirements.
Pre-commissioning: Submit a copy of signed and witnessed pre-commissioning documents in **Pre-commissioning schedule** as evidence of conformity to documented requirements, 14 days before commissioning.
Survey: Submit set-out of pump stations and equipment locations, 3 days before commencing construction.
Work-as-executed details: Submit details, including water supply pump stations information sheets and works.

1.7.7 Shop drawings

Submit shop drawings to a scale that best describes the detail, as follows:

- Switchboards: 5 days before commencing manufacture.

1.7.8 Tests

Results: Submit results of testing to **ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES**.

1.7.9 Warranties

Requirement: Submit the following:

- Products, materials and equipment: Manufacturer's warranty against defects in materials and workmanship.

1.8 Inspections - Reticulation

1.8.1 Notice

General: Give notice so that inspection may be made of the following:

- Inadequate foundation material: Any area of the foundation including the sides of the trenches that may contain material that is inadequate to support the proposed drainage structure.
- Trench floor preparation: Completion of trench excavation including any rock trimming and backfilling to design trench floor level.
- Pipe embedment: Completed pipe laying, jointing and corrosion protection.
- Acceptance testing: When testing is due to take place.
- Existing condition: Corroded or damaged existing water mains.

- Connections: When connection to existing main and charging of new main is due to take place.
- Inspections to be in accordance with Council's Engineering Construction Specification C032 Summary of inspections, tests and documentation required for civil construction works within Wingecarribee Shire Council.

1.9 INSPECTIONS – PUMPING STATIONS

1.9.1 Notice

General: Give notice so that inspection may be made of the following:

- Commissioning: Intention to begin commissioning.
- Acceptance testing: Intention to begin testing.

2 Materials

2.1 General

2.1.1 Products and materials

Requirement: To WSA 03 clause 12.

2.1.2 Warranty

Manufacturer's warranty for pumps: Obtain a written warranty from the manufacturer of the equipment, accepting liability for any defect in materials or workmanship apparent within 2 years of delivery.

2.2 Pipes and fittings

2.2.1 General

Standard: To AS/NZS 4020.

2.2.2 Ductile iron (DI) water mains

Standard: To AS/NZS 2280
Flanges: To AS/NZS 4087 and AS 2129.
Bolts and nuts for flanged joints: To AS 2129, galvanized to AS/NZS 1214 or stainless steel to ASTM A276/A276M.

2.2.3 Polyvinyl chloride (PVC) water mains

Standard:

- PVC-U pipe: To AS/NZS 1477.
- PVC-M pipe: To AS/NZS 4765.
- PVC-O pipe: To AS/NZS 4441.

2.2.4 Polyethylene (PE) water mains

Standard: To AS/NZS 4130, WSA 01.
Property service pipe: PE 100, PN 16, series 1.

2.2.5 Steel water mains

Standard: To AS 1579
Steel pipe rated pressure: Hydrostatically tested.
Bolts and nuts for flanged joints: To AS 2129.

2.2.6 Copper pipe and fittings for property service.

Standard: To AS 1432 and WSA 03 Table 5.4.
Capillary and compression fittings: To AS 3688.

2.3 Valves and hydrants

2.3.1 General

Flanges: To AS 2129 and AS/NZS 4087.
WSC Standard Drawings: Refer to councils standard drawings on the website.

2.3.2 Stop valves

Standard: To the **Stop valve schedule** and the following:

- Gate valves: To AS/NZS 2638.1 and AS/NZS 2638.2.
- Knife gate valves: To AS 6401.
- Butterfly valves: To AS 4795.1 and AS 4795.2.
- Ball valves: To AS 4796.
- Only clockwise closing valves may be installed in the local government area

2.3.3 Control valves

Standard: To AS 5081 and the **Control valve schedule**.

2.3.4 Air valves

Standard: To AS 4956 and the **Air valve schedule**.

2.3.5 Non-return valves

Standard: To AS 4794 and the **Non-return valve schedule**.
Maintenance requirement: Locate body cover, of a sufficient size, to allow removal of valve flap and seat for inspection without removal of the valve body.

2.3.6 Hydrants

Standard: To AS 3952 and the **Hydrant schedule**.

2.3.7 Maintenance facilities

Scours, pump-out branches, swabbing points and disinfection facilities: As documented.

2.3.8 Surface fittings

Standard: To WSA 132 and the **Access covers and frames schedule**.

2.4 Steel and concrete

2.4.1 Steelwork

Structural steelwork, including ladders, brackets, and covers: To AS 1657.
Abrasive blast cleaning: To AS 1627.4 Class 2.5.
Protection: Hot-dip galvanize to AS/NZS 4680.

2.4.2 Concrete

Premixed, normal class concrete: To WSA PS-357.
Reinforcement: To WSA PS-367.

2.5 Bedding, embedment and fill material

2.5.1 General

Standard: To AS/NZS 2566.2 and the **Bedding, embedment and fill material schedule**.
Fill: To WSA 03 clause 17.

2.5.2 Recycled materials

Requirement: Use only approved recycled materials to WSA PS-364 and WSA PS-365.

2.5.3 Geotextile

Standard: To AS 3705 and WSA PS-355.

2.6 Electrical equipment

2.6.1 General

Switchboard, control panels, level control devices and level probe support brackets: To WSA 04 clause 20.3, WSA 04 clause 20.9 and as documented.

2.6.2 Switchboards

Requirement: Complete switchboards with circuit breakers, contactors, fuses, soft starters, relays, timers, instruments and accessories, as documented.
Type: Outdoor, stationary, free standing, metal-enclosed, cubicle type series conforming to the following:

- Minimum degree of protection: IP56D conforming to AS 60529.
- Securely mounted.
- Electrical components: Segregated into individual compartments.
- Steel galvanized channel base.

Fault current: Show prospective fault currents for each installation on the respective power circuit diagrams. Confirm all fault levels with the electrical distributor.

2.7 Pump equipment

2.7.1 General

Pressure booster pumps: To WSA 130 and WSA 131.
Multiple pump sets. All pumps in a set identical and interchangeable.
Selection: Select for the documented duty at not more than 47.5 Hz.
Motor protection: Provide each motor with thermistor protection to AS/NZS IEC 60947.8.
Liaise with Council regarding requirements for transfer pumps.

2.8 Steel and concrete

2.8.1 Structural steel and concrete

Concrete: To AS 3600.
Structural steel: To AS 4100.

2.9 Fasteners

2.9.1 General

Bolts, nuts and washers: To WSA 04 clause 20.8 and the following:

- Extreme temperature variations: To AS 2528.

- Metalwork: To WSA 04 clause 25.4.

2.10 Testing

2.10.1 Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.
Quality verification: If material/product quality verification can be obtained from the supplier, documented tests need not be repeated.

3 Execution – reticulation

3.1 General

3.1.1 Construction

Requirement: Conform to WSA 03 clause 11.

3.1.2 Customer focus

Customer contact: Record details of any contact with Water Agency customers. Promptly resolve their questions and complaints.

3.2 Establishment

3.2.1 General

Space allocations: Conform to any space allocation agreements, local agreements with road owners or other utility service provider.
Material and equipment: Locate material and equipment clear of watercourses or secure to prevent danger or damage in the event of large runoff flows.
Water mains in easements: Conform to documented requirements including positioning the main within the easement, as follows:

- 1/3 of the width into the easement, on the side away from any buildings.
- Centrally, where there are buildings on both sides or if the easement runs through narrow walkways.
- On the low side of any crossfall over the easement.

Protection: Provide protection from external factors such as external loading, third party intrusion as documented, including the following:

- Encasement pipe.
- Precast reinforced concrete removable slabs.
- Concrete encasement.
- Service duct.
- Security fencing.
- Protection barriers.

Effect of overhead power lines and transmission towers: Conform to documented mains alignment, electrical protection, corrosion protection and construction details.
Above ground water mains: Provide above ground water main components, as documented.

3.2.2 Alignment

Set out: Verify all on-site measurements and confirm set out immediately before starting construction. If any adjustments to alignment or position are required, prepare proposals.

3.2.3 Road openings

Section 138 Approval: Obtain a approval before starting works within a road or road reserve and conform to *C13 Road openings and restoration (Utilities)* worksection and Council's standard drawings. Council prefers underbore to trench excavation of the road carriageway.

3.2.4 Crossings

Authority approvals: If a pipeline crosses a road, creek, rail line, gas line or petroleum line or involves features documented as under the control of any authority, carry out the work in conformance with the requirements of that Authority.

3.3 Excavation

3.3.1 General

Requirement: To WSA 03 clause 13.
Excavation level: Excavate trench or foundation for water supply works to the designed level of the bottom of the bedding or foundation. Remove all loose material.
Location: Carry out all excavations for structures and pipelines to the documented lines, grades and forms.
Safety fencing: Provide safety fencing along the edges of open excavations to statutory requirements.
Access to properties: Provide fenced walkways and vehicular crossings across trenches, to maintain access at all times, from the carriageway to individual properties or within individual properties. Give notice to all affected property occupiers.

3.3.2 Protection of trees

Refer to Council's Street Tree Implementation Plan
Refer to Protection of trees on development sites AS 4970-2009

3.3.3 Blasting

Blasting: Not permitted.

3.3.4 Excavation support

Trench support: Provide shoring, sheet piling or other stabilisation methods to the sides of trench excavations, as necessary to conform to statutory requirements and WSA 03 clause 13.5.
Instability: Where trenching works cause ground instability, provide adequate permanent stability.

3.3.5 Temporary drainage

General: For each part of the system, complete the erosion and sedimentation control measures before starting the works.
Control of erosion and sedimentation: Make adequate provision for runoff flows at area of works and surrounds. Conform to *C04 Control of erosion and sedimentation (Construction)* and WSA 03 clause 11.5.5.4. Any conflicting requirements of WSA 03 clause 11.5.5.4 take precedence.
Dams and diversions: Do not dam up or divert existing watercourses (either temporarily or permanently) without approval from the relevant Authority.

3.3.6 Dewatering

Requirement: Keep all excavations free of water, provide dewatering including any equipment required. Make sure no damage is caused to adjacent structures and services. Obtain approval for any discharge to sewers, stormwater drains or watercourses by the appropriate Authority.

3.3.7 Excavation for under pressure cut-in connection to pressure pipes ≥ DN 80

Requirement: To WSA 03 clause 13.7.

3.3.8 Excavation across improved surfaces

Requirement: To *C13 Road openings and restoration (Utilities)*, WSA 03 clause 13.8, Council's Standard Drawings and the following:

- Obtain approval from the land owner before starting any excavation across improved surfaces.
- Council prefers underbore to trench excavation of the road carriageway

3.3.9 Trench excavation

Requirement: To WSA 03 clause 13.9.
Soil conditions: Confirm soil conditions are consistent with design assumptions.
Trench size for pipelines: Excavate the trench as documented and to the following:

- General buried flexible pipelines: To AS/NZS 2566.2.
- PVC: To AS/NZS 2032.
- PE: To AS/NZS 2033.

Bitumen and concrete surfaces: Carefully sawcut a neat straight line free from broken ragged edges.
Easement: Do not excavate outside the easement.
Minimum trench widths to equal the outside diameter of the pipe plus 300mm
Maximum trench width: 500 mm greater than the documented minimum trench width.
Minimum depth to crown of pipe 600mm
Maximum depth to crown 900mm – unless specifically agreed with Council.
Fittings: Locally widen and deepen the trench where necessary for the installation of valves and fittings and protective coating systems.
Embankment installation condition: If required, before placing bedding and laying pipes, place and compact embankment fill to a height equal to the top of the pipe embedment zone and for a minimum lateral distance outside each trench wall of 2.5 times the external diameter of the pipe. Place earthworks to *C06 Earthworks (Road reserve)*.
Stockpile: Provide stockpiles as follows:

- Do not stockpile excavated materials against the walls of any building or fence.
- Maintain a minimum of 600 mm or the depth of trench, whichever is the greater, between the edge of any excavation and the toe of a stockpile.
- Stockpile excavated topsoil separately and reuse for surface restoration after backfilling.
- Remove any surplus excavated material not required for reuse as topsoil or backfill.

Refill of excessive excavation: To WSA 03 clause 13.10.

3.3.10 Cover over pipelines

Minimum cover: Provide mains pipelines with the minimum depth of cover as documented and to WSA 03 Table 7.2, measured vertically from the finished ground level to the top of any socket.

Reduced cover: Less than minimum cover may be provided where special protection of the pipelines is documented.
Increased cover: Increased cover may be provided, as documented, to suit special conditions such as conflict with other services or to meet grading requirements.
Maximum cover: To the following:

- For pipe ≤ DN 375: 1.2 m.
- For pipe > DN 375 < DN 600: 1.5 m.

3.3.11 Underground services

Marking: Before starting earthworks, locate and mark existing underground services in the areas which will be affected by the earthworks operations including clearing, excavating and trenching.
Protection: Protect and repair, as necessary, all services within the extent of the works.
Public utilities within proximity of the excavation: Obtain approval from the relevant authority for the method of excavation, before commencing excavation.
Protection of property and environment: To WSA 03 clause 11.5.

3.3.12 Inadequate foundation material

Non-conformance: Provide a satisfactory foundation where the requirements of WSA 03 clause 13.11 have not been achieved.
Removal: Remove and dispose of inadequate foundation material to *C06 Earthworks (Road reserve)*.
Replacement material: To **BEDDING, EMBEDMENT AND FILL MATERIAL**.

3.3.13 Trenchless technology

Requirement: If using trenchless technology conform to the *C34 Trenchless conduit installation* worksection.
Existing road crossings: If documented, use trenchless methods for the installation of the mains.
Encasement pipe: Extend encasement pipe 1.0 m behind the back of the kerb on either side of the carriageway.
Support cradles: Position the carrier pipe on support cradles centrally located within the encasement pipe.
Ductile iron cement lined (DICL) carrier pipe: Polyethylene sleeving is not required for any length of DICL carrier enclosed within the encasement pipe.
Grouting: If required, after installation and pressure testing of the carrier pipe, fill the annular space between the carrier pipe and the encasement pipe with suitable grout or cementitious grout filler.

3.4 Bedding

3.4.1 Trench floor preparation

Requirement: To WSA 03 clause 14.1.

3.4.2 Bedding and pipe support

Requirement: To WSA 03 clause 14.2.
Minimum thickness: 75 mm below the barrel and socket of the pipe.

3.5 Pipe laying, jointing and connecting

3.5.1 Installation of pipes

General: To WSA 03 clause 15.1, AS/NZS 2566.2 and the following:

- PVC installation: To AS/NZS 2032.
- PE installation: To AS/NZS 2033.

- Copper pipe and fittings installation: To AS 4809.

Field cutting of ductile iron or steel: Make sure that working fire fighting equipment is on the site before making field cuts.
Petrol engined pipe cutter: If using a petrol engined pipe cutter in an excavation, make sure that the excavation is safely ventilated at all times.
Butt fusion of PE pipes: To PIPA POP003.
Electrofusion of PE pipes: To PIPA POP001.
Witness marks on PVC/PE pipes: Do not use PVC/PE pipes with scored witness marks.
Horizontal and vertical deflections: To WSA 03 clause 15.2.
Curving of PE/PVC pipe: Where required, bend pipes in conformance with PIPA POP202 and WSA 03 clause 15.2.3.
Horizontal and vertical separation of crossing pipelines: Confer with Council regarding maintaining minimum separation of crossing pipelines. Fill with embedment material and compact.
Prevent flotation: To WSA 03 clause 15.6.
Under pressure cut-in connection to pressure pipes ≥ DN 80: To WSA 03 clause 15.5.

3.5.2 Thrust and anchor blocks and restrained joints

Requirement: To WSA 03 clause 15.7.
Concrete placement: To WSA 03 clause 12.5.

3.5.3 Tapping of mains, property services and water mains

Requirement: To WSA 03 clause 15.8.

3.5.4 Marking

Requirement: To WSA 03 clause 15.12.
Tracer tape is required for non-metallic pipelines
Appurtenance location marking: Provide location marker posts, plates or other markings as documented.
Time: Fix marking as soon as practicable after each valve or hydrant is installed.
Temporary cover: Temporarily cover marking plates for hydrants using masking tape and remove on satisfactory completion of the pressure testing of the pipeline.
Distance: Permanently mark the plate with the distance to the valve or hydrant in metres, to an accuracy of 0.1 m, with legible numbers a minimum 80 mm high.
Post material: As documented on design plans.
Timber post finish: If timber posts are documented, paint posts with 2 coats of white water based enamel for exterior use.
Post length: Set sufficient length firmly in place under saturated ground conditions.
Installed post projection: To the following:

- Generally: 1000 mm above the ground.
- If tall grass or crops are likely to obscure the post: 1500 mm above the ground.

Pavement markers: Provide two-way reflective raised pavement markers to the road pavement and kerb, as documented.

3.5.5 Chambers

Extension spindle: Install as necessary so that top of spindle is no greater than 350 mm below finished surface level.
Covers and frames: Install covers to AS 3996 and the following:

- No warps or twists in covers and frames.

- No abrupt irregularities to surface and gradual irregularities of no more than 3 mm.
- Unformed surfaces: Dense, uniform and free from blemishes.
- Exposed edges: Minimum 4 mm radius.
- Road pavements, footpaths and other paved surfaces: Finish flush with the surface.
- Cover dimensions tolerance: – 3 mm, + 0 mm.
- Frame dimensions tolerance: ± 3 mm.

Plastic covers: Avoid lateral movement, cracking and subsidence when installing plastic covers and frames.

Cover colour: Paint covers as follows:

- Valve chamber covers: White pavement marking paint.
- Hydrant chamber covers: Yellow pavement marking paint.

3.5.6 Bored pipes under roads and driveways

Requirement: To WSA 03 clause 15.15.

3.5.7 Flanged joints

Requirement: To WSA 03 clause 15.19.

PE pipe: Provide a butt welded PE stub flange/adaptor with a stainless steel backing ring in conformance with PIPA POP007.

3.5.8 Welding of steel pipelines

Requirement: To WSA 03 clause 15.20.

Field welding of flanges: To WSA 03 clause 15.20.2.

External corrosion protection to welded joints: Apply as follows:

- Tape system: To WSA 03 clause 15.20.4.
- Heat-shrinkable sleeve: To WSA 03 clause 15.20.5.

3.5.9 Wrapping of ductile iron pipelines

Standard: To AS 3681.

Requirement: Enclose ductile iron pipelines, or sections of pipelines, in layflat high impact resistance polyethylene sleeving with plastic tape adhesive, as documented, and in conformance with the manufacturer's recommendations.

Width of sleeving when flat: To the manufacturer's recommendations for the size and type of the pipeline being encased.

Exposure: Do not expose the sleeve to more than 48 hours direct sunlight.

Protection: Protect the sleeve from damage during application and the backfilling of the trench.

Damage to sleeving: Rectify any damage to the polyethylene sleeving before backfilling of the trench.

Plastic adhesive tape: 50 mm wide.

Field joints: Provide 250 mm minimum overlap of sleeving at each field joint.

Sleeving ends: Hold in position with at least three circumferential turns of adhesive tape.

Excess material: Neatly draw up loose, excess polyethylene sleeving material around the pipe barrel, fold into an overlap on top of the pipe and hold in place with strips of plastic tape at approximately 1 m intervals.

Bends, tapers and similar fittings: Cover with polyethylene sleeving as documented for the pipes.

Valves, hydrants and irregular shaped fittings and joints: Hand wrap using flat polyethylene sheets secured with plastic adhesive tape, or other suitable material, to provide an adequate seal.

3.5.10 Steel bolts and nuts corrosion protection

General: Wrap all galvanized steel bolts and nuts, used for below ground installation of flanges, bolted gland joints, mechanical joints and tapping bands, with petrolatum tape to the manufacturer's recommendations.
Requirement: Dry, clean and free from rust, immediately before wrapping.

3.5.11 Joints

General: Joint pipes in the location and to the methods, as documented, including the following:

- Elastomeric seal joints:
  Roll-on or skid type.
  Lubricant: To manufacturer's recommendations.
- Mechanical joints: Fixed flange, bolted gland type.
- PE pipe: System specific joint type.
- Solvent cement joints: To AS/NZS 3879 and manufacturer's recommendations.

Witness mark: Make the joint so that the witness mark is no more than 3 mm from the end of the socket.

3.5.12 Jointing pipes of different materials

Ductile iron to PVC: If jointing PVC pipes to ductile iron pipes, confirm the compatibility of the PVC pipe, joint seal and DI socket. Make joints by inserting the PVC spigot into the ductile iron socket. Do not insert ductile iron spigots into PVC sockets.
Ductile iron to PE: Flanged joints.
Couplings: Use multi-fit mechanical couplings or flanged adaptor couplings. If jointing PE pipes with mechanical couplings, provide joint restraint.
Stainless steel leak/repair clamps: Do not use to join pipes of different materials.

3.5.13 Appurtenances

Compatibility: Provide compatible valves, hydrants and other appurtenances which allow for effective sealing between the pipe flanges and the appurtenance.
Pipework concrete lining: Do not chip away or reduce the concrete lining of pipework to provide clearance from the working parts of valves or other appurtenances.
Maintenance: Install valves, hydrants and other appurtenances to allow easy access for maintenance and repair.
Valve operation: Removable tee key or hand wheel, as documented and to the following requirements:

- Size tee key or hand wheel to operate valve, under all conditions throughout its full range, with a maximum force of 180 Newtons applied at the end of the key bar or the rim of the hand wheel.
- Hand wheels (only in production sites/ pump stations): Embossed or engraved with an arrow, together with the word open and/or close corresponding to the valve operation.

3.6 Embedment and backfill

3.6.1 Pipe embedment

Requirement: To WSA 03 clause 16 and Council's Standard Drawing.
Approval: Do not backfill trench without approval of completed pipe laying, jointing and corrosion protection.
Removal of trench supports: To WSA 03 clause 16.5.

3.6.2 Compaction

Requirement: Compact in layers maximum 150 mm thick. Conform to AS/NZS 2566.2 and WSA 03 clause 16.3.
Flooding compaction: Obtain approval from the Water Agency if flooding compaction is proposed.

3.6.3 Concrete embedment and encasement

Requirement: To WSA 03 clause 16.6.
Concrete placement: To WSA 03 clause 12.5.
Concrete strength: 20 MPa.
Concrete slump: 80 mm.

3.6.4 Trench stops and concrete bulkheads

Requirement: Provide trench stops consisting of sealed bags filled with clay, sand or cement stabilised sand, or concrete bulkheads, as documented.

Requirement	**Spacing m**
Trenchstop	100/Grade
Concrete bulkheads.	L/Grade where L = 80 x Pipe length, m = 450 m max If L>100 m use intermediate trenchstops at spacing <100/Grade
Concrete bulkheads. Embedment may need to be specially designed	100/Grade
Special design	

Drainage: Provide a continuous drainage path at trench stops and bulkheads, as documented.

3.6.5 Trench fill

Prevention of damage to pipes, coating and wrapping: Backfill and compact all materials without causing movement or damage to the pipe or its external coating or wrapping.
Excavated material: Use only in non-trafficable areas, to WSA 03 clause 17.1.1.2.
Placement: To WSA 03 clause 17.1.2.
Compaction: To WSA 03 clause 17.1.3.

3.6.6 Geotextile

Install approved geotextile over any single size aggregate embedment in trafficable areas, including footways.

3.6.7 Embankment fill

Requirement: To WSA 03 clause 17.2 and as documented.

3.6.8 Drives and tunnel fill

General: To WSA 03 clause 17.3.

3.7 Cleaning

3.7.1 Swabbing

Requirement: To WSA 03 clause 18.

3.7.2 Disinfection

Requirement: Disinfect mains to WSA 03 clause 20 after satisfactory hydrostatic pressure testing.

3.8 Testing

3.8.1 General

Requirement: To WSA 03 clause 19.
Quality: Test for all characteristics in conformance with **ANNEXURE – MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES.**

3.8.2 Compaction testing

Requirements: To WSA 03 clause 19.3.
Test methods:

- Cohesionless materials: To AS 1289.5.6.1.
- Cohesive materials: To AS 1289.5.7.1.

3.8.3 Hydrostatic pressure testing

Requirement:

- To WSA 03 clause 19.4.
- The applicant needs to make application to Council for Pressure Test at the applicant's expense. Council will engage a NATA registered tester to undertake testing
- Document operating/test pressures for each pipe and location on the drawings.
- Test method to AS/NZS 2566.2 clause 6.3

Sections: Test pipeline sections as soon as practicable after each section has been laid, jointed and backfilled or 7 days after the last placement of concrete thrust or anchor block. Leave some or all of the pipe joints uncovered until the whole of the section has been successfully pressure tested.
Wet weather: Do not perform pressure testing during wet weather.
Field joints: During pressure testing, make sure all field joints, which have not been backfilled, are clean, dry and accessible for inspection.
Stop valves: During pressure testing, test each stop valve to at least the full test pressure on one side of the valve in the closed position, with no pressure on the other side, for a minimum of 15 minutes.
Filling with water: Before testing, clean the pipe and fill it slowly with water, taking care that all air is expelled. Promote purging of air from rising mains by opening air valves or hydrants.
Stable testing conditions: To allow for absorption, movement of the pipeline and escape of entrapped air, keep the section full of water for a minimum period of 24 hours before starting pressure testing.
Test pressure: Do not exceed the manufacturer's recommended test pressure for the lowest rated component in the section.
Test duration: Maintain the required test pressure for a minimum of 6 hours.
Compressed air test: Do not test the pipeline using compressed air.

3.8.4 Dual water supply testing

Block testing dual water supply systems: Test for connectivity to WSA 03 clause 19.5 and to the ITP approved by the Water Agency.

3.8.5 Insulated joint resistance test

Requirement: Test the resistance of insulated joints, to WSA 03 clause 19.6.

3.8.6 Water quality testing

Water quality testing: Carry out bacteriological testing following satisfactory swabbing/flushing and pressure testing and subsequent disinfection of the main, to WSA 03 clause 19.7. Council will arrange the disinfection at the applicant's cost. The application form is available from Council's web site.

3.9 Connections to existing water mains

3.9.1 Acceptance testing

Requirement: Complete acceptance testing to the approval of the Water Agency before connecting to existing water mains. The applicant must submit an application form for all live connections.

3.9.2 Existing condition

Requirement: Inspect the condition of the existing water main for corrosion or other surface damage.

3.9.3 Connections

Requirement: To WSA 03 clause 22.

3.10 Restoration of surfaces

3.10.1 General

Requirement: To *C13 Road openings and restoration (Utilities),* WSA 03 clause 23 and WSC Standard Drawings.
Pavement reinstatement contractors: Use only the approved contractors listed in **ANNEXURE – APPROVED PAVEMENT REINSTATEMENT CONTRACTORS**.
Property owner advice: Provide notice to affected property owners of any pending works.

3.10.2 Backfill

Dry weather conditions: If dry weather conditions have persisted after the original backfilling, including during the Defects Liability Period, consolidate the trench before removing surplus materials from the site.
Tunnelling: If tunnelling under paving, kerb and gutter or other improved surfaces instead of trenching, backfill to restore full support to those surfaces.

3.10.3 Stabilise topsoil

Requirement: Immediately following earthworks, where required, stabilise the topsoil with hydroseed to *C29 Landscape - road reserve and street trees*.

3.10.4 Surplus material

Disposal: Obtain the property owner's approval for the disposal of any surplus material on that property.

3.11 Asset details

3.11.1 Work-as-executed

Requirement: Prepare work-as-executed details and operation and maintenance information as follows:

- Refer to Councils Facts Sheet for Asset Handover
- Refer to information in Design Specification D12
- Drawings in the same format as the design drawings, certified by a Registered Surveyor, showing the actual location and alignment of pipelines. Include the size, type, and levels of pipelines, valve and hydrant chamber types and cover details, and easement requirements for maintenance.
- Asset register data.

4 Execution – pump station

4.1 General

4.1.1 Establishment

Requirement: To **ESTABLISHMENT** in the *C30 Water supply - reticulation (Construction)* worksection.
Set-out: Confirm pump station and equipment location before construction.

4.1.2 Construction

Requirement: Construct the water booster pumping station and associated works to the documented levels, grades, materials and methods and to WSA 03 clause 11.
Excavation, bedding, pipe laying, jointing and connecting, embedment and backfill: To the *C30 Water supply – reticulation (Construction)* worksection.
Steel and concrete construction: To the relevant standard.

4.1.3 Miscellaneous structures

Metalwork: Install associated metalwork conforming to WSA 04 clause 25 and as documented.
Access: To WSA 03 clause 6.2.2.12 and as documented.
Retaining walls: Construct retaining walls conforming to WSA 04 clause 27 and as documented.

4.1.4 Installation of booster pump station

Requirement: Install pumps, discharge equipment and other associated equipment to manufacturer's recommendations. Complete all work, including fittings, before connecting to the water supply system.

4.1.5 Provision for maintenance

Maintenance: Provide dismantling joints and valves in the pipe work to facilitate removal of the pumps for maintenance and to minimise the need for surge control devices.

4.2 Electrical works

4.2.1 General

Requirement: To AS/NZS 3000 and to WSA 04 clause 21.
Electrical safety and earthing to water services: Test for defects in the electrical supply, provide a conductive bridge around the work area if required and notify occupants and electricity distributors of any change. Obtain a certificate of safety declaration before proceeding.
Safety of people: To WSA 03 clause 5.1.3 and WSA 03 Appendix J Safety assurances plan and job safety analysis.
Power system and supply: To WSA 03 clause 6.2.8.
Lighting: To AS/NZS 1680.2.4.
Primary power supply requirements: To the electricity distributor's requirements.

Lightning and surge protection: Protect all incoming power supply and control power supply to WSA 03 clause 6.2.8.3.
Sealing: At the completion of commissioning tests, seal all conduits into the outdoor SCA with a non-setting sealing compound to prevent the ingress of vermin.
Painting: Paint all equipment mounting panels, except aluminium alloy and stainless steel components conforming to WSA 04 clause 21.12.
Lock barrels: Liaise with the electricity distributor to supply a lock barrel for the metering equipment.
Packing: Pack equipment for transport after final factory inspection and tests. Make sure equipment is protected during delivery.
Tools: Make sure spare parts and tools, are packed separately from the main plant and marked as appropriate.
Spare parts: Supply spare parts

4.2.2 Electrical installation

Electricity distributor's requirements and metering: Conform to the following:

- Apply to the electricity distributor for connection, including electrical loads and type of service required.
- Pay all fees associated with the metering including inspection fees and capacity charges.
- Mount the metering equipment inside the switchboard or as documented.

4.2.3 Point of supply

Requirement: Obtain a service marking from the electricity distributor. Confirm the point of attachment, as documented.

4.2.4 Lead-in pole and overhead mains construction

Requirement: Install poles and aerial cables to WSA 04 clause 21.4.7 and as documented.
Pole termination method: As documented.

4.2.5 Underground cable installation

Requirement: To WSA 04 clause 21.4.8.1 and to the *1391 Service conduits* or *1392 Trenchless conduit installation* worksection, as appropriate.
Cable route: Obtain approval all of underground cabling routes.
Underground conduits: Install HD-PVC underground conduits conforming to the electricity distributor's requirements and the following:

- Non-trafficable areas: Minimum 500 mm below the finished ground level.
- Trafficable areas: 600 mm below the finished ground level.
- Clear the trench and backfill material of rocks and other foreign matter likely to damage the conduits.

Electrical marker tape: Conform to the following:

- Colour: Orange.
- Width: 150 mm.
- Warning text: Stamped with the words DANGER – ELECTRIC CABLES BELOW or similar.

Brass marking plates for cables under roads: Position on any concrete surround, clearly showing the direction of the incoming consumer mains. Mark with the words DANGER – ELECTRICAL CABLES BELOW.

4.2.6 Earthing

Combined earthing system: Provide an MEN earthing system conforming to AS/NZS 3000, WSA 04 clause 21.5, the electricity distributor and the relevant state Service and Installation Rules.
Earthing conductor: Size and installation to the relevant state Service and Installation Rules and AS/NZS 3000. Run the main earthing conductor in conduit to the main earthing electrode.
Earthing connection: Contain the main earthing connection in an earthing electrode connection box.
Pipework: Bond the pump station metallic pipe work to the main earth.
Surge diverters: Provide a separate earthing conductor and electrode for the surge diverters, bond each electrode and label with engraved brass label.
Labelling: Label all major earth connection cables clearly at both ends.

4.2.7 Switchboard

Standard: To AS/NZS IEC 60947.5.1.
Minimum degree of protection: Within the pump station buildings, IP51.

4.2.8 Switchboard components

Starter contactors: Provide starter contactors with the appropriate rating for the pumps to AC03 duty.
Terminal numbers: Number terminals and cables, as documented.
SCA electrical characteristics: Conform to the following:

- Main circuit: 415/240 V, 50 Hz, 3-phase, 4-wire.
- Motor control circuit: 240 V, 50 Hz.
- Common control circuit: 240 and 24 V a.c.
- Prospective short-circuit current: 14 kA for 1 second.
- Peak factor: 2.2.
- Power factor correction (determined in consultation with the Water Agency).
- Earthing (MEN system).
- Cable entry to switchboard: From below.

4.2.9 Switchboard installation

Requirement: To WSA 04 clause 21.6.
Thermal derating of equipment:

- Derate switchgear installed in switchboards to the manufacturer's recommended derating or to 88% of the equipments nominal current rating, whichever is the greater.
- Derate solid state power equipment installed in switchboards to the manufacturer's recommended derating or to 77% of its nominal 35°C current rating, whichever is the greater.

Switchgear data: Confirm Type 2 co-ordination between contactors, motor protection relays and corresponding circuit breakers.
Starter contactors: Confirm starter contactors have the appropriate rating for the proposed pumps to AC03 duty.
Labelling: Clearly label every item of equipment within or on the switchboard to WSA 04 clause 21.6.4.

4.2.10 Pump control

Automatic control: Provide automatic control of the pump station pumping equipment by way of float switches/probes providing single pump duty operation, as documented. Provide

switches/probes compatible with those in use in the system. Ensure SCADA visibility and remote control.
Operation: Allow for overriding the AUTO by turning the starter selector switch to the ON position, conforming to the following:

- Manual operation: For use in the event of failure of the telemetry system or for function testing.
- Warning label: Provide a warning label (R/W/R) advising selector switches to be left in the AUTO mode to common control cover.
- Factory and functional tests: To AS/NZS 61439.1.

4.2.11 Circuits

Requirement: Arrange and colour code all main circuit wiring and busbars to WSA 04 clause 21.7.

4.2.12 Cabling

Requirement: Cabling, including consumer mains, motor, control and flow meter cables, conduits and electrical pits, to AS/NZS 3000 and AS/NZS 3008.1.1 and the electricity distributor's requirements.
Consumer mains: Generally run the consumer mains underground and commence at the point of supply/attachment on a consumer's steel pole (if applicable), installed near the property boundary and run in conduit to the switchboard.
Power and control cables: To AS/NZS 4961.
Cable sizing: Calculate cable sizes.
Consumer mains minimum size: Conform to the following:

- Minimum current carrying capacity to be 130% of the calculated maximum demand current.
- A voltage drop less than 1.5% of the maximum demand as calculated.
- Single core PVC/PVC cables. XLPE insulated cable may also be used.

4.2.13 Installation of pump cables

Requirement: To WSA 04 clause 21.9.

4.2.14 Conduits

HD-PVC-U: To AS/NZS 61386.21.
Galvanized screwed steel conduits, medium protection: To AS/NZS 61386.21.

4.2.15 Terminations

Requirement: Suitably rated power and control terminals to WSA 04 clause 21.11.
Glands: Gland cables using non-ferrous metallic or plastic glands with neoprene compression seals, and connect the on-flow switch and pump motor cables to the appropriate terminals. Do not joint cables. Gland all cables at the point of entry into switchboards conforming to WSA 04 clause 21.11.2.

4.2.16 Installation in valve pits

Requirement: To WSA 04 clause 21.13.

4.2.17 Completion of electrical works

Notification: Notify the electricity distributor of completed electrical works.
Switchboard metering panel: Attach a copy of the notification of wiring for the switchboard to the switchboard metering panel.
Acceptance testing: To WSA 04 clause 36.9.

4.3 Control and telemetry

4.3.1 Telemetry system

Telemetry hardware: To WSA 04 clause 22 and to WSA 03 clause 6.2.11.
Telemetry software: RTU/PLC programming and configuration conforming to the logic drawings, process and instrumentation drawings, configuration list, I/O lists, including central monitoring and display system.
SCADA: Install SCADA to conform with manufacturer's recommendations including upstream and downstream clearances. Connect pump station, reservoir, tank, control valves, flow meters and chambers to the SCADA for monitoring and control, as documented.
Alarms and controls: Provide an alarm and control system to WSA 03 clause 6.2.10, as documented.
Communication service: Provide a communication service compatible with the existing system.

4.4 Mechanical installation of pumps, valves and fittings

4.4.1 General

Requirement: To WSA 04 clause 24.

4.4.2 Pressure gauges

Requirement: Provide diaphragm protected, glycerine or oil filled, direct mounting, bottom connection pressure gauge complying with AS 1349 for centrifugal pump installation.
Fittings: Provide each gauge with sized metric equivalent of 3 bronze fittings including gate valve, union, nipple and reducing nipple.
Gauge dial: 100 mm diameter face, calibrated in head (m) of water, indicating the pump operating head and the pump no-flow head.
Installation: Conform to the following:

- Pipework ≥ 150 mm: Screw gauges and fittings screwed into the pipe wall of ductile iron pipes or pipe fittings. Install a ball valve to allow removal of the gauge where required.
- Pipework < 150 mm: Screw gauges and fittings into a tapping band.

Gauge range: For single or parallel pumps duty, 0 to 1.7 times the shut off head of the pumps.
Protective case: Stainless steel to ASTM A240/A240M, bronze or polycarbonate, which can be dismantled for cleaning without affecting the accuracy of the gauge.

4.4.3 Bolts and flanges

Maximum protrusion: 10 mm past the nut when tightened.
Anti-galling, anti-seize: Apply either of the following to threads of all stainless steel fasteners to WSA 109 Appendix E:

- PTFE tape: To BS 7786.
- Molybdenum disulfide.

Concrete anchor bolts, nuts, locking nuts and large series washers: 16 mm minimum diameter to the equipment manufacturer's recommendations.
Concrete anchor bolts: Chemical masonry type set to full depth.

4.5 Commissioning

4.5.1 General

Requirement: Certify conformance to documented requirements, and to WSA 03 clause 6.2.3.
The applicant is to submit a pre-commissioning schedule for Council's approval.

4.6 Work-as-executed details

4.6.1 General

Requirement: Provide details of work-as-executed to WSA 04 clause 39, including the following:

- Work-as-executed drawings: Same format as the design drawings, certified by a registered surveyor.
- Pump station: Show location, alignment and details, including the size and type of pipes, valves, hydrants and pumps, switchboard equipment details and structural details.
- Asset register data, as required.

4.6.2 Operation and maintenance manuals

Requirement: Include the following information in the manuals:

- Contractor's name, address and telephone number.
- Client's contract number, job name.
- Circuit diagrams.
- Electrical and mechanical layout.
- Workshop fabrication drawings.
- Commissioning manual.
- Pump station general arrangement drawing showing pumps, motors, valves, pipework, switchboard and electrical installation.
- Safe working procedures: For switching and isolating the supply and distribution system.
- Description of operation.
- Maintenance procedures: Recommended maintenance periods and procedures.
- Tools: Details of maintenance equipment and tools provided, with instructions for their use.
- Equipment: A technical description of the equipment supplied, with diagrams and illustrations, as appropriate.
- Dismantling: Where necessary, procedures for dismantling and reassembling equipment.
- Spare parts: A list of the spare parts provided.
- Trouble shooting instructions for pumps, motors, valves and SCA.
- Assembly/disassembly procedures: Step-by-step procedures for dismantling and reassembly of pumps, motors and valves using any special tools.
- Replacement procedures: Step-by-step procedures for replacement of wearing parts, including bearing, seals and wear rings.

Pump and motor curves: Include the following test curves in the manuals:

- Pump witnessed test curves marked with the normal operating point or range.
- Motor test curves and motor current.
- Motor torque/speed/efficiency characteristic curves.

Pumps: Include the following information in the manuals for pumps:

- Manufacturer.
- Type and model number.
- Serial number.
- Dimensioned general arrangement drawing of pump and motor.
- Sectional arrangement drawing with parts and list.

- Dimensioned sectional arrangements detailing:
  Maximum and minimum shaft/bearing clearance (radial).
  Maximum and minimum impeller/bowl clearance (radial).
  Maximum and minimum impeller/bowl clearance (axial).
  Impeller/bowl wear rings.
  Motor/pump coupling – type, make and model number.
  Mechanical seals where applicable.

Motors: Include the following information in the manual for motors:

- Manufacturer.
- Type and model number.
- Serial number.
- Dimensioned general arrangement drawing.
- Sectional arrangement drawing for submersible motor power cabling where applicable.
- Gland sealing arrangement drawing for submersible motor power cabling where applicable.
- Cables where applicable.
- Terminal block arrangement drawing where applicable.

Valves: Include the following information in the manuals for valves:

- Dimensioned sectional arrangement drawing with parts and material list for all valves.

4.7 Testing

4.7.1 Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.
Quality verification: If material/product quality verification can be obtained from the supplier, documented tests need not be repeated.

5 Annexures – RETICULATION

5.1 Annexure – Approved payment reinstatement for contractors

5.1.1 Approved list

Refer to Council's Standard Drawings for restoration specification

5.2 Annexure – Summary of hold and witness points

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
C30-HP01	SUBMISSIONS, Variations Alignment	H	Proposals to adjust alignment or position	7 days before excavating trenches	Trench excavation
C30-HP02	SUBMISSIONS, Variations Trench excavation	H	Details of unexpected soil conditions	5 days before preparing trench floor	Preparation of trench floor
C30-HP03	SUBMISSIONS, Execution details Excavation support	H	Permanent stability proposals	5 days before installing permanent stability measures	Installation of permanent stability measures
C30-WP04	INSPECTIONS, Notice Inadequate foundation material	W	Any area that may contain material inadequate for support	5 days before preparing trench floor	
C30-WP05	INSPECTIONS, Notice Underground services	W	Location and marking of existing underground services.	3 days before excavating trenches	Trench excavation,
C30-HP06	SUBMISSIONS, Execution details Inadequate foundation material	H	Details for providing adequate foundation	3 days before preparing trench floor	Preparation of trench floor
C30-WP07	INSPECTIONS, Notice Trench floor preparation	W	Completed trench excavation	5 days before placement of bedding	

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
C30-HP08	SUBMISSIONS, Material sheets and product sheets	H	Material/product sheets from Manufacturer/Supplier as evidence of material/pipe conformance	10 days before placement/installation	Pipe laying and embedment
C30-WP09	SUBMISSIONS, Authority approvals PE weld pre-qualification	W	Evidence of approval of proposed elocrofusion and butt welding	5 days	-
C30-WP10	SUBMISSIONS, Material storage	W	Confirmation that suitable storage of material and capping of pipes.	2 days before placement	Storage of material
C30-HP11	INSPECTIONS, Notice Pipe embedment	H	Completed pipe laying, jointing and corrosion protection	2 days before trench backfilling	Trench backfilling, For development inspections book through "MyInspect".
C30-HP12	INSPECTIONS, Concrete formwork/reinforcement	H	Formwork/reinforcement prior to concrete pour	1 day before concrete pour	Pouring of concrete. For development inspections book through "MyInspect".
C30-HP13	INSPECTIONS, Notice Acceptance testing (Visual, Compaction, Pressure, Water quality, Special)	H	Acceptance testing being carried out	3 days before starting acceptance testing	For development inspections book through "MyInspect". Section 19 WSA 03.
C30-WP14	INSPECTION, Notice Swabbing	W	Swabbing	3 days before starting swabbing	Section 19 WSA 03
C30-HP15	INSPECTION, Notice	H	Disinfection	3 days before starting disinfection	For developmen

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
	Disinfection				t inspections book through "MyInspect".
C30-HP16	INSPECTIONS, Notice Existing condition	H	Badly corroded or damaged existing water mains	3 days before connecting to existing main	Connecting to existing main
C30-HP17	INSPECTIONS, Notice Connections	H	Connecting to existing main and charging new main	5 days before Council crew connecting to existing main	For developmen t inspections book through "MyInspect".
C30-HP18	SUBMISSIONS, Work as Executed Drawings and Water Attribute Schedules	H	Submit certified drawings and schedules	2 weeks after completion of works	Prior to Subdivision Certificate / Occupation Certificate
	*H = Hold Point, W = Witness Point				

5.3 Annexure – Maximum lot sizes and minimum test frequencies

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material quality – Supplier's documentary evidence and certification of:			
	• - DI pipe	1 contract	1 per contract	AS/NZS 2280 or EN 545
	• - PVC pipe	1 contract	1 per contract	AS/NZS 1477, AS/NZS 4441 or AS/NZS 4765
	• - PE pipe	1 contract	1 per contract	AS/NZS 4130
	• - Steel pipe	1 contract	1 per contract	AS 1579
	• - GRP pipe	1 contract	1 per contract	AS 3571.2
	• - Copper pipe	1 contract	1 per contract	AS 1432
	• - Gate valves	1 contract	1 per contract	AS/NZS 2638.1 or AS/NZS 2638.2
	• - Knife gate valves	1 contract	1 per contract	AS 6401
	• - Butterfly valves	1 contract	1 per contract	AS 4795.1 or AS 4795.2
	• - Ball valves	1 contract	1 per contract	AS 4796
	• - Control valves	1 contract	1 per contract	AS 5081
	• - Air valves	1 contract	1 per contract	AS 4956
	• -Non-return valves	1 contract	1 per contract	AS 4794
	• - Hydrants	1 contract	1 per contract	AS 3952
	• Bedding and embedment grading	1 contract	1 per contract per source	Relevant WSAA product specification
Siting and excavation	Geometry	1 line	1 per line	Survey
Thrust blocks, anchor blocks and concrete encasement	Consistency – slump	15 m³	1 per load	AS 1012.3.1
	Compressive strength (7 and 28 day)	15 m³	2 pairs per 15 m³	AS 1012.1 AS 1012.8.1 AS 1012.9
Chamber covers and frames	Geometry	1 cover/frame	1 per cover/frame	Measurement
Backfill and compaction	Compaction	Refer to WSA 03 clause 19.3.2	Refer to WSA 03 clause 19.3.2	AS 1289.5.6.1or AS 1289.5.7.1
Testing of	Pressure testing	1 line (max 1000	1 per line	Refer to **Hydrostatic**

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
pipelines		m)		**pressure testing**
	Dual water supply cross connection	1 line	1 per line	WSA 03 Appendix K
	Water quality	1 line	1 per line	Refer to WSA 03 clause 19.7
Insulated joints	Electrical resistance	1 joint	1 per joint	Refer to WSA 03 clause 19.6

5.4 Annexure - Referenced documents

The following documents are incorporated into this worksection by reference:

AS 1012		Methods of testing concrete
AS 1012.1	2014	Sampling of concrete
AS 1012.3.1	2014	Determination of properties related to the consistency of concrete - Slump test
AS 1012.8.1	2014	Method for making and curing concrete - Compression and indirect tensile test specimens
AS 1012.9	2014	Compressive strength tests - Concrete, mortar and grout specimens
AS/NZS 1214	2016	Hot-dip galvanized coatings on threaded fasteners (ISO metric coarse thread series) (ISO 10684:2004, MOD)
AS 1289		Methods of testing soils for engineering purposes
AS 1289.5.6.1	1998	Soil compaction and density tests - Compaction control test - Density index method for a cohesionless material
AS 1289.5.7.1	2006	Soil compaction and density tests- Compaction control test - Hilf density ratio and Hilf moisture variation (rapid method)
AS 1432	2004	Copper tubes for plumbing, gasfitting and drainage applications
AS/NZS 1477	2017	PVC pipes and fittings for pressure applications
AS 1579	2001	Arc welded steel pipes and fittings for water and waste water
AS 1627		Metal finishing - Preparation and pretreatment of surfaces
AS 1627.4	2005	Abrasive blast cleaning of steel
AS 1657	2018	Fixed platforms, walkways, stairways and ladders - Design, construction and installation
AS/NZS 2032	2006	Installation of PVC pipe systems
AS/NZS 2033	2008	Installation of polyethylene pipe systems
AS 2129	2000	Flanges for pipes, valves and fittings
AS/NZS 2280	2014	Ductile iron pipes and fittings
AS/NZS 2566		Buried flexible pipelines
AS/NZS 2566.2	2002	Installation
AS/NZS 2638		Gate valves for water works purposes
AS/NZS 2638.1	2011	Metal seated
AS/NZS 2638.2	2011	Resilient seated
AS/NZS 3500		Plumbing and drainage
AS/NZS 3500.1	2015	Water services
AS 3571		Plastics piping systems - Glass-reinforced thermoplastics (GRP) systems based on unsaturated polyester (UP) resin
AS 3571.2	2009	Pressure and non-pressure water supply (ISO 10639:2004, MOD)
AS 3681	2008	Application of polyethylene sleeving for ductile iron piping
AS 3688	2016	Water supply - Metallic fittings and end connectors
AS 3705	2012	Geotextiles - Identification, marking, and general data
AS/NZS 3879	2011	Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings
AS 3952	2002	Water supply - spring hydrant valve for waterworks purposes
AS 3996	2006	Access covers and grates

AS/NZS 4020	2005	Testing of products for use in contact with drinking water
AS/NZS 4087	2011	Metallic flanges for waterworks purposes
AS/NZS 4130	2009	Polyethylene (PE) pipes for pressure applications
AS/NZS 4441	2017	Oriented PVC (PVC-O) pipes for pressure applications
AS/NZS 4680	2006	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS 4765	2017	Modified PVC (PVC-M) pipes for pressure applications
AS 4794	2001	Non-return valves - Swing check and tilting disc
AS 4795	2006	Butterfly valves for waterworks purposes
AS 4795.1	2011	Wafer and lugged
AS 4795.2	2011	Double flanged
AS 4796	2016	Water supply - Metal bodied and plastic bodied ball valves for property service connection
AS 4809	2017	Copper pipe and fittings - Installation and commissioning
AS 4956	2017	Air valves for water supply
AS 5081	2008	Hydraulically operated automatic control valves for waterworks purposes
AS 6401	2003	Knife gate valves for waterworks purposes
PIPA POP001	2017	Electrofusion jointing of PE pipe and fittings for pressure applications
PIPA POP003	2017	Butt fusion jointing of PE pipes and fittings - recommended parameters
PIPA POP007	2015	Metal backing flanges for use with polyethylene (PE) pipe flange adaptors
PIPA POP202	2008	PVC and PE pressure pipe installation on curved alignments
WSAA WSA PS	2017	Product specifications for products and materials
WSA 01	2004	Polyethylene Pipeline Code 2004 3rd edition Version 3.1
WSA 03	2011	Water Supply Code of Australia
WSA 132	2011	Industry standard for ductile iron access covers for water supply and sewerage
WSA PS-264	2018	Non-return (reflux) valves for pressure applications - Water supply and sewerage
WSA PS-265	2018	Air valves for pressure applications - Water supply
WSA PS-267	2018	Hydrants (spring) for pressure applications - Water supply
WSA PS-268	2018	Automatic control valves for pressure applications - Water supply
WSA PS-312	2018	Flange gaskets and o-rings
WSA PS-355	2018	Geotextile filter fabric
WSA PS-357	2018	Concrete, pre-mixed, normal class
WSA PS-364	2018	Graded recycled materials for pipe embedment
WSA PS-365	2018	Recycled materials for trench fill
WSA PS-367	2018	Steel reinforcing materials for concrete
WSA TN-08	2017	Technical note Product conformity assessment requirements
ASTM A276/A276M	2017	Standard Specification for Stainless Steel Bars and Shapes
EN 545	2010	Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods

6 Annexure – PUMPING STATIONS

6.1 Annexure - Summary of hold and witness points

Reference No:	Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
C30-HP19	SUBMISSIONS Products and materials Electrical and pump equipment	H	Submit proposal for all products and materials	4 weeks before ordering	Ordering
C30-HP20	SUBMISSIONS, Certification Electrical signoff Electrical safety and earthing to water services	H	Test for defects and submit a certificate of safety declaration	1 week before starting works	Commencement of works
C30-HP21	INSPECTIONS, Notice Connections	H	Connecting to existing main and charging new main	5 days before Council crew connecting to existing main	-
C30-HP22	INSPECTION, Notice Acceptance testing	H	Give notice of the intention to undertake acceptance testing	10 days before starting acceptance testing	WSA
C30-HP23	INSPECTIONS, Notice Commissioning	H	Give notice of the intention to undertake commissioning	10 days before commissioning	-
C30-HP24	SUBMISSIONS, Work as Executed Drawings and Water Attribute Schedules	H	Submit certified drawings and schedules	2 weeks after completion of works	Prior to Subdivision Certificate / Occupation Certificate
C31-HP25	SUBMISSIONS, Structural certification from professional engineer	H	Submit certification letter	With subdivision/occupation certificate submission	Prior to Subdivision Certificate / Occupation Certificate
	*H = Hold Point, W = Witness Point				

6.2 Annexure - Maximum lot sizes and minimum test frequencies

6.2.1 Water supply - pump stations (Construction)

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Equipment supply:	Equipment quality – Supplier's documentary evidence and certification of:			
	Centrifugal pumps: Independent witness testing	Each	Each	To WSA 04 clause 20.9.2 and WSA 130 or WSA 131
	Motors	Each	Each	To IEC 60034-30-1 and WSA 04 clause 20.9.3
	Switchboards	Each	Each	To WSA 04 clause 20.9.1
Electrical works	Acceptance testing	Each installation	1 test per installation	To WSA 04 clause 36.9
Switchgear and controlgear assembly	Electrical function	Each installation	1 test per installation	AS/NZS 61439.1

6.3 Annexure - Referenced documents

The following documents are incorporated into this worksection by reference:

AS 1349	1986	Bourdon tube pressure and vacuum gauges
AS/NZS 1680		Interior and workplace lighting
AS/NZS 1680.2.4	2017	Industrial tasks and processes
AS 2528	1982	Bolts, studbolts and nuts for flanges and other high and low temperature applications
AS/NZS 3000	2018	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS/NZS 3008		Electrical installations - Selection of cables
AS/NZS 3008.1.1	2017	Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions
AS 3600	2018	Concrete structures
AS 4100	1998	Steel structures
AS/NZS 4961	2003	Electric cables - Polymeric insulated - For distribution and service applications
AS 60529	2004	Degrees of protection provided by enclosures (IP Code)
AS/NZS IEC 60947		Low voltage switchgear and controlgear
AS/NZS IEC 60947.5.1	2015	Control circuit devices and switching elements - Electromechanical control circuit devices
AS/NZS IEC 60947.8	2015	Control units for built-in thermal protection (PTC) for rotating electrical machines
AS/NZS 61386		Conduits systems for cable management
AS/NZS 61386.21	2015	Particular requirements - Rigid conduit systems
AS/NZS 61439		Low-voltage switchgear and controlgear assemblies
AS/NZS 61439.1	2016	General rules (IEC 61439-1, Ed,2.0(2011),MOD)
WSA 03	2011	Water Supply Code of Australia
WSA 04	2005	Sewage Pumping Station Code of Australia
WSA 109	2011	Industry standard for flange gaskets and O-rings
WSA 130	2011	Industry standard for ISO end suction centrifugal pumps
WSA 131	2011	Industry standard for ISO end suction centrifugal motor pumps
BS 7786	2006	Specification for unsintered PTFE tapes for general use
ASTM A240/A240M	2016	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
IEC 60034-30-1	2014	Rotating electrical machines - Efficiency classes of line operated AC motors (IE code)