



PRE-START MEETING AGENDA & MINUTES

Date: _____ Unitywater Connection Approval No. _____

Development Estate Name: _____ Stage No. _____ of _____

Street Address: _____

Has W&S Construction Commenced: Yes No

Expected Construction Commencement Date: _____

Accredited Entity Name: _____ Accredited Entity No. _____

Major Certifier Name: _____ Major Certifier No. _____

Construction Certifier Name: _____ Construction Certifier No. _____

Contracting Firm: _____ Representative: _____ Phone No. _____

Conflict of Interest: All actual, perceived and potential conflicts of interest are identified and recorded. _____

| | Name | Company | Phone No | Signature |
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| Attendees | | | | |
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1 Construction Plans with amendments (if applicable) as per conditions of the Unitywater Approval:
 Yes No (Reschedule Prestart Meeting)

List Approved Drawings: _____

Approval Standards Applicable:

Unitywater technical specifications

SEQ design and construction code

WSAA national codes

Do the approved design plans comply with the SEQ code Standards. Yes No (Arrange Amendments)

2 Sewer Pipes to be used: (Under no circumstances are Core Filled or Solid Core Sandwich pipes and fittings to be used).

Reticulation UPVC SN8 (Solid Wall Only) UPVC Class 12 PE100 SDR21 White Wall

Deeper than 3.0m UPVC Class 12 PE100 SDR21 White Wall

Pressure PE100 SDR11 Cream Stripe

Other Approved: _____

Accredited pipe layer: (name and accreditation number) _____

At Least one person on site must have completed a pipe laying training course approved by the supplier.

The contractor will provide documented evidence of such qualification prior to commencement of the works.

Century Plus DI Pipe Installation (Mandatory for Water Main Construction)

PVC "Pipelines Installation Course"

Polyethylene "Electrofusion/Butt Welding of Polyethylene Pipe"

Rehau (letter of competency)

Smartstream Smartpit (letter of competency)

Iplex Ezipit (letter of competency)

Other Approved –

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| 3 | <p>Sewer Pipe embedment material:</p> <input type="checkbox"/> 5/7mm washed screenings nominal single sized aggregate (as per WSA PS-351). <input type="checkbox"/> Other Approved - |
| 4 | <p>Sewer Maintenance Holes (MH) to be used:</p> <input type="checkbox"/> Concrete Pre-Cast (Humes) <input type="checkbox"/> Conc. Pre-Cast (Civilmart) <input type="checkbox"/> PE Smartstream SmartPit (DN1050) <input type="checkbox"/> PP Rehau AWASHFT (DN1000) <input type="checkbox"/> PP Iplex Ezipit (DN1000) <input type="checkbox"/> Insitu <input type="checkbox"/> Other Approved - |
| 5 | <p>Concrete Converter Top Slab to be used:</p> <input type="checkbox"/> Civilmart <input type="checkbox"/> Everhard <input type="checkbox"/> Insitu <input type="checkbox"/> Other IPAM Approved - |
| 6 | <p>Concrete Sewer Access Chamber <u>BASE</u> to be used:</p> <input type="checkbox"/> Humes <input type="checkbox"/> Civilmart <input type="checkbox"/> Insitu <input type="checkbox"/> Other Approved - |
| 7 | <p>Maintenance Shafts (MS) to be used:</p> <input type="checkbox"/> Smartstream Poo-Pit (DN600) <input type="checkbox"/> PE Smartstream Mini Pit <input type="checkbox"/> Iplex Ezipit <input type="checkbox"/> SMS <input type="checkbox"/> Rehau <input type="checkbox"/> Other Approved-..... |
| 8 | <p>Water Main Pipe to be used:</p> <input type="checkbox"/> DICL PN35 <input type="checkbox"/> PVC-O PN16 SN10 MR S 450 <input type="checkbox"/> PE100 PN16 SDR11 <input type="checkbox"/> Water Main Road Crossings (Min. PN20) -..... <input type="checkbox"/> Other Approved - |
| 9 | <p>Water Main Pipe embedment:</p> <input type="checkbox"/> Sand (as per Table G3 of AS/NZS 2566.2) DI pipes only. <input type="checkbox"/> 5/7mm washed screenings nominal single sized aggregate (as per WSA PS-351). <input type="checkbox"/> Other Approved - |
| 10 | <p>Live Connection - Locate Levels of Existing Water and Sewerage Infrastructure: Levels of existing water/sewer services and connection points to be verified prior to commencement of construction</p> |
| 11 | <p><input type="checkbox"/> A Construction Certifier <i>must not</i> also be the construction supervisor for the contractor on the construction site for which he is the appointed Construction Certifier.</p> <p>Construction Certifiers Inspections Audit Schedule & Records: <input type="checkbox"/></p> <p>All records should include enough photographic evidence to support the confirmation of code compliance of works inspected.</p> <p>1. First two weeks of Sewer construction works (for new contractor relationships):</p> <ul style="list-style-type: none"> • Daily or twice daily inspection of contractor works, record evidence of works inspected, and rectification instructions issued; • Where rectification instructions are issued, also inspect and record follow up of rectified works once satisfactorily completed. <p>2. First two (2) weeks of Water Supply construction works (for new contractor relationships):</p> <ul style="list-style-type: none"> • Daily or twice daily inspection of contractor works, record evidence of works inspected, and rectification instructions issued; • Where rectification instructions are issued, also inspect and record follow up of rectified works once satisfactorily completed. <p>3. Regular Water Supply and Sewerage construction inspections:</p> <p>Materials: Record pipes delivered and stored on site are compliant (e.g., pipe material, class and storage method) Record evidence of works inspected, and rectification instructions issued. Where rectification instructions are issued, also inspect and record follow up of rectified works once satisfactorily completed.</p> |

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| | <p>Sewerage:</p> <ul style="list-style-type: none"> Record minimum one (1) inspection of each line (including between Maintenance structures and bends – where line to bend is greater than 30m) to demonstrate correct bedding, bedding placement, marker tape and alignment; Record of each maintenance structure to demonstrate correct installation of each component (e.g., MH bases, lifts, converter slab, MS installation and screening backfill); Record of each property connection branch (prior to backfill) demonstrating correct installation of each component; Record of each trench stop location excavated and then after trench stop placement. <p>Live Connection: Record Live connection works (where authorised to be completed under inspection of Construction Certifier).</p> <p>Water Supply:</p> <ul style="list-style-type: none"> Record minimum one (1) inspection of each line between fittings to demonstrate correct bedding, bedding placement, marker tape and alignment; Record of each fitting wrapping until satisfied correct fitting wrapping technique is adequate and then random spot inspection of fitting wrapping until works complete; Record of each thrust block location excavated and then after concrete poured. Review each hydrant location with contractor to ensure no design error has occurred for 80m hydrant spacing requirements; Record of each poly water service installation until satisfied installation technique is adequate and then random spot inspection of water services until works complete. <p>3rd Party Photographs: Where inspection and photos are being undertaken by a third party on behalf of the Construction Certifier, the following rules apply:</p> <ul style="list-style-type: none"> No more than 10% of the inspections and photos can be recorded by the responsible person on the construction site i.e., Construction Supervisor; The Construction Certifier must review the inspection records and photos by a third party and any works that are not to standard must be rectified. The recording of the rectification issue and the rectified result must be included in the inspection records; All inspection records and photos from a third party must be declared on the inspection report. <p><input type="checkbox"/> Other</p> |
| 12 | <p>Major Certifies Audit of Construction Inspection Records:</p> <p><input type="checkbox"/> Construction Certifier to supply Major Certifier with the Inspection Records no less than once a week to enable the Major Certifier Audit.</p> <p><input type="checkbox"/> Other -</p> <p>Pipes and structures outside SEQ code tolerances (i.e., +10mm/-50mm). Certifier must, rectify, or obtain Unitywater's acceptance of the SEQ code non-compliant construction tolerances prior to lodging the CofC application. The appropriate format in which the Registered Certifier must communicate construction non-conformances with the approved design or the SEQ Code is by means of a Non-Conformance Report. An example template for a Non-Conformance Report available on Unitywaters webpage.</p> |
| 13 | <p>Private Works Quote: Water/Sewer connection, cut-ins, modification of existing water/sewer systems (live works) and Water Meter installation require a quote from Unitywater Private Works to enable the works to be completed. Complete the "Water supply and sewerage services private works application" form. Attach approved design drawings and all relevant information to enable Unitywater to quote the job correctly, and email to privateworks@unitywater.com</p> <p>Live water connection (and sewer connection where being done by Private Works) will only occur after the On Maintenance process is finalised and a Certificate of Completion is issued to the certifier. Water main bacterial testing must await confirmation that the Certificate of Completion has been issued.</p> <ul style="list-style-type: none"> Provide a copy of the Private Work quote letter and receipt of payment in the A&C Certificate of Completion and On-Maintenance submission, Infrastructure charges must be paid prior to works commencing, Provide a copy of Private Works Quote Letter and receipt of payment to the Major Certifier, Private works quotes are valid for 90 days. Once payment has been made, the works need to be site ready, have On Maintenance and Certificate of Completion issued (ICN paid) and works authorised for connection by the Major Certifier to Private Works within 60 days. Requote will be needed if not within timeframe. |

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| 14 | <p>Live Sewer Connections:</p> <p><input type="checkbox"/> Contractor</p> <p>Unitywater will require the developer's contractor to undertake the <i>minor</i> sewerage connection works under the inspection of the Construction Certifier where:</p> <p>I. The connection works does not involve 'plugging' Unitywater's sewers or interruption to existing flows in the network; or</p> <p>II. If 'plugging' or interruption to existing flows is necessary, then the connection:</p> <ol style="list-style-type: none"> a) Does not involve an upstream pumped discharge flow; b) Is not on a pipe diameter exceeding 225mm; and c) The timeframe for plugging or interruption to the existing flows must not exceed 2 hours <p>Live sewerage connection works to be undertaken by the developer's contractor under the inspection of the Construction Certifier. The Planned Network Intervention (PNI) process as detailed in the Unitywater Accreditation and Certification Manual section 5.1.3 - On-Maintenance Acceptance and Sewerage Connection must be followed.</p> <p><input type="checkbox"/> Is the approved Live connection methodology in accordance with Unitywater's current requirements. If not, submit an Amendment Application to Unitywater for approval.</p> <p><input type="checkbox"/> Unitywater Private Works:</p> <p>Where it has been determined that Unitywater will undertake the sewer connection works under a Private Works Quote, there is to be no request for Unitywater inspection of the sewer connection works, as the actual construction of sewer connection is being undertaken by Unitywater.</p> |
| 15 | <p>On-Maintenance Acceptance Process</p> <p>Prior to the issuing of the Certificate of Completion, all water supply and sewerage construction works must be accepted "On-Maintenance". Following confirmation from the Construction Certifier and agreement from the Major Connections Certifier that all items as outlined in the Unitywater Accreditation and Certification Manual are satisfactory, the Major Connections Certifier will complete the A&C On-Maintenance or Early Connection of Works Inspection Notification (<i>online form</i>) and submit the form at least seven (7) business days before the intended on-maintenance inspection date.</p> |
| 16 | <p>As-Constructed Information Package:</p> <p>The as-constructed drawings for all water supply and sewerage infrastructure that will be provided to Unitywater as contributed assets must be prepared in accordance with the SEQ Water Supply and Sewerage Design and Construction Code Asset Information Specification. The relevant formats for the As Constructed documents must align with Appendix B – Checklist of Typical Final Handover Deliverables of the SEQ Water Supply and Sewerage Design and Construction Code Asset Information Specification.</p> <p>As-Constructed Package files:</p> <p>The As- Constructed Information Package will include the following files in accordance with the SEQ WS&S D&C Code Asset Information Specification:</p> <ol style="list-style-type: none"> 1. Completed Appendix B; 2. RPEQ certified (Unitywater Stamped) design redline mark-ups in adobe .pdf format; all sheets and all long sections. 3. ADAC XML data file; 4. RPEQ Certified As-Constructed drawings; <ol style="list-style-type: none"> a. AutoCAD .dwg drawing file; b. RPEQ signed .pdf file. |
| 17 | <p>Unitywater Drawing Number:</p> <p>A Unitywater drawing template with applicable Unitywater drawing number to be used as part of the as- constructed package.</p> |
| 18 | <p>All email correspondence for the project shall include the Unitywater Development Approval Application Number within the subject title.</p> |
| 19 | <p>Maintenance Bond:</p> <p>A receipt or acknowledgment from Unitywater for the provision of a maintenance bond of five percent (5%) of the value of the works or \$6,000 for sewerage component of the works and \$4,000 for the water component of the works (whichever is the greater). The maintenance bond can be in the form of EFT, bank cheque or an unconditional bank guarantee (refer to Unitywater's Bank Guarantee Pro forma).</p> <p>Unitywater will hold the maintenance bond as security. The bond will be returned after the Off-Maintenance Certificate has been issued.</p> |

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| 20 | <p>Easements:</p> <p>Where an easement is required by the SEQ Code, relevant landowner or by an approval condition, the certification package prepared by the Registered Certifier must include the standard condition requiring easements to be registered by the applicant in accordance with the SEQ Code prior to the issue of the Certificate of Completion.</p> <p>Easement terms must be Unitywater's most current registered dealing held by the Department of Natural Resources Mines and Energy and must not be altered or amended.</p> <p>The Major Connections Certifier will review the survey plan and ensure all required easements are correctly shown and located in accordance with the SEQ Code. The Major Connections Certifier must then provide easement confirmation to Unitywater's Property Section with the required supporting documents (e.g., Survey Plan, Form 9 etc.) to allow Unitywater to execute the easement documents. This can be done directly by the Major Connections Certifier or the Major Connections Certifier may provide the easement confirmation to the Developer or Developer's surveyor to include in the lodgement of required documents to Unitywater's Property Section for Unitywater to execute the easement documents.</p> <p>The easement confirmation must include the statement and details as outlined in the A&C Manual.</p> |
| 21 | <p>Ensure all Certifiers, Contractors and Sub-Contractors have read and understand the Unitywater A&C – Construction Notes (<i>downloadable from the Unitywater Website</i>). This includes all current Unitywater directives on subjects such as PE Welding, PE Lined Maintenance Hole Construction, NuSEWER Maintenance Hole Construction, Pipe Penetration into PE Lined Maintenance Holes, DICL RR fittings construction and wrapping.</p> <p><input type="checkbox"/> Yes <input type="checkbox"/> No</p> |

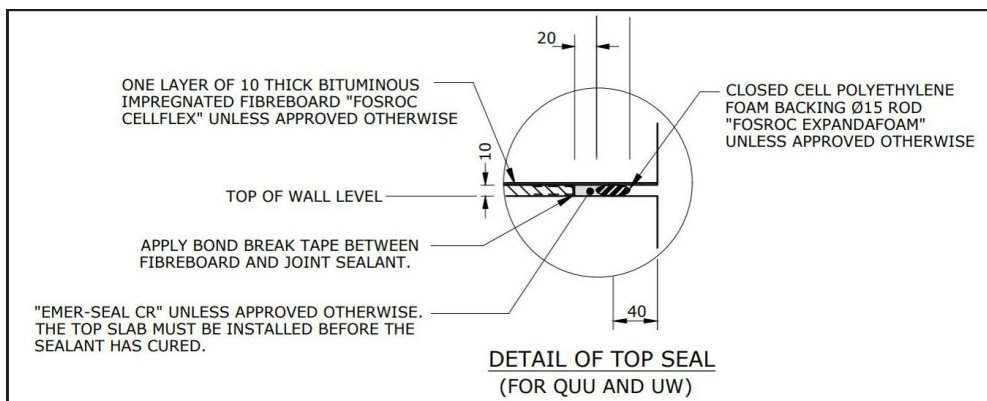
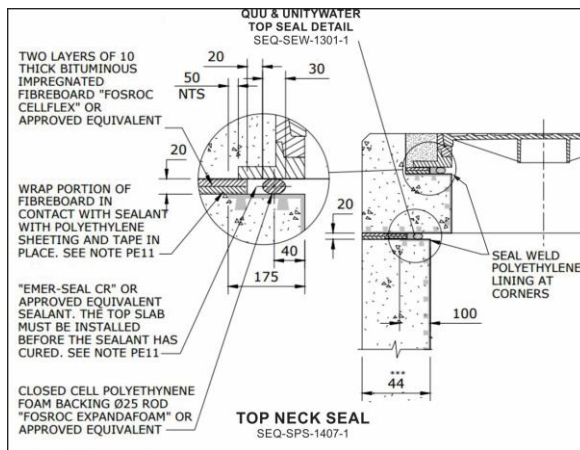
GENERAL CONSTRUCTION NOTES

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| G1 | Construction to comply with Unitywater's Accreditation and Certification Manual, Connections Policy, Specifications and the South East Queensland Water Supply and Sewerage Design and Construction Code and is not negotiable. |
| G2 | All work to be undertaken in accordance with relevant Workplace Health and Safety Standards, including confined space entry, trench shoring etc. |
| G3 | Levels of existing water/sewer services and connection points to be verified prior to commencing construction. |

CURRENT CONSTRUCTION DIRECTIVES

D1 **NuSewer PE lined converter slab installation requirement (where the MH is not being fully lined)**

Unitywater have relaxed the SEQ code requirement to install PE Lined converter slabs when installing a NuSewer Maintenance hole but if a PE lined converter slab is installed onto a NuSewer or Riggs maintenance hole, it shall fully comply with the SEQ code standards, including the standard drawing SEQ-SEW-1301-1's QUU and Unitywater Top Seal Detail and the SEQ-SPS-1407-1's Top Seal Detail. The PE lining in the neck shall be welded to the PE lining installed under the MH cover frame. The installation of Megapoxy, Sikaflex or equivalent at the top of the maintenance hole neck will not be accepted by Unitywater.



This directive was released in the uCertify Newsletter – August 2020 Edition 10

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| D2 | <p><u>PE WELD TESTING</u></p> <p>All Welding and testing of PE pipes (water and Sewer) shall comply with the following codes and specifications:</p> <ul style="list-style-type: none"> • WSAA Gravity Sewer Code WSA02 SEQ Edition – Version 2.1 (September 2021) • WSA01_2004_3_1 - Polyethylene Pipeline Code • PIPA POP001 Electrofusion Jointing of PE Pipes and Fittings for Pressure Applications Issue 8.0 • PIPA POP003 Butt Fusion Jointing of PE Pipes and Fittings Recommended Parameters Issue 7.0 • PIPA POP014 Assessment of Polyethylene Welds Issue 1.1 • Pr9875 Specification for non-pressure pipeline construction; and • Pr9904 specification for pressure pipe construction. <p>Regardless of the jointing methodology undertaken by the contractor, testing of the welds should be integral to the contractor's QA system and clearly identified within the ITP. Unitywater expect the above testing of the PE welds to be submitted with the On-Maintenance/Certificate of Completion Submissions.</p> <p>Butt weld jointing is Unitywater's "preferred" weld jointing type (Pr9904 - Specification for Pressure Pipe Construction & Pr9875 - Specification for Non-Pressure Pipeline Construction). All electrofusion Welding to be approved by Unitywater.</p> |
| D3 | <p><u>PE LINED MAINTENANCE HOLE</u></p> <p>The PE Lining of all maintenance holes shall comply with following code and standard drawings:</p> <ul style="list-style-type: none"> • WSAA Gravity Sewer Code WSA02 SEQ Edition – Version 2.1 (September 2021) • SEQ-SEW-1101-6 Version A • SEQ-SEW-1307-1 Version C • SEQ-SPS-1407-1 Version A <p>The top seal (Wall to Converter slab Seal) & top neck seal (under the cover frame) shall comply WSAA Gravity Sewer Code WSA02 SEQ Edition – Version 2.1 (September 2021) Section 17.2.6. Internal coating of concrete maintenance holes - For PE lining systems - These shall be installed in accordance with 17.2.5 Concreting for thermoplastics-lined works and as detailed in the SEQ-SPS-1407-1 drawing set, which is part of the Sewage Pumping Station Code.</p> |
| D4 | <p><u>NuSEWER MAINTENANCE HOLE</u></p> <p>Where the trigger for PE lined MH occurs, the PE Lining of all NuSewer maintenance holes shall comply with following code and standard drawings:</p> <ul style="list-style-type: none"> • WSAA Gravity Sewer Code WSA02 SEQ Edition – Version 2.1 (September 2021) • SEQ-SEW-1301 series • SEQ-SEW-1307-1 Version B • SEQ-SEW-1308-1 Version C • SEQ-SPS-1407-1 Version A <p>The top seal (Wall to Converter slab Seal) & top neck seal (under the cover frame) shall comply WSAA Gravity Sewer Code WSA01 Section 17.2.6. Internal Coating of Concrete maintenance holes - For PE lining systems - These shall be installed in accordance with 17.2.5 Concreting for thermoplastics-lined works and as detailed in the SEQ-SPS-1407-1 drawing set, which is part of the Sewage Pumping Station Code.</p> |
| D5 | <p><u>PE LINED MAINTENANCE HOLES PIPE WALL PENTRATION</u></p> <p>If not demonstrated via a detail on the approved plan the detail shall be prepared and approved by Unitywater until such time as Unitywater have a standard detail available. (SEQ-SEW-1307-4)</p> |
| D6 | <p><u>HYDRANTS & SPACING</u></p> <p>Hydrant Spacing on reticulation water mains shall strictly comply with the following requirements (SEQ-WAT-1101-4):</p> <ol style="list-style-type: none"> a) Every property shall have a hydrant within 40 m of its front boundary, b) Hydrants shall be installed at a maximum spacing of 80 m, c) Hydrants shall be located in line with the side real property boundary, d) Hydrants shall be installed at crests, low points and other points determined by the SEQ-SP for operational purposes. <p>In urban areas, every property, other than properties that are part of a community title scheme, shall have a hydrant within 90 m of the furthest point of any existing, proposed or future Class 1 buildings, measured along the street to the property entrance and around the perimeter of the building (where this requirement cannot be met from hydrants on SEQ-SP mains in public streets, a private fire main must be provided on the property); (SEQ-WAT-1101-4)</p> <p>Hydrants must be installed in accordance with SEQ-WAT-1302-1. The hydrants shall comply with but not limited to the following requirements at both the on-maintenance and off maintenance inspections.</p> <ol style="list-style-type: none"> a) Top of hydrant lugs/claws to be a maximum 225mm and minimum 100mm in depth, b) Hydrants shall be located in line (+/- 200 mm) with the side real property boundary, |

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| | <p>c) Hydrant must be centralised within box, d) Blue marker tape must be accessible from within the hydrant box, e) Hydrants and hydrant boxes to be void of mud and dirt, f) Hydrants are to be installed so that the lugs/claws are either side of the main.</p> <p>Hydrants at the end of lines shall be installed so that the lugs/claws and lid are at 90° to the main.</p> <p>Hydrants identification in accordance with SEQ-WAT-1300-1.</p> <ul style="list-style-type: none"> • Blue Bi-Directional Raised Reflective Pavement marker (RRPM), • Golden Yellow (AS2700 Y14) Thermoplastic Reflective Direction Arrow. <p>200m wide Golden Yellow (AS2700 Y14) Thermoplastic Kerb Marking Brass (only) “HP” marker with inscribed (8mm high) distance.</p> |
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| Sewer Main Construction | |
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| SA | Construction Certifier must be notified to inspect installation of all sewer property connections. House connections: Minimum 0.5m into property Minimum 1m off sewer line (SEQ-SEW-1106-2) Minimum 0.6m and Maximum 1.5m deep unless otherwise approved. (SEQ-SEW-1104-1 & SEQ-SEW-1106-1) |
| SB | Minimum cover of sewer mains achieved as per SEQ-SEW-1200-2 |
| SC | The invert of all ends of all sewer lines and house connection are to be marked by single length, 2m long, diameter 40mm, orange, PVC conduit in accordance with SEQ-SEW-1106-2. |
| SD | All SEQ Service Providers accept only Plain Wall uPVC for RIGGs non-pressure sewerage systems. Other type of uPVC such as foam core sandwich and solid core sandwich are not accepted (IPAM List). Ensure all fittings such as long radius bends, molded oblique junctions, bends, inspection I.O junctions, shorts, sanded shorts, maintenance shaft rises, and maintenance shaft connections have been constructed from Plain Wall uPVC. |
| SE | All RIGGs pipes and fittings to rubber ringer jointed; glue joints are not accepted. |
| SF | Pre-cast concrete maintenance holes are not acceptable in the following cases: <ul style="list-style-type: none"> • NUSEWERS (PE) systems. • Deeper sewer systems - greater than 6 meters (SEQ-SEW-1300-1 Note 1) • In areas subject to Q100 flooding (SEQ-SEW-1300-1 Note 9) • In areas where there is a risk of surcharge (SEQ-SEW-1300-1 Note 9) • in water charged ground (SEQ-SEW-1300-1 Note 9) • in conjunction with bolt down lids (SEQ-SEW-1300-1 Note 9) • in sulphide control sewer maintenance hole (e.g. rising main receiving maintenance holes) (SEQ-SEW-1307-2&3) • in areas with unsuitable soil conditions. |
| SG | Insitu and pre-cast concrete sewer MH internal or external joints are NOT to be bagged or repaired, unless approved prior by Unitywater in accordance with SEQ-SEW-1300-1. No epoxy to be used within pre-cast maintenance hole internal or external joints. |
| SH | Pre-cast concrete sewer MH - Apply a 150mm wide external bitumastic seal tape (DENZO) over a coat of manufacturer’s recommended prime seal to all external joints in accordance with SEQ-SEW-1300-1. |
| SI | PE sewer pipe cannot be connected to pre-Cast maintenance hole bases unless specific special detail has been approved by Unitywater. |
| SJ | Maintenance shaft risers are minimum DN300 diameter. |
| SK | Rubber bungs are NOT to be used in maintenance shaft caps for both NU-sewer and for RIGGS. For UW, the riser cap shall comprise of a PVC bayonet cap with RRJ seal and a PVC RRJ socket (SEQ-SEW-1308-1 & SEQ-SEW-1315-1). |
| SL | All uPVC house connection branch fittings such as molded oblique junctions, bends, inspection I.O. junctions and maintenance shaft connections shall be plain wall uPVC, rubber ringed and fibreglass reinforced in accordance with SEQ-SEW-1104-1 & 1105-1. |
| SM | Detectable cream marker tape “SEWER” shall be provided either above the embedment zone of the sewer main or 1000mm below the F.S.L., whichever is closest to F.S.L. (SEQ-SEW-1201-1) |
| SN | Vacuum testing of all sewer mains and maintenance holes, and pressure testing of rising mains to be undertaken by a NATA accredited testing agent. Major Certifier & Construction Certifier |

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| | <p>must be notified of scheduled test time. Refer to “Unitywater Testing Requirements Summary”. maintenance holes and sewers are to be tested after all earthworks have been completed and large machinery has been removed from site.</p> |
| SO | <p>CCTV of all sewers and accompanying independent consulting RPEQ report and certification to be forwarded to Unitywater with both the on and off-maintenance application submissions. Unitywater’s CCTV Review Technical Specification is to be used and followed for the RPEQ and contractor review of the CCTV survey information. <u>Unitywater requests that this is done no more than two (2) months prior to commissioning, to provide our team with a true representation of the condition of the asset at the time of handover. This is consistent with the Off Maintenance (OFM) CCTV Survey requirements outlined in the A&C Manual, which is two months prior to the notification for an OFM inspection.</u></p> <p>All CCTV inspections in general shall be carried out in accordance with the latest version of the WSAA Conduit Inspection Reporting Code of Australia WSA 05.</p> <p>Maintenance holes and sewers are to be CCTV surveyed after all earthworks have been completed and large machinery has been removed from site.</p> <p>The CCTV surveys shall comply with but not limited to the following requirements:</p> <ol style="list-style-type: none"> a) The CCTV survey shall be carried out from the centre of the start maintenance structure to the centre of the finish maintenance structure. Each maintenance structure shall be fully scanned using the pan/tilt and zoom functions of the CCTV camera and the video footage recorded as part of the overall CCTV survey. b) All pipe joints shall be scanned by a 360-degree pan. <p>Refer to “Unitywater Testing Requirements Summary” for the general CCTV requirements. All the requirements shall be complied with.</p> <p>The operator shall use Appendix F to highlight all unacceptable defects in the CCTV report.</p> |
| SP | <p>Proving Tool (Ovality) testing of all sewer lines to be undertaken by NATA accredited testing agent. Refer to attached “Unitywater Testing Requirements Summary”. All the requirements shall be complied with. Do not conduct deflection testing until at least 14 days after completion of placement and compaction of trench and embedment fill material and not before all earthworks have been completed and large machinery has been removed from site.</p> |
| SQ | <p>Compaction test results of all embedment, trench fill and site filling works in accordance with WSAA requirements. Please take special note of trafficable testing requirements. Refer to “Unitywater Testing Requirements Summary”. All requirements shall be complied with. Please take note that all maintenance holes & maintenance shafts require testing within 300mm.</p> |

Water Main Construction

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| WA | <p>All water main fittings are to be free from damage and free from damage coatings, damaged FBE fittings shall be discarded and removed from site. fusion powder coated.</p> |
| WB | <p>All new water mains shall start and finish with temporary hydrants. The temporary hydrants will be removed by Unitywater when completing the live connection and left for contractor to remove from site. (SEQ-WAT-1303-1)</p> |
| WC | <p>Water service connections to use pre-tapped connectors (i.e. Ready Taps) in accordance with SEQ-WAT-1108-2. Tapping bands are not an approved product and are not to be installed on water mains.</p> |
| WD | <p>Approved water meters in accordance with Appendix A of the ‘South East Queensland Water Supply and Sewerage Design and Construction Code’ to be provided to each lot in accordance with SEQ-WAT-1108 series drawings.</p> <p>Water meter register with lot No’s and their associated water meter No’s is to be forwarded to Unitywater as part of the on-maintenance application submissions.</p> <p>All water meters are to have a Unitywater coded number as per Unitywater’s Pr10068 Specification for Water Meters (All Unitywater meters numbers will begin with a letter “U”).</p> |
| WE | <p>Water meters shall be installed in accordance with SEQ-WAT-1108-1 to 3.</p> <p>The water meters construction shall comply with but not limited to the following requirements at both the on-maintenance and off-maintenance inspections.</p> <ol style="list-style-type: none"> a) Ball valve must be lockable and unobstructed within the box. Lockable ball valve, water meter and meter box to be approved fitting as per SEQ code IPAM List. b) Ball valve must be 500mm from front boundary and 300 from side boundary. c) Meter box lid shall have nonslip pattern, lettering cast into lid indicating "water meter" and be black in colour. d) Meter box lid to be left so that it sits flush with turf surround. |

| | <ul style="list-style-type: none"> e) Turf surround to extend a minimum of 600 mm on all sides of meter box. f) Geotextile fabric to be laid around and underneath meter box taped each side & around pipe to prevent ingress of sand, soil, and mud. g) Water meter box must be void of all sand, soil, and mud at on maintenance inspection. h) Water meters must be clean of all mud and facing straight upwards. i) Water meter components to sit high, level & centered within the box with a min. 20mm air gap between the bottom of the water meter and bottom of the water meter box. | | | | | | | | | | | | |
|----------------------------|--|----------|---------|---------|----------------------------|-----|------|------------------------|-----|------|---------|------|------|
| WF | <p>Water Service Pipes shall be installed in accordance with SEQ-WAT-1108-1 to 3: The Water Service Pipes shall comply with but not limited to the following requirements.</p> <ul style="list-style-type: none"> a) Water service pipework shall be PE100 PN16 black polyethylene pipe with blue stripe in accordance with AS/NZS 4130. b) DN25 PE100 PN16 pipe with blue stripe for service < 20 m long. c) DN32 PE100 PN16 pipe with blue stripe for service > 20 m long. d) Any pipework showing signs of kinking or strain from over bending will be rejected. e) All connections to polyethylene pipe to be approved brass or plastic mechanical fittings. f) PE100 pipe shall be laid with 100 mm minimum surround of sand or approved granular material. g) PE100 pipe must be continuous without joints. No Joints permitted between the ready tap/tapping saddles and water meters. | | | | | | | | | | | | |
| WG | <ul style="list-style-type: none"> • Detectable blue marker tape, thrust blocks and strapping of valves required to all mains in accordance with SEQ-WAT-1206-1 | | | | | | | | | | | | |
| WH | <p>Minimum cover to water main in accordance with SEQ-WAT-1200-2:</p> <table border="1"> <thead> <tr> <th>Location</th> <th><=150NB</th> <th>>=200NB</th> </tr> </thead> <tbody> <tr> <td>Non-roadways /Sealed Roads</td> <td>600</td> <td>1000</td> </tr> <tr> <td>Major Roads/embankment</td> <td>750</td> <td>1000</td> </tr> <tr> <td>Freeway</td> <td>1200</td> <td>1200</td> </tr> </tbody> </table> | Location | <=150NB | >=200NB | Non-roadways /Sealed Roads | 600 | 1000 | Major Roads/embankment | 750 | 1000 | Freeway | 1200 | 1200 |
| Location | <=150NB | >=200NB | | | | | | | | | | | |
| Non-roadways /Sealed Roads | 600 | 1000 | | | | | | | | | | | |
| Major Roads/embankment | 750 | 1000 | | | | | | | | | | | |
| Freeway | 1200 | 1200 | | | | | | | | | | | |
| WI | No bending or curving of oPVC pipes as per 5.4.14 of WSA03. | | | | | | | | | | | | |
| WJ | Polythene sleeving of D.I. pipe and fittings as per manufacturer's specifications. Century Plus DI Pipe Installation (Mandatory for Water Main construction) is mandatory training for pipe layers. | | | | | | | | | | | | |
| WK | <p>Maximum 1° deflection out of a RRJ oPVC spigot joint or 105mm over 6 metres (15.2.2 WSA03). Maximum 5° deflection out of DICL fittings or 502mm over 6 metres.</p> <p>Unitywater prefer the use of DICL RRJ Connectors when there is a requirement to deflect pipes within joints.</p> <p>Deflection out of RRJ oPVC spigot joints requires an approved certified design, detailing lengths and offset distances. Pipes deflected without this approved certified design will be required to be removed from the trench.</p> | | | | | | | | | | | | |
| WL | Water mains (future extensions) must be constructed and terminated in accordance with SEQ-WAT-1303-1. | | | | | | | | | | | | |
| WM | <p>Valve must be installed in accordance with SEQ-WAT-1301-1. The valves shall comply with but not limited to the following requirements at both the on-maintenance and off maintenance inspections:</p> <ul style="list-style-type: none"> • Top of valve spindle to be a maximum 225mm and minimum 100mm from FSL. • Valves must be centralised within box. • Blue marker tape can be installed such that it is accessible from within the valve box. • Valve and valve box to be void of mud and dirt. | | | | | | | | | | | | |
| WN | <p>Valves identification in accordance with SEQ-WAT-1300-1:</p> <ul style="list-style-type: none"> • White (AS2700 Y35) thermoplastic reflective "V" and direction arrow. • 200m wide white (AS2700 Y35) thermoplastic kerb marking. • Brass (only) "V" kerb marker. | | | | | | | | | | | | |
| WO | Pavement marking paint shall be of an approved thermoplastic reflective paint, incorporating applied glass beads, manufactured, and applied as per the requirements of Main Roads MRTS45. Refer to attached " | | | | | | | | | | | | |
| WP | Pressure testing of reticulation water mains to 1200 kPa, as close as practicable to the lowest point of the main by NATA accredited testing agent at completion of all water main works. Refer to "Unitywater Testing Requirements Summary". | | | | | | | | | | | | |

“Unitywater Testing Requirements Summary”

Trench Backfill Compaction Testing

(Water Supply (225mm and greater) and Sewerage)

- a) The consulting engineer shall be responsible for all compaction testing and shall arrange for the testing to be carried out by a NATA certified Test Laboratory. Standard compaction tests to be used.
- b) Prior to commencing work the the consulting engineer shall ensure a test plan showing the correct number of test locations, determination of number of tests per location (based on trench depth) has been prepared and reviewed as correct by the consulting engineer.
- c) The Laboratory shall randomly select test locations in each zone. The road authority supervisor may direct the Laboratory to undertake additional tests in any zone. The test locations shall be uniformly distributed over the works.
- d) Testing shall not be clustered within a zone or at boundaries of a zone. In deep trenches where more than 1 layer is to be tested, the test locations shall, where practicable, be staggered from those layers above or below by at least 5 m for water mains and 2 m for water services.

Trafficable Areas: “Defined as

- a) The full width of any existing or proposed road carriageway plus shoulders and extending to 1 m beyond the shoulders or kerbs.
 - b) The full width of any property access driveway and extending 1 m either side.
 - c) The full length of any constructed footway including, but not limited to, concrete, asphalt and crushed rock pavements.
 - d) The full width of any median strip.
 - e) Any other areas subject to vehicular traffic.
- Conduct one test for each 300mm layer of fill above bedding layer for each:
 - 300m² of trench backfill area or part thereof for water mains
 - 50 lineal metres for sewer mains

Non-Trafficable Areas:

- Conduct one test for each 900mm layer of fill for each:
 - 1200m² of trench backfill area or part thereof for water mains
 - 100 lineal metres for sewer mains

Maintenance Structures:

- Conduct one test within each 1m layer depth within 300 mm of each maintenance hole/maintenance shaft.

General Notes:

- Dynamic Cone Penetrometer Testing (DCP) is not an acceptable test method

Compaction Required:

| Material Type | Test Method | Minimum Value (%) | Minimum Value (%) |
|---------------|--|---|---|
| | | Trafficable Areas – Trench Fill & Embedment | Non-Trafficable Areas – Trench Fill & Embedment |
| Non-Cohesive | Density Index (ID) AS 1289.5.6.1 | 70 | 60 |
| Cohesive | Dry Density Ratio or Hilf Density Ratio (Appropriate part of AS 1289) | 95 | 90 |

NOTE: Graded gravels and sands having fines (silts and clays) greater than 5% shall have their compaction dry density ratio test method

Vacuum Testing (Sewer):

Maintenance holes and sewers are not to be tested or CCTV'd before all earthworks have been completed and large machinery has been removed from site.

Maintenance holes (Water drop testing is not acceptable)

- Apply –34 kPa and record time to drop to –30 kPa.

Maximum time allowed for 1050mm dia. maintenance holes

| Depth | Time in Seconds |
|------------|-----------------|
| 0 – 2.4m | 17 |
| 2.4 – 3.0m | 21 |
| 3.0 – 3.7m | 25 |
| 3.7 – 4.3m | 30 |
| 4.3 – 4.5m | 34 |
| 4.5 – 5.5m | 38 |
| 5.5 – 6.1m | 42 |

Sewer pipe (Pressure testing is not acceptable):

- Apply -27 kPa for 3minutes and allow to stabilise. Once stabilised establish -23.6kpa and record time and drop (not greater than 7kpa).

Minimum time to record vacuum drop:

| Length | 50 m | 100 m | 150 m | 200 m | 250 m | 300 m |
|-------------------|--------|--------|---------|---------|---------|--------|
| Dia. | | | | | | |
| 100mm dia. | 2 min. | 2 min. | 2 min.. | 2 min. | 3 min. | 3 min |
| 150mm dia. | 3 min. | 3 min. | 3 min. | 5 min. | 6 min | 6 min |
| 225mm dia. | 4 min. | 5 min. | 8 min. | 10 min. | 13 min. | 15 min |
| 300mm dia. | 6 min. | 9 min. | 14 min. | 18 min. | 23 min. | 29 min |

* Timing in table above shall not commence until after initial 3min stabilising period is completed.

Deflection (Ovality) Testing (Sewer):

All flexible sewer pipes are to be deflection tested in accordance with WSAA Sewerage Code of Australia

Do not conduct deflection testing until at least 14 days after completion of placement and compaction of trench and embankment fill material.

Test sewers in sections from maintenance structure (IS, MH, MC, MS or TMS) to maintenance structure.

Pressure Testing (Water):

Shall be done after water services are connected and electrical conduits installed.

- All dead ends lines are to be tested. This may require temporary hydrants or tapping bands. Temporary tapping bands to be cut off when connection to live main occurs.
- Preliminary pressurise the mains to 75% of the test pressure for a minimum of twelve (12) hours.
- Apply test pressure (1200kPa) at the highest point of the water main for four (4) hours.
- Ideally there should be no pressure loss after four (4) hours or alternatively as per below

Volume of makeup water after a 3 hour test is to be not more than:

| Length | 50 m. | 100 m. | 200 m. | 300 m. | 400 m. |
|-------------|--------|--------|--------|--------|--------|
| Dia. | | | | | |
| 100 mm dia. | 0.27 L | 0.55 L | 1.09 L | 1.64 L | 2.18 L |
| 150 mm dia. | 0.41 L | 0.82 L | 1.64 L | 2.46 L | 3.28 L |
| 200 mm dia. | 0.55 L | 1.09 L | 2.18 L | 3.28 L | 4.37 L |
| 250 mm dia. | 0.68 L | 1.36 L | 2.73 L | 4.10 L | 5.46 L |
| 300 mm dia. | 0.82 L | 1.64 L | 3.28 L | 4.91 L | 6.55 L |
| 375 mm dia. | 1.02 L | 2.05 L | 4.09 L | 6.14 L | 8.19 L |
| 450 mm dia. | 1.23 L | 2.46 L | 4.91 L | 7.37 L | 9.83 L |

For PE pipe, conduct and report testing in accordance with Section 6 of AS/NZS 2566.2:2002 using the test method appropriate for the pipe material as nominated in the AS/NZS standard i.e. Clause 6.3.4.2 (method M5) for PE pipes.

M5 Constant pressure Test (water loss method) for Visco -Elastic Pressure Pipelines. This test is applicable to PE pressure pipelines.

Chlorination/Disinfection and Bacteriological Testing

Chlorination/disinfection and bacteriological testing **must** be undertaken in accordance with Unitywater’s “Procedure for Managing Water Quality during Mains Commissioning”.

Water Quality Acceptance Criteria – New Mains

| Water Quality Parameters | Units | Water Mains - Quality Limits |
|---------------------------|-----------|------------------------------|
| PH | | >6.5 – <9.2 |
| Apparent Colour | PCU | <15 |
| Turbidity | NTU | <5 |
| EC | uS/cm | <1250 |
| Free Chlorine Residual | mg/L | <3mg/L |
| Total Chlorine Residual | mg/L | <3mg/L |
| E.coli. Count | cfu/100mL | <1 |
| Total Coliforms | cfu/100ml | <1 OR <10 ¹ |
| Heterotrophic Plate Count | Cfu/mL | <100 |

*Sources: Whilst the quoted water quality criteria are compliant with SEQ WSA03 Water Supply Code of Australia and guidance provided in the Australian Drinking Water Guidelines 2011 (ADWG), some minor modifications have been included to simplify this table for easier use as well as accommodate Unitywater specific requirements

Note1: <10 cfu/100mL Total Coliforms will be accepted where total chlorine is greater than 0.5mg/L.

CCTV Inspection Requirements:

Maintenance holes and sewers are not to be tested or CCTV'd before all earthworks have been completed and large machinery has been removed from site.

All sewers and maintenance structures shall be inspected by CCTV after all backfilling operations have been satisfactory completed and all junctions are installed. This inspection is required to ensure that the pipe is without any construction defects, the pipe has no internal flow obstructions and all approved junctions are in right location. Further the inspection will verify the information provided with the 'As Constructed' drawings. ***Unitywater requests that this is done no more than two (2) months prior to commissioning, to provide our team with a true representation of the condition of the asset at the time of handover. This is consistent with the Off Maintenance (OFM) CCTV Survey requirements outlined in the A&C Manual, which is two months prior to the notification for an OFM inspection.***

The sewers and maintenance structures shall be cleaned prior to the CCTV inspection.

All CCTV inspections in general shall be carried out in accordance with the latest version of the WSAA Conduit Inspection Reporting Code of Australia WSA 05. The operator shall use Appendix F to highlight all unacceptable defects in the CCTV report.

In addition to the WSAA WSA 05 requirements the CCTV surveys shall comply with the following additional requirements:

- a. All CCTV surveys shall be accompanied by an inclination report in the form of a scaled graph that plots the pipe's altitude over the distance travelled. The inclinometer shall be accurate to +/-1%. The inclinometer reading shall be on screen display at all times during the recording of the CCTV survey.
- b. The CCTV survey shall be carried out from the centre of the start maintenance structure to the centre of the finish maintenance structure. Each maintenance structure shall be fully scanned using the pan/tilt and zoom functions of the CCTV camera and the video footage recorded as part of the overall CCTV survey.
- c. All pipe joints shall be scanned by a 360 degree pan.
- d. Additional welding defects to be coded for PE sewers with electro fusion joints:
 - a. A PE pipe end not cut square in a joint shall be coded as circumferential welding defect (Code WC)
 - b. Visible welding wires in a joint shall be coded as circumferential welding defect (Code WC)
 - c. Partially melted fusion couplings in a joint shall be coded as circumferential welding defect (Code WC)
- e. All changes in horizontal and vertical direction of the pipe along the survey shall be coded using the appropriate WSA 05 codes.
 - a. A number of general photographs shall be taken along the sewer surveyed, as a minimum to satisfy the requirements of this standard:
 - b. one photograph in each maintenance structure showing the condition of the structure above the pipe obvert level
 - c. one photograph each showing the connection point between the maintenance shaft/maintenance hole and the incoming/ outgoing pipes

- d. a general photograph every 20-25m of the pipe condition not related to any defect over the distance surveyed
- e. a photograph of each junction installed
- f. photographs of all welding defects identified

Two copies of the following information shall be provided prior to commissioning of the assets:

- a) A digital video file (MPEG 1 or MPEG 2 format) for each sewer segment (Maintenance shaft/hole to Maintenance shaft/hole),
- b) Digital photographs (JPEG format) of certain defects as stated in Appendix F of WSA 05 and for all the situations mentioned above
- c) One digital file with the asset information, coding information and Inclinator readings (to an acceptable version of the WinCan software or other digital formats stated in future editions of the WSA 05 standard)
- d) Hardcopy of the WinCan report with the coding information including the photographs taken
- e) Hardcopy of the inclination report

All digital files shall be provided as data files on USB drive ('vob' files not acceptable).