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| **CLIENT:** | | **Watercare Services Limited** | | **INSPECTION AND TEST PLAN FOR:** | | | | **ITP No:** | **GAJV-ITP-00028\_8.0** |
| **CONTRACT No. #** | | **6661** | | **JOB/ITP TITLE:** | **TWIN RISING MAINS INSTALLATION** |
| **CONTRACT:** | | **Central Interceptor** | | **WORK DESCRIPTION: Twin Rising Main Installation Open Trench Technique CONTRACTOR NAME: GAJV**  **SUBCONTRACTOR/S NAME: SEIPP** | | | | **PACKAGE No:** | **CON-DPCIN-84-0006.03-10** |
| **WORKPLACE NAME / ADDRESS:** | | **Mangere Pump Station** | | **CHAINAGE (if any):** | **56 – 661** |
| **DATE:** | | **28/10/2021** | | **WORK AREA:** | **Twin Rising Main** |
| **ENGINEERS NAME:** | | **Callum Langford** | | **RELATD CEP No:** | **GAJV-CEP-00167, GAJV-CEP-00174** |
|  | |  | | **SWMS No (if any):** | **GAJV-SWMS-0009** |
| **The purpose of this Inspection and Test Plan is for identifying and tracking stages of completion and product traceability during all phases of construction. ISSUED FOR CONSTRUCTION**  **Packages:** - Discrete components or work areas.  **Inspection and Test Plan:** A sequential work method statement capturing quality related requirements that provide evidence of conformance to specifications.  **Inspection Check Sheet:** A document detailing specific criteria to be checked and recorded, often developed to meet testing requirements of standards and / or technical specifications.  **Punch List / Defects List:** A list of minor rectification type tasks which need to complete to satisfy the term of the contract.  **Surveillance:** Ongoing monitoring  **Hold Point:** A notice of the event must be provided and shall not proceed with the work without the client or its representative being present unless authority to proceed has been provided by the client in writing. Signature required  **Witness Poin**t: A notice of the event must be provided. If the client representative is not present at the designated time and place, work may proceed. | | | | | | | | | |
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| **LEGEND:** | W = WITNESS POINT | | H = HOLD POINT | | S= SURVEILLANCE | GAJV = GHELLA ABERGELDIE JOINT VENTURE | S/C = SUBCONTRACTOR | | WSL = ENGINEER REPRESENTATIVE |

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| **ACTIVITY No. #** | **DESCRIPTION** | **RESPONSIBILITY** | **REQUIREMENTS / REFERENCE** | **CONFORMANCE CRITERIA** | **METHOD** | **FREQUENCY/PROCESS HELD** | **HOLD/WITNESS REQUIREMENTS** | | **RECORDS OR CHECKLISTS** |
| **TYPE** | **ATTENDANCE REQUIRED** |
| **1.0 Preliminaries** | | | | | | | | | |
| 1.1 | Design Drawings | GAJV | Ensure the latest IFC drawings are used and available onsite | Sighting of drawings | Retain Drawings | Before project execution | H | GAJV | DWG register with the drawing revision used |
| 1.2 | Check - CEP, SWMS, TMP and ESCP in place and signed off by personnel | GAJV | Ensure the latest IFC Plans are used and  available onsite | Sighting of plans | Retain Plans | Before project execution | **H** | GAJV | Plan register with the revision used |
| **2.0 Materials (approval)** | | | | | | | | | |
| 2.1 | Pipe delivery inspection | GAJV | Watercare Standard Specification 203.7 , 203.12,  225.9,  AS2033, AS 4130, AS 4131 | Free from defects and meet the requirements of Tables in specification 225.9 | Visual Inspection | Within 2 working days of delivery | H | GAJV | This ITP signed, delivery dockets, pipe inspection check sheet  GAJV inspection release certificate required. |
| 2.2 | Flange Connections | GAJV | Watercare Standard Specification 225.8.1 | Flanged connections to conform to BS EN 1092 PN16 with any necessary modifications to  suit the polyethylene pipe and any connections  to adjoining pipework | Visual Inspection | Before project execution | W | GAJV | Pipe inspection check sheet, Material Certs |
| 2.3 | PE Stub Flanges | GAJV | Watercare Standard Specification 225.8.1 | Conform to Table 3 of the latest revision of ISO 9624 | Visual Inspection | Before project execution | W | GAJV | Pipe inspection check sheet, Material Certs |
| 2.4 | Backing ring | GAJV | Watercare Standard Specification 225.8.1 | Mild steel or stainless-steel backing flanges shall be used on all flanged joint. Stainless steel backing flanges, bolts, nuts, and washers made  from 316 stainless steel shall be utilised. | Visual Inspection | Before project execution | H | GAJV | Material Certs |
| 2.5 | Bolts and Nuts and Washers | GAJV | Watercare Material Supply Standard | Bolts and nuts for large flanges shall be manufactured to AS/NZS1251 316 stainless steel class 80  Washers shall be manufactured from 316  stainless steel | Visual Inspection | All mechanical joints | W | GAJV | Material Certs |

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| 2.6 | M/4 AP40 Base | GA-JV | CI-CIVIL 2013350.219 | Minimum sampling rate: Sand Equivalent: >= 40 Clay Index: =< 3 Plasticity Index: <= 5  Broken face content: >= 70% Particle size distribution for AP40 | | | | | Test sand equivalent with sand equivalent test.  Test Clay Index or Plasticity Index with either clay index test or plasticity index test.  Test Broken Face Content with broken face test.  Test Particle size distribution with wet sieving test.  If any test fails, go back to production of new aggregate and repeat tests. | Before project execution | H | Watercare | Materials Data Record Sheet, Delivery Dockets |
| Test Sieve Aperture | | Maximum and minimum allowable percentage  weight passing | |  |
|  | | AP40 (Max size 40mm) | |
| 37.5mm | | 100 | |
| 19mm | | 66-81 | |
| 9.5mm | | 43-57 | |
| 4.75mm | | 28-43 | |
| 2.36mm | | 19-33 | |
| 1.18mm | | 12-25 | |
| 600um | | 7-19 | |
| 300um | | 3-15 | |
| 150um | | 0-10 | |
| 75um | | 0-7 | |
| Particle Size distribution shape control: | | | | |
| Fractions | Maximum and minimum allowable percentage weight of material within the given  fraction | | |  |
|  | AP40 (Max size 40mm) | | |
| 19mm –  4.75mm | 28 - 48 | | |
| 9.5mm –  2.36mm | 14 – 34 | | |
| 4.47mm  –  1.18mm | 7 – 27 | | |
| 2.36mm  – 600um | 6 – 22 | | |
| 1.18mm  – 300um | 5 – 19 | | |
| 600um –  150um | 2 - 14 | | |
| 2.7 | AC14 M10 | GA-JV | CI-CIVIL 2013350.219  (Temporary works), however the asphalt is permanent | Mix Design Requirements: Dense Graded Asphalt: | | | | | Asphalt mixes shall be designed with a target combined aggregate particle size distribution (including filler) and binder content complying with the relevant limits given. The following tests performed:  The particle size distribution, The total binder content,  The RAP content (if used),  The maximum specific gravity and density of the compact mix,  The air voids at laboratory design  compaction level. | Before project execution | H | Watercare | Materials Data Record Sheet |
| Sieve Size (mm) | | | Nix Designation |  |
|  | | | AC14 |
|  | | | Percentage Passing  Sieve Size (By Mass) |
| 37.5 | | | - |
| 26.5 | | | - |
| 19.0 | | | 100 |
| 13.2 | | | 90 – 100 |
| 9.5 | | | 72 – 83 |
| 6.7 | | | 54 – 71 |
| 4.75 | | | 43 – 61 |
| 2.36 | | | 28 – 45 |
| 1.18 | | | 22 – 40 |
| 0.600 | | | 13 – 27 |
| 0.300 | | | 9 – 20 |
| 0.150 | | | 6 – 13 |
| 0.075 | | | 4 – 7 |
| Minimum Layer Thickness (mm) | | | 55 |
| Binder Content  (% by mass) | | | 4.0 – 6.0 |

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| 2.8 | Bedding Material | GA-JV | 2012034.055  WSL 225,WSL 225P  CG-P | Bedding shall be DM 7/3. | Material Approval | Before project execution | H | WSL | Materials Data Record Sheet |
| 2.9 | Lightweight Sand | GA-JV | 2012034.113 | Lightweight sand to be installed between Ch 557 to 663  Lightweight sand to be used in lieu of cement  stabilized sand | Material Approval | Before project execution | H | GAJV | Materials Data Record Sheet |
| 2.10 | F2 Sand | GA-JV | 2012034.113 | F2 sand to be installed between Ch 557 to 663 | Material Approval | Before project execution | H | GAJV | Materials Data Record Sheet |
| **3.0 Construction** | | | | | | | | | |
| 3.1 | Survey and Set out | GA-JV | Drawings | Survey and set out to be as per drawings. | Visual Inspection | As required | W | GAJV | N/A |
| 3.2 | Undercut procedure and design | S/C | Drawings | If 12kpa to 50kpa use 2012034.054 IF 50kpa plus use 2012034.055  If less than 12kpa , excavation to be undercut up to 1750mm below pipe invert or until 12kpa strength is found. This is to be backfilled with  DM 7/3. | Shear Vane | Every 4m after CH412 (each trench shield installation). | W | Watercare | Scala or shear vane records. |
| 3.3 | Trench Bedding | S/C | WSL 225.22, drawings WSL 225.22P | Bedding shall be DM 7/3. Minimum bedding depth shall be 400mm below pipe invert, max 1750mm (depending on ground conditions), 200mm cover, and 350mm surround.  Bedding to be installed to correct gradient as per drawings. Gradient changes across various chainages across the pipeline.  Bedding to be 90% in vegetation Bedding to be 95% in road works | NDM test | 1 test per 2 layers per 100 linear meters of the pipeline | H | GAJV | IANZ NDM Results |
| 3.4 | Trench Backfill | S/C | Watercare Standard Specification 225.23  And 225.23P  Drawings CG-P | As per DWGs in 2012034 Set  - Backfill in vegetation to be as per drawing compacted to 90%  Backfilling of trench through trafficable areas within the Mangere Wastewater Treatment Plant shall be shall compacted in layers to achieve 95%MDD (industry Standard) Clegg calibration.  Lightweight Sand to be 95% compacted F2 Sand to be 95% compacted | NDM test | 1 test per 2 layers per 100 linear meters of the pipeline | W | GAJV | IANZ NDM Results |
| 3.5 | Geogrid and Geotextile install | S/C | 2012034 Set  Manufactures instruction | A29 bidim filtration class 4 and strength class C to be included showing minimum 500mm overlap.  Geo grid to either have bodkin installed or  cable tied | Visual Inspection | Trench length | W | GAJV | Install Checklist |
| 3.6 | Backfilling around existing services | S/C | WSL CG C3.1.5, C3.1.6, C3.1.7 | Minimum vertical and horizontal separation as per Watercare design standards, and utility specific requirements.  Refer to CG -3.1.5 and CG -3.1.6 for minimum  clearances | Compaction Test | Each service crossing trench | W | GAJV | Clegg sheet or NDM. (for polystyrene install visual inspection required ) |
| 3.7 | Trace wire and warning tape installation | S/C | WSL CG C3.1.7 and  Drawings | Install tracer wire at trench extremities as per drawings  Warning tape to be cream coloured 100mm  width and installed 450mm above top of pipe | Visual Inspection | Trench length | W | GAJV | Install Checklist |
| 3.8 | Flanged Joints | S/C | Watercare Standard Specification 225.11.2 | Nuts shall be oiled before tightening. The Contractor shall detail flange tightening procedure and torque values in their WMS. Stainless steel backing plates shall be used on all flanged joints unless specified otherwise in  the Particular clauses. | Torque wrench | Each mechanical Joint | W | Watercare | Checklist signed |

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| 3.9 | Compaction of AP40 | GA-JV | CI-CIVIL 2013350.219 | MDD = 95% | Nuclear Densometer | 5 tests every 1000m2 | W | Watercare | Nuclear Densometer Test Results |
| 3.10 | Compaction of AC14 | GA-JV | Auckland Transport Code of Practice 2013 | MDD >= 98% | Core sample | Each new batch | W | Watercare | Core Sample Test Results |
| 3.11 | Beam test | GA-JV | Auckland Transport Code of Practice 2013 | Not more than 5% of the deflections exceed 1mm. None to exceed 1.5mm | Benkelman Beam test | 10m staggered intervals | W | Watercare | Benkleman Beam Test |
| **4.0 Construction: (Testing to be done after final install )** | | | | | | | | | |
| 4.1 | CCTV Inspection PRE |  | Watercare Standard Specification 225.11.3  and 225.11.4 | A CCTV inspection shall be carried out of any welded pipe string. The video record shall be delivered to the Engineer for inspection and  approval prior to the in-ground installation | CCTV Camera | Prior to backfilling pipe/sections of pipe | W | Watercare | Video Record |
| 4.2 | CCTV Inspection Post |  | Watercare Standard Specification 225.11.5  and 225.11.6  Watercare Standard Specification 225.12  And 225.12P  Watercare Standard Specification 225.18  And 225.18P | Following the in-ground installation of the pipeline, it shall be CCTV inspected prior to water pressure testing. The video record shall be delivered to the Engineer for inspection and approval  prior to final testing.  The video data shall be in colour, be presented in an approved format and be recorded on DVD medial. The video of each inspection record shall clearly identify the pipe string and running chainage by means of a digital overlay on the video image. It shall also include the following information:   1. The day, date and time of the inspection; 2. Camera orientation; 3. Inclinometer reading; and 4. Appropriate references to related surveys. The quality of the video picture shall be such that the condition of the pipe surface is readily apparent and any defects or obstructions are clearly visible. The CCTV camera shall proceed at a height corresponding to the centreline of the pipeline ± 10%   of the pipes internal diameter. The speed of the camera shall not exceed 0.2 m/sec. The camera shall be a pan and tilt type with w zoom capability. The camera shall be set to record immediately before entering the pipe and shall be kept running  until the end of the inspection. | CCTV Camera | Prior to final testing | H | Watercare | Video Record |
| 4.3 | Pressure pipelines Final Testing – exceeding 400m and greater than 315mm |  |  | The pipeline shall be filled with water 24 hours before commencement of the test. The main shall be pressurised to 1.25 times the MAOP. Loading Time (tL) shall not be less than 50 minutes. The Contractor shall record pressures in the main throughout the test by means of a data-logger. The data-logger shall have a current certificate of calibration, and shall be capable of recoding pressures in increments of 5 kPa or less. A calibrated test gauge shall also be installed to monitor mains pressures and to check the data-log results. Where the test is abandoned for any reason, the main shall to be left to recover at static  pressure before re-pressurising | Hydrostatic test, Visual Inspection | Entire pipeline | H | Watercare | This ITP signed, Record Sheet. Procedure |
| **5.0 Post Construction:** | | | | | | | | | |
| 5.1 | As built records | GA-JV | Watercare Standard Specification  225.31 | As built records - containing a list of materials used in the pipeline and their relevant material test certificates, and a copy of the joint welding data for all the welded joints, indexed to recognisable  features on the Drawings | Survey Drawings | General | H | Watercare | As built Records |

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| 5.2 | Final Submission Via Aconex | | GA-JV | | - | All QA documents to be placed in appropriate packages to be submitted | | | Aconnex Mail | After Construction | | H | | Watercare | Aconex Request |
| 5.3 |  | |  | |  |  | | |  |  | |  | |  |  |
| 5.4 |  | |  | |  |  | | |  |  | |  | |  |  |
| 5.5 |  | |  | |  |  | | |  |  | |  | |  |  |
| **ITEM** | | **QA DOCUMENT CHECKLIST** | | **TICK APPROPRIATE BOX** | **COMMENTS** | | **ITEM** | **QA DOCUMENT CHECKLIST** | | | **TICK APPROPRIATE BOX** | | **COMMENTS** | | |
| 1 | | Completed Inspection and Test Plan | | ☐ |  | | 12 | Check sheets Completed and signed | | | ☐ | |  | | |
| 2 | | Material Delivery Dockets (if applicable) | | ☐ |  | | 13 | Independent Reviewer Report | | | ☐ | |  | | |
| 3 | | Incoming Material Inspection Checklist | | ☐ |  | | 14 | Operation and Maintenance Manuals (if applicable) | | | ☐ | |  | | |
| 4 | | All Aconex Mails Closed-Out - Related to Lots | | ☐ |  | | 15 | Warranties / Guarantees (if applicable) | | | ☐ | |  | | |
| 5 | | Conformance Certificates (if applicable) | | ☐ |  | | 16 | Producer Statements | | | ☐ | |  | | |
| 6 | | Test Reports | | ☐ |  | | 17 | Compliance Statement | | | ☐ | |  | | |
| 7 | | Engineers Red-Line mark ups | | ☐ |  | | 18 | Relevant RFIs - | | | ☐ | |  | | |
| 8 | | As Built Survey | | ☐ |  | | 19 | Instructions - | | | ☐ | |  | | |
| 9 | | Photos | | ☐ |  | | 20 | Factory Acceptance Test (if applicable) | | | ☐ | |  | | |
| 10 | | Geotechnical Site Inspection Report (if applicable) | | ☐ |  | | 21 | Other - | | | ☐ | |  | | |
| 11 | | QA Engineer Site Inspection Report | | ☐ |  | | 22 | Other - | | | ☐ | |  | | |

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| **CONFORMANCE / VERIFICATION STATEMENT** | | | | | | |
| This closed lot conforms in all respects with the standards and requirements specified in the Contract Documents. The lot verification records are complete, and any non-conformances have been closed out in accordance with the Projects requirements. | | | | | | |
| **Construction Lot checked by the Senior Project Engineer responsible for the works** | **PRINT NAME** | Click or tap here to enter text. | **SIGNATURE** |  | **DATE** | Click or tap to enter a date. |
| **Construction Lot verified and closed by Quality Management Representative** | **PRINT NAME** | Click or tap here to enter text. | **SIGNATURE** |  | **DATE** | Click or tap to enter a date. |

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| **Independent Verification Review (if required) by:** | **PRINT NAME** | Click or tap here to enter text. | **SIGNATURE** |  | **DATE** | Click or tap to enter a date. |