INSPECTION TEST PLAN

CLIENT:	Watercare Services Limited	**INSPECTION AND TEST PLAN FOR:**		**ITP No:**	GAJV-ITP-00184_5.0
CONTRACT No. #	6661			**JOB/ITP TITLE:**	Concrete work Diversion Chamber & Confluence Chamber
CONTRACT:	Central Interceptor	**WORK DESCRIPTION: Concrete work - Diversion and Confluence chambers**		**PACKAGE No:**	MPS-CON-DTMAN-20-0001.04
WORKPLACE NAME / ADDRESS:	Mangere Pump Station	**CONTRACTOR NAME: GAJV**		**CHAINAGE (if any):**	N/A
DATE:	**28/04/2023**			**WORK AREA:**	Diversion chamber & confluence chamber
ENGINEERS NAME:	Michael Pilkington – Waris Mohamad	**SUBCONTRACTOR/S NAME: Seipp Construction**		**RELATD CEP No:**	GAJV-CEP-00330
	Tomos Davies (SEIPP)			**SWMS No (if any):**	Click or tap here to enter text.

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 Point: A notice of the event must be provided. If the client representative is not present at the designated time and place, work may proceed.

LEGEND:	W = WITNESS POINT	H = HOLD POINT	S= SURVEILLANCE	GAJV = GHELLA ABERGELDIE JOINT VENTURE	S/C = SUBCONTRACTOR	WSL = ENGINEER REPRESENTATIVE

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	Check -Drawings are IFC and current	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.
1.2	Check - CEP, SWMS, TMP and ESCP in place and signed off by personnel	GAJV	Ensure 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	Steel reinforcing	SEIPP	DWG 2012036 Series NZS 4671/ 3109 GC-C4P – 4.1 and 4.1.1.10	• Grade 500E • Produced using micro-alloy process • GRP 16 • Chemical Anchor	Review mill certificate Reinforcing ID	Each batch	**MAR**	GAJV	Mill Certificates
2.2	Concrete Mix Design (base, wall, benching)	SEIPP	NZS3104 MS-41P – 5P, 5.2P DWG 2012036.861	• Grade 45 MPa OPC	Review mix design	Each mix design	**MAR**	GAJV	Aconex approval mail
2.3	Block out infill concrete	SEIPP	DWG 201236.862	• Infill concrete to be S45/10 • Additional dosage of shrink reduction admixture as per drawing to be Sika control plus as or approved equivalent at 2.25% by weight of cement mass and shall comply with manufacturers requirements. • Additional dosage of admixture as per drawing to be Xypex admix C-5000 additive or approved equivalent at 0.6% by weight of cementitious content and shall comply with manufacturers requirements.	Review dockets	Each delivery	**S**	GAJV	Material dockets

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2.4	Epoxy grout	SEIPP	DWG 2012036.908 DWG 2012036.863 GC-C4P	• As per manufacturers data sheet • 25W x 20 NITOSEAL SC600 SEALANT	Review product data sheet	Each delivery	**MAR**	GAJV	Material dockets
2.6	Concrete pipe DN2100	GAJV	DWG 2012034.183 MS-03	• RCRRJ Class 4	Review shop drawings	Each Delivery	**MAR**	GAJV	QA from supplier
2.7	Hydrophilic Strip	SEIPP	DWG 2012036.873 DWG 2012036.908	• CJ-0725-3K or approved equivalent • •	Review product data sheet	Prior to commencement of work	**MAR**	GAJV	Material dockets
2.8	PE Liner & filler rod	GAJV	CG-C27P - Table 5-1	• Technical data sheets • Manufacturers certificates of compliance	Manufacturers certificate of compliance	Prior to commencement of work	**MAR**	GAJV	Material certificate and aconex mail approval
2.9	Approved Curing compounds	SEIPP	MS-41P 11.3P	• Curing to be accepted by the engineer • Curing to meet the requirements of MS-41P • E-cure As per GAJV-MAR-000035	Review technical data	Prior to commencement of work	**MAR**	GAJV	Material certificate and aconex mail approval
2.10	Materials for Concrete Repairs	SEIPP	MS-41P	• Technical data sheets	Review technical data	Prior to commencement of work	**MAR**	GAJV	Material data sheet and aconex mail approval
2.11	Manhole Covers	SEIPP	DWG 2012036 Series NZS 3996 CG-	• PAMREX DN700 • Gatic GM302C1212D, GM309C66D, GM303C6122D • Class D400 HN-HO-72 rated • Manufacturers certificates of compliance • Shop drawings.	Manufacturers certificate of compliance	Prior to commencement of work	**S**	GAJV	Dockets
2.12	Stainless Steel Safety Grille	SEIPP	DWG 2012034.161 NZS 3996	• Manufacturers certificates of compliance • Shop drawings.	Final design and detail to be submitted to Watercare for review and approval	Prior to commencement of work	**MAR**	GAJV	Material Approval
2.13	Water stop	SEIPP	CG-C4P 4.1.2P DWG 2012036.862	• Supercast Rearguard R or approved equivalent	Review product data sheet	Prior to commencement of work	**MAR**	GAJV	Material dockets
2.14	Backfill Material – 7/3	SEIPP	Table C2-1 - Behind walls or chambers, CG_1 GAJV-RFI-002719	• Approved DM7/3	Material order review	Before procurement	**MAR**	GAJV	Delivery dockets Quarry material test results for PSD, MDD
2.15	Backfill Material – Flowable Fill	SEIPP	GAJV-RFI-002719	• Min 5 MPa flowable fill	Review mix design	Each mix design	**MAR**	GAJV	Aconex approval mail
3.0 Construction: Reinforcing Cages									
3.1	Reinforcement Placement	SEIPP	DWG 2012036 Series DWG 2012036.861 DWG 2012036.909 DWG 2012036.907 DWG 2012036.906 DWG 2012036.903 DWG 2012036.902 DWG 2012036.900 DWG 2012036.893 DWG 2012036.891 DWG 2012036.890 DWG 2012036.889 DWG 2012036.888 DWG 2012036.887 DWG 2012036.886 DWG 2012036.883	• Ensure that the placed reinforcement complies in all respects with the Design Drawings and this Specification • Minimum cover over reinforcement shall be as noted on the Design Drawings • Lap lengths shall generally be as detailed on the Design Drawings or otherwise as per 2012036.861 • Not more than 50% of the reinforcing bars shall be lapped at any one section, i.e. laps shall be staggered.	Visual Inspection and measurement on site	During and after steel placement	**HP**	WSL/GAJV	Pre-pour checklist Photographs

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			DWG 2012036.882 DWG 2012036.881 DWG 2012036.880 DWG 2012036.879 DWG 2012036.878 DWG 2012036.877 DWG 2012036.876 DWG 2012036.875 DWG 2012036.872 DWG 2012036.871 DWG 2012036.870 CG-C4P - 4.1.1 and 4.1.1.17 in accordance to NZS3109						
3.2	Chemical Anchors/ Chem Set Bars	SEIPP	DWG 2012036.909 DWG 2012036.861	• SAF2507 Stainless Steel Anchors. • HILTI RE-500-SD Injection Adhesive	Review product data sheet. Manufacturers certificate of compliance.	Prior to and after installation.	**HP**	WSL/GAJV	Installation checklist
3.3	Rebar Couplers	SEIPP	NZS 3101 DWG 2012036.862	• ReidBar Steel coupler • Use EPCON C8 XTREME as per manufactures instructions. • RB25CS instead.	Review product data sheet. Visual inspection.	During and after placement	**HP**	WSL/GAJV	Pre-pour checklist
3.4	Construction Joints and Water Stop Placement	SEIPP	CG-C4P - 4.1.2P NZS 3109, Clause 5.6.3 DWG 2012036 Series DWG 2012036.861 DWG 2012036.862 DWG 2012036.863 DEG 2012036.873 DWG 2012036.903	• Construction joints shall conform to NZS 3109, Clause 5.6.3, type B • Joint position shall be as shown on the Design Drawings unless otherwise agreed with the engineer • Water stops shall be placed as indicated on the drawings • Installed as per manufacturer's specification • and care taken to prevent damage during concrete placement.	Visual inspection with reference to DWGS	Before concrete pour	**WP**	GAJV	Pre-pour checklist
4.0 Construction: Formwork									
4.1	Formwork	SEIPP	DWG 2012036 Series CG-C4P - 4.5P NZS 3109 Section 5	• Formwork adequately supported and restrained – Design approved if necessary. • Formwork to be treated with release agent where in direct contact with concrete. • Formwork must produce cast surfaces within a tolerance of +15 or -12mm on the given dimensions for width and ± 12mm for vertical height, and without visible offsets, bulges, or misalignment of the concrete.	Visual Inspection	Prior to concrete pour	**WP**	GAJV	Pre-pour checklist Photographs
4.2	Cast in items	SEIPP	CG-P DWG 2012034.185 DWG 2012036.863	• Carry out inspection and confirm correct position prior to concrete pour. • Ensure correct cover is achieved around the item.	Visual Inspection	Prior to concrete pour	**HP**	WSL/GAJV	Pre-pour checklist
4.3	Block-out infill pipe penetration (if required)	SEIPP	CG-C4P-4 DWG 2013036.862	• Ensure all reinforcement is to be continuous through block-outs during construction. • Ensure correct cover is achieved prior to concrete pour.	Visual Inspection Construction methodology and associated reinforcement curtailment details for approval before construction	Prior to concrete pour	**HP**	WSL/GAJV	Pre-pour Checklist
5.0 Post Construction: Concrete Works									

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5.1	Concrete Testing • Consistency • 28-day compressive strength • Shrinkage • Permeability • Water absorption • Sulphite content • Alkali content • Chloride content • Temperature rise	SEIPP	MS-41P - 5P MS-41P - 12P MS-41P – table 6.1P **Consistency:** NZS 3109 and NZS 3112 **28-day compressive strength:** NZS 3109 Section 9 and NZS 3112 **Shrinkage:** AS 1012.13 **Permeability:** DIN 1048 **Water absorption:** AS 4058 Appendix F **Sulphite content:** AS 1012.14 **Alkali content:** **Chloride content:** AS 1012.14 **Temperature rise**: Not applicable as pours are less than 0.9m thick (as per MPS Temperature Control Plan)	• **Consistency:** For water retaining structures, slump tolerances shall be half those given in Table 9.1 of NZS 3109 • **28-day compressive strength:** 45 MPa • **Shrinkage:** 430mS at 21 days, 600 mS at 56 days with variance 10% precast & 15% for cast in-situ • **Permeability:** <20mm • **Water absorption:** <6.5% • • **Sulphite content:** <4% by mass • • **Alkali content:** <2.5kg/m3 • • **Chloride content:** As per table 5-1 of MS-41P • • **Temperature rise:** The lesser of: Thermal Control Plan limits • <70°C maximum • <40°C temperature rise from its fresh concrete casting temperature	IANZ Lab tests	**Consistency:** Slump test every batch **28 days compressive strength:** 3 Cylinders (1x7day, 2x28 day per shift or per 75m3 poured (NZS 3104), whichever is more frequent. **Shrinkage:** Every 1,500m3 of concrete **Permeability:** Every 1,500m3 of concrete **Water absorption:** Every 1,500m3 of concrete **Sulphite content:** Every 1,500m3 of concrete **Shrinkage:** Every 1,500m3 of concrete **Permeability:** Every 1,500m3 of concrete **Water absorption:** Every 1,500m3 of concrete **Sulphite content:** Every 1,500m3 of concrete **Temperature rise:** Not applicable as pours are less than 0.9m thick (as per MPS Temperature Control Plan)	**WP**	WSL/GAJV	Lab Results. Witness point release after witnessing of in-situ/immediate tests and sampling for longer tests
5.2	Concrete Curing	SEIPP	NZS 3109 Clause 7.8 MS-41P 11P	• Curing of cast-in-situ concrete elements shall be undertaken in accordance with the appropriate Material Specification	Visually monitored on site as per thermal control plan	Hourly during peak sun hours and as required elsewhere	**WP**	SEIPP	Post pour check sheet
5.3	Concrete finishes	SEIPP	CG-C4P - 4.1.6P DWG 2012036.900	• Concrete finishes to be in line with the design drawings and specification. • Concrete finish to be U3/ F3 or approved finish where not PE lined.	Visual Inspection	Post pour	**WP**	SEIPP	Post pour check sheet
5.4	Concrete Benching	SEIPP	DWG 2012034.161 DWG 2012034.183 CG-C4.2.1	• Benching slope shall be 1:12 minimum unless otherwise noted in the drawings. • Plastering over the concrete finish is not accepted. The troweled finish is to be a U2 finish. • Should have the same grade as walls and base slab.	Visual inspection	Post pour	**WP**	GAJV	Post-pour check sheet
5.5	Concrete Grouting lid panel joints	SEIPP	DWG 2012036.908	• Ensure joint details are as per the drawings	Visual inspection	Before epoxy	**WP**	SEIPP	QA Check sheet
5.6	Post Pour Inspection	SEIPP	MS-41P	• Full post pour inspection review of the concrete finish to identify surface defects, ensuring the specified curing has been undertaken, concrete cover checks or any other defects identified or non-conformances.	Visual Inspection	Post pour	**HP**	WSL/GAJV	Post pour check sheet
5.7	Concrete Repairs	SEIPP	CG-C4P-4.6.1.4P	• Concrete repair using resin as per concrete structures specification. • As per GAJV-CEP-00272 Mangere Pump Station Defect Repair Procedure	Visual Inspections	Post Pour	**HP**	WSL/GAJV	Post pour check sheet

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6.0 Construction: Construction PE Liner									
6.1	PE Liner shop drawing	GAJV	CG-C27P	• Shop drawing to be submitted to WSL	Submission	4 weeks prior to installation	**HP**	GAJV	Shop drawing submission
6.2	Extrusion weld certificates	SEIPP	CG-C27P	• Welders' certificates for welding	Copy of certificates	All welders	**WP**	GAJV	Copy of certificates
6.3	PE Liner Prior To Pour	SEIPP	CG-C27P	• Final inspection of the liner to ensure its adequately restrained, no visible holes, no fixings left on the inside face, drainage lines are correctly positioned, no folds, bulges, all • joints on the liner are adequately secured.	Visual Inspection	Each pour	**HP**	WSL/GAJV	Pre-Pour Inspection
6.4	Extrusion weld testing	SEIPP	CG-C27P ASTM D4437, ASTM D5641 DVS 2227-1	• As a minimum all site welds shall be tested.	Either vacuum box testing or high voltage spark testing Visual inspection	All welds	**WP**	WSL/GAJV	As recommended by the manufacturer Checklist for visual inspection
6.5	Tapping Survey	SEIPP	AGRU Design & Installation Handbook. CG-C27P	• Tapping survey to identify voids • Voids to be repaired as recommended by the manufacturer. • Pages 24 & 34 of Design & Installation handbook.	As recommended by the manufacturer. Rubber mallet delamination survey.	As recommended by the manufacturer	**WP**	WSL/GAJV	Post pour check sheet
6.6	Liner repairs	SEIPP	AGRU Design & Installation Handbook. CG-C27P DVS 2227-1	• As recommended by the manufacturer • Clearly mark out areas for repair • Extrusion welding • As per GAJV-CEP-00272 Mangere Pump Station Defect Repair Procedure	Visual Inspection. Surfacing welds. Blanks. Panel strips.	As recommended by the manufacturer	**HP**	WSL/GAJV	PE Liner Checklist
7.0 Post Construction									
7.1	Final As built including PE membrane	GAJV	IFC Drawings – 2012036 series 2012034 series	• Survey	Survey	At completion	**WP**	GAJV	As built drawings
7.2	Hydrostatic testing	SEIPP	GC_1 10.5.2 D)	• Infiltration test for manholes over 3.5m deep • There are no visible leaks, wet patches or "sweating" at any of the pipe penetrations, seals or riser joints.	Infiltration test	At completion	**HP**	WSL/GAJV	Test record sheet
7.3	Backfilling – 7/3	SEIPP	GAJV-RFI-002719	• Compacted to 90% of Maximum Dry Density	NDM Test	1 Test per 500mm surrounding chamber	**HP**	GAJV	NDM Test Results
7.4	Concrete Testing – Flowable Fill • Consistency • 28-day compressive strength	SEIPP	GAJV-RFI-002719 **Consistency:** NZS 3109 **28-day compressive strength:** NZS 3109 Section 9 and NZS 3112	• **Consistency:** +/- 40mm - NZS 3109 • **28-day compressive strength:** 5 MPa	IANZ Lab tests	**Consistency:** Slump test every batch **28 days compressive strength:** 3 Cylinders (1x7day, 2x28 day per shift	**WP**	GAJV	Lab Results. Witness point release after witnessing of in-situ/immediate tests and sampling for longer tests

INSPECTION TEST PLAN

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 -	☐	

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