Quality Assurance / Quality Control Manual
Vested Assets

Inspection & Handover Procedures

Document status

Version	Status	Date	By	Designation
001	Draft	16 December 2010	B Leeuwenburg	Projects Engineer
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003	Final	17 August	B Leeuwenburg	

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Contents

Glossary

Abbreviations

AEP	Annual exceedance probability
CBR	Californian bearing ratio
CCTV	Closed circuit television
Council	Whangarei District Council
EES	Environmental Engineering Standards
IQP	Independently Qualified Person
DR	Developer's Representative
ITP	Inspection and test plan
NRC	Northland Regional Council
QA/QC	Quality assurance/quality control
WDC	Whangarei District Council

Definitions

Hold point (WDC)	Council's attendance at the particular inspection/test is mandatory. The DR or IQP[1] must pre-test/inspect to ensure that all is in order before requesting WDC to attend. The DR or IQP[1] is to advise Council a minimum of 24hrs ahead of time of the proposed inspection/test.
Witness point (WDC)	Council may attend these inspections/tests if deemed necessary in the ITP. The DR or IQP[1] is to advise Council a minimum of 24hrs ahead of time of the proposed inspection/test.
Hold point (DR or IQP[1])	The DR or IQP[1] must undertake an inspection/test at these points before proceeding with the works and provide WDC with the results within 24 hrs. (Refer to the "Inspection and Testing" section).
Witness point (DR or IQP[1])	The DR or IQP[1] is to carry out spot checking of the particular operation and provide certification that the work was carried out satisfactorily.

[1] If the work is required to be carried out by or under the control of an IQP

General

Introduction

This manual sets out the minimum Quality Assurance / Quality Control (QA/QC) requirements for developments incorporating assets that will transfer to WDC ownership upon completion of the works. Typically, this involves Water Supply, Sewerage, Storm water, Road and public open space assets associated with developments. Acceptance of an alternative means of compliance for meeting the objectives of the WDC's QA/QC requirements for developments containing six or less residential lots, will be at the discretion of Council's senior environmental engineering officer, and will not confer approval in general to any construction technique, or material forming part of the development.

The Manual has been divided into three sections as follows:

- Requirements Prior to Construction
- Requirements during Construction
- Acceptance of Works

Requirements Prior To Construction

General Requirements

The person nominated to undertake the role of Developer's Representative (DR) for the development shall be responsible for the provision of inspection/ testing services unless the Whangarei District Council's Environmental Engineering Standard 2010 (WDC EES 2010) requires the supervision and certification to be undertaken by an Independently Qualified Person (IQP). The DR shall however retain overall responsibility for ensuring all inspection/ testing services are completed in accordance with the Council's approved inspection and test plan. (refer to the WDC EES 2010 for the definition and description of the duties of an IQP and DR).

Inspections/ testing may be carried out by the DR and/or IQP or his/her delegate who shall be a suitably qualified/ experienced person approved to undertake the Inspections/ testing by the DR or IQP who in terms of the WDC EES 2010 will be required to certify the element of the works..

The DR and IQP[1] is required to certify that all works have been carried out in accordance with the WDC EES and/or the approved engineering plans. This is to be done on form EES-PS4 (to be found in the WDC EES 2010) or similar approved.

Inspection and Test Plan

The DR and IQP[1]are to prepare an ITP identifying the following items:

- Element of work
- Tests and checks required
- Quality requirement
- Frequency of testing
- Contractor's responsibility
- DR and IQP's[1] responsibilities
- Council's responsibility
- Asset data recording requirements

The ITP must be approved prior to the commencement of the works. Refer to the "Inspection and Testing" section for the requirements of the ITP.

The DR and IQP[1] in undertaking construction inspections shall:

[1] If the work is required to be carried out by or under the control of an IQP

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- Allocate competent and experienced staff to undertake site inspection and testing.
- Provide sufficient site presence and be satisfied that all work meets the design specifications and performance requirements.
- Prior to requesting Council inspections, inspect the works and confirm that the work complies with the approved design and is constructed in accordance with the Council approved plans/ designs.

Pre–Start Meeting

Following ITP approval a pre-start meeting is to be held prior to the commencement of work. The meeting is to be attended by the DR and IQP[1], contractor's representative, any relevant specialist consultants and Council's representative.

Items to be considered at this meeting will include but not be limited to the following:

- Council's construction requirements.
- The process for monitoring compliance and auditing (ITP plan).
- Parks and environmentally significant areas and/or trees for preservation.
- Sewerage and Water Pump Station Commissioning requirements (if applicable to the project).
- Northland Regional Council (NRC) Consents.
- Condition of the existing infrastructure prior to construction.

The pre-start meeting is a "**Hold Point**" and works may not proceed until the meeting is held and any further requirements identified during the meeting are satisfied.

Council may require developers undertaking subdivisions in difficult terrain or environmentally sensitive areas to peg road centre lines prior to the pre-start meeting. This will allow Council, DR and IQP1 to view first hand the potential ramifications of construction activities such as storm water drainage points, earthworks areas, clearing etc. Any approvals in terms of the WDC EES 2010 is passed on an examination of the information provided and does not relieve the developer of the responsibility for compliance with Council standards, established principles, and carrying out the works in accordance with sound engineering practice. Therefore Council reserves the right to require an amendment to the design should any problems arise as a result of this inspection.

Requirements During Construction

General Requirements

The general requirements during the construction process are as follows:

- Work may only proceed subsequent to Council receiving all the relevant documentation set out in the previous section "Requirements Prior to Construction".
- No work shall be undertaken on any existing road open to the public without a corridor access request that has been specifically approved by Council.
- No work shall be undertaken on, or machinery driven above, or near existing Council owned water and or sewerage pipes unless specifically approved by Council.
- Any damage to existing Council owned services must be reported immediately and repaired at the developer's cost to the Council's satisfaction.
- Use of Council services, (e.g. water from existing mains), is subject to approval by Council and payment of the appropriate fees.
- Pumping stations, electrical switchboards, access covers, compounds and associated equipment installed during construction shall be securely locked when left unattended.
- No public road may be closed, or traffic diverted elsewhere without the prior written approval from the Council.

Document Control

A copy of the approved Project Drawings, Specification and QA/QC Works documentation shall be kept on the job site at all times during construction.

All amendments shall be approved **in writing** by Council prior to the works being undertaken.

Parks & Environmentally Significant Areas

In cases where the subject land or the adjacent land is an existing or proposed Park, recreation reserve, or area otherwise declared by Council as environmentally significant, the following general precautions shall be mandatory.

- The areas shall be clearly pegged, flagged, (and fenced if required) inspected and approved by Council Officers.
- The approved design shall indentify any unavoidable intrusion into such areas and detail the extent of the works, nominated access routes, methods and timing of rehabilitation.
- Council shall be notified immediately if any damage or disturbance occurs beyond the approved limits and rehabilitation of these areas shall be undertaken at the developers cost to the Council's satisfaction.

Inspection and Testing

During the construction phase, the DR and IQP[1] shall be responsible for undertaking the required inspections and tests in accordance with the accepted ITP. The Council may, on a random basis, call upon the DR or IQP[1] to provide evidence of conformance with the accepted ITP in the form of diary records, site visit reports etc.

There are a number of major inspections that are mandatory, identified as "**Hold Points**" for the DR and IQP[1] and "**Hold Points**" or "**Witness Points**" for Council. These will be included in the ITP and can be found in appendices. As a minimum the ITP is to be based on the inspection and test plan templates contained within the appendices and updated with project specific test/inspection requirements. Within one day of a "**Hold Point**" inspection, the DR or IQP[1] is to provide Council with an inspection report which is to include evidence that the works inspected are satisfactory and the Contractor has been issued a written instruction to proceed.

Acceptance of an alternative means of compliance for meeting the objectives of the WDC's QA/QC requirements for developments containing six or less residential lots, will be at the discretion of Council's senior environmental engineering officer, and will not confer approval in general to any construction technique, or material forming part of the development.

Council is to be advised by the DR a minimum of 24 hours ahead of any test/inspection listed as a "Hold Point' or "Witness Point" for Council.

During construction, Council reserves the right to conduct random audit inspections on any or all of the works without prior notification. These inspections do not release the DR or IQP[1] from his/her responsibility to check the Contractor's work.

Applications to Connect to Council's Network

Unless otherwise approved, Council requires all connections and/or alterations to Council's live sewer, storm water or water mains to be completed with Council approval and subsequent supervision by licensed contractors. The Developer shall engage a Council licensed contractor to co-ordinate the application process and undertake the works. All works completed by Council's licensed contractors are to form part of the developments As-Built plans.

NOTE: Any works on Council infrastructure will require an approved application for public utility connection/ disconnection form and an approved Corridor Access Request (as applicable).

Sewer, storm water and water mains are considered to be live once ownership of the asset has transferred to the Council, or physically connected to Council's network, whichever is the earliest.

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Application should be made in writing five working days prior to work commencing to enable Council to provide staff to operate valves, isolate pump stations as required, and supervise the work. The nature and extent of works shall be clearly identified on the plans. Work may only proceed subsequent to Council approving the procedures and plans in writing.

Contractors are not permitted to carry out any work on Council's infrastructure unless written approval has been obtained from Council. The placement and removal of plugs within live sewers must be done under direct supervision of Council's Inspector.

Council reserves the right to stop, or take over a connection being undertaken by a Contractor, if in the Council's opinion the Contractor is incapable of completing the connection work in a reasonable time without causing damage to Council's infrastructure or undue inconvenience to the public.

All connections and/or alterations to Council's live sewer, storm water or water mains shall be undertaken at the Developer's cost.

Applications to Draw Water from Council Mains

All Developers who wish to draw water from Council water mains are required to use metered standpipes hired from the Council's Water Services department. No privately owned connections or unmetered standpipes may be used for this purpose. Standpipes are not to be used for filling water trucks. A truck filling point is provided on Kioreroa Road for this purpose.

Acceptance Of Works

Introduction

The DR or IQP[1] is responsible for ensuring that all Council's requirements for acceptance of the works are satisfied prior to requesting a "Works Acceptance" inspection. Failure to do so may result in cancellation of the inspection.

The following items are required to be completed prior to Council's acceptance of works:

- As-Built drawings and schedule of assets submitted and approved.
- "Statement of Compliance - As Built works" submitted and approved.
- Management plans & operation and maintenance manuals submitted and approved.
- All project documentation submitted and approved

As-Built Documentation

As –Built documentation serves two distinct functions:

- Evidence that "As Built" works have been checked against the approved design, to support certification by the DR or IQP[1] responsible for the design that design philosophies and criteria have been achieved. To satisfy this requirement the DR or IQP[1] shall complete the "Statement of Compliance - As Built Works" contained within the appendices.
- To provide an accurate record of the "As Built" services. As-Built drawings and schedules of assets shall be submitted through the normal subdivision process in accordance with Council's EES.

Management Plans, Operation and Maintenance Manuals

Where works comprise pump stations, reservoirs, treatment plants, storm water ponds/treatment devisees etc. Operations and Maintenance Manuals for all components of the works shall be provided. Operating and Maintenance Manuals shall include spare parts lists, electrical documentation and any other relevant information. Maintenance Manuals and procedures are also required for drainage structures which incorporate Gross Pollutant Traps, interceptor devices etc. The Maintenance procedures should indicate recommended frequencies for maintenance/cleaning functions in wet and dry seasons.

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Project Documentation

Development works will not be accepted until construction records have been certified as being completed by the DR or IQP[1] and accepted by Council.

A complete copy of the following documents shall be provided to Council prior to the acceptance of the works.

- Inspection and Testing certification by the DR or IQP[1].
- "Works Acceptance" Inspection Checklist.
- As-Built drawings and schedules of assets.
- "Statement of Compliance - As Built works".
- Management Plans, Operation & Maintenance Manuals (as applicable).

Copies of all test results confirming compliance with Council's specifications shall be assembled and retained by the DR or IQP[1] as a part of the project documentation process. While not a complete listing, the following list details some major records to be included:

- Geotechnical testing
- Fill compaction test results.
- Sub-grade CBRs.
- Sub-grade replacement material quality, thickness and locations. *
- Sub-grade replacement material compaction test results. *
- Subsoil drain filter media quality statements.
- Sub-base and base course material quality statements and thicknesses.
- Sub-base and base course compaction test results.
- Prime or primer seal spray and application rates.
- Sewer & Storm water pressure test records.
- Sewer & Storm water bedding quality statements.
- Water main bedding quality statements.
- Water main pressure test records.
- Pump Station testing (sewer and water) including wet-well, pumps and switchboard. *
- Any concrete testing required by the technical specifications.
- Pipe work material quality statements for all pipe work material. (water, sewer, storm water, etc.)
- Geo-fabric material quality statements. *
- Digital copy of CCTV survey undertaken in accordance with the latest version of the New Zealand Pipe Inspection Manual for sewer and storm water with Engineering Report and Certification.
- Any other testing results or statements required in terms of this manual.
- Any other job specific testing carried out or ordered by the DR or IQP[1].

* Where required to be used.

The IQP is to submit a letter to Council requesting acceptance of pump stations. The letter should include:

- The pump station allotment number, as it appears on the survey plan
- The name of the pump station and ICP number.

[1] If the work is required to be carried out by or under the control of an IQP

- Copy of approved design drawings.
- Copy of As-built drawings.
- Copy of completed pre-commissioning checklist.
- Copy of Inspection and Test Plan.
- Certification by the IQP for structural design, 1% AEP flood level, buoyancy and compliance with As-built drawings and Council's EES.
- Confirm that Council authorizes the transfer of the relevant power and water accounts to the WDC.
- Confirmation that no outstanding payments are due to Council or other authorities.
- Evidence that the commissioning documentation for a sewerage pump station has been completed.

The information to be provided to Council shall include as a minimum:

- All requirements set out in the Pump Station Commissioning Checklist.
- Operations and Maintenance Manuals in the format described in the Council's EES.

"Works Acceptance" Inspection

The "Works Acceptance" inspection requires attendance by:

- The DR or IQP[1].
- The Contractor.
- Council's nominee/s.

It is the responsibility of the DR and or IQP[1] to ensure all the works are completed to an acceptable standard (as defined in approved design and construction documentation) prior to requesting a "Works Acceptance" inspection.

Prior to requesting a "Works Acceptance" inspection, the DR or IQP[1] shall ensure:

- The approved works have been completed
- Any non-compliant issues or defects noted during the construction process, have been rectified to Council satisfaction
- No outstanding payments are due to Council or other Authorities
- All construction records have been certified as being completed and accepted by Council
- The above listed items are in accordance with the approved drawings, Council's technical specifications and accepted engineering and landscaping practice.

Failure to do so will result in the cancellation of the inspection and incur a re-inspection fee.

In addition to the items listed above, the DR or IQP[1] shall complete the "Works Acceptance" Inspection Checklist which shall be presented to the relevant Council Officer prior to the "Works Acceptance" inspection. The Council Officer may not undertake a detailed check of all items raised in the checklist, but will as a minimum examine selected aspects of the works on an audit basis.

Final Acceptance of Works

The DR shall ensure all Council's requirements are satisfied prior to requesting the transfer of the constructed assets to Council ownership.

Council's requirements for final acceptance of the works comprise the following:

- Satisfactory "Works Acceptance" inspection" and audit by relevant Council Officers.
- Satisfactory review of all project documentation by relevant Council Officers.
- Confirmation that no outstanding payments are due to Council or other authorities.

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When the above requirements have been satisfied the DR or IQP[1] shall submit a written request to Council for Final Acceptance of the works. Council will, upon confirmation that no issues arising from the development are outstanding, provide written acceptance of the works, and arrange for assets to be transferred to Council ownership.

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Appendices

Inspection & Test Requirements

Note: Hold points and Witness points marked with a * will be confirmed by Council in writing if they are required.

Elements of Work	DR orIQP's[1] Responsibility	WDC's Responsibility
Roading infrastructure		
Site Clearance	**Hold Point** Joint inspection of defined limits and tree removal.	**Hold Point**
Sub-grade		
Material Quality	Routine inspections to assess quality of materials	Audit inspections.
Compaction	**Hold Point** Inspect, examine and assess test results.	***Witness Point**.
Horizontal & Vertical Alignments	Routine inspections. Examine and assess all cross section geometry.	Audit inspections.
Profile & Depth	**Hold Point** Inspection during trimming and removal of soft spots.	Audit inspections.
Embankments	**Hold Point** Inspect, examine and assess test results.	***Witness Point**.
Sub-base		
Material Quality	Routine inspections, examine and assess test results	Audit inspections.
Compaction	**Hold Point** Inspect, examine and assess test results.	***Witness Point**.
Profile & Depth	**Hold Point** Joint inspection on completion of final preparation.	**Hold Point**
Base Layer		
Material Quality	Routine inspections, examine and assess test results	Audit inspections.
Compaction	**Hold Point** Inspect, examine and assess test results & cross section geometry.	***Witness Point**.
Profile	**Hold Point** Joint inspection on completion of final preparation.	**Hold Point**
Surfacing		
Profile	**Hold Point** Joint pre-seal inspection	**Hold Point**
Kerb and Channel		
Material Quality	**Hold Point**	***Witness Point**.

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Elements of Work	DR orIQP's[1] Responsibility	WDC's Responsibility
	Inspect foundations prior to kerb placement	
Landscaping		
Grass establishment	Routine inspections to assess Contractors performance	Audit inspections
Tree Planting	Routine inspections to assess Contractors performance & assess quality of plants	Audit inspections
Irrigation	***Witness Point.**	Audit inspections
Storm water Drainage		
Location of Structures	**Hold Point** Inspect & assess compliance	***Witness Point.**
Material Quality	Routine inspections to assess quality.	Audit inspections
Pipelines	**Hold Point** inspection prior to laying of pipes	**Witness Point**
Backfilling	**Witness Point**. Inspection of lines prior to backfill & compaction testing	Audit inspections
Manholes, inlets & outlets	**Witness Point** Inspect & assess compliance	Audit inspections
Cast In-situ concrete work	**Hold Point** Inspect reinforcement and/or formwork prior to concrete pour	**Witness Point**
Testing	**Hold Point** Witness testing of Manholes & Pipelines upon completion.	**Witness Point**
Sewerage Reticulation		
Location of Structures	**Hold Point** Inspect & assess compliance	***Witness Point.**
Material Quality (Bedding & Pipes)	**Hold Point** Inspection prior to laying of pipes	**Witness Point**
Pipelines	**Hold Point** Inspection prior to laying of pipes	Audit inspections
Backfilling	**Witness Point** Inspection of lines prior to backfill & compaction testing	Audit inspections
Manholes, Maintenance Shafts & Benching	**Witness Point** Inspect & assess compliance	Audit inspections
Cast In-situ concrete work & thrust / anchor blocks	**Hold Point** Inspect reinforcement and/or formwork prior to concrete pour	**Witness Point**
Trunk Infrastructure	**Hold Point** Pre-connection inspection of trunk lines.	**Witness Point**
Testing	**Hold Point** Witness testing of Manholes & Pipelines upon	**Witness Point**

Elements of Work	DR orIQP's[1] Responsibility	WDC's Responsibility
	completion.	
Water Reticulation		
Location	**Hold Point** Inspect & assess compliance	***Witness Point.**
Material Quality (Bedding & Pipes)	**Hold Point** Inspection prior to laying of pipes	**Witness Point**
Valves, Hydrants & Bends	Audit inspections	Audit inspections
Pipelines	**Hold Point**- Witness pressure test of lines. Witness disinfection / flushing of pipeline	**Witness Point** -
Backfilling	**Witness Point** Inspection of lines prior to backfill.	Audit inspections
Cast In-situ concrete work & thrust / anchor blocks	**Hold Point** Inspect reinforcement and/or formwork prior to concrete pour	**Witness Point**
Pump Stations & Valve Chambers		
Excavation	**Witness Point** Confirm water table level and founding condition	Audit inspections
Base reinforcement, formwork & ground water control	**Hold Point** Inspect reinforcement formwork & ground water control prior to concrete pour	**Witness Point**
Reinforcement and formwork	**Hold Point** Inspect reinforcement & formwork prior to concrete pour	**Witness Point**
Materials testing	**Witness Point** Review materials testing	Audit inspections
Hydrostatic Testing	**Hold Point** Witness hydrostatic tests.	**Hold Point**
Electrical and SCADA Equipment	**Witness Point** Review switchboard test certification. Inspect installation	**Hold Point** Review certification of telemetry (SCADA) & certification of switchboards prior to delivery to site
Mechanical Equipment	**Witness Point** - Review certification & inspect installation	**Witness Point**
Pump testing and Station Commissioning	**Hold Point** - Witness draw down testing of pumps. - Inspection against commissioning checklist.	**Hold Point**

Inspection & Test Plan - Storm water Reticulation

ITP to be completed by the DR or IQP[1]

Developer:		DR or IQP[1]:		DR or IQP's[1] Rep:		
Consent No:		Contractor:		Contractors Rep:		
Description:		Sub-contractors:		**I - Audit Inspections**		
		Inspector:		**H - Mandatory Hold Point**		
Location:		ITP Prepared by: Date: / /	Reviewed by: Date: / /	**W - Witness Point**		
				S - Surveillance		
Item	**Inspection Activity**	**Inspection Procedure & Acceptance Criteria**		**IQP**	**Validation**	**WDC**	**Validation**
1	Pre Start/Site establish	Pre-Start Meeting Checklist. Site establishment visual check. Checklist completed		H		H	
2	Materials Quality	Visual check approved materials. Quantity and condition		S		I	NA
3	Excavation and pipe laying	Visual check of excavation & bedding prior to pipe laying		H		W	
4	Backfilling	Visual checks and compaction testing		W		I	NA
5	Manholes & inlet/outlets	Visual checks and assess compliance		W		I	NA
6	Cast In-situ concrete work	Visual checks of reinforcement and/or formwork		H		W	
7	Testing	Witness testing of manholes & Pipelines		H		W	
8	Ponds / Treatment devices	Visual checks and assess compliance		W		W	
9	Landscaping	Visual checks and assess compliance		W		W	
10	Restoration	Visual inspection against photographs. Clearance letter from Council/property owner		W		W	
I certify that the works have been constructed in accordance with WDC Standards and the Inspection and Test Plan				----------		IQP[1] # --------	Date: / /20

[1] If the work is required to be carried out by or under the control of an IQP

Inspection & Test Plan - Sewerage Reticulation

ITP to be completed by the DR or IQP[1]

Developer:	DR or IQP[1]:		DR or IQP's[1] Rep:			
Consent No:	Contractor:		Contractors Rep:			
Description:	Sub-contractors:		**I - Audit Inspections**			
	Inspector:		**H - Mandatory Hold Point**			
Location:	ITP Prepared by:	Reviewed by:	**W - Witness Point**			
	Date: / /	Date: / /	**S - Surveillance**			

Item	Inspection Activity	Inspection Procedure & Acceptance Criteria	IQP	Validation	WDC	Validation
1	Pre Start/Site establish	Pre-Start Meeting Checklist. Site establishment visual check. Checklist completed	H		H	
2	Materials Quality	Visual check approved materials. Quantity and condition	S		I	NA
3	Excavation and pipe laying	Visual check of excavation & bedding prior to pipe laying	H		W	
4	Backfilling	Visual checks and compaction testing	W		I	NA
5	Manholes Maintenance shafts & Benching	Visual checks and assess compliance	W		I	NA
6	Cast In-situ concrete work & thrust / anchor blocks	Visual checks of reinforcement and/or formwork	H		W	
7	Testing	Witness testing of manholes & Pipelines	H		W	
8	Restoration	Visual inspection against photographs. Clearance letter from Council/property owner	W		W	
I certify that the works have been constructed in accordance with WDC Standards and the Inspection and Test Plan			----------		IQP[1]#	Date: / /

[1] If the work is required to be carried out by or under the control of an IQP

Inspection & Test Plan - Water Reticulation

ITP to be completed by the DR orIQP[1]

Developer:		DR or IQP:		DR or IQP's Rep:		
Consent No:		Contractor:		Contractors Rep:		
Description:		Sub-contractors:		**I - Audit Inspections**		
		Inspector:		**H - Mandatory Hold Point**		
Location:		ITP Prepared by:	Reviewed by:	**W - Witness Point**		
		Date: / /	Date: / /	**S - Surveillance**		
Item	**Inspection Activity**	**Inspection Procedure & Acceptance Criteria**		**IQP**	**Validation**	**WDC**	**Validation**
1	Pre Start/Site establish	Pre-Start Meeting Checklist. Site establishment visual check. Checklist completed		H		H	
2	Materials Quality	Visual check approved materials. Quantity and condition		S		I	NA
3	Excavation and pipe laying	Visual check of excavation & bedding prior to pipe laying		H		W	
4	Backfilling	Visual checks and compaction testing		W		I	NA
5	Valves, Hydrants & Bends	Visual checks and assess compliance		I		I	NA
6	Cast In-situ concrete work & thrust / anchor blocks	Visual checks of reinforcement and/or formwork		H		W	
7	Disinfection	Witness disinfection / flushing of pipeline		H		H	
8	Testing	Witness pressure testing of Pipelines		H		W	
9	Restoration	Visual inspection against photographs. Clearance letter from Council/property owner		W		W	
I certify that the works have been constructed in accordance with WDC Standards and the Inspection and Test Plan				----------		IQP[1]#	Date: / /

[1] If the work is required to be carried out by or under the control of an IQP

Inspection & Test Plan – Pump Stations

ITP to be completed by the IQP

Developer:		IQP:		IQP's Rep:		
Consent No:		Contractor:		Contractors Rep:		
Description:		Sub-contractors:		**I - Audit Inspections**		
		Inspector:		**H - Mandatory Hold Point**		
Location:		ITP Prepared by:	Reviewed by:	**W - Witness Point**		
		Date: / /	Date: / /	**S - Surveillance**		
Item	**Inspection Activity**	**Inspection Procedure & Acceptance Criteria**		**IQP**	**Validation**	**WDC**	**Validation**
1	Pre Start/Site establish	Pre-Start Meeting Checklist. Site establishment visual check. Checklist completed		H		H	
2	Materials Quality	Visual check approved materials. Quantity and condition		S		I	NA
3	Excavation	Visual check of excavation for water table & founding condition etc		H		W	
4	Foundations	Visual checks and compaction testing		W		I	NA
5	Base Slab	Visual checks of reinforcement and/or formwork		H		W	
6	Cast In-situ concrete work & thrust / anchor blocks	Visual checks of reinforcement and/or formwork		H		W	
7	Embedment & Backfill	Visual checks and compaction testing		W		I	NA
8	Scada & Electrical	Review certification and visually check installation		W		H	
9	Valves & Pipe work	Review certification and visually check installation		W		I	NA
10	Testing	Witness pressure testing of Pipe Work		H		W	
11	Disinfection	Disinfect to WDC requirements		H		H	
12	Telemetry	Programmed and connected to WDC system		H		H	
13	Pre-Commissioning Inspection	Complete Pre-Commissioning Inspection & Checklist		H		W	NA
14	Commissioning of Pump	Review Pre-Commissioning checklist & associated documentation –		H		H	

	Station	Inspection Test Plan, Management & Operation manuals etc				
15	Restoration	Visual inspection against photographs. Clearance letter from Council/property owner	W		W	
I certify that the works have been constructed in accordance with WDC Standards and the Inspection and Test Plan			----------		IQP	Date: / /

Inspection Certificate for Witness/Hold Point

To be completed by the DR or IQP[1]

QA/QC MANUAL
VESTED ASSETS

INSPECTION CERTIFICATE FOR WITNESS/HOLD POINT

This certificate registers that the works as noted herein has been inspected by the Inspector noted below and were found to be satisfactory.

Development Name: .....

Development Location: .....

DR orI QP's[1] Inspector:.....

Contractor: .....

Resource Consent No: .....

Works being Inspected / Tested / Witnessed:

.....

.....

.....

.....

.....

.....

.....

DR or IQP's[1] Inspectors Signature: .....

Date of Inspection: .....

WDC Inspectors Signature: ..... (if required)

DR or IQP's[1] Signature: .....

[1] If the work is required to be carried out by or under the control of an IQP

Pre-Commissioning Checklist - Pump Stations

To be completed by the IQP

PRE-COMMISSIONING CHECKLIST FOR NEW PUMP STATIONS

The following checklist is required to be fully completed, signed and returned to Council before a joint commissioning is considered. Please note: in the event of a commissioning being abandoned due to works not completed or operational, Council will recover costs incurred.

Station Name ..... **Station No:** .....

Resource Consent No: .....

- ⇨ Provision of power Yes ☐ No ☐
- ⇨ Provision of sufficient water for all testing purposes Yes ☐ No ☐
- ⇨ Pre commission switchboard test completed Yes ☐ No ☐
- ⇨ Station telemetry points list supplied Yes ☐ No ☐
- ⇨ Established telemetry communications and verified inputs locally Yes ☐ No ☐

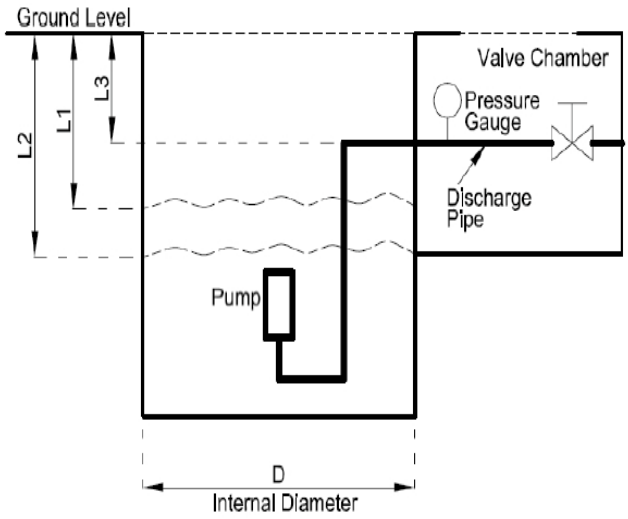
Verification Of As Constructed Levels and Operation

Note: Levels taken from top of well cover down

Setting/Alarm	**Measurement**	**Operational function (IQP to verify correct operation)**
Overflow alarm	m	Yes ☐ No ☐
H/L back up pump 2 start	m	Yes ☐ No ☐
H/L back up pump 1 start	m	Yes ☐ No ☐
Float/Probe high level alarm	m	Yes ☐ No ☐
H/L pump cut out/ Transfer	m	Yes ☐ No ☐
Duty pump cut-in	m	Yes ☐ No ☐
Duty pump cut out	m	Yes ☐ No ☐
Float/Probe low level alarm	m	Yes ☐ No ☐
Level settings in according to design		Yes ☐ No ☐

Procedure for Performance Testing of Pumps

IQP to complete for all pumps:



General Sewerage Pump Station Well

Date

Pump No _____

Pump make/model:

Electric motor kw _____SPEED _____RPM

Serial no:= _____

Measure inside diameter of well:- D = _____m

Measure L3 = _____ m

Pump duty head H = _____m

Pump duty flowrate Q =_____L / S

(A) QUICK CHECK OF PUMP GENERAL CONDITION - HEAD TH1 (AT VALVE CLOSED)

L1 , L2 - operating levels
Run pump for one minute with the delivery valve open.
Close the valve.
Read L1 in meters at the beginning of one minute.
Read L2 in meters at the end of this minute.
Read AMP meter.
Read pressure gauge (HD) in meters at the end of one minute.
Record :

L1	L1 = ... m
L2	L2 = ... m
Delivery Gauge reading HD	HD = ... m
Height Correction HC = L2 – L3	HC = ...m
Total head TH1 = HD + HC	TH1 = ...m

Check TH1 against the pump curve at no flow condition
Check AMPs on pump curve

(B) QUICK CHECK OF INFLOW Q1 (IF INFLOW BLOCKED OFF - GO TO (C))

L1 , L2 - operating levels
Switch off the pump and keep the delivery valve closed.
Read L1 in meters at the beginning of one minute.
Read L2 in meters at the end of this minute.

L1	L1 = ... m
L2	L2 = ... m

Calculate flowrate Q1 during this minute

Q1 = ... l/s

(C) NORMAL FLOWRATE Q2 TEST (VALVE OPEN)

L1 , L2 - operating levels
Run pump for one minute with the delivery valve open.
Read L1 in meters at the beginning of one minute.
Read L2 in meters at the end of this minute.
Read AMP meter.
Read HD in meters at the end of one minute.
Record :

(C) Cont.

L1 L1 = ... m
L2 L2 = ... m
Delivery Gauge reading HD HD = ... m
Height Correction HC = L2 – L3 HC = ...m
Total head TH2 = HD + HC TH2 = ...m

Calculate flowrate Q2 during this minute

Q2 = ... l/s

Check AMPs on pump curve

(D) **QUICK CHECK OF INFLOW AGAIN Q2 (IF INFLOW BLOCKED OFF GO TO (E))**

L1 , L2 - operating levels
Switch off the pump and keep the delivery valve closed.
Read L1 in meters at the beginning of one minute.
Read L2 in meters at the end of this minute.

L1 L1 = ... m
L2 L2 = ... m

Calculate flowrate Q3 during this minute

Q3 = ... l/s

(E) **SUMMARY**

If inlet is blocked off for the time of the test the duty head H and duty flowrate Q should be similar to TH2 and Q2.

If inlet is not blocked off for the time of the test the duty head should be similar to TH2 and duty flowrate shoud be similar to :

$$Q\,D = Q2 + (Q1 + Q3)/2$$

Pressure gauges calibrated Yes ☐ No ☐

Pump performance satisfactory Yes ☐ No ☐

Test performed by .....

Pump performance results as compared to tender offer satisfactory? Yes ☐ No ☐

IQP's General Comments:

.....

.....

.....

.....

All information has been supplied and verified ready for Commissioning

IQP's Inspectors Signature: .....

Date of Inspection: .....

WDC Inspectors Signature: ..... (if required)

IQP's Signature: .....

NOTE: The Telemetry is to be fully ready for commissioning

Commissioning of Civil Works

Item	Complete Yes/No	Date /Initial	Council Audit
Management			
Verify that all documentation has been provided. (as constructed details, operating manuals, test results etc)			
If NO then close audit.			
Concrete			
Verify that the pump station concrete works is as designed e.g. Cast in-situ.			
Verify that there is no damage to any exposed concrete surface.			
Verify that drainage of the site is away from the Pump Station & the Station is above the 1:100 year flood level			
Verify that the surface dimensions of the top slab are in accordance with the design drawings.			
Verify that the below ground concrete structures (including emergency storage) are dimensionally correct and in accordance with the design drawings.			
Verify no seepage through the concrete structure.			

Item	Complete Yes/No	Date /Initial	Council Audit
Verify the structure is plumb & within the design tolerances.			
Verify that the pump well benching has been provided in accordance with design drawings. (Flygt "TOPS" base)			
Verify that the coatings have been applied in accordance with the design specifications & Council requirements			
Products & Materials			
Verify that all incorporated items/products are approved for Council use			
Verify that all markings as required by Council specifications are visible.			
Verify that the covers and frames are greased in accordance with the manufacturer's requirements.			
Verify that the covers comply with "Manukau City Council" standard details as per Council requirements			
Verify wet well covers are in accordance with the Council specifications			
Pipes and Fittings			
Verify that the pump station pipes & fittings are as per the designed e.g. 316 stainless steel within pump well.			
Verify that the incoming sewer is in accordance with the design drawings & includes a dropper pipe			
Verify that pumps are clear of all inlet pipe work			
Verify that there is only one inlet pipe to the pump station.			
Verify that there is sufficient clearance for maintenance.			
Verify all bolts are 316 stainless steel with 308 nuts.			
Verify that the valves are anticlockwise closing.			
Verify that adequate supports are provided in accordance with Council standards			
Verify that the pipe work has been provided to correct nominal diameter			
Verify that the Non return ball valves have been provided as per council requirements			
Electrical Equipment			
Verify that the Station Identification plate has been fitted to the electrical cabinet.			
Verify that the Control cabinet is fitted in accordance with the design specifications & Council requirements			
Verify that the Control cabinet complies with the WDC District Plan height and coverage rules			

Item	Complete Yes/No	Date /Initial	Council Audit
Living 1, 2 and 3, Business 1, 2 and 3 & Open Space Environments Height not greater than 1.5m Area not exceeding 3.0 m2 Countryside, Coastal Countryside & Business 4 Environments Height not greater than 2.5m Area not exceeding 4.5 m2			
Verify that the Control cabinet is fitted with heating/cooling fans (if required)			
Verify that pumps are Flygt - 3 phase submersibles located on guide rails & connected to approved soft starters or variable speed drives if 5 Kw or greater			
Verify that the telemetry has been fitted in accordance with the design specifications & Council requirements & antenna has adequate protection, is programmed & connected to Councils SCADA system			
Verify that lighting within the switchboard has been provided			
Verify that float cables & lifting chains have hook plates fitted			
Verify that the flow meter (if required) is fitted & functioning in accordance with the design specifications & Council requirements& connected to Councils SCADA system			
Mechanical Equipment			
Verify that the guide rails comply with the design specifications & Council requirements			
Verify that the lifting chain complies with the design specifications & Council requirements			
Verify that the Pump footstools have been secured to wet well floor with appropriate chemical anchors & 316 S/S bolts.			
Verify that pumps can be fully removed from pump station without disconnecting the guide rails.			
Verify that wet well & emergency storage washers are provided in accordance with the design specifications & Council requirements			
Other Services			
Verify that a 25mm water service has been provided and			

Item	Complete Yes/No	Date /Initial	Council Audit
the water account is paid in full Meter Reading			
Verify that the water service has been fitted with an approved back flow prevention device.			
Verify that all conduits through the walls have been sealed to prevent odour escaping			
Verify that the sealed access track is in accordance with the design drawings and Council requirements			
Verify that a power supply has been provided and the power account is played in full Meter1 Reading ..... Meter2 Reading ..... Meter3 Reading			
Security			
Verify that the security fencing has been installed in accordance with the design specifications & Council requirements (if required)			
Verify that Council keyed locks are installed			
Verify that the switchboard/meter cabinet has been fitted with Council Locks			
Testing			
Verify that pump well infiltration test passed			
Verify that pump draw down tests passed			
Verify that the rising main has been tested			
Verify the water service back flow prevention device has been tested			
Overflow			
Verify overflow has been constructed in accordance with the design specifications & Council requirements (including levels)			
Verify flap valves are in place and operational			
Verify Overflow can be accessed for maintenance			

Item	Complete Yes/No	Date /Initial	Council Audit
OSH			
Verify Full Risk Assessments have been performed and permanent operational/ maintenance risks identified			
Verify that all signage pertaining to those risks is in place			
Verify that there is adequate access, manoeuvrability and parking for maintenance vehicles			
Verify that there is adequate distance between wet well opening and switchboard			
Verify that safety cages been specified in accordance with the design specifications & Council requirements			
Restoration			
Verify that the site restoration has been completed.			
Have all items been resolved (including any raised as a result of this audit)?			
If YES Issue Acceptance of Works, and close audit.			

Works Acceptance Inspection Checklist

Development Name: ……

Resource Consent No: ……

Development Location: ……

Item	Verification (Yes / No / NA)	Comments
Storm water Drainage System: The works have been finally inspected and:		
Pipe layout is as per plan or approved amendments with respect to pipe size, levels and location.		
Pipe work has been visually inspected and is satisfactory, i.e. • alignment and grade • free of debris and siltation • pipe joints satisfactory • lifting plug holes sealed • no visible sign of trench subsidence • Compaction testing of backfill is available and satisfactory with surface restored. • no damaged pipes.		
Sumps and manholes have been constructed to the correct standards, i.e. • correct type of grate or cover • lintels • side entry slots • benching (no water ponding) • grates are satisfactorily & seated in frames • weep holes are provided to bedding material • no damaged to structures • converter slabs/sections mortared & bedded • correct drops through sumps/manholes • all lids/grates finished to match surface level		
All compaction tests for backfill are available and satisfactory.		
Material gradings are available for bedding material and satisfactory.		
Outlet/Inlet structures are satisfactorily constructed and are free from scour or siltation.		
All manhole and sump pipe connections are mortared flush with the walls and no pipe reinforcement is exposed.		
Open cut channels have been finally inspected are satisfactory, i.e. • cut to design profiles • lining of channel is to the required thickness and reinforcement, with appropriate weep holes		

Item	Verification (Yes / No / NA)	Comments
Overland flow, the works have been finally inspected and appropriate flow paths are provided and clear of obstruction.		
Outlets and outfalls have been constructed to control discharge flow in accordance with the plans.		
Subsoil drainage discharges to gullies or other approved points of discharge.		
All grassing requirements to channels, swales, outlets, inlets etc have been completed.		
CCTV inspections of storm water pipes		
Water Quality: The works have been finally inspected and:		
Water Quality structures have been constructed in accordance with approved engineering drawings		
Structures are free of debris and sediment		
Sewer Reticulation: The works have been finally inspected and:		
Pipe layout is as per the plan or approved amendments with respect to pipe size, levels, and location.		
Pipe work has been visually inspected and is satisfactory, i.e. • pipe work flush with internal walls of manhole • alignment and grade • flexible joints • line flushed and clean • no visible sign of trench subsidence • Compaction testing of backfill is available and satisfactory. • CCTV survey results submitted and satisfactory		
Manholes and Maintenance Shafts have been constructed to the correct standards, i.e. • benching • no ponding • profile satisfactory • no weeps (free of infiltration) • concrete work • no honey combing • covers correct type • covers checked to be water tight • depth of cover surround – flush with finished surface level • depth of top slab • location relative to lot boundaries		
Material gradings for bedding material are available and satisfactory.		
Pressure test results are available and		

Item	Verification (Yes / No / NA)	Comments
satisfactory.		
Manhole hydrostatic test all satisfactory.		
Pump Station – refer separate Checklist		
Water Reticulation: The works have been finally inspected and:		
Pipe layout and services fixtures (valves and hydrants) are as per the plan or approved amendments with respect to pipe size and location.		
Pipe work has been pressure tested in accordance with Council's requirements and test results are available and satisfactory.		
Pipe work has been flushed & chlorinated in accordance with Council's requirements.		
There are no visible signs of trench subsidence or leaks.		
Compaction testing of backfill is available and satisfactory with surface restored.		
Valves and hydrants have been inspected and are satisfactory, i.e. • location • sets and surrounds correctly installed to prevent ingress of soil, etc. • mortar packing to boxes correctly completed • depth to top of hydrant or valve stem within limits • covers to hydrants & valves • colour of marker plate correct • direction of flow indicated • marking plates correctly installed		
Material grading for bedding material is available and satisfactory.		
Pump Station – refer separate checklist		
Road Pavements: The works have been finally inspected and:		
Plan layout and geometry of road system is in accordance with the drawings.		
Finished levels of the crown and channel are to design levels.		
Cross falls are to the approved plan.		
AC / chip seal is satisfactory with regard to finish & quality.		
Joints in the seal (especially where various development stages apply) are flush.		
The sealed surface is free of blemishes.		
All compaction test, material quality, material		

Item	Verification (Yes / No / NA)	Comments
grading, are satisfactory and available		
Ponding of storm water does not occur.		
Concrete Works: The works have been finally inspected and:		
The correct type has been used at all locations in accordance with drawings.		
Ponding of storm water does not occur.		
Transitions and connection to existing construction is smooth and to a satisfactory standard of workmanship.		
Lip and back of kerb are flush with the roadway and footpath		
All channelization works and medians have been satisfactorily completed.		
Infill treatment of medians has been inspected and is satisfactory. Any landscaping has been completed to standard.		
Subsoil drains have been provided (including under medians).		
Appropriate expansion and contraction joints provided		
Subsurface finish is to the approved design and within the specified tolerances		
Footpaths: The works have been finally inspected and:		
Profiles & surface are as per the plans & specifications.		
All service fixtures (such as valves etc.) flush with the surrounding footpath.		
Pram ramps constructed as required.		
Approved property entrance ways are constructed in accordance with the drawings.		
Areas adjacent to the footpaths are top soiled, grassed and satisfactory		
Footpaths to be free of rocks and loose stones.		
Lighting: The works have been finally inspected and:		
Lighting has been installed and is operating as per approved design		
copy of service agreement from the power supply company		
Other		
Approvals for the completed works have been obtained from all other agencies		
Street name signs, traffic signs and pavement		

Item	Verification (Yes / No / NA)	Comments
marking have been installed/completed.		
Works have not resulted in problems on neighbouring properties. Clearance letters from adjacent property owners are available where applicable.		
All necessary testing to ensure the quality of the work has been carried out and results are available.		
IQP's Statement of Compliance "As Constructed" is completed		
As-built plans have been approved		
All test results and records have been compiled and a copy forwarded to Council.		
All operating Manuals, maintenance procedures, mechanical warranties etc have been submitted to Council.		
Parkland is in a mow able condition where practical and free of rock and loose stones.		
Irrigation systems have been provided, are operating as designed and council has accepted ownership of the Water connection.		
Verify that water service has been provided and the water account is paid in full. Meter Reading.....		
NR or IQP's[1] Signature: ..... NR or IQP's[1] Name:..... Registration number……. Date: ...../...../.....		

[1] If the work is required to be carried out by or under the control of an IQP

Statement of Compliance - As Built Works

Name of Development: .....

Consent Number: .....

Location of Development: .....

Applicant: .....

IQP .....

It is hereby certified that the "As-Built" drawings submitted have been prepared, checked and amended in accordance with the requirements of the Whangarei District Council's Environmental Engineering Standards and that the completed works comply with the requirements therein.

(Note: Certification is to be in accordance with the Whangarei District Council's Environmental Engineering Standards).

Compliance with the manual Design Intent and Function not compromised by the "As Constructed" Works.	**Compliance Yes / No**	**Non-Compliance refer to attached redesign of works to ensure satisfactory performance**
Road works		
Storm water Drainage		
Water Reticulation		
Sewerage Reticulation		
"As Constructed" Documentation		

NR or IQP's[1] full Name: .....

Date of Inspection: ...../...../.....

NR or IQP's[1] Signature: .....

NR or IQP's[1] registration number: .....

[1] If the work is required to be carried out by or under the control of an IQP