

ACS1510 Internal inspection of pipelines

Contents

ACS1510	Internal inspection of pipelines	1
ACS1510.1	Scope	2
ACS1510.2	General requirements	2
ACS1510.2.1	Cleaning.....	3
ACS1510.2.2	CCTV Inspection	3
ACS1510.2.3	Laser profiling.....	7
ACS1510.2.4	Walkthrough surveys.....	10
ACS1510.2.5	Asset validation.....	11
ACS1510.2.6	Optional codes	13
ACS1510.2.7	Major defects requiring immediate attention	14
ACS1510.2.8	Significant flow capacity ‘hazards’ requiring notification	14
ACS1510.2.9	Personnel.....	14
ACS1510.2.10	Quality assurance	15
ACS1510.2.11	Information to be provided to the Contractor	15
ACS1510.2.12	Information to be supplied by the Contractor.....	16
ACS1510.2.13	Deliverable format	16
ACS1510.2.14	Liaison with call centre.....	20
ACS1510.3	General condition surveys (planned inspections)	20
ACS1510.3.1	Introduction/scope.....	20
ACS1510.3.2	Cleaning.....	20
ACS1510.3.3	Still images	21
ACS1510.3.4	Additional surveys.....	22
ACS1510.3.5	Quality assurance	23
ACS1510.4	Post construction/as-built surveys.....	24
ACS1510.4.1	Introduction/scope.....	24
ACS1510.4.2	Cleaning.....	25
ACS1510.4.3	Preparation prior to inspection.....	25
ACS1510.4.4	Still images	25
ACS1510.4.5	Depth of water flow during inspection.....	25

ACS1510.4.6	Temporary asset numbers	25
ACS1510.5	Build over/building consent surveys	26
ACS1510.5.1	Introduction/scope.....	26
ACS1510.5.2	Cleaning.....	26
ACS1510.5.3	Extent of CCTV inspection	27
ACS1510.5.4	Still images	27
Appendix 1 - Surveys Import File Specifications V4		29

ACS1510.1 Scope

This section covers the gathering asset condition data from pipelines, manholes, and other structures, using CCTV (closed circuit television) and still digital camera images, manual inspection, and laser profiling to directly inspect the internal surfaces of the pipeline.

Section ACS1510.2 of this specification sets out the general requirements. The following sections set out the specific requirements for certain types of internal inspections:

- a) Section ACS1510.3 General condition surveys (planned inspections)
- b) Section ACS1510.4 As-built/post construction surveys
- c) Section ACS1510.5 Build-over/consent surveys.

ACS1510.2 General requirements

Preparation, setup, and operation of inspection equipment, capture and supply of video and photographic images, condition code reporting, identification and recording of defect and feature codes, shall all be undertaken in accordance with the *New Zealand Gravity Pipe Inspection Manual (NZGPIM4)*. This specification sets out only the particular requirements for the internal pipe inspection for Auckland Council or specific changes to NZGPIM4. This Specification shall be read in conjunction with NZGPIM4. Where there is a discrepancy between this Specification and the NZGPIM4, this Specification shall take precedence.

Any work that is notifiable works under the Health and Safety in Employment Regulations shall be lodged with WorkSafe New Zealand. Copies of notifications shall be supplied to the Contract Administrator.

ACS1510.2.1 Cleaning

Cleaning of stormwater pipelines shall not be undertaken unless tree roots, debris or obstructions prevent inspection equipment or personnel from travelling the full length of the asset. Cleaning shall only be undertaken when instructed by the Contract Administrator.

Where instructed, cleaning shall be in accordance with Auckland Council Standard Specification *ACS1410 Pipe Cleaning*.

CCTV inspections shall be carried out at the first possible time after cleaning (when cleaning has been specified) but not later than 7 days. Any build-up of debris occurring between cleaning and inspection shall be removed as necessary for a satisfactory picture quality.

ACS1510.2.2 CCTV Inspection

ACS1510.2.2.1 Inspection equipment

The Contractor shall only use:

- Pan-tilt-zoom colour cameras capable of looking up lateral connections in a downstream direction
- Digital scanning cameras utilising wide angle lenses
- Fixed axial colour camera for pipe diameters less than 150 mm, or where accepted by the Contract Administrator.

The camera equipment may be transported on a tractor/crawler, pushrod or floating platform as required.

The inspection equipment shall be sufficient to enable a single pass inspection of a minimum 100 m length of pipeline.

ACS1510.2.2.2 Depth of water flow during inspection

The CCTV inspection shall be carried out in minimum flow conditions to maximise the perimeter of conduit view. Flow shall be controlled such that the maximum depth of flow is as specified below, for inspections carried out from the upstream manhole:

- | | |
|-------------------------|------------------|
| a) 100 mm - 225 mm pipe | 20% of diameter |
| b) 300 mm - 600 mm pipe | 25% of diameter |
| c) >600 mm pipe | 30% of diameter. |

The above maximum depths of flow shall be reduced by 50% for inspections carried out from the downstream manhole, i.e. against the flow of water.

If the maximum depth of water flow exceeds specified depths, then the flow shall be lowered by plugging the line and/or bypass pumping or by rescheduling the CCTV inspection to time when there is less flow.

Where it is not practical to reduce flow depths to the specified maximum depths, the reason shall be provided in the log sheet header.

Notwithstanding the provisions of this Clause, the Contract Administrator may reject inspections should depth or velocity of flow affect the picture quality.

ACS1510.2.2.3 Inspection through dips

CCTV inspections shall generally continue throughout the full length of any dip that is encountered, and the extent of the dip noted on the log sheets as a continuous defect in the normal manner. The depth of the base flow shall be discounted from the depth of flow in the dip to determine the dip severity.

If the depth of water in the dip exceeds 40% of pipe diameter, or if the Contractor has genuine concerns about the safety of the equipment in a dip, the Contractor shall abandon the inspection and the inspection shall then continue from the opposite direction. The length of the dip shall be determined by either travelling through the dip or inspecting from the other direction.

The base flow level should be considered when determining the depth of a dip. That is, if there is a base flow of less than or equal to 10 mm, then this can be added to the 20 mm dip allowance and the dip would not be coded as a defect.

ACS1510.2.2.4 Abandonment

Where the full section of pipeline can be inspected by removing temporary obstructions, the inspection is not regarded as “abandoned”.

Abandoned inspections shall all be recorded and the reason/s for abandonment clearly identified in the “Remarks” column of the Condition Records, and the Inspection Status recorded as “UI” (Uncompleted Inspection) in the header.

Where the cause of the abandonment is rectified prior to completion of the inspection works with intervention by the Contract Administrator, the Contractor shall complete the inspection.

ACS1510.2.2.4.1 Inspections from both ends of a pipeline section

Where inspections from both ends occur, the Contractor shall record the following details in the “Remarks” field of the Condition Records for each additional inspection:

- a) The circumstances of the continuation of the inspection
- b) The date of continuation of the inspection
- c) The video record number (if different recorded by entering using the PC feature code)

Video records of multiple inspections may be on different video files.

Should the Contractor consistently inspect from both ends of pipeline sections due to equipment or methodology inadequacies, the Contract Administrator shall require the Contractor to make appropriate changes to enable single-pass inspections.

ACS1510.2.2.5 Camera speed

Camera speed shall be as defined in B1.2.3.2 of NZGPIM4.

Where the CCTV inspection is being carried out with equipment that digitises the pipe inspection, maximum and minimum speeds of travel are not applicable.

Camera travel shall be as smooth as is practicable. The camera shall move forward only when the line of sight is along the spring line of the pipeline. The camera shall not travel forward with the camera in pan or tilt mode.

Where these speeds are exceeded, either instantaneously or as an average, to the extent where the Contract Administrator considers the operator's ability to identify defects is compromised, the Contractor shall repeat the inspection.

Where the above minimum speeds are consistently unachievable due to lack of traction or for any other reason, the Contractor shall fit a tow line to the camera and pull it through the pipeline or take other appropriate action.

ACS1510.2.2.6 Picture quality

Inspection equipment shall provide a picture quality suitable for the purpose of the pipeline inspection in the opinion of the Contract Administrator.

Video and still pictures shall be sufficiently sharp that any defect can be clearly seen.

The Contractor shall submit for the Contract Administrator's acceptance, a sample video record for all CCTV cameras that will be used. The video 'benchmark' samples provided for each camera shall provide examples of outputs for the various ranges of pipe diameters that the camera is proposed to be used for.

The sample videos will form a reference, benchmark video, for acceptable picture quality for quality assurance purposes.

If the picture quality of submitted inspections is found to be not acceptable to the Contract Administrator, the Contractor shall carry out a re-inspection. Grounds for rejecting an inspection due to inferior picture quality may include:

- a) Not meeting the standard accepted from the benchmark video
- b) Fault level L1 or L2 as categorised in Table A4.7 Section A4.4.4, NZGPIM4

- c) Repeat occurrences of video quality faults as defined as L3 and categorised in Table A4.7
Section A4.4.4, NZGPIM4

Where the pipe material is not conducive to CCTV inspections, such as white reflective or black, light absorbing polyethylene pipe, the Contractor shall adjust light intensity to maintain picture quality as best as practicable.

ACS1510.2.2.7 Linear measurement - accuracy of measuring equipment

The CCTV monitor shall display, to tenths of a metre, the camera's position in the pipeline relative the centre of the start manhole. The displayed camera position shall be accurate to $\pm 2\%$ or 0.3 m, whichever provides greater accuracy.

The camera cable shall be kept taut in front of the distance measurement unit to ensure the meterage shown on the screen reflects the true position of the camera. The camera cable shall not be coiled in front of the distance measurement unit, except for the first metre or so of the inspection, prior to setting the distance measurement system. If the camera is reversed, the camera cable shall also be pulled back through the distance measurement unit to ensure correct distance measurements are maintained.

Where a defect or feature occurs prior to the minimum monitor distance setting, the Contractor shall estimate the distance from the centre of the manhole.

Where an inspection proceeds through a manhole or node, whether marked or unmarked on the plan, the distance reading shall be re-set to zero at the centre of that point.

ACS1510.2.2.8 Video recording and information display

ACS1510.2.2.8.1 General

Video records shall be recorded and edited as necessary to ensure that:

- a) Screen headers appear on the screen for a maximum of 5 seconds at the start of each inspection
- b) The camera is seen to move continuously through the pipelines, except at features or defects
- c) Any stops at features or defects in excess of 10 seconds (or 25 seconds for a pan and tilt camera) are removed
- d) Features or defects are clearly in focus for 5 seconds.

ACS1510.2.2.8.2 Screen header information

In addition to the start of inspection requirements described in B1.2.2.8, NZGPIM4, the following additional information shall be displayed:

- a) Client reference ID (e.g. contract number)
- b) Location (town or suburb).

Where a new manhole or node is identified during the inspection, a corrected screen header shall be displayed at the conclusion of the inspection of that newly identified section.

Promotional material shall not be entered onto the video record.

ACS1510.2.2.8.3 Continuous display

In addition to the Continuous Screen Display (Running Page) requirements described in B1.2.2.8, NZGPIM4, the following additional information may be displayed:

- a) Inclinator display (if available).
- b) Camera head position diagram (if available).

The continuous display may be temporarily deleted or moved if necessary to facilitate viewing of defects.

ACS1510.2.2.9 Risk to equipment

Auckland Council will accept no responsibility for damage to, or loss of, the Contractor's equipment. Any works required to recover Contractor's equipment shall be the full responsibility of the Contractor and shall be carried out only with the prior approval of Auckland Council.

In the event that the Contractor considers that to proceed further with cleaning or an inspection could involve risk of damage to the equipment, or risk of equipment becoming jammed in the pipeline, then that inspection may be abandoned at that point. The Contractor shall then inspect from the other direction to the point of abandonment.

ACS1510.2.3 Laser profiling

Where laser profiling is required, a combination colour CCTV pipe inspection system complying with this Specification with cable distance counter, circumferential laser ring projection system and measurement software shall be used.

ACS1510.2.3.1 Laser profiling equipment

Laser profiling equipment shall provide data of sufficient accuracy and level of detail for the purpose of the pipeline inspection in the opinion of the Contract Administrator.

ACS1510.2.3.2 Accuracy

Laser profiling equipment shall be capable of achieving an accuracy of at least 0.5%. Calibration certificates not more than 6 months old shall be supplied for the equipment to be used.

ACS1510.2.3.3 Profile inspections

- Flow Depth for Ovality Analysis flow shall not exceed 1/3 full.
- For Corrosion Analysis, flow shall not exceed 1/3 full and shall be performed during lowest flow period.
- The camera head will be configured to a central position in the pipe (+/-15%).
- Laser ring shall be clear, central and take up between approximately 2/3 and 3/4 of the vertical screen.
- Lights shall be turned off.
- Distance counter shall be displayed.
- Distance counter shall not overlap the laser ring.
- All other text shall be removed from screen.
- Camera shall be in home position (0,0) for the entirety of the profile inspection.
- Recording shall be from start manhole to end manhole.
- Profiling shall be performed in either a forward or reverse direction, however, this shall be clearly displayed in the header details of the profile inspection.
- The camera and laser system shall be moved through the pipe at a constant speed not to exceed 10 m or 30 feet per minute.
- The tractor shall not stop in the pipe during the profile inspection.

The camera shall not perform pan or tilt during profile inspection. Pan and tilt operations shall be performed during the CCTV lights on inspection.

ACS1510.2.3.4 Calibration

Calibration shall be performed using the same CCTV camera and video recording medium as used for the inspection:

- The calibrator shall be assembled as per manufacturer's instructions and shall be performed using the exact CCTV camera and laser configuration used in the profile inspection
- The calibrator shall be clearly viewed (focussed) and without glare on screen
- The calibrator shall be recorded in the horizontal position and in the vertical position
- The video image shall be included in the submitted inspection video.

ACS1510.2.3.5 CCTV camera lens correction

To validate camera lens correction, a flat 'lens correction grid' shall be placed perpendicular to camera lens recorded using the same CCTV camera and video recording medium as used for the inspection.

All text shall be removed from the screen. The checkers shall be clearly viewed (focussed) and without glare on screen. The video image shall be recorded and be included in the submitted Inspection video.

ACS1510.2.3.6 Software analysis

The inspection video shall be loaded into the profiling software:

- The correct camera option shall be selected based on the CCTV camera used in the profile inspection
- The selected camera option shall be automatically stamped into the data file so that the settings cannot be changed
- The camera setting shall be displayed in the profiling data file.

Horizontal and vertical calibration shall be performed on the calibration segment of the inspection video:

- The profile pipe selection shall be from start of pipe asset (beside start manhole) to end of pipe asset (beside end manhole) and selected using the start and end markers in the profile software
- The profile software shall be tuned to the laser ring so as to provide maximum number of profile points
- A water/debris mask shall be positioned to mask the highest water/debris point in the pipe.

The data file shall be recorded at 25 to 30 profile cross-sections per second and linked to the profile inspection segment of the video:

- The recorded video shall be used to provide quantitative information of pipe diameter, ovality and corrosion
- Due to the complex nature of corrosion, all Corrosion Reports must be created by a qualified profiler analyst in the opinion of the Contract Administrator.

ACS1510.2.4 Walkthrough surveys

ACS1510.2.4.1 General

Walk through surveys shall use the following equipment as a minimum:

- a) Still camera with date and time imprint
- b) Video camera with date and time imprint and audio facility
- c) Linen tape for distance measurement.

The time and date imprint of the video and still cameras shall be synchronized before the start of each inspection to allow cross-referencing of still and video images.

ACS1510.2.4.2 Recording laterals and defects

All pipe laterals and defects shall be recorded by:

- a) Video record with commentary including nature of the defect, distance from the manhole and comments
- b) Still photographs
- c) Log sheet records.

ACS1510.2.4.3 Accuracy

Longitudinal measurements shall be accurate to ± 50 mm.

Circumferential position of defects and laterals shall be accurate to $\pm 10^\circ$ or located by height above invert with an accuracy of ± 25 mm.

ACS1510.2.5 Asset validation

An important output from an internal pipeline inspection is the confirmation of the location and attributes of the inspected assets. This includes:

Pipe size and materials	<ul style="list-style-type: none"> The pipe diameter shall be measured. The correct information shall be recorded on the log sheet header. Any differences between Auckland Council's records and what was observed in the field shall be summarised in the "comments" section of the log sheet. If the pipe size measurement cannot be obtained, the field is to be left blank. A description of why the measurement could not be obtained shall be written in the comments section of the log sheet.
Newly found assets	<ul style="list-style-type: none"> Where a manhole that is not shown on Auckland Council's GIS is located, the Contractor shall prepare an as-built drawing, marked over an aerial photograph, showing the location of the manhole, with measurements from two perpendicular fixed points. The manhole shall be allocated a temporary asset number. Refer below, to <i>ACS1510.2.5.1 (Temporary asset numbers)</i>. The existence of the new manhole shall be noted in the "comments" section of the log sheet. The existence of the manhole will mean that there are now two pipeline assets. The existing pipe asset SAP ID shall be used for the first section inspected. A temporary asset ID shall be used for the second pipe section, (refer to Clause <i>ACS1510.2.5.1 – Temporary asset numbers</i>). Should another unrecorded manhole be found, in the second section, the same naming process shall be used. The temporary numbers allocated are to be shown on the site sketch.
Manholes in different locations	<ul style="list-style-type: none"> If a manhole is found to be more than 5 m from that shown on Auckland Council's GIS or located in a different property, the Contractor shall prepare an as-built drawing, marked over an aerial photograph, showing the location of the manhole, with measurements from two perpendicular, fixed points. The location of the manhole shall be noted in the "comments" section of the log sheet.
Connectivity	<ul style="list-style-type: none"> If the connectivity is different to that shown on Auckland Council's GIS, then the Contractor is to prepare a site sketch showing the actual connectivity. The actual connectivity is to be noted in the "comments" section of the log sheet.
Depth to pipe inverts	<ul style="list-style-type: none"> Shall be measured at both upstream and downstream access points. The depths to pipe inverts are to be provided on the log sheet header.

ACS1510.2.5.1 Temporary asset numbers

The Contractor shall use the asset SAP IDs as provided by Auckland Council unless there is a need to create a temporary asset ID.

If the need arises to inspect additional existing pipe assets that were not initially identified/highlighted, the correct asset SAP IDs shall be used in log sheets. These asset SAP IDs shall be obtained from Auckland Council's website (Auckland Council GIS Viewer, or H2KnowHow).

The Contractor will use unique temporary IDs for all new built assets, split pipes, newly found manholes or other point assets not currently shown on Auckland Council's GIS.

The temporary asset IDs will follow the following rules:

New built assets	<ul style="list-style-type: none"> Development asset IDs as shown on as-built drawings
Newly found and split pipes	<ul style="list-style-type: none"> Start with "L" followed by the pipe asset SAP ID of the pipe immediately upstream plus an A (any new adjoining pipes would be B/C etc.), e.g. L12345A.
Newly found point assets such as manholes	<ul style="list-style-type: none"> Start with "P" followed by the node asset SAP ID of the node immediately upstream plus an A (any other new point assets found in a consecutive string would be B/C etc., e.g. P12345A.

Assets that have been allocated temporary asset IDs are to be shown on the as-builts required to be completed under Section ACS1510.2.5.2 (*As-builts*) below.

ACS1510.2.5.2 As-builts

Where the actual position of a manhole or the pipe arrangement differs from that shown on Auckland Council's GIS plans, then As-built Plans shall be prepared showing the correct position of the manhole and/or pipe arrangement. Plans shall be prepared in the following cases:

- Where a manhole position has been recorded on the Asset Plans more than 5 m from where its actual position should be recorded
- Where a manhole position is closer than 5 m to its actual position but is shown on the wrong side of a boundary
- Where the layout/alignment of the pipelines differs to that shown on Auckland Council's GIS
- Where an inlet or outlet pipe has been recorded on the Asset Plans as connected to the wrong upstream or downstream manhole or node.

As-built Plan location measurements shall have an accuracy of ± 0.3 m:

- Measurements shall be made from permanent features such as buildings, existing manholes, site boundaries or outside kerb face
- Offset measurements are preferred, but intersecting arc measurements may also be made, with a minimum of two measurements in each case, being made as close as possible perpendicular to each other
- A total of three measurements shall be made to the manhole cover.

The As-built Plan shall clearly indicate the address of the property in which the manhole is located, or the nearest adjacent property where the manhole is located in the road reserve or a park. At least one adjacent property should also be identified to facilitate later manhole location by other personnel.

ACS1510.2.5.3 Manholes

ACS1510.2.5.3.1 Access & location

The following applies regarding the location and access to manholes:

- a) The Contractor shall confirm the location of all manholes
- b) All manholes shall be opened, and manhole depths recorded on the CCTV log sheet
- c) The CCTV camera shall pan around manholes and other stormwater nodes/features, to show the condition of the manhole/feature and any significant defects. A description of the condition of the manhole/feature shall be included in the comments section of the log sheet.

When buried manholes are located, the Contractor shall:

- a) Mark the position of the manhole on the ground surface and prepare an as-built drawing showing the location of the manhole, with measurements from at least two perpendicular, fixed points. The manhole will be raised by others.

ACS1510.2.5.3.2 Missing or buried manholes

Where a manhole is shown on Auckland Council's GIS and cannot be located, the Contractor is expected to take reasonable steps to locate the manhole. This shall include, but not be limited to, sending the camera along the pipe from up to two manholes upstream and downstream. If after an hour's work, the manhole cannot be located, the search shall be abandoned, and Auckland Council's representative informed.

ACS1510.2.6 Optional codes

Joint displaced, small severity (JD,S) and joint open, small severity (JO,S) defects shall be recorded.

ACS1510.2.7 Major defects requiring immediate attention

If the Contractor identifies any of the following defects, they are to immediately notify Auckland Council's Representative:

- Pipe broken (L severity)
- Pipe collapsed (L severity)
- Deformed pipe (L severity)
- Tomo
- Any defects where it is evident that tomos could be forming outside the pipe.

ACS1510.2.8 Significant flow capacity 'hazards' requiring notification

All obstructions, deposits and tree root intrusions reducing the clear pipe diameter by more than 25% are defined as a significant flow capacity hazard. If these hazards cannot be removed with cleaning or root cutting during the inspection, the location and description of the problem together with photographic evidence shall be reported to Auckland Council in the appropriate time frame below:

- Hazards with a loss of diameter of 25% to 50% shall be reported no later than the next business day
- Hazards with a loss of diameter of greater than 50% shall be reported immediately.

ACS1510.2.9 Personnel

The provisions of this clause also apply to any Sub-contractors that the Contractor engaged for internal pipeline inspection works.

All site staff are to hold current confined space training qualifications appropriate to the Works.

Only CCTV operators deemed 'competent' by an Auckland Council approved training provider are to be used:

- Uncertified or trainee operators can be used under strict supervision by certified operators
- Certified Operators shall maintain a current certification throughout the contract period (i.e. the certification date shall not exceed a period of 2 years, without obtaining re-assessment and re-certification)
- Evidence shall be provided of all operators' competency status
- Suitable evidence of competence may include satisfactory Independent Quality Audits carried out within the last 2 years.

The Contractor will supply the name of the person responsible for the quality assurance of the project (refer to Clause ACS1510.2.10 *Quality assurance*) below). Evidence of this person's suitability for the task, i.e. qualifications and experience shall be provided. Should the Contractor appoint a new person for this role during the course of the contract, acceptance shall be obtained from the Contract Administrator.

ACS1510.2.10 Quality assurance

The Contractor shall implement an internal quality audit process, based on A4 Quality Control and Management NZGPIM4, which shall be submitted to the Contract Administrator for acceptance. Evidence of completed internal audits may be requested by the Contract Administrator.

Auckland Council may undertake spot checks on the quality and completeness of the Contractor's work. If errors are identified, then Auckland Council may engage personnel to undertake more extensive audits of the work.

ACS1510.2.11 Information to be provided to the Contractor

Table 1: Information to be provided to the Contractor

Item	Notes
GIS drawings	<ul style="list-style-type: none"> Access to GIS
Pipe asset SAP ID	<ul style="list-style-type: none"> Printed or access to GIS
Upstream/downstream node asset SAP IDs & type	<ul style="list-style-type: none"> If known from Auckland Council GIS records
Pipe size	<ul style="list-style-type: none"> If known from Auckland Council GIS records
Pipe length	<ul style="list-style-type: none"> If known from Auckland Council GIS records
Pipe material	<ul style="list-style-type: none"> If known from Auckland Council GIS records
Pipe shape	<ul style="list-style-type: none"> If known from Auckland Council GIS records
Operational issues or limitations	<ul style="list-style-type: none"> Includes surcharging, history, access issues, where known

ACS1510.2.12 Information to be supplied by the Contractor

Table 2: Information to be supplied by the Contractor

Details	Specification reference
Location of manholes & pipelines	ACS1510.2.5 (Asset validation)
Locate major defects requiring immediate attention	ACS1510.2.7 (Major defects requiring immediate attention) & ACS1510.2.8 (Significant flow capacity ‘hazards’ requiring notification)
Type, severity, and location of all pipe defects	NZGPIM4
Report/as-built on position of manholes incorrectly located on Auckland Council’s GIS plans	ACS1510.2.5 (Asset validation) & ACS1510.2.11 (Information to be provided to the contractor)
Structural & service mean & peak scores (preliminary)	NZGPIM4
Report on any pipelines that could not be inspected	ACS1510.2.2.4 (Abandonment)
Report on any operational problems identified as part of the inspections	ACS1510.2.8 (Significant flow capacity ‘hazards’ requiring notification)

ACS1510.2.13 Deliverable format

All deliverables shall be supplied to Auckland Council using the following folder directory structure:

- Video FILES
- Data & still images
- As-built drawings.

ACS1510.2.13.1 Video files

Video files shall be supplied in the following format:

- a) Encoded to MPEG4 format
- b) Separate video file for each pipeline asset inspection.

ACS1510.2.13.1.1 Naming of video files

Each video file shall be named using a unique naming convention. The video file name shall be recorded in the Video Recorder No Field in the inspection header. Each video file shall be named using the following unique naming convention:

AAAAAAAAAAAA_BBBBBB_CC_D

Table 3: Unique naming convention for video files

Code	Description	No. of Characters	Example
AAAAAAA	Pipe asset SAP number	12	2325348
BBBBBB	Date of CCTV survey	6	021015 (ddmmyy)
C	Purpose of inspection	2	PR – Pre-maintenance PO – Post maintenance
D	Camera setup location	1	U – Upstream setup D – Downstream setup

The video file name shall be recorded in the Video Recorder No Field in the inspection header.

ACS1510.2.13.2 CCTV Inspection data

For all inspections, the header and observation/survey data shall be computer generated and provided in an export format suitable for uploading to the MOATA website. The format suitable for uploading to MOATA is set out in Surveys Import File Specifications V4 in Appendix 1 of this specification.

ACS1510.2.13.3 Still images

Still images shall be supplied in the following format:

Electronic snapshots (JPEG or BMP). Images shall be taken in 32-bit colour and minimum resolution of 720 pixels wide and 576 pixels high.

ACS1510.2.13.4 Laser profiling reports

In addition to the CCTV camera records required by this Specification, the following additional information shall be provided where laser profiling has been performed:

- a) **Ovality reports** shall be presented as an Ovality Observation Report:
 - o A line graph displaying ovality of the pipe over the length of the inspected pipe asset.

- Where water or debris exists, the software shall use a mask for the non-structural segment to calculate ovality.
- A 'match to reference shape and size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches (as agreed with the Contract Administrator)
 - 1) The as-built diameter, or
 - 2) The median calculated diameter over the entire pipe length
- Cross-sectional observations should be taken where the structural Ovality threshold exceeds 5% (or as directed by the municipality).
- Project Reports are to be shown as a coloured flat graph and a line graph that clearly shows ovality.
- Where the measured pipe ID coincides with expected values it shall be coded white. Areas where the data is greater than the pipe ID shall be coloured on a yellow/red colour scale.
- Areas where the data is smaller than the pipe ID shall be coloured on a blue scale.
- The line graph will be aligned with the flat graph, clearly showing ovality above the desired threshold.

b) Deflection Reports - Alternative option for condition analysis of plastic pipe

- X and Y diameter reports shall be presented as a XY deflection observation report - a line graph displaying and XY deflection of the pipe over the length of the inspected pipe asset.
- Where water or debris exists, the software shall use a mask for the non-structural segment to calculate the X and Y diameters.
- A 'match to reference shape and size' observation shall be shown for each pipe highlighting a cross-section where the actual pipe shape and size closest matches the median calculated diameter for each cross- section.
- Cross-sectional observations should be taken where the X and Y deflection threshold exceeds 5%.

c) Corrosion Reports – e.g. the analysis of concrete pipe

- Corrosion and Build-up Reports shall be presented in a flat Observations Report – a colour map of the circular dimensions of the pipe over the length of the inspected pipe asset.
- Measured pipe ID that coincides with expected values must be coded white.
- Material loss (corrosion), as measure by increasing pipe ID must be coloured on a yellow/red colour scale, with red colour set to $\frac{1}{2}$ of the expected wall thickness.

- Material gain (build up), as measured by decreasing pipe ID, must be on a blue colour scale.
- A ‘match to reference shape and size’ observation should be shown for each pipe highlighting a cross-section where the actual pipe shape closest matches the reference shape and size.
- Cross-sectional observations should be taken to highlight areas of worst corrosion.

ACS1510.2.13.5 As-built drawings

As-built drawings for all new built assets, split pipes, newly found manholes, or other point assets not currently shown on Auckland Council’s GIS shall be supplied in electronic PDF file or shape file format.

ACS1510.2.13.6 Header information required

in addition to the mandatory fields specified in Section B2.2 NZGPIM4, the following optional header information is required to be provided:

Table 4: Header information required

Field
Contract No/Asset Owner Reference (ABJ)
Asset Owner (AAM)
Contractor
Drawing no (enter catchment number) (AAS)
Date of data entry (ABU)
Upstream/downstream node asset type (ACP/ACQ)
Upstream/downstream manhole depth (ACH/ACI)
Location (AAJ)
Surface/Location Type (AAL)
Weather/Precipitation (ADA)
Inspection Method (ABE)
Tidal Influence (ADD)

Notes:

1. The Contractor shall only record the pipeline diameter on the CCTV inspection data if the diameter can be observed by measurement. Where the diameter cannot be measured, the field is to be left blank and a description of why is to be written in the comments.

ACS1510.2.14 Liaison with call centre

In the event of any damage caused by CCTV or associated operations, the Contractor shall notify the property owner, the call centre, and Auckland Council's Representative as soon as possible (but no later than 24 hours).

The Contractor shall take photos of the damage before and after any reinstatement/repair work.

ACS1510.3 General condition surveys (planned inspections)

ACS1510.3.1 Introduction/scope

A CCTV pipeline inspection for general condition surveys is used to:

- a) Determine compliance with infrastructure standards
- b) Determine structural condition and identification of faults visible from the inside of the pipe
- c) Determine service condition and identification of faults that may affect the ability to convey stormwater
- d) Collect pipeline attribute information or identify changes to the pipe network.

The information collected these inspections enables a risk-based condition assessment and renewal planning. Condition assessment and collection of pipeline attribute information is used for renewal and catchment management planning, deterioration modelling, and asset valuation.

This Section, *ACS1510.3 (General condition surveys [planned inspections])*, sets out the specific requirements in addition or variance to those already described with in *ACS1510.2 (General requirements)*.

ACS1510.3.2 Cleaning

Unless otherwise specified, cleaning is not required to be completed prior to a general condition survey.

If the inspection of a pipeline is unable to be completed from both ends of the section, then the Contractor shall submit a brief report to the Contract Administrator, within 24 hours, that provides photos of the debris, roots or obstruction and contains details of:

- The location of the debris, roots or obstruction that stopped the inspection
- The type of debris, obstruction encountered
- The approximate volume of debris or size of roots
- The length of pipeline that was unable to be inspected
- Comments on whether the debris, roots or obstruction is affecting service
- Comments on whether any structural defects are present or might be present in the pipeline.

Auckland Council may then elect to:

- Have the debris, roots or obstruction removed by its maintenance contractor and the Contractor, then complete the inspection after the debris has been removed
- Instruct the Contractor to clean the pipe and complete the instruction
- Abandon the inspection and not undertake any further works.

If cleaning is required, it shall be in accordance with Auckland Council Standard Specification *ACS1410 Pipe Cleaning*.

ACS1510.3.3 Still images

Still images of the defects listed in Table 6 are to be captured and linked to the relevant inspection data.

Table 5: Defects/Features requiring still images.

Main Code	Characterisation Code(s)	Quantification Code(s)
CM	All	M,L
CL	All	M,L
CC	All	M,L
DF	All	M,L
IP		M,L
JD		L
JF	All	L

Main Code	Characterisation Code(s)	Quantification Code(s)
JO	A	L
LF	All	L
LP		L
LX	All	
O	All	
PB		M,L
PF	All	M,L
PH		S,M,L
PL	All	M,L
PX/MX		
S	All	M,L
RI	All	M,L
TM		
MUS		M,L
MM		M,L
DI		M,L
DMU	All	
W	All	
DE		L
ED		M,L
B		
LD	All	

ACS1510.3.4 Additional surveys

In some circumstances, additional inspections may need to be undertaken to investigate and determine the extent of defects, or network changes.

ACS1510.3.4.1 Additional inspections due to significant defects

If a pipe is found to have a significant defect, then the Contractor shall notify the Contract Administrator immediately and further work may be authorised. A list of significant defects is identified in the following table. Significant defects are either individual defect codes or are a combination of defect codes occurring at the same location.

Table 6: Significant Defects

	Significant defects
Multiple crack	CM(L) & *
Pipe hole	PH(M/ L)
Pipe broken	PB(M/ L)
Pipe collapse	PX
Joint faulty	JF(L) & TM
Joint open	JO(L) & JF(L) & *
Joint displaced	JD(L) & TM
Deformed pipe	DF(M/ L)
Deformed pipe (plastic)	PF(L)
Liner defective	PL(L)
Surface damage	SS, SAP, SAM, SRC, SCP, SPM, SH(M/L)

* = M to L Severity IP or RI

“/” indicates either defect code. “&” indicates the combination of defect codes at the same location

ACS1510.3.4.2 Additional inspections due to changes to Auckland Council’s GIS

If a “public” pipe is located adjoining a pipe surveyed, that is not shown in Auckland Council’s GIS system, Auckland Council shall be notified immediately, and further work may be authorised.

ACS1510.3.5 Quality assurance

The Contractor is to undertake their own audit on the quality of the CCTV footage and log sheet data entry prior to submitting to Auckland Council, to ensure the work undertaken complies with the NZGPIM and the requirements of this specification:

- The Contractor’s Audit Methodology shall be submitted to Auckland Council, as part of the Contract Quality Plan, for approval prior to the commencement of inspections. The Audit Methodology shall be based A4.4, NZGPIM4.

- The Contractor shall nominate an experienced and ‘competent’ auditor to undertake on-going auditing of the inspections.
- The frequency of auditing by the Contractor shall be at minimum on-going audit of 5% of all CCTV inspections for each batch submission (5% of the total length of inspected length).
- If the accuracy level for a batch submission is less than 95% (the minimum specified Accuracy Level), then a further 5% will be audited.
- If subsequent to the additional audit, the accuracy level of 10% of the inspected length of the batch submission is less than 95%, the audit is deemed to “fail”.
- If a batch fails the 10% audit, then the required actions set out in Table A4.5, NZGPIM4 shall apply.

Following re-submission of the corrected work, a further 5% audit shall be undertaken by the Contractor to confirm that the required standard has been achieved.

The Contractor shall submit copies of all audits undertaken to Auckland Council.

Auckland Council may undertake on-going monitoring audits.

ACS1510.4 Post construction/as-built surveys

ACS1510.4.1 Introduction/scope

This Section, *ACS1510.4*, covers the inspection of pipelines that are:

- a) Newly constructed as part of a residential or commercial development and to be vested in Auckland Council ownership; or
- b) Extensions to the existing reticulation; or
- c) Upgrades or pipe renewals; or
- d) Lined/rehabilitated pipelines.

Condition assessment and collection of pipeline attribute information is used to determine compliance with the Auckland Codes of Practice and Standards, collection of asset attribute information and long-term planning.

This Section, *ACS1510.4*, sets out the specific requirements in addition or variance to those already described with in *ACS1510.2 (General requirements)*.

ACS1510.4.2 Cleaning

All pipelines shall be heavy cleaned and free of all debris before the inspection is undertaken. Cleaning shall be in accordance with Auckland Council Standard Specification *ACS1410 Pipe Cleaning*.

Following cleaning, immediately prior to inspection, a charge of water shall be sent through the pipe prior to inspection. This will allow the operator to identify dips based on standing.

ACS1510.4.3 Preparation prior to inspection

The inspection shall only be completed once all construction and reinstatement work has been completed. Where the work is being undertaken within the road carriageway, the inspection shall be undertaken once the road surface is to a finished level and prior to any road surfacing.

Manhole benching shall be completed or reinstated where it has been removed/partially removed to facilitate rehabilitation, prior to the inspection.

Lateral junctions/connections in pipes that have been connected, lined, or rehabilitated shall be “buffed” or have lateral junction seals installed prior to the CCTV inspection.

The operator shall clearly inspect the seal of the liner at both the upstream and downstream manholes. If the CCTV camera is not able to rotate backwards to view the downstream manhole connection the camera should be re-launched from the downstream manhole.

ACS1510.4.4 Still images

Still images shall be provided for all reported defects.

ACS1510.4.5 Depth of water flow during inspection

The pipeline shall not be in service during the inspection. In addition to the requirements of Clause ACS1510.2.2.2, the Contractor shall take steps to reduce/maintain the depth of flow to maximum allowable flow depth to less than or equal to 5% of the pipe diameter.

ACS1510.4.6 Temporary asset numbers

In addition to the requirements of Clause *ACS1510.2.5 (Asset validation)*, where the inspected pipes are to be vested into Auckland Council’s Asset Register, the pipe and manhole asset IDs shall be identified by utilising the reference numbers shown on the construction as-built drawings.

ACS1510.5 Build over/building consent surveys

ACS1510.5.1 Introduction/scope

This Section, *ACS1510.5*, covers the inspection of pipelines where building structures may be built over or in close proximity.

Inspections are required of Auckland Council infrastructure before and after the performance of any work which involves building over or within 5 m of Auckland Council infrastructure.

Pre-inspections are required to confirm the location of pipes traversing the entire development site, their condition and ensure that connections are not built over. Post-inspections are required to ensure no damage has occurred during the building work.

This section, *ACS1510.5*, sets out the specific requirements in addition or variance to those already described with in *ACS1510.2 (General requirements)*.

ACS1510.5.2 Cleaning

All pipelines should be heavy cleaned no more than 24 hours prior to the CCTV inspection. Pipes shall be free of all debris or roots before the CCTV Inspection is undertaken.

Cleaning is to be conducted in accordance with Auckland Council Standard Specification *ACS1410*. Following cleaning, immediately prior to inspection, a charge of water shall be sent through the pipe prior to the inspection.

If the inspection of a pipeline is unable to be completed from both ends of the section, then the Contractor shall submit a brief report to the Contract Administrator, within 24 hours, that provides photos of the debris, roots or obstruction and contains details of:

- The location of the debris, roots or obstruction that stopped the inspection
- The type of debris, obstruction encountered
- The approximate volume of debris or size of roots
- The length of pipeline that was unable to be inspected
- Comments on whether the debris, roots or obstruction is affecting service
- Comments on whether any structural defects are present or might be present in the pipeline.

Auckland Council may then elect to:

- Have the debris, roots or obstruction removed by its maintenance contractor and the Contractor then complete the inspection after the debris has been removed

- Instruct the Contractor to clean the pipe and complete the instruction
- Abandon the inspection and not undertake any further works.

ACS1510.5.3 Extent of CCTV inspection

The Contractor shall fully inspect the pipelines crossing the property (development site). The Contractor shall identify on the inspection log sheet, screen text on the video, and on a marked-up aerial photograph any occurrence of the following:

- The location of where the camera position crosses the property boundary
- The location of where the camera position enters or leaves the proposed building platform area
- Location of lateral connections and their connectivity
- The depth of these positions shall also be recorded on the log sheet and screen text.

ACS1510.5.4 Still images

Still images of the defects listed in Table 9 are to be captured and linked to the relevant electronic log sheet.

Table 7: Defects requiring still images

Main Code	Characterisation Code(s)	Quantification Code(s)
CM	All	S,M,L
CL	All	S,M,L
CC	All	S,M,L
DF	All	M,L
IP		M,L
JD		M,L
JF	All	M,L
JO	A	M,L
LF	All	M,L
LP		M,L
LX	All	
O	All	

Main Code	Characterisation Code(s)	Quantification Code(s)
PB		S,M,L
PF	All	M,L
PH		S,M,L
PL	All	M,L
PX/MX		
S	All	M,L
RI	All	M,L
TM		
MUS		S,M,L
MM		M,L
DI		S,M,L
DMU	All	S,M,L
W	All	
ED		S,M,L
B		
LD	All	

Appendix 1 - Surveys Import File Specifications V4

The surveys import takes the following components and brings them into a project in Moata:

- One or more CCTV surveys
- Corresponding observations
- Observation photos (one max per observation)
- Survey videos (one max per survey).

The Inspections (CCTV) import process accepts a survey's import file meeting a strict set of requirements. If the requirements are not met, then the import process will fail in validation and the file will be rejected. The importer will then be required to correct the discrepancy and attempt a new import. The specifics of these requirements are detailed below.

Archive

File Format	<ul style="list-style-type: none"> • The import file must be a single-part zip file without a password.
Size Limits	<ul style="list-style-type: none"> • The zip file may not be more than a total of 5 GB in size. No single file within the zip file, when expanded, may be greater than 5 GB. • Managing size limits for imports with very large numbers of videos: <ul style="list-style-type: none"> ○ Sometimes an import may have so many video files that, when archived, they exceed the 5 GB allowance per import. ○ To circumvent this limitation: <ul style="list-style-type: none"> ▪ Continue referencing the video file by name in survey detail ▪ Omit the video file from the archive ▪ Complete the import ▪ Use the separate video file reconciliation process to upload the missing video files. • The video files must still each be smaller than 5 GB uncompressed.
Contents	<ul style="list-style-type: none"> • The import archive is required to contain the following: <ul style="list-style-type: none"> ○ An observation file whose filename ends with Observations.csv, e.g. MyObservations.csv is a valid observations filename ○ A survey's file whose filename ends with Surveys.csv, e.g. MySurveys.csv is a valid survey's filename ○ For every image file that is referenced from Observations.csv, an image file with the same name in the archive. • It may also (optionally) contain a video file for each video filename referenced in Surveys.csv.

Supported image and video file formats	<ul style="list-style-type: none"> • Not all image and video file formats are supported by surveys import. <ul style="list-style-type: none"> ○ All of your images are expected to be in JPEG format, and they must have the ".jpg" file extension. ○ Any video files must have one of the following file extensions: <ul style="list-style-type: none"> ▪ mp4 ▪ m4v ▪ mpg ▪ mpeg ▪ vob ▪ avi ▪ wmv ▪ ipf
---	--

Any files in the archive that don't match the above supported formats will be ignored.

About directories and file uniqueness

The import archive format ignores directory structures, allowing you to use any directory organisational strategy you like to arrange your files.

However, there is then an expectation that all of the image and video filenames in your archive - irrespective of what directory they are in - are unique. This means that a legal archive could not contain both dirA/dirB/file.jpg and dirC/file.jpg.

On the other hand, non-image and non-video files such as readme.txt could exist in as many directories of the archive as desired.

Inspections from both ends of a pipe

When a pipe is inspected from both ends of the pipe due to (for example) an obstruction, the 2 inspections can be considered one inspection. If the inspection software used doesn't merge the two, then the following rules apply.

Make sure these 3 fields in the 2 rows in the surveys file are exactly identical and the 2 surveys will be merged.

- PipeAssetNo
- DateStarted
- TimeStarted

The 2 rows will be combined to form a single log sheet, with all observations from both surveys attached.

Surveys CSV file

The surveys CSV file is required to exist in the import archive. Its filename must end with Surveys.csv. The file format should be comma-delimited (,) CSV. The columns should be as follows, and may be empty unless otherwise stated:

SurveyID	Required <ul style="list-style-type: none"> Contains a unique identifier for this survey. The scope of uniqueness of the survey ID must at minimum be the contents of this import archive. Must contain an integer which must be unique in the scope of the batch file.
PipeKeyField (Asset owner's ref)	Required <ul style="list-style-type: none"> The reference code or name for the inspection supplied by the asset owner.
Standard	Required <ul style="list-style-type: none"> The version of the standard used to record the data. Valid options are [3,4]. Requires value '4' if using PIM V4 codes and value '3' if using PIM V3 standard code.
US_Node (Up node ref)	Required <ul style="list-style-type: none"> The asset ID of the upstream node.
DS_Node (Down node ref)	Required <ul style="list-style-type: none"> The asset ID of the downstream node.
Setup (Camera setup location)	Required <ul style="list-style-type: none"> Records the setup node in which the camera is starting the inspection. Valid values are ['U', 'D', 'UD', 'DU']
Parallel line	Required <ul style="list-style-type: none"> Record the line number where there is more than one direct line between two manholes. The line number is supplied by the asset owner.
UpLocation (Upstream node location)	Required <ul style="list-style-type: none"> The address of the upstream node.
DownLocation (Downstream node location)	Required <ul style="list-style-type: none"> The address of the downstream node.

DateStarted (Date of inspection)	Required <ul style="list-style-type: none"> Record the short date of the inspection using DD/MM/YYYY format, leading zeros included.
TimeStarted (Time of inspection)	Required <ul style="list-style-type: none"> The time as specified in ISO 8601 using the 24-hour hh:mm format, leading zeros included.
SurveyedBy (Name of operator)	Required <ul style="list-style-type: none"> The name of the inspection equipment operator.
Storage medium for video	<ul style="list-style-type: none"> Type of media used for storing moving images. Valid options ['CD', 'DVD', 'PHD', 'USB', 'Z']
VideoRecorderNo (Video volume reference)	Required <ul style="list-style-type: none"> Where storage medium is PHD or USB or Z, the file name for the video file. The file name must be unique, and where applicable conform to the asset owners specified file naming convention. Where storage medium is recorded as CD or DVD, the storage medium reference name, the media name must be unique.
Purpose of inspection	Required <ul style="list-style-type: none"> The purpose of the inspection. Valid options are: ['C', 'IE', 'IP', 'L', 'NC', 'OE', 'R', 'RC', 'S', 'SE', 'T', 'W', 'Z']
Pipe length	Required <ul style="list-style-type: none"> Record the measured length of the pipe asset. The measurement is from the centre of the upstream node to the centre of the downstream node. The pipe length will be the same value as the Surveyed Length (ARB) where the inspection is complete. Where the pipe length cannot be measured, (i.e. inspection is not able to be completed) the value to be recorded in the Pipe Length field shall be, (in the following order): <ol style="list-style-type: none"> The pipe length measured above ground, (e.g. using a measuring tape. The GIS length, if physical measurement is not possible Left blank, if the GIS length is not available
Line length (Survey length)	Required <ul style="list-style-type: none"> Record the measured length is the length of pipe that has been surveyed.

CompStatus (Inspection completion status)	Required <ul style="list-style-type: none"> The completion status of the inspection. Valid options: ['IC', 'UI']
Name of coder	Required <ul style="list-style-type: none"> The name of the person who encoded the pipe condition.
Shape	Required <ul style="list-style-type: none"> The shape of the cross section of the pipe. Valid options are ['A', 'C', 'E', 'O', 'R', 'U', 'Z']
Height	Required <ul style="list-style-type: none"> The height of the section in mm. Not required where both dimensions are the same e.g. circular
Width	Required <ul style="list-style-type: none"> The width or diameter of the section in mm
Material	Required <ul style="list-style-type: none"> The material of the fabric of the pipe, under the coding of Table B1 of Appendix B. Where the pipe has been lined the Material field shall be left blank. Valid options ['RC', 'UR', 'PE', 'PP', 'PVC', 'FPVC', 'GRP', 'FRP', 'AC', 'PFPF', 'GEW', 'EW', 'VC', 'CORS', 'DI', 'ST', 'CLS', 'CI', 'BK', 'CIS', 'ZC', 'ZS', 'ZP', 'ZZ']
Lining type	Required <ul style="list-style-type: none"> The method of lining used where a pipe has been lined. Valid options are ['CFL', 'CIP', 'LCP', 'LDP', 'MFL', 'SEG', 'SPL', 'SWL', 'Z']
Lining material	Required <ul style="list-style-type: none"> The lining material where a pipe has been lined using the coding of Table B2 of appendix B. Valid options are ['CL', 'EP', 'GRP', 'FRP', 'PE', 'PVC', 'CIP']
JointSpacing	Required <ul style="list-style-type: none"> Record the length (m) of the individual pipe units that comprise the pipeline, (refer B2.1, H4.4.1). Where the pipe is continuous e.g. masonry, or PE, this field is left blank, and a remark made in ADE (General comment).
Operation of pipeline	Required <ul style="list-style-type: none"> The operational mode of the pipeline. Valid options ['G', 'P']

Use (Use of pipeline)	Required <ul style="list-style-type: none"> The use of the pipeline. Valid options ['COM', 'CUL', 'S', 'F', 'TW', 'Z']
Cleaning status	Required <ul style="list-style-type: none"> Whether the pipeline was cleaned prior to the inspection. Valid options: ['LC', 'HC', 'NC', 'RC']
Total structure score	<ul style="list-style-type: none"> Calculated total structural score
Structural peak score	<ul style="list-style-type: none"> Calculated peak structural score
Structural mean score	<ul style="list-style-type: none"> Calculated mean structural score
Total service score	<ul style="list-style-type: none"> Calculated total service score
Service peak score	<ul style="list-style-type: none"> Calculated Peak service score
Service mean score	<ul style="list-style-type: none"> Calculated Service Mean Score
StrPeakGrade	<ul style="list-style-type: none"> (Preliminary Structural Peak Grade) Calculated peak structural condition grade
SerPeakGrade	<ul style="list-style-type: none"> (Preliminary Service Peak Grade): Calculated peak service condition grade
Comments (General comment)	Required <ul style="list-style-type: none"> Any information that cannot be include in any other way
Up node coordinate	<ul style="list-style-type: none"> The grid reference (coordinates) of the upstream node.
Down node coordinate	<ul style="list-style-type: none"> The grid reference (coordinates) of the downstream node.
Location	<ul style="list-style-type: none"> A description of the location of the pipe e.g. street name.
Location type	<ul style="list-style-type: none"> Record the type of location of the pipe. Valid values are ['B', 'BO', 'C', 'D', 'DA', 'F', 'G', 'M', 'NS', 'P', 'R', 'W', 'Z']
Asset owner	<ul style="list-style-type: none"> The name of the asset owner.
Town or suburb	<ul style="list-style-type: none"> The name of the town or suburb as specified by the asset owner.
District/catchment	<ul style="list-style-type: none"> The name of the district or catchment as specified by the asset owner.
Name of pipe system	<ul style="list-style-type: none"> The name of the pipe system, or a pipe system reference as specified by the asset owner.
Land ownership	<ul style="list-style-type: none"> Record the ownership of the land. Valid options ['C', 'Q', 'T']

Drawing (Drawing number)	<ul style="list-style-type: none"> The drawing reference number on which the pipeline is shown, if applicable
Original coding system	<ul style="list-style-type: none"> Where the coding has been translated from an earlier version or from another system, the name of the original coding system.
Method of inspection	<ul style="list-style-type: none"> Record the method used to inspect the pipeline. Valid options are ['FZ', 'LP', 'M', 'PS', 'S', 'SS', 'TVPT', 'TVFA']
Operator's reference	<ul style="list-style-type: none"> The reference code or name for the inspection supplied by the operator or the operator's company.
ContractNo	<ul style="list-style-type: none"> Contains text.
Contractor	<ul style="list-style-type: none"> Contains text. Example value: "City Parks"
Date of data entry	<ul style="list-style-type: none"> The date of the data entry if different to the date of inspection (DD/MM/YYYY)
UpDepth	<ul style="list-style-type: none"> (Depth at upstream node) Depth of the invert of the pipe below cover level at the upstream node in m, (refer B2.1, H4.7)
DownDepth	<ul style="list-style-type: none"> (Depth at downstream node) Record the depth of the invert of the pipe below cover level at the downstream node in m, (refer B2.1, H4.7).
JointingMethod	<ul style="list-style-type: none"> The pipe jointing method. Valid options: ['A', 'BF', 'BFD', 'CMJ', 'EF', 'F', 'L', 'MC', 'RRJ', 'SCJ']
Up node type	<ul style="list-style-type: none"> The type of node at the upstream. Valid options: ['SND', 'SMH', 'SPS', 'SIP', 'SMS', 'STND', 'STMH', 'STI', 'STO', 'STCP', 'STMS']
Down node type	<ul style="list-style-type: none"> The type of node at the downstream. Valid options: ['SND', 'SMH', 'SPS', 'SIP', 'SMS', 'STND', 'STMH', 'STI', 'STO', 'STCP', 'STMS']
Precipitation	<ul style="list-style-type: none"> The precipitation. Valid options: ['N', 'R', 'S']
Temperature	<ul style="list-style-type: none"> The ambient temperature either in Celsius or coded as follows ['C', 'W']
Flow control measures	<ul style="list-style-type: none"> The measures taken to deal with flow at the time of the inspection. Valid options: ['B', 'N', 'P', 'Z']
Tidal influence	<ul style="list-style-type: none"> The tidal influence. Valid options: ['A', 'B']

Observations CSV file

The surveys CSV file is required to exist in the import archive. Its filename must end with Observations.csv. The file format should be comma-delimited (,) CSV. The columns should be as follows, and are optional unless otherwise stated:

ObsID	Required <ul style="list-style-type: none"> Text. Contains a unique identifier for this observation. The scope of uniqueness of the observation ID must at minimum be the contents of this import archive.
SurveyID	Required <ul style="list-style-type: none"> Text. Must match the ID of a survey in the Surveys CSV file of this same import.
Condition (Main Code)	Required <ul style="list-style-type: none"> Principal defect or feature code concatenated with Characterisation code, e.g. DMUI. Must match a valid code, there are over 100 codes, so these are not listed in this document
Characterisation	Required <ul style="list-style-type: none"> Additional codes that describe a defect or feature in more detail (included in condition)
Severity (Quantification)	Required <ul style="list-style-type: none"> Additional code that quantifies the severity of the defect.
PositionTo (Longitudinal Distance)	Required <ul style="list-style-type: none"> The distance measured from the start node to a defect, or feature.
MeasureFrom (Measurement From)	Required <ul style="list-style-type: none"> A single code, (U/D) identifying the node that the longitudinal distance to the defect or feature is measured from, (i.e. the Upstream or Downstream node).
Circumferential location, Position From	Required <ul style="list-style-type: none"> A clock face reference that locates the position of a defect or feature around the circumference.
Circumferential location, Position To	<ul style="list-style-type: none"> A clock face reference that locates the end position of a defect or feature around the circumference if it is not a point.

Continuity (Continuous Observation Code)	Required <ul style="list-style-type: none"> Denotes a defect or feature that continues for a distance greater than one metre length or is a repeated feature that occurs in at least three out of four adjoining pipe segments.
Remarks	Required <ul style="list-style-type: none"> Text that describes aspects of the observation that cannot be described any other way.
PhotoNumber (Photograph Ref)	<ul style="list-style-type: none"> A reference to identify any still photographs
VideoCount (Video Ref)	<ul style="list-style-type: none"> A video recording timer reference to locate a defect or feature within the continuous video record of the inspection. In format HH.mm.ss, e.g. 00.00.07