ACS1530 Surveying

Contents

ACS1530.1 Scope

This Specification covers surveying for asset data collection including topographical data, manholes and buildings data by land-based survey instruments or aerial survey techniques. It does not cover deposited plan or survey office surveys.

Section ACS1530.3 of this Specification sets out the general requirements for survey. The following sections set out the specific requirements for:

a) Section ACS1530.3 – Survey for infrastructure design and topographical survey

b) Section ACS1530.4 – Data collection for stormwater modelling

c) Section ACS1530.5 – Infrastructure construction as-built surveys

d) Section ACS1530.6 – Aerial surveys.

ACS1530.2 Survey – general requirements

ACS1530.2.1 Health and safety

The Contractor is responsible for health and safety issues relating to survey services and shall, at all times, comply with the Health and Safety at Work Act 2015. The Contractor shall comply with all health and safety plans and regulations of parties in control of a site.

ACS1530.2.2 Survey accuracy

The Contractor shall take all practicable measures to eliminate all systematic errors and gross errors from the survey work and deliverables.

The survey procedure shall include sufficient checks and redundancy to identify and mitigate potential errors and to ensure that survey accuracy can be proven and complies with the Specification. Evidence that the survey data complies with the Specification and accuracy standards may be requested by Auckland Council and allowance to provide this information shall be made in all offers of service for the supply of survey data to Auckland Council.

Auckland Council may undertake independent field audits of a sample of the survey data to verify compliance. Where audits identify non-compliance with the Specification or accuracy requirements, or where the Surveyor is unable to provide evidence that the survey data complies, the Surveyor will be fully responsible for making corrections, undertaking additional survey or re-survey or supplying missing information.

All surveys shall include at least two permanent survey markers to allow error correction to be carried out. Refer to Table 1 for details of the accuracy bands used in this Specification.

Table 2 indicates the required accuracy for band for each type of survey described in this Specification. Note that this may be modified for particular features in the detailed specification for each survey type below and/or in the Particular Specifications.

Table 1: Survey accuracy bands

	Horizontal Accuracy		Vertical Accuracy			
			Hard detail		Soft detail	
Accuracy band	**1 Σ (note 1)**	**2 Σ (note 1)**	**1 Σ (note 1)**	**2 Σ (note 1)**	**1 Σ (note 1)**	**2 Σ (note 1)**
A	±2 mm	±5 mm	±2 mm	±5 mm	N/A	N/A
B	±5 mm	±10 mm	±10 mm	±15 mm	N/A	N/A
C	±10 mm	±20 mm	±20 mm	±30 mm	±25 mm	±50 mm
D	±20 mm	±40 mm	±50 mm	±100 mm	±50 mm	±100 mm
E	±50 mm	±100 mm	±50 mm	±100 mm	±100 mm	±200 mm
F	±100 mm	±200 mm	±100 mm	±200 mm	±100 mm	±200 mm

Note 1: Σ is a standard deviation

Table 2: Summary of required accuracy for survey type

Survey type	Required horizontal accuracy band	Required vertical accuracy band
Topographical surveys (relevant sections of *(ACS1530.3 Survey for infrastructure design and topographical survey)*	C	C
Infrastructure design (relevant sections of *(ACS1530.3 Survey for infrastructure design and topographical survey)*	C	B
Data collection for stormwater modelling *(ACS1530.4 Data collection for stormwater modelling)*	E	C
As-built surveys *(ACS1530.5 As-built surveys for infrastructure),* and; Asset data collection for contiguous piped systems	E*	B*
Aerial surveys *(ACS1530.6 Aerial surveys)*	F	F

*E for horizontal accuracy (1 Σ) *B for vertical accuracy (1 Σ)

For developer-created assets to be vested into Auckland Council ownership, accuracy shall also be in accordance with the Auckland Council Regulatory Engineering As-built Requirements.

ACS1530.2.3 Survey datum and coordinate system

All surveys shall use the NZGD2000 coordinate reference system as geodetic datum. Surveys shall report elevation using both Auckland 1946 (orthometric height) datum and New Zealand Vertical Datum 2016 as vertical datum, or as otherwise specified. Surveys shall use the NZTM (New Zealand Transverse Mercator) as projection in accordance with LINZ: Standard for New Zealand Geodetic Datum 2000 Projections: Version 2 - LINZS25002.

ACS1530.2.4 Permanent survey markers

The Contractor shall select and verify the accuracy of the survey mark to be used for each location. Unless otherwise specified, all surveys shall use at least two permanent survey marks in order to cross check their accuracy.

Permanent survey markers shall be selected by the Contractor to meet the accuracy requirements of the survey and shall be obtained from LINZ[1]. Notwithstanding this, the Contractor shall select survey markers appropriate to achieve the specified accuracy of the survey.

ACS1530.2.5 Information supplied by Auckland Council

Auckland Council will supply the following items to the Contractor, as appropriate:

a) Plans showing the area and the extent of the survey

b) A detailed scope of Works identifying the survey requirements

c) A list of properties to be surveyed

d) The GIS Shape files of the area to be surveyed

e) A list of properties for the Contractor to notify by letter drop for private property access.

[1] http://www.linz.govt.nz/data/geodetic-services/search-for-geodetic-marks

ACS1530.2.6 Access

The Contractor shall notify the Engineer (or Client's Representative) of any access restrictions or related issues which may impact on the survey requirements or deliverables. The Contractor shall notify the Engineer (or Client's Representative) within 1 working day of any issues and take all reasonable steps to reduce the impact on the survey.

Actions to resolve any access issues shall be agreed with the Engineer (or Client's Representative) or acceptance obtained from the Engineer (or Client's Representative) to omit areas that are not accessible from the survey.

The Contractor shall ensure landowners are informed about access to private property by letter. The Contractor shall not enter properties where access has been refused. The Engineer (or Client's Representative) shall provide a letter template as appropriate.

ACS1530.2.7 Photographs

Photographs shall be date and time stamped in New Zealand Standard Time (NZST).

The quality of the photograph (including colour balance, focus and contrast) shall be, in the opinion of the Engineer (or Client's Representative), sufficiently clear for their purpose.

Photographs shall be geo-referenced to within 5 m horizontally and the direction of view indicated.

Photographs taken looking downwards, for example for manholes, shall be orientated with the major outlet at the top of the image.

Still images shall be supplied in JPEG format and be taken in 32-bit colour and a minimum of 6 mega-pixels. The JPEGs shall contain EXIF data.

The photograph file name shall include reference to the object photographed; either a street address or asset ID as appropriate, and the date.

ACS1530.2.8 Survey records

The Contractor shall retain survey records for 7 years and shall make them available to Auckland Council on request.

ACS1530.3 Survey for infrastructure design and topographical survey

This section covers survey for infrastructure design and also topographical survey. For either type of survey, the relevant clauses of this section shall apply.

ACS1530.3.1 Accuracy

Survey for infrastructure design and topographical survey shall be performed to an accuracy complying with the relevant accuracy bands of Table 1: Survey accuracy bands and Table 2: Summary of required accuracy for survey type.

Where existing buildings, manholes and chambers require survey for inclusion in the proposed Works they shall be surveyed to accuracy Band B as per Table 1 or as otherwise described in the Particular Specification.

ACS1530.3.2 Access approvals

The surveyor shall obtain the appropriate approvals prior to commencement of survey work on any wastewater assets (Watercare or Veolia Works Over Approval), road corridor (Corridor Access Request), private property (landowner approval or access using the Local Government Act or Public Works Act), railway (KiwiRail approval) or motorway (Waka Kotahi/NZTA approval).

ACS1530.3.3 Survey requirements

Table 3: Required survey information for infrastructure design

Feature	Information required
General topographic survey	
General topographical information	• Sufficient spot heights shall be taken to allow contour intervals of approximately 0.1 m to be generated, unless otherwise specified.
Landforms	(e.g. embankments, mounds, depressions, banks, terraces, etc) • Sufficient spot heights of high and low points, i.e. top and bottom and annotate as such.
Streams, ponds, wetlands, lakes, ditches	• Top of bank, top of water level annotated

Feature	Information required
Roads, footpaths & surfaces	
Berms	• Edge location
Kerb line or edge of carriageway surfacing	• Location
Top of kerb & channel invert	• Location and level
Kerb outlets (private stormwater outlets)	• Location and diameter
Drop kerbs for pram crossings, vehicle crossings, etc	• Sufficient points to define elevation changes
High point in road (crown or superelevation)	• Location and level
Any low points in the road	• Location and level
Traffic islands and traffic calming measures	(Such as chicanes, speed tables, paved shared zones, cycle lanes, changes in surfacing, etc.) • Along the edges with sufficient points to define the shape
Road surfacing	(e.g. asphalt, chipseal, concrete surfacing or other surfacing) • Location and type of surface
All road markings	(Includes outer lines, centreline, medians, parking, cycling, yellow and white line extent, bus stops, intersections, and pedestrian crossings) • Linear features along the centre line • Medians and pedestrian crossings sufficient points along the edges to define the shape • Extent of road marking including disabled parking
Carparking areas	• Location and extent either within or outside of carriageway, formal or informal, i.e. edge of seal or metalled
Footpaths including boardwalks	• Extent and type and any change in surfacing
Bridges (pedestrian, rail, cycle, or vehicle)	• Location and extent of bridge • Abutment location and extent • Bridge deck elevation along centreline or edge of deck where superelevated • Pile or pier locations and details annotated • Balustrade location • Materials annotated

Feature	Information required
Underpasses (pedestrian, rail, cycle, or vehicle)	• Location, elevation, and dimensions of upstream and downstream approaches • Material type
	Street furniture
Traffic signals, control boxes and covers	• Poles - 1 point • Small covers - 1 point at centre • Large covers - sufficient points to define shape
Street lighting and signage	(Road signs, sign name plates, hoardings, notice boards, etc.) • Poles - 1 point plus reference to diameter All others - sufficient points along the edges to define shape
Other surface features	(Including public mailboxes, utility cabinets, bus shelters, ticket machines, bollards, pedestrian cycle hold rails, pedestrian refuge rails, barriers, fences, braille guides, seating) • Sufficient points along the edges to define shape
Street trees or planting	• Centre of tree and edge of dripline
	Stormwater
Manholes	• Location and level at centre of lid. Annotate diameter and type of manhole. Annotation if an access grill is in place. • Invert level, diameter and location of all incoming and outgoing pipes, rodding eyes, or droppers. Where possible include pipe material of each incoming and outgoing pipe • Sufficient annotated photographs in accordance with *ACS1530.2.7 (Photographs)* are required to capture the manhole shaft, pipe entries, orientation of flow and manhole location in relation to surrounding features.
Catchpits and other inlets	• Centre of sump and grate • Sump, inlet and outlet invert levels and diameter • Where recessed into kerb the extent of the inlet and location of access lids
Roadside / table drains	• Top and invert level of drain, incoming and outgoing pipes and diameter annotated

Feature	Information required
Inlets and outlets	• Inlet or outlet diameter and type • Scruffy dome location, height, and diameter • Bubble-up manhole location and diameter with annotation • Inlet or outlet grills • Apron and headwall levels and extent, invert, size, and direction of all pipes • Riprap or erosion protection extent and annotation • Annotated photograph of each inlet and outlet
Water quality treatment devices including GPTs, proprietary devices, rain gardens, tree pits, swales, etc.	• Location and extent of device • Location of features such as scruffy domes, manholes, inlets (including kerb cuts, lowered kerb, etc.), weirs and outlets / outlet structures • Invert levels, top level, and diameters of any manholes • Invert levels and diameters of any pipes • Extent of any riprap or erosion protection • Annotation as to type of device
Culverts	• Location, extent, elevation, and dimensions for both upstream and downstream faces including any wingwalls and aprons • Barrel locations and dimensions • Culvert and barrel materials, annotated • Road/surface profile above culvert including footpaths, embankments or other surface • For railway embankments, the top of rail level (if there is one) with photograph to show details of the rail • Photographs of the culvert - facing inlet, away from inlet, facing outlet and away from outlet
Wastewater	
Manholes	• Location and level at centre of lid. Annotate diameter and type of manhole. • Annotation if an access grill is in place. • Invert level, diameter and location of all incoming and outgoing pipes, rodding eyes, or droppers. Where possible include pipe material of each incoming and outgoing pipe • Sufficient annotated photographs in accordance with *ACS1530.2.7 (Photographs)* are required to capture the manhole shaft, pipe entries, orientation of flow and manhole location in relation to surrounding features.
Pump stations	• Extent of main above ground structure including any overhangs or below ground structure extents, valve chambers, manholes, etc.

Feature	Information required
Water	
Above ground watermains and aerial pipe bridges	• Location, location of any piles and diameter, type, and size of watermain, air, scour, gate, or other valve locations where mounted to top or bottom of pipe
Water meters, valves, fire hydrants, scour valves and chambers (if any)	• Small covers and plinths - 1 point at centre • Large covers - sufficient points along the edges to define shape
Service utilities	
Electricity pylons, poles, overhead cables, transformers, and pits	• Poles - 1 point plus reference to diameter • Annotate overhead lines • All others - sufficient points along the edges to define shape
Telecom poles, plinths, pits and covers and public call boxes (if any)	• Poles - 1 point plus reference to diameter • Small covers and plinths - 1 point at centre • All other covers and call boxes - sufficient points along the edges to define shape
Fibre optic cables and associated utilities	• Small covers and plinths - 1 point at centre • Large covers - sufficient points along the edges to define shape
Gas covers, valves, and markers	• Small covers and plinths - 1 point at centre • Large covers - sufficient points along the edges to define shape
Other utility covers and markers	• Small covers and plinths - 1 point at centre • Large covers - sufficient points along the edges to define shape
	Parks, reservice and public spaces
Playgrounds and play features	• Extent of playground including any surrounds and type, e.g. retaining, timber poles, etc
Seating and picnic tables	• Location and extent, annotated
Public toilets, changing rooms, showers, drinking fountains	• Location of any building footprints and overhangs, surrounding paths, drainage features (gully traps, sumps, downpipes) • Type and size of facility annotated
Carparks including kerb, line marking, etc.	• Location and extent, surfacing, lane marking including disabled access
Paths, paved or concreted areas	• Location and extent, annotated with surface type and any features such as ramps, stairs, steps, etc.

Feature	Information required
Pedestrian or cycle bridges	• Location and extent of bridge • Abutment location and extent • Bridge deck elevation along centreline or edge of deck where superelevated • Pile or pier locations and details annotated • Balustrade location • Materials annotated
Signage, lighting, bins, and other amenities	• Location and annotation
Barbeques and covered areas	• Extents and annotation
Vegetation	• Grassed areas: location and extent, annotated • Hedge's location and extent sufficient to define shape • Areas of smaller dense vegetation (grouped) sufficient to define location and shape • Trees centre of trunk and extent of dripline (by way of circle), annotate height (where applicable) • Trees with a girth of 0.60 m (at 1 m above ground) or above shall be shown individually • Stumps one central point and annotated
	Private properties

Buildings and structures	• Footprint of all buildings, including the roof extent and any overhead features such as pergolas, canopies, etc.
	• Floor levels (both habitable and non-habitable annotated) and the level of any decks
	• Downpipe size and location
	• Gully trap and wastewater connection locations and sizes (where visible)
	• Location and extent of any:
	  ○ Huts, outbuildings, garages, sheds, glass houses, etc.
	  ○ Permanent surface features such as swimming pools
	  ○ Ruins, partially demolished buildings, or foundations

Feature	Information required
Boundary or internal features	• Vehicle crossings, driveways, parking areas and hardstands • Fences (including description and height) and gates • Paths, stairs, and ramps • Walls (including height and type) • Retaining walls (levels to be recorded both sides) • Garden beds: location and extent • Grassed areas: location and extent, annotated • Hedge's location and extent sufficient to define shape • Areas of smaller dense vegetation (grouped) sufficient to define location and shape • Trees centre of trunk and extent of dripline (by way of circle), annotate height (where applicable) • Trees with a girth of 0.60 m (at 1 m above ground) or above shall be shown individually • Stumps one central point and annotated • Any other features.

ACS1530.3.4 Deliverables

In general, for topographical surveys, the following survey data deliverables shall be submitted to the Engineer (or Client's Representative) within 14 days of the completion of the survey works. Survey data shall include the following:

a) Point file: text file with a field for each point stating Point Number (P), Northing (N), Easting (E), Level (Z), Description (D).

b) AutoCAD ".dwg" file or ".DXF" file, in 3D, with all x, y, and z coordinates for all surveyed features, including:

i. All surveyed DWG layers

ii. Surveyor name

iii. Surveyor certification (a Suitably Qualified and Experienced Person, as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*), on the request of the Engineer (or Client's Representative)

iv. Control marks

v. Contours at 0.10 m intervals

vi. Digital terrain model (DTM) from which the contours are constructed

vii. Break lines used to build the DTM (for kerbs, walls etc.)

viii. Survey date

ix. Survey extent

c) Vectorised PDF files covering the survey extent, including:

i. Surveyor name

ii. Surveyor certification (a Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*), at the request of the Engineer (or Client's Representative)

iii. Control marks

iv. Survey date

d) Written memorandum, covering:

i. Any features that could not be surveyed

ii. Issues encountered during the survey.

The following deliverables are also required for infrastructure design surveys:

a) DWG and vectorised PDF documents of survey data.

The code (name), datum and coordinates of any benchmark used in the survey shall be clearly stated in the survey drawings side notes.

Where assets indicated in GIS are not able to be located or accessed, notes should be recorded against each asset on the drawing clearly indicating the issue.

b) Photographs as noted in Table 3.

c) Manhole record sheets as noted in Table 3.

d) Dimensional drawings of elevations of culverts and bridges where required.

ACS1530.4 Data collection for stormwater modelling

ACS1530.4.1 General

Survey data collected for stormwater modelling purposes, must be compatible with Auckland Council GIS databases to allow the data to be uploaded into GIS without further processing.

This section covers three types of survey works which are listed below:

a) Spot height survey of floor levels and points of special interest

b) Cross-section survey of open channels/overland flow paths

c) Survey of hydraulic structures and assets such as manholes/pipes/culverts/bridges/road crest.

Survey scope and deliverables shall be delivered to the satisfaction of the Engineer (or Client's Representative).

ACS1530.4.2 Information supplied by Auckland Council

In addition to data provided under *ACS1530.2.5 (Information supplied by Auckland Council),* Auckland Council will provide the Contractor with existing stormwater asset and flood hazard information held in the corporate GIS system and a template geodatabase for deliverables.

ACS1530.4.2.1 Geodatabase deliverables template

A latest version ArcMap geodatabase template will be provided by Auckland Council. The deliverables from the survey shall also be compatible with the same version of ArcGIS as the provided geodatabase.

The Contractor must add features and complete attributes as necessary to include the required survey data, otherwise the structure or content of the geodatabase must not be changed, including:

a) Attribute fields must not be added or removed

b) All required fields for each asset type, must be completed

c) Fields are predefined, and values allowed in those files are defined using Domains in the geodatabase setup. The fields must be completed using the predefined Domain values assigned in the database.

d) Predefined domain values must not be edited, added, or removed.

The Contractor shall notify the Engineer (or Client's Representative) if changes to the predefined value lists are required to complete the project.

Any photograph deliverables shall be geotagged and included as attachments in the geodatabase.

A Surveyor's Certificate must be provided with the completed geodatabase to certify the quality of the data meets the specifications. The Surveyor's Certificate must be completed and signed by a Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements* (see Section *ACS1530.4.8 Survey report* (q)).

ACS1530.4.2.2 Geodatabase – Temporary ID for assets not in Auckland Council GIS

Where stormwater assets are present in the field but not included in Auckland Council's GIS, the Contractor shall assign a temporary ID based on the asset type, as follows:

Stormwater feature	Feature geometry	Example of temporary ID
Manhole, chamber, inlet, outlet, soakage feature	Point/node	NN_001
Pipe, culvert	Line	NL_001
Building, pond	Polygon	NP_001
Splitting an asset	Line/polygon	OrignalAssetID_001

a) The ID shall take the format "NN_001" for example. The IDs shall be NN, NL or NP, depending on the type of feature being surveyed.

b) There shall be no spaces, or characters other than _ (underscore) in the name

c) The numeric component shall be incremental and consecutive integer IDs for each new asset found.

d) The ID assigned shall be consistent for each asset across any material delivered (photographs, geodatabase features, etc.).

e) If a feature is being split, e.g. a building footprint, then the new naming convention shall be AssetID_1, AssetID_2, etc.

If survey of asset types not covered by this document is required, the Contractor shall agree with the Engineer (or Client's Representative) the data required and the format for the deliverable.

ACS1530.4.2.3 Geodatabase – Geometry and connectivity

The submitted geodatabase shall be a true and correct record of the surveyed parameters in the field including:

a) The position of assets shall be corrected according to the surveyed (x, y) coordinates

b) Where surveyed asset lines are drawn in the wrong direction, they shall be edited so as the line is drawn upstream to downstream

c) Where assets are found that are not included in the Auckland Council GIS data, these features will be added, and assigned the temporary ID (refer *ACS1530.4.2.2 Geodatabase – Temporary ID for assets not in Auckland Council GIS*)

d) Where assets are present in the Auckland Council GIS, but are not present in the field, these assets shall be marked as "not found" in the deliverable

e) All relevant attributes will be completed

f) The geometry of the lines and points will be edited as required, to ensure exact snapping of attributes to ensure geometric connectivity in the network.

ACS1530.4.3 Survey accuracy for stormwater modelling data collection

Unless otherwise specified, the survey shall comply with accuracy bands in accordance with Table 1: Survey accuracy bands, which has been modified for specific features as in Table 4: Accuracy for stormwater modelling surveys, below.

Table 4: Accuracy for stormwater modelling surveys

Survey type	Required vertical accuracy band	Required horizontal accuracy band
Floor levels (habitable and non-habitable)	band C	band E
Assets (Manholes, pipe inlets and outlets)*	band C*	band E*
Structures	band C	band E

*Asset Data collection for contiguous piped systems shall be B for vertical accuracy (1 Σ), E for horizontal accuracy (1 Σ)

Note: If confined space entry is required, the Contractor shall notify the Engineer (or Client's Representative) immediately.

ACS1530.4.4 Survey of floor levels for stormwater modelling

ACS1530.4.4.1 Habitable and non-habitable floors

Building floors are defined as either:

a) **Habitable floors**: Floors used for residential activity including dwellings, home occupations, visitor accommodation, camping grounds, boarding houses, student accommodation, integrated residential development, retirement village, supported residential care and sleepouts.

b) **Non-habitable floors**: Spaces of a specialised nature that are occupied neither frequently nor for extended periods and do not have overnight sleeping including garages, sheds, storage facilities, hay barns and other outbuildings.

ACS1530.4.4.2 Building usage

Building usages are defined as either:

a) Residential buildings as described in *ACS1530.4.4.1 (Habitable and non-habitable floors) (a)*

b) Commercial buildings include offices, retail, commercial services, recreational and entertainment facilities

c) Industrial buildings include warehouses, factories, storage facilities and depots

d) Educational buildings include schools, day care.

ACS1530.4.4.3 Information supplied by Auckland Council

In addition to the data supplied under *ACS1530.2.5 (Information supplied by Auckland Council)*, Auckland Council will supply a geodatabase indicating all lots which require buildings required to be surveyed for floor levels and ground levels. These buildings are selected because they may be at risk from flooding. Background information such as flood hazard data and property parcels will also be provided.

ACS1530.4.4.4 Survey scope

Auckland Council surveys floor levels and compares these to modelled flood levels to see how many buildings (or dwellings) would flood during predicted storm events. Understanding which building will flood helps to identify areas where infrastructure projects may help reduce flooding issues.

Buildings (or dwellings) requiring survey shall have ground floor level/s and ground level/s surveyed. Auckland Council is trying to investigate potential routes by which water could enter the building so levels shall be recorded at every entrance to the building (or dwelling) and for all floor levels for split level buildings (or dwellings). The survey includes attached garages and basements. A floor-level elevation and a ground-level elevation shall be recorded at the same location (or as close as possible) at every entrance to the building (or dwelling) so that floor clearance above the ground can be determined.

A reference ground-level elevation shall also be captured a short distance away from the building.

If the properties have large, detached garages, sheds, or other outbuildings, these non-habitable floor levels shall also be surveyed. Large will be defined by the Engineer (or Client's Representative). If a small standalone building is clearly a habitable floor, then this building shall also be surveyed.

Structures without walls shall not be surveyed, e.g. carports.

The Contractor shall visually assess all structures within properties requiring survey, to identify habitable and non-habitable floors and building usage (i.e. habitable or non-habitable, and residential, industrial, or commercial).

Contractors may need to split the GIS polygons for individual units and split-level properties. Contractors shall follow the naming convention for new polygons in *ACS1530.4.2.2 (Geodatabase – Temporary ID for assets not in Auckland GIS)* (e).

Photographs complying with *ACS1530.2.7 (Photographs*) shall be taken for each property to show an overview of the property and all the floor levels surveyed. The locations where floor and ground levels have been taken shall be marked in the photograph, e.g. with cones. No marks shall be made on the floors, paths, or other structures.

ACS1530.4.5 Survey of overland flow paths for stormwater modelling

Overland flow paths are the routes taken by water when the pipe network is overloaded. Where overland flow paths are required to be surveyed, a topographical survey in accordance with *ACS1530.3 (Survey for infrastructure design and topographical survey)* shall be undertaken within the identified flow path or within a strip as indicated in the provided Geodatabase. In addition, the following shall be surveyed:

a) Cross-sections as indicated in the provided Geodatabase

b) Any potential obstructions found on site that may impede flow, e.g. walls, fences, planter boxes, etc.

ACS1530.4.5.1 Information supplied by Auckland Council

In addition to the data supplied under *ACS1530.2.5 (Information supplied by Auckland Council)*, Auckland Council will supply details of the approximate centre line of overland flow paths or otherwise define the extent of the survey. Background information such as flood hazard data will also be provided.

ACS1530.4.5.2 Survey scope

Overland flow paths are surveyed to understand how water may travel through the catchment in a storm event. This type of survey is usually undertaken when LiDAR data does not give enough detail about an area.

Left bank and right bank are defined looking downstream. All cross-sections shall be recorded looking downstream.

The centreline is defined as the low point where water would concentrate and run over the ground. All sections surveyed are to be perpendicular to the flow path.

Additionally, cross-sections shall be surveyed at any change in grade, slope, or width, if these changes are not otherwise captured as the representative cross-sections indicated in the provided Geodatabase.

At least two photographs must be taken for each overland flow path cross-section to show an overview of the flow path including geometry and vegetation cover. Photographs will be labelled as facing upstream or facing downstream in the overland flow path. The left-most and right-most extents of the cross-section survey shall be marked in the photograph.

Cross-sections at obstructions to the overland flow path (such as fences) shall be surveyed and photographs taken in accordance with *ACS1530.2.7 (Photographs).* Key levels and dimensions of the obstruction shall be surveyed (such as the gaps in the fence and the top level of the fence).

ACS1530.4.6 Cross-section survey of open channels for stormwater modelling

Where topographical data is not considered sufficiently accurate to describe the cross-section of natural or engineered open channels, surveyed cross-section data will be required. Cross-sections are important to understand the channel conveyance capacity and volume of water that is held by the stream banks.

ACS1530.4.6.1 Information supplied by Auckland Council

In addition to the data supplied under *ACS1530.2.5 (Information provided by Auckland Council)*, Auckland Council will supply details of the approximate 100-year flood extents or otherwise define the extent of the survey.

ACS1530.4.6.2 Survey locations

Cross-sections shall be surveyed as indicated in the provided Geodatabase unless otherwise agreed with the Engineer (or Client's Representative).

At least four photographs are to be taken at each cross-section. These photos shall be taken at, and include, the cross-section, looking upstream, downstream, left bank and right bank. The photographs shall be sufficient, in the opinion of the Engineer (or Client's Representative), to enable the nature of the terrain to be determined and to identify any significant obstructions along the channel.

The Contractor shall inform the Engineer (or Client's Representative) if there are any areas where the stream channel changes significantly that are not identified in the survey scope. The Engineer (or Client's Representative) may instruct additional cross-sections to be surveyed.

ACS1530.4.6.2.1 Confluences

At confluences, a representative section shall be taken upstream and downstream of the confluence.

ACS1530.4.6.2.2 Bed change

All significant changes in bed slope such as those associated with large waterfalls and cascades shall be surveyed downstream and upstream of the change. The downstream cross-section shall be taken at the widest part of the pool and then further downstream again once the section narrows again, unless otherwise agreed with the Engineer (or Client's Representative).

ACS1530.4.6.2.3 Channel geometry

A representative section of identified survey locations shall be taken so that the channel geometry can be, in the opinion of the Engineer (or Client's Representative), reasonably represented, particularly at locations where there are significant changes in channel geometry.

ACS1530.4.6.3 Survey extent

Left bank and right bank are defined as looking downstream. All cross-sections shall be recorded looking downstream.

Cross-section points surveyed shall be less than a metre offset from the straight line between the first and last surveyed point. Where the terrain makes this impossible, notes shall be made to accompany the survey data to explain why the requirement cannot be met.

X, Y coordinates and levels shall be recorded for each survey point of the cross-sections. As a minimum, the thalweg point (the line defining the lowest points along the length of a riverbed or valley, which may be underwater) and bank edge points, (i.e. top and bottom of left and right banks), shall be recorded. If the thalweg point is underwater, confirm it is safe to complete the survey and discuss with the Engineer (or Client's Representative).

For all cross-sections, horizontal spacing of survey points shall be close enough to capture all slope changes, normal water level and bed levels with measurements accurately recording all gradients. A maximum spacing for cross-sectional survey points of 1 m within the channel is required.

The survey shall ensure that the lateral extent of a cross-section is sufficiently wide to include the full extent of the 100-year ARI floodplain.

ACS1530.4.6.3.1 100-year ARI flood level higher than top of bank

For channel types where the predicted 100-year ARI flood level is higher than the top of the bank, the extents of the survey will be indicated in the provided Geodatabase.

ACS1530.4.6.3.2 Top of bank fences higher than 100-year ARI flood level

For channel types with top of bank fences above the flood level, the extent of the survey shall cover channel bed, banks, and the fences.

A survey point shall be taken at the foot of the fence and the top of the fence. At least one photo shall be taken at the fence, which clearly demonstrates fence material and permeability.

ACS1530.4.6.3.3 Photographs of channels

In addition to the requirements of *ACS1530.2.7 (Photographs),* photographs of channels shall be taken looking both upstream and downstream and be annotated with the following:

a) A clearly identifiable cone or arrow showing the extents of the surveyed cross-section

b) The cross-section ID, as recorded in the geodatabase deliverables.

Ideally the extents of the cross-section should be marked while in the field prior to photographing. If this is not possible an arrow can be added digitally to the photographs.

ACS1530.4.7 Survey of structures and assets for stormwater modelling

ACS1530.4.7.1 Survey of culverts for stormwater modelling

Culverts are surveyed in order to understand the conveyance of the asset, any potential impediments to water flow, and the level at which overtopping occurs.

The following information shall be captured for culverts:

a) Two stream cross-sections (one upstream, one downstream) within 5 m of the culvert's inlet and outlet that are representative of channel geometry. Cross-section surveys shall be undertaken in accordance with *ACS1530.4.6 (Cross-section survey of open channels for stormwater modelling)* and as indicated in the provided geodatabase and particular specification.

b) A cross-section parallel to the road/footpath/etc. which captures the crest levels of the ground including spill point of the road (including the lowest point at which overtopping of the embankment occurs).

c) Invert and soffit levels of inlet and outlet of the culvert/s including width, height and included angle of each of the wing walls and head walls to the direction of the culvert centreline. These shall be annotated in the supplied diagram.

d) Internal diameter or dimensions (height-width) of the culvert/s are to be recorded accurately, as measured, and are not to be to be changed to the nearest nominal pipe diameter. For concrete pipes, the standard pipe size is also required as the surveyor will be able to best determine this in the field.

e) For railway embankments, the highest rail level (the rail causing the dam) with photograph to show details of the rail.

f) Material of the culvert.

g) For any inlet screens/grilles or upstream trash rack, capture the screen width and height, bar opening width, bar width, and other features that may affect hydraulic performance.

h) A minimum of four photographs in accordance with *ACS1530.3.7 (Photographs)* are required to capture the images of facing inlet, away from inlet, facing outlet and away from outlet that adequately show the culvert, its approaches and downstream conditions.

i) Annotated sketches.

j) X, Y coordinates and levels shall be recorded for each survey point of the cross-sections. The thalweg point and bank edge points shall be marked.

k) X, Y coordinates of inlet and outlets.

ACS1530.4.7.2 Survey of bridges for stormwater modelling

Bridges are surveyed to understand any constrictions to the flow of water. There are three types of bridge surveys: full bridge survey, partial bridge survey and bridge opening only survey.

Full bridge survey shall include at least five channel cross-sections and one bridge deck cross-section including:

a) A cross-section under the middle of the bridge (unless there is an alternative position with a smaller opening, in which case this takes preference). The cross-section shall include the longitudinal profile of the bridge soffit. The bridge soffit shall also be surveyed at the lowest elevation of the impermeable structure. This does not include pipes or other assets crossing the watercourse (see separate comment later). The bridge abutments/piers shall be included in the bridge cross-section survey.

b) Stream cross-section under/at the upstream face of the bridge.

c) Stream cross-section under/at the downstream face of the bridge.

d) Stream cross-section representative of channel geometry immediately upstream of the contraction due to the bridge.

e) Stream cross-section representative of channel geometry immediately downstream of the contraction due to the bridge.

f) Longitudinal bridge deck profile shall be surveyed along the top of the bridge at the maximum elevation of the impermeable structure (usually this will be the footpath or road crest). The top of the guardrail level shall be surveyed. A photograph in accordance with *ACS1530.2.7 (Photographs)* shall be taken of the guardrail to show its openings as these may restrict or allow flow.

g) Bridge skew angle (if the bridge is not aligned at right angle to flow direction).

h) Bridge inlet headwalls dimensions and included angle of each of the wing walls and head walls to the direction of the bridge waterway centreline.

i) Photographs.

j) Sketch with bridge dimensions. Refer *ACS1530.4.7.2.2 (Sketch requirements – bridge surveys for stormwater modelling).*

Partial bridge survey can be done where there is no apparent contraction or expansion of river channels at the bridge site so only three cross-sections are required. The survey shall include the following:

a) As above for full bridge survey but stream cross-sections upstream and downstream of any channel constriction due to the bridge (points d) and e)) are not required.

Bridge opening only survey shall include the following:

a) One cross-section at the centre of the bridge opening including longitudinal profile of the bridge soffit. The other opening dimensions, e.g. bridge abutments, piers, etc are still required.

b) Bridge skew angle if necessary (if the bridge is skewed to the channel, the angle between the bridge and the cross-section in the channel shall be surveyed).

c) Bridge inlet headwalls dimensions and included angle of each of the wing walls and head walls to the direction of the bridge waterway centreline.

d) Photographs.

e) Sketch with bridge dimensions. Refer *ACS1530.4.7.2.2 (Sketch requirements – bridge surveys for stormwater modelling*).

Cross-section surveys shall be undertaken in accordance with *ACS1530.4.6 (Cross-section survey of open channels for stormwater modelling)* and shall extend a minimum of 10 m on either side of top of the stream bank.

Bridge length and width shall be measured and any services (e.g. pipes or cables) that restrict flood flows underneath the bridge shall be surveyed.

ACS1530.4.7.2.1 Photographs – bridge surveys for stormwater modelling

A minimum of four annotated photographs in accordance with *ACS1530.2.7 (Photographs)* are required to capture the images of facing inlet, facing upstream from inlet, facing outlet, and facing downstream from outlet. Annotations shall clearly describe any codes or abbreviations used to reference the features of the structures in the database (e.g. Soffit, pier 1, pier 2, etc.).

ACS1530.4.7.2.2 Sketch requirements – bridge surveys for stormwater modelling

A simplified scale drawing with dimensions is required which includes the bridge deck, bridge opening and the smallest cross-section showing coordinates and levels that represent the information included in this sub-section. X, Y coordinates and levels shall be recorded for each survey point of the cross-sections. The thalweg point and bank edge points shall be marked. The scale drawing of the structures cross-section shall include levels in relation to chainage. The cross-section chainage shall begin from the left bank when facing downstream.

ACS1530.4.7.3 Survey of manholes, inlets, and outlets for stormwater modelling

Surveys of manholes, inlets and outlets are important to understand the capacity of the piped stormwater system and how the flow of stormwater is conveyed or impeded. There are three types of manhole surveys: manhole lid surveys, manhole depth to invert only surveys, and full manhole surveys.

Manhole lid surveys shall include the following:

a) Manhole location coordinates and lid level

b) Lid type, diameter of clear opening

c) Photographs

d) Annotated sketch.

Manhole depth to invert only surveys shall include the following:

a) Depth to invert of the lowest outgoing pipe

b) Photographs

c) Annotated sketch.

Full manhole surveys shall include the following:

a) Manhole location coordinates and lid level

b) Lid type, size, and level

c) Manhole chamber dimensions

d) Depth to invert of all incoming and outgoing pipes

e) Pipe internal dimensions and pipe materials of all incoming and outgoing pipes (do not include the pipe socket dimension)

f) In case of grated manhole covers, the size and spacing of grating slots and their total open area

g) For special chamber structures, such as scruffy dome manholes, discuss what is required with the Engineer (or Client's Representative)

h) Photographs

i) Annotated sketch

   i. Arrows shall be added showing the flow direction of all incoming and outgoing pipes

   ii. The surveyed diameter of each pipe shall be annotated in millimetres

   iii. The sketch shall be oriented with the main outlet at the top of the sketch (12 o'clock orientation) and include a north arrow.

In the case of a Bifurcation manhole (two outlet pipes), the main outgoing pipe is taken as the following (based on order of priority):

a) The lowest outlet pipe

b) The largest diameter outlet pipe

c) The outlet pipe opposite the largest inlet pipe.

Diameters are to be provided as measured value (not rounded).

X, Y coordinates, levels and all information requested shall be recorded for each manhole / inlet / outlet and associated pipes.

Inlet and outlet surveys

Inlets and outlets surveys shall include the following:

a) Dimensions (internal diameter or height-width) of the pipes

b) Inlet and outlet location coordinates and invert level

c) Dimensions of any associated screen with bar thickness, spacing and orientation (horizontal/vertical)

d) Photographs

e) Annotated sketch including:

    i. The asset ID of the inlet / outlet node

    ii. Dimensions of the structure including the wingwall

    iii. Pipe diameter and invert level dimensions of all main pipes

ACS1530.4.7.3.1 Photographs – manholes and chambers for stormwater modelling

At least two photographs in accordance with *ACS1530.2.7 (Photographs)* are required to show the location of the manholes, i.e. not just the lid and the inside of the manhole.

For the photograph(s) inside of the manhole, in addition to the requirements of *ACS1530.2.7* photographs of manholes and chambers shall be taken looking downwards with the full extent of the manhole being shown (if possible). The photograph(s) shall be oriented with the main outlet at the top (12 o'clock orientation) and include a north arrow.

ACS1530.4.7.3.2 Photographs - Inlets and outlets for stormwater modelling

In addition to the requirements of *ACS1530.2.7* photographs of inlets and outlets shall include:

a) A single photograph (if possible) to include all pipes, and the whole inlet or outlet structure. The photograph(s) must be annotated with the asset ID of the inlet / outlet node

b) Additional photographs showing the location of the inlet/outlet.

ACS1530.4.8 Survey report

A survey report shall be submitted to the Engineer (or Client's Representative) within 14 days of the completion of the survey works. The report shall include the following:

a) Name and qualifications of Surveyor

b) Name and contact details of the Suitably Qualified and Experienced Person (as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*) responsible for overseeing the survey

c) A description of the survey (location, purpose, reference number, etc.)

d) The purpose of the survey

e) Details of equipment used, including make, model, serial numbers and calibration certificate

f) Dates and time the survey was undertaken

g) Weather conditions experienced during the survey

h) A list of control marks (including coordinate orders for each mark) used in the survey

i) Details of any 'site calibrations' or transformations applied to the raw survey data

j) Methodology – a brief description of the field methods adopted to meet the specified standards for accuracy. Include details of methodology to manage and reduce survey errors

k) Details of quality control for site and processing work

l) Comments on any off-specification data that is being submitted with an explanation why the data could not be provided to specification

m) Details of any areas that could not be surveyed as specified.

n) Details of problems encountered including:

    i. Unlocated assets with a description of all attempted measures taken to locate the asset
    ii. Details of any errors in Auckland Council GIS
    iii. Inability to acquire any required data and the reasons why.
    iv. Details of any reason that might affect the accuracy of data recorded (for example, spot heights taken on loose ground)

o) Details of any access problems:

    i. Details of any complaints from property owners
    ii. Details of any changes to structures within the survey area that restricted access

p) Evidence that the data meets the accuracy requirements (through least squares analysis, or statistical or direct analysis of redundant observations)

q) The dataset shall be certified as meeting the specifications by a member of the New Zealand Institute of Surveyors (NZIS) who holds the qualification of a Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements* and who is competent and experienced in this particular field. The certificate shall read:

> *"I, [full name], being a Suitably Qualified and Experienced Person, as defined in The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements, certify that the data provided by me and its related survey are accurate, correct and in accordance with the Auckland Council Survey Specification Version X, dated ..... I also certify that the survey was undertaken by me or under my personal direction."*

r) Summaries of other deliverables

s) Recommendations for how to collect any data that was not obtainable during the survey works.

For data collection for stormwater modelling, the survey report shall include:

a) Statistics on assets fully surveyed, partially surveyed, not found, not accessed, etc.

b) Summaries of corrections made to existing assets in the geodatabase

c) Summaries of assets added to the geodatabase

d) Details and explanations for any fields not completed in the geodatabase

e) Details and explanations of any assets that could not be surveyed.

ACS1530.5 As-built surveys for infrastructure

Infrastructure construction as built surveys shall capture all features associated with any new assets or those existing assets where data is required.

For developer-created assets to be vested into Auckland Council ownership, survey shall be in accordance with the Auckland Council Regulatory Engineering As-built Requirements.

ACS1530.5.1 Accuracy

Notwithstanding the accuracy requirements of *ACS1530.2.2 (Survey accuracy),* as-built surveys shall be carried out in accordance with Table 1: *Survey accuracy bands* and Table 2: *Summary of required accuracy for survey type.*

ACS1530.5.2 Deliverables

In general, the following survey data deliverables shall be submitted to the Engineer (or Client's Representative) within 14 days of the completion of the survey works. Survey data shall include the following:

a) Point file: text file with a field for each point stating Point Number (P), Northing (N), Easting (E), Level (Z), Description (D).

b) AutoCAD ".dwg" file or ".DXF" file, in 3D, with all x, y, and z coordinates for all surveyed features, including:

   i. All surveyed DWG layers
   ii. Surveyor name
   iii. Surveyor certification (a Suitably Qualified and Experienced Person, as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*), on the request of the Engineer (or Client's Representative).
   iv. Control marks
   v. Contours at 0.10 m intervals
   vi. Digital terrain model (DTM) from which the contours are constructed
   vii. Break lines used to build the DTM (for kerbs walls etc.)
   viii. Survey date
   ix. Survey extent

c) Vectorised PDF files covering the survey extent, including:

   i. Surveyor name
   ii. Surveyor certification (a Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*), at the request of the Engineer (or Client's Representative).
   iii. Control marks
   iv. Survey date

d) Written memorandum, covering:

   i. Any features that could not be surveyed
   ii. Issues encountered during the survey.

Red-line markups of vectorised PDF files shall also be provided, including:

a) Construction details

b) Nature of constructed assets (including, but not limited to, pipe sizes, manhole diameters)

c) Summaries of departures from construction drawings

d) Clear statement of the benchmark and datum used in the survey.

Where the as-built survey is being undertaken as part of a Construction Contract the as-built deliverables shall be in accordance with Auckland Council Standard Specifications A*CS100 (General specification).*

ACS1530.6 Aerial surveys

ACS1530.6.1 LiDAR

The LiDAR survey shall generally comply with the accuracy requirements of *ACS1530.2.2 (Survey accuracy)*. Where a LiDAR survey is required, the Contractor shall submit a detailed work method statement including the following:

a) Method of survey including:

   i. Programme of Works indicating the approximate timing of each stage and the order in which the survey will be completed
   ii. Name and qualifications of the Surveyor
   iii. Equipment to be used
   iv. List of permanent survey marks proposed
   v. Any specialist sub-contractors to be used
   vi. Details of any traffic management required
   vii. Method of demonstrating that the required survey accuracy will be met and data quality assured.

b) Evidence of the accuracy capability of the proposed equipment

c) Details of proposed data processing methods

d) Details of quality assurance procedures to ensure that the survey achieves the required accuracy

e) Details of proposed deliverables.

ACS1530.6.2 Unmanned aerial vehicle (UAV) survey

UAV survey shall generally comply with the accuracy requirements of *ACS1530.2.2 (Survey accuracy)*. Where UAV survey is required, the Contractor shall submit a detailed work method statement in accordance with *ACS1530.4.7.1 (Survey of culverts for stormwater modelling).*

The Contractor shall comply with the Auckland Council policy, where you can fly your drone or UAV, available at https://www.aucklandcouncil.govt.nz/parks-recreation/get-outdoors/drones-unmanned-aerial-vehicles/Pages/where-you-can-fly-your-drone-uav.aspx. Also, the Contractor shall comply with the Auckland Council Code of conduct for use of drones and UAVs, available at https://www.aucklandcouncil.govt.nz/parks-recreation/get-outdoors/drones-unmanned-aerial-vehicles/Pages/code-of-conduct-use-drones-uavs.aspx.

ACS1530.6.3 Deliverables

A survey report in accordance with the relevant clauses *ACS1530.4.8 (Survey report)* shall be provided to the Engineer (or Client's Representative) within 14 days of the completion of the survey works.

ACS1530.7 Survey report template

[Type of survey]

[Location of survey]

[Date]

Prepared For [Team Name]

[Reference]

Contact information		Document information	
Company name		Prepared for	Auckland Council
Company address		Project name	
Company telephone		File reference	
		Job reference	
		Date	
		Version number	

Author/s		Approved by	
Name		Name	
Job title		Job title	
Signature		Signature	

Effective Date:

Date Approved:

Document history:

Version	Effective Date	Description of Revision	Prepared by:	Reviewed by:

Copyright

[copyright statement]

Executive summary

1. Personnel

Name	Role	Qualifications

2. Suitably qualified and experienced person

[Name and contact details of the Suitably Qualified and Experienced Person (as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*) responsible for overseeing the survey]

3. Description and purpose of the survey

[A description of the survey (location, purpose, reference number, etc]

[Purpose of the survey]

4. Equipment

Type	Make	Model	Serial Number	Calibration certificate

5. Dates

[Dates and time the survey was undertaken]

6. Weather conditions

[Any adverse weather conditions experienced during the survey]

7. Control marks

[A list of control marks (including coordinate orders for each mark) used in the survey]

Name	Geodetic Code	Horizontal Order (NZGD 2000)	Vertical Order(s) [clearly state datum(s) used]*

[*Note: surveys shall report elevation using both Auckland 1946 (orthometric height) datum and NZVD2016 as vertical datum, or as otherwise specified.]

8. Site calibrations

[Details of any 'site calibrations' or transformations applied to the raw survey data]

9. Methodology

[A brief description of the field methods adopted to meet the specified standards for accuracy. Include details of methodology to manage and reduce survey errors]

10. Quality control

[Details of quality control for site and processing work]

11. Non-complying data

[Comments on any off-specification data that is being submitted with an explanation why the data could not be provided to specification]

12. Assets unable to be surveyed

[Details of any areas that could not be surveyed as specified.]

Asset ID	Address	Reason cannot be surveyed	Comment	Survey ID	Remains in GIS?
		COULD_NOT_LOCATE			
		ACCESS_DENIED			

13. Problems encountered

[Details of any problems encountered such as:

- Unlocated assets with a description of all attempted measures taken to locate the asset
- Details of any errors in Auckland Council GIS
- Inability to acquire any required data and the reasons why.
- Details of any reason that might affect the accuracy of data recorded (for example, spot heights taken on loose ground)]

14. Access issues

[Details of any access problems such as:

- Details of any complaints from property owners
- Details of any changes to structures within the survey area that restricted access]

15. Accuracy evidence

[Evidence that the data meets the accuracy requirements (through least squares analysis, or statistical or direct analysis of redundant observations)]

16. Summary of other deliverables

[Summaries of other deliverables]

17. Recommendations

[Recommendations for how to collect any data that was not obtainable during the survey works.]

18. Surveyor's certificate

[The dataset shall be certified as meeting the specifications by a member of the New Zealand Institute of Surveyors (NZIS) who holds the qualification of a [qualification that meets Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*] and who is competent and experienced in this particular field. The certificate shall read:]

Surveyor's Certificate

Type: [Dataset Certificate]

Project:

Our Ref:

Background:

Certification: "I, [Name] , being a [qualification that meets Suitably Qualified and Experienced Person as defined in *The Auckland Code of Practice for Land Development and Subdivision Chapter 1 General Requirements*], certify that the data provided by me and its related survey are accurate, correct and in accordance with the Auckland Council Survey Specification Version 2.0, dated June 2024. I also certify that the survey was undertaken by me or under my personal direction"

Signed:

[Name]

[Job Title and qualifications]

[Company]

Date: