Tasman District Council
Nelson City Council

Joint Tender for;

Orthophotography
&
LiDAR

(2018-2021)

Closes: 4.00pm Friday 05 October 2018

tasman district council

Nelson City Council
te kaunihera o whakatū

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1 Introduction

1.1 Background

A shared services initiative involving Tasman District Council and Nelson City Council was implemented in 2013. One of the early projects to be set up was the establishment of a team to investigate potential cost-savings by initiating a joint capture programme for the ongoing maintenance and acquisition of Orthophotography and LiDAR across the two Councils.

Each Council had previously controlled and managed their respective acquisition of data. The shared services initiative has identified a proposed Orthophotography capture programme for each Council, with the current Long Term Plan (LTP) round outlined in the following matrix.

Financial Year	Annual Plan Year	Tasman	Nelson
2018/2019	1	Rural Aerials (Northern area)	Rural Aerials (entire region)
2019/2020	2	Rural Aerials (Southern area)	Urban Aerials (as shown)
2020/2021	3	Urban Aerials	

LiDAR capture is less structured and will be moving from an initial acquisition phase to a re-fly as maintenance phase. This is primarily for the purposes of coastal and river management, along with settlement infrastructure. LINZ has applied for Provincial Growth Fund (PGF) funding to implement a nationwide elevation capture programme, which subject to approval and proposed timeframes, may change extent requirements.

Refer respective Appendices for a better definition of Orthophotography and LiDAR coverage.

1.2 Definitions

For the purposes of this document the following can be defined as:

Principal: Being Tasman District Council and Nelson City Council (defined jointly as “Top of the South Councils”) as the entities seeking a proposal, shall be referred to, within the text of this document, in all cases except for address purposes, as the **Principal**.

Tenderer: Being the vendor, or solution provider who is answering this proposal, shall be referred to, within the text of this document, in all cases except for address purposes, as the **Tenderer**.

Primary Contact: Representative of the **Principal** who administers the running and completion of the Tender.

1.3 Objectives

The **Principal** is seeking Tenders for the supply of Orthophotography and LiDAR derivatives over specified areas (refer Appendices). A spatial definition of defined areas, in ESRI Shape file format, is attached.

Tenderers may include the services of third parties in their proposal, but must highlight where these are used and be prepared to take the Prime **Tenderer** responsibilities for the supply and implementation of all services, including those third parties.

The successful Tenderer will be responsible for the supply and support of appropriate imagery and LiDAR derivatives for defined areas within Top of the South Councils, with the first right to supply imagery and LiDAR derivatives for the second and third years.

1.4 Primary Contact

Each Tender will have a Primary Contact who administers the running and completion of the Tender. The Primary Contact for enquiries and all communications is below;

Tasman DC	Pete Inwood	Database Information Administrator
	Phone	(03) 543 8469
	E-mail	pete.inwood@tasman.govt.nz
	Street Address	189 Queen Street, Richmond 7020
	Postal Address	Private Bag 4, Richmond 7050

1.5 Council Contacts

Each Council has a technical contact should any follow-up (as directed by the Primary Contact) be required.

Nelson CC	Kilmeny Stephens	Team Leader GIS
	Phone	(03) 546 0252
	E-mail	kilmeny.stephens@ncc.govt.nz
	Street Address	110 Trafalgar Street, Nelson 7010
	Postal Address	PO Box 645, Nelson 7040

1.6 Tender Closing Date

Tenderers are requested to submit their proposal, by **email**, by the close date which is:

4.00 pm Friday 05 October 2018

1.7 Format of Responses

Tenderers are requested to respond in the format defined in *Section 1.10 Evaluation Process, plus Pricing schedules in Sections 2.2 and 3.5*. This is to facilitate the evaluation of proposals and ensure each proposal receives an objective review. Proposals not conforming to this format **will** be rejected.

The **Principal** requires the **Tenderer** to outline in full the methodologies, systems and processes they will employ through the course of the Contract and that these will form the basis of the final Contract.

1.8 Timeframe for Completion

The **Tenderer** is asked to provide a project schedule, which should indicate specific project milestones from project commencement. All flying for Year 2018/2019 is expected to be completed by 01 March 2019. Final delivery of all data is expected to be completed by 30 June 2019.

1.9 Proposal Procedure

General

Proposals are to be **emailed** to the Primary Contact as referenced in Section 1.4 above. The Primary Contact will then forward the response to other Council Contacts. The **Tenderer** is welcome to provide a hard copy as backup. Two copies are required, with one being addressed to each of the Council Contacts listed above.

Proposal Enquiries

Should **Tenderers** have any enquiries these should be directed to the Primary Contact (see above for full details).

Proposal enquiries are to be made in writing at least 5 working days before the close of proposals. All questions will be evaluated at the **Principals** sole discretion. The answers to questions will be made in

writing to all **Tenderers** who have uplifted proposal documents. Proposals shall acknowledge receipt of Notices to Tenderers.

Timetable

The current timetable for the evaluation and selection process is as follows (with these dates being indicative only)

Date	Event
07 September 2018	Invite Proposals
05 October 2018	Proposals Close
19 October 2018	Confirm successful Tender

Proposals Closing Date

Proposals will close at 4.00 pm Friday 05 October 2018, and are to be **emailed** to the Primary Contact as referenced in Section 1.4 above.

It shall be the sole responsibility of the **Tenderer** to ensure their proposal is received by the specified closing time.

1.10 Evaluation Process

Tenders will be evaluated taking in to account various attributes and price. This Tender evaluation process shall be conducted in two stages:

Stage One

The first stage will involve the evaluation of attributes as listed below, together with price.

(a) Relevant Experience

Each **Tenderer** shall submit a record of their relevant experience, particularly technical experience, which would indicate their suitability for the work described in the Tender documentation. Where subcontractors are proposed to be engaged, their relevant experience shall also be supplied. Experience relates more to the Tendering company than the individuals within the company. However, in the case of newly formed firms or consortia, consideration may be given to the relevant experience held by the named personnel who are proffered for the project.

The **Tenderer** shall particularly address:

(i) whether experience is recent or historic

(ii) whether the **Tenderer** has undertaken this type of work before and if not, can the **Tenderer** readily adapt existing experience to this type of work

(iii) whether the **Tenderer** has experience in projects of similar scale to this project

(b) Track Record

Each **Tenderer** shall submit records relating to the last two years that demonstrate their ability to complete projects to target performance levels on schedule and within budget. Similar information shall be provided for any proposed subcontractor.

The **Tenderer** shall particularly address:

(i) the contract cost of each project

(ii) whether or not the project was completed on time and within budget

(iii) the name of the Contract Supervisor to whom representation can be made

(c) Technical Skills and Resources

Each **Tenderer** shall submit details of the key personnel to be employed on the contract works. These details should indicate each key personnel's proposed involvement with the project and demonstrate that their qualifications, experience and skills, in particular technical qualifications, experience and skills, are compatible with the project.

Details should also include an outline of:

(i) the specific equipment to be used on the project

(ii) the contractors equipment and facilities

(iii) commentary on the intellectual property of the contractor

The **Tenderer** shall particularly address:

(i) whether the proposed equipment is of the right type to undertake the work and what back up equipment is available to the **Tenderer** should breakdowns occur

(ii) whether resources are sufficiently located so that adequate service can be provided

(iii) whether labour resources are sufficient to meet the predicted labour requirements of the contract

(iv) whether sufficient financial resources are available to fund the contract works and insurance requirements

(d) Project Management

Each **Tenderer** shall describe the management methods and skills which will be applied in order to successfully carry out the work.

The **Tenderer** shall particularly address:

(i) the management structure proposed to focus on the achievement of the contract requirements

(ii) the organisation's approach to quality assurance

(iii) the organisation's approach to providing quality customer service

(iv) how contact with the Primary Contact is proposed to be maintained

(e) Methodology

Each **Tenderer** shall describe the methodology proposed to achieve the specified end result within the specified response periods and to the required standard, and the systems whereby the method results are to be achieved.

This methodology should encompass, but not be limited to, the following:

(i) Scheduling/Programming

(ii) Proposed methodology to satisfy the technical specification

(iii) Implementation/Supervision

(iv) Communications

(v) Reporting/Invoicing

(vi) Quality Assurance Procedures

(vii) Management

(v) A Statement on the Tenderer's Health and Safety Policy

(f) Copyright

The **Principal** requires unrestricted copyright to all delivered data and reports, allowing it to release data for widespread re-use with a Creative Commons Attribution 4.0 International licence (CC BY) with attribution to The Principal in line with the New Zealand Government Open Access Licensing framework (NZGOAL).

(g) Pricing

The Tenders shall be checked for arithmetical errors and omissions. Where an arithmetical error or omission occurs the **Tenderer** must confirm the Tender sum otherwise the Tender shall be rejected.

Tender information schedules shall be considered when evaluating Stage One.

Stage Two

Negotiations shall then be conducted with the highest ranked **Tenderer** to finalise the Contract Agreement, including an acceptable price. If agreement cannot be reached with the highest ranked **Tenderer**, then the proposal will be rejected and the **Tenderer** advised in writing. The **Principal** will then enter in to negotiations with the next highest ranked **Tenderer**.

Once a Proposal has been rejected, for any reason whatsoever, the **Principal** shall not subsequently accept that Tender, either in its original form or any negotiated form.

For the avoidance of doubt;

a) nothing in this clause shall oblige the **Principal** to negotiate with all **Tenderers**, or any other party

b) all or any such negotiations will be undertaken strictly without prejudice to the **Principals** right to accept the proposal's bid as originally made.

Proposed rates and prices shall remain fixed and valid for acceptance for six months.

1.11 Late Proposals

Late proposals will not be considered.

1.12 The Tender

Prices submitted shall include all labour, materials, plant, disbursements and travelling costs, to carry out each part of the work as set out in the brief. The Tender shall include all of the following information:

(i) completed Schedule of Prices – Sections 2.2 & 3.5

(ii) a programme for the completion of the projects showing critical dates

(iii) attribute details (limited to ten single sided pages using 12 point font but shall exclude CV's, programme, Tenderers Health and Safety Policy and QA system which can be appended)

(iv) proof that Public Liability (to cover for example if there is a mistake in the data) and Professional Indemnity (someone gets hurt in the process of flying the plane) would both apply

1.13 Notification of Acceptance

The successful **Tenderer** shall be notified in writing by the Primary Contact that the Tender has been accepted

If no Tender has been accepted within two months of Tenders closing, each **Tenderer** shall be notified in writing by the Primary Contact whether their Tender is or is not still under consideration.

1.14 Duration of the Contract

The Contract period shall commence 5 working days from the date on the letter of acceptance and end no later than 30 June 2019. The successful Tenderer for the 2018/2019 delivery will have first rights to providing the additional delivery for 2019/2020 & 2020/2021.

1.15 Special Conditions of Contract

A Schedule of Prices is required with the Tender

A Contractor's Bond is not required

A Principal's bond is not required

1.16 Payment

Each Top of the South Council (**Principal**) will provide a Purchase Order number for payment of their respective component of the contracted work. Payment is to be made by two instalments, with the first payment being at completion of the flying component of the Contract, and the second payment upon receiving and verifying the successful completion of the Contract. Payment shall be the 20th of the month following Invoicing, providing that the Invoice is received by the 5th of the month.

1.17 Payment due upon Suspension, Abandonment or Termination

If the project is suspended, abandoned or terminated before completion of the full service, the **Principal** and **Tenderer** shall negotiate what fees will be paid for services completed.

1.18 Disputes

If the Contractor responds that it does not agree with all or any of the statements made in any notice served by the Principal the matter or matters in question shall be determined as follows:

(i) In the first instance parties will in good faith use their best endeavours to resolve the dispute themselves; or

(ii) If the parties cannot resolve the dispute themselves then they must explore if the dispute can be resolved by use of an alternative resolution technique; but

(iii) If the dispute is not settled within a reasonable time, then either Party may refer the dispute to arbitration to a sole arbitrator under the provisions of the Arbitration Act 1996 and the substantive law of New Zealand.

1.19 Tide Height

Coastal areas, where imagery or LiDAR will extend to the area below Mean High Water Springs (MHWS), are to be captured at the lowest tide possible, ie. inside 1.5 hours either side of low tide, as per Land Information New Zealand data.

1.20 Nelson CC – Building Outlines

Nelson CC request their existing Building Outlines data be updated. The existing Building Outlines data is to be updated after comparison to the aerial photography captured as part of this Tender, once the image processing and aerial triangulation work is complete.

The Building Outlines and attribution for the "Roof Height" and "Ground Height", as defined below, should be updated.

Nelson CC will supply a copy of the Building Outlines dataset in ESRI File Geodatabase format. There are currently 31373 building outlines, which were last updated in November 2017.

Attribute	Digitising Details
Building Outline	For all buildings greater than 10 sq m in area a closed polygon is to be captured. The polygon is to follow the roof outline of the building. Where the roof outline contains right-angle corners the polygon angles are to be captured as right-angles. Pergolas, decks and other such structures attached to buildings are not to be captured. No buildings under 10 sq m in area are to be captured. This means that features such as single garages will be captured, but not small garden or implement sheds. In industrial and commercial areas where buildings commonly abut to one another it is only necessary to capture the individual building outlines where evidence of a 'firewall' can be seen that separates the buildings. For industrial buildings with complex rooflines and a multitude of levels it is only necessary to capture the outline of the building complex and not the individual building elements. In commercial shopping districts it is common for shop frontages to have a permanent veranda attached to the building to provide shelter to pedestrians. Example below:  These features are not to be included in the building outlines.
Roof Height	The roof height is the elevation of the highest point in the roof structure of the building.
Ground Height	The ground height is the visual estimate of the average elevation of the ground in the area immediately surrounding the building polygon.

Tasman DC will review its' Building Outline requirements in Year 3 (2020/2021).

1.21 Additional Proposal Section(s), if any

Tenderers may supply any additional information that they feel may support their proposal.

It is possible a request will be made during the **Principal's** evaluation process to provide clarification of parts of your proposal, or to provide supplementary information. Responses to these points of clarification may be provided verbally but must be confirmed in writing.

Confirm that the costs are the total costs of your proposal, and that there are no areas of cost that have been missed.

1.22 Coverage & Pricing Information

The respective Coverage & Pricing matrices shall be read in conjunction with the Tender, the General and Special Conditions of Contract, the Specification and the associated maps.

The rates to be inserted in this matrices by the **Tenderer** shall be the full value of the work described under the Schedule items, including costs and expenses which may be necessary for the delivery of the work, together with allowance for all general risks, liabilities and obligations set forth or implied in the documents upon which the Tender shall be based. The rates in the Coverage & Pricing shall include full allowance for all overheads whether time related or not, and profits which the **Tenderer** will require if any item in the Coverage & Pricing is adjusted. The quoted rates shall include allowance for all items necessary for the satisfactory completion of the whole of the work as required. Where special risks, liabilities and obligations cannot be dealt with as above, then the price thereof shall be separately entered under the heading "Unscheduled Items".

Should the **Tenderer** be of the opinion that additional items should be added to the Schedule in respect of particular work, then the **Tenderer** shall enter these under the heading "Unscheduled Items", detailing and pricing each. Failure of a **Tenderer** to do so will be construed as meaning that they required no additions to the Schedule in respect of items of work not specifically listed.

A price or rate shall be entered against each item in the Schedule, whether quantities are stated or not. Items against which no price is entered shall be considered to be covered by the other rates and prices in the Schedule.

General directions and description of work and material given in the Specification have not necessarily been repeated in this Schedule. Reference shall be made to the Specification for this information.

1.23 Digital Data Supply Format

Tenderer is to keep backup copies of all data provided, for availability to the **Principal** on request.

All Data produced in this project is to be supplied in the agreed format (refer specification sections below), and shall remain the property of the **Principal** and as such, the **Principal** has the right to alter, add or on sell at the **Principal's** discretion.

Due to the volume of data to be delivered, it is recommended that an external hard disk drive (HDD) be considered as the means of supplying the final data.

2 Orthophotography Specification

2.1 Deliverables

Tenderers are expected to provide a full response to all requirements detailed in this section.

Deliverables are;

- Aerial photography – low res images for proof of flying
- Digital Orthophotography imagery
- Extent tile layout supplied in ESRI File Geodatabase or Shape format. Minimum attributes should include tile name, e.g. BQ26_0302, plus date and time flown

The minimum specifications and format for Township deliverables are;

Urban Aerial Photography	***Description***
Camera system	Vexcel UltraCam, or similar
Forward Motion Compensation (FMC)	Yes
Building Lean Requirement	Less than 1m for every 3m in height
Nominal flying height	Contractor to state (suitable to achieve desired output ortho pixel resolution)
Minimum Sun Angle	35 degrees above the horizon
Quality/Acceptance criteria	Contractor to briefly state QA procedures for acceptance of photography (ie. cloud, shadow, water reflection, etc.)
Supply format	As proof of flying, supply “Quickview” images in JPG format, or similar
Copyright	Contractor to retain aerial photo copyright

Urban Digital Orthophotography Imagery	***Description***
Orthophotography GSD	0.10m or better (as specified on pages 14 & 15)
DTM source	Stereo compiled (or, if DTM already exists, it will need to be reviewed & updated) from above photography
Orthophotography spatial accuracy	+/- 3 pixels (90% confidence level)
Coordinate system	NZTM
Quality/Acceptance criteria	Final Metadata Report on methodology, QA processes & results to be provided
Image tile layout	LINZ standard NZTM 1:1000 sheet layout
Image tile dimensions	480m x 720m
Supply format	RGB – 24-bit colour uncompressed TIFF with TFW file, and 90% compressed JPG with JGW file, supplied on HDD
Copyright	Licence for both parties to use without further obligation to the other party

Refer Appendices for imagery coverage, and areas covered by this Tender for Year 2018 - 2021.

The minimum specifications and format for Rural deliverables are;

Rural Aerial Photography	***Description***
Camera system	Vexcel UltraCam, or similar
Forward Motion Compensation (FMC)	Yes
Nominal flying height	Contractor to state (suitable to achieve desired output ortho pixel resolution)
Minimum Sun Angle	30 degrees above the horizon
Quality/Acceptance criteria	Contractor to briefly state QA procedures for acceptance of photography (ie. cloud, shadow, water reflection, etc.)
Supply format	As proof of flying, supply “Quickview” images in JPG format, or similar
Copyright	Contractor to retain aerial photo copyright

Rural Digital Orthophotography Imagery	***Description***
Orthophotography GSD	0.3m (or better)
DTM source	Stereo compiled (or, if DTM already exists, it will need to be reviewed & updated) from above photography
Orthophotography spatial accuracy	+/- 3 pixels (90% confidence level)
Coordinate system	NZTM
Quality/Acceptance criteria	Final Metadata Report on methodology, QA processes & results to be provided
Image tile layout	LINZ standard NZTM 1:5000 sheet layout
Image tile dimensions	2400m x 3600m
Supply format	RGB & RGBI – 24-bit colour uncompressed TIFF with TFW file, and 90% compressed JPG with JGW file, supplied on HDD
Copyright	Licence for both parties to use without further obligation to the other party

Refer Appendices for imagery coverage, and areas covered by this Tender for Year 2018 - 2021.

An electronic copy of photo centres is to be supplied in ESRI File Geodatabase or Shape file format. Minimum attributes should include; ImageID, SN, Camera, NZ Date, NZ Time, NZTM Easting, NZTM Northing.

2.2 Orthophotography Coverage & Pricing

Year 1 (2018/2019)

The proposal for 2018/2019 is to update/extend Tasman DC's northern rural imagery (at 0.3m GSD or better), and Nelson CC's adjacent rural imagery (at 0.3m GSD), taking in to account full NZTM tiles.

Tasman DC – refer Appendix A

Tasman DC	*Number of Tiles*	*GSD (m)*	*Tile Size*	*Delivery of Orthophoto Tiles*
Area				***Amount***
Northern area	647	0.3	1:5000	$
Total	**647**	--------	----------	**$**

Nelson CC – refer Appendix D

Nelson CC	*Number of Tiles*	*GSD (m)*	*Tile Size*	*Delivery of Orthophoto Tiles*
Area				***Amount***
Nelson	80	0.3	1:5000	$
Total	**80**	--------	----------	**$**

Nelson CC	*Delivery of Building Outlines*
Area – Rural Imagery Extent	***Amount***
Total	**$**

Year 2 (2019/2020)

The proposal for 2019/2020 is to update/extend Tasman DC's Southern rural imagery (at 0.3m GSD or better), and Nelson CC's urban imagery (at 0.075m GSD or better), taking in to account full NZTM tiles.

This will be confirmed closer to the 2019/2020 flying season.

Tasman DC – refer Appendix B

Tasman DC	*Number of Tiles*	*GSD (m)*	*Tile Size*	*Delivery of Orthophoto Tiles*
Area				***Amount***
Southern area	646	0.3	1:5000	$
Total	**646**	--------	----------	**$**

Nelson CC – refer Appendix E

Nelson CC	***Number of Tiles***	***GSD (m)***	***Tile Size***	***Delivery of Orthophoto Tiles***
Area				***Amount***
Nelson	995	0.075	1:1000	$
Total	**995**	--------	----------	**$**

Nelson CC	***Delivery of Building Outlines***
Area – Urban Imagery Extent	***Amount***
Total	**$**

Year 3 (2020/2021)

The proposal for 2020/2021 is to update Tasman DC's Township imagery (at 0.1m GSD or better). Tasman DC's last update involved the delivery of Richmond as 0.075m and the balance as 0.1m, please provide costings for both resolutions (for balance areas) to assist in final decision.
This will be confirmed closer to the 2020/2021 flying season.

Tasman DC – refer Appendix C

Tasman DC	***Number of Tiles***	***GSD (m)***	***Tile Size***	***Delivery of Orthophoto Tiles***
Area				***Amount***
Collingwood	13	0.1	1:1000	$
Takaka	33	0.1	1:1000	$
Pohara/Tata Beach	37	0.1	1:1000	$
Marahau	7	0.1	1:1000	$
Kaiteriteri	11	0.1	1:1000	$
Motueka/Riwaka	72	0.1	1:1000	$
Mapua/Ruby Bay	48	0.1	1:1000	$
Richmond	64	0.075	1:1000	$
Brightwater	15	0.1	1:1000	$
Wakefield	24	0.1	1:1000	$
Tapawera	7	0.1	1:1000	$
St Arnaud	10	0.1	1:1000	$
Murchison	17	0.1	1:1000	$
Total	**358**	--------	----------	**$**

3 LiDAR Specifications

3.1 Technical Specification

Top of the South Councils are looking to produce a LiDAR derived DTM solution with a high degree of accuracy for the specified area(s). With this in mind, the **Principal** is looking to purchase a LiDAR solution with +/-0.1m, vertical accuracy. Refer section **3.5 LiDAR Coverage & Pricing**.

The base specification is to align with LINZ guidelines – New Zealand National Aerial LiDAR Base Specification – with the addition of derived 0.5m Contours.

3.1.1 Control Requirements

The **Tenderer** should note that the **Principal** wishes to sign-off the sites being used as control points. This list should be supplied before any work is undertaken. Tasman District Council has Alex Grigg, Ph 03 543 8463, available to discuss the accuracy and appropriateness of any control points to be used, i.e. LINZ geodetic database or other sources. It is advisable that this is done before a Tender price is nominated in case extra control is required.

The **Tenderer** should also note that the **Principal** expects that first or second order bench marks are used and that suitable control around the periphery of the survey area is established.

The **Principal** will not be providing the survey, or the installation of control points.

The location of any survey control/check sites to be used is to be supplied along with the details listed under 3.3.

3.2 LiDAR

Digital Terrain Model Requirement

- Vertical accuracy of 0.1 metre, and the derived 0.5 metre contouring
- All accuracy specifications must be based on a 90% confidence level or higher

Height Datum, Horizontal Datum and Accuracy Specifications

- The final DTM is required to have orthometric heights in Council Standard Datum, which is Land Information New Zealand's (LINZ's) New Zealand Vertical Datum 2016 (NZVD2016).

Supplied Coordinates to be in the following format;

- All horizontal coordinates must relate to New Zealand Transverse Mercator (NZTM) projection coordinate system using New Zealand Geodetic Datum 2000 (NZGD2000).

3.2.1 Flight Specification

Once agreed, the specifications will be followed unless otherwise agreed, in writing, between the **Tenderer** and the **Principal's** Primary Contact.

The **Tenderer** shall provide details for the following;

- Proposed LiDAR acquisition system
- Proposed flying height
- Aircraft Velocity
- Swath Width
- Laser Pulse rate (in KHz)
- Mirror Scan rate (in Hz)
- LiDAR Returns
- Method of determining positional accuracy (type of GPS and accuracy)
- If GPS is used for positional accuracy, include minimum satellite PDOP (Positional Dilution of Precision) that will be used to ensure final accuracy

- Navigational accuracy – provide details of how accuracy between runs will be set and monitored to preclude any gaps between flight runs

3.2.2 Cloud and Haze

The **Tenderer** will endeavour to fly in atmospheric conditions which allow complete LiDAR coverage. However, if weather conditions are such that this is not possible, flying in hazy conditions is acceptable provided other quality measures are met. If there are any gaps in the LiDAR due to cloud or other atmospheric conditions, then these must be reflown at the **Tenderer's** expense to cover all the gaps, unless otherwise agreed in writing by the **Principal's** Primary Contact.

3.2.3 Positioning accuracy

All flying and positioning calibration requirements and quality parameters will be clearly specified in the Quality Plan. All data gaps found will be noted in the Final Report, along with the extra flight runs to fill them.

3.2.4 LiDAR Processing

The **Tenderer** will specify when production of the DTM can commence following successful acquisition of LiDAR data.

The **Tenderer** will specify what resource they will allocate to the processing to enable delivery of all the DTM, fully quality assured, within the time frames specified above.

3.2.5 Accuracy and point density of the LiDAR derived DTM and Contours

The following accuracy and point density are required

- LiDAR point density is to be sufficient to achieve the required vertical accuracy as specified, and a minimum of 2 points per square metre
- Contouring: 0.5 metre interval

It is acknowledged that the above specification may not be achievable over vegetation-covered areas, or areas with other obstructions. In situations where the above specification is not achieved, these areas will be clearly mapped in the Final Report and the actual achieved specification in those areas stated.

3.2.6 Geoid height model

The **Tenderer** will specify what, if any, Geoid Height model they require from the **Principal** for the **Tenderer** to successfully create the raw point cloud file in the agreed Standard Datum.

3.2.7 Creation of the Raw Point Cloud Data File

The **Tenderer** will specify how they propose to derive trajectory, e.g. by GPS observations with the Inertial System and Accelerometer data to calculate the best estimated trajectory of the scanner position. The **Tenderers'** specification will be included in the Quality Plan. Any areas where the positioning accuracy is not achieved will be highlighted and if necessary the LiDAR reflown.

The **Tenderer** will specify how the final raw point cloud data file will be produced and supplied.

3.2.8 Production of the Digital Terrain Model and Classification of non bare earth data points

The **Tenderer** will process the raw point cloud data to produce a Digital Terrain Model to the required standards as specified above.

The processing techniques will be designed to make maximum benefit of the four LiDAR returns acquired with the LiDAR.

The **Tenderer** will specify the methodology and checks to be used to produce the DTM from the raw point cloud and this will be detailed in the Quality Plan.

Any areas where the DTM may not meet the required standard will be delineated (e.g. due to a specific area of vegetation which the LiDAR did not penetrate).

3.2.9 Data Voids

There will inevitably be 'data voids' in the final Bare Earth Model produced from the LiDAR. These may be for a number of reasons.

3.2.10 Non acceptable Data Voids

None of the situations below will be acceptable reasons for Data Voids;

- Flight navigation errors, heavy winds or other reasons may have caused gaps between flight lines
- The LiDAR system may have malfunctioned for some reason
- Poor weather conditions rendered LiDAR returns unusable.
- Any other reason apart from those specified in section 3.2.11 below.

3.2.11 Acceptable Data Voids

The situations described below are the only acceptable reasons for data voids, unless agreed in writing by the **Principal's** Primary Contact.

- The LiDAR pulses are absorbed by water bodies or other non reflectant surfaces
- Data points are intentionally removed as part of post-processing as they were on man made structures (e.g. buildings and bridges) and not bare earth.

3.2.12 Bush covered areas

While there are not significant amounts of vegetation in the target area, areas where vegetation does not allow LiDAR penetration or only partial penetration may cause data voids or degradation of quality. The required Quality Plan (refer section 3.2.15) should clearly state how processing of these areas will be carried out, including descriptions of any processing algorithms which alleviate the problem, and how actual accuracies are calculated.

Any vegetation covered or other area where the specified accuracy or point density is not achievable must be clearly delineated by a polygon and separable in the DTM. The accuracy achieved in the area must be specified.

3.2.13 Quality Assurance and areas of Accuracy Degradation:

There may be other areas of the final bare earth model where it would be expected that full accuracy of DTM would be achieved but for some reason has not been. Reasons could include for example; systematic errors, environmental conditions, processing errors, malfunctioning sensors, poorly calibrated instrumentation or atmospheric conditions.

Quality Assurance methodologies must be designed to identify any areas of unexpected accuracy degradation. The Quality Plan must give explanation of the methods of identifying such areas. The **Tenderer** may propose workarounds to improve the quality of DTM in any of these areas, but, if significant, the **Principal's** Primary Contact may require that they are reflown. The Quality Plan should be clear as to the way any such areas will be identified and handled.

3.2.14 Other non-ground points or statistical Outliers

The Quality Plan should clearly explain how the LiDAR processing deals with any multipath points or statistical outliers, and whether these are automatically or manually removed.

3.2.15 Quality Plan

The purpose of the Quality Plan is to demonstrate to the **Principal** how the quality requirements of the deliverables will be met. Any facet of the flying, capture or processing of the LiDAR which could impact on the quality of the final products is to be included in the Contractors Quality Plan.

The Quality Plan should include;

- An overview of the stages (if any) of flying and processing of the LiDAR
- The critical parameters of each stage
- Methodology used to ensure successful acquisition within acceptable parameter bounds
- Statement of Quality Control measures used
- How any areas of data outside specifications will be reported

The Quality Plan will be submitted to the **Principal's** Primary Contact for approval in writing prior to commencement of any acquisition.

At each stage of the project, the **Tenderer** will provide the **Principal's** Primary Contact with confirmation that the Quality Parameters have been met, including copies of the relevant statistics.

If at any stage of the project the Quality Parameters are not achieved as specified in the Quality Plan, the **Tenderer** will inform the **Principal's** Primary Contact, and suggest the preferred correction methodology for continuing for the **Principal's** Primary Contact to approve.

3.3 Contours, Regular Grid Digital Terrain Model (DTM) and Triangulated Irregular Network (TIN)

A DTM of irregular points, as specified above will be produced from processing the LiDAR. This will be used for producing contours, regular grid DEM's, DSM's, and TIN's of the target area.

3.3.1 Contours

Contours will be generated from the DTM by interpolation. Contour lines will be smoothed to give an acceptable cartographic appearance and will include labels and attributed height values. Every 5th contour (2.5m) is to be labelled an "INDEX", ie. 4 x "INTER" then an "INDEX". Contours will be interpolated through data gaps caused by man made features.

Formats for delivery of contours are as stipulated in **1.22 Digital Data Supply Format**. Examples of contouring will be provided to the **Principal's** Primary Contact for acceptance prior to delivery.

Contour Intervals

- 0.5 metre

3.3.2 Regular Grid DTM's and TIN's

Regular Grid DTM's and TIN's will be produced from the DTM of irregular points.

Procedures and standards for producing the Regular Grid DTM's or TIN's will be agreed with the **Principal's** Primary Contact.

3.4 Project Deliverables

The deliverables are as listed below.

Tenderer is required to provide pricing for LiDAR and DTM.

One set of deliverables will be required unless otherwise specified.

All DTM's and contours will refer to Council Standard Datum, refer section 3.2 above.

3.4.1 Digital Terrain Models and Contours

The DTM shall be tiled into map sheet areas as per standard LINZ NZTM 1:1000 sheets, each measuring 480m x 720m, or as otherwise agreed. Each sheet shall be exactly edge matched to all adjacent sheets with no overlap or drop-off.

Digital Terrain Model

- Raw point cloud data
- Classified LAS
  - Categorisation of ground and above ground
  - Minimum LAS 1.4 classification being;

Code	Description
1	**Processed, but unclassified (a minimum requirement)**
2	**Ground (a minimum requirement)**
3	Low vegetation (<0.5m)
4	Medium vegetation (0.5m-2m)
5	High vegetation (>2m)
6	Building
7	**Low noise (LAS v1.4), noise (LAS v1.2/3) (a minimum requirement)**
9	**Water (a minimum requirement)**
18	**High noise (LAS v1.4) (a minimum requirement)**

  - Return Intensity information
  - Return Number (1-5) information
  - Point density: at least 2 per square metre (irregular points)
  - Data to be thinned where it does not compromise accuracy

Contours

- Interval 0.5 metre, with height attribute
- Every 5th contour (2.5m) is to be labelled an “INDEX”, ie. 4 x “INTER” then an “INDEX”
- Format: ESRI File Geodatabase or Shape file format (or as otherwise agreed)
- Best endeavours are to be made to butt-join and align new contouring to existing contouring

Triangular Irregular Network

- Format: ESRI TIN ADF file (or as otherwise agreed)
- Point density: as defined by the TIN

Elevation & Surface Models

- Digital Elevation Model (DEM), as 1.0m interval grid, to be created from ground classified points
- Digital Surface Model (DSM), as 1.0m interval grid, to be created from 1st return points

Extent & Tiles

- Area of Coverage: as specified for relevant year in Appendices
- Map Sheets tiled, and named, by standard format, e.g. BQ26_0302, plus date and time flown
- Format: ESRI File Geodatabase or Shape file format (or as otherwise agreed)

3.4.2 LiDAR derived Imagery

A copy of any imagery captured as part of the process. This would be ortho-rectified, and supplied on a standard tile cut-up.

3.4.3 Final Report

A Final Report on the whole project in MS Word and/or PDF format.

This will be designed in such a way that someone unfamiliar with the Project can quickly assimilate it, and will include details (in Appendices) of Q.A. methodology of the whole process, and calibrations of critical equipment.

It will include the following;

- Introductory text outlining the project, dates, key personnel, etc.
- Details of the flying specifications, including LiDAR equipment details, etc.
- Maps of 'As Flown' strips of LiDAR (including any gaps found in the data from the original flights and subsequent reflies)
- Map showing the ground control used and description of its source and accuracy
- Details of any premarking
- Outline of the procedure for LiDAR processing and resultant accuracy statistics of the DTM
- A conclusion summarising any areas of difficulties where the specification may not have been fully met
- Signed copies of all relevant sheets from the Quality Plan
- A clear explanation of how it has been shown that all accuracy and other Quality criteria have been met

The Report, including all Appendices and Attachments, must accompany data delivery. This is to be provided as a digital PDF format file.

3.5 LiDAR Coverage & Pricing

Year 1 (2018/2019)

The proposal for 2018/2019 is to capture 243.8 km^2 of Tasman DC's LiDAR coverage. Nelson CC has no LiDAR requirements for this year.

Tasman DC – refer Appendix F

Lower Motueka Valley (243.8 km^2)

Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Year 2 (2019/2020)

The proposal for 2019/2020 is to capture 247.3 km^2 of Tasman DC's LiDAR coverage, with data requirements to be confirmed closer to the 2019/2020 flying season. Nelson CC has no LiDAR requirements for this year.

Tasman DC – refer Appendix F

Korere (247.3 km^2)

Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Year 3 (2020/2021)

The proposal for 2020/2021 is to update/capture 275.3 km^2 of Tasman DC's LiDAR coverage, Nelson CC is proposing to capture 175 km^2 of LiDAR coverage, with data requirements to be confirmed closer to the 2020/2021 flying season. Nelson CC has no LiDAR requirements for this year. Nelson CC also request Additional Pricing for areas A+B and C.

Tasman DC – refer Appendix F

Murchison (275.3 km^2)

Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Nelson CC – next page

Nelson CC – refer Appendix G

Area A (175 km^2)

Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Area A+B (289 km^2)

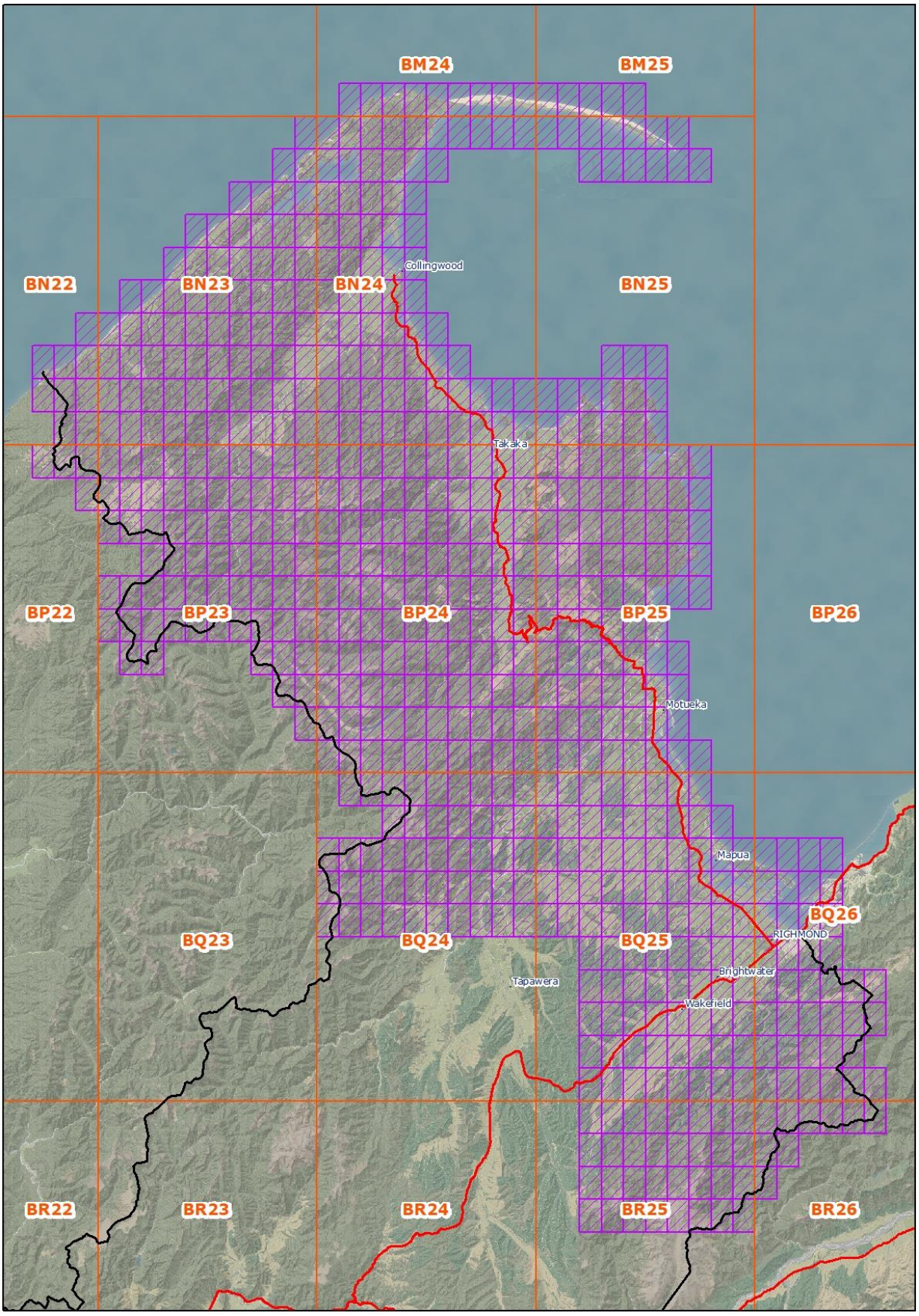
Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Area C (455 km^2)

Item	*Description of Work*	*0.1m Total Amount*
1	*Digital Terrain Model*	$
	(a) Ground points	----------
	(b) Non ground points	----------
	(c) Raw data cloud model	----------
2	*Contours*	$
3	*TIN digital terrain model*	$
		$

Appendix A

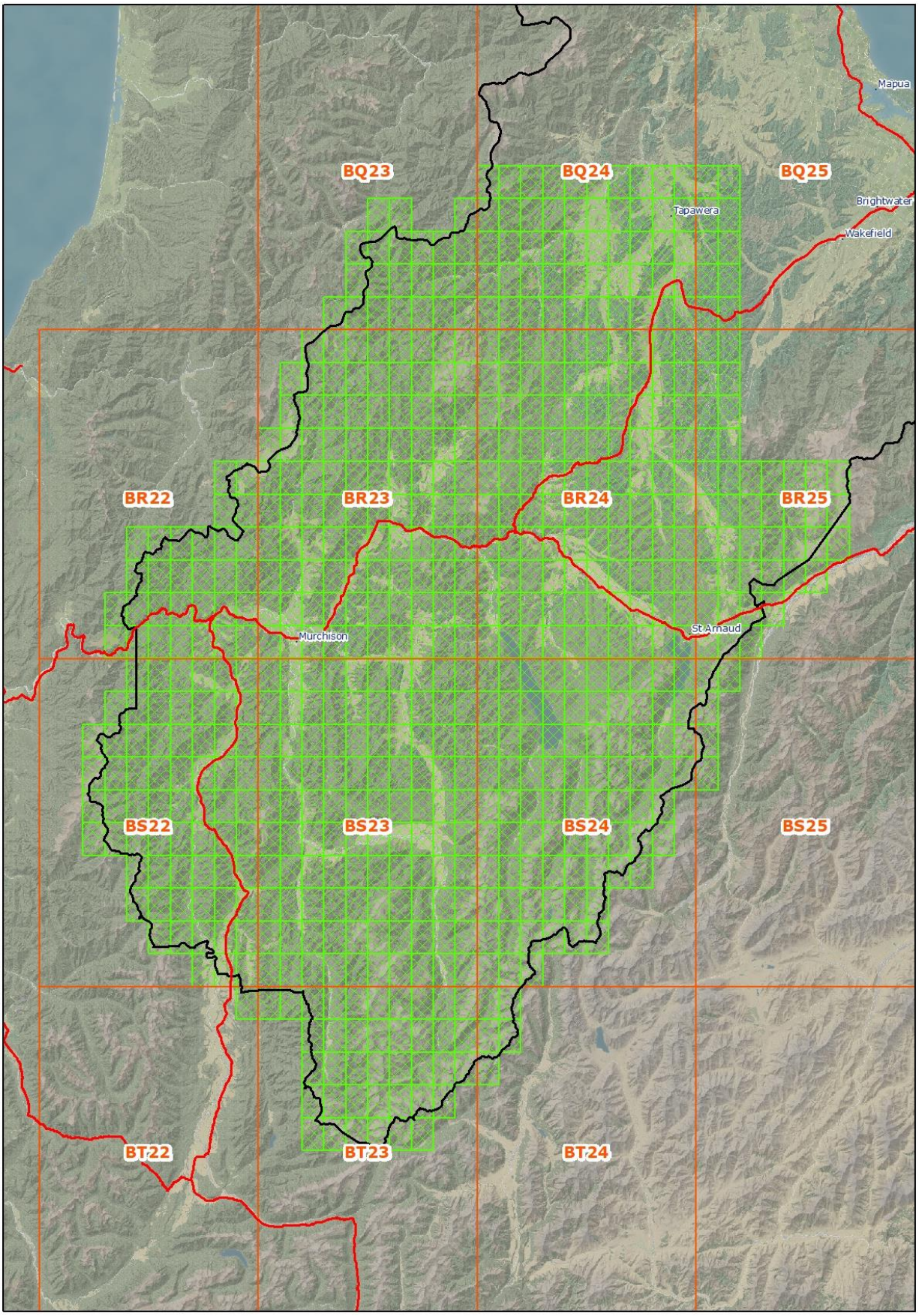
Tasman DC – Proposed Orthophotography Coverage for 2018/2019 (Rural)



Northern Area (647 tiles)

Appendix B

Tasman DC – Proposed Orthophotography Coverage for 2019/2020 (Rural)



Southern Area (646 tiles)

Appendix C

Tasman DC – Proposed Orthophotography Coverage for 2020/2021 (Urban)

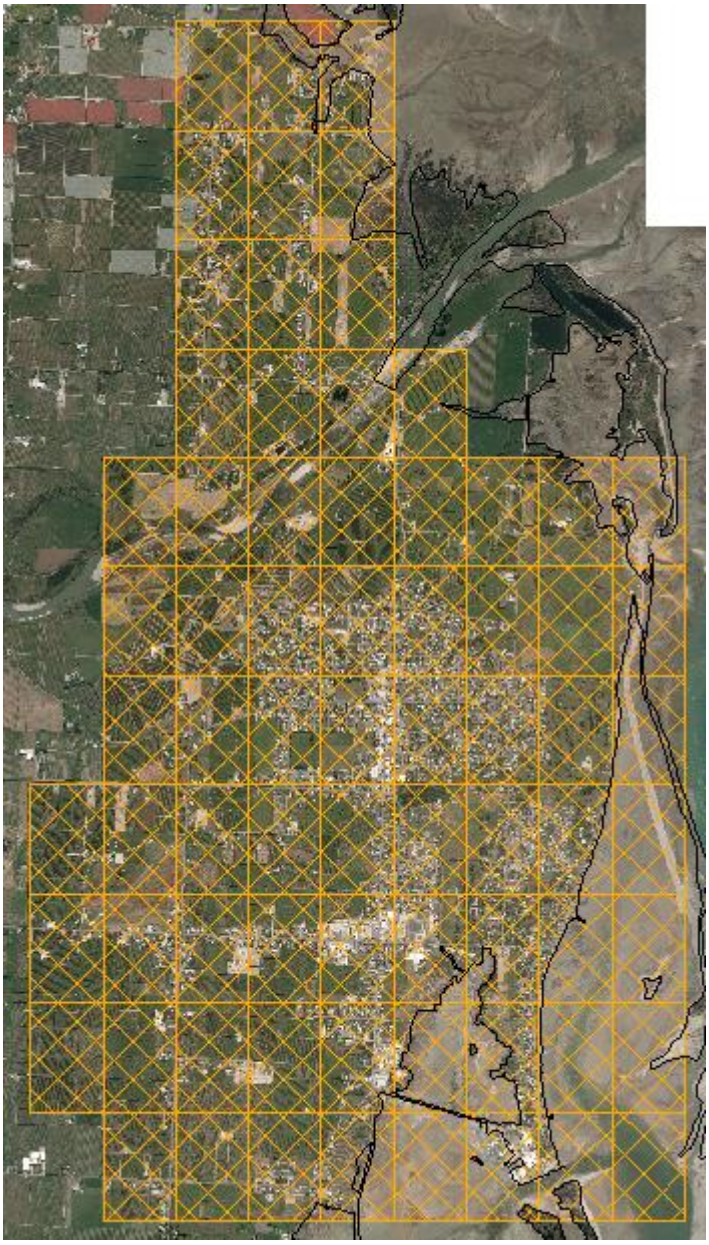
Collingwood (13 tiles)

Takaka (33 tiles)

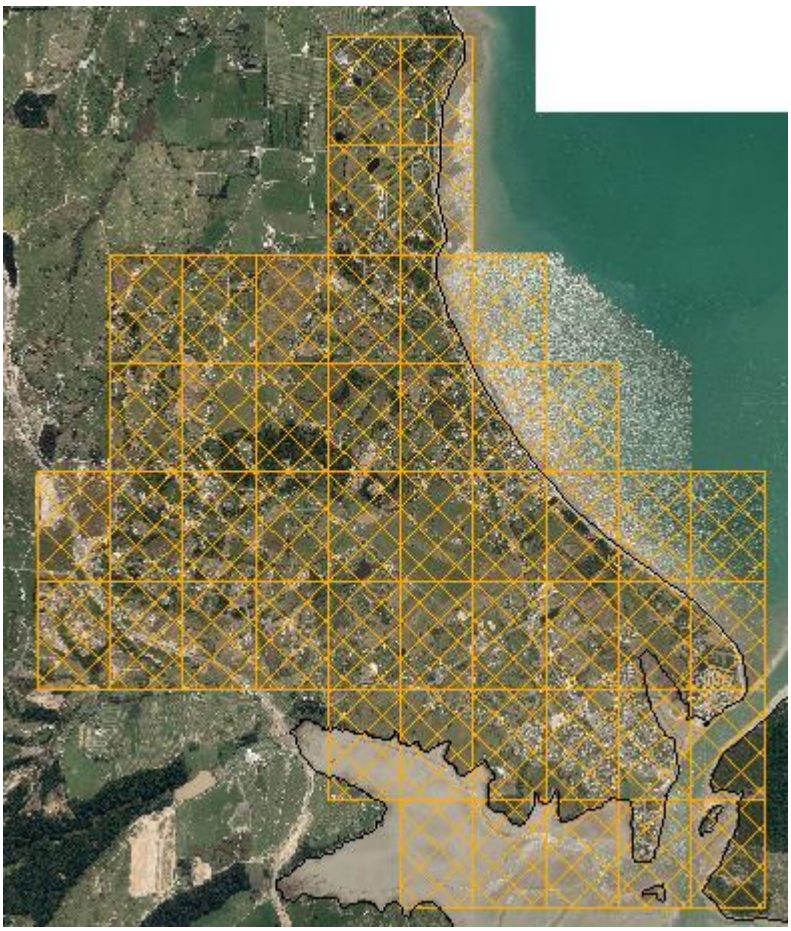
Pohara/Tata Beach (37 tiles)

Marahau (7 tiles)

Kaiteriteri (11 tiles)



Motueka/Riwaka (72 tiles)

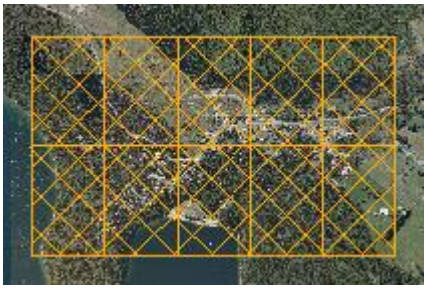


Mapua/Ruby Bay (48 tiles)

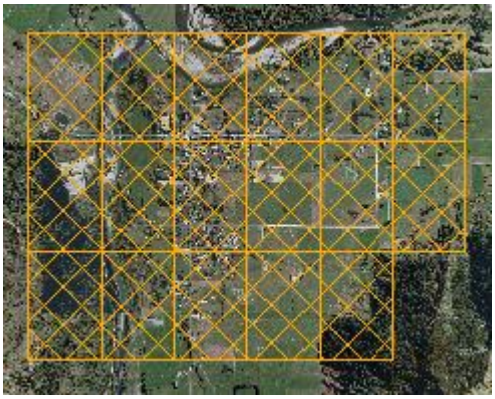
Upper Takaka (4 tiles)

Best Island (2 tiles)

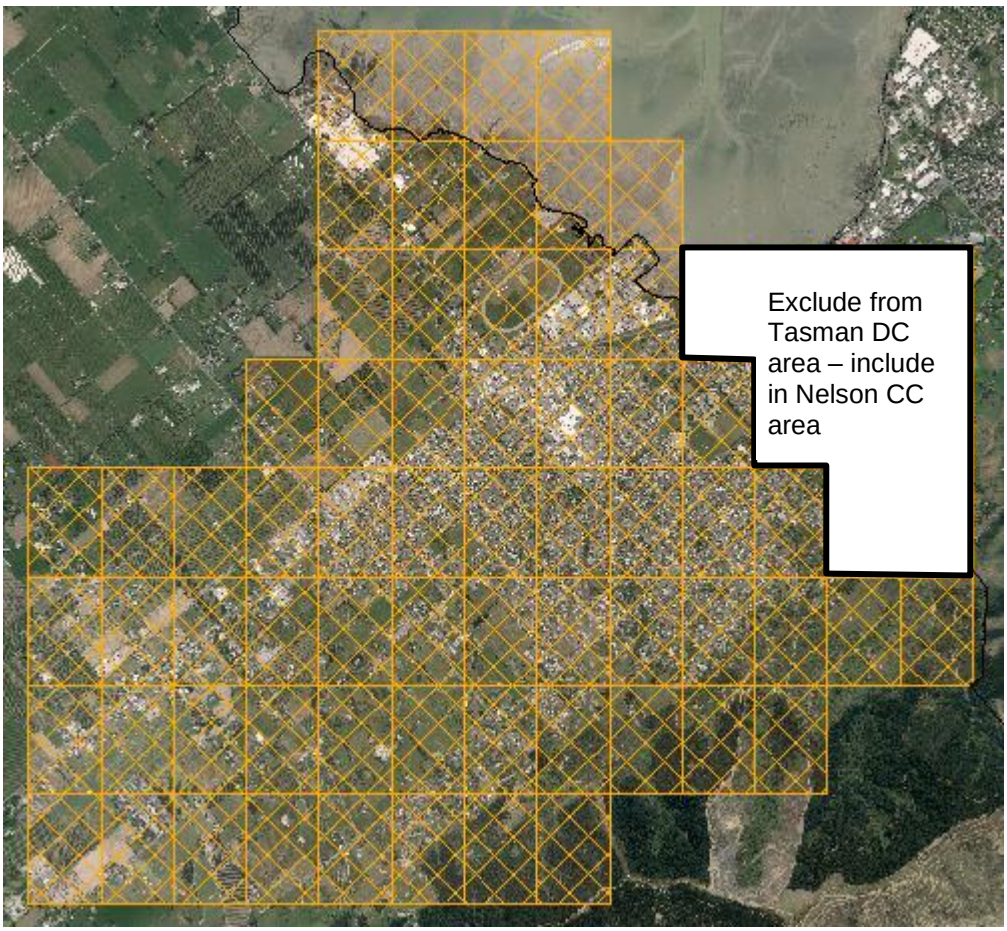
Tapawera (7 tiles)



St Arnaud (10 tiles)

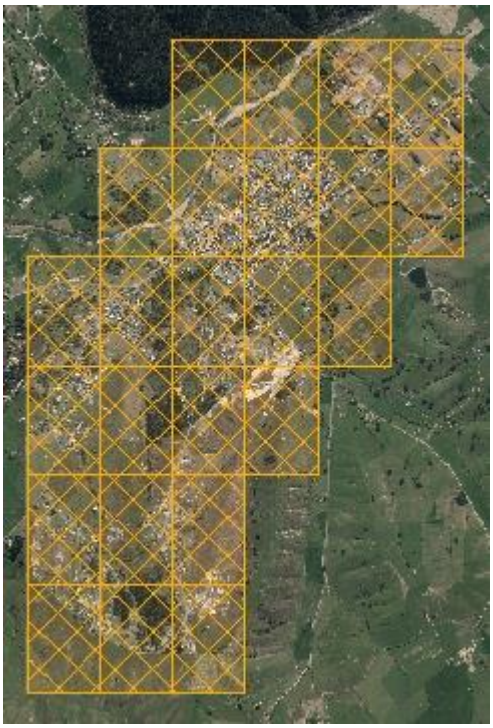


Murchison (17 tiles)



Richmond (73 – 9 = 64 tiles)
Tasman DC/Nelson CC overlap to be reviewed 2020/2021

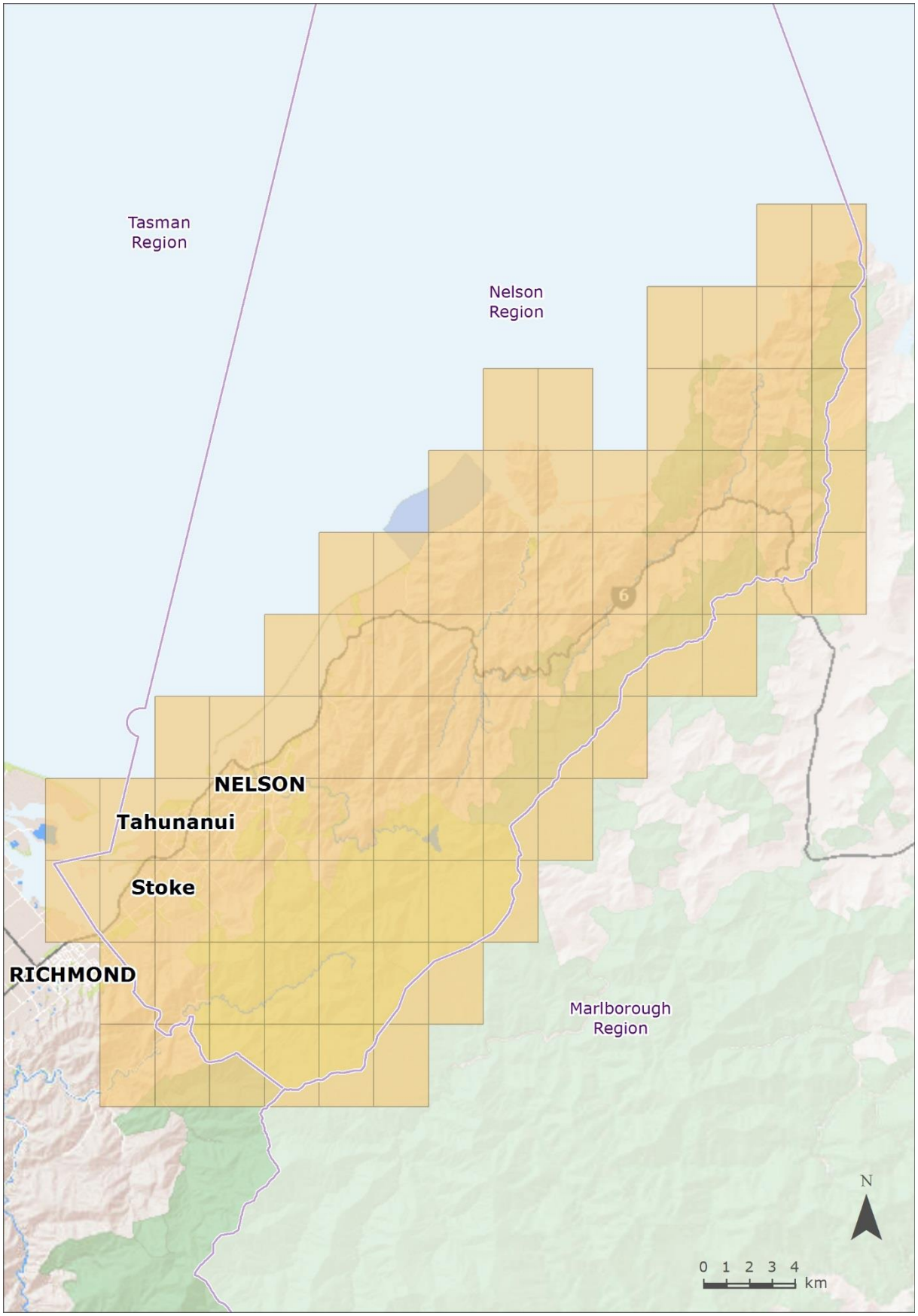
Brightwater (15 tiles)



Wakefield (24 tiles)

Appendix D

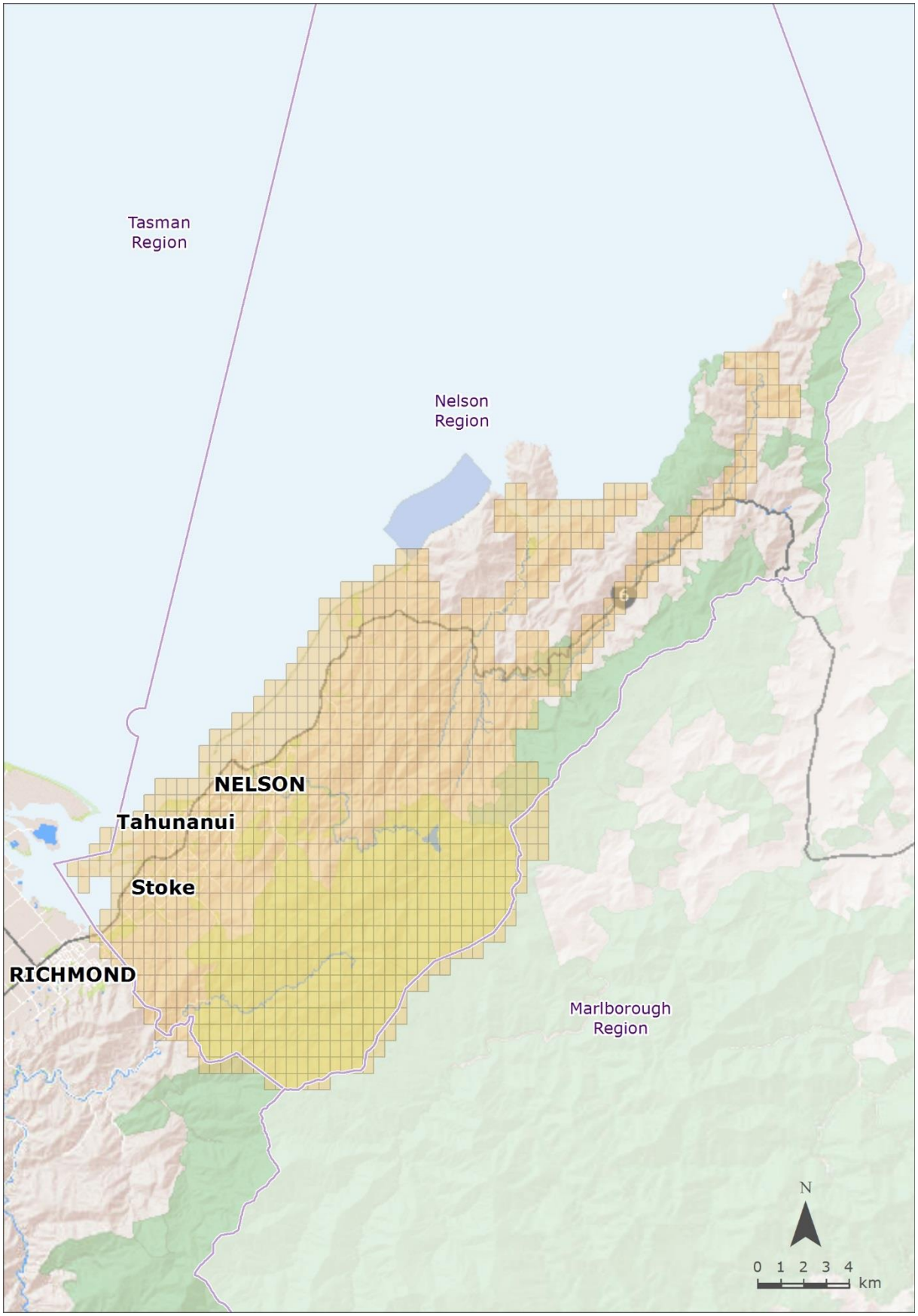
Nelson CC – Proposed Orthophotography Coverage for 2018/2019 (Rural)



Nelson CC (80 tiles)

Appendix E

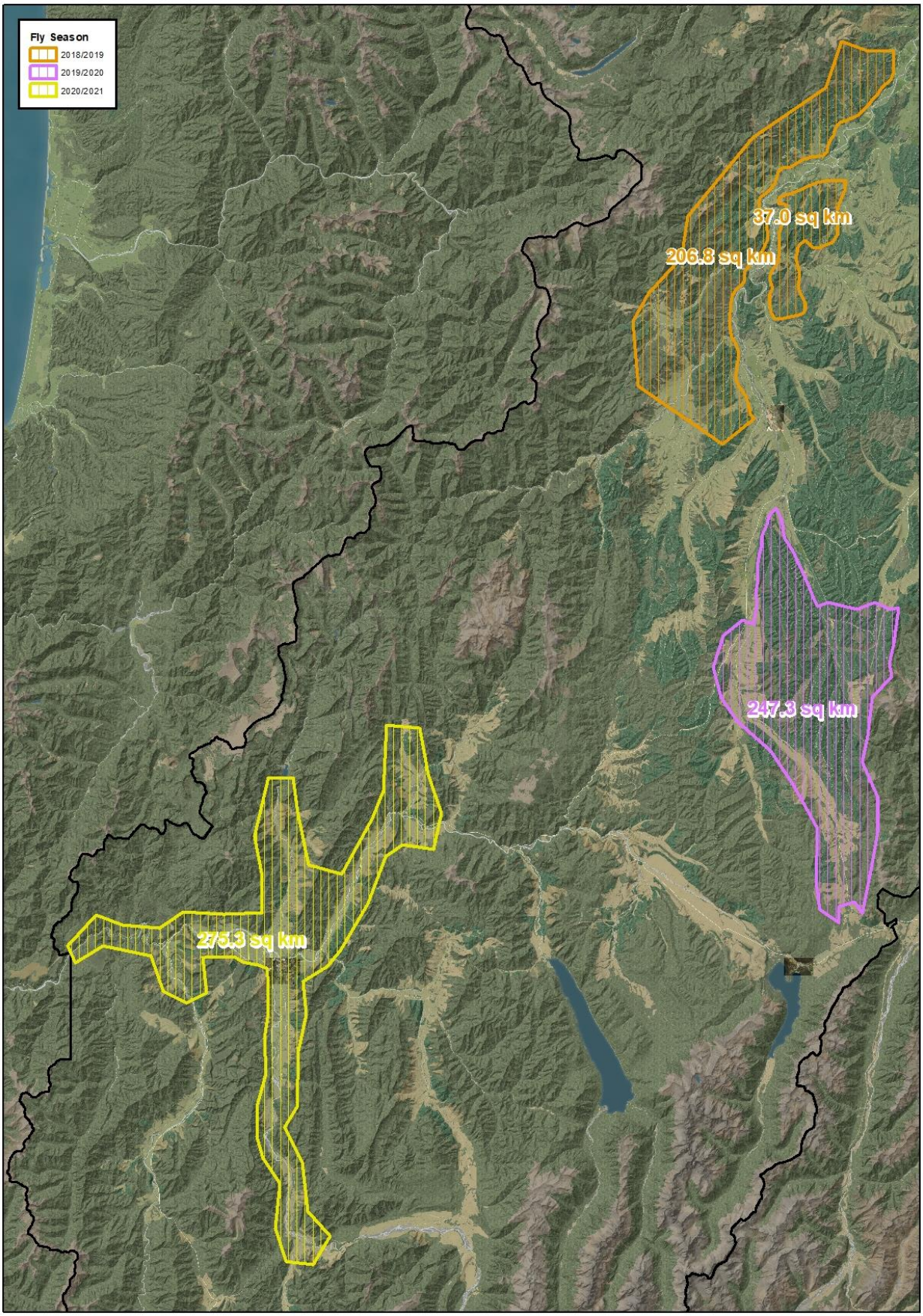
Nelson CC – Proposed Orthophotography Coverage for 2019/2020 (Urban)



Nelson CC (995 tiles)

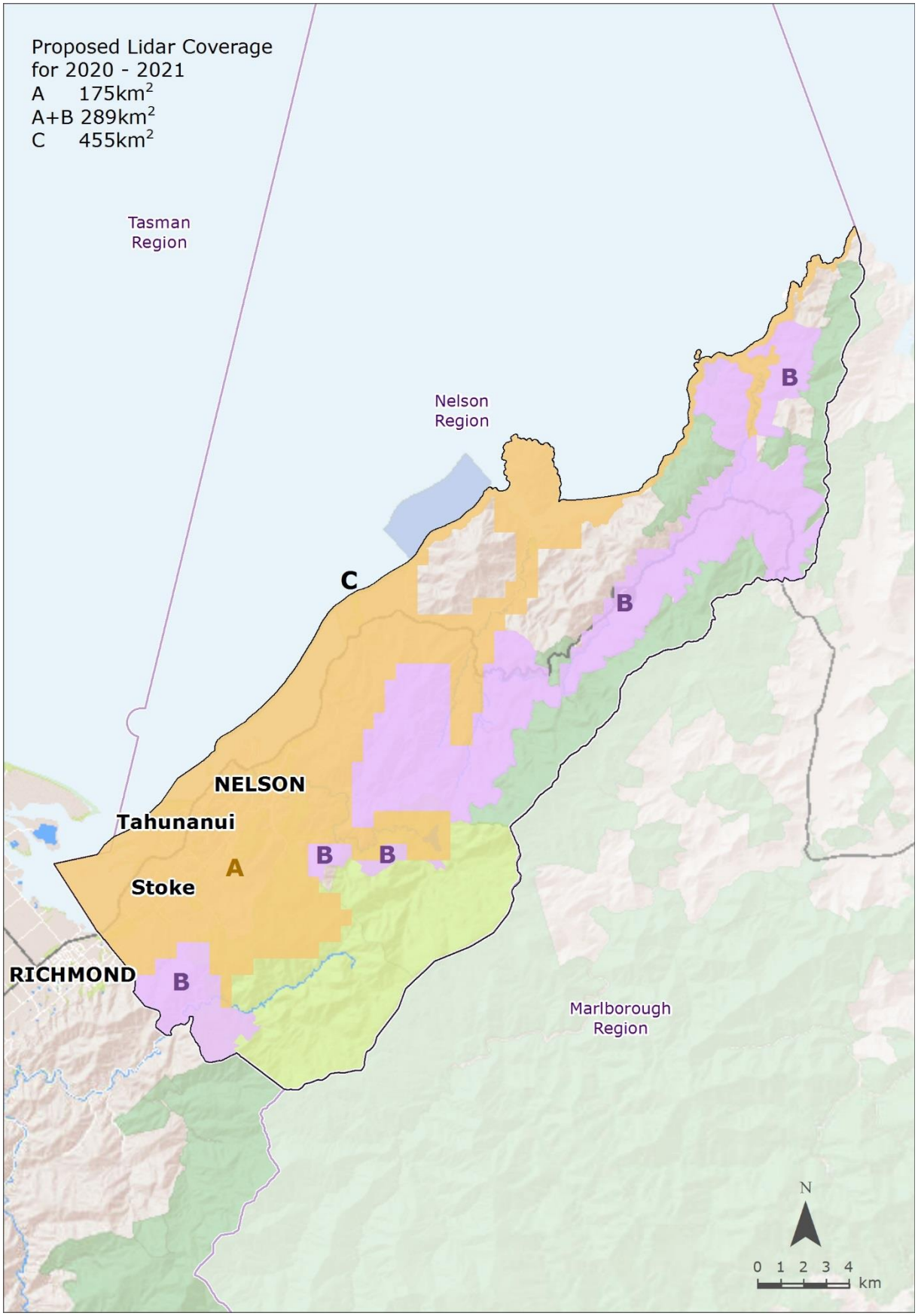
Appendix F

Tasman DC – Proposed LiDAR Coverage for 2018 - 2021



Appendix G

Nelson CC – Proposed LiDAR Coverage for 2020/2021



Appendix H

Terms and Conditions

The information provided in this Tender, and in any subsequent correspondence in relation to this Tender, is for the sole purpose of assisting prospective **Tenderers** in the preparation of their responses. It may not be used for any other purpose, or revealed to any other party not directly involved in the response to this tender. This document and any copies of it remain the property of the **Principal** and must be returned or destroyed at the conclusion of the selection process.

Requests for additional information must be directed to the Primary Contact in writing. The **Principal** reserves the right to distribute the responses to any such requests to all prospective **Tenderers**.

The specifications stated in this Tender reflect the **Principals** currently known requirements. The **Principal** reserves the right to vary, in negotiation with any successful **Tenderer**, these specifications and requirements.

The **Principal** will not be responsible for any expense incurred by a **Tenderer** in preparing a response to this Tender, or in responding to subsequent questions relating to this Tender, or in any subsequent evaluation process.

No negotiations, decisions, or actions shall be initiated or executed as the result of any verbal discussion with any employee of the **Principal**. Only those communications that are in writing from the Primary Contact may be considered as a duly authorised expression on behalf of the **Principal**.

Proposals must be delivered to the Primary Contact, by email, on or before the stated deadline. The **Principal** will decline proposals delivered after this time.

The lowest priced or any proposal will not necessarily be accepted. No Proposal shall be deemed to have been accepted or rejected unless and until the **Tenderer** has been advised of such acceptance or rejection in writing by the Sole Contact.

The **Principal** reserves the right to accept individual parts rather than the whole of any particular proposal and contract the remaining elements to an alternative party.

Tenderers should note that the **Principal** reserves the right to withdraw from the proposal process at any time without notice before entry into a contract. If the **Principal** withdraws from the proposal process **Tenderers** acknowledge and agree that no Tenderer shall have any claim for compensation or otherwise against the **Principal** and/or its members and officers.

The **Principal** will require that contracts covering the provision of products and services requested in this Tender be negotiated with the preferred **Tenderer** to the satisfaction of the Principal.

All submitted proposals will become the property of the **Principal** and will not be returned to the **Tenderer**.

Tenderers are advised that the **Principal** considers their proposals (and all related information), the evaluation of all proposals and conditions of contract to be strictly confidential. **Tenderers** are further advised that unless directed otherwise by the Ombudsman holding office under the Ombudsman Act 1975, the **Principal** will refuse any request from a third party under the Local Government Official Information and Meetings Act 1987 for information on proposals on the grounds that the information is the subject of commercial negotiation. The **Principal** however cannot guarantee that its decision not to release such information will not be challenged.

Tenderers are advised that the **Principal** will regard the content of any successful proposal as being part of the contractual obligations between the parties, and retains the right to incorporate the whole or sections of the proposal into the final contract.

All prices quoted must be in New Zealand dollars and exclude GST.