



agriculture, land reform & rural development

Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

Chief Directorate: National Geospatial Information

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REPORT

CRITERIA FOR, AND DETAILS OF APPROVED OPERATIONAL TEST AREAS TO BE FLOWN TO ASSESS THE SUITABILITY OF DIGITAL AERIAL SENSOR SYSTEMS FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

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CRITERIA FOR, AND DETAILS OF APPROVED OPERATIONAL TEST AREAS TO BE FLOWN TO ASSESS THE SUITABILITY OF DIGITAL AERIAL SENSOR SYSTEMS FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

1. PURPOSE:

- 1.1 To outline the criteria, and identify test area/areas to be flown by contractors for Chief Directorate: National Geospatial Information to assess the suitability of the proposed digital aerial sensor system for acquisition of digital aerial imagery.

2. BACKGROUND AND DISCUSSION:

- 2.1 The standard for the Acquisition for Digital Aerial Imagery (v7, dated 7 March 2022) of the Chief Directorate: National Geospatial Information (section B(2)(a)) states that ***“Only digital sensor systems which meet the requirements of these specifications, and as determined by appropriate sensor system documentation, certification and sample imagery submitted shall be used to acquire the digital aerial imagery.”***
- 2.2 The standard “requires an operational test to be undertaken as detailed in section B 2.17 of the standard:

B 2.17 Operational Test

- (a) *Prior to the commencement of imagery acquisition for the CD: NGI, and at any stage when the camera or IMU system has been disturbed in the aircraft, imagery of a CD: NGI approved test area shall be acquired for the purposes of an operational test. The Operational Test shall be undertaken after a successful Bore-sight Calibration has been completed.*
- (b) *The test area shall be flown at an optimal ground sample distance (GSD) of 0.25m, or as specified by the CD: NGI, with the same aircraft/sensor/peripheral equipment combination as will be used in the image acquisition programme of the CD: NGI.*
- (c) *This imagery shall consist of at least two adjacent strips, with each strip with a forward overlap of between 55% and 65% and a sidelap of between 20% and 30%. Tie strips shall be flown, such that they traverse the start and end of the east-west strips to tie the aerial triangulation block together.*
- (d) *Unless otherwise stipulated by CD: NGI, the area flown shall be able to yield orthorectified imagery of at least 15 minutes (5 orthophoto sheets) East-West and 6 minutes (2 orthophoto sheets) North-South in dimension.*

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- (e) The entire area shall be stereoscopically covered within the usable portions of the images.*
- (f) The expected error, of the ground control points (GCP's), at a confidence level of 2σ , in the individual easting and northing components, after aerial triangulation, shall not exceed $\pm 0.068m$, to a maximum permissible error of $\pm 0.10m$.*
- (g) The expected error, at a confidence level of 2σ , in the height, after aerial triangulation, shall not exceed $\pm 0.12m$, to a maximum permissible error of $\pm 0.30m$.*
- (h) The following records in respect of the test area shall be provided:*
 - i) Plan of the test area*
 - ii) Co-ordinates, height and description of each GCP*
 - iii) Enlargements on which the GCP are clearly marked at a scale such as to allow their easy identification*
 - iv) All information as stipulated in paragraph*
- (i) Should the results obtained from the imagery of the test area not be consistent with the sensor calibration data supplied nor suitable for photogrammetric or photo interpretation purposes, the Chief Director may prohibit the use of that sensor.*

2.3 The purpose of the undertaking the operational test is for CD: NGI to satisfy itself that the proposed sensor system can deliver imagery and associated parameters and other information that meets the requirement of the standard and can be integrated into the workflow up to and including image orthorectification.

3. CRITERIA FOR OPERATIONAL TEST AREAS

- 3.1** Any test area, whether identified by CD: NGI or as proposed by contractors **must** be approved by CD: NGI prior to commencement of the test.
- 3.2** Although section 2.17 (h) of the standard indicates that CD: NGI will provide ground control points to the stated accuracy, this however, only applies to test areas pre-identified by CD: NGI.
- 3.3** In all cases, the operational test area shall have a minimum of four surveyed Photo Ground Control (PGC) points, one in each of the four corners of the block.
- 3.4** Operational test areas must be characterised by as much of the following features:
 - built up areas,

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- undulating areas for shadow detail, (steep slope areas where possible)
- water bodies,
- Roads
- cultivation \ vegetated areas
- natural features such as rivers

3.5 The approved test areas detailed below are examples that meets the above requirements in terms of image feature characteristics and requirements of B 2.17 of the standard.

4. IDENTIFICATION AND SURVEY OF APPROVED TEST AREAS

4.1 Three geographically spread test areas were identified that had the characteristics above, located in the vicinities of :

- 4.1.1 Hartebeestpoort Dam (North West Province)
- 4.1.2 Franschoek (Western Cape Province)
- 4.1.3 Queenstown (Eastern Cape Province)

4.2 Survey of Photo Ground Control Points

- 4.2.1 The PGC's were preidentified in the office of the Division: Field Surveys of the CD: NGI.
- 4.2.2 All points were observed using Static GNSS survey technique and all coordinate accuracies were within the requirements of the Standard.
- 4.2.3 The results of the survey are listed in Annexure A
- 4.2.4 Details of each survey are available with associated GNSS processing reports and locality sketches.

5. APPROVAL

5.1 This report was approved by the Chief Director (or his/her delegate):

| Name | Signature | Date |
|--------------|---|------------|
| Aslam Parker |  | 2023-02-02 |

6. ANNEXURE A : APPROVED OPERATIONAL TEST AREAS (JANUARY 2023)

6.1 Hartebeestpoort Dam (North West)

6.1.1 Geographic Extent

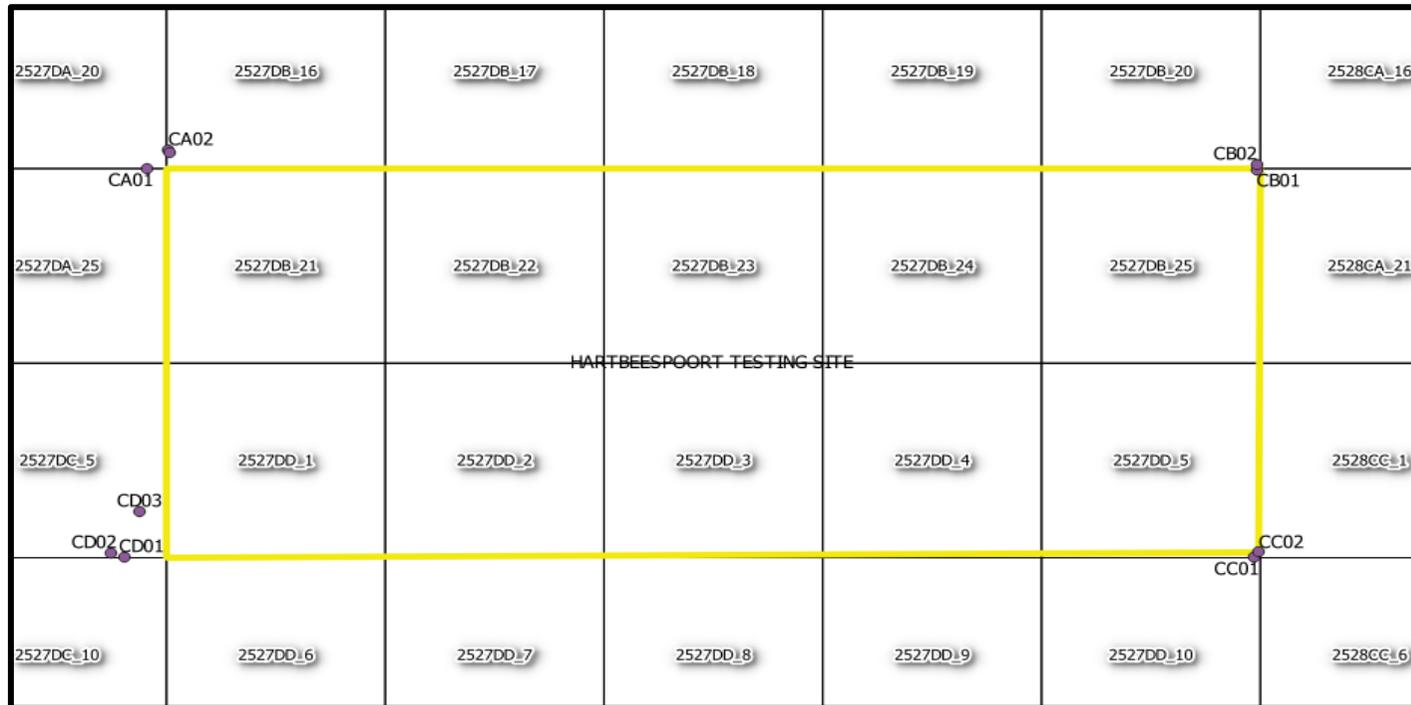
- Strip 1: 2527DB21-27
- Strip 2: 2527DD01-05



Department of Agriculture, Land Reform and Rural Development | Departement van Landbou, Grondhervorming en Landelike Ontwikkeling | Muhasho wa zwa Vhulimi, Mbuedzedzo ya Mavu na Mveledzisoya Mahayani, uMnyango Wezolimo, Izinguquko Kwezomhlaba Nokuthukiswa Kwezindawo Zasemakhaya | Ndzawulo ya Vurimi, Antswiso wa Misava na Nhluvukiso wa Matikoxikaya | Litiko Letekulima, Tingucuko Kutemhlaba Nekutfutukiswa Kwetindzawo Tasemaphandleni | UmNyango wezokuLima, ukuBuyiselwa kweNarha nokuThuthukiswa kweNdawo zemaKhaya | Kgoro ya Temo, Peakanyoleswa ya Naga le Tlhabollo ya Dinaga- magae | Lefapha la Temothuo, Kabobotjha ya Naha le Tlhabollo ya Dibaka tsa Mahae | Lefapha la Temothuo, Pusetsodinaga le Tlhabololo ya Metsemagae | Sebe lezoLimo, uBuyekezo lwemiHlaba noPhuhlisolamaPhandle

CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.1.2 Distribution of Photo Ground Control Points (PGC's)



CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.1.3 Coordinates of (PGC's)

| HAARTESBEESTHOEK 94 | | | | | | | | |
|---------------------|----|--|-------------|-------------|------------------|----------------|------------------------|------------------------|
| Point Name | Lo | Description | y (m) | x (m) | Latitude (S) | Longitude(E) | ht(Ellipsoidal) (m) | Ht(Orthometric) (m) |
| CA01 | 27 | Point of Intersection between gravel road and island road marking. | -74850.687 | 2843818.114 | 25° 42' 00.2601" | 27°44'44.6283" | 1193.038 | 1168.288 |
| CA02 | 27 | Right hand side corner of the pump house. | -75324.992 | 2843269.585 | 25° 41' 42.3495" | 27°45'01.5271" | 1180.181 | 1155.455 |
| CA03 | 27 | Centre of the board made structure next to the tracks. | -75363.550 | 2843347.758 | 25° 41' 44.8824" | 27°45'02.9258" | 1182.088 | 1157.361 |
| CB01 | 29 | Edge of white painted line on the tar road | 100289.096 | 2844001.427 | 25° 42' 00.7579" | 28°00'03.0328" | 1317.315 | 1292.614 |
| CB02 | 29 | Corner of stop sign road marking. | 100300.275 | 2843847.024 | 25° 41' 55.7385" | 28°00'02.6738" | 1324.396 | 1299.698 |
| CC01 | 27 | Centre of the concrete block | -100135.468 | 2855055.868 | 25° 47' 59.9617" | 27°59'54.4595" | 1369.324 | 1344.407 |
| CC02 | 27 | Centre of the pile of rocks | -100253.019 | 2854905.513 | 25° 47' 55.0476" | 27°59'58.6376" | 1359.588 | 1334.672 |
| CD01 | 27 | Centre of the Mile Marker next to the gravel road | -74257.941 | 2854849.214 | 25° 47' 58.007" | 27°44'25.5914" | 1232.081 | 1207.042 |
| CD02 | 27 | Centre of the termite hill next to the fence near the gravel road | -73947.483 | 2854733.919 | 25°47'55.1111" | 27°44'14.4246" | 1236.085 | 1211.045 |
| CD03 | 27 | Apex of the grass island formed by intersecting tracks | -74606.255 | 2853557.685 | 25°47'16.7717" | 27°44'37.8319" | 1216.290 | 1191.291 |

CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.1.4 Enlargements

Area CA
Image 2527DA_25



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area CA
Image 2527DB_16



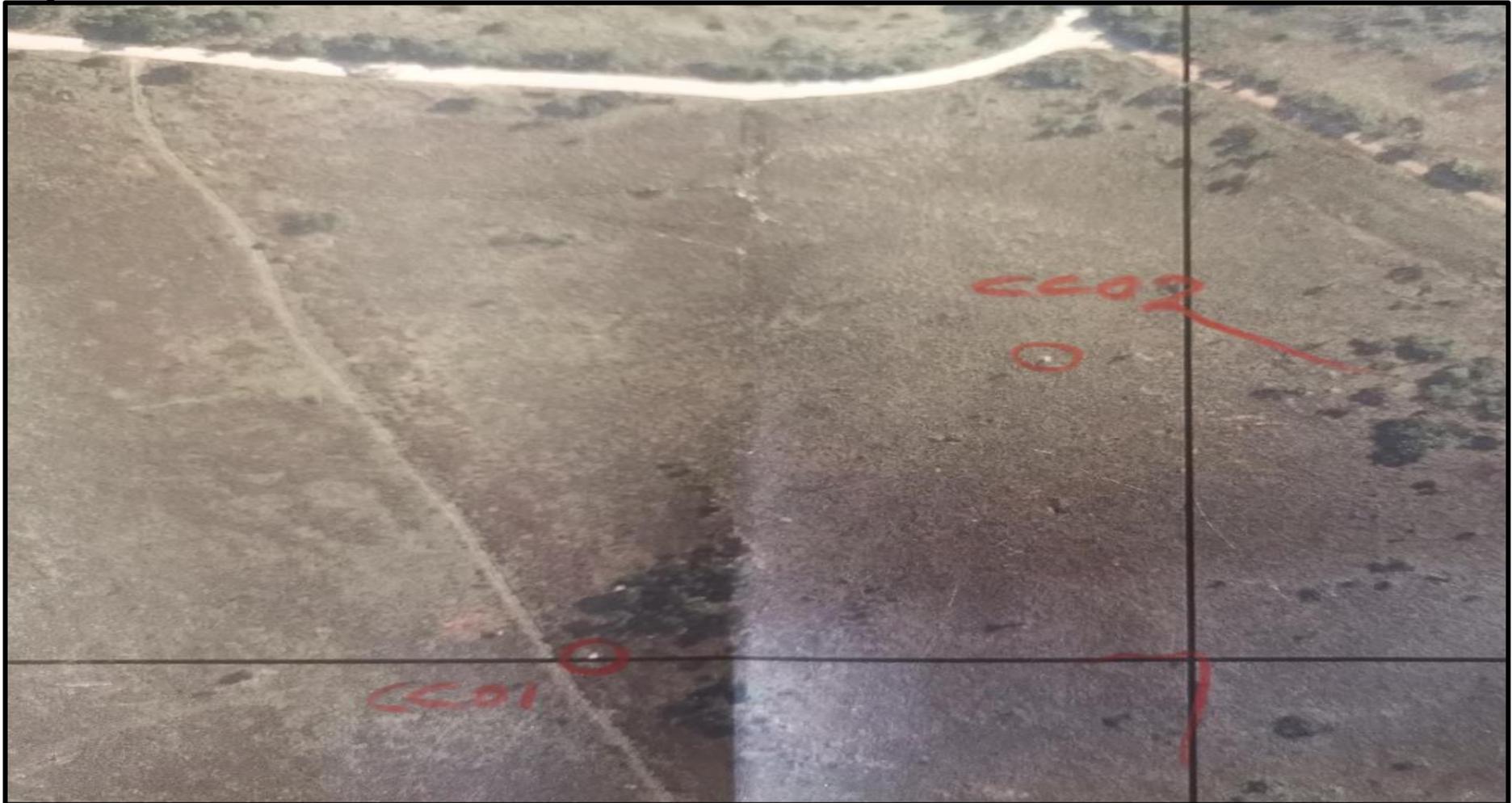
CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area CB
Image 2528CA_16



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area CC
Image 2527DD_5



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area CD
Image 2527DC_5

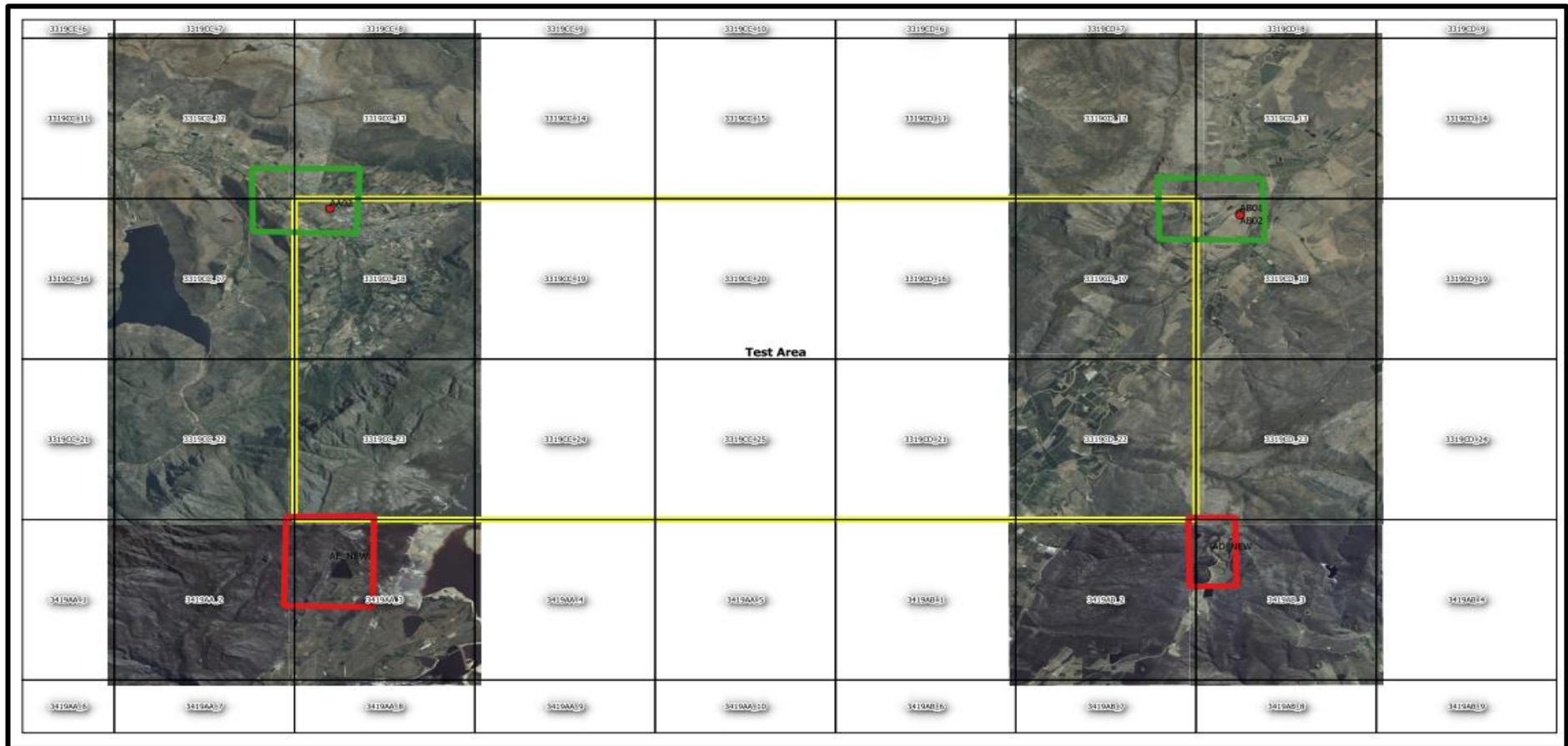


CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.2 Franschoek (Western Cape)

6.2.1 Geographic Extent

- Strip 1: 3119CD18-CC17
- Strip 2: 3119CD22-CC23



CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.2.2 Distribution of Photo Ground Control Points (PGC's)

| | | | | | | |
|-----------|--------------------------|-----------|-----------------------------------|-----------|-----------|---------------------------|
| 3319CC_12 | 3319CC_13 | 3319CC_14 | 3319CC_15 | 3319CD_11 | 3319CD_12 | 3319CD_13 |
| 3319CC_17 | AA02 3319CC_18 | 3319CC_19 | 3319CC_20 | 3319CD_16 | 3319CD_17 | AB01 AB02 3319CD_18 |
| 3319CC_22 | 3319CC_23 | 3319CC_24 | FRANCSHOEK TEST AREA 3319CC_25 | 3319CD_21 | 3319CD_22 | 3319CD_23 |
| 3419AA_2 | AC01 AC02 3419AA_3 | 3419AA_4 | 3419AA_5 | 3419AB_1 | 3419AB_2 | AD01 AD02 3419AB_3 |

CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

6.2.3 Coordinates of PGC's

| HAARTESBEESTHOEK 94 | | | | | | | | |
|---------------------|----|---|------------|-------------|------------------|----------------|------------------------|------------------------|
| Point Name | Lo | Description | y (m) | x (m) | Latitude (S) | Longitude(E) | Ht(Ellipsoidal) (m) | Ht(Orthometric) (m) |
| AA02 | 19 | Right hand side corner where the paving intersects with the tar road. | -10153.142 | 3752918.632 | 33° 54' 11.1610" | 19°06'35.1938" | 281.200 | 249.042 |
| AB01 | 19 | .Centre of the Corner fence | -33497.658 | 3753134.210 | 33° 54' 16.4179" | 19°21'43.8588" | 315.865 | 283.253 |
| AB02 | 19 | .Centre of the Corner fence | -33499.473 | 3753199.858 | 33° 54' 18.5483" | 19°21'43.9384" | 320.214 | 287.603 |
| AC01 | 19 | .Centre of the rock | -10061.633 | 3764072.917 | 34° 00' 13.1809" | 19°06'32.0930" | 372.644 | 340.633 |
| AC02 | 19 | .Centre of the white concrete slab. | -10052.079 | 3764130.584 | 34° 00' 15.0528" | 19°06'31.7230" | 367.644 | 335.634 |
| AD01 | 19 | Footpath intersection | -32482.286 | 3764276.823 | 34° 00' 18.1631" | 19°21'5.8239" | 1024.733 | 992.175 |
| AD02 | 19 | White patch of sand opposite the Dam | -32472.567 | 3764320.458 | 34° 00' 19.5804" | 19°21'5.4510" | 1015.054 | 982.499 |

CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Enlargements

Area AA
Image 3319CC_18



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area AB
Image 3319CD_18



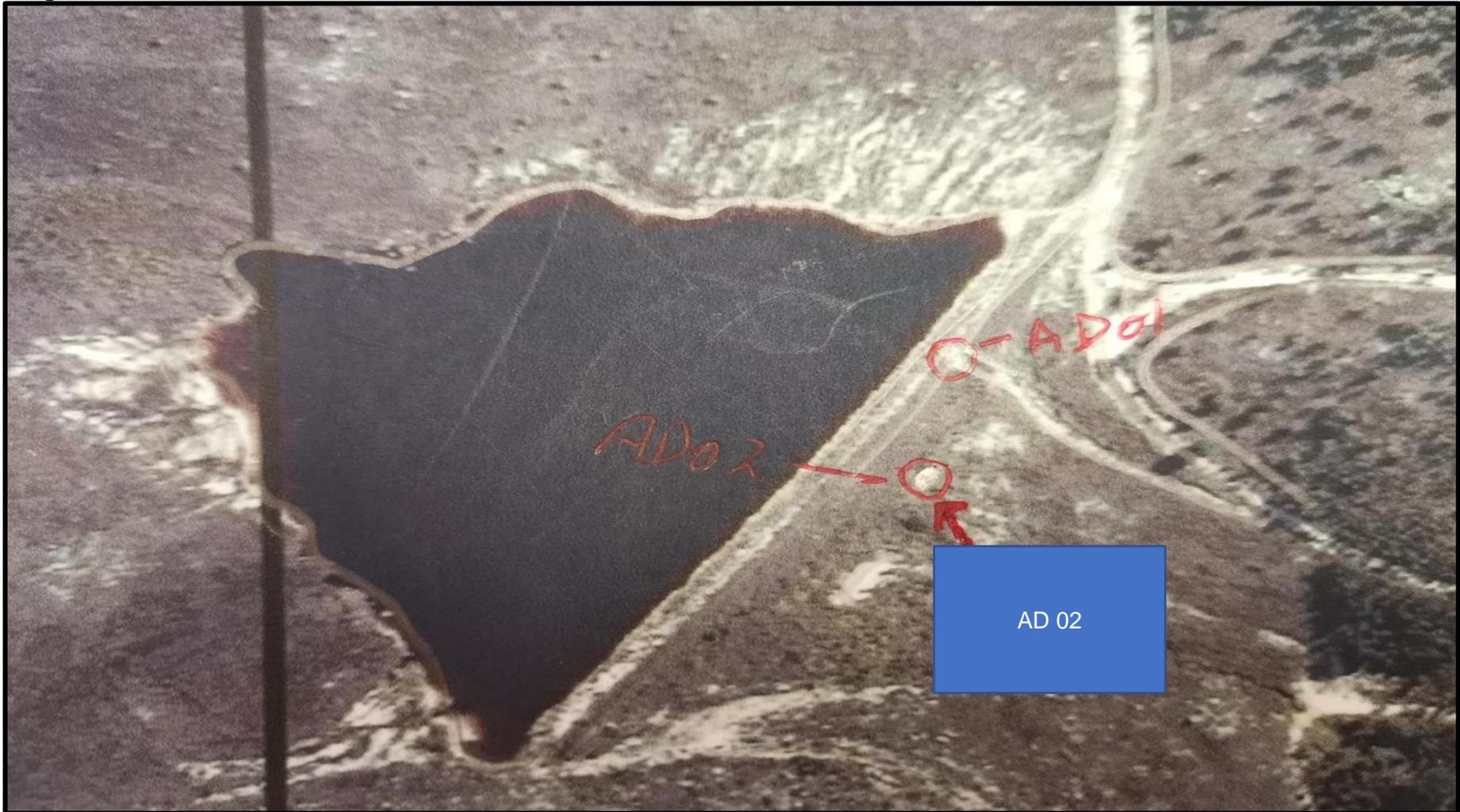
CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area AC
Image 3419AA_3



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area AD
Image 3419AB_03

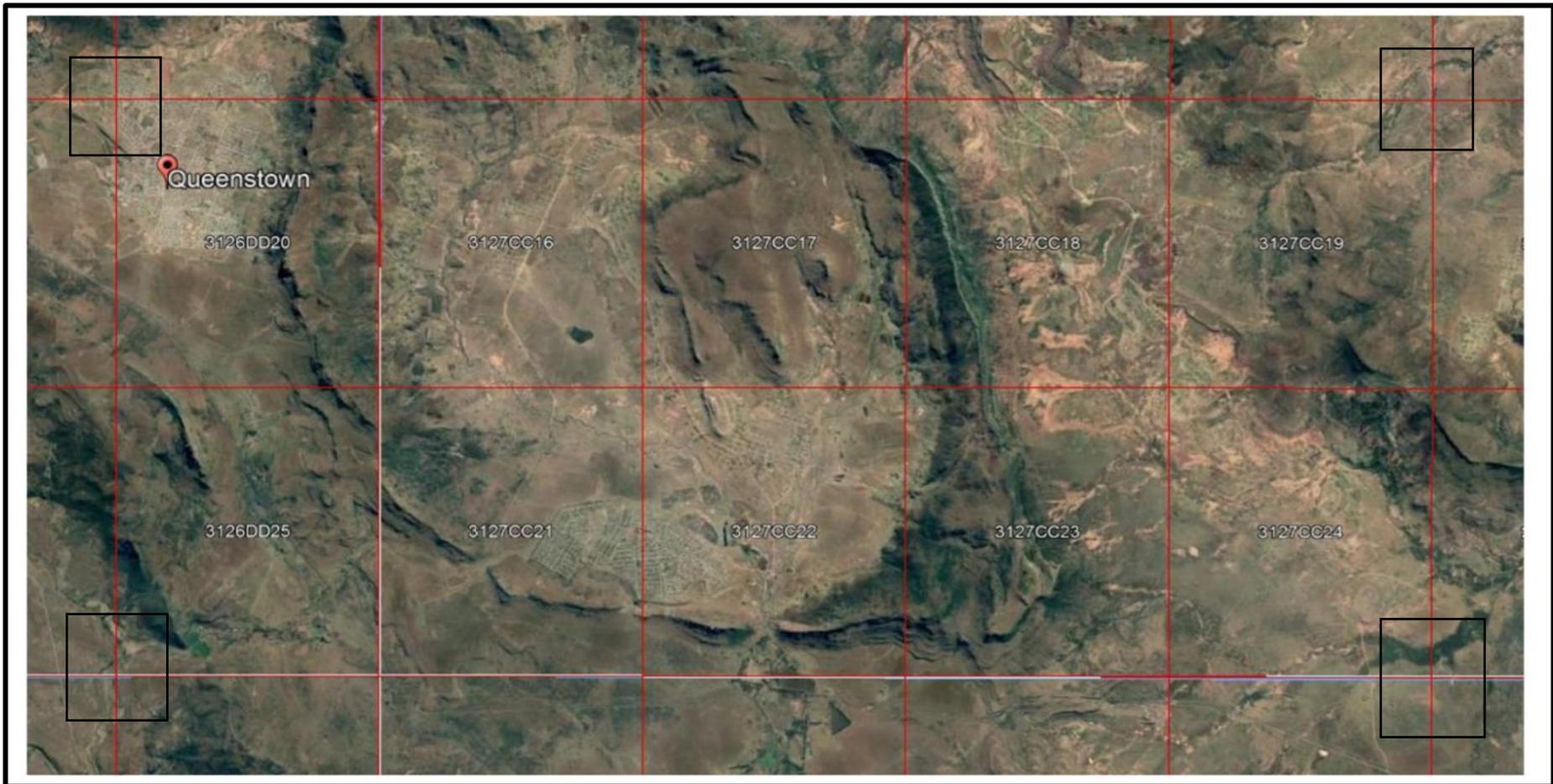


CRITERIA FOR TEST AREA TO BE FLOWN TO ASESSE SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

7. Queenstown (Eastern Cape)

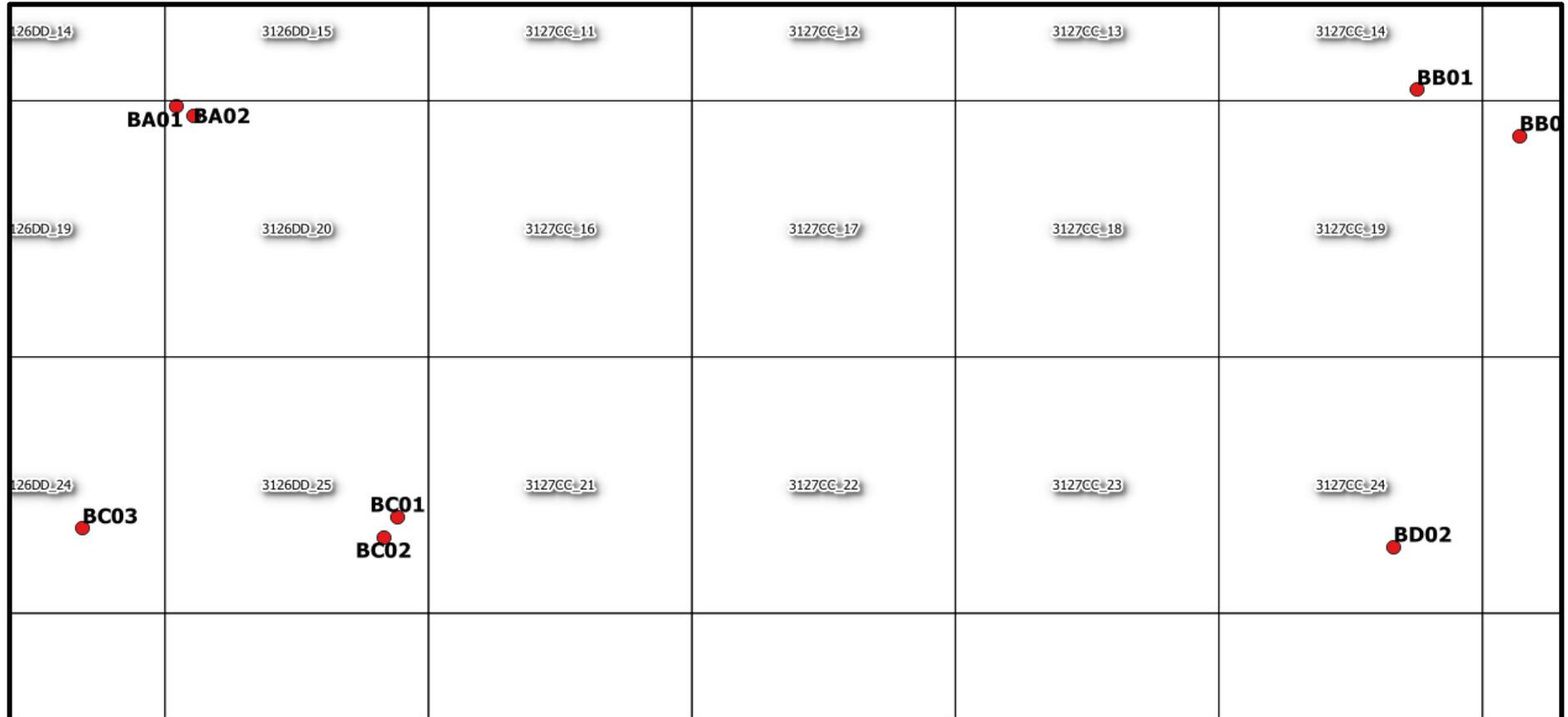
7.1.1 Geographic Extent

- Strip 1: 3127DD20-3127CC19
- Strip 2: 3126DD25-3127CC24



CRITERIA FOR TEST AREA TO BE FLOWN TO AESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

7.1.2 Distribution of Photo Ground Control Points (PGC's)



CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

7.1.3 Coordinates of PGC's

| Queenstown Test Area Datum: Hartebeesthoek94 94 | | | | | | | | |
|--|----|---|------------|-------------|------------------|----------------|----------|----------|
| Point Name | Lo | Description | Y-value | X-Value | Latitude (S) | Longitude(E) | Ht | ht |
| BA01 | 27 | Corner of the school fence | -4523.767 | 3530893.342 | 31° 54' 04.1720" | 26°57'07.8380" | 1129.737 | 1163.207 |
| BA02 | 27 | Intersection of two fences in the school yard | -4219.212 | 3531086.408 | 31° 54' 10.4443" | 26°57'19.4254" | 1134.911 | 1168.369 |
| BB01 | 27 | Corner of the school fence | -17740.861 | 3530543.764 | 31° 53' 52.3569" | 27°11'15.1436" | 964.879 | 997.718 |
| BB02 | 27 | Corner of the homestead fence | -19585.331 | 3531545.093 | 31° 54' 24.7569" | 27°12'25.4089" | 939.261 | 972.014 |
| BC01 | 27 | Corner of stop sign road marking. | 549.300 | 3539769.923 | 31° 58' 52.3896" | 26°59'39.0770" | 1088.157 | 1121.258 |
| BC02 | 27 | .Centre of the barrier guard pole | 806.272 | 3540212.973 | 31° 59'06.7729" | 26°59'29.2876" | 1070.621 | 1103.711 |
| BC03 | 27 | Intersection of farm two fences | 6205.388 | 3540020.064 | 31° 59' 00.4499" | 26°56'03.6296" | 1058.294 | 1091.485 |
| BD02 | 27 | Corner of the school fence | -17309.535 | 3540433.724 | 31° 59'13.4650" | 27°10'59.3657" | 927.899 | 960.482 |

CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

7.1.4 Enlargements

Area BA
Image 3126DD_20



CRITERIA FOR TEST AREA TO BE FLOWN TO ASES SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

**Area BB
Image 3127CC_14&20**



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area BC
Image 3126DD_24&25



CRITERIA FOR TEST AREA TO BE FLOWN TO ACESS SUITABILITY OF CAMERA FOR CD: NGI DIGITAL AERIAL IMAGERY PROGRAMME.

Area BD
Image 3127CC_24

