THE ROLE OF CADASTRAL SURVEYING AND GIS IN THE MANAGEMENT OF RESTITUTION AND LAND RIGHTS CLAIMS, A CASE STUDY OF LADY SELBORNE

By

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Master of the Built Environment

in the

Department of Civil Engineering and Geomatics

Faculty of Engineering and Built Environment

at the Durban University of Technology

August 2022

DECLARATION

I, Lungileyo Nontobeko Ngidi hereby declare that this dissertation except where indicated in the text, is my own work and has not been submitted in part, or in whole, at any other University or University of Technology.

This research was conducted at the Durban University of Technology under the supervision of Professor Dhiren Allopi and Mr Cherven Singh.

20 August 2022

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I would also like to acknowledge my Supervisor Prof. Dhiren Allopi and Co-Supervisor Mr Singh for holding my hand through guidance and advice, they challenged me to think out of the box, and for that I am grateful.

My appreciation also goes to Michael T. Moipolai, my colleague, for his support and encouragement in my practical.

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Lastly, I would like to thank my family: my parents, husband and daughter for their continued support and motivation from the beginning to the end.

ABSTRACT

Twenty six years into democracy, the issue of land redistribution as promised by the government of South Africa is still far from being resolved. The government promised to correct the injustices of the past which left many black people stripped of their land and poor. The state passed the Restitution of Land Rights Act 22 of 1994 to bring back the land to the rightful owners, but to date some claimants who lodged their claims before 1998 have not seen the 'promised land' yet. The time that has passed since independence clearly indicates that there are challenges that are hindering the process. The Commission on Restitution of Land Rights (CRLR) is facing challenges with regard to the shortage of skilled staff to collect evidence because project officers, who are supposed to assist the claimants, seem confused by the maps. In addition, some of the rural land for expropriation has not been surveyed yet.

The aim of the study was to discuss and show the importance of the involvement of Cadastral Surveying and Geographical Information Systems (GIS) in the processing of restitution of land rights claims in improving the turnaround time of claims and to show how that can be done. The case study was conducted at lot 408 Lady Selborne township situated in Pretoria North (25˚41´27´´S and 28˚07´42´´E) City of Tshwane Metropolitan Municipality (CTMM), Gauteng Province (GP). Qualitative research methodology was used to discuss the role of cadastral surveying and GIS. Articles, journals, books, reports and legislation documents were used to gather the required information. Another methodology used was overlay methodology which superimposes different data (cadastral documents, historical images and shape files) with common coordinates reference systems.

Geomatics is regarded as a scarce skill specialising in measuring the earth size, boundary positioning, analysing structure and physical features. In this study a combination of cadastral surveying and Geographical Information System (GIS) technology was used. The focus was to investigate and locate the actual piece of land that was claimed.

The role of cadastral surveying and GIS in the restitution and land claims is to paint a clear picture to those who were not there during dispossession, by giving historical background data in terms of size, historical images and maps. Another role is to serve as a mediator to resolve boundary disputes, encroachment disputes, overlapping claims and multiple claims on one piece of land, and by locating of the correct boundary beacons. This process provides an objective truth regarding land details, thereby providing clarity regarding the claimed land. Open-source software Quantum GIS (QGIS), Microsoft excel and Base Map Google satellite were used for the analysis of data.

In this study, the land reform process of the Republic of South Africa (RSA) was compared with Australia, New Zealand and the Canada. These countries were chosen because they are rectifying past discriminatory injustices by allowing black citizens to claim back their land. The focus was to

compare their structure in terms of specialists involved in collecting data for the purpose of compensation to the claimants.

The findings revealed that competent and experienced skilled personnel can extract, analyse and manipulate data in order to collect data on claimed land. A combination of cadastral surveying and GIS can be used for research on un-surveyed land, complex overlapping claims, and to manage change detections on claimed land. Recalculation of old coordinates (points), conversions of coordinates, sides, reconstruction of parcels and other related data can be accomplished. The Department of Agriculture, Land Reform and Rural Development (DALRRD) has land specialists but they are not involved in the process. The DALRRD hires external experts to resolve complex claims, while they have experts within the department. The DALRRD has resources, equipment and employees who are being underutilised.

Recommendations are that research and investigations based on locating the claimed land must be conducted by professional people with the relevant experience and skills to perform the job. This will prevent disputes with landowners and help in shortening the period taken to complete research, as claimants tend to lose patience and take the Commission to court. The DALRRD also needs to understand that the most important part of a land claim is the piece of land that is being claimed, hence there should be no mistakes regarding finding enough information about each piece of land.

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ACRONYMS AND ABBREVIATIONS USED

AH	Agricultural Holding
ANC	African National Congress
CTMM	City of Tshwane Metropolitan Municipality
CFRT	Crown Forestry Rental Trust
CRLR	Commission on Restitution of Land Rights
CSGO	Chief Surveyor General Office
DALRRD	Department of Agriculture Land Reform and Rural Development
DPME	Department of Planning, Monitoring and Evaluation
DRDLR	Department of Rural Development and Land Reform
DUT	Durban University of Technology
EPSG	European Petroleum Survey Group
GP	Gauteng Province
GCP	Ground Control Points
GIS	Geographic Information Systems
GP	General Plan
GTAC	Government Technical Assistance Component
LRMF	Land Rights Management Facility
MSAT	Metis Settlements Appeal Tribunal
NGI	National Geospatial Information
NGMS	National Geomatics Management Services
NZ	New Zealand
QGIS	Quantum GIS
RLCC	Regional Land Claims Commission
RSA	Republic of South Africa

SAHRC	South African Human Research Council
SCT	Specific Claims Tribunal
SGO	Surveyor General Office
USA	United States of America
UNISA	University of South Africa
WT	Waitangi Tribunal

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

The Restitution of Land Rights Act 22 of 1994 was created with the aim of compensating black people in South Africa who were unjustly dispossessed of their land as a result of the past discriminatory apartheid laws including the Natives Land Act of 1913 (South Africa. Department of Justice and constitutional development 1994:1). Government invited black people to claim back their land via the (CRLR), the closing date to lodge the claims was 31 December 2008 (South Africa. Department of Justice and constitutional development 1994:1). On 30 June 2014 President, Jacob Zuma approved the CRLR Amendment Act 2014 (Act No 15 of 2015), the act allowed the new lodgement of claims from 1 July 2014 to 30 June 2019 for those who did not lodge their claims (CRLR, 2015). The Constitutional Court of South Africa, however, nullified the amended act as invalid, therefore the lodgement of claims has been suspended (Land access movement of South Africa v Chairperson of the National council of provinces, 2016).

Black people are concentrated in the townships like District 6, Soweto, Sophia town and many other townships which were established to accommodate black people after dispossession of their land, some black people are based in rural areas, situated on infertile land with little or no basic services (Molala, 2019). The land formerly owned by the blacks has been turned into hotels, game reserves, national parks, malls and other businesses for white people, the blacks were forced to work as cheap labour in mines and on farms for white people in order to feed their families (Sekgota, 2012). This research study's focus was on the claims that were lodged before 31 December 2008. However, findings and recommendations in this study may be used when the court has given the go ahead to lodge new claims.

As an employee of the Office of the Surveyor General (SGO) in Pretoria Gauteng, the researcher worked directly with clients for 9 years at the Client Service Centre. A large number of these clients were sent from CRLR offices to SGO to get property descriptions of the areas they intended to claim or had claimed. These clients would come to SGO Pretoria from all over the provinces of RSA, some in groups of communities by taxi or bus. Most claimants believed that the process is done in Pretoria; hence the long trips, neglecting their nearest offices.

The challenge faced by officers when trying to assist these claimants was that in most instances the latter did not have the correct descriptions of their properties. Most only knew the physical features of the areas and the current or previous owners. The majority of them were old with little or no formal education and unable to read or interpret maps. Worst still, in certain instances, some of the people who were forcibly moved from their lands were dead and descendants who were pursuing the land claim were not familiar with the areas (Claassens and Sihlali, 2020).

Some of the officers from CRLR who process the claims also come to the SGO Pretoria in Gauteng looking for cadastral maps. The challenges faced when trying to help them is that in most instances the information which they need would be on the maps they already have. The problem is that these officers are not geometicians and it is difficult for them to understand, analyse and interpret maps (Parker, 2014). Some officers give coordinates which they took in the field using a hand held global positioning systems receiver and request a map created from that, as a result those gadgets are inaccurate. When capturing these coordinates result in overlapping or encroaching boundaries, demonstrating that the field data was not collected by an expert in land surveying.

In order to assist, officials from SGO sometimes get aerial photographs from the National Geospatial Information (NGI) system to show the physical features of the areas. Some areas have since been well developed and this causes confusion to the claimants regarding the pieces of land they need to claim or have claimed. Therefore, it becomes very difficult to inform the claimant whether they need to claim the whole farm or certain portions or how many parent farms or farm portions they need to claim. This then raises the question of whether the clients are getting what they deserve in terms of compensation for their claims or not, and also whether they are claiming or have claimed the correct land, or do they just end up accepting what they are getting from the government.

1.2 PROBLEM STATEMENT

If the geomatics profession was considered as a scarce skill in the process of land claiming, then geomatics can be used as a tool in managing the land claims. This question comes because project officers, who are supposed to assist the claimants, seem confused by the maps and the SGO then demystifies the confusion. The most important thing in the land claims is the land, hence the need for expertise in analysis and manipulation of data to prevent confusion and mistakes in the future.

On 30 June 2014 President Jacob Zuma approved the CRLR Amendment Act 2014 (Act No 15 of 2015) which allowed the new lodgement of claims from 1 July 2014 to 30 June 2019 for those who did not lodge their claims before 2008 (CRLR, 2015). The Constitutional Court of South Africa, however, nullified the amended act as invalid therefore the lodgement of claims has again been suspended (Land access movement of South Africa v Chairperson of the National council of provinces, 2016). The commission is not allowed to process new lodged claims until old claims are settled (CRLR 2019).

It is an irrefutable fact that land is an appreciating asset, this means that every year its value goes up in the owner's favour, it is the dream of every human being to own such an asset for current investment and for future generations (Lear, 2012). It needs no specialist to notice the challenges the government is facing regarding the land claims, claimants all over the country are disgruntled with the slow pace concerning the delivery of claims, the CRLR is facing challenges with regards to the shortage of skilled staff to collect evidence and as earlier mentioned, some of the rural land is not yet surveyed (Rugege, 2004).

The annual report of the CRLR for the 2005-2006 financial year which was presented in parliament by the Commissioner, Mr Thozamile Gwagwa, highlights that a number of provinces are facing challenges such as unsurveyed rural land, overlapping claims, land owners challenging the validity of claims, and claimants submitting incorrect documents, as a result, there are delays in settling the claims. The report also indicates that service providers were employed to collect evidence on big lands (CRLR, 2006). The profession of these service providers, and the kind of evidence they need to collect, is not clear.

The annual report of the CRLR for 2014-2015 financial year which was presented in parliament by the Commissioner, Ms Nomfundo Gobodo Ntloko, there is still poor or no skill and experience in terms of the capacity for doing the research, Shortage of staff is also another concern that was raised, the commissioner suggested that competent research capacity and training be added to the programme when the government reopens the lodgement of new claims (CRLR, 2015).

The annual report of the CRLR for 2019-2020 financial year which was presented in parliament by the Commissioner, Ms Nomfundo Gobodo Ntloko, states that a project called Kuyasa had been formed, she highlighted nine different aims of the project, one of them being a strategy to reduce the backlog, she further said an agent would be arranged to do physical validation of data (CRLR, 2019).

1.3 AIMS AND OBJECTIVES OF THE STUDY

The aim of the current study was to discuss and show how cadastral surveying can assist in the restitution process. A case study of Lady Selborne township was used, to show how improving and enhancing the research processes can improve the turnaround time of claims.

1.3.1 Specific objectives

- To show the impact of cadastral surveying and GIS in the process of land claims by means of a case study of Lady Selborne.
- To discuss and review selected case studies related to land claims.

1.4 RESEARCH METHODOLOGY

Qualitative research methodology was used to discuss the role of cadastral surveying and GIS. Articles, journals, books and other sources were used to gather the required information. Another methodology used was overlay methodology which superimposes different data (cadastral documents, historical images and shape files) with common coordinates reference systems.

1.5 STUDY AREA DESCRIPTION

The researcher decided to randomly look into the properties that were inquired about most frequently by the clients at the SGO counter Therefore, Lady Selborne became the best location that the researcher could use to get the desired findings. It should be noted therefore, that this property as a study area was not taken on the RLCC spreadsheet that was given containing details about claims and claimants, it was randomly selected.

Lady Selborne is located in Pretoria north in the City of Tshwane Metropolitan Municipality (CTMM) (Figure 1), near where the researcher lives. This means that a physical visit of the study area was easy, especially during the time of the Covid pandemic where movement of people was restricted. Looking at the available historical data, Lady Selborne has data from 1906 and it has had developments over the years until 1986. There have been developments in land surveying and GIS within the period of 80 years in comparison with other areas which either do not have enough data or the area has not changed at all over the years.

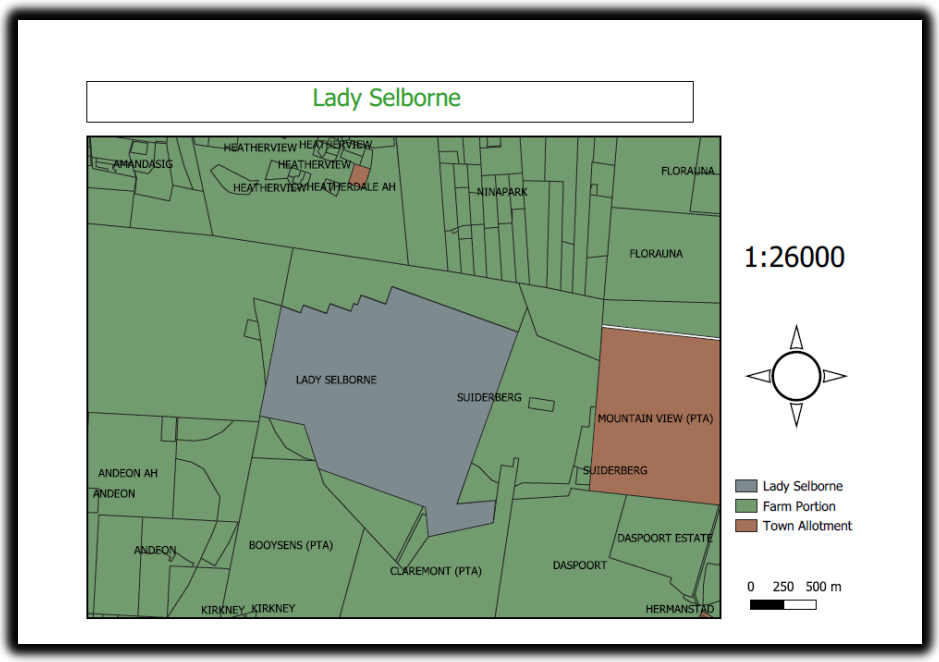


Figure 1: Map of study area Lady Selborne Township.

1.6 OVERVIEW OF CHAPTERS

Chapter 1 – Introduction and Background

States the overall goals and aims, what the researcher wanted to achieve and how it was done. It also gives a clear picture of what led to the decision to undertake this study.

Chapter 2- Literature Review

Various relevant literature sources were reviewed in order to establish a theoretical framework for the study, detailing other related studies and opinions.

Chapter 3 – Research Methodology

A qualitative research method was used whereby a geomatics tool was used to collect evidence on the claimed land.

Chapter 4 – Result presentation and discussion

This chapter describes the findings based on the data collected, and presents the relevant tables and figures.

Chapter 5 – Conclusion and recommendations

The chapter states the findings from the data, the importance of the study and finally makes recommendations for the future.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the material relating to the role of cadastral surveying and GIS in restitution and claims, the case study of Lady Selborne, as well as land claims and restitution in South Africa more broadly, and in countries such as New Zealand, Australia and Canada. The focus was on, firstly, collecting the evidence regarding claimed land. Secondly, researching how it was collected and checking if experts were involved in the process of restitution. Thirdly, analysing how cadastral surveying and GIS involvement has enhanced or assisted in the finalisation of claims.

2.2 ESTABLISHMENT OF LADY SELBORNE

The most important part of a land claim process is the collection of evidence on claimed land. This may include oral evidence, graves, archived legal documents, historical documents, maps, photographs, archaeological remnants, and old homestead structures (Sokolic, 2017).

Lady Selborne was surveyed from July to December 1905 by land surveyor Mr P.S. Krige, the general plan was approved on 15 January 1907 by Mr W.H. Gilfilan at the SGO in Pretoria, this township consisted of 440 lots, two public squares and streets (Figure 2) metadata on general plan, the township was cancelled on 14 June 1976 as requested in the letter (Figure 3).

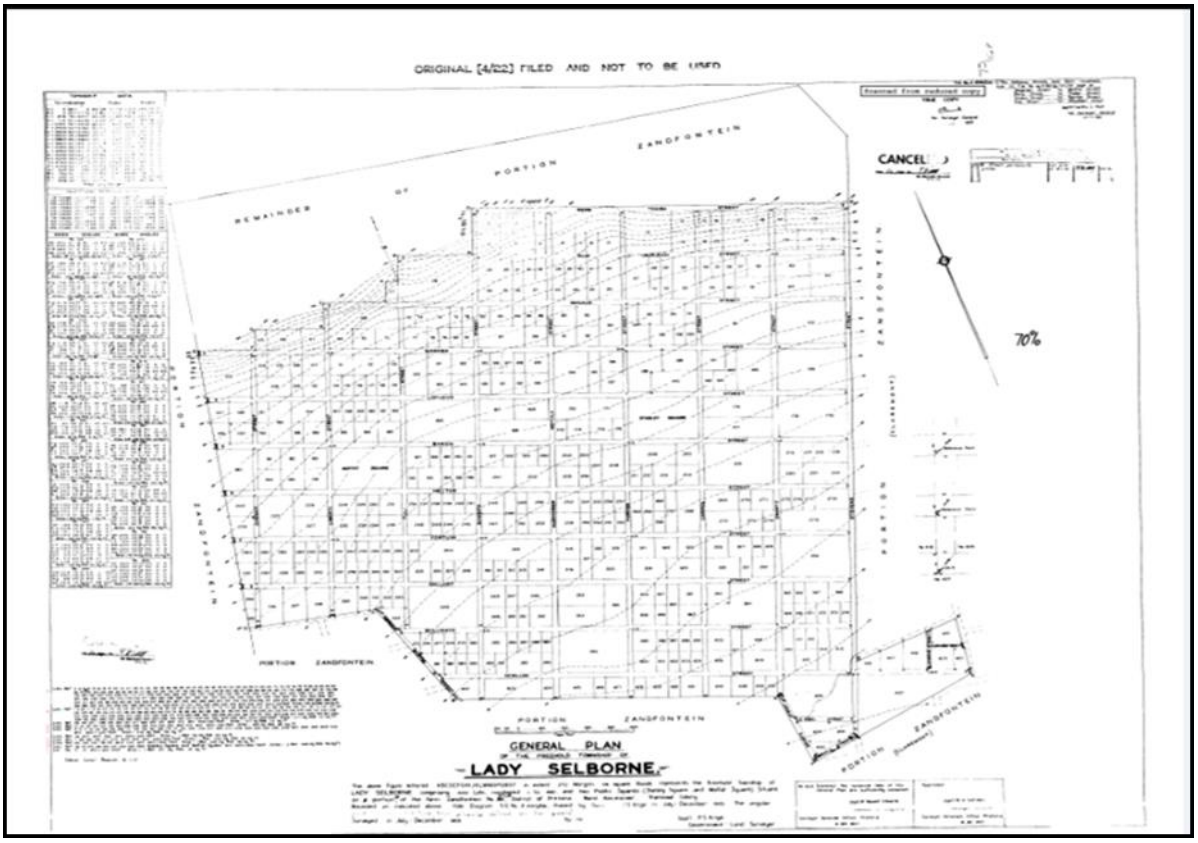
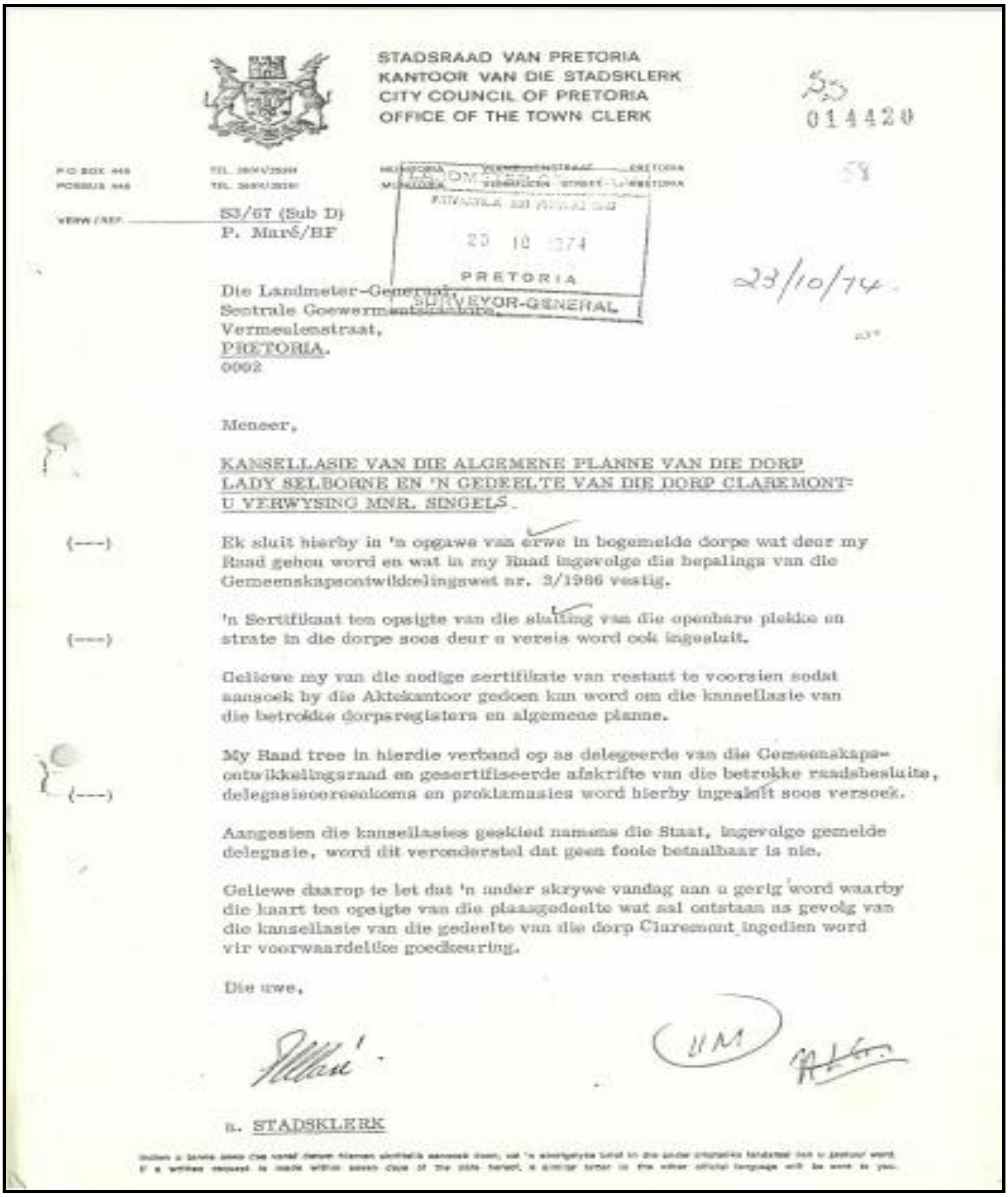


Figure 2: General plan of Lady Selborne.

Source: (CSG, 2021)



STADSRAAD VAN PRETORIA
KANTOOR VAN DIE STADSKLERK
CITY COUNCIL OF PRETORIA
OFFICE OF THE TOWN CLERK

014420

VERW./REF. S3/67 (Sub D)
P. Maré/BF

23 10 1974
PRETORIA
SURVEYOR-GENERAL

23/10/74

Die Landmeter-Generaal,
Sentrale Goewermentsgebou,
Vermeulenstraat,
PRETORIA.
0002

Meneer,

KANSELLASIE VAN DIE ALGEMENE PLANNE VAN DIE DORP LADY SELBORNE EN 'N GEDEELTE VAN DIE DORP CLAREMONT: U VERWYSING MNR. SINGELS.

(---) Ek sluit hierby in 'n opgawe van erwe in bogemelde dorpe wat deur my Raad gehou word en wat in my Raad ingevolge die bepalings van die Gemeenskapsontwikkelingswet nr. 3/1966 vestig.

(---) 'n Sertifikaat ten opsigte van die sluiting van die openbare plekke en strate in die dorpe soos deur u versis word ook ingesluit.

Geliewe my van die nodige sertifikate van restant te voorsien sodat aansoek by die Aktekantoor gedoen kan word om die kansellasie van die betrokke dorpsregisters en algemene planne.

(---) My Raad tree in hierdie verband op as delegeerde van die Gemeenskapsontwikkelingsraad en gesertifiseerde afskrifte van die betrokke raadsbesluite, delegasieooreenkoms en proklamasies word hierby ingesluit soos versoek.

Aangesien die kansellasies geskied namens die Staat, ingevolge gemelde delegasie, word dit veronderstel dat geen fooie betaalbaar is nie.

Geliewe daarop te let dat 'n ander skrywe vandag aan u gerig word waarby die kaart ten opsigte van die plaasgedeelte wat sal ontstaan as gevolg van die kansellasie van die gedeelte van die dorp Claremont ingedien word vir voorwaardelike goedkeuring.

Die uwe,

n. STADSKLERK

Figure 3: Letter written to the SGO to cancel the township.

The case study displays the presentation of the results of the data collected on the claimed land. The township was established on a farm portion and it is called a small scale diagram. When you look at the shape of the entire township it looks exactly the same as the farm portion where it was established. Lady Selborne was established on portion 16 of the farm Zandfontein 317 JR appearing on diagram A4915/1906 (Figure 4a; 4b) the case study was done on Lot number 408.

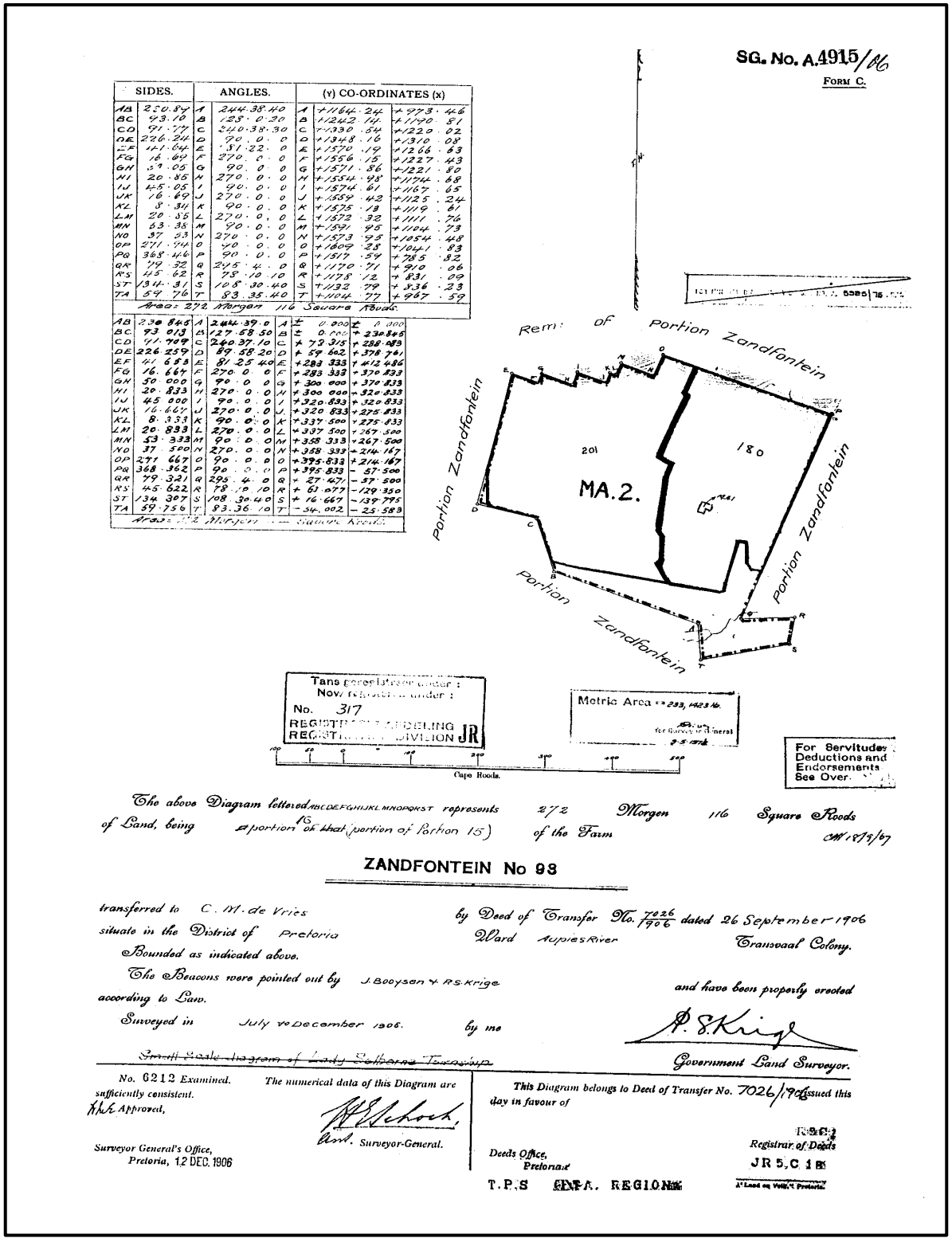


Figure 4a: Small scale diagram of farm portion where the township was established.

Source: (CSG, 2021)

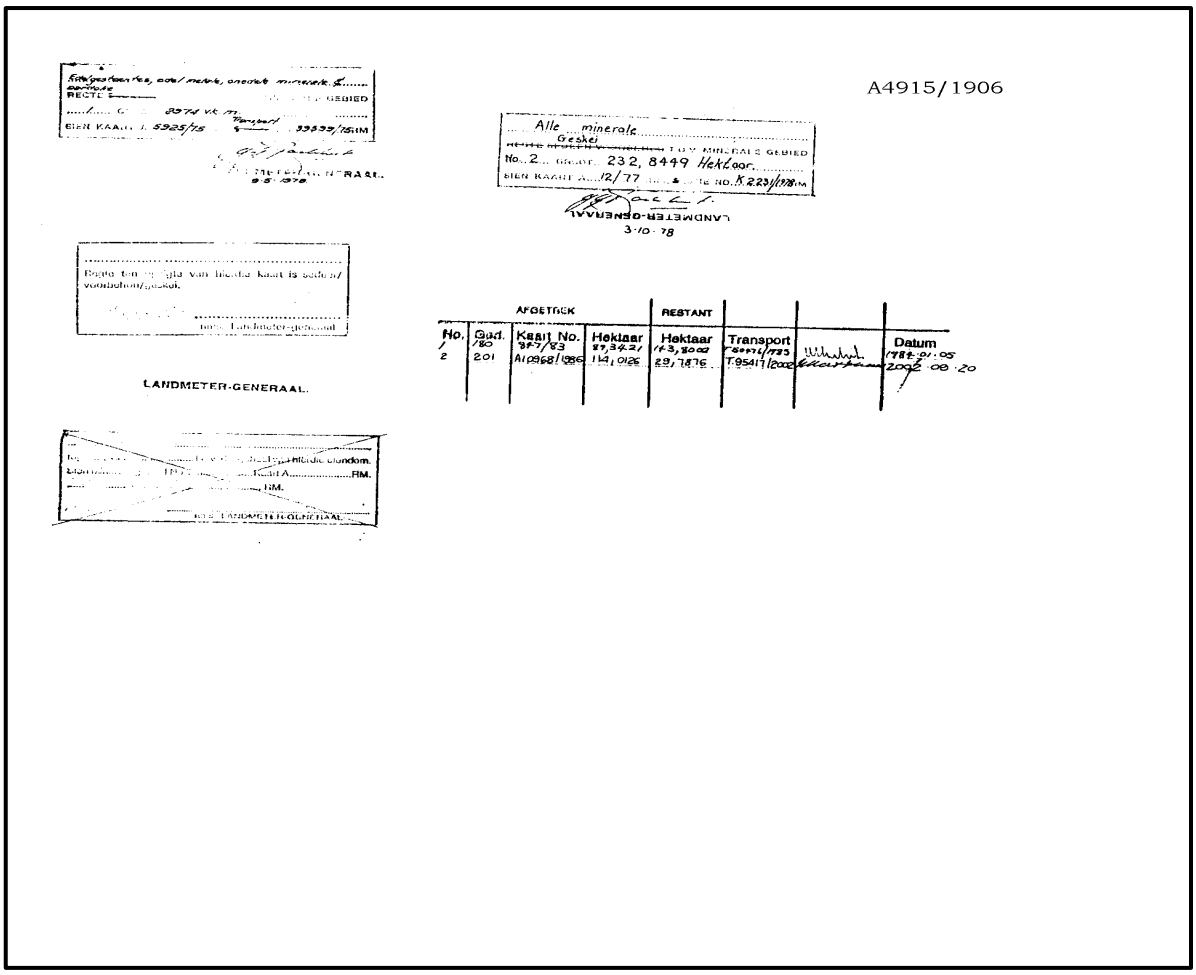
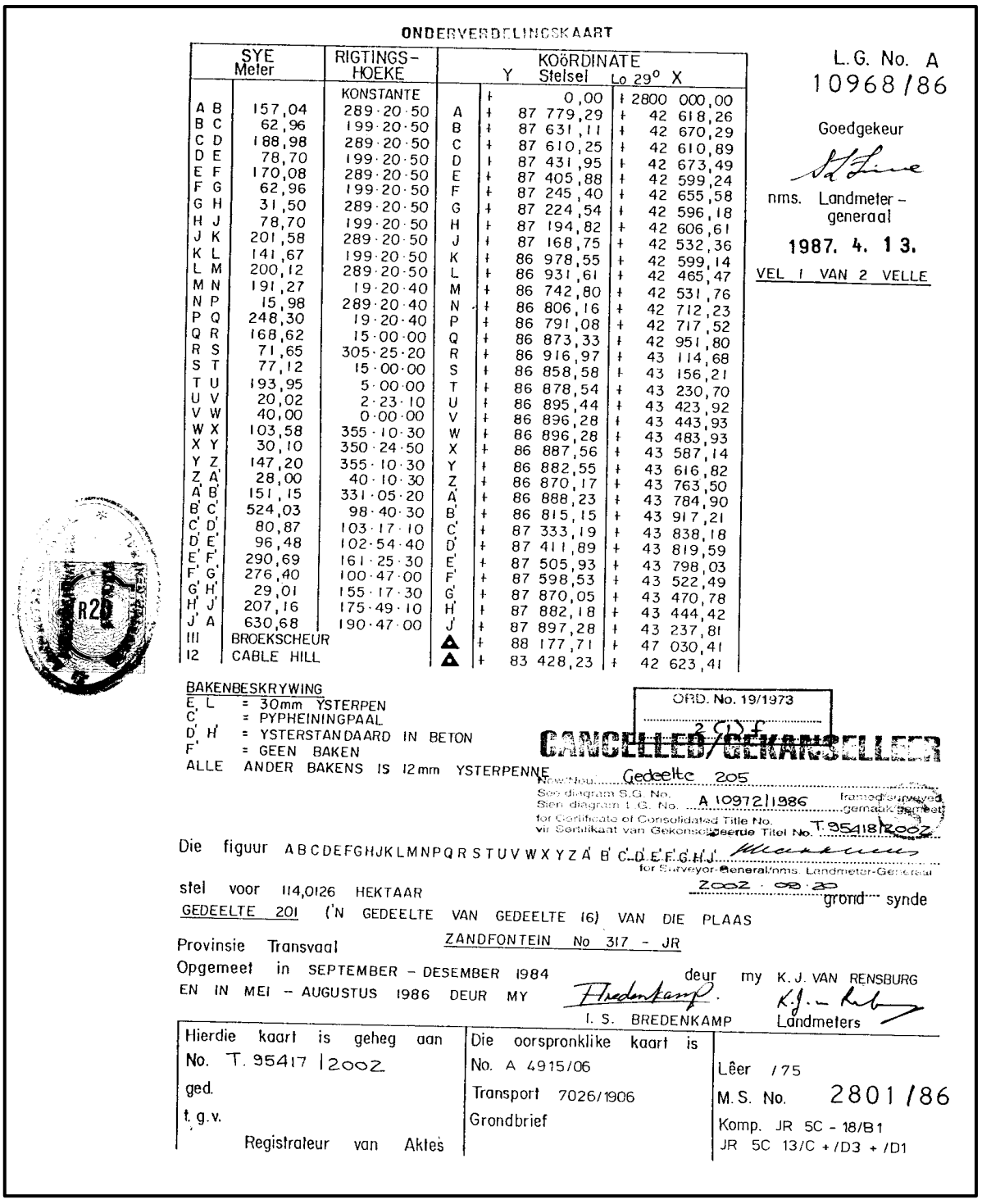


Figure 4b: Deduction page where newly subdivided portions were deducted from the parent portion, and showing the remaining extent.

Source: (CSG, 2021)

As stated earlier, the township was cancelled which means the township does not exist anymore, however the farm portion where the township was established was not cancelled. Portion 16 was then subdivided in two portions; portion 201 appearing on diagram A10968/1986 (Figure 5a; 5b) and portion180 appearing on diagram A847/1983 (Figure 6a; 6b).



ONDERVERDELINGSKAART

	SYE Meter	RIGTINGS-HOEKE		KOÖRDINATE Y Stelsel Lo 29° X	
		KONSTANTE		+ 0,00	+ 2800 000,00
A B	157,04	289·20·50	A	+ 87 779,29	+ 42 618,26
B C	62,96	199·20·50	B	+ 87 631,11	+ 42 670,29
C D	188,98	289·20·50	C	+ 87 610,25	+ 42 610,89
D E	78,70	199·20·50	D	+ 87 431,95	+ 42 673,49
E F	170,08	289·20·50	E	+ 87 405,88	+ 42 599,24
F G	62,96	199·20·50	F	+ 87 245,40	+ 42 655,58
G H	31,50	289·20·50	G	+ 87 224,54	+ 42 596,18
H J	78,70	199·20·50	H	+ 87 194,82	+ 42 606,61
J K	201,58	289·20·50	J	+ 87 168,75	+ 42 532,36
K L	141,67	199·20·50	K	+ 86 978,55	+ 42 599,14
L M	200,12	289·20·50	L	+ 86 931,61	+ 42 465,47
M N	191,27	19·20·40	M	+ 86 742,80	+ 42 531,76
N P	15,98	289·20·40	N	+ 86 806,16	+ 42 712,23
P Q	248,30	19·20·40	P	+ 86 791,08	+ 42 717,52
Q R	168,62	15·00·00	Q	+ 86 873,33	+ 42 951,80
R S	71,65	305·25·20	R	+ 86 916,97	+ 43 114,68
S T	77,12	15·00·00	S	+ 86 858,58	+ 43 156,21
T U	193,95	5·00·00	T	+ 86 878,54	+ 43 230,70
U V	20,02	2·23·10	U	+ 86 895,44	+ 43 423,92
V W	40,00	0·00·00	V	+ 86 896,28	+ 43 443,93
W X	103,58	355·10·30	W	+ 86 896,28	+ 43 483,93
X Y	30,10	350·24·50	X	+ 86 887,56	+ 43 587,14
Y Z	147,20	355·10·30	Y	+ 86 882,55	+ 43 616,82
Z A'	28,00	40·10·30	Z	+ 86 870,17	+ 43 763,50
A' B'	151,15	331·05·20	A'	+ 86 888,23	+ 43 784,90
B' C'	524,03	98·40·30	B'	+ 86 815,15	+ 43 917,21
C' D'	80,87	103·17·10	C'	+ 87 333,19	+ 43 838,18
D' E'	96,48	102·54·40	D'	+ 87 411,89	+ 43 819,59
E' F'	290,69	161·25·30	E'	+ 87 505,93	+ 43 798,03
F' G'	276,40	100·47·00	F'	+ 87 598,53	+ 43 522,49
G' H'	29,01	155·17·30	G'	+ 87 870,05	+ 43 470,78
H' J'	207,16	175·49·10	H'	+ 87 882,18	+ 43 444,42
J' A	630,68	190·47·00	J'	+ 87 897,28	+ 43 237,81
III	BROEKSCHEUR		▲	+ 88 177,71	+ 47 030,41
12	CABLE HILL		▲	+ 83 428,23	+ 42 623,41

L.G. No. A 10968/86

Goedgekeur

nms. Landmeter-generaal

1987. 4. 13.

VEL 1 VAN 2 VELLE

BAKENBESKRYWING
E, L = 30mm YSTERPEN
C' = PYPHEININGPAAL
D', H' = YSTERSTANDAARD IN BETON
F' = GEEN BAKEN
ALLE ANDER BAKENS IS 12mm YSTERPENNE

ORD. No. 19/1973

CANCELLED/GEKANSELLEER

Nuwe Nou: Gedeelte 205
Sien diagram S.G. No. A 10972/1986 framed/raamwerk gemaak/gemeet
for Certificate of Consolidated Title No. T 95418/2002
vir Sertifikaat van Gekonsolideerde Titel No.

Die figuur A B C D E F G H J K L M N P Q R S T U V W X Y Z A' B' C' D' E' F' G' H' J'
for Surveyor-General/nms. Landmeter-Generaal

stel voor 114,0126 HEKTAAR 2002 · 08 · 20 grond synde

GEDEELTE 201 ('N GEDEELTE VAN GEDEELTE 16) VAN DIE PLAAS ZANDFONTEIN No 317 - JR

Provinsie Transvaal

Opgemeet in SEPTEMBER - DESEMBER 1984 EN IN MEI - AUGUSTUS 1986 DEUR MY deur my K. J. VAN RENSBURG

I. S. BREDENKAMP Landmeters

Hierdie kaart is geheg aan No. T. 95417/2002 ged. t.g.v. Registrateur van Aktes	Die oorspronklike kaart is No. A 4915/06 Transport 7026/1906 Grondbrief	Lêer /75 M.S. No. 2801/86 Komp. JR 5C - 18/B1 JR 5C 13/C + /D3 + /D1

Figure 5a: Sheet 1 of portion 201 (a portion of portion 16) whose coordinates were adopted, because they are on LO 29.

Source: (CSG, 2021)

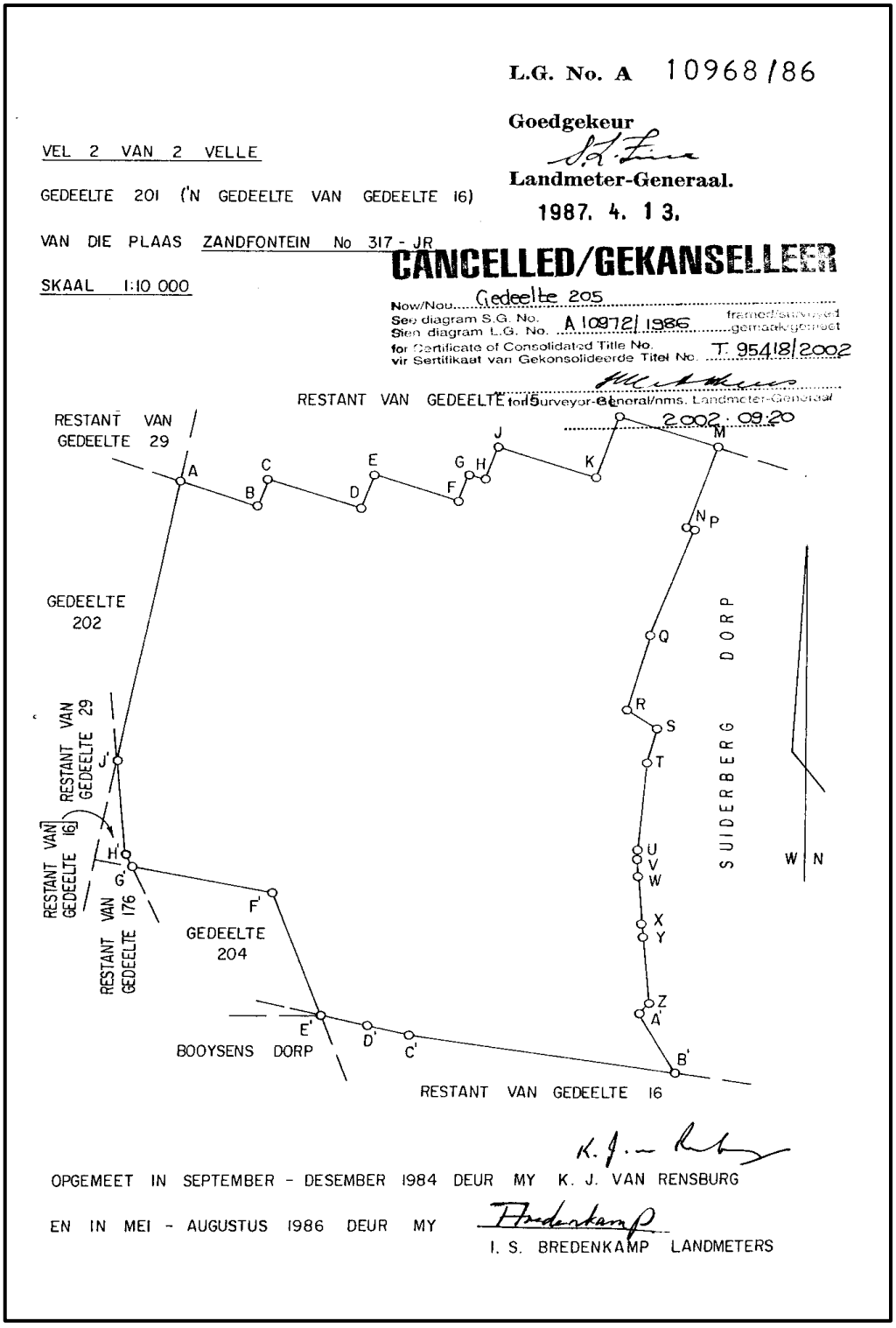
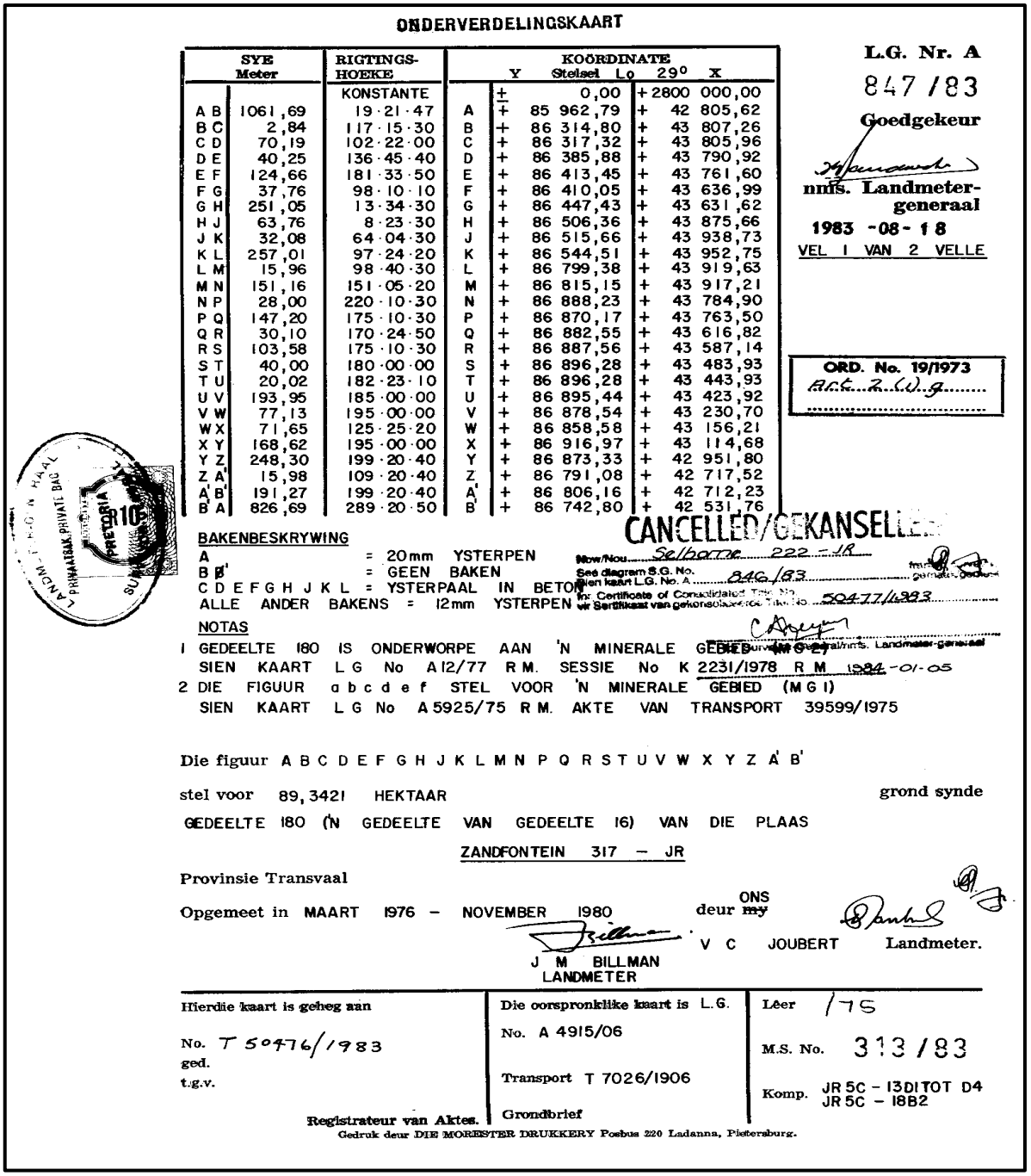


Figure 5b: Sheet 2 showing the figure or the shape of portion 201.

Source: (CSG, 2021)



ONDERVERDELINGSKAART

	SYE Meter	RIGTINGS-HOEKE		KOÖRDINATE Y Stelsel Lo 29° X	
		KONSTANTE	±	0,00	+ 2800 000,00
A B	1061,69	19·21·47	A	+ 85 962,79	+ 42 805,62
B C	2,84	117·15·30	B	+ 86 314,80	+ 43 807,26
C D	70,19	102·22·00	C	+ 86 317,32	+ 43 805,96
D E	40,25	136·45·40	D	+ 86 385,88	+ 43 790,92
E F	124,66	181·33·50	E	+ 86 413,45	+ 43 761,60
F G	37,76	98·10·10	F	+ 86 410,05	+ 43 636,99
G H	251,05	13·34·30	G	+ 86 447,43	+ 43 631,62
H J	63,76	8·23·30	H	+ 86 506,36	+ 43 875,66
J K	32,08	64·04·30	J	+ 86 515,66	+ 43 938,73
K L	257,01	97·24·20	K	+ 86 544,51	+ 43 952,75
L M	15,96	98·40·30	L	+ 86 799,38	+ 43 919,63
M N	151,16	151·05·20	M	+ 86 815,15	+ 43 917,21
N P	28,00	220·10·30	N	+ 86 888,23	+ 43 784,90
P Q	147,20	175·10·30	P	+ 86 870,17	+ 43 763,50
Q R	30,10	170·24·50	Q	+ 86 882,55	+ 43 616,82
R S	103,58	175·10·30	R	+ 86 887,56	+ 43 587,14
S T	40,00	180·00·00	S	+ 86 896,28	+ 43 483,93
T U	20,02	182·23·10	T	+ 86 896,28	+ 43 443,93
U V	193,95	185·00·00	U	+ 86 895,44	+ 43 423,92
V W	77,13	195·00·00	V	+ 86 878,54	+ 43 230,70
W X	71,65	125·25·20	W	+ 86 858,58	+ 43 156,21
X Y	168,62	195·00·00	X	+ 86 916,97	+ 43 114,68
Y Z	248,30	199·20·40	Y	+ 86 873,33	+ 42 951,80
Z A'	15,98	109·20·40	Z	+ 86 791,08	+ 42 717,52
A' B'	191,27	199·20·40	A'	+ 86 806,16	+ 42 712,23
B' A	826,69	289·20·50	B'	+ 86 742,80	+ 42 531,76

L.G. Nr. A 847/83

Goedgekeur

nms. Landmeter-generaal

1983 -08- 18

VEL I VAN 2 VELLE

ORD. No. 19/1973

Act. 2. (1) g.

CANCELLED/GEKANSELLEER

BAKENBESKRYWING

A = 20mm YSTERPEN

B B' = GEEN BAKEN

C D E F G H J K L = YSTERPAAL IN BETON

ALLE ANDER BAKENS = 12mm YSTERPEN

Now/Nou Selborne 222 - JR

See diagram S.G. No.

Plan kaart L.G. No. A 846/83

In Certificate of Consolidated Title No.

In Sertifikaat van gekonsolideerde Titel No. 50477/1983

NOTAS

1 GEDEELTE 180 IS ONDERWORPE AAN 'N MINERALE GEBIED (M G 27)
SIEN KAART L G No A 12/77 R M. SESSIE No K 2231/1978 R M 1984-01-05

2 DIE FIGUUR a b c d e f STEL VOOR 'N MINERALE GEBIED (M G 1)
SIEN KAART L G No A 5925/75 R M. AKTE VAN TRANSPORT 39599/1975

Die figuur A B C D E F G H J K L M N P Q R S T U V W X Y Z A' B'

stel voor 89,3421 HEKTAAR grond synde

GEDEELTE 180 ('N GEDEELTE VAN GEDEELTE 16) VAN DIE PLAAS

ZANDFONTEIN 317 - JR

Provinsie Transvaal

Opgemeet in MAART 1976 - NOVEMBER 1980 deur ~~my~~ ONS

J M BILLMAN
LANDMETER

V C JOUBERT Landmeter.

Hierdie kaart is geheg aan	Die oorspronklike kaart is L.G.	Leer 175
No. T 50476/1983 ged. t.g.v.	No. A 4915/06	M.S. No. 313/83
	Transport T 7026/1906	Komp. JR 5C - 13D TOT D4 JR 5C - 18B2
Registrateur van Aktes.	Grondbrief	

Gedruk deur DIE MOREESTER DRUKKERY Posbus 220 Ladanna, Pietersburg.

Figure 6a: Sheet 1 of Portion 180 (a portion of portion 16) newly subdivided portion on LO 29 whose coordinates were also adopted.

Source: (CSG, 2021)

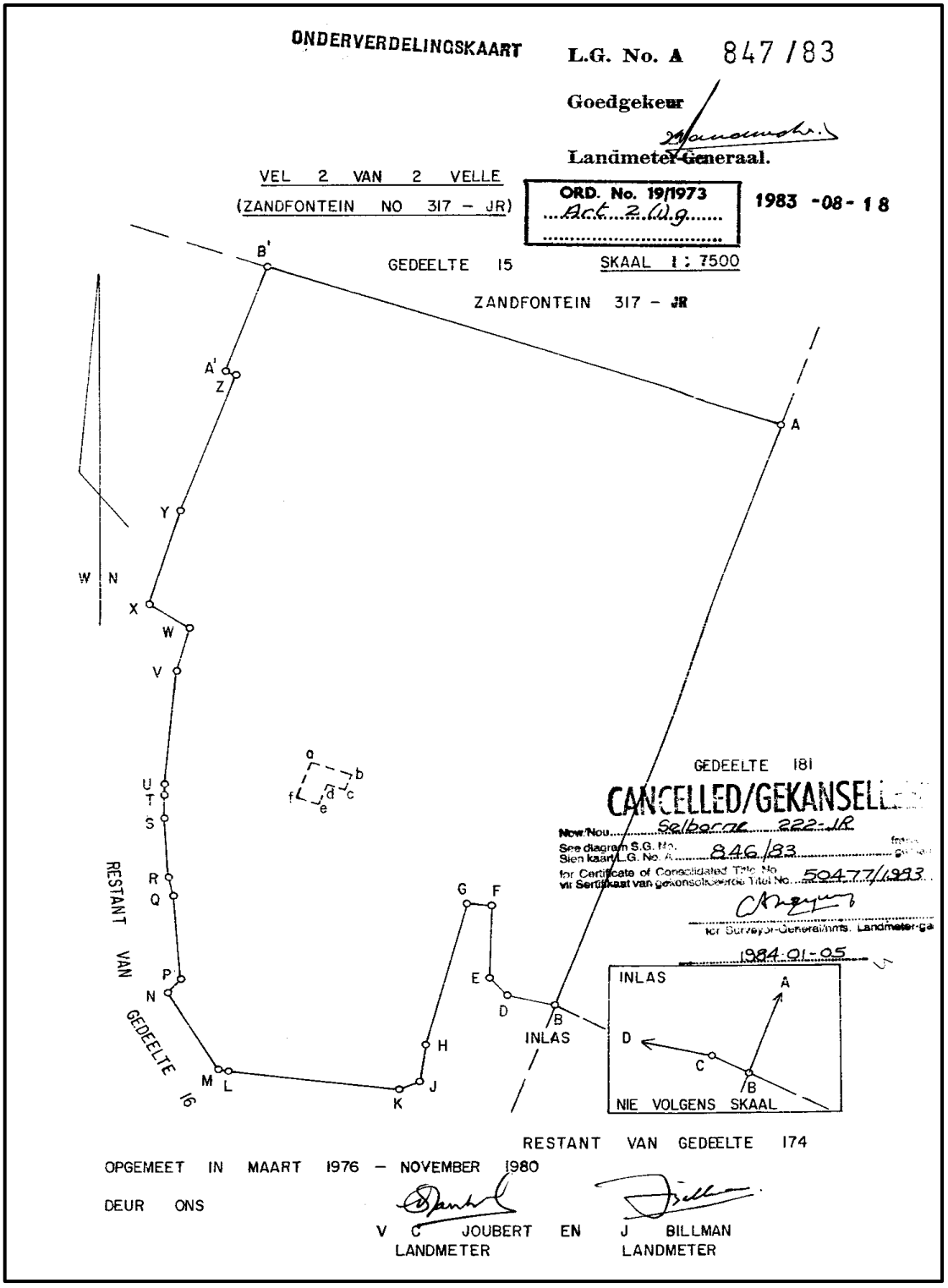


Figure 6b: Sheet 2 of Portion 180 (a portion of portion 16) showing the figure.

Source: (CSG, 2021)

2.3 CADASTRAL SURVEYING AND GIS ROLE IN LAND CLAIMS AND RESTITUTION

Surveying can be described as a process of tracing the property borders by observing the landmarks and placing makers where required on a ground surface, this process produces a map (Sampeck, 2013). Surveying helps an individual to understand the history, time and shape of land developments that have happened previously as well as currently, and is important for the planning of future developments on the land (Sampeck, 2013). The use of GIS by surveyors makes data integration, transfer and documentation simple (Olsen 2011: 37).

In times of land disputes, especially related to customary land claims, a mediator must be able to map the evidence, then translate and explain all the evidence gathered to the affected people to prevent fighting amongst the people (Cullen, 2015). The mediator may also need to resolve overlapping boundaries, seasonal variations and multiple owners on one property (Cullen, 2015). The issue of encroachment is the greatest challenge that land claims normally face; in such cases, maps become the solutions to prove to the claimants who has a case and who does not (Cullen, 2015).

Aerial photographs that show time intervals of historical changes in physical features of land play a major role in mapping and analysing of data such as locating houses, graves, and cultivated land of a claimed land in areas where physical features have been changed completely (Ghavampour, Del Aguila and Vale, 2017) .

GIS uses data collected by GPS receivers, maps and images. GIS processing includes georeferencing, digitising, designing layers and scanning (Al-Ruzouq et al. 2022; Dempsey, 2017). Restitution is a spatial problem because the main issue is the land being claimed (Sokolic, 2017). This means that there should be no mistakes in the identification of the affected land, therefore processing old aerial photographs and using GIS tools play a big role in the land claim process (Sokolic, 2017; Parker et al. 2014; Grecea and Vilcea, 2012).

Chief Surveyor General (CSG) through the SGO may assist the CRLR on complex, unsurveyed land claims, and overlapping claims, in terms of section 6 of the Land Survey Act 8 of 1997 (SAHRC, 2013). This is accomplished by supplying proper property descriptions, pinpointing all the borders of claimed land, supplying legal maps or diagrams, and performing all cadastral related activities such as consolidation and subdivision of land (SAHRC, 2013).

GIS is a technology that is used to manage, display, and create details of a location; the details can be related to historical, current and future planning about that particular location (Esri, 2021). This technique uses a combination of data sources to produce maps, graphs and other visual products (Esri, 2021; Jansen, 2010).

The strength of any GIS software is its capability to accept and utilise different data produced in different databases (Pascual, 2011). QGIS software has many different plug-ins and tools to perform any GIS activity, therefore efficiency and integrity is achievable when using this software

(Kukulska et al., 2009). It is for these reasons that the researcher opted to use open source software QGIS in this project. This was used for manipulation of the data. Microsoft Excel spreadsheets were also used for data analysis.

2.4 LAND RESTITUTION AND CLAIMS

Indigenous people have the right to compensation by a means of restitution of land, resources, properties they used to own, traditions, land tenure, customs and many other rights as stated by international human rights law (Eyford, 2015; Joffe, 2015; Koerner Yeo, 2018). Land restitution takes place when different parties admit or accept that previous occupation and allocation of land was not lawful and was incorrectly done, processes of land restitution globally involve redistribution, compensation and allocation of land (Meitzner Yonder and Joireman, 2019). Land claims are spatially compassed to a location which cannot be moved to another location, the land claims process assists dislocated people to reclaim their lost land (Meitzner Yonder and Joireman, 2019).

Numerous black communities around the worlds whose countries were under colonial rule faced dispossession of their ancestral land, and are currently seeking compensation for the lost land through restitution and land claims (Vorster et al. 2006). Land restitution is about correcting the wrongs of the past that happened to black people when their land was taken away from them by the use of discriminatory laws designed to oppress them (Mokwena et al. 2020). Lodging a claim to get a compensation for the land lost is an effort to correct the injustices of the past (Mokwena et al. 2020). The compensation can be money or land, when the affected land cannot be restored, alternative land available can be given to the claimants (Kepe, 2012). The purpose of restitution is not only to rectify history but also to meet the current economic, social and political goals of the claimants (Mokwena et al. 2020).

Restitution is based on acknowledging and reimbursing people who suffered dispossession of their land as a result of past laws, the purpose of the land claims process is to heal the emotional, psychological and social wounds of those who were hurt and silenced, by restoring their dignity (Beyers et al. 2016).

Who can lodge a land claim? The person whose land was dispossessed or a direct descendent, which means that when the person who was dispossessed of their land has died already, the children of the deceased or grandchildren can lodge a claim on behalf of the deceased (Huizenga, 2014).

Layton (2010), stated that land restitution needs to discover the lawful claimants, the current owners and evidence of claimed land, the purpose being to build the nation and to bring peace to those who have suffered. The problem with restitution is that there are details that are not put on the table when people are claiming the land, other races may view themselves as being the targeted for the sins of their ancestors (Layton, 2010).

2.5 LAND RESTITUTION IN SOUTH AFRICA

South African is a country that is located in the southern part of the Africa continent. South Africans are known as a rainbow nation where Africans, whites, coloureds and Indians live together and enjoy equal rights as South Africans (Sidanius et al. 2019). This means that the people in the country are allowed to practice their different cultures, religions, and beliefs, and to speak their different languages freely without fear or favour (Sidanius et al. 2019). During the apartheid era white people were the only beneficiaries of the apartheid system, while the black majority were oppressed and disempowered (Davids, 2018; Walker et al. 2012).

In the beginning of 1990s restitution was on top of the list of the things that needed to be negotiated between the National Party, the African National Congress (ANC) and other parties during the constitutional negotiations (Everingham et al. 2006). In the new democracy the Restitution of Land Rights Act was amongst the first laws to be approved by the ANC government to correct the injustices of the past, the act allows people who lost their land after 19 June 1913 as a result of the apartheid laws to formally lodge a claim with the government (Hamilton et al. 2016). Claimants can choose money or restoration of land, and the cases where the land cannot be restored, alternative state land can be granted as compensation (Hamilton et al. 2016).

The act authorise two institutions to manage all the processes: the CRLR for the administration of claims and the land claims court which act as a mediator in times of disputes, the CRLR has district offices throughout the country to serve all the people of South Africa (Walker et al. 2012).

Following the Restitution of Land Rights Act 22 of 1994, the issue of restitution has been watched closely by stakeholders, namely, the researchers, the general public, and farmers (Ramutsindela, Davis and Sinthumele, 2016). Its performance and success or failure has caused various debates in political circles (Ramutsindela, Davis and Sinthumele, 2016).

2.5.1 Processes

Restitution of land rights Act 22 of 1994 is an act that gives guidance in implementing the restitution in South Africa, the act consist of 6 phases: **Lodgement and registration**- this includes acknowledgement and recording of a claim and allocation of a case number and a project officer who will work on the claim (South Africa. Department of Justice and constitutional development 1994: 10). **Screening and categorisation**- checking on all documents to see if they meet the requirements of sections 2 and 11 of the Restitution of Land Rights Act 22 of 1994, this includes batching, prioritising and categorising (South Africa. Department of Justice and constitutional development 1994: 10)

Determining of qualification- researching and gazetting of the claim and informing the affected parties, this includes the landowner, claimants and the CRLR (South Africa. Department of Justice and constitutional development 1994: 10). **Preparation for negotiations**- the CRLR provides a workshop for the claimants to inform them of the options for settlement such as getting back the

land which was taken, or getting alternative land if the land that was taken cannot be restored, or financial compensation (South Africa. Department of Justice and constitutional development 1994:10)

Land valuation is also involved in this process; investigations and the determination of the price of the land are accomplished. **Negotiations**- This involves meeting the affected parties and going through the process of mediation and negotiation. The outcome could be the reaching of an agreement among the parties, deed of settlement, or if parties are not in agreement, then the matter will be sent to the courts for finalisation, **Implementation**- this is when compensation is paid if the claimant chooses financial compensation, or the land is transferred to the new owners if they choose to get the land (South Africa. Department of Justice and Constitutional Development, 1994: 10).

2.5.2 Challenges

The nature of restitution is a very long process which leads to claimants ending up settling for less by taking money as compensation instead of land, some claimants have taken the commission to court (Mudau, Mukonza and Ntshangase, 2019). The CRLR outsources service providers to provide expert investigations and research (Mudau, Mukonza and Ntshangase, 2019). The DALRRD, land claims court, community property association, CRLR and trusts operate separately which create problems in fast tracking the current claims (Mokwena and Maluleke, 2020).

The use of outside service providers does not make much impact on the rate of delivery, such providers often produce poor quality research that needs vetting (Mudau, Mukonza and Ntshangase, 2019). Other challenges are staff shortages, not having archives relating to the land that is registered, and service providers do not do proper work because they do not understand their task (Mudau, Mukonza and Ntshangase, 2019).

Between 12 November 2013 and 5 December 2013, the SAHRC conducted an investigation regarding systematic problems affecting the CRLR on land claims processes, the challenges facing restitution programmes at that time were:

Lack of skilled personnel to do research on claims due to highly imperfect research results, landowners find loopholes to dispute the viability of claims in court, this causes delays in completing claims, **Conflicting and complex overlapping claims** which are situated in deep rural areas on unsurveyed land (SAHRC, 2013).

Budget constraints – there is not enough money available for the programmes. **Claimants taking the CRLR to court** for validity of claimed land, or due to frustrations as a result of the slowness of the process and other reasons, when the claim has been gazetted, property owners cannot develop or sell the land until the process has been finalised (SAHRC, 2013).

The DALRRD has experts and specialists whose role is to assist in the processing of land claims (Parker 2014). The DALRRD may follow all the steps of the process but the bottom line is that this is not easy without the right resources and skills (Du Plessis, 2004).

The diagnostic report on land reform and restitution in RSA shows that there were independent studies conducted by the Department of Planning Monitoring and Evaluation (DPME) and by the Government Technical Assistance Component (GTAC) in the national treasury. The study conducted by DPME monitored and assessed challenges that affect the restitution process and made recommendations on what must be done in order to complete the claims that have been pending for more than 20 years (Ramutsindela, Davis and Sinthumele, 2016).

Some of the challenges noted were: A poor filing system, poor research skills, slow pace of the process, budget constraints, claimants sending the Commission to court, conflicting and overlapping claims and poor administration because documents were being lost (Ramutsindela, Davis and Sinthumele, 2016).

The DALRRD has failed to give an accurate report on the location and the sizes of affected parcels as well as the relevant historical and current parcels that have been claimed, this can in part be attributed to the lack of involvement of relevant professionals or expertise in this field in the land claims processes (Parker et al. 2014). In South Africa, there are different kinds or forms of rights, registered or unregistered, such as customary law interests and share cropping, this has resulted in a big challenge for claimants to describe their land and for researchers to adequately capture the correct property descriptions (Parker et al., 2014).

In addition, even with those claimants in possession of registered rights and diagrams (maps), a large number of apartheid laws and other physical developments have changed the landscape in such a way that the current cadastral plans have little or no resemblance to what most lands used to look like, for example, some cemeteries have been removed and replaced with plants, therefore claimants are unable to estimate or guess the location of their land (Parker et al., 2014).

2.5.3 The absence of the use of geomatics in the CRLR process

Parker et al. (2014), pointed out that the people who do the research at the CRLR do not have geomatics qualifications, this means that they do not have the expertise to analyse and interpret maps, hence claims take long to be completed.

There are instances where there are older structures, some of which are damaged or extended, and there is a need to make a record using measuring tapes and other geomatics machinery in combination with manual records, without the relevant skills one cannot do this (Mills and Barber, 2004). Sokolic (2017), was of the view that the most important process for the implementation of the Restitution of Land Rights Act from a legal perspective is phase 3 which is determining the qualification of the claim, this is where evidence for or against a claim must be provided, that evidence can be used by the courts to give their final decision.

The period that the CRLR takes to conclude or finalise the claims is so long that it causes frustrations for both the claimants and the property owners as there is no development, selling or buying allowed on the land until the claim is concluded (Moabelo, 2007). The negotiation process between affected parties takes time, some of the issues that cause delays are disputes over the size of the claimed area, validity of the claim, and the rightful claimants. Geomatics tools are able to resolve some of these problems, this can assist claimants and property owners not to over claim or under claim because through images evidence can emerge to provide clarity (Sekgota, 2012).

2.5.4 The DALRRD appointing service providers

Frank Sokolic, of EduAction GIS Solutions, has described how EduAction GIS Solutions, using GIS, assisted the DALRRD to resolve a claim after 16 years of lodgement. EduAction GIS Solutions was asked to help the commission to gather historical evidence in the form of aerial photographs for the Emalangeni land claim which is located along Lions River in KwaZulu Natal (Sokolic, 2017). The reason for them being approached was because of their experience in mapping the layout of rural dwellings, especially related to people who were moved from their homes as a result of mining projects (Sokolic, 2017).

Sokolic (2017), says documents which were given to them when they were approached by the commission included NGI aerial photographs, but the previous researchers were unable to process and interpret the data, the claim was lodged in January 1996 and gazetted on 16 July 2004, the claim involved 34 farms, the claimants were moved from their land as a result of the construction of Midmar dam in Howick.

Sokolic (2017), goes on to talk about how they requested and used the NGI historical images of 1950 and 1960 to track down the evidence of the claim, and also how photographs were processed using the open source software Quantum GIS (QGIS). When the mapping of the area was done, they retrieved the farms using 21 digit codes, they cropped and mosaicked the images and the NGI zoomed the images for them, the findings were broken down in a map and tabled (Sokolic, 2017).

The results indicated how the number of buildings and farming areas faded over the years as a result of physical changes on the land. The findings were presented in the courts and in February 2012 the court finalised the claim and claimants were given compensation of 10 Million Rands as the area could not be given back to them because it had been developed into a dam (Sokolic, 2017). The article shows how the involvement of geomatics was used to solve the backlog of claims.

2.5.5 Proposed solutions

SAHRC (2013), was of the view that the proposed solutions for these challenges are that: there should be a partnership programme between the SAHRC and the University of South Africa (UNISA) to assist with research and skills transfer for the workers at the CRLR. It is not clear if this will be done for free or not.

According to South Africa government printers (1997:4), section 3 of the Land Survey Act 8 of 1997 the functions of the Chief Surveyor General (CSG) are to: Manage research related to cadastral surveys, control and direct all cadastral survey work, be custodians and keep all survey records in all the SGO offices, compile, amend, examine, prepare and approve maps for registration at the Deeds office.

The CSG through the SGO may assist the CRLR on complex, unsurveyed land claims, and overlapping claims, in terms of section 6 of the Land Survey Act 8 of 1997 by supplying proper property descriptions, pinpointing all the borders of claimed land, supplying legal maps or diagrams and performing all cadastral related activities such as consolidation and subdivision of land (South Africa Government printers, 1997:4)

The deliberations in the report were: to eliminate restrictions for development on claimed land, there should be discussions with national treasury to try and increase the budget for restitution programmes (Ramutsindela, Davis and Sinthumele, 2016). The DALRRD is seeking ways to resolve disputes amongst the claimants and the commission; this will reduce the number of cases which are sent to court, the Department should include the Land Rights Management Facility (LRMF) strategy which was formed to provide legal mediation in land reform programmes (Ramutsindela, Davis and Sinthumele, 2016).

Ramutsindela, Davis and Sinthumele (2016), report that the GTAC recommended that the CRLR should provide more details on their business operations, and they need to provide more clarity regarding positions and duties, more detail needed to be provided on procedural, structural, legal and institutional challenges that cause delays in delivering the claims.

The DPME Evaluation Plan 2013/2014 recommended that the Commission restructures their business processes by concentrating on the core or main duties and ensuring clear independence in the management of the process (DPME, 2014). Both reports also stated that there should be an improvement of research skills by adding capacity to assist the commission with the backlog (SAHRC, 2013; Ramutsindela, Davis and Sinthumele, 2016).

Recommendations were that the processes of restitution and land claims must be revised and involve competent skilled experts (Mudau, Mukonza and Ntshangase, 2019). Research conducted by outside service providers is not effective, it would be more effective to add project officers to ease the shortage of staff (Mudau, Mukonza and Ntshangase, 2019).

Rural communities must be given courses, workshops and lectures by the relevant experts; these must be organised through the municipalities, provincial and national government, the training should be about the lodgement of claims (Mokwena and Maluleke, 2020). Allocation of land must be transparent and applicants must be given regular feedback, the research element must be improved to bring fairness when the Commission takes a decision and the public must also participate in all the processes (Mokwena and Maluleke, 2020).

According to CRLR (2019), a project called Kuyasa had been formed and the nine aims of the project includes a strategy to reduce the backlog by appointing an agent to do physical validation of data.

The National Geomatics Management Services (NGMS) is a branch of the DALRRD mandated to update, maintain, approve and archive all geomatics related work which is mostly based on land surveying and GIS related matters (South Africa. The Presidency. 2013:4). This branch has professional geomatician specialists on staff who are registered with the professional body, who can assist with the relevant skills (Rowe, 2011). This branch has a different directorate which can be useful in the processing of land claims.

The (NGI) has an archive of images and material to do with spatial maps dating back to 1928 (Parker et al. 2014). These images are an authoritative source which is being underutilised to validate land claims. The archive consists of topographical maps, orthophoto maps, aerial photographs, topocadastral maps, topo admin maps, South African maps, provincial maps, municipal maps and a variety of other maps depending on the analysis required (Parker et al. 2014). These maps are in hard copies, soft copies and in spatial formats such as tiff, and shapefiles. Clients may request data manipulation, cropping or enlarging of certain areas as needed (Parker et al. 2014).

The NGI are the custodian of maps as they update and maintain them for the government, and provide access to them when requested. The DALRRD has experts and specialists in its employ that can assist in the processing of land claims, failure to utilise these resources for this purpose is costing the department in service delivery, time and efficiency (Parker et al. 2014).

2.6 LAND RESTITUTION IN AUSTRALIA

In 1770 Captain Cook invaded Australia, in 1788 Governor Philips from Britain decided to rule the whole continent, as the pair took over Australia, and they established discriminatory laws and policies against the aboriginal people (De Villiers, 2003). They dispossessed them of their land and oppressed them through colonialism, they took the land rights and its ownership, the process was rationalised by the legal fiction terra nullius that most of the land taken was vacant land and was not occupied when the colonisers arrived on the continent (Wensing and Porter, 2016).

In 1992, Queensland (No. 2) versus Mabo and others was a case that brought an end to the terra nullius practise in Australia, the court decision led to the beginning of restoration of land rights and restitution (Mabo v Court 1992; Erden et al. 2021). The court decided that the aboriginal people could claim their land back as long as they could prove that they were the traditional dwellers of the land and that they had a long uninterrupted period occupying the land, this court ruling gave birth to the Native Title Act 1993 (Wiessner, 2011; De Villiers, 2003; Wensing and Porte, 2016).

2.6.1 The claims process in Australia

Kariuki (2013), states that the most important thing in the process is for claimants to prove ancestral connection to the land when lodging a claim, claimable land can be unoccupied Crown land, beaches, national and regional parks, nature reserves, conservation land, and state forest land.

A claim is submitted to the federal court by a group of people or an individual representing aboriginal people, when lodging the claim, applicants must clearly describe the property and the location of the affected land, preferably images of the area must be included (Duff, 2014). The court forwards the matter to the National Native Title Tribunal (NNTT) which is responsible for the assessment of the claim through a test. The test is done to prove the validation, the relevance of the supporting documents attached, and general correctness of the claim (NNTT, 2014).

When the application passes the test it gets registered and a reference number is issued, after this process, claimants are automatically allowed to be part of the negotiations and to give their opinion during the process, and the community is informed about the claim through an advertisement so that the affected people and interested parties may be involved in the process (De Villiers, 2003). Mediation by the court is undertaken until all involved parties reach an agreement, the court then writes a report to conclude the findings and make recommendations regarding the claim (Wensing and Porte, 2016; De Villiers, 2003; NNT, 2014)

When a determination test fails then the claim fails (Smith and Morphy, 2007). When the determination test has been passed, and the boundaries of a claimed land have been identified, claimants gain rights to control access, to occupy, maintain and protect the land (Wensing and Porter, 2016).

The process of lodging a claim is stressful especially when one does not know the prerequisites to pass the test for registration, and when there are competing demands and shortage of resources (Duff, 2014). Different groups of people or tribes can claim one piece of land, and this sometimes leads to overlapping claims. Some claimants sign documents which they are not supposed to, especially in when claims involve traditional authorities, this is one of the reasons that determinations of claims take a long time (Bauman et al. 2013: 1).

In situations where different tribes claim one piece of land some tribes come together but some split up and re-lodge the claim separately, further slowing down the process. Some separations lead to violent conflicts especially among those who have family members on both sides of the claim (De Villiers, 2003).

Those who are involved in the claims process need clearly to understand the ruling of the court in the Mabo case. Furthermore, they need to understand everything about the Native Title Act 1993 and all the legislative frameworks on the side of the claimants (Jackson, Porter and Johnson, 2017). They need to understand culture, aspirations, property rights and social relations (Jackson, Porter and Johnson, 2017). Officials need to get a chance to participate in meetings with claimants and

engage with the community on programmes, policy, economic development, heritage and housing in order to have a fruitful process (Brunner and Glasson, 2015).

The Land Divided: Land and South African Society conference held in Cape Town in 2013 indicated that anthropologists, archaeologists, linguists, historical experts and lawyers are amongst the experts that are involved in aboriginal land claims in Australia (Fredericks et al. 2013; De Villiers, 2003). Federal courts deal with the claims since their processes are legal processes, experts provide evidence and the aborigines provide oral evidence before the courts, claimants are involved throughout the process and administration of the claim until the court finalises a case (Altman, 2014; De Villiers, 2003).

Altman (2014), described how a good combination of different experts can assist to finalise a claim, the author explained how the cartographer Simon Ryan provided historical images which helped to trace back evidence on claimed land. Mathew Finder processed surveyed maps that can large land claims, and Patric Wolfe who is a historian clarified the connection between elimination of societies and dispossession (Altman, 2014).

Altman (2014), created maps with the GIS expert Francis Markham which represented cultural activities, and economic practices such as fishing and hunting. These maps can be acquired from the government department and be used by anthropologists, lawyers and claimants to show or give the evidence to the court regarding continuity of tradition and custom (Altma, 2014).

2.7 LAND RESTITUTION IN CANADA

The government of Canada has signed a number of treaties with the communities of Saskatchewan, Alberta and Manitoba. In 1874 the government of Canada and the band (first nation) signed treaty number four in Southern Saskatchewan (Scholtz, 2013). The treaty signing led to the release of the majority of beautiful ancestral land, swapping it for small scale areas (Kariuki, 2013). The band people were promised to be given annuity from the production on the farms released to the state so that they would be able to feed their families (Lickers, 2004).

The Supreme Court judgement in 1973 between the Attorney General and Calder stated that the first dwellers had a right to claim back their land (Scholtz, 2013). The judgement further states that in 1974 the office of Native Claims was opened by the Indian Affairs Department with the mandate to focus on: **Comprehensive claims**: claims that mainly concentrate on land titles and land rights that have not been attended to by treaties and legal processes, also known as modern treaties (Dyzenhaus, 2014; Miller, 2009).

Specific claims: claims that concentrate on correcting the injustices of the past, mainly focusing on land management and other assets of the First Nations where the treat agreements were not honoured (Garcea, 2020; Muthama, Tompkins and Barry, 2019). The government works together with the claimants to settle outstanding claims through negotiations, to honour agreements that were signed a long time ago (Government of Canada, 2021).

Muthama, Tompkins and Barry (2019), described that claimants may negotiate directly with the Canadian indigenous services, if this process fails claimants may lodge their claims at the Specific Claims Tribunal (SCT). This tribunal was established by government and First Nations as a way to fast track the process, and has high court status because its rulings are binding (Muthama, Tompkins and Barry, 2019).

Other claims: any other claims that are taking place in Canada based on government policies to correct the wrongs done by the government to its citizens (Indian and Northern affairs Canada, 2003).

Ballantyne (2016) reported that the Metis Settlements Appeal Tribunal (MSAT) which mediates on boundaries and ownership disputes has solved some of the cases using geomatics. For example, a boundary case of Erf 6 and 7 Gift Lake in the case of Belmont v McKenzie in 1995, where historical images were presented and the correct boundary was found, a dispute between Thompson v Cardinal in 2006 where the mediator found that the respondent built a fence without checking the boundary line hence encroaching by 2.5 km (Ballantyne, 2016). Surveying located the correct boundary and the case was solved.

In Tiny and Dale Township in 2015, the SGO had to validate resurveying of all municipal roads. The court was pleased with the consistency of the evidence presentations gathered by SGO to solve the case (Ballantyne, 2016). Treaty disputes are about presenting a map, locating the boundaries and spatial extent of claimed land (Barzo, 2012). The final report in 2015 stated that many cases that have boundary disputes remain unresolved (Eyford, 2015; Lickers, 2004).

The procedure occurs in courts of law with experts providing evidence and cross examination taking place, these experts provide customary land use exercises, artefacts, statistical surveys, archival evidence such as maps, treaties and certificates (Kariuki, 2013). The experts involved in the collection of evidence include historians, anthropologists, biologists, archivists, genealogists, and lawyers (Kariuki, 2013).

2.8 LAND RESTITUTION IN NEW ZEALAND

The Waitangi Treaty was an agreement between Maori chiefs and British authorities signed on 6 February 1840, the treaty agreement gave the British a subscription privilege over the Maori land (Mutu et al. 2019: Mutu, 2010). The agreement was complex because each party had different aims. When agreement was reached, both English and Maori languages were used but there was no translation (Mutu et al. 2019). Disagreements started because the parties did not understand what was agreed upon and whether the state had met its duty to Maori people or not (De Villiers, 2003).

In the early 1970s there was an outcry by the community for the restoration of land rights for the aboriginals, as a result, the government decided to accept its wrong doings and initiated the Reconciliation and Restitution Commission to correct the wrongs of the past (Tribunal, 2018). The

Treaty of Waitangi Act of 1975 was established for the Maori people to claim back their land that was taken based on the laws and practices of the Crown after 1840 (De Villiers, 2003; Mutu et al. 2017).

A commission called the Waitangi Tribunal (WT) was established to facilitate all the processes. The function of the Tribunal was to interpret the English and Maori languages so that the commission could report back on all the infringements of the treaties by the government and recommend elimination of prejudice to the government (Mikaere, 2011; Mutu et al. 2019). Harris (2011), states that in New Zealand the policy on restitution allows two options for claimants as compensation, offer back the land to the rightful owners in cases where the land which was dispossessed has been reserved for public works, bring back the land to those who lost it as a result of the treaty agreement for the purpose of reconciliation.

A case between the Maori Council and the Attorney general in 1987 ended in a court order that the government must give the land back to the rightful owners (Miller et al. 2010). The Maori have lodged the claims for the return of their minerals, land water, airways, foreshores, fisheries and others. They also want the government to acknowledge their cultures, languages and their rights (Mutu et al. 2019).

Kariuki (2013), further states that there are three institutional bodies involved in the processing of a claim, **The Crown Forestry Rental Trust (CFRT):** An independent structure or organisation that represents and supports the claimants with money, advice, support and provides the experts in the process. **The Waitangi Tribunal (WT):** A commission that facilitates all the processes including hearings, administration of claims, keeping the records, writing the final reports and making recommendations to the Crown (Tribunal, 2018; Kariuki, 2013). **The Crown or Government:** Implements the recommendation made by the Tribunal (Kariuki, 2013; Tribunal, 2018).

2.8.1 The Land claims process in New Zealand

According to Melvin (2000), claimants need to be of Maori origin and their application forms should indicate who they are representing. A claim is lodged at the WT and the registrar verifies if the claim qualifies to be registered according to section 6 of the Treaty of Waitangi Act of 1975 (Te Aho, 2017; Tribunal, 2018). When the claim is registered it is allocated a unique reference number which is called a Wia number, the Crown and interested citizens are alerted about the developments, and all related claims are combined and listed together (Scholtz, 2013). After a claim has been accepted by the registrar, claimants are free to negotiate with the Crown directly without involving the WT (Law Commission, 2002: 27).

When a claim has gone through the WT processes, after a claim is registered, a casebook is opened where all relevant research collected by claimants, Crown and other interested citizens are stored (Scholtz, 2013; Te Aho, 2017; Melvin, 2000). Various experts, most of whom are Tribunal employees, Crown, CFRT representing claimants, and Tribunal contractors, do the technical and

professional research and present it in the hearings, they organise and give each other roles in conducting the research (Scholtz, 2013; Te Aho, 2017; Melvin, 2000).

Research involves finding information in libraries, historical archives, maps, reports, photographs and other related information, based on the evidence presented, an informed decision is taken regarding the outcome of a claim and a report with recommendations is sent to the Crown (Tribunal, 2018). The Crown and claimants conclude negotiation on the settlement and all parties involved need to accept the recommendations regarding the settlement of the claim. Involved parties sign the settlement, and the implementation begins (Melvin, 2000).

2.8.2 Evidence collection on a claimed land

The Tribunal does their own research to check the relevance of the evidence or proof submitted by the claimants, the process is similar to that of the USA as it involves lawyers and experts who collect and present the evidence before the Tribunal (Scholtz, 2013). When the hearing is completed, the WT checks the cultural and historical evidence presented by both parties, they take note of conflicting evidence before finalising their findings (Scholtz, 2013).

Claimants can do their own research with the Crown Forestry Rental Trust which was established to fund research done by claimants (to pay for work done by experts for claimants), the geographical information and maps are used to provide evidence on claimed land (Tribunal, 2018). Due to the judicial procedures on the process, it takes about 15 to 20 years to finalise a claim, researching the validity of claims and tracking the evidence is complex and takes a long time (Kariuki, 2013).

2.9 CONCLUSION

As an employee of the DALRRD, the researcher has worked with several claimants and project officers, and has experienced first-hand their struggles in locating the claimed land. The clients seek assistance because the DALRRD office is mandated to help with the claims process. They are the custodians and have resources to answer questions regarding pieces of land to be claimed.

This chapter points out that many reviews were conducted in the RSA. The results revealed that the challenges facing the land claims are almost the same. These include shortage of skills from the researchers, shortage of funds, claimants sending the commission to the courts, competing and complex claims.

The reviews show that the department has a variety of skills and resources to resolve some of the challenges, but they are not being utilised. Instead, the commission is outsourcing the research skills to outside service providers to solve the problems. The irony is that they complain about lack of money and a shortage of staff, yet they house resources and skills that could be of great help. The processes in the RSA are not based in the courts where experts present their evidence like in the countries discussed above. Only if there is a dispute between the parties, are the courts involved. The phases or structure of land claims do not involve experts.

In the review of international countries, Australia, New Zealand and Canada, the common thing is that their land was dispossessed by colonisers using discriminatory laws. The land claims process is a court procedure where claimants, lawyers, other bodies and the state sit before a judge. Experts then present evidence such as oral evidence, maps, treaties, archived documents and other evidence. Cross examination takes place as well. This is done so that the courts can make informed decisions based on the evidence presented before them. The court proceedings and hiring experts are expensive.

What common to all the countries is that the processes take long time to complete. The process of land claims is not something that can be done quickly. It needs time, good resources, skills, money, and support from the community at large. In RSA, the process is ongoing and it will take years to complete as the government is planning to open another window for land claims.

Land surveying and GIS is useful in times of land disputes. It produces maps and helps individuals understand the history, time and shape of the land development pattern that has happened previously and currently, and is also important for future planning on the land. Maps become solutions to prove to the claimants who has a case and who does not.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses in detail how material and information was collected in order to complete this research project. It describes how a combination of cadastral surveying and GIS were used to locate claimed land. QGIS, cadastral and spatial data were used in order to gather data for this project.

3.2 RESEARCH DESIGN AND METHOD

Qualitative research methodology was used to discuss the role of cadastral surveying and GIS. Articles, journals, books and other sources were used to gather the required information. Another methodology used was overlay methodology which superimposes different data (cadastral documents, historical images and shape files) with common coordinates reference systems. Figure 7 is a flow chart illustrating methodology.

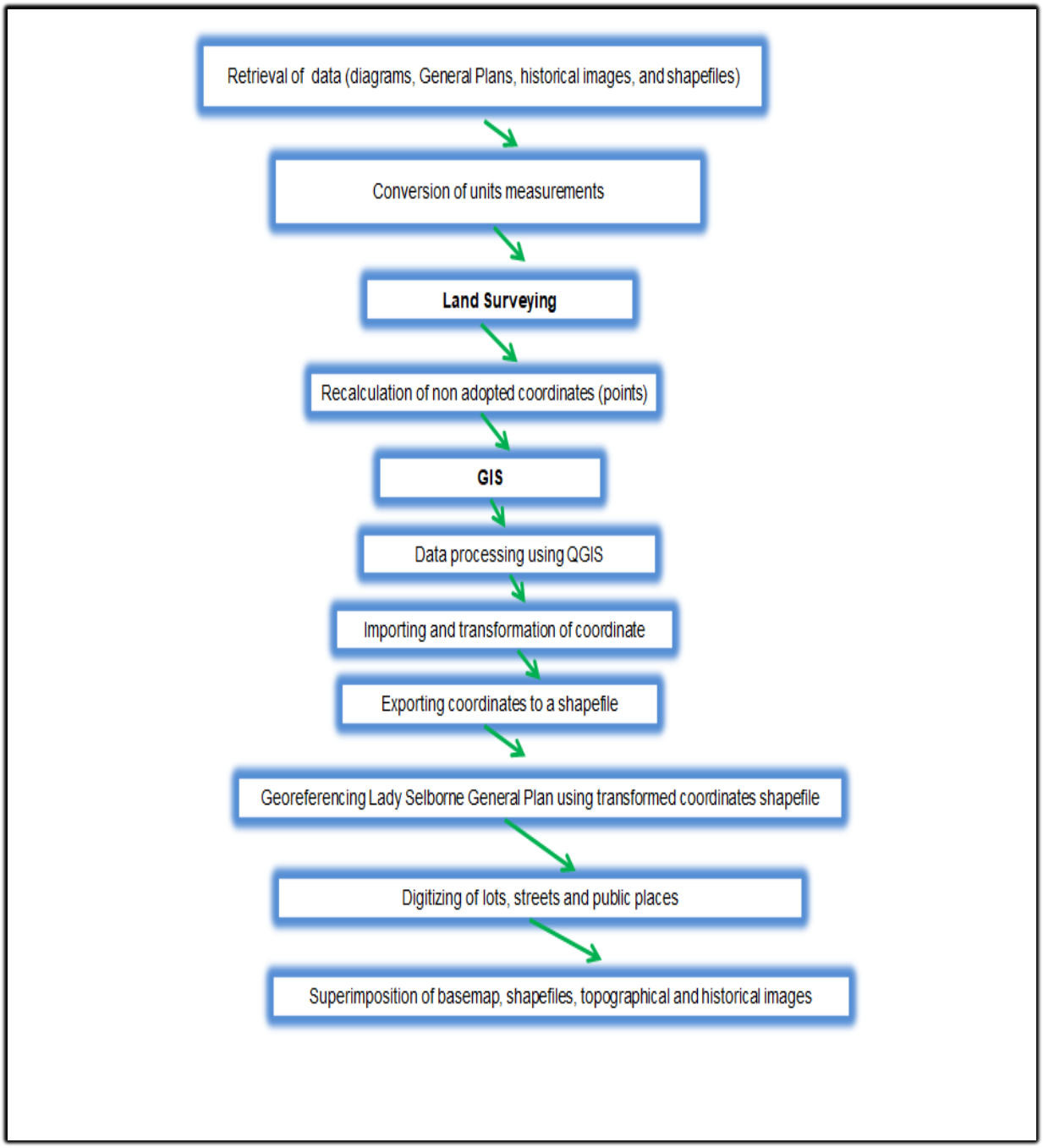


Figure 7: Methodology used to show how land surveying and GIS can assist land restitution**.**

3.3 DATA COLLECTION AND SOURCES OF DATA

Data was collected from different platforms, but mainly from the internet, SGO, Google scholar, DUT library and other research database. This is because this research was done during the period of the Covid-19 pandemic whereby the movement of people was restricted. The government recommended that people stay at home, and those who could work from home were encouraged to do so (Govender, Cowden, Nyamaruze, Armstrong and Hatane, 2020). This intervention was recommended in order to curb the spread of the deadly virus. Due to these restrictions, the movement to the library for book collections and travelling to other places could not take place.

Journals, articles, online databases, academic theses, books, Durban University of Technology (DUT) library portal, reports, government databases and Google scholar were used as sources of data. Some of the data collected were diagrams and general plans; these were collected from the CSG website. This website is used by the general public to retrieve maps and spatial information regarding all properties located in the RSA.

It should be noted that only properties located in surveyed land can be retrieved i.e., mostly urban, agricultural holdings (AHs) and farms and farm portions, unsurveyed land such as informal settlements and villages cannot be found on the CSG website.

Some of the data collected was printed on Launcher (software that retrieves images from the database) at the SGO in Pretoria (Table 1). Topographical maps and aerial photographs shape files were collected at the NGI branch in Pretoria, the researcher also went to the Regional Land Claims Commission (RLCC) offices at the Pretoria branch for data collection before lockdown. The only data available included spreadsheets containing personal information on claimants (forms containing their personal details, ID copies, proof of residence, government gazettes, traditional leaders' letters and, historical letters). It was then that the researcher realised that there was not much information that could be obtained except for property descriptions of the claimed land.

Table 1: List of scanned SGO diagrams and general plan retrieved.

Farm /Township Name	Reg. Div.	Farm No.	Portion No.	SG. No.
Zandfontein	JR	317	205	A10972/1986
Zandfontein	JR	317	204	A10971/1986
Zandfontein	JR	317	RE/16	A915/1906
Zandfontein	JR	317	201	A10968/1986
Zandfontein	JR	317	180	A847/1983
Zandfontein	JR	317	202	A10969/1986
Selborne	JR	222	0	A846/1983
Lady Selborne				A916/1906
Lady Selborne Ext.1				A10973/1986
Suiderberg Township				A645/1983

3.4 DATA CONVERSIONS AND CALCULATION OF NON ADOPTED COORDINATES (POINTS)

The area sizes are in Morgan, Square Roods and Square Ft (Figure 8; Table 2). Portion 208 and 180 have been subdivided from portion 16, which means that they are the latest survey data on portion 16. An online software program called Convert Units was used to convert the sides and the small scale diagram sizes from Cape roods to metres (Figure 9). There are many platforms which can be used to do the conversions; some use software, and some spreadsheets which have formulas, to do the conversions. The data which needs to be converted gives direction as to which software to use. An excel spreadsheet with populated formulas was used to do the area calculations

(Table 4), and a converted new m² as indicated in (Table 3). Alphabets on the left marked in red (Figure 10) represent categories (lot numbers in category A, B etc).

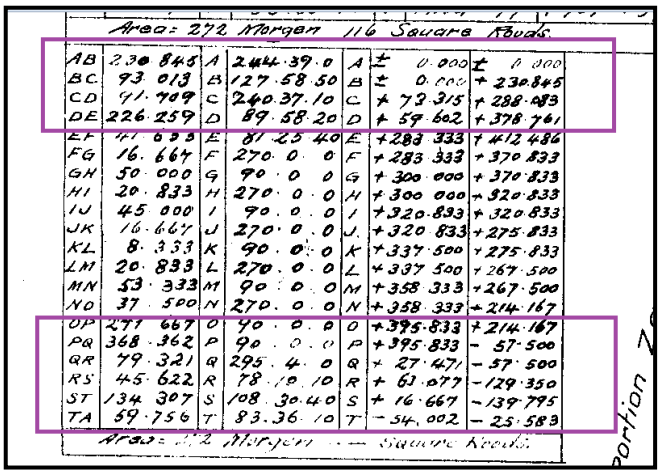


Figure 8: Sides selected for conversion from Cape Roods into Metres for polar calculations.

Source: (CSG, 2021)

Table 2: Converted boundary distances of the small scale diagram from Cape Roods to Metres.

Points	Distance Roods	Distance Metres	Angles	Interior angles
AB	230.845	872.194	A	244° 39' 00"
BC	93.013	351.428	B	127° 58' 50"
CD	91.709	346.501	C	240° 37' 10"
DE	226.259	854.867	D	89° 58' 20"
OP	271.667	1026.43	O	90° 00' 00"
PQ	368.362	1391.77	P	90° 00' 00"
QR	79.321	299.696	Q	295° 04' 00"
RS	45.622	172.372	R	78° 10' 10"
ST	134.307	507.448	S	108° 30' 40"
TA	59.75	225.751	T	83° 36' 10"

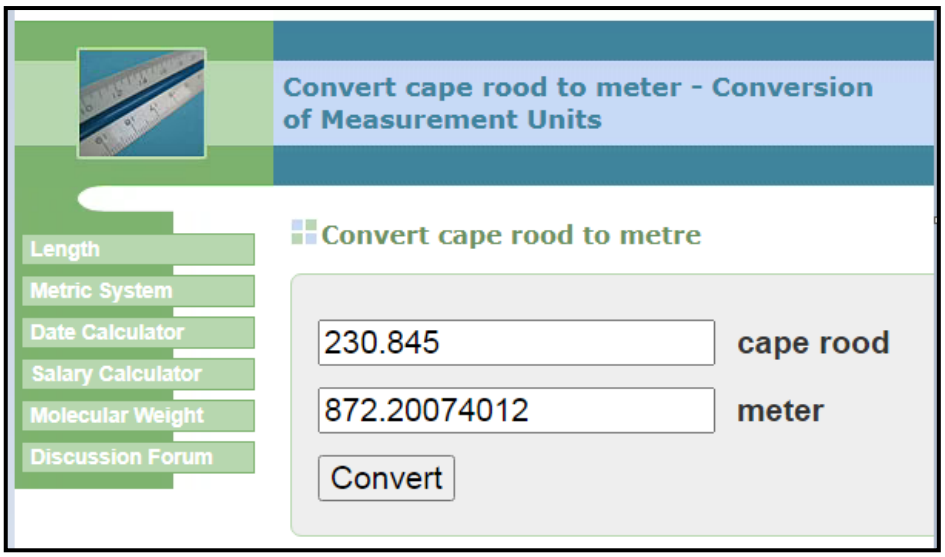


Figure 9: Software used for the conversion of selected sides from Cape Rood to Metres.

Source: (Convert units, 2021).

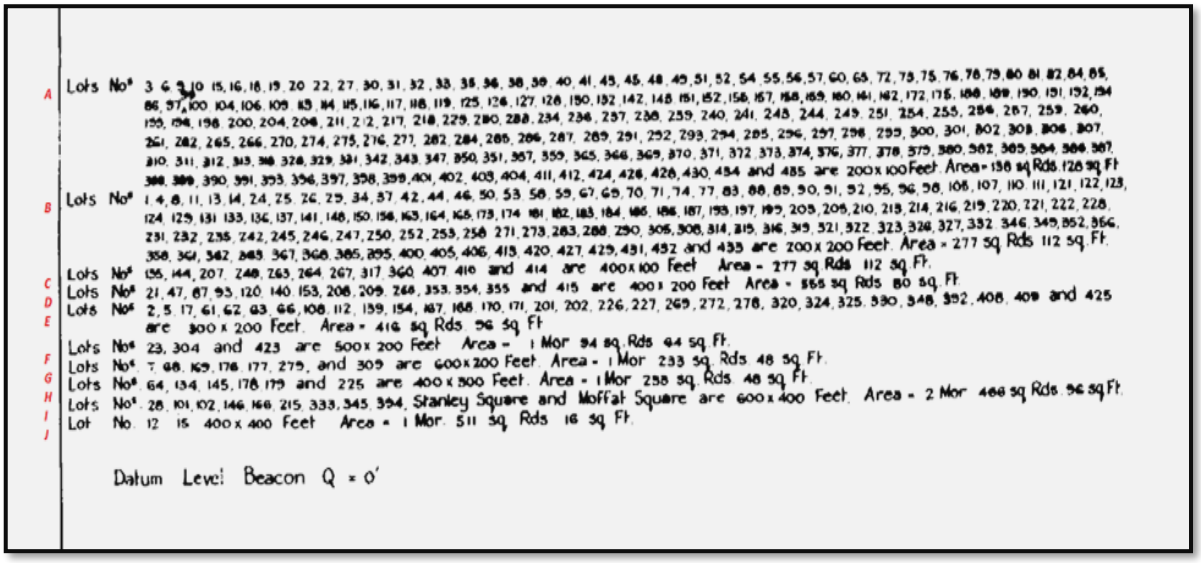


Figure 10: Extraction of lot numbers, area extent and categories labelled in red alphabets.

Source: (CSG, 2021)

Table 3: Converted Lots extent from Square Rds. Sq. Ft to M².

	Sides Mesurements			Stand Extent		
Erf numbers	**Sides in Ft.**	**Sides in Metres**	**Morg**	**Square Rds**	**Sq.Ft.**	**Extent in M²**
A	200X100	62.97 X 31.49	0	136	128	1954.13
B	200X200	62.97 X 62.97	0	277	112	3981.72
C	400X100	125.94 X 31.49	0	277	112	1981.72
D	400X200	125.94 X 62.97	0	555	80	7930.72
E	300X200	94.46 X 62.97	0	416	96	5948.04
F	500X200	157.43 X 62.97	1	54	64	9342.53
G	600X200	188.91 X 62.97	1	233	48	1,1896 hactares
H	400X300	125.94 X 157.43	1	255	48	1,2210 hactares
I	600X400	188.91 X 125.94	2	466	96	2,3792 hactares
J	400X400	125.94 X 125.94	1	511	16	1,5862 hactares

Table 4: Populated formula spread sheet used to convert area from Square Rds. Sq. Ft to M².

MORGEN	HECTARES	SQR ROODS	HECTARES	SQR CAPE FEET	HECTARES		HECTARES
0.0000	0.0000	136	0.1941	128	0.0013		0.1954
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx..							
	SQR METRES		SQR METRES		SQR METRES		SQR METRES
	0.000000		1941.440256		13		1954.129408
							CALCULATOR
				CAPE FEET	METRES		0.1954
							29.5683
				0	0		
				ROODS	METRES		-29.3729
					0		

Diagrams and general plans for the township under study were created on an old coordinates reference system, the coordinates of the farm portion and the one for the township are in the Cape Ft. units measurement Fortunately, there were new developments on the farm hence common coordinates (points) which were created on a better coordinates reference system were found, these newly surveyed diagrams were in Local coordinates reference system (LO 29). Some of these coordinates were adopted and other coordinates were calculated (Figure 11).

Common points on the newly surveyed diagrams were adopted; other coordinates were calculated using polar calculations. All coordinates (points) of the small scale diagram were in Local coordinates reference system (adopted points and recalculated points). All coordinates, including newly surveyed portions, were captured on an Excel spreadsheet. These coordinates were saved as a Comma Separated Values (CSV) file and Coordinates Reference System (CRS) was European Petroleum Survey Group (EPSG): 22289 LO 29. The reason was that, it was important to have all coordinates in one coordinate reference system.

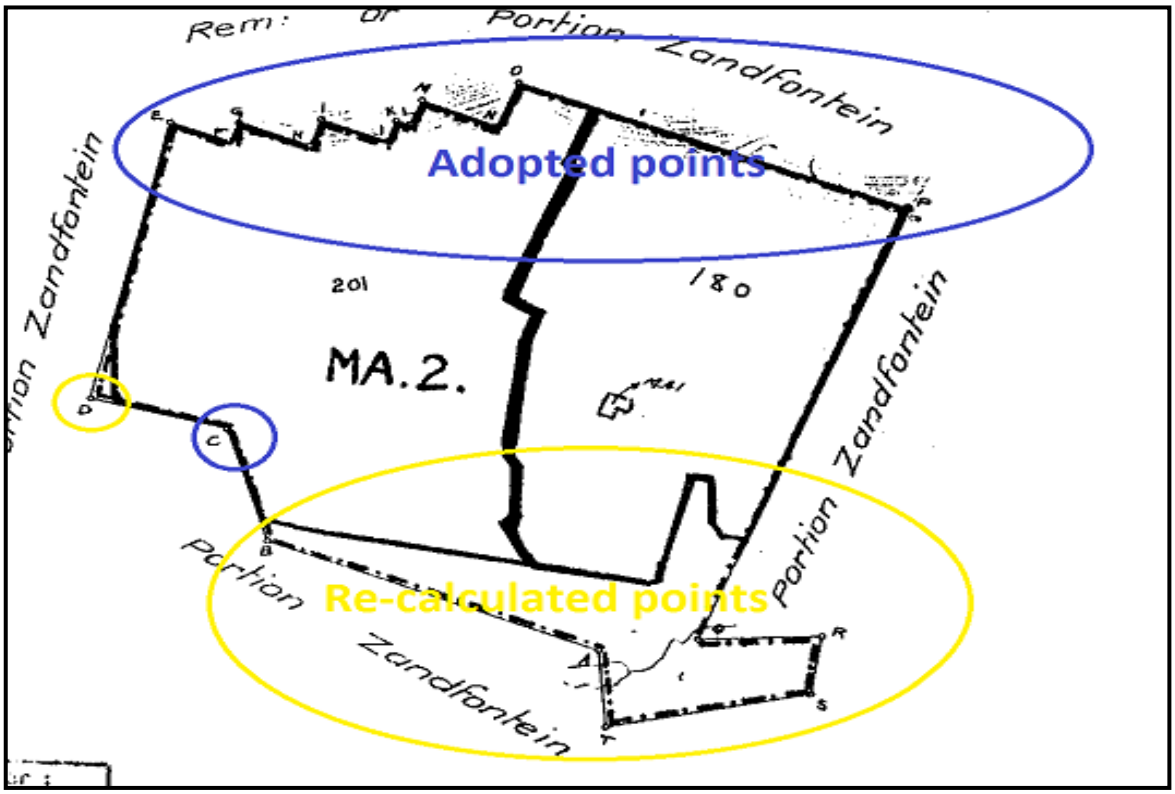


Figure 11: Small scale diagram showing adopted and recalculated coordinates (points).

Source: (CSG, 2021)

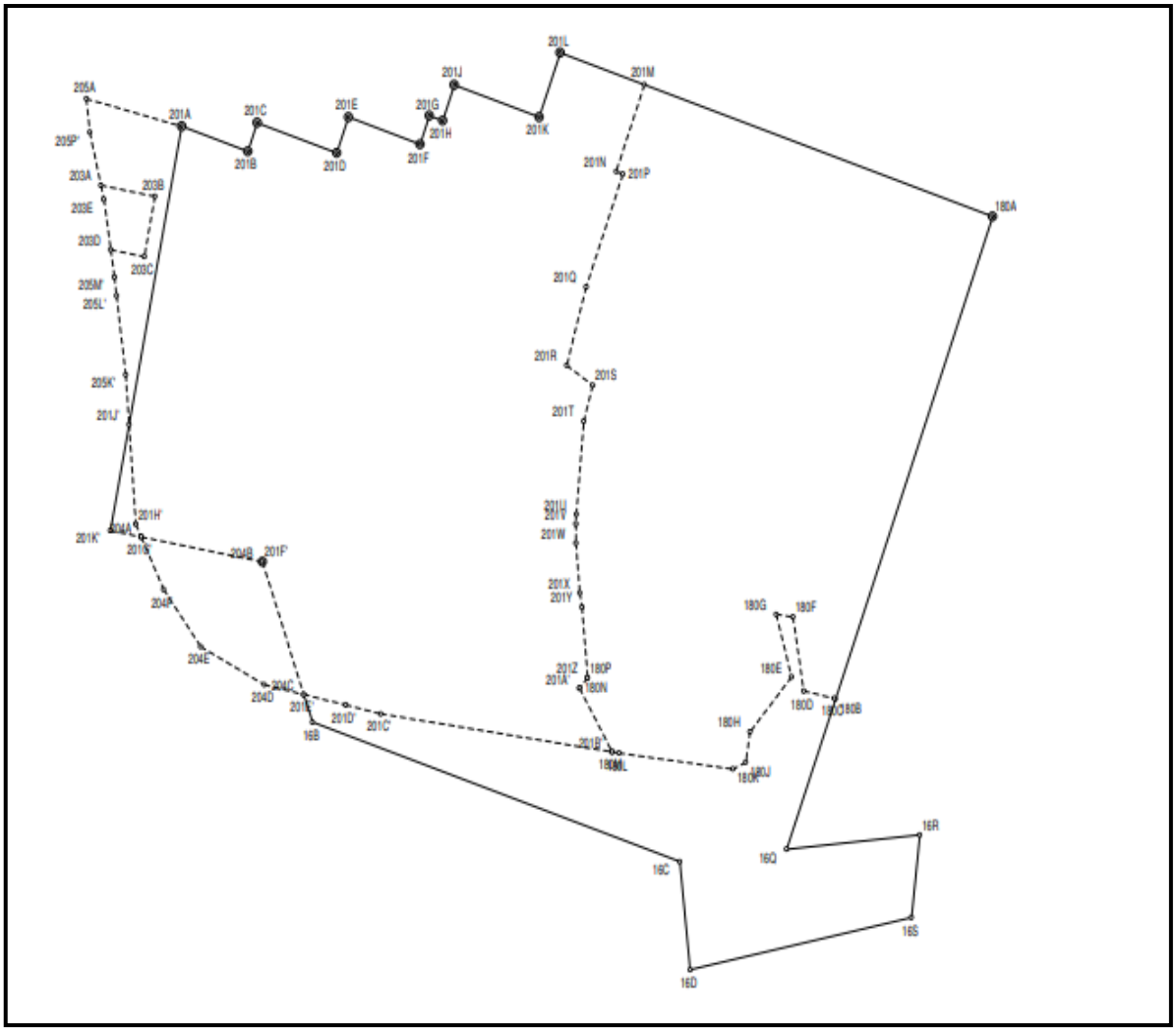


Figure 12: Working plan.

To calculate Y and X co-ordinates these formulas were used (Table 5):

Y = distance X sin (direction)

X = distance X cos (direction)

The answer received when calculating Y was added or subtracted from the Y value of a known point. The same procedure was done on the X value. Subtracting or adding of Y and X values depends on the quadrants where the direction falls (Figure 13).

Table 5: Details of calculated coordinates (points), the sequence is shown on the working plan.

Points Calculations							
From	To	Distance	Direction	Y	X	Co-ordinates	description
201A	201K'	854.867m	10.783	87779.29	2842618.26	201A	Adopted
				159.937	839.772		
				87939.227	2843458.032	201K'	
201P	16B	351.428M	341.402	87598.53	2843522.49	201P	Adopted
				-112.079	333.076		
				87486.451	2843855.566	16B	
16B	16C	872.194M	289.38258	87486.451	2843855.566		
				-822.761	289.459		
				86663.69	2844145.025	16C	
16C	16D	225.751	354.03258	86663.69	2844145.025		
				-23.47	224.528		
				86640.22	2844369.553	16D	
16D	16S	507.448M	257.63536	86640.22	2844369.553		
				-495.678	-108.661		
				86144.542	2844260.892	16S	
16S	16R	172.372M	186.14647	86144.542	2844260.892		
				-18.456	-171.381		
				86126.086	2844089.511	16R	
16R	16Q	299.696M	84.315917	86126.086	2844089.511		
				298.222	29.683		
				86424.308	2844119.194	16Q	

Coordinates of point 201A (Figure 12; Figure 5a; 5b), which is a common point, were adopted. Using given distances and directions, polar calculations were done in an anticlockwise direction. Calculating a polar means finding unknown coordinates from known coordinates using distance and direction.

Checking

Checking the correctness of calculations was done by recalculating of point 180B (Figure 12), which is a given co-ordinated B (Figure 6a; Figure 6b). PQ = 1391.77 metres, and given the distance AB = 1061.69 metres (Figure 6a; 6b), therefore the distance from point 16Q to 180B was PQ – AB which

was 1391.77m - 1061.69m = 330.08m. Given the direction of AB 19° 21´ 47”, 180° 00´ 00” was added so that the direction was on the correct quadrant. Therefore, the direction was 199° 21´ 47”.

Below formulas was applied:

Y = distance X sin (direction)

X = distance X cos (direction)

Therefore	**Y**	**X**
16Q to 180B	86424.038	2844119.194
Distance = 330.08 m	**-109.439**	**- 311.410**
Direction = 199° 21´ 47”	86314.8	2843807.7
Co-ordinate of 180B is	**86314.80**	**2843807.3**

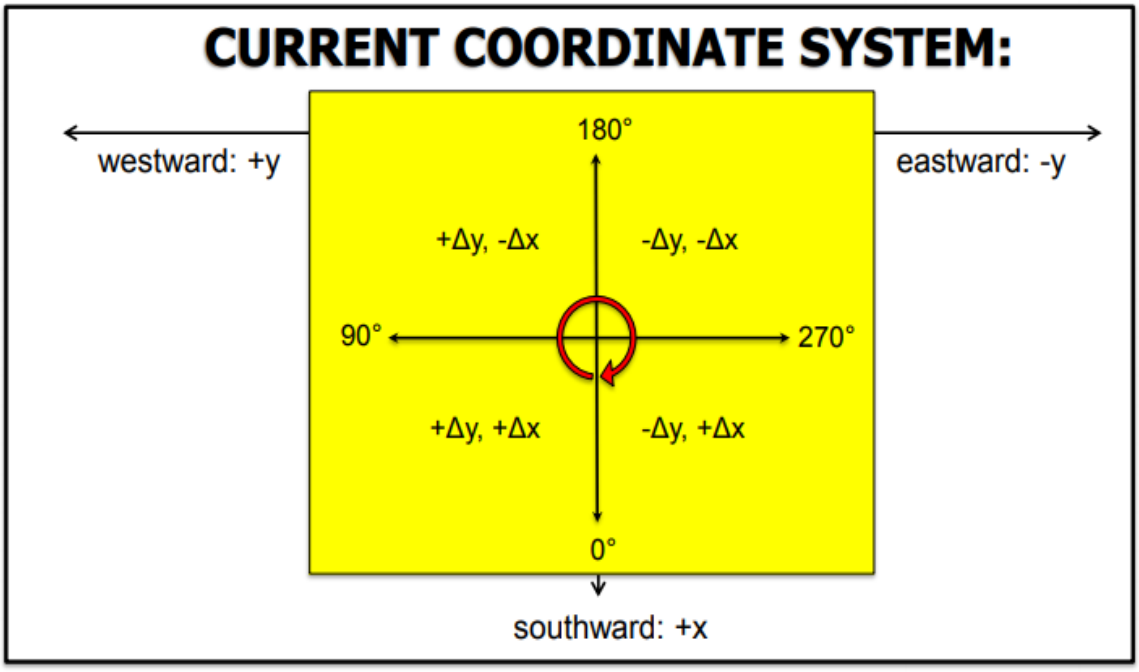


Figure 13: South African coordinates system.

Source: (NGI, 2021).

Table 6: South African coordinates system codes used in QGIS.

SA System	QGIS Code	QGIS Name
Cape Datum	EPSG:22275 to EPSG:22293	Cape/LO29 (EPSG:22289)
Hartebeesthoek 94	EPSG:2046 to EPSG:2057	Hartebeesthoek 94/ LO 29 (EPSG:2053)
WGS84	EPSG:4326	WGS84
Web Mercator	EPSG3857	Pseudo Mercator

The South African coordinates system codes used in QGIS in (Table 6). The challenges of using QGIS to map in the RSA are that base maps, which are located on the HCMGIS plug-in, do not work on Cape datum and Hartebeesthoek 94. However, they work well on WGS84 and Pseudo Mercator. Data manipulation was done by swapping the coordinate values (Table 7). This was done to prepare the data to be sit on a correct location in South Africa after data transformation, they were saved as CSV file.

Table 7: Data manipulation where values are swapped.

Original co-ord LO29				Swapped X and Y values co-ord		
Points	Y	X		Points	Y	X
16B	2843855.566	87486.45		16B	87486.45	2843855.566
16C	2844145.025	86663.69		16C	86663.69	2844145.025
16D	2844369.553	86640.22		16D	86640.22	2844369.553
16Q	2844119.194	86424.31		16Q	86424.31	2844119.194
16R	2844089.511	86126.09		16R	86126.09	2844089.511
16S	2844260.892	86144.54		16S	86144.54	2844260.892
180A	2842805.62	85962.79		180A	85962.79	2842805.62
180B	2843807.26	86314.8		180B	86314.8	2843807.26
180C	2843805.96	86317.32		180C	86317.32	2843805.96
180D	2843790.92	86385.88		180D	86385.88	2843790.92
180E	2843761.6	86413.45		180E	86413.45	2843761.6
180F	2843636.99	86410.05		180F	86410.05	2843636.99
180G	2843631.62	86447.43		180G	86447.43	2843631.62
180H	2843875.66	86506.36		180H	86506.36	2843875.66
180J	2843938.73	86515.66		180J	86515.66	2843938.73
180K	2843952.75	86544.51		180K	86544.51	2843952.75
180L	2843919.63	86799.38		180L	86799.38	2843919.63
180M	2843917.21	86815.15		180M	86815.15	2843917.21
180N	2843784.9	86888.23		180N	86888.23	2843784.9
180P	2843763.5	86870.17		180P	86870.17	2843763.5
201A	2842618.26	87779.29		201A	87779.29	2842618.26
201A'	2843784.9	86888.23		201A'	86888.23	2843784.9
201B	2842670.29	87631.11		201B	87631.11	2842670.29

QGIS was opened project setups was done (Figure 14), since the coordinates were on LO 29, the project CRS were put on EPSG: 22289 LO 29. Exchanged coordinates in CSV format were imported.

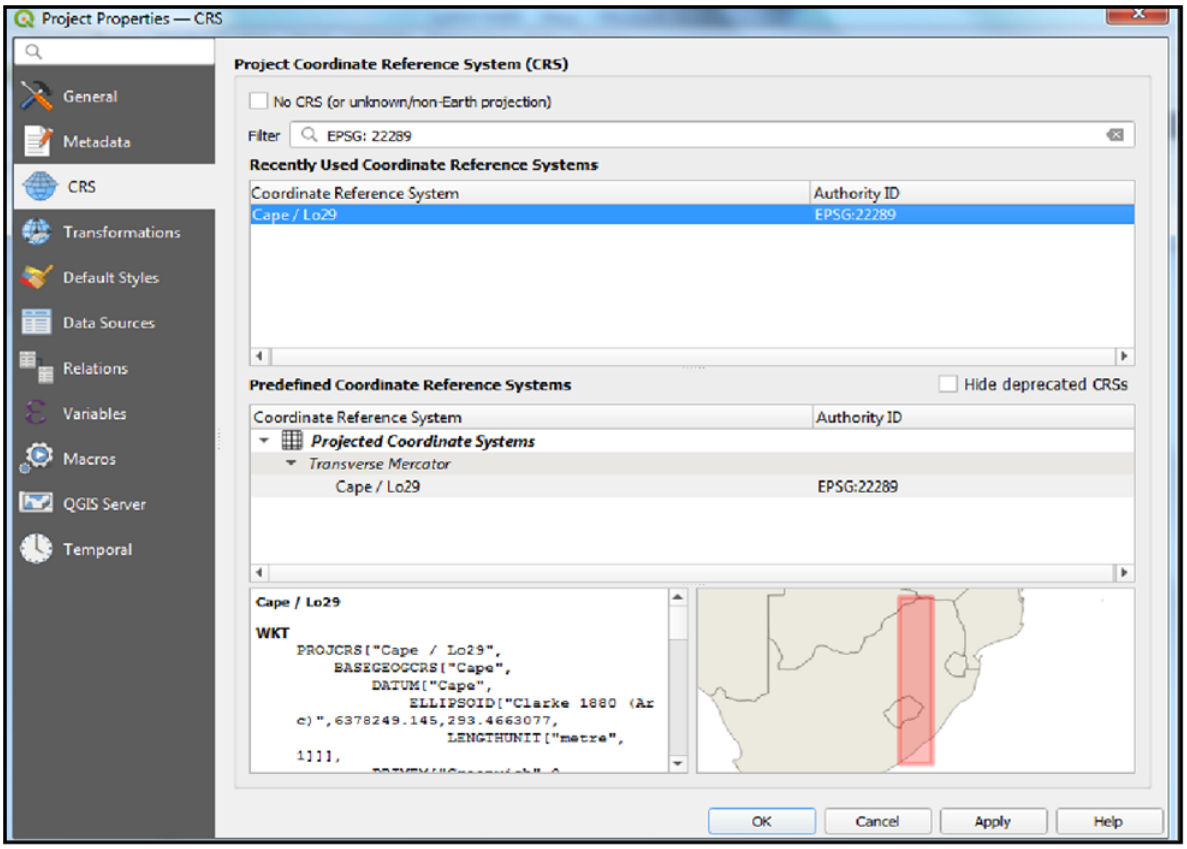


Figure 14: QGIS Project setup.

3.5 COORDINATES TRANSFORMATION

Coordinates were transformed from LO 29 to WGS 84 by exporting exchanged coordinates on CSV file (Figure 15). CRS was set to EPSG: 4326 WGS 84. The new exported CSV file was given a new name (Cape datum LO 29 to WGS 84) (Figure 16). This was done to show that QGIS is capable of doing coordinates transformation and also because WGS 84 is the coordinate reference system that is used in the current era.

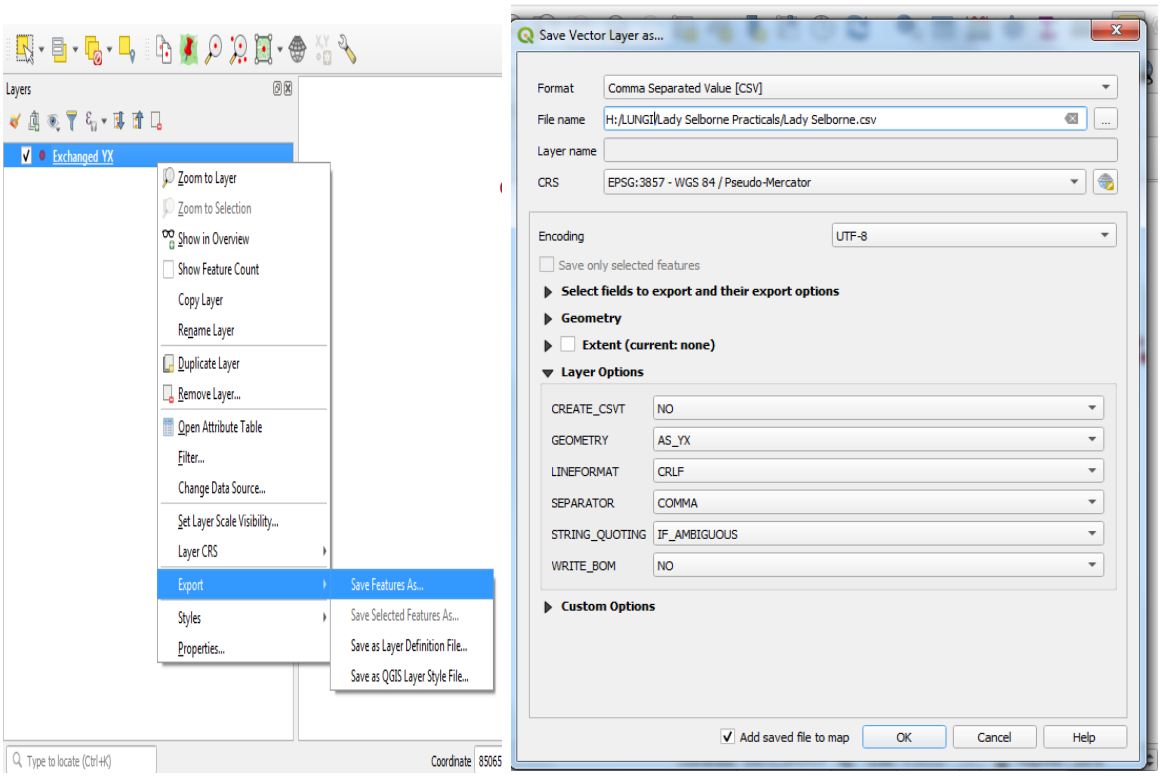
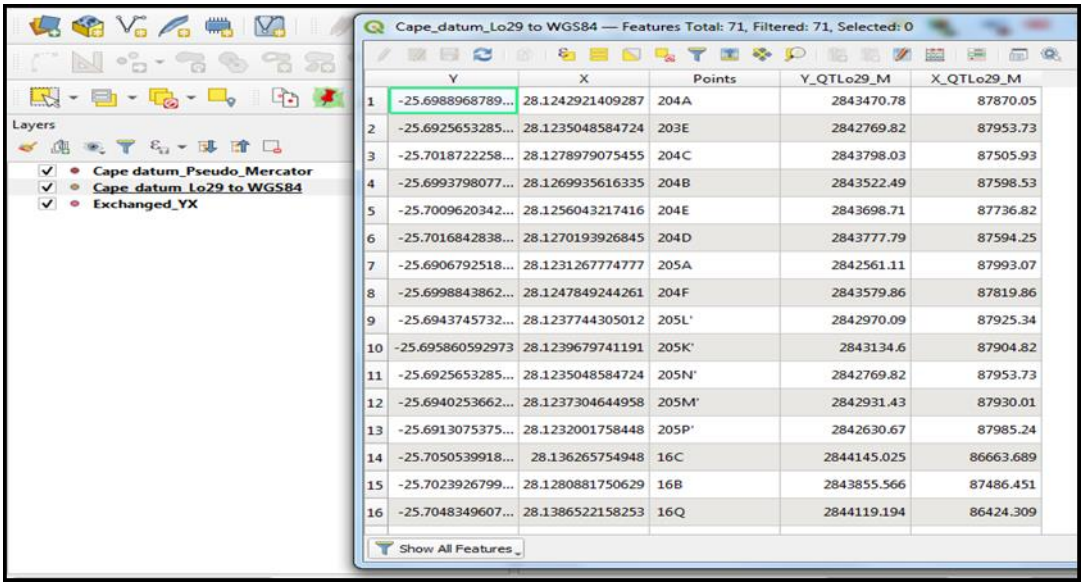


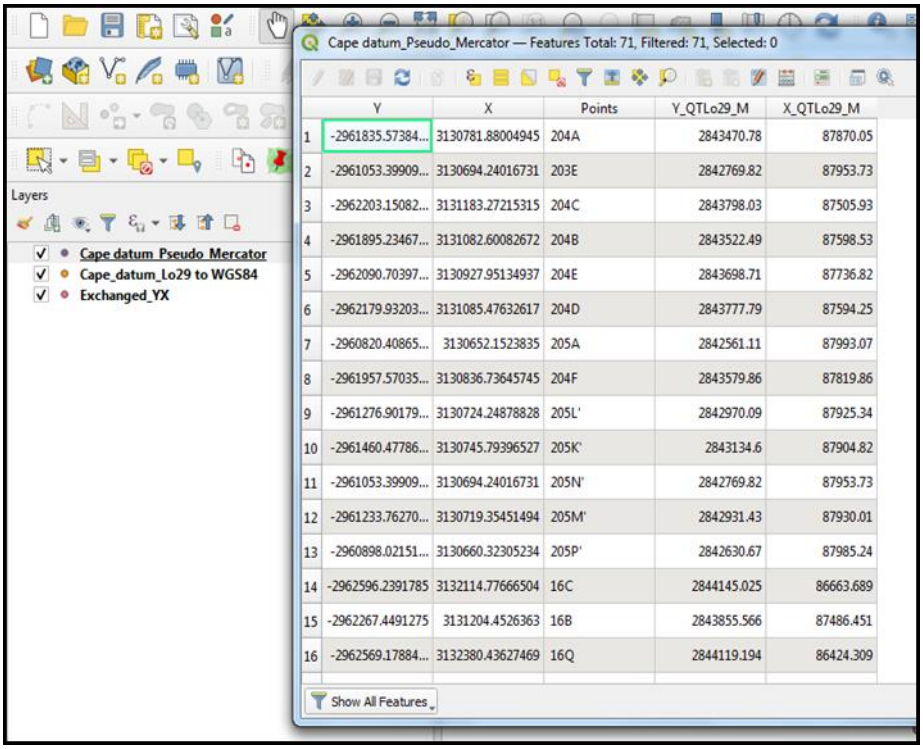
Figure 15: Exporting setup for CSV points from LO 29 to WGS 84.



	Y	X	Points	Y_QTLo29_M	X_QTLo29_M
1	-25.6988968789...	28.1242921409287	204A	2843470.78	87870.05
2	-25.6925653285...	28.1235048584724	203E	2842769.82	87953.73
3	-25.7018722258...	28.1278979075455	204C	2843798.03	87505.93
4	-25.6993798077...	28.1269935616335	204B	2843522.49	87598.53
5	-25.7009620342...	28.1256043217416	204E	2843698.71	87736.82
6	-25.7016842838...	28.1270193926845	204D	2843777.79	87594.25
7	-25.6906792518...	28.1231267774777	205A	2842561.11	87993.07
8	-25.6998843862...	28.1247849244261	204F	2843579.86	87819.86
9	-25.6943745732...	28.1237744305012	205L'	2842970.09	87925.34
10	-25.695860592973	28.1239679741191	205K'	2843134.6	87904.82
11	-25.6925653285...	28.1235048584724	205N'	2842769.82	87953.73
12	-25.6940253662...	28.1237304644958	205M'	2842931.43	87930.01
13	-25.6913075375...	28.1232001758448	205P'	2842630.67	87985.24
14	-25.7050539918...	28.136265754948	16C	2844145.025	86663.689
15	-25.7023926799...	28.1280881750629	16B	2843855.566	87486.451
16	-25.7048349607...	28.1386522158253	16Q	2844119.194	86424.309

Figure 16: Transformed coordinates from LO29 to WGS 84.

Coordinates were transformed from LO 29 to Pseudo Mercator by exporting exchanged coordinates on CSV format. CRS was set to EPSG: 3857 Pseudo Mercator projection. The new exported CSV file was given a new name (Cape datum_ Pseudo_Mercator) (Figure 17). This was done so that all points are on the coordinates reference system that was going to give the required result for the project. This projection allows the use of Google base maps, online base maps, Bing maps and others included in the analysis.



	Y	X	Points	Y_QTLo29_M	X_QTLo29_M
1	-2961835.57384...	3130781.88004945	204A	2843470.78	87870.05
2	-2961053.39909...	3130694.24016731	203E	2842769.82	87953.73
3	-2962203.15082...	3131183.27215315	204C	2843798.03	87505.93
4	-2961895.23467...	3131082.60082672	204B	2843522.49	87598.53
5	-2962090.70397...	3130927.95134937	204E	2843698.71	87736.82
6	-2962179.93203...	3131085.47632617	204D	2843777.79	87594.25
7	-2960820.40865...	3130652.1523835	205A	2842561.11	87993.07
8	-2961957.57035...	3130836.73645745	204F	2843579.86	87819.86
9	-2961276.90179...	3130724.24878828	205L'	2842970.09	87925.34
10	-2961460.47786...	3130745.79396527	205K'	2843134.6	87904.82
11	-2961053.39909...	3130694.24016731	205N'	2842769.82	87953.73
12	-2961233.76270...	3130719.35451494	205M'	2842931.43	87930.01
13	-2960898.02151...	3130660.32305234	205P'	2842630.67	87985.24
14	-2962596.2391785	3132114.77666504	16C	2844145.025	86663.689
15	-2962267.4491275	3131204.4526363	16B	2843855.566	87486.451
16	-2962569.17884...	3132380.43627469	16Q	2844119.194	86424.309

Figure 17: Transformed coordinates from LO29 to Pseudo Mercator.

All 3 layers were removed. Project CRS were put on EPSG: 3857, new transformed coordinates (Cape datum Pseudo Mercator) in CSV file were imported. Imported points were exported and saved as a shapefile format. HCMGIS is a plug-in that has BaseMap, therefore Google satellite was opened to check if points sit on the correct area (Figure 18).

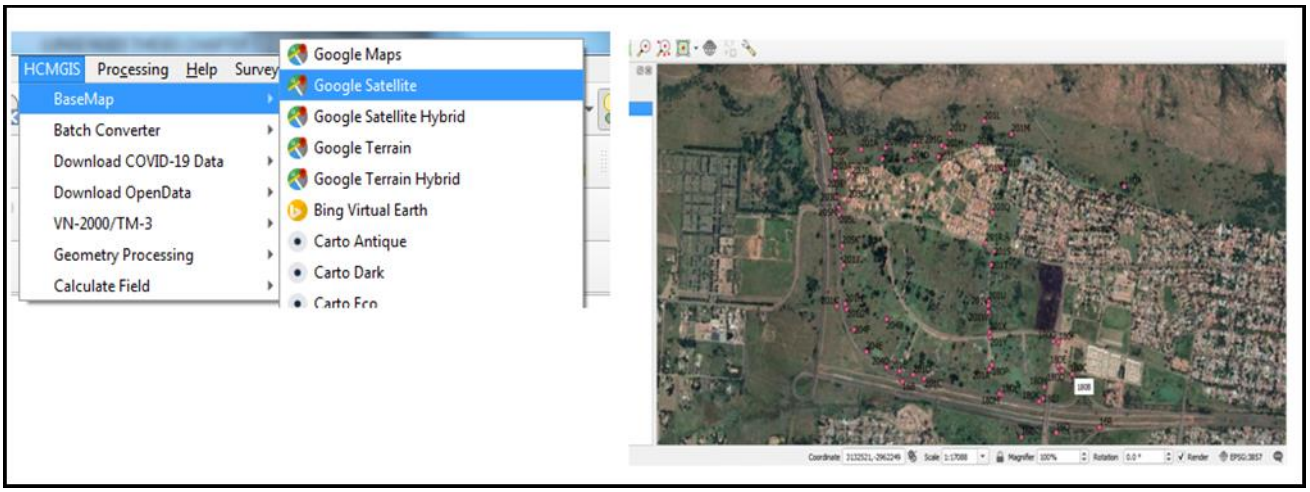


Figure 18: Base Map Google satellite showing points location.

3.5.1 Georeferencing of the general plan boundaries

The general plan was georeferenced using a tool called a georeferencer. The general plan in a raster image format was imported. Property boundary points on general plan were digitised using the GCP points on the ground in a shapefile, hence there was no need to enter the coordinates

manually. This was accomplished by clicking a point on a general plan and clicking the same point in a shapefile.

As this was done, a snapping option was turned on such that points clicked on vertex. This means that points were clicked on the exact positions where they were located. Points that were used are marked in red (Figure 19). The GCP table showed that a total of 20 points were used to reconstruct the modified image of the general plan (Table 8). The modified general plan was now on a Pseudo-Mercator EPSG: 3857 coordinate reference system (Figure 20).

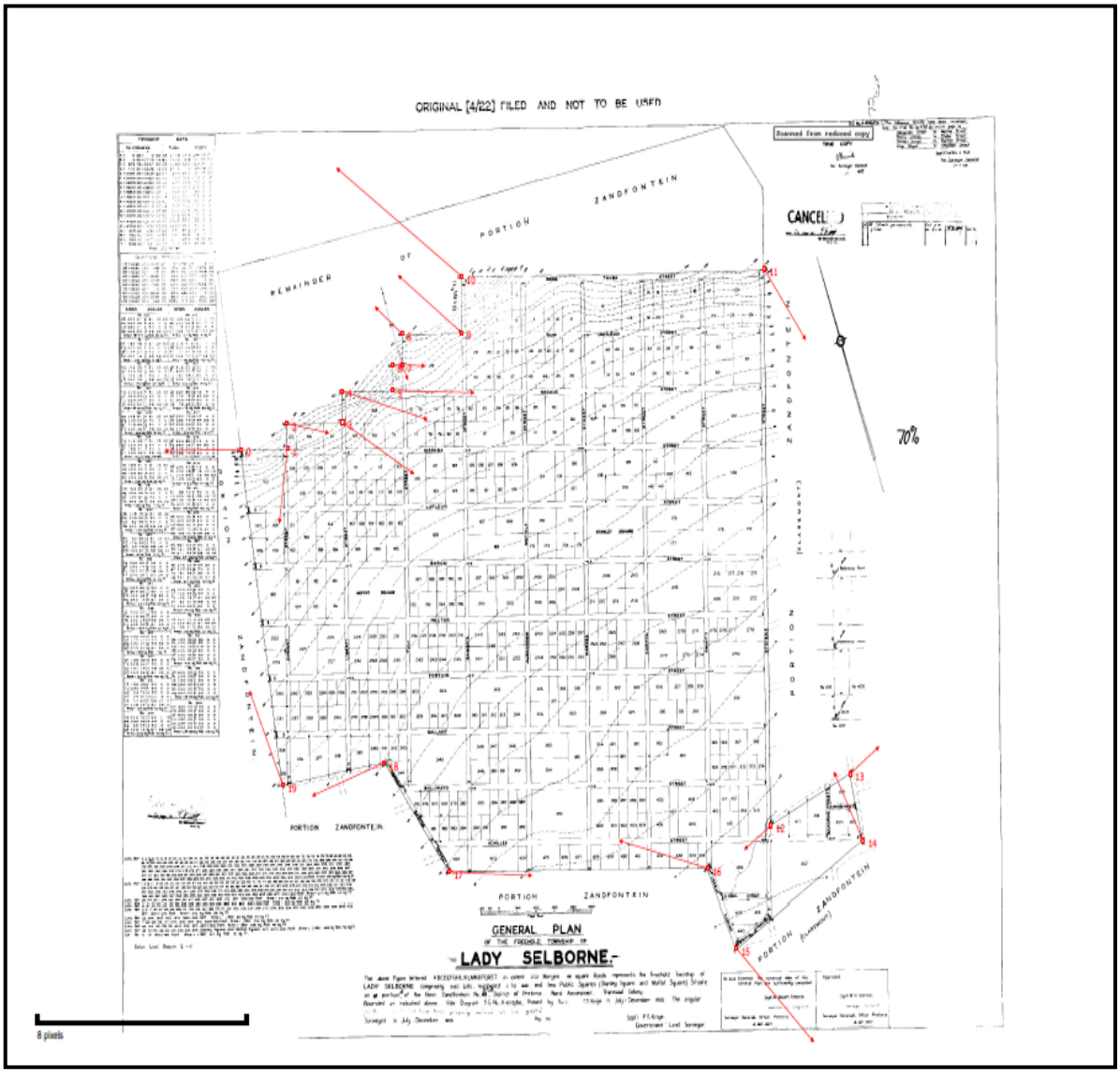
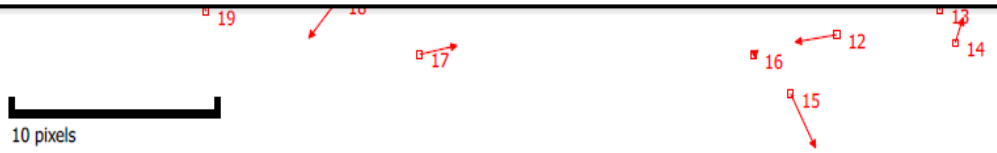


Figure 19: General plan showing points used for digitising.

The result of georeferencing came as new coordinates with residuals (Table 8) and modified general plan (Figure 20). Some points came out with different results; a few points such as point 3, 4, 9, 10 and 19 came with slightly higher residuals. However, all points were adopted. Points with higher residuals were adopted because there was a distortion of the original data when portions 201 and 180 were subdivided.

It should also be noted that according to the diagram of portion 16, the first survey was conducted in 1906 and unknown machines were used. New technology is being used at the moment so this might be the cause of distortions.

Table 8: Root mean square deviation of errors



ID	Enabled	Pixel X	Pixel Y	Map X	Map Y	Res X (pixels)	Res Y (pixels)	Res Total (pixels)
0	yes	1002	-1962	3130888.786	-2960885.707	-1.78498	0.459359	1.84314
1	yes	1348	-1961	3131052.717	-2960944.810	-0.729741	1.95742	2.08902
2	yes	1346	-1825	3131076.283	-2960878.736	0.964807	-0.409969	1.0483
3	yes	1762	-1824	3131273.537	-2960949.843	2.50236	1.61192	2.97659
4	yes	1761	-1651	3131302.988	-2960867.250	2.97123	0.673723	3.04665
5	yes	2138	-1653	3131480.529	-2960931.244	1.49119	-0.710804	1.65193
6	yes	2138	-1513	3131504.093	-2960865.170	1.42349	0.399442	1.47847
7	yes	2209	-1513	3131536.973	-2960877.017	0.354019	0.448403	0.571309
8	yes	2209	-1340	3131566.422	-2960794.424	0.309653	-0.70704	0.771875
9	yes	2658	-1341	3131776.842	-2960870.272	-3.45818	-1.15414	3.64569
10	yes	2659	-1029	3131829.864	-2960721.581	-3.99648	-2.87477	4.92302
11	yes	4921	-1021	3132901.707	-2961107.871	1.72888	1.87968	2.55387
12	yes	4931	-4092	3132380.436	-2962569.179	-1.9936	0.299016	2.0159
13	yes	5528	-3815	3132711.380	-2962538.245	-0.618205	-1.45547	1.58132
14	yes	5616	-4182	3132689.677	-2962729.214	0.378863	-0.999268	1.06868
15	yes	4665	-4765	3132139.176	-2962846.777	1.19739	2.18876	2.49488
16	yes	4450	-4320	3132114.777	-2962596.239	0.214617	-0.175856	0.277463
17	yes	2522	-4317	3131204.453	-2962267.449	1.79463	-0.357978	1.82999
18	yes	2045	-3707	3131082.601	-2961895.235	-1.36097	1.50585	2.02973
19	yes	1288	-3822	3130705.359	-2961820.392	-1.38897	-2.57828	2.92861

Figure 20: Georeferenced general plan overlayed on Base Map.

Boundaries of the general plan were reconstructed by connecting the points to form a complete figure of a small scale diagram, and newly subdivided portions were also reconstructed creating a shapefile for them in a format of EPSG: 3857 Pseudo Mercator projection (Figure 21).

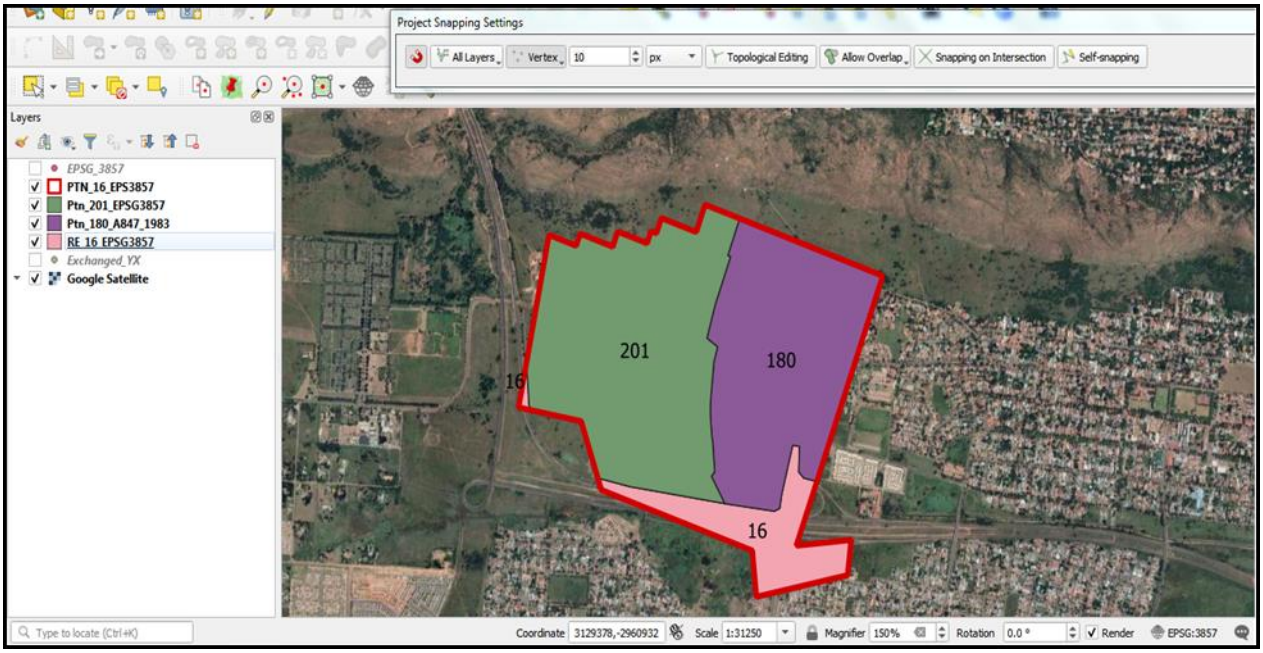


Figure 21: Shapefile of subdivided portions.

3.5.2 Digitising of block corners, ervens and elimination of errors

The type of digitising used was an on-screen digitising or head-up digitising, because tracing of physical features on images was done from a computer screen. The shapefile of a small scale diagram was created by clicking the boundary points of portion 16. The shapefile of two portions (portion 201 and 180) which were subdivided from portion 16, were also created (Figure 21). Portion 16 was filtered to be transparent so that portions inside it would be clear.

The reconstructing of block corners was done by creating a shapefile of vertical and horizontal lines. These lines were constructed by digitising the block corner lines (Figure 22). A copy and-move tool was used to copy these lines and paste them on top of all block corners lines on the general plan. On the street, a crossing split and-trim tool was used to split and trim the crossing of the streets. An extend tool was used to extend the block corner lines. These lines were saved as a shapefile of block corners.

A shapefile of ervens, streets and parks was created by digitising, by means of constructing the lines on top of the ervens lines on a general plan (Figure 23). Trimming and extending was also done and the shapefile was saved. Finally, a shapefile affected erf or lot number was created alone excluding other ervens, as this process was happening a shapefile of lots was created. Lot number 408 was randomly selected to make the case study; hence lot 408 was clipped from the lot shapefile layer.

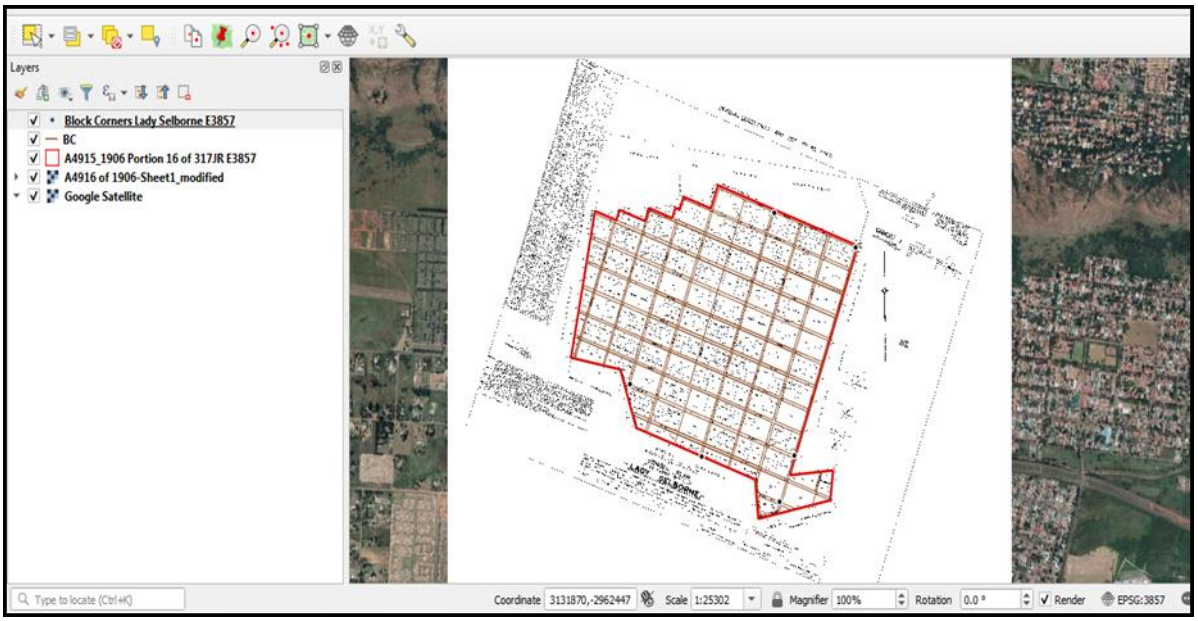


Figure 22: Vertical and horizontal lines drawn to construct block corners.

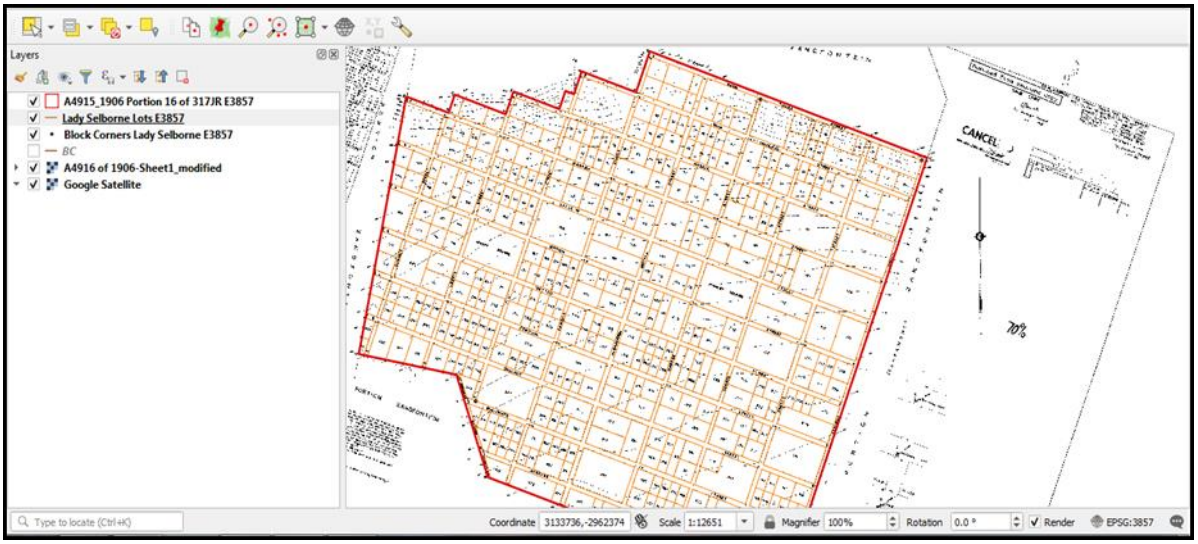


Figure 23: Reconstructed of township boundaries, parcels, streets and parks.

As a project is being digitised, certain errors such as overlaps, gaps, overshoots and undershoots are likely to happen. As stated, QGIS has different plug-ins and tools to perform any GIS work. Thus, errors were eliminated by using trims, extends, splits, copies, move features, cuts, subdivides and other tools. Before digitising started, the snapping option was turned on to allow the computer to click on a vertex. A topology tool can also be used to correct undershooting, overshooting and other errors (Durga, 2020).

QGIS has a plug-in which is called HCMGIS; this plug-in consists of a Base map; this Base map has a list of different kinds of maps. On that list, Google satellite was selected showing the aerial view of the affected area. Overlay of newly created shapefiles, topographical maps, and Google maps, before it was cancelled (Figure 24). Unfortunately, older orthophoto image flight plans did not cover the area when images were taken. There is no old data of images of the area hence a topographical map was used.

Figure 24: Overlay of Shapefiles, Topographical map before Lady Selborne was cancelled

CHAPTER 4: RESULTS PRESENTATION AND DISCUSSION

4.1 INTRODUCTION

This chapter mainly focuses on the presentation of the results in the reviews on South Africa, Australia, Canada and New Zealand, and on the reconstruction of the township of Lady Selborne. The case study shows how a combination of cadastral surveying and GIS was used to collect data on the claimed land. The results are presented in the form of maps, tables, figures and images. A number of maps were used in order to make the presentation more vivid and graphic.

4.2 RESULTS OF GIS AND LAND SURVEYING ON RESTITUTION AND LAND CLAIMS

Findings of the literature review was that restitution is a process that is not easy as it requires time, money, resources and honesty of those who are directly involved in the process. It needs all stake holders to be fully committed, especially government, the claimants and the experts. Restitution has been happening for many years now and it is a continuous process that is not going to end anytime soon.

People who lost their land in the past because of dispossession by colonialism have a right to formally lodge a claim to the relevant offices, and follow relevant procedures depending on a country's procedure. Compensation may be money or land, and if the land cannot be restored alternative land can be given. The purpose of restitution is to build the nation and bring peace to those who have suffered.

The literature review reveals that cadastral surveying and GIS is useful in times of land disputes. It produces maps and helps individuals understand the history, time and shape of the land development pattern that has happened previously and currently, and is also important for future planning on the land. Maps become solutions to prove to the claimants who has a case and who does not.

This process has challenges that need to be addressed. However, these challenges can only be solved if all parties, including the community at large, assist where there is a need. The most important challenge is finding and compiling evidence on the claimed land. The review reveals that cadastral surveying, maps, GIS and historical images have been tools that can be used to trace the evidence on claimed land including historical change detection, encroachments, overlapping claims and multiple claims on one claimed land.

Outside South Africa, the review of Canada, New Zealand and Australia reveals that the processes involve experts who make presentations in courts of law. Cartographers, historians, anthropologist, lawyers, GIS specialists archaeologists and linguists are amongst the experts that work together to give the required evidence before the court. These countries take an informed decision when

finalising the claim because professional personnel are directly involved and these experts cannot give false information under oath.

The South African literature review reveals that formal restitution processes do not indicate or talk about specialists or experts being involved in the process, and project officers who are not geomaticians do the research on the claimed land. Some of the reviews reveal that there are service providers who are hired to assist the Commission where they themselves are unable to collect the evidence on the claimed land. However, the Department has employees who can perform those services. These employees can assist with the claims process in order to cut down the costs of hiring external service providers.

A number of these service providers across all the provinces of South Africa are hired and paid substantial amounts of money to do work that can be done internally. In South Africa, processes do not involve the courts where evidence is presented by an expert before the judge. Challenges facing restitution in South Africa include budget constraints, slow paced processes, poor administration, conflicting and complex overlapping claims, and unsurveyed land. Lack of research skills and imperfect research results means that landowners tend to find loopholes to dispute the viability of claims in the courts.

The SAHRC recommended that the CSGO be involved in the processes to solve problems of unsurveyed land, competing overlapping claims, complex claims and also claims that involve land that has been developed. Some of similar recommendations from DPME, GTAC and SAHRC were that there is a need for improvement of research skills, restructuring of business processes, give details on business operations in terms of the duties of employees by CRLR. The DALRRD must seek ways to resolve disputes amongst the claimants and the Commission, so as to reduce claimants taking the Commission to the courts.

The case study on Lady Selborne revealed that the analysis of old data on claimed lands needs experienced personnel trained on how to extract, manipulate, analyse and interpret data, involving experts who are equipped to prevent mistakes that might cause disputes. It also revealed that within the department there are archives that conserve historical land data even if the area was demolished or developed and looks different.

It also shows how internal free data and a combination of cadastral surveying and GIS using open-source software was used to extract, manipulate, analyse and interpret data in the hands of skilled internal personnel can give thorough results regarding claimed land. The skilled personnel highlighted and interpreted all the events that have happened on the land from the time of the township’s establishment, its cancellation, to the consolidations and subdivisions that have happened to date. A map displaying a comparison of then and now was also produced.

4.3 RESULTS ON HOW TO DO A RESEARCH ON A CLAIMED LAND

Table 9a: Sheet 1 of coordinates list for all adopted and recalculated coordinates combined.

POINTS	Y	X	
	LO 29		
KONSTANTE	0	0	
16B	87486.451	2843855.566	
16C	86663.689	2844145.025	
16D	86640.22	2844369.553	
16Q	86424.309	2844119.194	
16R	86126.086	2844089.511	
16S	86144.542	2844260.892	
180A	85962.79	2842805.62	
180B	86314.8	2843807.26	
180C	86317.32	2843805.96	
180D	86385.88	2843790.92	
180E	86413.45	2843761.6	
180F	86410.05	2843636.99	
180G	86447.43	2843631.62	
180H	86506.36	2843875.66	
180J	86515.66	2843938.73	
180K	86544.51	2843952.75	
180L	86799.38	2843919.63	
180M	86815.15	2843917.21	
180N	86888.23	2843784.9	
180P	86870.17	2843763.5	
201A	87779.29	2842618.26	
201A'	86888.23	2843784.9	

Table 9b: Sheet 2 of coordinates list for all adopted and calculated coordinates.

201B	87631.11	2842670.29	
201B'	86815.15	2843917.21	
201C	87610.25	2842610.89	
201C'	87333.19	2843838.18	
201D	87431.95	2842673.49	
201D'	87411.89	2843819.59	
201E	87405.88	2842599.24	
201E'	87505.93	2843798.03	
201F	87245.4	2842655.58	
201F'	87598.53	2843522.49	
201G	87224.54	2842596.18	
201G'	87870.05	2843470.78	
201H	87194.82	2842606.61	
201H'	87882.18	2843444.42	
201J	87168.75	2842532.36	
201J'	87897.28	2843237.81	
201K	86978.55	2842599.14	
201K'	87939.141	2843457.622	
201L	86931.61	2842465.47	
201M	86742.8	2842531.76	
201N	86806.16	2842712.23	
201P	86791.08	2842717.52	
201Q	86873.33	2842951.8	
201R	86916.97	2843114.68	

Table 9c: Sheet 3 of coordinates list for adopted and calculated coordinates.

201S	86858.58	2843156.21	
201T	86878.54	2843230.7	
201U	86895.44	2843423.92	
201V	86896.28	2843443.93	
201W	86896.28	2843483.93	
201X	86887.56	2843587.14	
201Y	86882.55	2843616.82	
201Z	86870.17	2843763.5	
203A	87960.31	2842740.76	
203B	87839.33	2842763.77	
203C	87863.13	2842888.88	
203D	87938.35	2842874.58	
203E	87953.73	2842769.82	
204A	87870.05	2843470.78	
204B	87598.53	2843522.49	
204C	87505.93	2843798.03	
204D	87594.25	2843777.79	
204E	87736.82	2843698.71	
204F	87819.86	2843579.86	
205A	87993.07	2842561.11	
205K'	87904.82	2843134.6	
205L'	87925.34	2842970.09	
205M'	87930.01	2842931.43	
205N'	87953.73	2842769.82	
205P'	87985.24	2842630.67	

Calculations of coordinates produced a result of coordinates list for all calculated and adopted coordinate combined (Table 9a, 9b and 9c).

4.3.1 Historical data analysis

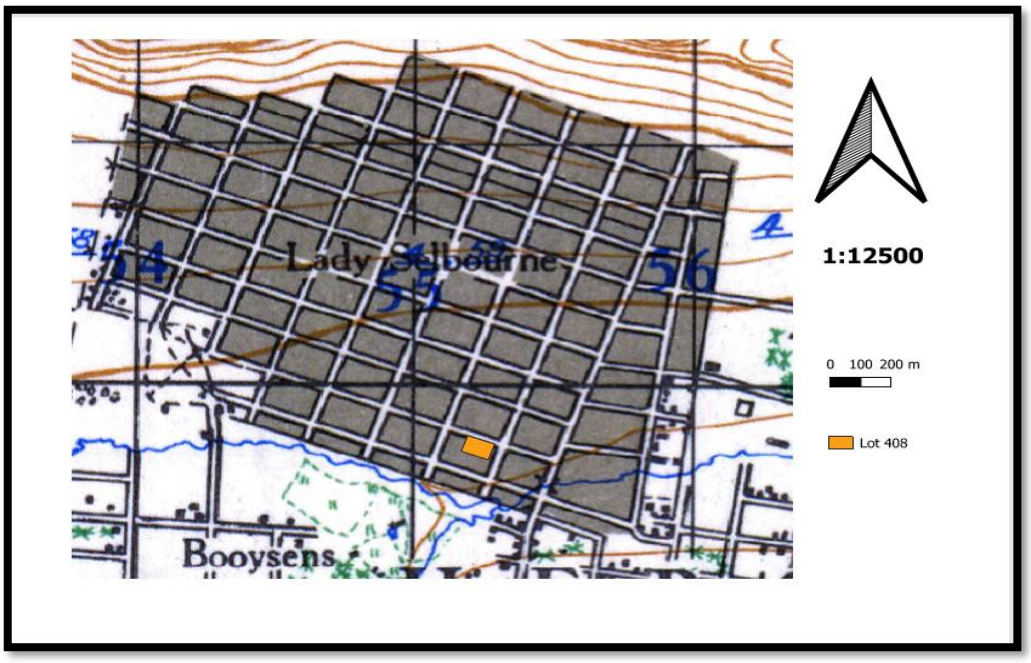


Figure 25: Topographical map in 1966 showing Lady Selborne location.

The historical topographical map made in 1966 (Figure 25) shows the location of the township Lady Selborne and lot 408 marked in red.

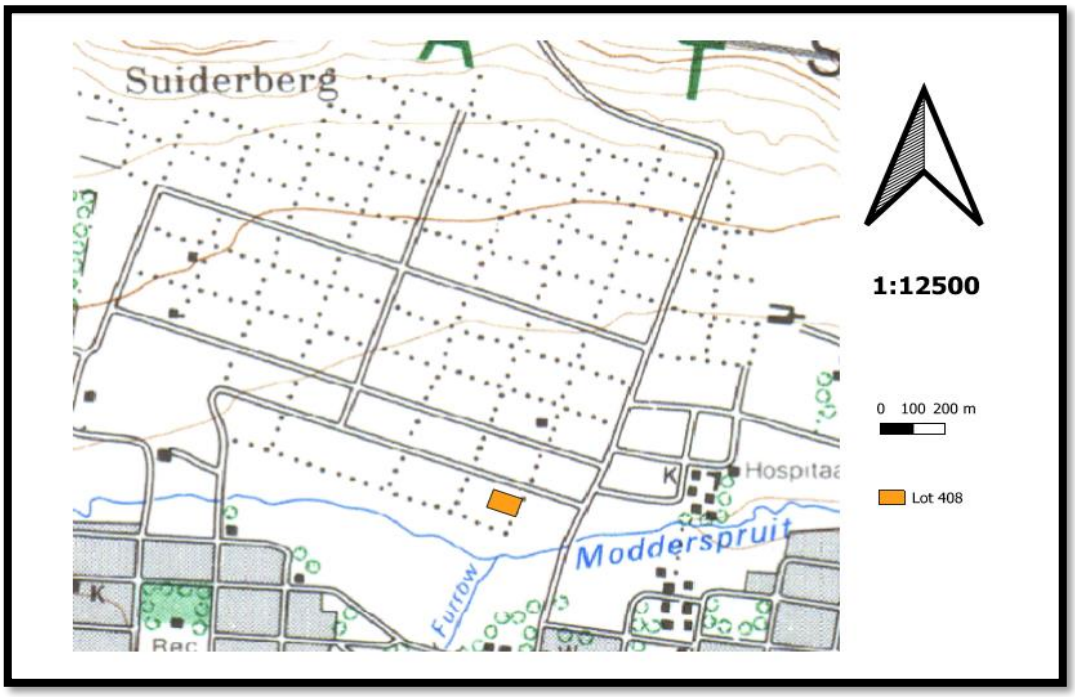


Figure 26: Lady Selborne in 1979 was no longer existing as it was cancelled.

The topographical map made in 1979 (Figure 26) shows that Lady Selborne was no longer existing as the township had been cancelled by the SGO.

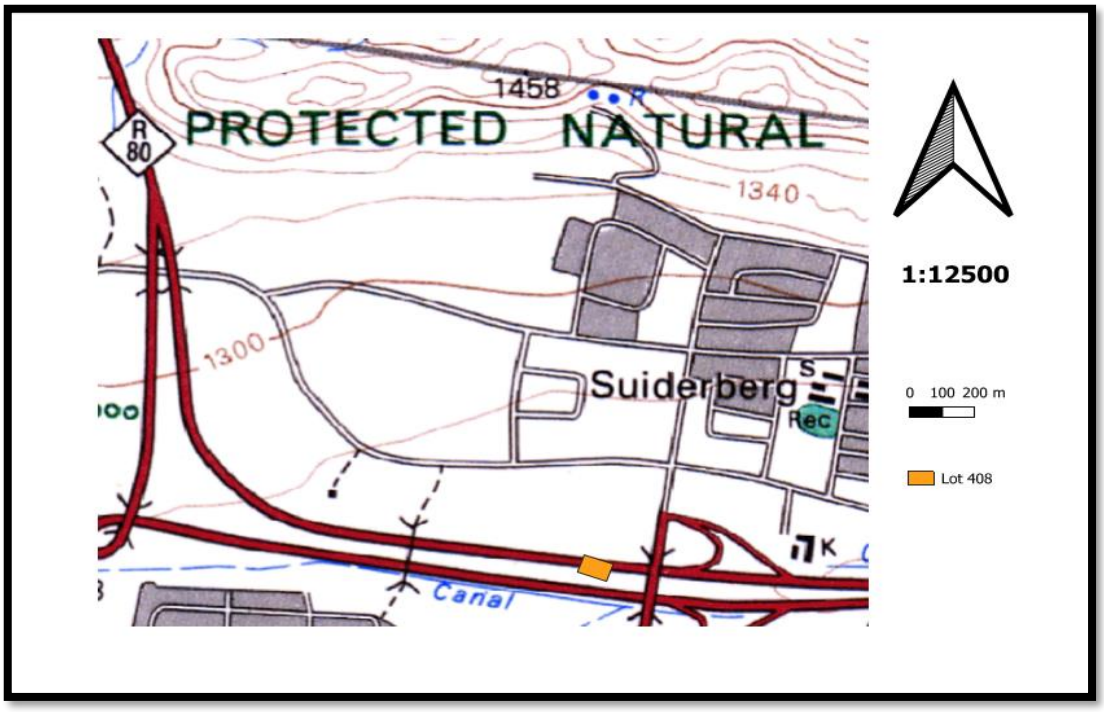


Figure 27: Topographical map in 1995 shows that Suiderburg was a new development in the area.

The Topographical map made in 1995 (Figure 27) shows that there was a new suburb called Suiderberg Township that was established after Lady Selborne was cancelled. This suburb is located where Lady Selborne was located.

Figure 28: 2008 NGI Aerial photograph showing aerial view and overlay of Lady Selborne shapefiles.

Figure 28 shows an aerial photograph from NGI showing an aerial view of the area and overlay of reconstructed township shapefiles to show how the area has changed compared to its previous state (Figure 28).

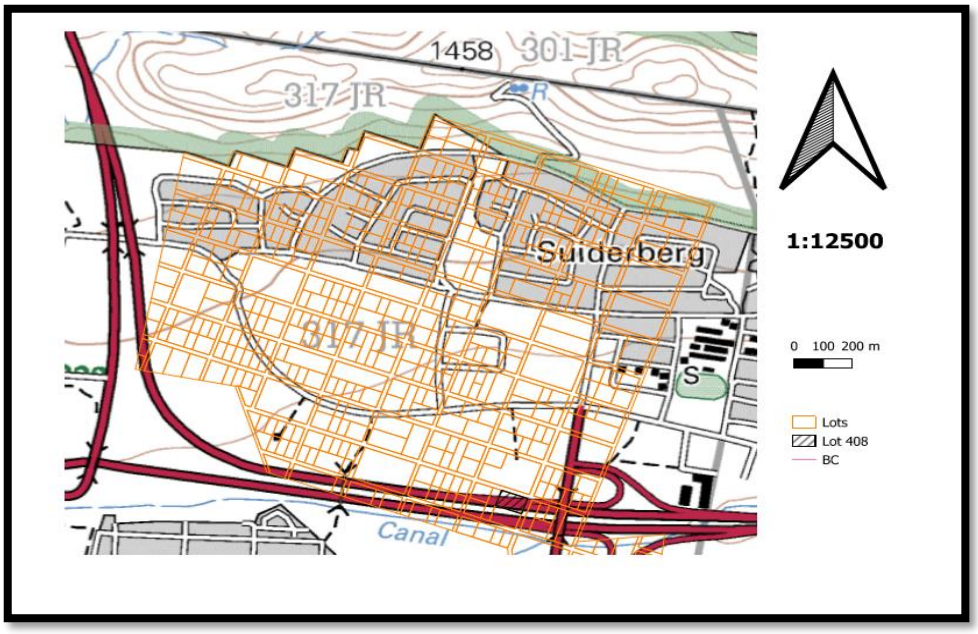


Figure 29: Topographical map of Lady Selborne in 2012.

Overlay of Topographical map with shapefiles (Figure 29) also show how the area has developed in 2012, which shows a Suiderberg township and a provincial road as new development in the area.

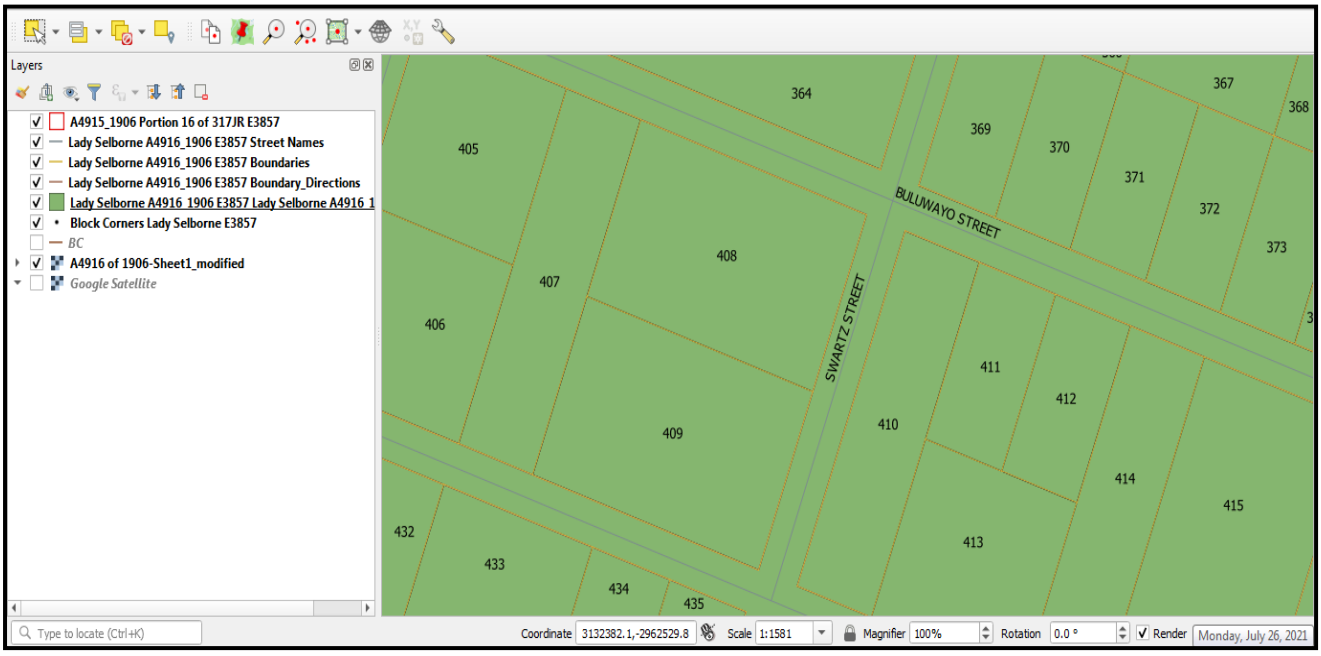


Figure 30: Complete general plan with lots, lot numbers, street names and block numbers.

Figure 30 shows a digitized small scale diagram with portions, complete general plan boundary with block corners, lots and lot numbers, public places, streets and street names.

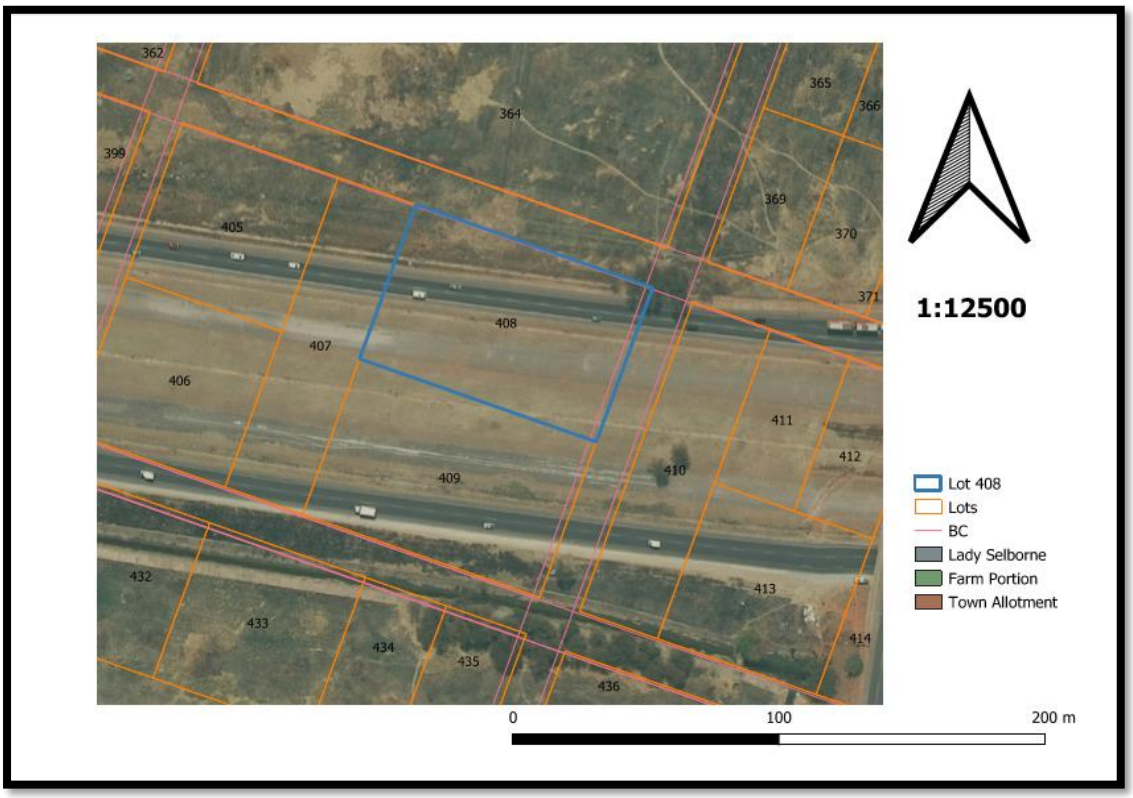


Figure 31: Overlay of shapefiles, Google satellite and Lot 408 current aerial view.

Overlaying of shapefiles and Google satellite image showed that Lot number 408 is currently located on the R80 Mabopane highway (Figure 31), a provincial road from Pretoria town to the Pretoria northern suburbs. In cases like this the claimant cannot get back lot 408 because it has been developed into a Provincial road. The claimant may get alternative land or monetary compensation. In terms of the land size, according to Table 3, Lot 408 falls under lot numbers in category E hence the erf size is 5948.02 square metres.

4.3.2 Current data analysis

The current situation as indicated (Figure 32) shows an overlay of Earial photograph with shapefile of Suiderburg, Lady Selborne and study area, shows that lot 408 is sitting on top of the Mabopane highway and on a small part of erf 577 and 578 Suiderberg township. A designed map (Figure 33) showing a combination of data from the SGO and NGI which are the custodian of cadastral surveying, maps and GIS in South Africa, under the DALRRD. As has been indicated above, in this case a claimant cannot claim lot 408 because it does not exist anymore because the land has been developed into something else. The claimant will have to get alternative land should the claimant want land, otherwise compensation can be monetary.

Figure 32: NGI 2018 Aerial photograph showing current situation on the study area marked in red overlayed with Suiderburg lot numbers marked in green, and other Lady Selborne lots marked in orange.

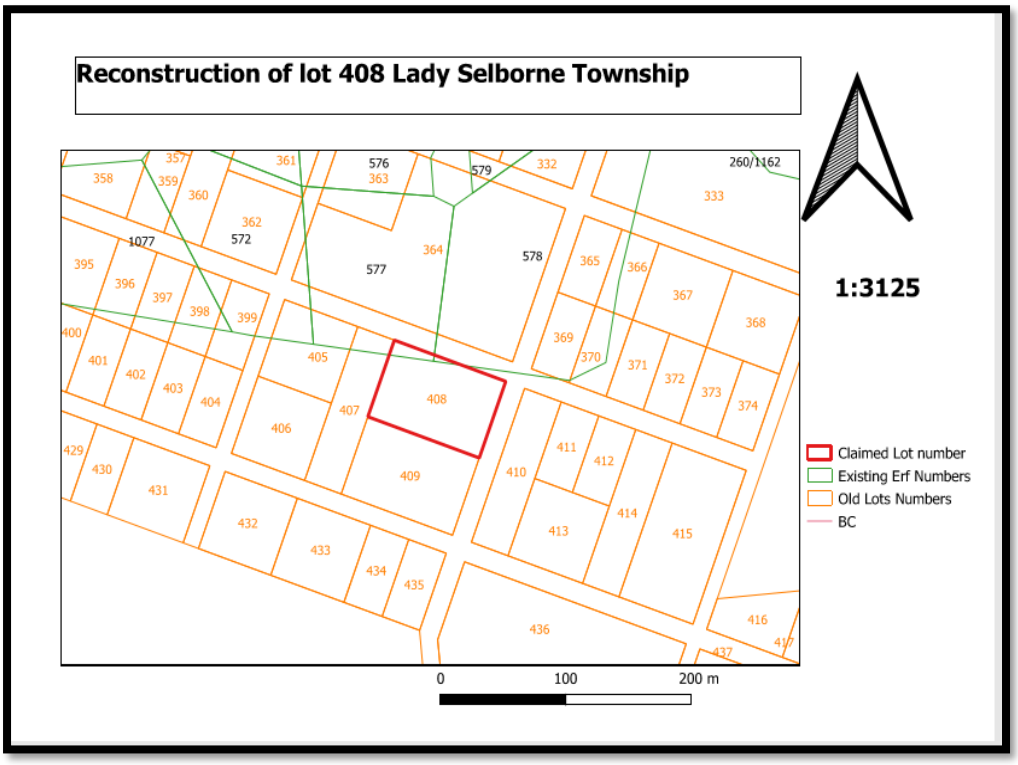


Figure 33: Designed locality map of lot 408.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter draws conclusions from the findings, summarises the important highlights of the events that have happened in the study, and then makes recommendations for the future. The issue of land is at the heart of most of the citizens of this country, therefore should be treated with caution and as a matter of urgency. Restitution aim is to reconcile the people so that all the wounds of the past can heal, and also for members of the community move forward to the future.

Restitution has been happening for many years already, and it is a continuous process that will continue in the future, therefore proper research and proper planning must be done to enhance the process for the benefit of citizens who have lost hope about the promised land. This process is not easy as it needs time, money, resources, and support from the community.

5.2 CONCLUSION

A combination of GIS and cadastral survey to provide maps and historical images can play a valuable role in the restitution process, and is able to address issues of encroachment, overlapping claims and change detection on claimed land. These tools help individuals to understand historical, current and future scenarios. The direct involvement of experts in the restitution court processes in Canada, Australia and New Zealand provides an example of how a combination of many brains gives excellent results. This means that whatever decision is taken it is based on an informed decision because people who are experts can be trusted because they are professionals, who work under a code of conduct from the professional bodies, and who cannot lie under oath to deceive the community. Claimants are involved throughout the process and they have a say in the court proceedings.

In South Africa there are no experts involved in the processes, but project officers who lack geomatics expertise are directly involved in the process. The DALRRD has geomatician personnel within the department but they are not involved, instead they outsource the skill to service providers and pay money for the skill that is already available internally. The reviews have emphasised that there is a skills shortage in terms of research and as a result landowners find loopholes. This causes frustrations for the claimants hence they end up taking the state to the courts of law.

The role of cadastral surveying and GIS in the restitution and land claims process is to paint a clear picture to those who were not born or who were not there during dispossession, by giving historical background data that shows what the area looked like up to now through historical images and maps. Another role is to serve as a mediator to resolve boundary disputes, encroachment issues, overlapping claims and multiple claims on one piece of land, by locating the correct boundary beacons to bring clarity regarding the claimed land.

In deep rural areas and where land is not surveyed, surveyors may be called to make correct property boundaries, and determine the property size of land using modern machines that can produce reliable measurements, which is helpful in determining the compensation value of land. Recalculation and conversions of coordinates, sides, reconstruction of parcels and other related data can be accomplished. Such work will prevent over-claiming, under-claiming, and disputes.

As an individual who has seen the claimants and project officers struggling to make sense of data on claimed land, it is this researcher's aspiration to be of assistance in interpreting data and designing maps using co-ordinates taken in the field. The aim of writing this dissertation was to conscientise the Commission regarding the human resources and skills at their disposal that can be used to solve some of the problems. The Commission needs to be made aware that the skills and resources that they are outsourcing to external service providers are available internally.

Under the DALRRD there is a branch called the NGMS, and under this branch there is the NGI and the SGO which archive, update and maintain historical data related to the land in RSA. They keep all kinds of maps in hard copies and soft copies. There is historical vector and raster data and other related data. Even the service providers get their information from these offices. In a case whereby the area needs to be extracted and enlarged, that work is done by internal staff. These offices have field work equipment and software to conduct the research related to claimed land. Some of the officials working there are qualified professionals registered with professional bodies. This means that they are competent enough to do the job.

The case study of Lady Selborne has shown that cadastral surveying and GIS tools combined can track down historical research by reconstructing an old general plan which was approved on 19 January 1907 based on a land survey that was done more than 115 years ago. The township was cancelled on 14 June 1976 and the physical evidence of the township's existence was abolished. Forty six years later these geomatics tools were able to reconstruct what has been eradicated by recalculating, manipulating, and analysing the data to get the desired results. Open source software QGIS played a big role in the data processing through georeferencing, digitising and overlaying of shapefile, historical images and historical maps. This provided an informative story from the establishment to the cancellation and up until now.

5.3 STRENGTHS AND WEAKNESS OF THE STUDY

5.3.1 Strengths

A combination of GIS and cadastral surveys to provide maps and historical images can play a good role when in the can play a valuable role in the land claim and restitution processes. It has the capability of resolving encroachment disputes, overlapping claims, unsurveyed land and change detection on claimed land, provide details to history and accurate and reliable measurements to finalise the claim.

As outlined, the findings were derived from South Africa and three countries outside South Africa, namely, Canada, Australia and New Zealand. The study indicated that land restitution is not a simple process, because land questions are a subject that is very sensitive to those who have lost their land due to past laws. Outside South Africa, there are experts involved in the processes and claimants are directly involved. Cartographers, historians, anthropologists, lawyers, GIS specialists, archaeologists and linguists are amongst the expert that work together to give the required research evidence before the court. These countries take an informed decision when finalising the claim because professional personnel are directly involved, and these experts cannot give false information under oath.

In South Africa this research reveals that there are no experts involved in the land claims process. The DALRRD hires external experts to resolve complex claims, while they have experts within the department. The DALRRD has resources, equipment and employees who are being underutilised. The research indicated that surveying and GIS can solve some of the existing challenges. Land claims are about land, and not involving land specialists is questionable, and not involving geomaticians costs the DALRRD time, money, and delays the process.

This case study of Lady Selborne showed that geomatics tools which was GIS and cadastral surveying, using an open source software QGIS was able to get a proper research evidence about the claimed land. Data was collected from SGO and NGI the custodians of South Africa to archive and maintain land surveying and GIS.

5.3.2 Weaknesses

This research was done during the Corona virus pandemic. Since 26 March 2020 the country has been on various levels of lockdown, with restrictions in place as measures to try and control the spreading of the deadly virus. The government encouraged people to stay at home and those who could work from home were encouraged to do so. People movement was discouraged hence most of the data retrieval was done online. The number of people entering buildings were restricted hence there were queues all over especially public buildings.

Data received from the land claims offices in Pretoria before lockdown was only the spreadsheet with information about the claims. On this spreadsheet only the property description were relevant to this study. It was said some of the claims were in court, and some were in the dispute, so they could not provide further information on those claims. They emphasised that the issue of land claims is sensitive and should be treated with caution, hence they are not at liberty to disclose some of the information of clients. With this in mind, Lady Selborne area was randomly selected as the case study.

Human error can be expected when capturing and processing data, especially when georeferencing, digitising and recalculating of points. The reason for this is that the original data which was surveyed more than 115 years ago is now old and the instrument used is not known. When new surveys were done in the 1980s there were discrepancies in the data. The reason could

be that modern equipment might not have the same accuracy as the olden days equipment. Georeferencing and digitising were done by a human hand not a machine; therefore there might also be discrepancies in accuracy. This process should be treated carefully in future research.

5.4 RECOMMENDATIONS

- Research studies based on locating the claimed land must be conducted by professional people with the relevant experience and skills to perform the job. This will prevent disputes from landowners and help in shortening the period taken to complete the research, otherwise claimants tend to lose patience and take the Commission to court.

- Cadastral surveying, GIS and other related skills that might be useful must be formally utilised in the processes, to address the issue of unsurveyed land, overlapping and complex claims as a result of changes done on the claimed land.

- Internal skills sets, archives, equipment and other relevant resources must be utilised first before outsourcing skills from service providers. In the cases where there are no skills internally, then service providers may be approached. This will assist in reducing the costs for the Commission. The money that was being spent on the service providers can be used in other areas.

- Departmental branches or offices should have open lines of communication where challenges are outlined and made known. This will ensure quick generation of ideas and solutions. The airing out of problems opens the doorway to getting solutions. Therefore, communication within branches or offices is vital. This will prevent outsourcing the skills that are already available in the department.

- The DALRRD should recognise that there are employees within the department with the skills which are currently being obtained by outsourcing. In addition, there are unused archives which should be used in the processes of land claims. This will solve some of the problems which they are currently facing. Geomatics must be involved in resolving backlogs on unresolved claims and the department must monitor the progress on the performance of the Commission. The department also needs to understand that the most important part of a land claims is the piece of land that is being claimed, hence there should be no mistakes regarding finding enough information about each piece of land.

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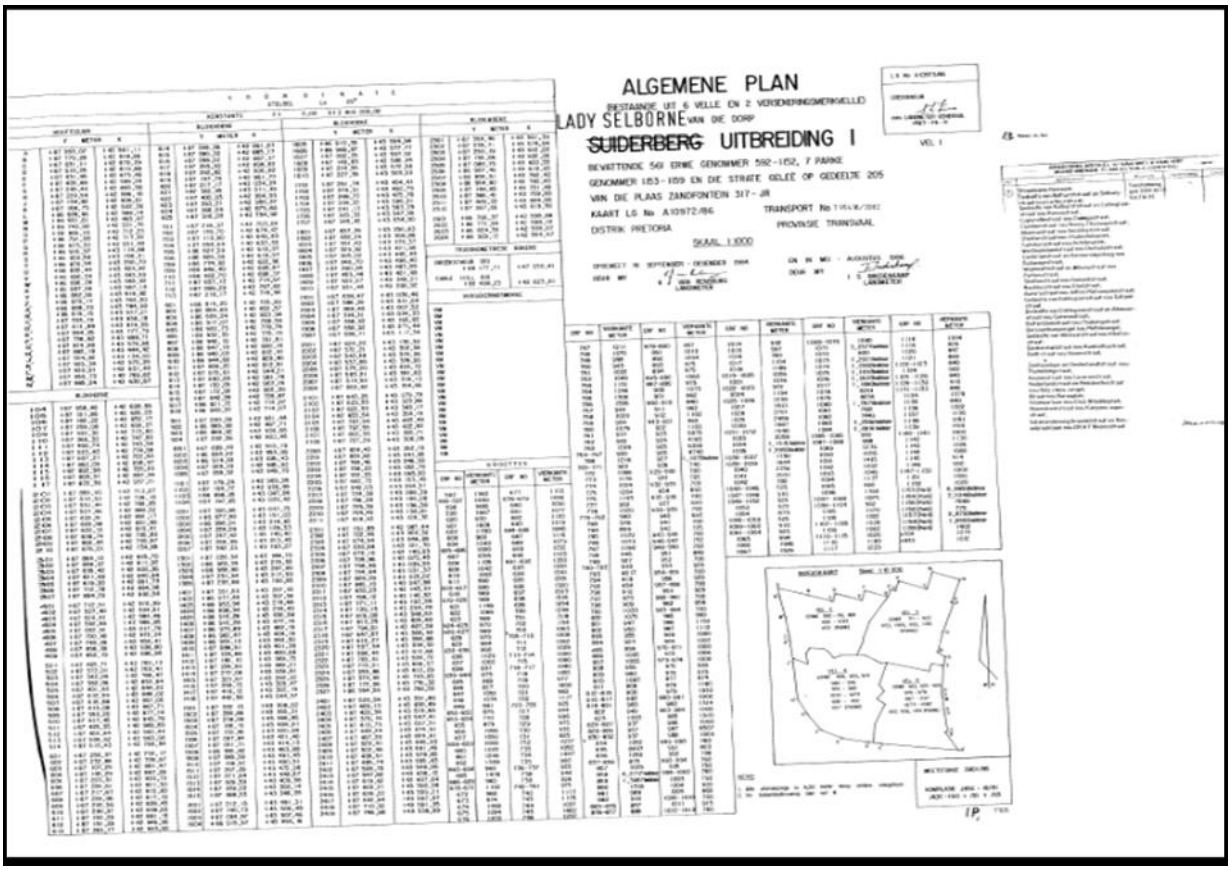
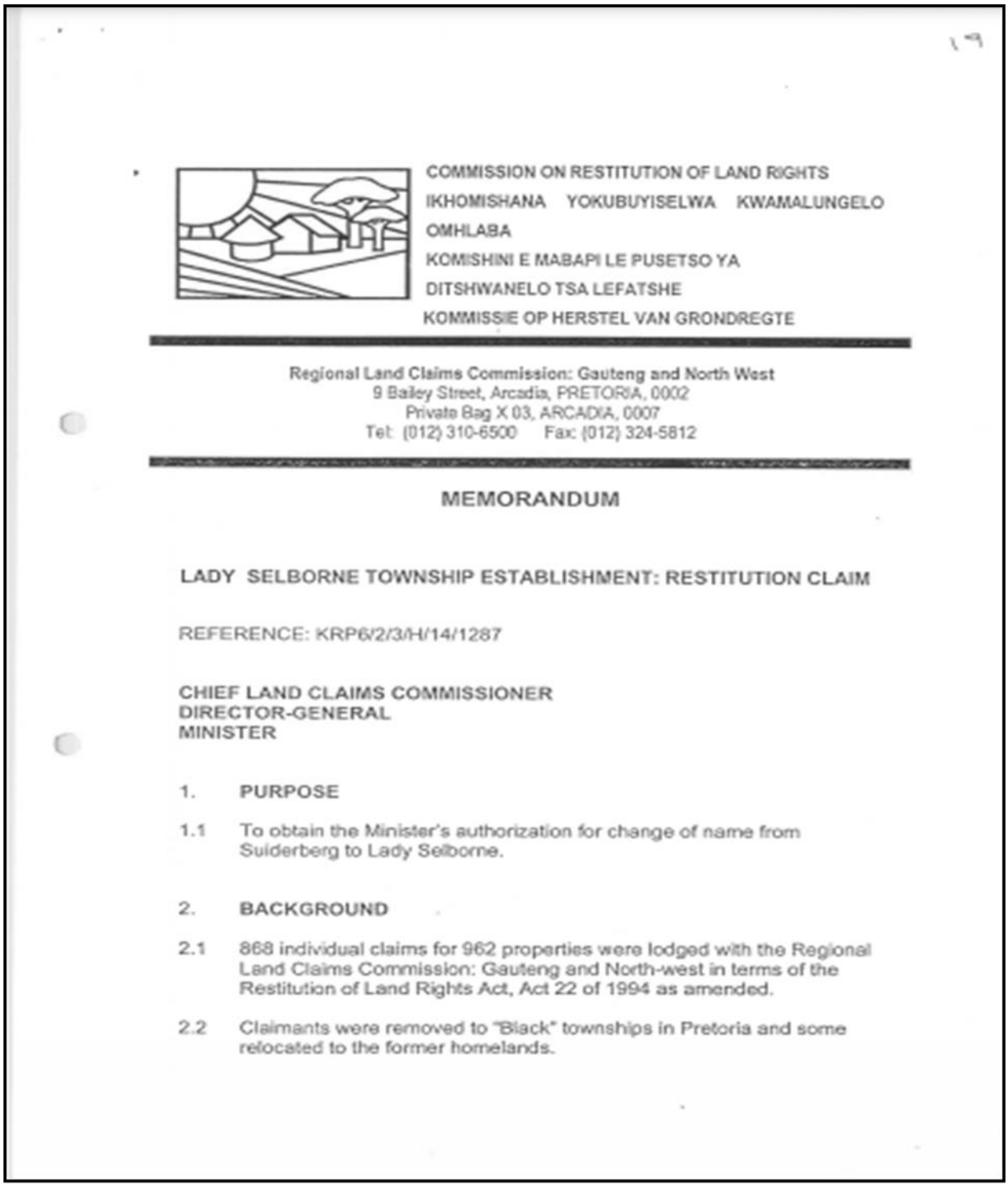
APPENDICES

Appendix 1: Suiderberg extension 1 has been renamed as Lady Selborne as per request by the claimants.



Appendix 2: Sheet 1 of memorandum requesting the change of Suiderburg township into Lady Selbone.



COMMISSION ON RESTITUTION OF LAND RIGHTS
IKHOMISHANA YOKUBUYISELWA KWAMALUNGELO OMHLABA
KOMISHINI E MABAPI LE PUSETSO YA DITSHWANELO TSA LEFATSHE
KOMMISSIE OP HERSTEL VAN GRONDREGTE

Regional Land Claims Commission: Gauteng and North West
9 Bailey Street, Arcadia, PRETORIA, 0002
Private Bag X 03, ARCADIA, 0007
Tel: (012) 310-6500 Fax: (012) 324-5812

MEMORANDUM

LADY SELBORNE TOWNSHIP ESTABLISHMENT: RESTITUTION CLAIM

REFERENCE: KRP6/2/3/H/14/1287

CHIEF LAND CLAIMS COMMISSIONER
DIRECTOR-GENERAL
MINISTER

1. **PURPOSE**

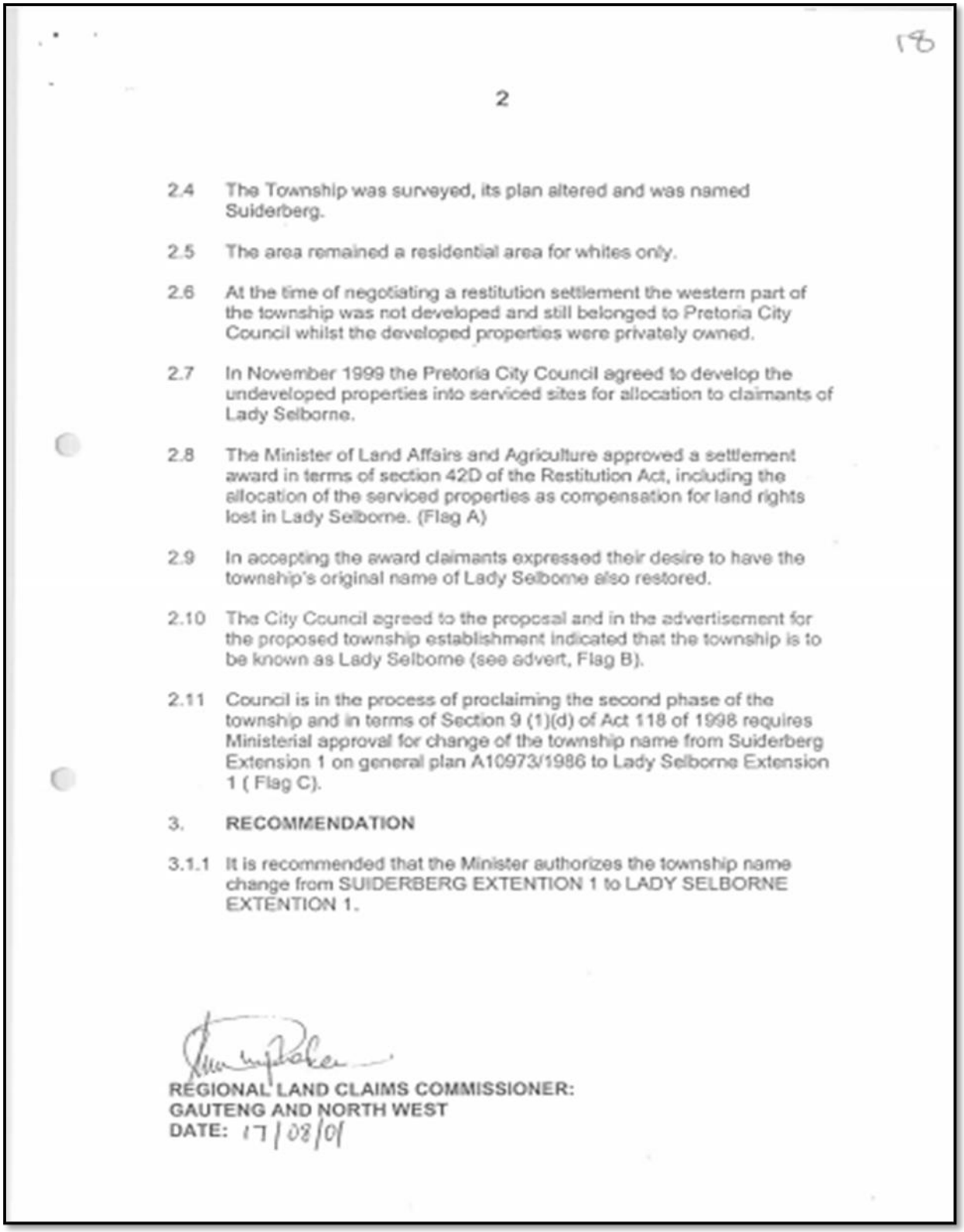
1.1 To obtain the Minister's authorization for change of name from Suiderberg to Lady Selborne.

2. **BACKGROUND**

2.1 868 individual claims for 962 properties were lodged with the Regional Land Claims Commission: Gauteng and North-west in terms of the Restitution of Land Rights Act, Act 22 of 1994 as amended.

2.2 Claimants were removed to "Black" townships in Pretoria and some relocated to the former homelands.

Appendix 3: Sheet 2 of memorandum requesting the change of Suiderburg township into Lady Selbone.



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2.4 The Township was surveyed, its plan altered and was named Suiderberg.

2.5 The area remained a residential area for whites only.

2.6 At the time of negotiating a restitution settlement the western part of the township was not developed and still belonged to Pretoria City Council whilst the developed properties were privately owned.

2.7 In November 1999 the Pretoria City Council agreed to develop the undeveloped properties into serviced sites for allocation to claimants of Lady Selborne.

2.8 The Minister of Land Affairs and Agriculture approved a settlement award in terms of section 42D of the Restitution Act, including the allocation of the serviced properties as compensation for land rights lost in Lady Selborne. (Flag A)

2.9 In accepting the award claimants expressed their desire to have the township's original name of Lady Selborne also restored.

2.10 The City Council agreed to the proposal and in the advertisement for the proposed township establishment indicated that the township is to be known as Lady Selborne (see advert, Flag B).

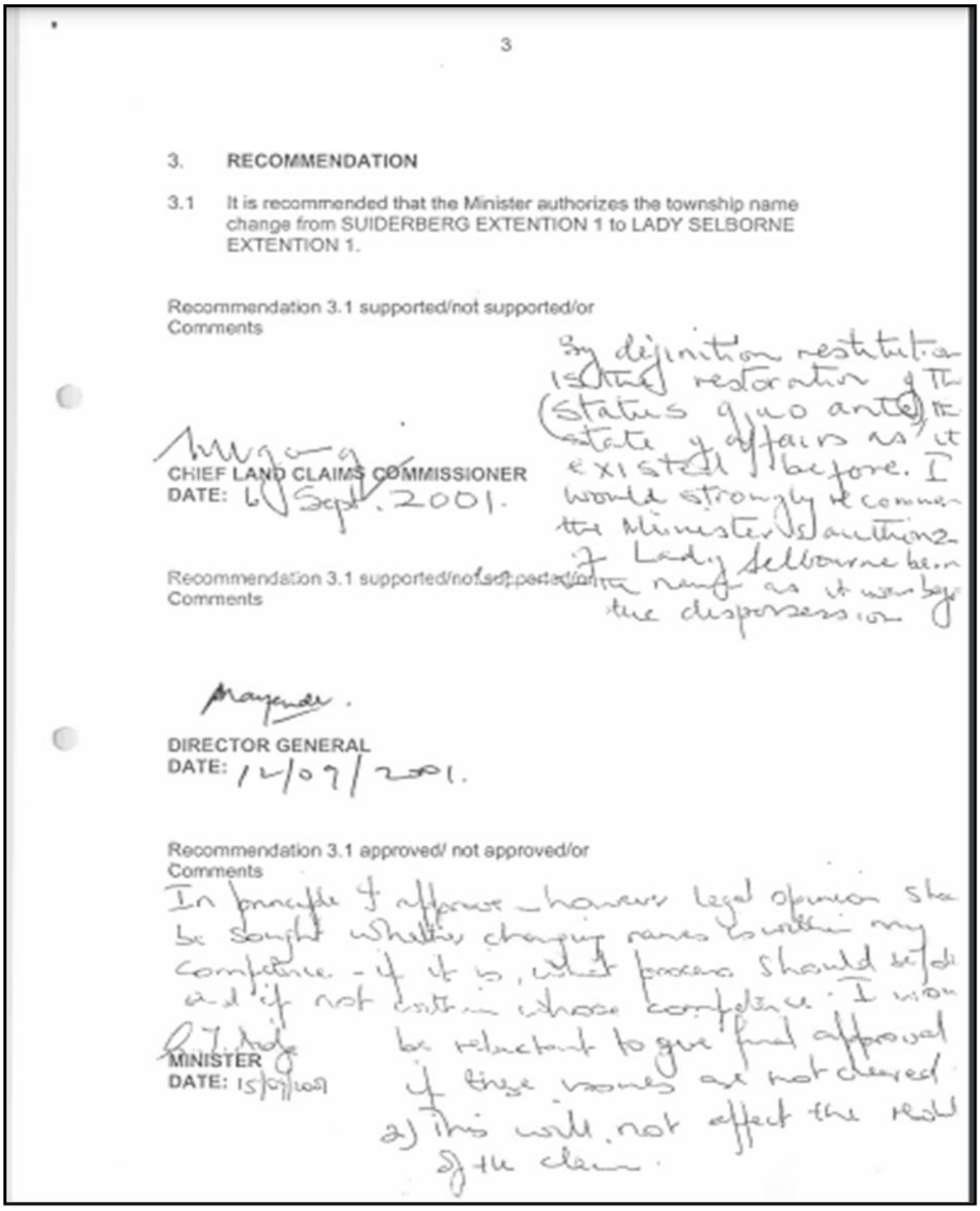
2.11 Council is in the process of proclaiming the second phase of the township and in terms of Section 9 (1)(d) of Act 118 of 1998 requires Ministerial approval for change of the township name from Suiderberg Extension 1 on general plan A10973/1986 to Lady Selborne Extension 1 (Flag C).

3. **RECOMMENDATION**

3.1.1 It is recommended that the Minister authorizes the township name change from SUIDERBERG EXTENTION 1 to LADY SELBORNE EXTENTION 1.

REGIONAL LAND CLAIMS COMMISSIONER:
GAUTENG AND NORTH WEST
DATE: 17/08/01

Appendix 4: Sheet 3 of memorandum requesting the change of Suiderburg township into Lady Selbone.



3

3. **RECOMMENDATION**

3.1 It is recommended that the Minister authorizes the township name change from SUIDERBERG EXTENTION 1 to LADY SELBORNE EXTENTION 1.

Recommendation 3.1 supported/not supported/or
Comments

By definition restitution is the restoration of the (status quo ante) the state of affairs as it existed before. I would strongly recommend the Ministers authorize Lady Selborne be given back as it was by the dispossession

CHIEF LAND CLAIMS COMMISSIONER
DATE: 6 Sept. 2001.

Recommendation 3.1 supported/not supported/or
Comments

DIRECTOR GENERAL
DATE: 12/09/2001.

Recommendation 3.1 approved/ not approved/or
Comments

In principle I approve however legal opinion should be sought whether changing names is within my competence - if it is, what process should be followed and if not within those competence. I would be reluctant to give final approval if these names are not cleared.
2) this will not affect the rights of the claim.

MINISTER
DATE: 15/09/2001

Appendix 5: Georeferenced general plan and small scale diagram boundary.