A technical examination and discussion of the conservation decision-making process using Anton van Wouw's *Cattle Grazing near Pretoria Zoo* (ca. 1896) as case study

by

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Submitted for the partial completion of degree

MSocSci Tangible Heritage Conservation

in the

SCHOOL OF THE ARTS

FACULTY OF HUMANITIES

UNIVERSITY OF PRETORIA

November 2022

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ABSTRACT AND KEY TERMS

Title of dissertation: A technical examination and discussion of the conservation decision-making process using Anton van Wouw's *Cattle Grazing near Pretoria Zoo* (ca. 1896) as case study.
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The study aims to examine, discuss and develop a feasible treatment proposal for a damaged oil on canvas landscape *Cattle Grazing near Pretoria Zoo* that was completed around 1896. The painting is by Dutch-born South African artist Anton van Wouw (1862-1945) who is predominantly known as a sculptor. Therefore, the research aims to position the artist in a new light – that of a painter – since very little of his painting oeuvre has been documented or studied. The painting chosen for the case study was extensively damaged in the past, including storage in a folded state and has undergone several treatments in the past, including marouflage, consolidation and infilling; yet the treatment remains incomplete. The research proceeds by thoroughly documenting the painting using a variety of historical, visual and analytical techniques including technical photography and X-Ray Fluorescence spectroscopy, which are widespread in heritage conservation practices because of their non-invasive and non-destructive nature. The information obtained from these investigations sheds light on van Wouw as a painter, his technique and material use, for which there is currently no data. In addition, the analytical research sets the foundation for discussing the treatment decision-making process that ensues. The treatment proposal employs contemporary conservation ethics as guidance to ensure the integrity of the painting's history and meaning remains intact, and based on consultations with the painting's custodian discusses its intended future use and potential avenues for treatment.

Key terms: Anton van Wouw; oil painting; 19th century South African art; painting documentation; technical photography; X-ray Fluorescence Spectroscopy; paintings conservation; conservation decision-making; conservation ethics

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PLAGIARISM DECLARATION

I, Johannes Anthonie Elsenbroek, hereby declare that *A technical examination and discussion of the conservation decision-making process using Anton van Wouw's Cattle Grazing near Pretoria Zoo (ca. 1896) as case study* is my own original work, and that all the sources I have consulted have been appropriately acknowledged by means of complete references.

Johannes Anthonie Elsenbroek
November 2022

ACKNOWLEDGEMENTS

This endeavour would not have been possible without the tremendous input from my study leaders Dr Isabelle McGinn and Dr Lise Havermans-Steyn. Thank you so much for keeping me on the right track, for your invaluable time and patience in sharing your vast knowledge and expertise in the discipline of conservation with me. I could not have asked for better supervisors.

My deepest gratitude towards the generosity of the Andrew W. Mellon Foundation who provided me with the financial means to pursue my dream of becoming a paintings conservator. A very special thank you also goes to my family for their unwavering support in all my undertakings.

I would like to extend my sincere thanks to Ms Maggi Loubser. Your expertise in XRF, your ability to connect me with the right people and your ongoing words of encouragement greatly contributed to the success of this research. To Mr Gerard De Kamper for sharing his impressive amount of historic knowledge on Anton van Wouw. To Ms Sandra Markgraaf for her enthusiastic willingness in taking me under her wing by teaching me the practical side of paintings conservation.

Other individuals I am indebted to in my journey of learning include Ms Salomé Le Roux, Ms Thania Louw, Ms Daniéle Knoetze, Mr Dirk Oegema, Ms Jean Dommermuth and Dr Sian Tiley-Nel.

I am truly grateful for the lasting impact from all of you. Thank you.

CHAPTER 1
INTRODUCTION

This chapter serves to introduce this research paper by providing a background to the study in general. A background to the specific case study is also given which places it into context and includes information about the painting's history, provenance and past treatments. The research questions and aims of the study are also given.

1.1 Background to the study

As a painter and an aspiring paintings conservator, I have come to realise that a shift from a mindset of creating paintings to one of caring for them does not come without its own set of challenges. Before starting my studies in Tangible Heritage Conservation just over a year ago I was under the naïve impression that I, as a painter, would seamlessly be able to transition from being an artist to becoming an art conservator. After all, would a painter not naturally be able to fix paintings as well? There is no simple answer since conservation is no simple profession.

Conservation is blanket term that encompasses all actions aimed at promoting the longevity of cultural property for future generations. These actions include examination, documentation, preventative conservation, preservation, treatment, restoration and reconstruction (CAC & CAPC, 2000:12). All these actions are unified under a common goal – that of managing or attempting to control material change. Clavir (1998:1) notes that conservation methods operate through a systematic scientific approach to grasp how the materiality of artworks or artefacts, along with their surrounding environment, influence their deterioration over time. Thus, having the material knowledge dealing with the chemical, biological and physical processes of deterioration is one of the key competencies required to be a practicing conservator (ICOM-CC, 1984).

In addition, a conservator also requires sensitive artistic manual skills, knowledge of art and cultural history, the ability to conduct research, as well as knowledge of conservation theory and ethics (ICOM-CC, 1984). Last but not least, the conservator is required to formulate guidelines for preventative measures to delay material deterioration in addition to carrying out remedial treatment. This is done through

judgement. Judgement plays a crucial role in the formulation of a treatment strategy as it involves selecting and applying the appropriate knowledge from the abovementioned fields. Caple (2000:1) defines judgement as:

> 'the weighting of knowledge leading to a decision' and includes: ethical considerations, the best way of achieving the aims of conservation, the extent of cleaning, the extent of restoration, the extent to which limited time or funding should influence the conservation, the wishes of the object owner, risks of damage to an object, the health and safety of the conservator, aesthetic considerations and many other factors.

Caple (2002:1) further notes that judgement is an aspect of conservation that students tend to struggle with. Although students generally assimilate knowledge of different conservation treatment methods readily, they struggle with deciding on which one to apply in which situation.

Decision-making can be particularly complex when it involves the re-treatment of artworks that have undergone conservation efforts in the past such as the painting which forms the core of the present research. Treatment in such cases, not only deals with understanding the materiality of the artist and the artwork, but also the understanding of the physical and chemical properties of the conservation materials and the interplay of these newer materials with the original. Ethical considerations of whether to retain or reverse past repairs may be limited to what treatments can realistically be carried out safely within the limitations of time, budget or skill of the conservator.

Due to the complexity of conservation decision-making, particularly for novice conservators, I have decided to make it the focus of my dissertation by applying Barbara Appelbaum's *Conservation Treatment Methodology* (2010) to a partially restored oil painting by Anton van Wouw.

1.2 Background and context of the case study

Cattle Grazing near Pretoria Zoo (figure 1) is an oil painting on canvas adhered to Masonite board that was completed in or around 1896 by the renowned Dutch-born South African artist Anton van Wouw (1862 – 1945). It is currently held at the Wouw

House[1] in Pretoria (van Wouw's last place of residence) and forms part of the University of Pretoria (UP) Art Collection, more specifically the UP Anton van Wouw Collection[2].

Figure 1: Anton van Wouw, Cattle Grazing near Pretoria Zoo, ca. 1896. Oil on canvas affixed on Masonite board, 870 mm x 1420 mm. Van Wouw House, Pretoria. Photograph by Ms Thania Louw, Art 2 Motion.

This landscape painting depicts a dirt path leading into a crudely cultivated grassland patch where two cows are grazing in the foreground. Behind the cows is a fence and beyond a field of overgrown grass. On the right of the painting there is a thicket of trees

[1] The Van Wouw House is located at 299 Clarke Street in Brooklyn Pretoria. From the early 1970s the University of Pretoria had been seeking to acquire a gallery or exhibition space for itself. The Van Wouw House had been an option for this endeavour. In 1973 the University acquired the house, including seven of van Wouw's sculptures that were on the property. This was made possible with the generous financial assistance from Dr Anton Rupert on the condition that a room of the house would be set aside to exhibit van Wouw's artworks; that the University would continue to collect artworks by van Wouw with Rupert's aid; that the house could be let to a couple; that two rooms be reserved for exhibitions and that the house be renovated (De Kamper, 2018:144). The Van Wouw House was officially inaugurated in 1974 with an exhibition of van Wouw's artworks (De Kamper, 2018:145). Since 1983 the house was curated and solely used as a fully-fledged museum. During 2014 the Van Wouw House ceased being a museum and was repurposed as a student art exhibition space by the University's Department of Fine Arts (De Kamper, 2022/03/16). In 2020 the Van Wouw House was repurposed as the conservation laboratory and teaching centre for the University of Pretoria's Tangible Heritage Conservation programme and still currently functions for this purpose.

[2] As mentioned above, the University of Pretoria's Anton van Wouw Collection started with the acquisition of the Van Wouw house along with seven sculptures in 1973. After the acquisition of the house, the University started to collect (and continues to collect) works by van Wouw in accordance with their agreement with Dr Anton Rupert (De Kamper, 2018:145). The collection currently consists of 166 sculptures, 14 other artworks (including 2 drawings, 3 oil paintings, 7 watercolours and 2 prints) and 14 personal objects (De Kamper, 2018:149).

and bushes situated behind the fence, whilst another row of trees recedes into the background on the left behind the overgrown grass. In the background a mountain ridge can be seen fading into the distant horizon. The sky makes up the upper third of the composition and is light and clear with no clouds present. The painting is executed in an impressionistic manner with prominent surface textures and loose, visible brushwork. Despite the rough and expressive paint application, the painting has a very realistic appearance. Van Wouw's signature can be seen in the bottom left corner along with the inscription 'Pretoria' next to it in red paint. As indicated by the painting's title this pastoral scene depicts a farm in Pretoria near the Zoological Gardens and so the mountain ridge in the background is the Magaliesberg mountain range as seen from the area surrounding Redoubt Hill where the zoo is located.

Before being accessioned into the University of Pretoria's Art Collection, the painting belonged to Ms Mimmie Stegmann, who donated it to the University in 1975, the time when UP started its collection of van Wouw's artworks, as seen in figure 2. According to the Tukkiewerf newspaper of 1975 in the article titled "Van Wouwskildery Oorhandig" (Van Wouw painting hand over) (1975:5) Ms Stegmann inherited the painting from her father Jan Francois Elias Celliers[3] (1865 – 1940), the famous Afrikaans poet and language activist. Celliers received the painting from van Wouw himself as a gift (De Kamper, 2022/01/17). Van Wouw was Celliers brother-in-law as his first wife, Suzanna Wilhelmina (Sannie), was Celliers's sister. According to the article, Ms Stegmann made the decision to donate the painting to the Anton van Wouw Collection after it had been discovered in the attic of her father's (Jan F E Celliers) house.

According to Mr Murray Schoonraad's (lecturer at the University of Pretoria's Department of Art History at the time of the painting's donation) notes, the painting

[3] Jan F E Celliers was an Afrikaans-language activist, poet, essayist, dramatist and reviewer. His father, Jan Francois Celliers (1839-1895) was a South African journalist, politician and founding director of the Afrikaans newspaper *De Volkstem*. Jan F E Celliers first worked as a land surveyor for one year before joining the Department of Education of the SAR in 1891. He obtained the position as State Librarian in 1894. When the South African War broke out Celliers fought in the war near Colesberg until the very end and thereafter managed to escape through the British lines, disguising himself in his wife's clothes. After the end of the war in 1902 he relocated to Europe with his family and studied literature. He returned to South Africa in 1907, receiving the position of translator at the Department of Home affairs and worked there for ten years. In 1919 the University of Stellenbosch offered him the position of extraordinary professor and he remained there until his retirement in 1929. Thereafter he moved to Cape Town. Celliers died in Johannesburg in 1940 (Breuer, Sa).

was taken to the liaison office of the University of Pretoria in February 1975 by Ms A S J van Heerden - granddaughter of Jan F E Celliers and daughter of Ms Stegmann (University of Pretoria Museums Archive, Anton van Wouw section, 1976). She was then referred to Mr Gunther who was an administrative official at the University of Pretoria at the time. Mr Gunther took the painting to Mr Schoonraad and provided him with the information he gathered from Ms van Heerden. According to Ms van Heerden the painting was discovered in the attic of Celliers's house. It was folded and the paint layers were severely cracked. Mr Schoonraad states that when he had received the painting it was in a battered condition with several tears in the canvas as well as paint flaking off at various areas (University of Pretoria Museums Archive, Anton van Wouw section, 1976).

Figure 2: Mr C Gunter (secretary of the governing body of the Van Wouw House Museum), Ms ME Stegmann, Prof F G E Nilant (head of the Department of Art History and Fine Arts) and Mr Murray Schoonraaad from the Department of Art History ("Van Wouwskildery Oorhandig", 1975:5).

After its donation, the painting was first exhibited in the UP Club Hall from 1975 until 1983. It was then moved and displayed at the Van Wouw House Museum in Brooklyn, until 2014 (De Kamper, 2022/03/16). It was exhibited among a collection of van Wouw's sculptures and other objects including his paint box, seen in the foreground of figure 10 (De Kamper, 2022/04/19)) and easel, sculpting tools and maquettes (De Kamper, 2018:148). By comparing the photographs of the painting taken during the

donation ceremony (figure 2) to that taken during its exhibition at the Van Wouw House (figure 3), it would appear that the frame may be a later addition to the painting. This suggests that it was only added after its donation for exhibition purposes, therefore the present research does not include the frame in its proposed treatment of *Cattle Grazing near Pretoria Zoo*.

Figure 3: Cattle Grazing near Pretoria Zoo as it was exhibited in the Van Wouw House Museum from 1983-2014. Photo by Mr G de Kamper.

During 2014 the Van Wouw House ceased being a museum and was repurposed as a student art exhibition space by the Department of Fine Arts (De Kamper, 2022/03/16). The painting was then moved and displayed in the Old Arts Buiding on the University of Pretoria's Hatfield campus until 2016 when it was sent to Art Revive[4] for further treatment (De Kamper, 2022/01/17).

[4] Art Revive is Pretoria-based company that specialises in the conservation of paintings, preservation of art, evaluation and condition assessment of artworks and is owned and managed by Ms Sandra Markgraaf.

1.3. *Cattle Grazing near Pretoria Zoo*'s conservation history

Since its donation, the painting had undergone several treatments. Upon receipt of the painting, Murray Schoonraad's immediate reaction was to formulate a treatment strategy with the aim of saving as much of the painting as possible. Not being a conservator himself, Schoonraad took the painting to Ms C van Tilburg, the restorer at the Pretoria Art Museum. It was with her help that Mr Schoonraad adhered the painting onto a Masonite backing board. This practice of attaching a canvas painting to a rigid support is known as *marouflage*[5], from the French *maroufler* which means "to stick on" or "to transfer" (Nicolaus, 1999:131).

In his notes Mr Schoonraad further states that Ms Gertrud Berger, a family friend of the Schoonraad's, came to visit them during April in 1975 (University of Pretoria Museums Archive, Anton van Wouw section, 1976). Ms Berger was the head restorer at the Staatsgalerie (State Gallery) Stuttgart in West Germany at this time. She received her tutelage in art restoration in West Germany, worked in the United States of America as an art restorer for seven years and was well known for her work in Europe. Mr Schoonraad asked her advice for the best method of having this painting preserved. She partially restored the painting during her visit in South Africa, first covering the painting in wax to prevent further flaking of the paint and subsequently cleaning it. After the wax consolidation, Ms Berger advised against further interventive treatment (Schoonraad notes, University of Pretoria Museums Archive, Anton van Wouw section, 1976). The painting was then left as it was: assembled and mounted on the Masonite backing and consolidated with wax.

On 27 May 1975 the painting was officially received by the University of Pretoria by the head of the Department of Art History, Professor F G E Nilant, as seen in the photograph (figure 2). Another photograph of the painting was also taken on this day of the donation ceremony (see figure 4).

[5] *Marouflage* has a long history of practice and refers the complete attachment of a canvas painting to a rigid support with an adhesive and has been mainly used by artists and architects for large canvasses that are attached to walls or ceilings. Such canvasses with an architectural function which are not expected to be moved, become part of the decoration of the building structures that are relatively solid and stable (Hackney, 2020:25). In paintings conservation, marouflage is usually restricted to only the most extreme structural problems and as it is seen as a highly invasive treatment. Some conservators deem marouflage a necessary treatment for extremely deteriorated canvases since it can provide enough stability for future handling, display and loan. (Hackney, 2020:89).

Figure 4: Photograph of van Wouw's Cattle Grazing near Pretoria Zoo after its treatment by Mr Schoonraad, Ms van Tilburg and Ms Berger. Photograph possibly taken by Mr M Schoonraad on 27 May 1975 (University of Pretoria Museums Archive, Anton van Wouw section, 1976). Photograph of this photograph provided by Mr G de Kamper (29/07/2022).

The painting had undergone further treatment in 2016 which was carried out by Ms Sandra Markgraaf from Art Revive. Ms Markgraaf (personal communication 2022. March 24) states that she consolidated areas of loose and flaking paint using Lascaux 4176 Medium for Consolidation. This is a water-based acrylic dispersion resin that has a neutral pH, good ageing properties, good penetration and wetting properties which makes it amongst the preferred consolidation materials for paintings conservators (Von der Goltz *et al*, 2012:373). Ms Markgraaf (personal communication 2022. March 24) states that she then cleaned the surface of the painting using Triton X-100[6]. Ms Markgraaf also noted that the painting's coat of varnish had been previously reduced, possibly during the painting's cleaning treatment by Ms Berger in 1975.

Ms Markgraaf (personal communication 2022. March 24) further stated that after the painting was consolidated and cleaned, she proceeded with the in-filling of the areas suffering from paint and ground loss. In-filling forms part of loss compensation and visual re-integration procedures that entails adjusting the surface level or texture of the

[6] Triton X-100 is a surfactant with a relatively low hydrophile/lipophile balance system (HLBs) that is used in aqueous solutions for the surface cleaning of paintings. Triton X-100 has a non-ionic structure which makes it more compatible with other ionic materials such as buffers and chelators. Moreover, Triton X-100 has a limiting solubility temperature that is much higher than room temperature, which helps to avoid separation and absorption of this surfactant onto oil paint surfaces (Wolbers & Stavroudis, 2012:503-504).

painting's surface that exhibits material loss. Loss compensation is a three-stage procedure that starts with the application and levelling of the fill material, then applying texture to the filler either to match the texture of the surrounding paint layers or to change the texture to make the restored areas more easily discernible. The final step is to add colour and the appropriate degree of gloss to re-integrate areas of loss. This process is known as inpainting or retouching (Fuster-López, 2012:586).

Ms Markgraaf (personal communication 2022. March 24) states that she was specifically wary of carrying out this step of the treatment due to the ethical concerns (discussed in chapter 5) that arise when applying loss compensation on paintings with a great amount of material loss. She noted that the instruction for loss compensation came from a previous co-curator of the UP Art Collection and that it was against her initial judgment to carry it out. Nonetheless she carried out the first step of the loss compensation procedure, applying and levelling the fill material, mostly to the bottom half of the painting's material loss areas and then stopped. According to Ms Markgraaf (personal communication 2022. March 24), after seeing all the white infilling on the areas of loss, she realised how much in-painting would be required which re-amplified her concerns as to the ethics in retouching the painting so extensively.

After the painting had been stabilised and some of its losses partially filled (see figure 1), the painting was moved to UP Main Museum Storage in 2016, and on 3 March 2020 it was returned to the Van Wouw House where it is still currently located (De Kamper, 2022/03/16).

1.4 Research questions

The main research question is thus to determine a treatment proposal for the further or re-treatment of *Cattle Grazing near Pretoria Zoo* since the painting cannot be exhibited in its current state (see figure 1), it requires some form of treatment to make it suitable for display.

In order to determine the most suitable treatment option it is necessary to first identify the values attributed to the painting, since value influences the object's function and meaning (Appelbaum, 2010:88). Therefore, the main research question requires answering further sub-questions, including: What are the meanings and value of the painting in its current state? What is its desired future use of the painting as identified by its current custodians, and what condition would most effectively reflect this

intended purpose? What kind of treatment approach and design would be most suitable to preserve its meanings, values and authenticity? In order to fully realise these ethically, it is likewise important to keep in mind how would the proposed treatment approach affect the painting's meanings, values and authenticity? Or how could the treatment approach reduce or enhance the painting's meanings and values?

1.5 Aims and objectives

This study aimed to examine and discuss the treatment decision-making process for the van Wouw painting and the implications thereof. In addition to obtaining more information on the intangible aspects of the painting, the research also aimed to conduct a thorough materials analysis of the painting, as knowledge about the painting's materiality and artist's use of material forms an integral part in the conservation decision-making process.

In order to achieve this aim, the painting was evaluated according to Appelbaum's *Conservation Treatment Methodology* (2010) which consists of eight systematic steps outlined below:

1. Characterising the object
2. Reconstructing a history of the object
3. Determining the ideal state for the object
4. Deciding on a realistic goal of treatment
5. Choosing the treatment methods and materials
6. Preparing pre-treatment documentation
7. Carrying out the treatment
8. Preparing final treatment documentation

Since the research focuses on decision-making in conservation, step seven (the physical application of treatment) and step eight (post-treatment documentation) are irrelevant to the present research. Steps one to six proved invaluable to the process of formulating and discussing a treatment proposal and aptly functioned as objectives in themselves to achieve the research aims. These objectives are as follows:

- positioning the painting in its South African art-historical context
- characterising the painting according to its material aspects which entailed physical examination, imaging, scientific analysis and testing for materials identification of the specific painting
- characterising the painting according to its associated material aspects which entailed its manufacturing methods, material properties and deterioration studies of oil paintings in general
- determining the values of the painting which can be art value, aesthetic value, historical value, use value, research value, age value, newness value, sentimental value, monetary value, commemorative value, associative value, educational value and rarity;
- determining the ideal state for the painting according to the values it holds;
- making suggestions towards a realistic treatment goal for the painting.

1. 6 Literature Review

The literature review for the present research focusses on five different sections. Literature from the first section aided in providing biographical information on the artist Anton van Wouw as well as information on the artist's paintings. The other four sections focus on paintings in general, allowing a deeper understanding of how they are created, how they age and deteriorate, how analytical methods can assist us in understanding the general state of conservation, and how the conservation of paintings is approached.

1.6.1 Anton van Wouw – biography and paintings

There are several sources that contain biographical information on van Wouw, although the most detailed and comprehensive of these is the biography of the artist written by Joey Ernst (2006). The author describes van Wouw's early life and education in the Netherlands, his career as a state sculptor in South Africa, his last years in Pretoria and also makes mention of his painting. The author M J Cohen also provides important information on van Wouw in his book *Anton van Wouw: Sculptor of South African Life* (1938) which includes information on his character, his artistic technique and his subjects of interest. The focus of this book, however is on van Wouw's sculpture works and does not elaborate on his painting oeuvre. The sources that provided the most comprehensive information on van Wouw's paintings are Esme Berman's *Art and*

artists of South Africa: an illustrated biographical dictionary and historical survey of painters, sculptors and graphic artists since 1875 (1983) and Professor Alexander Duffey's *Frans David Oerder (1867-1944): Anglo-Boereoorlogtekeninge en skilderye* (2017). Berman's (1983) book provides a section on van Wouw that primarily focuses on his paintings. While Duffey (2017) focusses on van Wouw's contemporary Frans Oerder, his book also offers valuable insights to van Wouw as a painter since van Wouw and Oerder often painted and worked together.

1.6.2 The manufacture of paintings

The book *The Science of Paintings* (2000) by W Stanley Taft and James W Mayer provides insights to readers with or without a background in art about the manufacturing process of paintings. It covers aspects about paintings relating to their structure, the differences in painting media and their physical properties. Stephen Hackney's book *On Canvas: Preserving the Structure of Paintings* (2020) likewise provides invaluable information on the component parts specific to canvas paintings, including the history and materials of their manufacturing process, in a clear and comprehensive manner.

1.6.3 The deterioration of paintings

Sources that are particularly helpful in explaining and discussing the general decay process of paintings include Marta O Folch's doctoral thesis *Non-destructive condition assessment of painting canvases using NIR spectrometry* (2011), Mary Fahey's article *The Care and Preservation of Oil Paintings* [sa], Marion F Mecklenburg's review paper *Methods and materials and the durability of canvas paintings: a preface to the topical collection Failure Mechanisms in Picasso's Paintings* (2020) and Stephen Hackney's book *On Canvas: Preserving the Structure of Paintings* (2020). Folch (2011) and Hackney (2020) go into great detail about the degradation process of canvas whereas Mecklenburg (2020) covers more about the decay mechanisms involved in the paint layers themselves and the causal factors such as temperature, humidity and the interaction between the pigments and binding media. Fahey [sa] provides a more general overview on the various types of damage oil paintings are prone to suffer from as well as recommendations and guidance on the proper storage and display conditions, handling approaches and some methods of cleaning that all contribute towards the continued preservation of paintings.

1.6.4 The examination and material analysis of paintings

The visual examination of *Cattle Grazing near Pretoria Zoo* is guided by the seminal book *Seeing through paintings: Physical examination in art historical studies* (2000) by Andrea Kirsh and Rustin S Levenson since this book is based on Western easel paintings. The authors present their information clearly in the form of case studies and place specific emphasis on the physical examination of paintings and the various data that may be obtained from such. Another important text that informs the chosen investigative methods is Barbara Stuart's book *Analytical techniques in materials conservation* (2007). This book provides an overview of the analytic techniques that are potentially available to those that are interested in materials conservation. Clear and straightforward information is presented on various aspects of material analytical methods such as the functions and workings of various analytical instruments, and examples of applying certain methods to specific types of heritage material.

Joanne Dyer, Giovanni Verri and John Cupitt's book *Multispectral Imaging in Reflectance and Photo-induced Luminescence modes: A User Manual* (2013) also offers invaluable information on investigative methods employed in heritage conservation, especially technical photography. This book serves as a user manual for the multispectral imaging techniques that are relatively affordable, non-invasive and non-destructive by describing the function, application and interpretation of the most commonly used multispectral imaging techniques presently available to cultural heritage conservation professionals. Another important book that is used as a seminal source in discussing aspects of technical photography is the handbook *The AIC Guide to Digital Photography and Conservation Documentation* (2017) edited by Jeffrey Warda and written by Franziska Frey, Dawn Heller, Dan Kushel, Timothy Vitale and Gawain Weaver. Chapter six of this book was particularly helpful to this study as it presents in-depth guidelines for nearly all the techniques used in visible light photography as well as thorough information on ultraviolet and infrared techniques. This chapter presents the information on imaging techniques accompanied by photographs, diagrams and illustrations to facilitate understanding. It was particularly useful as a guide in applying the visible light photography techniques, ultraviolet and infrared imaging techniques to the van Wouw painting to reveal more information on its materiality and material history.

For the section that employed X-ray Fluorescence Spectroscopy as an analytical technique to determine van Wouw's use of pigments in *Cattle Grazing near Pretoria Zoo*, the handbook *Handheld XRF in Cultural Heritage: A Practical Workbook for Conservators* (2020) by Aniko Bezur, Lynn Lee, Maggi Loubser and Karen Trentelman was especially helpful since it focuses specifically on handheld XRF instruments for the application of materials analysis in heritage conservation. It provides all the information from the safety measures involved in XRF to the analysis and interpretation of the data obtained through straightforward examples. Other sources that were invaluable to the process of identifying the possible presence of certain pigments include *Artists´ Pigments: A Handbook of Their History and Characteristics VOLUME 1* (1986) edited by Robert L Feller, *Artists´ Pigments: A Handbook of Their History and Characteristics VOLUME 2* (1993) edited by Ashok Roy and *Artists´ Pigments: A Handbook of Their History and Characteristics VOLUME 3* (1997) edited by Elisabeth West Fitzhugh. These three handbooks deal solely with artist pigments, providing the essential information pertaining to their structure, analytical methods for identification, characteristics, properties and their history of use.

1.6.5 The conservation of paintings

The seminal source of this research paper pertaining to conservation decision-making is Barbara Appelbaum's *Conservation Treatment Methodology* (2010). This book is written in an all-encompassing sense that can be applied to cultural material of all kinds. It is written with the aim to equip the conservator with greater insight into the treatment decision strategy. The book provides various examples that highlight the importance of being aware of both the material and immaterial aspects of an object and the role these aspects play in determining the most suitable treatment objectives for an object. This book is however not a technical manual on how to carry out treatments but rather lays the groundwork that leads to deciding on the most appropriate treatment. Chris Caple's *Conservation Skills: Judgement, Method and Decision Making* (2000) was equally useful in providing more background to the decision-making in conservation. It outlines the numerous and various issues that conservators of cultural material are faced with and explains what conservation is as well as the ethical implications involved in the practice of cultural material conservation. This book employs case studies of famous objects to discuss multiple aspects in the field of conservation such as ethics, decision-

making principles, preventative conservation, stabilisation, restoration, recording object conditions, investigation and object cleaning.

While both previously mentioned authors deal with the fundamentals of heritage conservation in general, a seminal source geared towards the specifics of paintings conservation is *Conservation of Easel Paintings* (2012) edited by Joyce Hill Stoner and Rebecca Rushfield. This book, written by several authors, brings together the complete history, philosophy, theory and practice of the conservation of easel paintings as a discipline. This book was indispensable to the research in providing explanations for certain treatment materials used in the past that may no longer be viable as well as insightful information about materials that are still currently used in the profession as supported by current conservation ethical principles.

Salvador Muñoz Viñas's article *Contemporary Theory of Conservation* (2002) addresses these shifts in conservation theory by highlighting the pitfalls of classical conservation principles such as reversibility, universality and objectivity and discussing the relatively recent rise of contemporary conservation theory that emphasises the intangible aspects of conservation. Caroline Villers's article *Post Minimal Intervention* (2004) likewise discusses shifting perspectives in the conservation principle of minimal intervention, as applied to the conservation of canvas paintings. Villers (2004) explains how certain treatments for canvas paintings were considered "minimal" in the past but then later rejected due to being more damaging to paintings and preventing further re-treatments in the future. Such an example, given by Villers (2004:7) that wax impregnation and lining of canvases to stabilise the paint film was considered a standard preventive conservation measure until it was challenged at the Greenwich Conference in 1975 for being too invasive and detrimental which thereafter led to the complete rejection of these techniques in the profession.

Lastly, another book that proved invaluable to the research is Knut Nicolaus's *The Restoration of Paintings* (1999). While some of the conservation techniques and materials discussed in this book may be outdated in the current field of paintings conservation, Nicolaus (1999) provides comprehensive and condensed information about such methods, especially the marouflaging process that is no longer advised but has been carried out on *Cattle Grazing near Pretoria Zoo.* Nicolaus (1999) discusses the marouflage technique in great detail along with the conditions in which it is carried

out and the risks associated with it. The book also contains a comprehensive glossary of the common terms used in the discipline of paintings conservation which immensely helped to clarify certain concepts that one may find unfamiliar.

1.7 Theoretical framework and research methodology

Methodology for this research relies on a case study to apply a methodological framework, as such the project falls within a qualitative research methodology. Although there are scientific techniques used for analytical purposes to identify materials present in the painting and not the quantity thereof and so this research is purely qualitative.

Following and applying Appelbaum's methodology, the initial step is to understand the context and creation of the artwork, reconstructing the painting's history and establishing its provenance. The painting was thus first contextualised within its South-African and global art-historical parameters. A section on Anton van Wouw's biography, artistic practice and career is also included. Information pertaining to the painting's provenance was obtained from various primary sources such as newspaper articles and notes on its previous treatments that are held in the University of Pretoria's archives. Other information such as stylistic and technical characteristics were also obtained by comparing the painting with some of van Wouw's other paintings.

Next, in order to understand the painting's materiality and characterise the painting according to its material aspects, the following non-invasive, non-destructive analytical and investigative techniques were employed:

- Condition assessment, documentation and reporting of empirical observed data
- Physical examination – visible light and magnification
- Investigative imaging/technical photography techniques – visible light photography, photomicrography, tangential/raking light photography, specular light photography, infrared photography and ultraviolet photography
- X-ray fluorescence spectroscopy (XRF)

The condition report in its preliminary form is the first step towards planning a treatment procedure since this document contains the conservator's initial assessment and detects damage and causes for deterioration based on the conservator's visual

observations (Finn, 2012:272). The condition report includes information such as the description of the painting with dimensions, original materials and technique, location, viewing conditions, environmental factors that might affect the painting, description of its current condition, how and why deterioration occurred, observations on previous treatments (Finn, 2012:273).

1.8 Research ethics

In order to use *Cattle Grazing near Pretoria Zoo* (ca. 1896) as a case study for this research paper, an internal loan form was obtained from and signed by the curator of the UP Art Collection – Mr G de Kamper (see Appendix A). This internal loan form contains special terms of agreement and grants permission for the painting to be held at the van Wouw House for the duration of the research as well as permitting the Tangible Heritage Conservation programme to use the painting as an example for educational purposes, conduct tests, analyses and research on the painting for publication. Another similar letter of permission was provided to the functional head of museum services of the Pretoria Art Museum, Mr D Oegema. Permission to use van Wouw's paintings in the Pretoria Art Museum's collection for purposes of comparison was granted by Mr Oegema (see Appendix B). This letter provides the research aims and objectives of the study and also indicates that the research findings will be available in the dissertation and possibly published as a journal article.

1.9 Feasibility and significance of the study

The painting in question is kept at the Van Wouw House which functions as the conservation laboratory and research space. Artworks for purposes of comparison are held by the Pretoria Art Museum, a public institution, which facilitates access to them. Furthermore, the University of Pretoria has access to all the mentioned scientific investigative and analytical methodologies and so conducting those investigations and analyses are feasible.

The significance of this research lies in the dialogue between the tangible and the intangible facets of heritage conservation. In relation to this painting the tangible aspects entail its materiality, its physical components and ultimately its visual and aesthetic appearance as it currently is. On the other hand, the painting's intangible aspects involve the metaphysical, pointing to its meaning which is shaped by its function, values and the narratives it contains through its history.

This study is significant as this is the first study that investigates, examines and documents van Wouw's painting materials and techniques. In addition, the study carries significance for conservation practice, ait is a practical application of the decision-making process on a previously treated artwork. As Caple (2000:1) states, judgement is the aspect of conservation that students and inexperienced conservators struggle most with. This case study can help those new to the field gain deeper insights into the decision-making process inherent in conservation of cultural heritage – especially paintings. Furthermore, this study is not solely based on the material aspects of a painting nor does it only focus on its immaterial features but rather adopts a mediatory stance between the two. This approach aligns this study with contemporary conservation theory which is critical of the notion that conservation is a neutral activity (Villers, 2004:8).

Lastly the significance of this study also lies in its adoption of the perspective to view the past as an opportunity for learning. According to Marincola and Maisey (2011:5) conservation education has a tendency to present the profession as something in which perfection is a goal to be attained and that there is little room for error. As a result of this mindset many conservation students and professionals might view the treatment that led to the current state of the painting as an error in judgement. However, this case study takes the position of seeing it as a learning opportunity. To breathe new life into a painting that stands at the cusp of abandonment.

1.10 Preliminary outline of chapters

Chapter one introduces the case study *Cattle Grazing near Pretoria Zoo*, the aim and objectives of the research, as well as the methodology followed.

Chapter two contextualises *Cattle Grazing near Pretoria Zoo* by introducing and providing a brief biographical overview of its creator, Anton van Wouw. Since van Wouw is chiefly known as a sculptor and not much about his paintings has been written, this chapter contains a section that only discusses van Wouw in terms of his painting practice.

Chapter three focuses mainly on the investigative and analytical methodologies that were involved in gathering data about the material aspects of *Cattle Grazing near Pretoria Zoo*. These methodologies include the physical examination of the painting,

technical photography and X-ray fluorescence spectroscopy (XRF). In addition to introducing these techniques, how they operate and why they are used; this chapter also has sections where the general composition and deterioration of paintings are discussed. This chapter essentially servers to provide context and an understanding to the material data that is presented in chapter four.

Chapter four presents the material data obtained from *Cattle Grazing near Pretoria Zooi* using the various techniques as introduced in chapter three. These observations are interpreted to provide an insightful overview of the painting's condition, its material composition as well as the painting techniques van Wouw employed to produce this work. This chapter prioritises the material aspects of the painting.

Chapter five focuses on the intangible qualities of the painting that manifest as its significance, meaning and values. The painting's intended function is determined based on its values which inform its ideal state. A suitable treatment strategy for the painting is proposed in alignment with its ideal state, values and conservation ethics.

Chapter six concludes the research and provides the limitations of the study as well as avenues for further research.

CHAPTER 2
THE PAINTING AS IT WAS

Following Appelbaum's *Conservation Treatment Methodology* (2010) to devise a suitable treatment goal for van Wouw's painting, *Cattle Grazing near Pretoria Zoo* the starting point entails the reconstruction of the painting's history from its creation to its present location. As the history of the object's creator forms an inextricable component of its past, Chapter 2 serves to introduce the painting's creator, the artist Anthonie (Anton) van Wouw. Although well known in local art circles as a master of South African sculpture, a brief overview of his biography and particularly his painting oeuvre is outlined to view the artist not only as a sculptor but also as a painter in his own right.

This chapter focusses on the painting's intangible qualities to position it within its socio-art historical context which will lay the groundwork in determining the values it embodies. Its values, as discussed in chapter 5, will directly affect its ideal treatment outcome.

According to Appelbaum (2010:67) the history of an object forms a vital part for the decisions that lead to its optimal post-treatment condition. Caple (2000:29) asserts that objects are valued and preserved for the information they contain and for what they represent, thus objects function simultaneously as historical documents and as aesthetic entities.

2.1 Anton van Wouw – a biographical overview

Anthonie (Anton) van Wouw is considered, by many art historians, to be the father of Eurocentric realist sculpture in South Africa. Van Wouw, however was not South African by birth and his oeuvre, was not limited to sculptural works. He was born in the town of Driebergen in the province of Utrecht in the Netherlands on 26 December 1862 (Pellissier, 1969:7). Van Wouw started showing an inclination towards art from a very young age. His mother, Helena van Wouw cherished his creativity, however his father, Ludolf Anne Frederik Hendrik van Wouw, on the other hand was reluctant to encourage his son on becoming an artist as he considered this an uncertain career path and worried about his son's future (Ernst, 2006:11).

Even though Ludolf recognised his son's talent, he could not afford to send him to art school and hoped his son would follow in his footsteps of becoming a teacher, which caused the young van Wouw much distress. In 1870, van Wouw's father got appointed as headmaster of Prins Mauritsschool in Rotterdam. This new position with improved pay allowed Ludolf to improve his standard of living and he finally agreed to invest in his son's art education (Ernst 2006:11). The 12-year-old Anton van Wouw received drawing and painting classes under instruction of the Flemish architect and artist, Vieillevoye, at the Rotterdam Academy of Fine Art (*Academie van Beeldende Kunsten en Technische Wetenschappen*), now known as the *Willem de Kooning Academy*. Van Wouw enjoyed his drawing instruction and had much appreciation for his teacher who instilled in him an awareness and attention to detail and took him on frequent painting excursions (Ernst, 2006:12). Even though van Wouw enjoyed his drawing and painting tuition at the Academy, he soon realised that his passion gravitated towards modelling form in clay (Cohen, 1938:14). Van Wouw wanted to pursue the career of a sculptor.

Upon hearing his wish, his mother enrolled him as student to the Belgian sculptor Joseph Graven (1836-1877). Van Wouw worked diligently until he systematically mastered his sculpting technique (Ernst, 2006:12). When Graven died of a sudden illness in 1877, Van Wouw's father saw this as an opportunity to enrol his son as a student teacher in his own school. Anton van Wouw, began working for a stucco worker instead where he worked enthusiastically and was encouraged to model with clay by the company foreman – Mr Welroge. During this time (1877-1881) van Wouw made decorative sculptures of birds, fruit and flowers out of clay (Ernst, 2006:13).

In 1881, while still working as a stucco worker, van Wouw created the small sculpture known as *De Vogelaar*, as seen in figure 5 (Ernst, 2006:14). This is a bronze sculpture of a young boy, trying to catch a bird, dressed in the typical fashion of the time: long, broad trousers, blazer, shirt with collar, clogs and a cap. The *De Vogelaar* shows a strong stylistic influence of Impressionism as well as the works of French sculptor August Rodin (1840-1917) whose work has a very serious, heavy appearance with a rough and expressive finish (Pellissier, 1969:8). *De Vogelaar* exhibits a coarse and broad rendering of form, and is not strictly realistic. This early work stands as stark contrast to the smooth finish and realism which van Wouw employed in his later work.

Figure 5: Anton van Wouw, De Vogelaar, 1881. Bronze, 420mm (height), private collection (Mutual Art, 2022).

In 1881 van Wouw was conscripted into the Dutch military and after completing his service he started working at a Dutch architect firm as a stucco worker (Ernst, 2006:14). This made him financially capable to realise one of his longstanding dreams to tour Europe extensively, with the main goal of visiting art museums to further his art studies. During this tour van Wouw developed a fascination towards the art of antiquity and an intense appreciation for the art of the Renaissance, especially for the work of Michelangelo[7] (Ernst, 2006:15).

It is also at this time, that European, and particularly Dutch interest in South Africa grew, especially in the aftermath of the Boer victory against the British in the Anglo-

[7] Michelangelo Buonarroti (1475-1564) was an artist and polymath genius who is regarded as one of the main proponents of the Italian Renaissance period and one of the greatest artists in Western art. His art was part of the revival of classical Greek and Roman art but also went further by incorporating potent psychological and emotional realism into his subjects. He was an expert at human anatomy, having studied classical Greek and Roman sculptures in his early life and later studying cadavers. Michelangelo's masterworks are said to be his monumental fresco paintings of biblical narratives in the Sistine Chapel (1508-1512), his massive marble statue of David (1501-1504) and his deeply moving marble sculpture of the Pieta (1498-1499) (The Art Story, 2022).

Boer War[8] (1880-1881) and the formation of the South African Republic (SAR)[9]. In 1883 Paul Kruger (1825-1904) was elected as the president of the South African Republic and he encouraged immigrants, especially from the Netherlands, to work in co-operation with the citizens of the South African Republic to develop the socio-political and economical infrastructure of the newly formed state (Ferreira, 1990:11). The South African Republic became the centre point of speculation, political intrigue and prospective hope for the Dutch who streamed towards Johannesburg and Pretoria, seeking their fortunes in the mines and in the civil service of a developing nation (Du Toit, 1933:3).

Van Wouw's father was impressed with the reports and prospects of South Africa. He also identified with the Boer's[10] strive for independence[11] and their Calvinist religion[12]. In 1882 Ludolf van Wouw thus left The Netherlands for South Africa, in search of a better paying job and settled in Pretoria, accepting the position of secretary of education (Ernst, 2006:20). This was the beginning of Anton van Wouw's interest in South Africa. Through the ongoing contact with his father in South Africa, van Wouw developed a

[8] Also referred to as the First Boer War, the Transvaal War, the Transvaal Rebellion or, in Afrikaans, the *Eerste Vryheidsoorlog* (First Freedom War). This war which was waged between the Afrikaner Boers and the British for three months from December 1880 to March 1881 and ended with a peace agreement that allowed the Boers to govern themselves. The war broke as a revolt of the Boers against the British annexation of the Transvaal (literally meaning "across the Vaal River," the name given to the SAR by the British) in 1877 (Giblin & Spring, 2016:111). The main cause of this war was the conflict over resources between the British Empire and the Boer republics, especially after the discovery of diamonds in Kimberley in 1866 (Giblin & Spring, 2016:112).

[9] The South African Republic, also known in its Dutch form as the Zuid-Afrikaansche Republiek (ZAR) or as the Transvaal Republic, was an independent Boer republic established by the Voortrekkers in 1852 at the Sand River Convention and was situated north of the Vaal River (Giliomee, 2003:175).

[10] "Boer" is the Dutch word for farmer. From around the 17th to 18th centuries, the early Dutch settlers that migrated further into the interior of South Africa away from Cape Town made a living by farming the land and produced only that which was necessary to meet their needs, hence their name Boer (Giliomee, 2003:35). Towards the end of the 18th century the Dutch Boer settlers came to identify themselves as a distinct people and started referring to themselves as Afrikaner; developing their language, Afrikaans, from a dialect of Dutch (De Menezes, 2004:13).

[11] The Boers have a long history of seeking independence. Firstly, no longer viewing themselves as Dutch but Afrikaners in their own right. Secondly, amongst numerous other causes, after the British annexed the Cape Colony in 1806 and abolished slavery in 1834, many Boers sought independence from British rule and took part in the Great Trek (De Menezes, 2004:13-15). The Boers migrated along the coast eastward to settle in Natal but after the British annexed Natal in 1843 they moved deeper into the interior across the Vaal and Orange Rivers (Giblin & Spring, 2016:112). These trekkers established their independent Boer republics of the South African Republic (SAR) in 1852 and the Orange Free State (OFS) in 1854 which the British officially recognised (Giliomee, 2003:175). And thirdly, the Boer's strive for self-governance further manifested itself in the First Anglo-Boer War (see footnote 2).

[12] The Boers or Afrikaners belonged to the Protestant Reformed Church based the Calvinist doctrine which was the state religion in the Cape for more than a century before the British took control in 1806. The Calvinist doctrine promoted the pursuit of wealth through honest investment and industry and was against the hierarchy and idolatry of the Roman Catholic Church (Giliomee, 2003:5-6).

great admiration for the Boers as well as an ongoing interest and reverence for their culture and identity. Believing he could make an important contribution towards sculpture and art in the developing country, Anton van Wouw, accompanied by his mother, arrived in Pretoria on the 1st of January 1890, he was then 27 years old (Keet Jr, 1981:3).

At the time, Pretoria was a dust ridden rural town on the outskirt of the South African Republic. Farming, hunting and politics was the way of life and therefore the people had no appreciation or demand for anything artistic and so Van Wouw's initial period in Pretoria was marked by unemployment (Cohen 1938:16).

Although van Wouw's rather idealistic notions that art would be in high demand in this newly found Republic had been met with utter disappointment, van Wouw was not disappointed by the Boers and developed a great liking towards the new president Paul Kruger, whom he regarded as a symbol of power, strength and the highest level of patriotism (Keet Jr, 1981:3). Faced by the need to earn a living, van Wouw found employment as assistant to the gunsmith Mr Moilee, helping with the manufacturing and repairing of firearms (Du Toit, 1933:4). Van Wouw worked at the gunsmith during the day and spent his evening hours drawing, painting and modelling. Six months later, van Wouw resigned from the gunsmith and decided to pursue art full-time. He advertised his services for decorative and ornamental sculpting in a local newspaper and shortly after he was approached by a Pretoria businessman, Edmund Francis Bourke[13] (Duffey, 2008:83). Bourke commissioned van Wouw to design and improve the interior of his drawing room with wall panels and modelled doors in the Louis XV style (Ernst, 2006:25). Van Wouw was well equipped for this task, drawing from his experience as a stucco worker. In 1891 he was commissioned to carve the crest of the Transvaal Republic on the front gable of the newly built Council Chamber on Church Square (Ernst, 2006:26).

As he settled into his surroundings and new life, van Wouw became involved in a singing group. There he met the poet Jan FE Celliers and his sister Suzanna Wilhelmina (Sannie), getting to know the Celliers family. Johannes (Jan) Francois Celliers (1839-

[13] Edmund Francis Bourke (1852-1926) was mayor of Pretoria from 1903 to 1904. He was born in Pietermaritzburg and is of Irish descent. He opened his first business in Pretoria, *Bourke & Co*, in 1879 which he later sold. He also owned *Black Mill*, was co-owner of a gold mine and was the first elected president of the Pretoria Chamber of Commerce in 1891. He founded the Pretoria Club in 1885 and was known for his generous patronage towards hospitals, schools and sporting bodies (Lehmkuhl, 2005).

1895) the founder of the first Afrikaans newspaper, *De Volkstem* (Voice of the People), was the head of the Celliers family with whom van Wouw became well acquainted, eventually producing illustrations and caricatures for *de Volkstem*, as well as immortalising both the poet Jan FE Celliers and Jan F Celliers in sculpture (Ernst, 2006:27). Van Wouw and Sannie developed a romantic relationship and got married in 1895 (Ernst, 2006:27).

Van Wouw had completely adapted to the South African way of life and identified with the Boers, their pioneer past, their hunting and trekking culture and their love for the natural environment. By the mid-1890s van Wouw's artistic career was launched, he became the caricature artist of the weekly paper *The Press*, produced caricatures for the magazine *Moon* and made drawings for *Cyanide Works* in Johannesburg (Ernst 2006:28, 31). Van Wouw's weekly portrayal of events was artistic and accurate as can be seen by the example of his illustration of the influx of immigrants to the South African Republic after the discovery of gold on the Witwatersrand in 1886 (see figure 6).

Figure 6: A wave of newcomers about to overcome a boer, illustration by Anton van Wouw, Sa. (Van Schalkwyk, 2015:197).

Van Wouw became widely known for his drawing and painting and architects increasingly made use of his modelling and sculpting skills for their newly erected buildings (Ernst 2006:34). During his life, van Wouw created architectural sculpture

for numerous prominent buildings in Pretoria which includes the Old National Bank and Mint (1893), the Old Standard Bank Building (1894), the Reserved Investments Building (1904), the Main Post Office Building (1909) and the Old Pretoria Abattoir Building (ca. 1930) (Duffey, 2008:28). In 1895, van Wouw received South African citizenship and began teaching art at the Staatsmodelschool (State Model School), the Staatsmeisjieschool (State School for Girls), as well as the Staatsgymnasium (State Gymnasium) (Ernst, 2006:35). *Cattle Grazing near Pretoria Zoo*, was likely painted at this time with a possible date of execution of 1896 as indicated by the painting's museum inscription.

1895 is also the year that van Wouw received his first large scale state commission, funded by the industrialist and influential businessman Samuel Marks (1844-1920), namely a monumental bronze statue of President Kruger to be displayed in Church Square in Pretoria (it is still there to this day). In addition to the sculpture, the monument included bronze frieze panels depicting key moments of Kruger's life as well as four large sculptures of Boer sentinels seated around the Kruger statue (Pellissier, 1969:7). This commission brought him fame and many more commissions followed suit. As the work had to be carried out in Europe, van Wouw received special leave and, accompanied by his wife, left for Europe. Van Wouw took three years to finish the sculptures and returned to Pretoria towards the end of September 1899, a fortnight before the outbreak of the South African War[14] (Ernst, 2006:54).

From 1902 to 1910, van Wouw's work was heavily influenced by his co-operation with Frank Emley, a British architect, for whom van Wouw produced architectural ornamental work for newly erected buildings in Johannesburg (Duffey, 2002:23).

[14] The South African War (1899-1902) is also referred to as the Boer War, the Second Boer War, the Second Anglo-Boer War or, in Afrikaans, the *Tweede Vryheidsoorlog* (Second Freedom War). This event has recently been renamed the South African War to indicate that various people, including the indigenous peoples of South Africa, have been affected by and were involved in it. The South African War was much longer and more brutal than the First Anglo-Boer War and was also caused by a conflict over the resources between the British Empire and the two Boer republics. This war arose due to the discovery of gold in the Transvaal in 1886 which reawakened Britain's conviction to seize the Boer republics. The Transvaal saw a massive influx of foreign, mostly British, migrants to work in the gold mines and they eventually outnumbered the Boers. The British demanded for voting rights but were refused by the Boer government and in 1899 a final demand was made to which Paul Kruger issued an ultimatum for the British to withdraw their troops from the Transvaal's borders. When the British ignored Kruger's ultimatum, the two Boer republics declared war on the Britain. Initially the Boers were advantageous and managed to evade the British. The war was prolonged by two years until the British applied scorched earth tactics, burning the Boers farms and holding their women and children captive in concentration camps. This ultimately led to the Boers' defeat and the war officially ended with the signing of the Treaty of Vereeniging in 1902 (Giblin & Spring, 2016:112-118).

Emley introduced van Wouw to the mining tycoons Lionel and Florence Phillips who supported his art and promoted it both in South Africa and abroad (Duffey, 2002:23). Towards the end of 1906 van Wouw relocated to Johannesburg and moved into a modest house in Doornfontein to which he added a spacious studio (Ernst 2006:68). In this studio he produced a body of smaller sculptural works portraying Boer figures during the South African War and the indigenous peoples of Southern Africa which brought him much fame in later years (Duffey, 2002:31). This was also a time in which van Wouw held his first solo exhibition in Johannesburg in 1908, repeated in Pretoria a month later (Duffey, 2002:32-33). In 1909 the Phillips businessmen organised an exhibition of van Wouw's smaller sculptural works at the Fine Arts Society's Gallery in London (Duffey, 2002:33). Duffey (2002:23) notes that these years of van Wouw's life are omitted in nearly all biographies written on the artist and speculates that this may be a result of most of the texts on van Wouw having been written by Afrikaner sympathisers who bitterly resented the British after the Second South African War. As such reporting on van Wouw's collaboration with the British would have tarnished the image of van Wouw as the leading sculptor of Afrikaner life and culture. The collaboration with the British was nonetheless very lucrative and enabled him to further establish a career as a reputable architectural sculptor but also provided him with the financial freedom to dedicate a full four years of his life to his art (Duffey, 2002:23).

In 1907 van Wouw was commissioned to produce the bronze figures for the National Women's Memorial in Bloemfontein in commemoration of the women and children who died in the concentration camps during the South African War (Ernst 2006:77). Pellissier (1969:7) regards this as van Wouw's ultimate masterwork.

After this, van Wouw received a number of state commissions including the statue of Sir Henry Timson Lukin and relief panels for the new station building in Johannesburg (Ernst, 2006:93), the statue of Jan Hendrik Hofmeyr in Church square in Cape Town, the statue of President Marthinus Theunis Steyn facing the main building of the University of the Free State in Bloemfontein[15] (Pellissier, 1969:7), and a series of busts depicting the Boer generals (Cohen, 1938:40). Although the majority of state commission van Wouw received and executed were of important Afrikaner statesmen

[15] This statue of President MT Steyn was removed from its original place at the University of the Free State in 2020 and can currently be seen at the National Women's Memorial in Bloemfontein (De Villiers, 2020).

and leaders, he also received the commission from the Khama family; the royal family of Bechuanaland (now known as Botswana) to produce a bust of King Khama III (1837?–1923) (leader of the Bamangwato people) as well as a duiker for his grave (Ernst 2006:75). Van Wouw also sculpted the bust of King Lobengula Khumalo (1845-1894), the second and last king of the Northern Ndebele people, who resisted the attempts of Cecil John Rhodes[16] (1853-1902) to colonise Mashonaland, a region in northern Zimbabwe (Art UK, Sa.).

In 1936 van Wouw was awarded an Honorary Doctorate by the University of Pretoria for his contributions to sculpture, and also received the Medal of Honour for sculpture by the Academy of Science and Art in 1937 (Ernst 2006:93). In 1936 van Wouw was tasked to produce a sculpture for the Voortrekker Monument[17]. Gerard Moerdijk (1890–1958), architect of the Voortrekker Monument was of the opinion that the monument would not be aptly representative of the Afrikaner people without van Wouw's sculptural input (Ernst 2006:94), and the monumental sculpture portraying a woman with two children was van Wouw's last large scale state commission which he completed in 1945 (De Kamper, 2018:144).

In 1937 Van Wouw decided to return to Pretoria, he purchased a corner property in the suburb of Brooklyn in Pretoria. His friend, Norman Eaton (1902-1966), a famous architect built the house at 299 Clark Street, Brooklyn, Pretoria (Ernst 2006:94). This house still stands and is now the home of the University of Pretoria's Tangible Heritage Conservation programme. Van Wouw spent the last years of his life in this home and passed away on 30 July 1945 at the age of 82 (Ernst 2006:100).

In light of this biographical overview in becomes clear that van Wouw remains known as the foremost sculptor of South Africa at the turn of the 20th century. He was not confined to produce work for only one cultural group but was an artist for South Africa's diverse group of peoples. As his most important work are sculptures, and sculpture having been his preferred medium for artistic outlet most of the available literature on the artist is primarily focussed on his sculptural work whether it is in the

[16] Cecil John Rhodes was a British imperialist, businessman and politician who was the driving force in annexing large territories of southern Africa for the British Empire in the late 19th century. Both Southern Rhodesia and Northern Rhodesia (now Zimbabwe) bore his name (Parkinson, 2015).
[17] The Voortrekker Monument is a massive granite structure that commemorates the Voortrekkers that left the Cape Colony between 1835 and 1854 to establish their own republics separate from British rule. The building of this monument started towards the end of 1938 and was officially completed towards the end of 1949 (SAHRA, 2020).

monumental, architectural or in the fine art sphere. The following section, however aims to focus on van Wouw as a painter.

2.2 Anton van Wouw – the painter

Van Wouw's formal artistic education began at the Rotterdam Academy of Fine Art where van Wouw learned the fundamentals of painting with oils in the Realist[18] tradition. The Rotterdam Academy was also where one of van Wouw's contemporaries, the artist Frans David Oerder (1867-1944) studied. Oerder's tutelage at the Rotterdam Academy lasted from 1881-1886 and he did not meet van Wouw whilst living in the Netherlands but only befriended him when he immigrated to Pretoria, South Africa in 1890, coincidentally the same year as van Wouw's relocation (Duffey, 2017:12). Duffey (2017:12) describes that Oerder's art course at the academy consisted of genre painting, history painting, interior painting, city scape painting, architectural drawing and graphic media such as lithography and etching. The academy also taught the subjects of aesthetic anatomy, the history of ornamental design as well as the history of architecture (Duffey 2017:12). It is probable that van Wouw did not study exactly the same syllabus as Oerder since he only went for evening classes. However, van Wouw undoubtedly received a painting education grounded in the Dutch academic art conventions of the 19th century.

The influence of formal training on van Wouw's painting technique is especially evident in his genre still life pieces titled *Still Life with Copper Kettle and Pipe* (date unknown) (see figure 7) and *Still Life with Musical Instruments* (1901) (see figure 8).

[18] Realism, as an artistic movement or convention of the 19th century, can be understood as a reaction against art that depicted mythological, religious and or fictional subjects. This movement is rooted in the argument that only the things that can be visually observed, the things of the artist's own time, are 'real.' Realist artists favoured the subject matter of everyday contemporary society as seen either through photography or direct life observation. The Realist painters' technique involved replicating the optical field of the observed subject through the exact matching of its colour and tone on a flat two-dimensional surface. The Realist stance in art was supported by important scientific and technological developments and discoveries of the 19th century (Gardner, 1980:755).

Figure 7: Anton van Wouw, Still Life with Copper Kettle and Pipe, date unknown. Oil on canvas, 330 x 485 mm. Private collection. (Strauss & Co, 2022).

Figure 8: Anton van Wouw, Still Life with Musical Instruments, 1901. Oil on canvas, dimensions unknown. Unknown collection. (Berman, 1983: 473).

Both of these paintings (figures 7 and 8) adhere to the formal requirements of academic art which is primarily concerned with the recreation of reality in the most faithful terms. Berman (1983:473) refers to this type of works as "pretentious" and explains that such an approach, when applied to painting, tends to entail *trompe-l'oeil*[19] effects. *Trompe-l'oeil* is a term used in the visual arts that denotes a high degree of visual illusion achieved, making a painted two-dimensional object appear three-dimensional and thus tricking the viewer's sense of perception.

When van Wouw arrived in Pretoria in 1890 and initially worked in the gunsmith's workshop, he presented drawing classes and painted in his free time (Pelissier 1969:7). According to Du Toit (1933:5) it is during this time that van Wouw produced several paintings. Early photographs such as the one referred to as figure 9 show van Wouw at work on a painting behind an easel in his studio. This photograph was taken at around 1895 (De Kamper, 2022/04/19). Behind him against the wall are three paintings, at the top a large painting is cut off by the framing of the photograph, making it difficult to decipher its subject; below a small painting depicts a mother and child, and below still is another large painting in an ornate wooden frame. According to the functional head of museum services of the Pretoria Art Museum, Mr Dirk Oegema (2022/04/12), this painting, seen in figure 10, is titled *Gesig op Daspoort* (View on Daspoort) and was acquired by the Museum before 1927. The painting is signed on the bottom right corner in red but undated however, seeing it in the photograph taken at around 1895, one can deduce that it was painted in the same year or even before.

[19] *Trompe-l'oeil* is a French term that means 'to fool the eye.'

Figure 9: Anton van Wouw painting in his studio, ca. 1895. UP Museums: Anton van Wouw Archive, Van Wouw Personal Photographs. Photographer unknown.

Figure 10: Anton van Wouw, Gesig op Daspoort (View on Daspoort), ca. 1895. Oil on canvas, 860 x 1420 mm, Pretoria Art Museum. Photograph by JA Elsenbroek.

Cohen (1938:30) makes mention that one of van Wouw's first works in South Africa is a landscape executed in oil paint, perhaps of the Apies River (seen in figure 11) also mentioned by Du Toit (1933:5), Ernst (2006:26) and Keet Jr (1981:5). According to the sources, van Wouw sold this painting to the Pretorian businessman E F Bourke, for whom van Wouw produced interior decorative work, and who later donated it to the Pretoria City Council. According to Ernst (2006:26) van Wouw started making a name for himself through the sale of this particular painting. *Apies River* is signed and dated 1895 in the bottom right corner. The painting was exhibited in the Van Wouw House Museum at the time when Ernst wrote his biography in 2006 and it currently forms part of the Van Wouw Collection which is housed by the UP Art Collection.

By comparing figure 10 and figure 11, visual similarities are evident in the surrounding hills and especially as seen in the meandering river banks. It can then be deduced that the river depicted in figure 10 is also the Apies River as seen from Daspoort in Pretoria.

Figure 11: Anton van Wouw, Apies River, 1895. Oil on canvas, 455 x 610 mm. Van Wouw Collection, UP Museums. Photograph by Ms Thania Louw, Art 2 Motion.

Another instance of van Wouw's painting work, this time executed along his artist friend Frans Oerder, is mentioned by Ernst (2006:34-5), Duffey (2017:18) and Berman (1983:139). With the official inauguration of the Delagoa railway in July 1895, Oerder and van Wouw were appointed to decorate the Reception Hall of Pretoria in which the celebratory feast took place. These decorations consisted of triumphal arches at all the entrances to Church Square and the festive decorations for the interior of the Reception Hall which entailed colourful drapery hanging from the ceiling, a large diorama of Lourenço Marques (currently known as Maputo, Mozambique) on the stage and twenty large mural paintings depicting the landscape between Pretoria and Delagoa Bay. A glimpse of these paintings can be seen in the photograph (figure 12) of the Reception Hall taken in 1895 at the inauguration ceremony of the Delagoa railway.

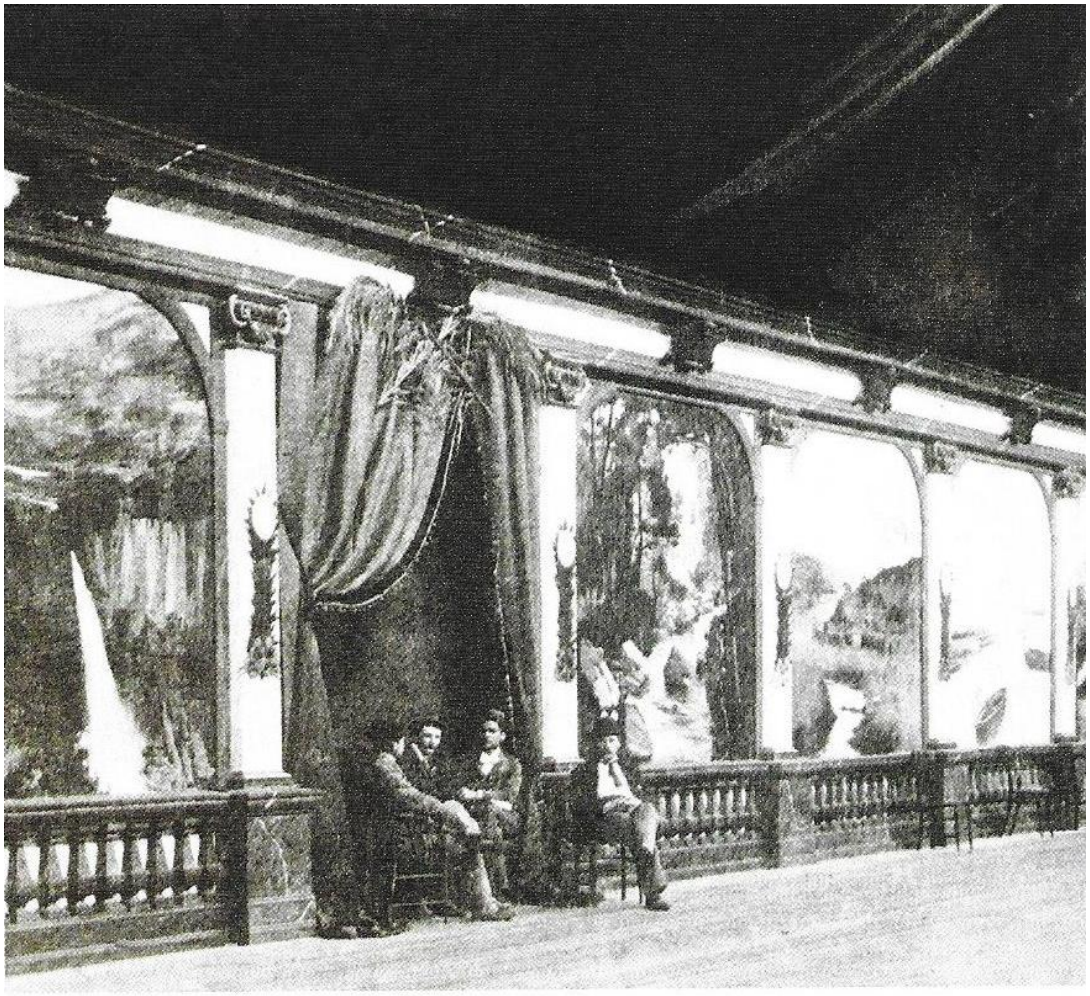


Figure 12: Decoration of the Reception Hall in Pretoria by Oerder and van Wouw. Photographer unknown. (Duffey, 2017:17).

According to Duffey (2017:39) van Wouw and Oerder together created a northern focal point in South African art by taking Dutch realist and Impressionist[20] stylistic influences from their artistic training at the Rotterdam Academy and applying it to the landscape of the Transvaal. This Transvaal landscape was very difficult to portray as the light changes momentarily and often. In the landscapes they painted, van Wouw and Oerder captured the South African atmosphere very effectively. The bright light eliminates subtler colour variations leaving broad flat planes of monochromatic hues. The sparse, thin and dry air results in the horizon appearing much further away.

These visual painterly effects come to the fore in *Cattle Grazing near Pretoria Zoo* (ca. 1896) (figure 1) as seen in van Wouw's interpretation of the veld in dull monochromatic hues of domineering light yellows and greens. The clear sky in all its brightness, painted in an almost white light closest to the horizon and turning to a gradual warm light blue display van Wouw's acute observation of the Transvaal's sparse, thin and dry atmosphere. Oerder's painting *Naby Pretoria* (Near Pretoria) (figure 13) painted in 1896 depicts the landscape surrounding old Pretoria and the expansive veld between Pretoria and Johannesburg (Duffey, 2017:39-40). This painting shows a remarkable similarity to van Wouw's *Cattle Grazing near Pretoria Zoo* both in subject matter and style. Like van Wouw, Oerder captured and rendered the effects of light on the dry highveld[21] grass in broad and monotonous planes of dull yellows and greens. The dirt paths consisting of red ochric soil, seen in both paintings, draw the viewer into the landscape where cattle are found grazing. From this comparison it is evident that both artists were primarily concerned with capturing the effects of the bright Transvaal light as faithfully as they observed it.

[20] Impressionism is an artistic movement of the 19th century that officially entered the art world in 1874 when the term was broadly applied to a group of artists who exhibited their paintings at a *Salon des Refusés* (French for 'exhibition of the rejected') during that year. The term was taken from Claude Monet's (1840-1926) painting titled *Impression Sunrise* (1872) and meant as an insult by the art critic Louis Leroy (1812-1885) to describe the work on display. These works had a crude, sketchy and unfinished appearance which conveyed a powerful sense of fleetingness and immediacy which was unappreciated by the art critics of the time. This group of painters, however proudly embraced the term *Impressionism* to describe their style and despite each having their own individualistic approach to painting, they had a common goal of achieving higher degrees of naturalism and luminosity in their work (Beckett & Wright 1994:294).

[21] The highveld is a high-altitude region of the South African interior plateau that is around 1200 meters to 1800 meters above sea-level and encompasses nearly all of the Free State and Gauteng provinces, including a section of KwaZulu-Natal. The highveld landscape mainly comprises grasslands, plains and some rocky ridges and constitutes to around 30% of South Africa's land area (South Africa Online, 2022).

At this time, the theme of the land, both in visual art and literature, is highly contested in terms of land ownership by South Africa's diverse cultural groups and it has been argued that artists in South Africa made the land their subject as a way to establish their roots and forming a new identity in a place far from their original home (Tietze & Botha, 2014:1184). Stylistic conventions taken from European landscape traditions aided in familiarising the alien terrain, taming the African landscape by rendering it in the image of the European landscape (Tietze & Botha, 2014:1184). Various approaches were introduced during the first quarter of the 20th century and some of the best painting emanated from the hands of settlers trained in the Dutch tradition, such as van Wouw and Oerder who contributed significantly to the development of South African art (Berman, 1983:3).

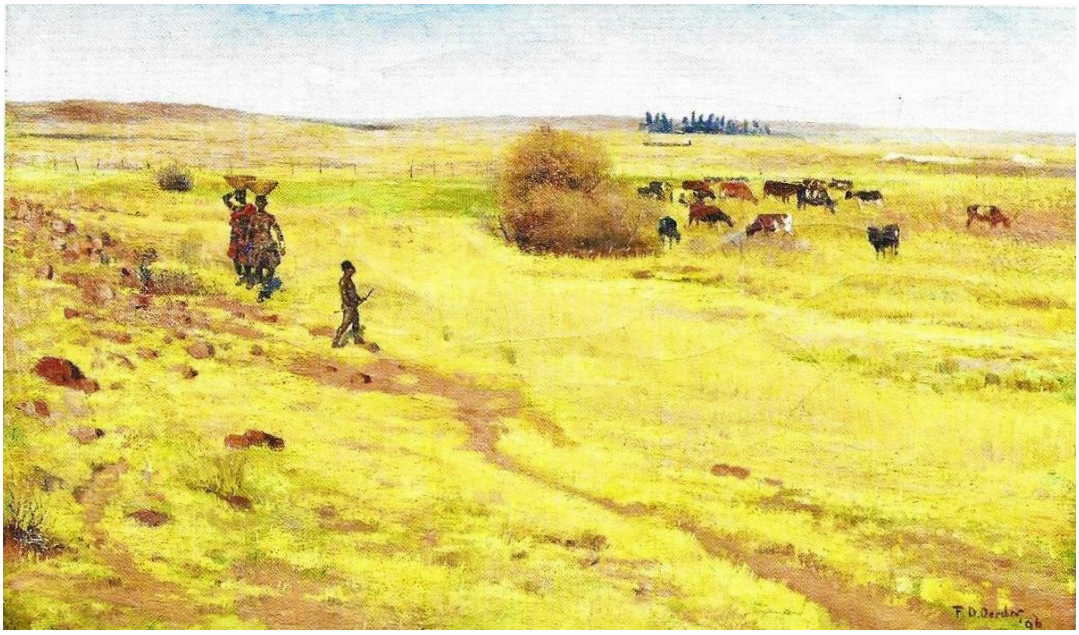


Figure 13: Frans David Oerder, Naby Pretoria, 1896. Oil on canvas, 320 x 510 mm, Johannesburg Art Gallery. (Duffey 2017:43).

According to Berman (1983:473) van Wouw held no exhibitions of his paintings nor drawings. This is perhaps the case since he identified himself as a sculptor and as such spent most of his time on large state commissions for both architectural sculpture or monumental sculptures. Although his sculptures can be found in most South African art galleries, Berman (1983:473) claims that many of his paintings are in the William Humphreys Gallery in Kimberley as well as in private collections and several of his drawings can be found at the Bloemfontein War Museum and the Africana Museum in Johannesburg. Berman (1983:473) describes most of his paintings as "little more than

sketches." This remark probably serves to describe the seeming immediacy, spontaneity and efficacy of van Wouw's paint application that is characteristic of impressionistic painting methods.

An example of his more sketchy and immediate painting approach can be seen in *In the sculptor's studio* (figure 14) an undated oil on panel showing van Wouw himself in the midst of working on a massive architectural sculpture of a lion's head. Other architectural ornamentation can be seen fixed to the studio wall, as well as a small model of a lion and an assistant or possibly a student of van Wouw working alongside him. The loose, broad and spontaneous brushstrokes that characterise *In the Sculptor's Studio* turns the moment in van Wouw's studio into a dynamic and fleeting creative event.

Figure 14: Anton van Wouw, In the sculptor's studio, undated. Oil on panel, 225 x 185 mm, Pretoria Art Museum. Photograph by JA Elsenbroek.

Figure 15: Anton van Wouw, Landscape, undated. Oil on canvas, 235 x 435 mm, Pretoria Art Museum. Photograph by JA Elsenbroek.

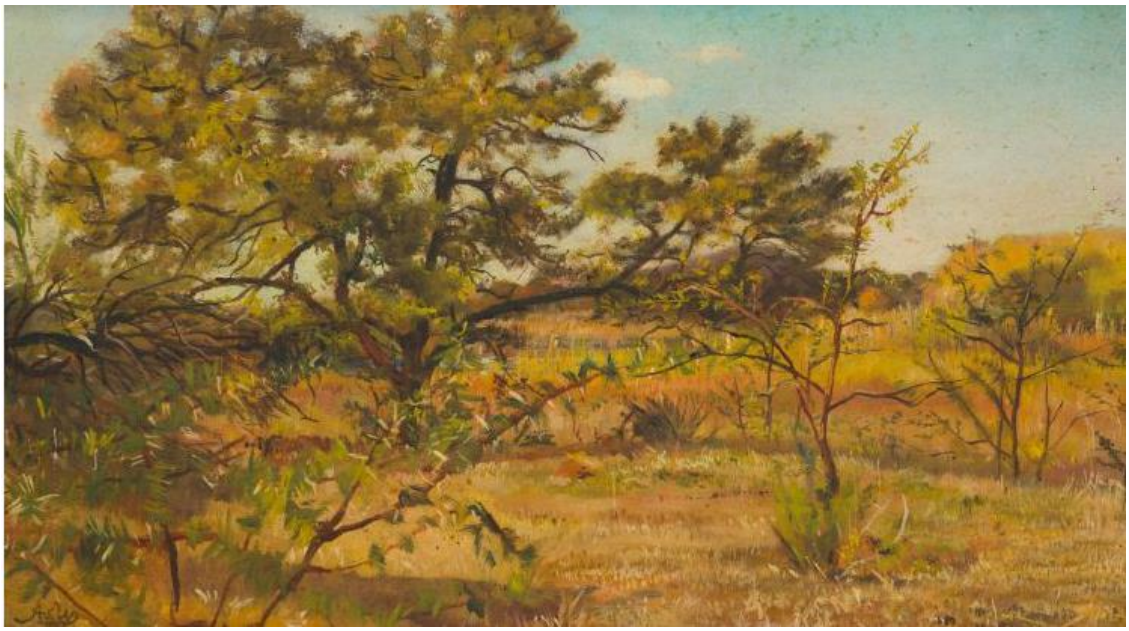


Figure 16: Anton van Wouw, Meintjieskop, undated. Oil on board, 195 x 340 mm, private collection. (Strauss & Co, 2022).

Figure 17: Anton van Wouw, Vlei landscape, undated. Oil on canvas, 400 x 490 mm. Private collection. (Artnet, 2022).

More examples demonstrating this spontaneous sketchy painting techniques can be seen in van Wouw's numerous landscape studies including *Landscape* (figure 15), *Meintjieskop* (figure 16) and *Vlei Landscape* (figure 17). Van Wouw wrote about his love for the South African bushveld[22] in letters to Albertus Daniël Keet[23] (1888-1972) with whom he was in correspondence between 1926 and 1930. Letters or any type of primary source documents of van Wouw are extremely rare since after his death most of his letters and documents were destroyed by his late widowed wife (Keet Jr, 1981:5).

In his letters to Keet, van Wouw declares how much the bright South African sunlight meant to him as an artist and he writes that there is only one South Africa with its invigorating sun that lights up his life and path. The harmony of colours in the bushveld left a lasting impression on him and mesmerised him so that he made several paintings

[22] The bushveld is the natural environment in southern Africa at an altitude of about 800 meters to 1200 meters and is located in South Africa's Limpopo province, extending into the northern parts of South Africa's KwaZulu-Natal province and neighbouring countries of Swaziland, Mozambique, Zimbabwe, and Botswana. Characteristic features of the moderately dry bushveld landscape include trees, especially acacia, baobab and thornbushes, as well as tall grasses (Editors of Encyclopaedia Britannica, 2019).

[23] A D Keet was a medical doctor and an Afrikaans poet who wrote some of the first Afrikaans love poems (Terblanche, 2016).

of it (Keet Jr, 1981:7). In 1927 he wrote about the beauty of the bushveld and that he had spent some time there that he enjoyed immensely. He recalls how lovely it was to live there amongst the various plants, herbs and bushes all nearly appearing the same colour (Keet Jr, 1981:27). He describes how the majority of the scene consists of a set yellow but in that yellow there are various nuances of colour of colour to be found – blue-brown light reflections... too many to name, yet all harmonising in a singular whole. Van Wouw exclaimed that he will never forget the harmony of colour experienced in the bushveld and that he had also made a set of paintings wherein one came out completely successful (Keet Jr, 1981:28).

Van Wouw's attraction to the untouched South African landscape is evident through his frequent camping trips in the veld and all the time he spent outdoors. He and his first wife Sannie and later second wife Engelina frequently went out camping in the veld with friends and other artists. They befriended the Pierneef family and although Jacob Hendrik Pierneef[24] (1886-1957) was much younger than van Wouw, they had a close friendship (Ernst 2006:32). In fact, van Wouw was Pierneef's godfather, teacher, mentor and confidant, and he had an immense influence on Pierneef, especially in his years as a youth. Van Wouw taught Pierneef how to draw and the importance of careful observation when drawing. He also stressed the importance of drawing as the foundation of oil painting as he told Pierneef to master his drawing technique before painting with oils (Pretorius, 1990:96).

Van Wouw and Pierneef shared their deep love of nature and frequently went together on camping trips where they spent their time sketching and painting out in the veld. The oil on canvas painting by Pierneef titled *The bush camp of Anton van Wouw, Rooiplaat* (1918) (see figure 18) captures a moment of their numerous outings together as it portrays their camp with their tent and an assistant busy boiling water to make tea. Towards the right, seated at a table under a large tree one sees van Wouw and his wife along with another woman wearing a hat which is possibly one of van Wouw's grown daughters or it could be Pierneef's wife Agatha Susanna Margaretha Delen (Bonhams, 2022).

[24] J H Pierneef was a Pretoria-based artist and is often regarded as South Africa's most notable landscape painter. With his incredible prolific artistic output during the first half of the 20th century he had developed an iconic style that still makes him a household name in the South African and international art world. The artist worked across media producing artworks in oils, watercolour, gouache, casein, linocuts and etchings (Strauss & Co, 2022).

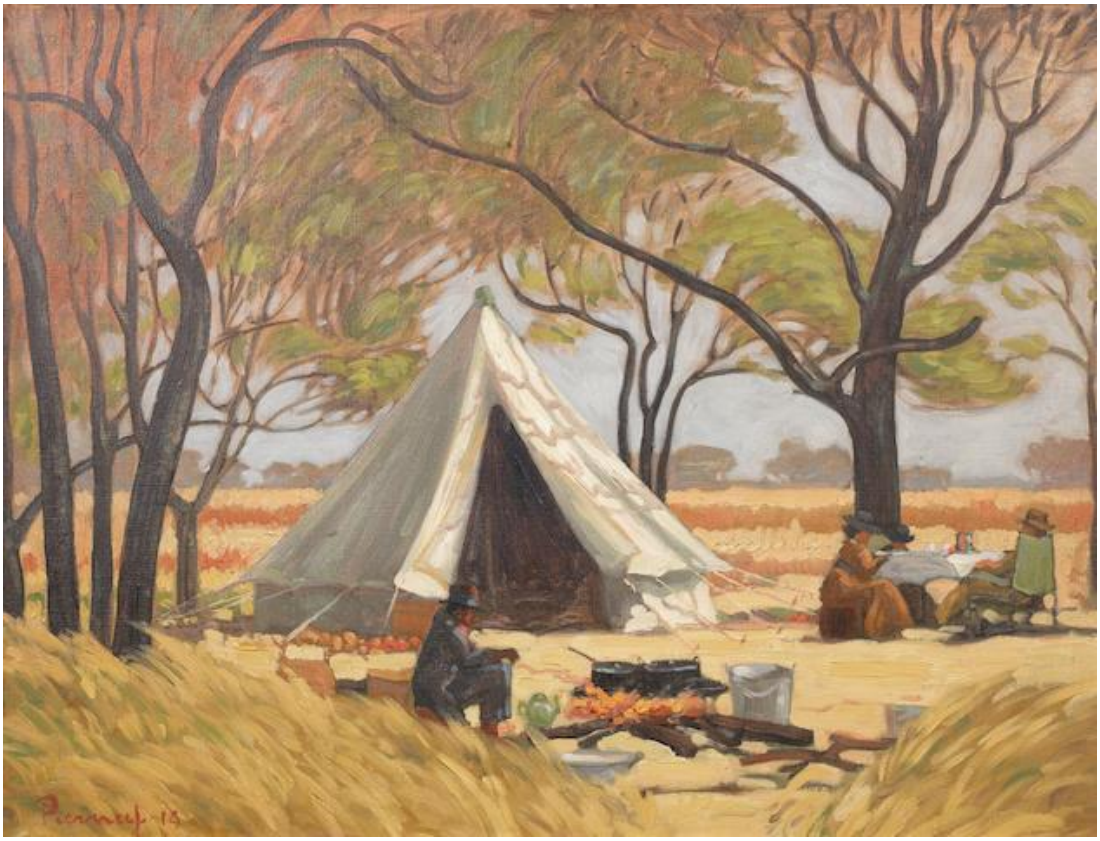


Figure 18: Jacob Hendrik Pierneef, The bush camp of Anton van Wouw, Rooiplaat, 1918. Oil on canvas, 510 x 660 mm. Private collection. (Bonhams, 2022).

This painting also stands as a unique moment in Pierneef's oeuvre since he seldom included people in his landscapes, favouring nature's silent force (Bonhams, 2022). Moreover, this painting provides insight into the working methods of two of South Africa's most celebrated artists, namely that of travelling and camping together in order to paint *en plein air*[25].

It is highly probable that van Wouw painted most, if not all his landscapes and other genre themes from direct life observation. In an article of 1926 in the Common Room Magazine of the Technical College in Durban van Wouw wrote about his own work wherein he is found saying: "The best training after all is to do everything after nature as near as possible" (Ernst, 2006: 75). He is thus of the opinion that nature is the most important master for an artist. He preferred working directly from life as reference for his work instead of working from photographs or drawings. For him it was essential and his lifelong objective as an artist to turn to nature for inspiration by sharpening his

[25] *En plein air* is French for 'in open air.' It is a practice amongst painters that rose to popularity in the 19th century particularly amongst Realist and Impressionist artists as a result of the 19th century development of metal paint tubes which made paint easily portable and enabled artists to make painting trips to the countryside with portable easels (Beckett & Wright 1994: 279).

senses to observe and capture every minute detail of his subject (Ernst, 2006:13). According to Cohen (1938:30) van Wouw was aware of the latest art trends of Europe in the early 20th century such as Expressionism[26] and Cubism[27], however he had absolutely no interest in these movements and preferred the school of Michelangelo above anything else.

After placing the artist and his general painting oeuvre into context, I now turn my attention to the general construction and deterioration of oil paintings as well as introducing and explaining the various investigative methods employed to further the material understanding of *Cattle Grazing near Pretoria Zoo*.

[26] Expressionism is an art movement that began in Germany around 1905 until 1933. The movement later spread throughout Europe, as a reaction to people's extensive anxiety towards modern society in which feelings of alienation and existential dread persisted. This movement was also partly reactionary to and against formal academic art and Impressionism and was mainly inspired by individualistic artists such as Vincent van Gogh (1853-1890), Edvard Munch (1863-1944) and James Ensor (1860-1949) who all portrayed a distorted sense of reality with strong colour usage to elicit their inner feelings. Expressionist is characterised by very expressive, visible and exaggerated brushstrokes with striking colours to depict their subjects in a distorted manner which was often intended as a form of social criticism towards the urbanisation of modern cities with its effects of alienation on the individual. Prominent Expressionist artists include Ernst Ludwig Kirchner (1880-1938), Käthe Kollwitz (1867-1945), Chaim Soutine (1893-1943), Emil Nolde (1867-1956) and Egon Schiele (1890-1918) (The Art Story, 2022).

[27] Cubism started around 1907 till 1922. The invention of this style is credited to artists Pablo Picasso (1881-1973) and Georges Braque (1882-1963) who produced artworks by incorporating different angles and perspectives of their subjects into one image, making their artworks appear fragmented, geometric and abstracted (Tate, 2022).

CHAPTER 3
INVESTIGATIVE METHODOLOGIES

This chapter serves to introduce how a painting is constructed, how it may deteriorate and explain the various means of investigation conducted on *Cattle Grazing near Pretoria Zoo* to obtain different information about it. These investigative methodologies are invaluable to the examination process of the painting since they can reveal information about the painting's condition as well as the artist's painting technique and use of materials which not only adds to our knowledge of the materials used by the artist, but also adds to the historical record and has bearing on conservation decision-making in terms of appropriateness of treatment. The various analytical techniques that are employed to examine the painting include physical examination and technical photography as well as X-ray fluorescence spectroscopy (XRF) are discussed below, whilst the results of these analyses are combined into the condition assessment in chapter four.

3.1. Understanding a painting's construction

Paintings are tangible objects consisting of endless variations of a limited number of substances of which each substance has its own physical properties (Hours, 1976:10). As such paintings consist of various and numerous layers which mainly involve layers of paint applied to a support that is typically made of canvas or a wooden panel. Paintings that have a canvas as the primary support are usually stretched over and attached to a secondary wooden support structure called either a stretcher or a strainer depending on its construction (Hackney, 2020:6-7). The secondary support is usually an open wooden framework that consists of at least four members that attach to each other at the corners. A strainer is a secondary or auxiliary support that has fixed corners whereas a stretcher is an auxiliary support with expandable corners. Canvasses can also be attached to a solid rigid support that acts as its auxiliary support. By the end of the 19th century in Europe, canvas boards became available and were sold by artists' suppliers. These canvas boards consisted of compressed wood-pulp or straw boards onto which a canvas was adhered. These were however only used for sketching; they were mainly manufactured in smaller sizes and were not considered as permanent painting supports since they were non-archival (Hackney, 2020:25-26).

The canvas support is typically prepared with a layer of glue size and or a layer of ground before the paint is applied. Sizing is the application of a thin, transparent coat of diluted adhesive to seal the surface of the primary support. Canvas sizing was originally done with animal-skin glue such as rabbit, goat or sheep skin which primarily consist of collagen and can be made into strong, flexible water-based gelatinous adhesives. Size is applied to canvas to serve several functions. It provides a structural film that stiffens the canvas; it covers the interstices of the canvas to reduce the absorption and strike-through of the ground layer; it tightens the canvas as it shrinks upon drying and it also provides the canvas with a protective barrier against the acidity that develops in the paint film (Hackney, 2020:11). A ground is an opaque layer that is applied to a sized canvas, acting as the structural support for the subsequent paint layers and also provides an optical ground for the pigments which reflects back all the light that penetrates the painting. Historically, the most popular oil ground consisted of lead white in linseed oil that is extended with fillers such as chalk and silica which also provided tooth (friction) onto which the paint layers attach (Hackney, 2020:13). All grounds are also not necessarily white, since the painter may decide to tone it according to their aesthetic needs with other pigments.

In the European tradition an *imprimatura* may also be applied before the image is painted. An *imprimatura* is a thin layer of colour that is applied over the ground or colours the ground, acting in a similar way as a toned ground and can also serve as a sealant to reduce the absorbency of the ground. These coloured grounds are often useful in the painter's painting process and may still be visible in some areas of the finished painting (Taft & Mayer, 2000:5). The artist would then either sketch out a preliminary composition in charcoal, graphite or paint directly. Sometimes these compositional placements are reworked and changed prior to the execution of the final image. The signs of these revised areas are referred to as *pentimenti* (Kirsh & Levenson, 2000:126).

The paint layers essentially consist of pigments that are suspended in a binder. Oil paint consists of pigment that is suspended in a type of drying oil as the binder. Drying oils are part of diverse group of natural compounds known as lipids with a particular property of forming solid films when exposed to air; polymerising as they react with oxygen (Taft & Mayer, 2000:36). The main drying oils used as binders for oil paint are linseed oil, walnut oil and poppyseed oil. Linseed and walnut oils were the most used

in European oil painting during the 18th century whereas linseed and poppyseed oil were generally the most used throughout the 19th century (Hermens & Townsend, 2012:213). Most traditional paintings have a surface coat of varnish that is applied over the paint layers after the painting is completed and has thoroughly dried.

Varnish is a transparent liquid resin material that sets upon exposure to air. It has two principal functions. Firstly, it provides an exterior coating that protects the paint layers from harmful factors such as abrasions, atmospheric pollutants, moisture and dirt particulates. Secondly it has an aesthetic function that finishes the painting by providing a uniform layer that unites the various colours of paint that may have dried in uneven amounts of gloss or matte under an even amount of gloss or matte appearance, bringing out the colours that may have faded upon drying (Taft & Mayer, 2000:5).

3.2 Understanding the general deterioration of oil paintings

Oil paintings, like all objects, have a finite lifespan. As discussed previously, paintings are composite structures consisting of several components, each of which interacts with the other in a complex manner depending on the surrounding environment. As such the environment in which they are stored or displayed has a tremendous impact on their continued preservation and has a direct impact on the behaviour of the structure of the painting both physically and chemically. Physical deterioration entails changes in the arrangement of a substance's molecules without changing their atomic arrangement or composition. Thus, with physical changes, no new substances are formed (Folch, 2011:27). The main cause of physical damage to paintings come from improper handling where physical forces from dropping, impact or vibrations can result in the formation of cracks and delamination in the paint layer while tears and holes may form in the canvas support (Fahey, [sa]:1).

Another form of physical damage to paintings is caused when paintings are exposed to environmental fluctuations in temperature and Relative Humidity (RH) (AIC, 2022). In humid conditions the hygroscopic[28] nature of the painting support (the canvas and the wooden auxiliary support) causes it to expand as the canvas absorbs moisture, while in dry conditions the canvas shrinks again. While the paint layer may also absorb moisture in humid conditions, it is much less hygroscopic than the canvas and does not readily

[28] Absorbing and retaining moisture.

expand. The traditional animal glue size layer is responsive to changes in RH and at high humidity levels this glue tends to lose its bonding strength to the canvas and ground, resulting in delamination of paint and ground layers and material loss (Hackney, 2020:105). These ongoing disproportionate internal stresses cause paint layers to crack, lift, flake or delaminate (Folch, 2011:31). Changes in RH may also cause the hygroscopic wooden auxiliary (stretcher, strainer or board) or primary (panel) support to warp, distort or crack that may lead to planar disturbances in the picture plane and or paint loss (AIC, 2022).

Temperature extremes are also detrimental to a painting's structure. Very low temperature may cause oil paint to become brittle and glass like, promoting serious cracking and delamination (Mecklenburg, 2020). High temperatures, on the other hand, cause paint layers to become more flexible and plastic (Folch, 2011:31). High temperature accelerates the rate of chemical deterioration of paintings. Heat is a catalyst for most chemical reactions because when a substance is exposed to high temperature, its atoms and molecules move faster which increases the likelihood of them colliding and reacting (Moncrieff & Weaver, 1992:39).

Chemical deterioration refers to alterations in the chemical make-up of a substance whereby the atoms in the molecules of a substance are rearranged to form new substances that have different physical properties to the previous substance. This chemical change in turn influences the physical characteristics and deterioration of a substance (Folch, 2011:27). Other factors that increase chemical reactions leading to the degradation of paintings include temperature, moisture, biological attack, light and air pollution (Boersma *et al*, 2007:21). The combination of heat and moisture promotes the growth of bacteria and mould that may break down the painting support and disrupt the paint layers (Mecklenburg, 2020).

Excessive exposure to moisture may cause hydrolysis of the paint films and canvas. Hydrolysis is the chemical degradation of a compound as it reacts with water (Folch, 2011:28). Hydrolysis weakens the paint film and makes it more vulnerable to the damaging effects of atmospheric moisture and cleaning solvents (Mecklenburg, 2020). Hydrolysis may also cause increased transparency of the paint layer over time (Hackney, 2020:53); as well as causing materials within the paint and ground layers to migrate, resulting in paint instability and the formation of degradation phenomena such

as metal soaps[29] and or efflorescence[30] (Hackney, 2020:153-155). The canvas (cellulose) structure is also affected by hydrolysis as it caused depolymerisation of the cellulose chains, embrittling the canvas (Folch, 2011:28).

Exposure to excessively high levels of light may cause fading and/or darkening of certain pigments that may heavily compromise the legibility of the painting. (Fahey, [sa]:1). Light may also accelerate oxidation processes. Oxidation is a chemical reaction whereby the molecule of a substance combines with oxygen (Folch, 2011:29). Light containing Ultraviolet (UV) radiation from sunlight can cause varnish as well as the canvas (cellulose) to oxidise leading to discolouration (often yellow-brown) and embrittlement that can result in the varnish to peel or flake and canvass to break (Young, 2012:117).

Atmospheric pollutants such as air borne particulate matter and gaseous exhaust fumes from industrial and vehicle activity also affect the longevity of paintings. The main pollutant, concerning paintings, is particulate matter suspended in the air in the form of dust and grime. Over a period of time the accumulation of dust and grime on the painting's surface will obscure the intended visual appearance of the work (Byrne, 1995:112). Surface dirt and grime accelerate the deterioration of paintings since it is hygroscopic and thus promotes mould growth and can also be the food source for insects. Insect excrement and accretions are acidic in nature and react with the surface of the painting by etching into and corroding the paint. Dirt components may also react with inherent materials of the painting to form by-products that can be challenging to remove without harming the artwork (Van den Burg & Seymour, 2022:13). Dirt's hygroscopic nature can also accelerate the development of inorganic by-products that corrode original material by means of salts in the dirt reacting with the fatty acids in the paint to form insoluble metal soaps and crusts and may also cause various whitening effects of the surface such as blanching, blooming or crazing (Van den Burg & Seymour, 2022:14).

[29] Metal soaps form in paintings due to a reaction between the metals from pigments in the ground and paint layers and the free fatty acids from the oil binding medium. Metal soap components that migrate and remineralise at the surface can destabilise the paint layers and cause disruption in the painted surface as it encourages of crusts, protrusions or efflorescence of the painting's surface (Cultural Heritage Agency, [sa]).

[30] Efflorescence is a term broadly applied to describe a change in the surface colour of a painting that often appears as a whitish substance that is formed by components within the paint that have reacted with foreign matter and has migrated to the surface of the paint layer (Cultural Heritage Agency, [sa]).

Another factor causing the degradation of paintings is that referred to as inherent vice[31] that relates to the composition of the materials used. Paints made from certain pigments such as earth colours, organic compounds and some inorganic substances seldom fully polymerise to form a durable paint film and will be prone to hydrolysis while other pigments dry to form very brittle paint films (Mecklenburg, 2020). The inconsistency in the polymerisation of paint in various layers may cause cracking and delamination.

After describing the main factors that lead to the degradation of paintings, I now turn my attention to explaining the ways in which conservators gather information from paintings using visual examination and documentation of the artwork as a preliminary step to investigative techniques.

3.3 Physical examination

The first step in any treatment strategy for an object is to view it under normal visible light conditions (such as fluorescent lighting or natural daylight but not direct sunlight) to gain the best possible understanding of the object as it would be perceived in its standard viewing setting. Appelbaum (2010:27) refers to this stage as the "just looking" stage. This stage enables the conservator to ascertain the physical state of the object along with observational cues that allude to its history and behaviour of its constituent parts.

In this observational approach the conservator looks for signs of the painting's construction; signs and extent of ageing or deterioration; evidence of use (display) such as fading colour due to exposure to light and or accumulations of surface dirt; indications of non-original material (previous restorations) and signs of instability (Appelbaum, 2010:27). These signs, appearing at the painting's surface, are recorded with photography to keep a permanent record of the painting's surface and structure. This becomes an invaluable reference point in keeping track of the artwork's ongoing degradation process as well as acting as a testament to the treatment it has undergone in the past before being potentially changed by possible future treatments.

Photography includes photomacrographs and photomicrographs. Photomacrographs are photographic images of the subject that are somewhat enlarged without the use of a microscope. Photomacrographs focus on particular areas of the painting so that these

[31] Inherent vice signifies deterioration that is caused by factors that are within the materials themselves, instead of deterioration that is caused by external agents. These agents can be intrinsic to the raw materials or they can be added to the materials during the manufacturing process (NEDCC, 2022).

areas show specific details that are not normally perceived when viewing the painting in the context of a whole image. It informs the eye and heightens the perception of details which the bare eye tends to overlook (Hours 1976:30). Photomicrography, on the other hand, entails photographing an image that is invisible to the naked eye using a microscope that produces enlargements to the power of 10 to 1000 magnification for ordinary microscopes, such as a USB digital microscope, and 30 to 40 000 magnification for an electron microscope (Hours 1976:30).

- The equipment used to photo document the van Wouw painting for its physical examination are as follows:
- A Canon EOS 6D Mark II camera and a Canon EF24-70mm f/2.8L II USM lens with the visible light filter – X-Nite Band Pass Series 1 (BP1) 320 – 670 nm – were used to capture a broad overview of the painting before removing it from the frame – see figures 22 and 23
- Two Eurolux 500W Halogen Floodlights, each mounted on a tripod stand, were used as the illumination source for the visible light photography for figures 22 and 23
- X-Rite ColorChecker Passport Photo II used for scale and white balancing
- A RMI (Robin Myer Imaging) Conservation Target (2017) was used for scale and light direction indication as well as colour checking and white balancing purposes.
- USB digital microscope with 1600x magnification potential with a 5-megapixel image sensor. This USB digital microscope was used through a laptop to view the magnified images through its screen and the micrographs were captured with the accompanying CoolingTech Microscope software. Scale on the micrographs were calibrated with this software and where scale indications are not present, the degree of magnification is provided in the image caption.
- For photomacrography Samsung Galaxy A12 smartphone camera was used. This camera consists of four cameras that operate simultaneously: a 48-megapixel, f/2.0, 26 mm wide camera; a 5-megapixel, f/2.2, 123º ultrawide camera; a 2-megapixel, f/2.4 macro camera and a 2-megapixel, f/2.4 depth camera. Most of the photomacrographs were taken with the smartphone's macro camera.

- A black and white checkered scale bar was used to indicate scale on the photomacrographs. Each square block on this scale bar has a side that measures 10mm.

3.4 Technical photography

Technical photography is a broad term used to denote several techniques of examining cultural heritage material under selected wavelength regions of the electromagnetic spectrum (see figure 19). These techniques are also collectively referred to as multispectral imaging. Multispectral imaging techniques are ideal for conservation applications because they are relatively inexpensive, entirely non-invasive and non-destructive (Dyer, Verri & Cupitt, 2013:1). The radiation used in these techniques include ultraviolet (UV) radiation at wavelength range 200-400 nm, visible light (VIS) at 400-700 nm and infrared (IR) radiation at 760-1700 nm.

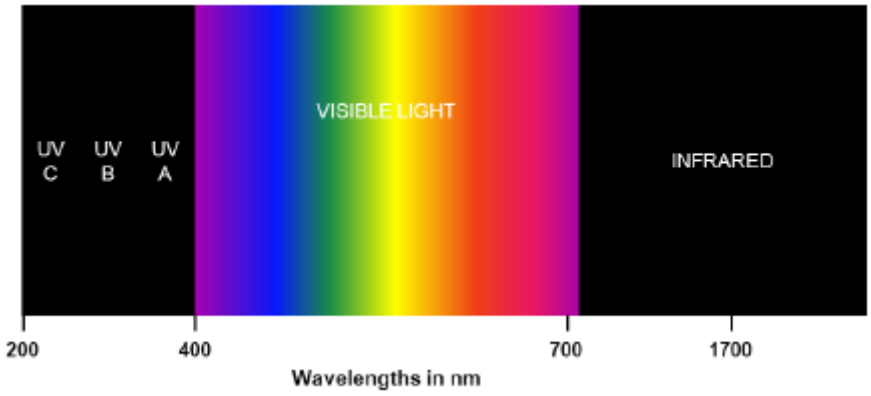


Figure 19: Illustration of wavelength ranges for regions in the electromagnetic spectrum for multispectral imaging as applied to cultural heritage research purposes. (Dyer, Verri & Cupitt, 2013:1).

Information specific to the type of radiation, which would normally be undetectable by the human eye (except for visible light), is revealed and the evidence of the moment's observation is captured using a camera and various light filters. Technical photography helps broaden our understanding of the painting's current condition, the artist's technique and possible use of materials in the making of the artwork.

Technical photography on *Cattle Grazing near Pretoria Zoo* was carried out using the following equipment:

- A Canon EOS 6D Mark II camera and a Canon EF24-70mm f/2.8L II USM lens with the visible light filter – X-Nite Band Pass Series 1 (BP1) 320 – 670 nm –

were used to capture normal reflected, raking, axial specular and oblique specular light.

- A Canon 6D 20.2 Megapixel camera with UV-VIS-IR Functionality was used with the Canon EF 24-70mm f/2.8L II USM lens with infrared passing filters – X-Nite 715 nm, X-Nite 850 nm and X-Nite 1000 nm – were used to photograph the effects of infrared radiation on the painting.
- A Canon 6D 20.2 Megapixel camera with UV-VIS-IR Functionality was used with the Canon EF 24-70mm f/2.8L II USM lens for the Ultraviolet radiation. A UV pass filter with IR blocking capability – the X-Nite 330nm Coated Filter – was also applied.
- Two Eurolux 500W Halogen Floodlights, each mounted on a tripod stand, were used as the illumination source for the visible light photography and the infrared radiation.
- For the UV radiation source, a Q-22 Ultraviolet light with 2 UV Bulbs (110 Volts) which has a peak intensity of 650 microW/cm^2 at 6 inches. BLE-220B and UVA bulbs were used to achieve ultraviolet-induced visible fluorescence.
- A RMI (Robin Myer Imaging) Conservation Target (2017) was used for scale and light direction indication as well as colour checking and white balancing purposes.
- A tripod on which the camera was mounted to ensure camera stability to eliminate any chance of photos to blur.
- Canon remote shooting software was used for taking the photographs.
- Rawtherapee software program was used to process and edit the RAW photo files into JPEG format with white balancing and preset editing applications specific to each method of illumination.

3.4.1 Visible light photography

Visible light photography involves photographs taken of the subject that is illuminated by the visible light band of the electromagnetic spectrum at the wavelength range of 400 – 700 nm. As the name suggests, this light spectrum is naturally detected by the human eye.

3.4.1.1 Normal reflected illumination

Normal reflected illumination is used to examine and analyse the painting's surface. This mode of illumination offers a record of an object's appearance as seen under standard viewing conditions. In this type of illumination, a relatively flat and uniform light source, for the purpose of eliminating or minimising surface glare, is preferred. As a pre-treatment record, photographs under this lighting condition will also provide an overview of the presence and distribution of disfigurements or visual disturbances as seen under normal viewing circumstances (Kushel, 2017:113). This photograph also acts as the point of reference to be compared or contrasted to photos taken of the painting in different light conditions or regions.

The painting was photographed according to Kushel's (2017:113) recommendations for two-dimensional objects. This involved mounting the painting onto an easel positioned parallel to the wall and at a 90º angle. Two Eurolux 500W Halogen Floodlights, each mounted on a tripod stand, were used as the illumination source and positioned approximately 25º from the surface plane of the subject. An angle between 20º – 45º from the lamps and the surface plane of the painting is recommended to reduce glare. Lamps should also be positioned as far from the subject as possible to attain a uniform surface illumination of the subject. Due to the limited space of the photography studio and the large scale of the painting, the distance within which the lamps could be moved was restricted and it was therefore very difficult to apply this recommendation and both uneven illumination and glare were challenging.

The warm emission spectrum of the floodlights created a hotspot at the centre which gives the light horizon above the mountain a slight orange appearance. This photograph does not meet the requirements for normal reflected illumination photography since it does not provide an accurate visual representation of the painting, especially with regards to the surface glare and the colour distortion. Art 2 Motion thus assisted with photography using Westcott lights with light diffusers to soften the light source as diffusers eliminate the formation of double shadows that may confuse the legibility of the photographed subject (Kushel 2017:113). Although the diffused lights were positioned as far away from the painting as possible, the surface glare on the painting persisted and the glare issue was finally resolved by moving the lamp faces up towards the white painted ceiling of the photography studio. This enabled further diffusing and scattering of the incident rays to such a degree that the surface glare was completely

eliminated. A photograph that accurately represents the visual appearance of the painting was now taken (see figure 45 in chapter 4).

3.4.1.2 Raking illumination

Raking or tangential illumination is another visible light investigation technique used to examine and analyse the surface of the painting. This technique can enhance the features of the painter's style and technique, highlight impasto and glazes and provide an indication of the condition of the painting's support.

This technique involves placing the painting in a dark room so that it can be lit by a light source parallel to or at a very small angle (between 5^{o} – 30^{o}) with its surface. This side lighting allows for any surface irregularities to become pronounced. It distorts one's perception of the painting by emphasising the slightest relief and thus reveals details of the painting's surface topography that would be imperceptible under standard lighting conditions. This method can reveal the slightest peeling, blisters, separation between pigment and support, any warping of the support or damage caused by any mechanical stretching. Different views of the surface can be obtained by varying the position of the light source such as illuminating the painting both laterally and vertically (Hours, 1976:21). Photographs taken under raking light reveal the extent and severity of the painting's topographical damage. Raking light was also used in several of the photomacrographs to accentuate surface anomalies or defects.

3.4.1.3 Specular illumination

Specular illumination is a technique used to record reflections off the painting's surface and thus requires the camera and light source to be positioned in a manner that would show the most surface glare of the painting. This mode of lighting aims to record topographical information of the painting that differs from the results achieved through raking light. While raking light is more effective at documenting a relative indication of the depth of a painting's surface texture, specular illumination documents variations in gloss and provides an indication of the presence of surface coatings on a painting, such as varnish, and the distribution of the painting's surface sheen (Kushel, 2017:118). Specular illumination can be done in two ways namely axial specular illumination and oblique specular illumination

Axial specular illumination records reflections off the painting's surface where the light source and the camera are positioned on the same axis. The camera stands parallel to

the painting's surface and the light source is placed next to the camera. Oblique specular illumination involves placing the light source and the camera at the same angle facing the surface plane of the painting, but on opposite sides of the painting.

3.4.2 Infrared photography

Infrared (IR) photography involves photographs taken in the infrared region of the electromagnetic spectrum. Infrared rays are warm, invisible to the human eye and are positioned just beyond the red band of visible light on the electromagnetic spectrum – see figure 19. Infrared rays are of low energy and have long wavelengths that increase along the electromagnetic spectrum away from the visible light region. These waves occupy the region from around 780 nm and extends to 10^5 nm which can be divided into four parts: (1) near infrared or NIR (780 – 3000 nm); (2) intermediate infrared (3000 – 6000 nm); (3) far infrared (6000 – 15000 nm) and (4) extreme infrared (15000 – 10^5 nm) (MacBeth, 2012:296).

The NIR range is the most suitable as the paint layers of a painting tend to readily absorb visible light whilst allowing the NIR light to pass through up to the ground layer. In other words, NIR can penetrate paint layers that appear opaque in visible light and make them appear transparent (MacBeth, 2012:296). If the artist made use of carbon-based preliminary sketching before painting, these drawings on the surface of the ground absorb the NIR that travelled through the paint layers is absorbed by the carbon-based material, reflected back and detected by a camera with infrared capturing properties (Stuart, 2007:73).

Because IR radiation is invisible to the human eye, the imaging technique of reflected infrared (IRR) photography is required to render the information visible which allows the examiner to see below the surface to detect concealed features such as underdrawings, underpainting and compositional changes if present.

The painting was illuminated with two Eurolux 500W halogen floodlights, each mounted on a tripod stand, and positioned at approximate angles of 25º-30º from the painting's pictorial surface plane. The floodlights emit both visible light as well as NIR radiation. As these two types of radiation interacted with the material of the painting, they were ultimately reflected back to be captured by the camera. Since only the reflected NIR radiation was to be recorded, a visible light blocking and infrared passing

filters, were affixed to the lens of the camera. The visible light filter used is an X-Nite Band Pass Series 1 (BP1) 320 – 670 nm and the infrared filters used are X-Nite 715 nm, X-Nite 850 nm and X-Nite 1000 nm. With the infrared filters, the longer the wavelength feature the greater the penetrative capacity.

Reflected infrared photographs of the painting were taken using the 715 nm, the 850 nm and the 1000 nm X-Nite infrared filters, although only the photograph from the 850 nm filter is included (see figure 52 in chapter 4) since it displays the possible findings from this imaging technique most clearly.

3.4.3 Ultraviolet photography

Ultraviolet (UV) radiation has been in use for the examination of paintings since the 1920s. UV rays start just outside the detection capacity of the human eye at the violet end of the visible light spectrum at the wavelength of around 400 nm and extend to the range of soft X-rays at the wavelength of about 10 nm. UV light is characterised by an increasing energy and shorter wavelength as it extends beyond the visible light spectrum. The UV section of the electromagnetic spectrum (see figure 19) can be partitioned into four segments of increasing energy and decreasing wavelength namely: (1) near or long-wave ultraviolet radiation (UVA) (320 – 400 nm); (2) middle ultraviolet radiation (UVB) (280 – 320 nm); (3) far or short-wave ultraviolet radiation (UVC) (200 – 280 nm) and (4) vacuum ultraviolet radiation (200 – 10 nm). The near or long-wave UV (UVA) is the most suitable for the examination of paintings since this radiation is the closest to visible light and has the ability to induce visible fluorescence in several organic materials such as varnishes, paint binders, adhesives and other media and few inorganic materials such as certain pigments. UVA radiation is generated by an ultraviolet lamp or ‘black light’ that also emits very little visible light alongside the UVA radiation (MacBeth, 2012:294).

When a painting is examined under UVA light, the reflected light we see is not UV, what we see is the reflected visible light from the UVA reacting with the materials on the surface of the painting (fluorescence). Materials that fluoresce (not all of them do) display different colours and intensities of fluorescence. These differences can provide information about the surface condition and sometimes the materiality of an artwork (MacBeth, 2012:294). Aged natural resin varnishes display a high intensity of fluorescence under UV examination. The oxidation process that causes these surface

films to age and discolour to yellow-brown allows the varnish to absorb more of the longer wavelength UV light and of the shorter wavelengths of visible light. This increased absorption results in a greater reflectance of visible light which leads to stronger fluorescence (MacBeth, 2012:294). Under UV examination old retouchings are often seen as dark purple patches as the restoration materials differ from those on the painting's surface. In addition, fluorescence fades with age and so the darkest retouching tends to be the most recent, while older restoration will have a stronger fluorescence and appear paler purple (MacBeth, 2012:295).

Recording and documenting UV fluorescence is done by setting up the camera, in this case a Canon 6D 20.2 Megapixel camera with UV-VIS-IR functionality. A Canon EF 24-70mm f/2.8L II USM lens was used with A UVA Barrier filter with IR blocking capability – the X-Nite 330nm Coated Filter. The painting is illuminated by two UVA lamps or "black lights", which also emit near infrared radiation, the light interacts with the materials in the painting and is reflected back as UVA, near infrared and visible fluorescence. The filter applied to the camera blocks the reflected UVA and near infrared while allowing for the visible fluorescence to be transmitted and therefore captured by the camera.

Due to the size of the painting, detecting finer intricacies and differences in the fluorescence of the materials was challenging as viewing the painting in its entirety as it fluoresces, it seems like it is mostly covered by a slight uniform indigo glow – as seen in figure 55. Parts of the painting were also further inspected and photographed at a closer range using a handheld Q-22 UV light with 2 UV bulbs (BLE-220B UVA) of 110 Volt which has a peak intensity of 650 microW/cm2 at 6 inches. This strategy provided a set of close-up photographs that revealed more discernible data in the characteristic fluorescence of certain materials and their distribution on the painting (see figures 56 – 60 in chapter 4).

3.5 X-ray fluorescence spectroscopy (XRF)

Handheld X-ray fluorescence spectroscopy (XRF) is a non-invasive and non-destructive method of scientific analysis that was used to gain a better insight into the possible pigments van Wouw used to produce *Cattle Grazing near Pretoria Zoo*. XRF provides information on the elemental composition of each area of analysis and is mainly suitable for inferring the presence of inorganic materials.

This technique involves the use of x-rays, which are high energy electromagnetic radiation with very short wavelengths and are situated in between the ultraviolet and gamma radiation bands on the electromagnetic spectrum. When the x-rays that are generated by the XRF spectrometer interact with materials, they are absorbed and produce fluorescence at an atomic level. As an x-ray makes contact with an atom it displaces an electron that is situated near atom's the nucleus in the inner shell. The atom returns to its ground state as electrons from higher energy levels move inwards towards the nucleus to fill the vacancy of the displaced electron. As the electrons travel from high to lower stable energy regions they emit x-ray photons, also known as fluorescent x-rays. These fluorescent x-rays have energies that are specific to and characteristic of the atom from which they originate. The detector of the XRF spectrometer measures the intensity and the energy of the fluorescent x-rays. The data is presented as a spectrum with peaks at energies that match elements that are present in the material (Bezur & Sperber, 2016:2).

Beyond its non-invasive and non-destructive nature, this technique has other benefits that contributes to its popularity in the sphere of cultural heritage conservation. These benefits include its portability, allowing for on-site analyses, and the relative short time for analysing material which offers a method to swiftly investigate an object that can lead to further avenues of inquiry (Bezur & Sperber, 2016:2). This technique, however also comes with its limitations. While it has the ability to detect heavier elements ranging from magnesium (Mg) to uranium (U) with ease, it can generally not analyse the lower energy fluorescent x-rays that are emitted by elements with lower atomic numbers than and including sodium (Na). This means that elements such as carbon (C), nitrogen (N), oxygen (O) and sodium (Na) go undetected. XRF therefore cannot detect organic materials such as varnishes, binding media or adhesives in paintings. It also does not directly identify compounds which requires interpretation of the data and therefore eliminates certainty of material identification. Another obstacle comes with the x-ray spot size (8mm in this case), which can detect small features that are situated next to the testing target that may not be of interest to the aims of the investigation. The high energy X-rays also have the ability to detect the elemental composition of subsurface layers along with the outermost surface material. Thus, elements detected in a painting may come from below the paint layers to include the elements contained in

the ground and from paint layers underneath the area of interest. This can make interpretation increasingly challenging (Bezur & Sperber, 2016:2).

To ascertain the elemental composition of a specific layer the removal of samples for cross-sectional analysis would be required. And for definite pigment identification complementary analyses that operate according to compound-specific techniques such as X-ray diffraction (XRD) and or Raman spectroscopy would be required. These techniques however do not fit into the scope of this study since they are invasive and will not be used.

A Bruker Tracer 5i handheld X-ray fluorescence spectrometer was used to conduct analysis of the elemental composition of specific spots on the painting. The spectrometer operates with a rhodium (Rh) X-ray tube and the spectra were obtained for 30 seconds live time at a 30 kV accelerating potential, 5 μA current and with a TiAl filter. The XRF spectrometer was mounted on a tripod for stability and to eliminate any movement whilst the analysis was in operation (see figure 20). Two pieces of foam strip tape was also applied above and below the spectrometer aperture which allowed the instrument to make contact with the painting without the risk of damaging it through scratching.

Figure 20: XRF set-up for analyses on Cattle Grazing near Pretoria Zoo (c 1896). Van Wouw House, Pretoria. Photograph by JA Elsenbroek.

After introducing and explaining the components parts of an oil painting, its general deterioration process and the methods to investigate a painting's material aspects, I now turn my attention to the data that was obtained through employing these techniques.

CHAPTER 4
THE PAINTING AS IT IS

Chapter four contains an in-depth documentation report which sets out to record as much of the material information on the painting in its current physical state as possible. This chapter prioritises the materiality of the painting over the meanings, qualities and values it may hold which will be addressed in the following chapter. According to Appelbaum (2010:30) the observations obtained from the physical examination are essential for determining a suitable treatment strategy because "they are a matter of physical fact and act as a foundation for everything that is to follow." Despite the immaterial aspects inherent in works of art, such as this particular painting, artworks are first and foremost physical objects and conservation is primarily concerned with preserving the physical (Appelbaum 2010:31).

This chapter, in the form of a documentation report, introduces the painting with all its empirical information which provides a broad overview of the painting itself for the purpose of categorisation. This includes general information such as the artist, signature on the work, date of completion, its museum accession number, medium, dimensions, collection to which it belongs, its current location, known provenance, and history of being displayed. The documentation then proceeds with a physical examination of the painting under standard viewing conditions, making use of photomacrographs and photomicrographs as explained in chapter three to document the painting's current physical condition, including (where applicable) the stabilising materials that had been introduced throughout its treatment history. Investigative imaging and technical photography techniques are also employed to enhance and extend the physical examination to reach a better understanding of the painting's condition.

In addition to discussing the painting's current physical state, this observational data will also form an invaluable part in elaborating on van Wouw's painting technique. Furthermore, the analytical method of X-ray Fluorescence Spectroscopy is used to determine possible pigments used by the artist and therefore furthering the understanding of the painting's materiality. All these investigative and analytical methodologies have been explained and described in the previous chapter.

4.1 Empirical details

Artist: Anton van Wouw (1862-1945)

Signature: Signed bottom left corner in red (see figure 21)

Title: Cattle Grazing near Pretoria Zoo

Date: undated, estimated circa 1896

Accession number: 0300656

Medium: Oil on canvas adhered to Masonite board

Dimensions: 870 mm x 1420 mm

Genre: Landscape

Style: Realism, Impressionism

Collection: Anton van Wouw Collection, University of Pretoria Art Collection

Frame: Bevelled laminated wooden frame with a silvery gold appearance. The frame is not original to the painting. It measures 1000 mm x 1550 mm x 50 mm

Current location: Van Wouw House, 299 Clark Street, Brooklyn, Pretoria, South Africa.

Known provenance: Coll. Jan FE Celliers; coll. Ms ME Stegmann; donated to UP Art Collection in 1975.

Exhibited: UP Club Hall (1975-1983), Van Wouw House Museum (1983-2014), UP Old Arts (2014-2016), UP Main Museum Storage (2016-2020), and Van Wouw House (2020-present).

Figure 21: Anton van Wouw's signature in the bottom left corner of the painting in red paint. Note the signature reading A v Wouw – Pretoria with the bottom half of the A missing due to material loss. The signature measures approximately 30 mm x 155 mm.

4.2 Physical examination

The photo documentation of the painting's structural and surface appearance follows a systematic approach according to the anatomy of the painting. Firstly, the recto and verso of the painting was photographed whilst in its frame to leave a record of what it looked like before it was removed from its frame (see figures 22 and 23). The frame was removed to retrieve more observational information from the painting's edges and because the frame is not original to the painting it was decided to omit its investigation from this study.

Figure 22: Recto view of Cattle Grazing near Pretoria Zoo (framed) in its current state at the Van Wouw House. Photographed with Xrite Pigment checker for scale and white balancing purposes. Photographed by JA Elsenbroek.

Figure 23: Verso view of Cattle Grazing near Pretoria Zoo (framed) in its current state at the Van Wouw House. Photographed with Xrite Pigment checker for scale and white balancing purposes. Photographed by JA Elsenbroek.

The photo documentation continues with the primary support along with descriptions and interpretations of the observations. Then follows the secondary support, the ground layer, the paint layers and finally the varnish layer.

4.2.1 Primary support

The primary support for *Cattle Grazing near Pretoria Zoo* is a medium to heavy weight canvas that is woven in a rep weave pattern (see figures 24 and 25). A rep weave (see figure 25) consists of double warp and weft threads and is rarely used as weave pattern for paintings (Vanderlip Carbonnel, 1980). The thread count of this canvas is 26 warp threads by 24 weft threads per square centimetre (taking the doubled threads into account).

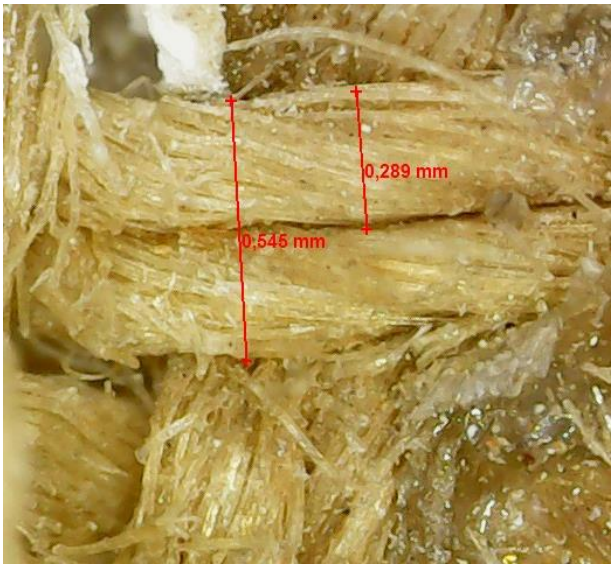


Figure 24: Canvas weave under magnification.

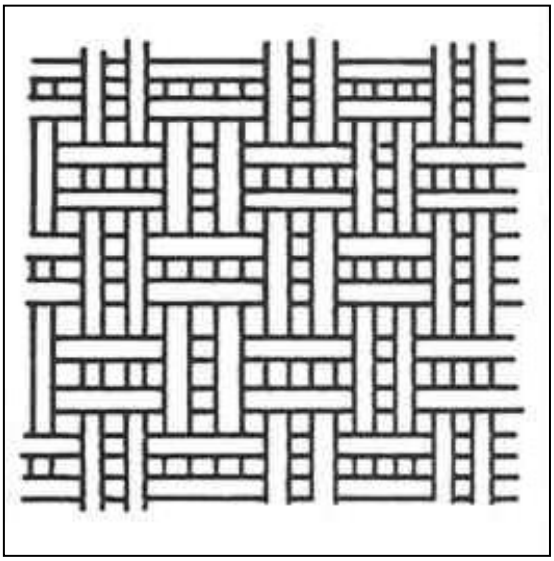


Figure 25: Diagram of a rep weave pattern (Vanderlip Carbonnel, 1980).

The drying twist test [32] was conducted on a single fibre that was sampled from the back of the canvas and revealed that the fibre is possibly made of hemp since it dried in an anticlockwise direction. According to Young (2012:139) hemp and linen were the main fabric supports for painting during the 18th and 19th centuries while during the 19th century linen was increasingly used over hemp and at the turn of the 20th century cotton

[32] The drying twist test involves the identification of fibre types by untwisting the helical structure of the fibre's microfibrils. The test is carried out by thoroughly wetting a single fibre or a thin fibre bundle that can be a few centimetres in length and holding it with forceps at one end close to a heat source to dry. The direction in which the free end dries is observed. Flax (linen) and ramie twist clockwise ("Z-type") upon drying whereas hemp, jute and most other fibres twist anticlockwise ("S-type"). Cotton twists alternately in opposite directions in an irregular manner (Mayer, 2012:325).

was used alongside linen. Knowledge of the fibre however, is seldom significant in studying canvases since the literature on this subject remains scarce despite the significance of canvas as a painting support. Evidence suggests that before the commercial manufacturing of specifically artists' canvas, painters used the fabric because of its availability rather than its specific features such as its weave, size or construction (Kirsh & Levenson, 2000:28).

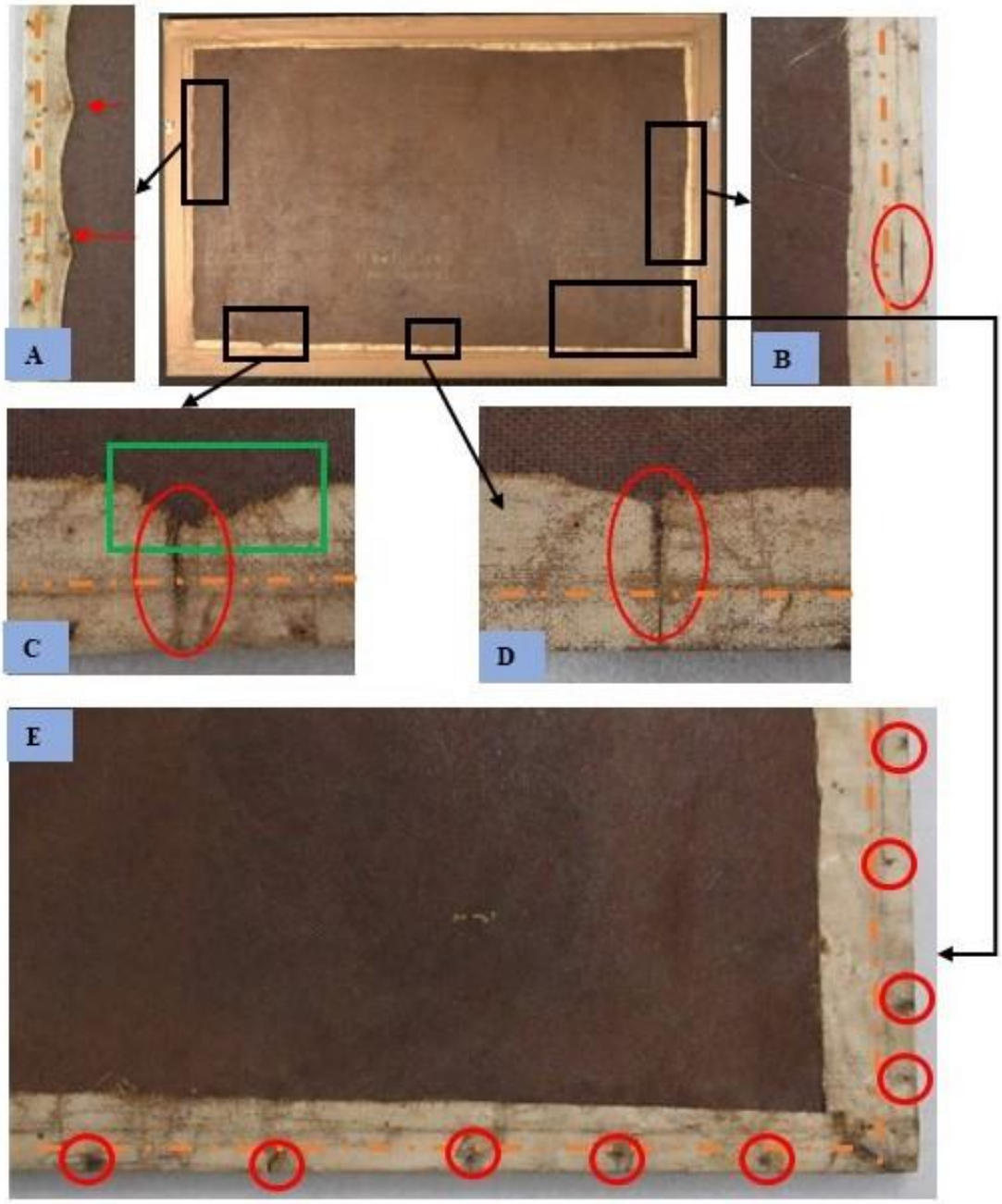


Figure 26: Mapped out details on the verso of the primary support.

The canvas is marouflaged to a board with an adhesive. According to Ms Markgraaf (personal communication 2022. March 24) some type of cold glue[33] was used in this process. As the painting's reverse had been sealed, there was no section available for testing of the glue to determine its origin.

Figure 27: Details on the top right corner and edge of the primary support.

There are several signs suggesting that the canvas had originally been stretched over a wooden auxilliary support. These signs include the cusping of the right vertical edge of

[33] Cold glue usually refers to polyvinyl acetate (PVA) glue that is water-based, quick setting at medium to low temperatures and can be used for most adhesion purposes including wood, leather, cloth, board and paper (Alcolin, [sa].).

the recto of the canvas (see figures 26 A and 27 A). Cusping refers to the undulating shapes or scallop pattern on the edges of a canvas that are the result of previous stretching of the canvas on a frame support and the size or ground layers have fixed these shapes in place (Hackney, 2020:8). Other signs of previous attachment to a frame support are the several tack holes visible that appear all along the outer edges on the verso of the canvas (see figure 26 E) as well as oxidation stains from the tacks in many of these tack holes (see figure 27 A). Figures 27 A1 and 27 A2 depict these oxidation stains under 10x magnification. The oxidation stains indicate that the painting had been stretched with tacks long enough for the oxidation to occur and transfer onto the canvas. The tack holes are irregularly spaced at an average of about 60 mm to 80 mm. The fold lines visible on the recto of the canvas (see figure 26 as indicated by the orange stippled lines) also show that the painting was likely stretched over a frame support. The edge of the picture plane up to the fold lines indicate the painting's original tacking margin which measures about 20 mm in width. This indicates that the depth of the original secondary support must have been about 20 mm. The painting's original auxiliary support no longer exists, and therefore it is not known whether it was a stretcher or a strainer, however there is a likelihood that it was a stretcher, as by the 19th century most artists used stretchers with expandable corners (Kirsh & Levenson, 2000:39).

The smaller tack holes visible on the edge of the canvas (see figures 27 B and B 1 under 10x magnification) are most likely from the painting's frame attachment.

A tear in the canvas can be seen along the fold line on verso of the left vertical side (figure 26 B, encircled in red). There also appears to be loss of canvas near the bottom right corner on the verso which possibly occurred from stretching the canvas onto the board (see figure 26 C, indicated by the green rectangle). Two tears can also be seen along the bottom lateral side on the verso (see figures 26 C and 26 D, both are encircled with red). These tears align with the vertical fold lines that extend throught the picture plane on the recto of the painting.

On the recto of the painting there is a slightly loose canvas thread located in the central fold damage of the picture plane (see figure 28 A). There are two holes in the canvas on the picture plane (see figures 28 B and 28 D, both encricled with red). The cleavage of the paint layer along the central fold damage of the picture plane may indicate a tear through the canvas (see figure 28 C). Wax from its previous consolidation treatment in

1975 can be seen on various parts of the exposed canvas on the picture plane (see figure 28 D, indicated by the surrounding yellow line). The exposed canvas (see figure 28) has aged to variations of yellow-brown.

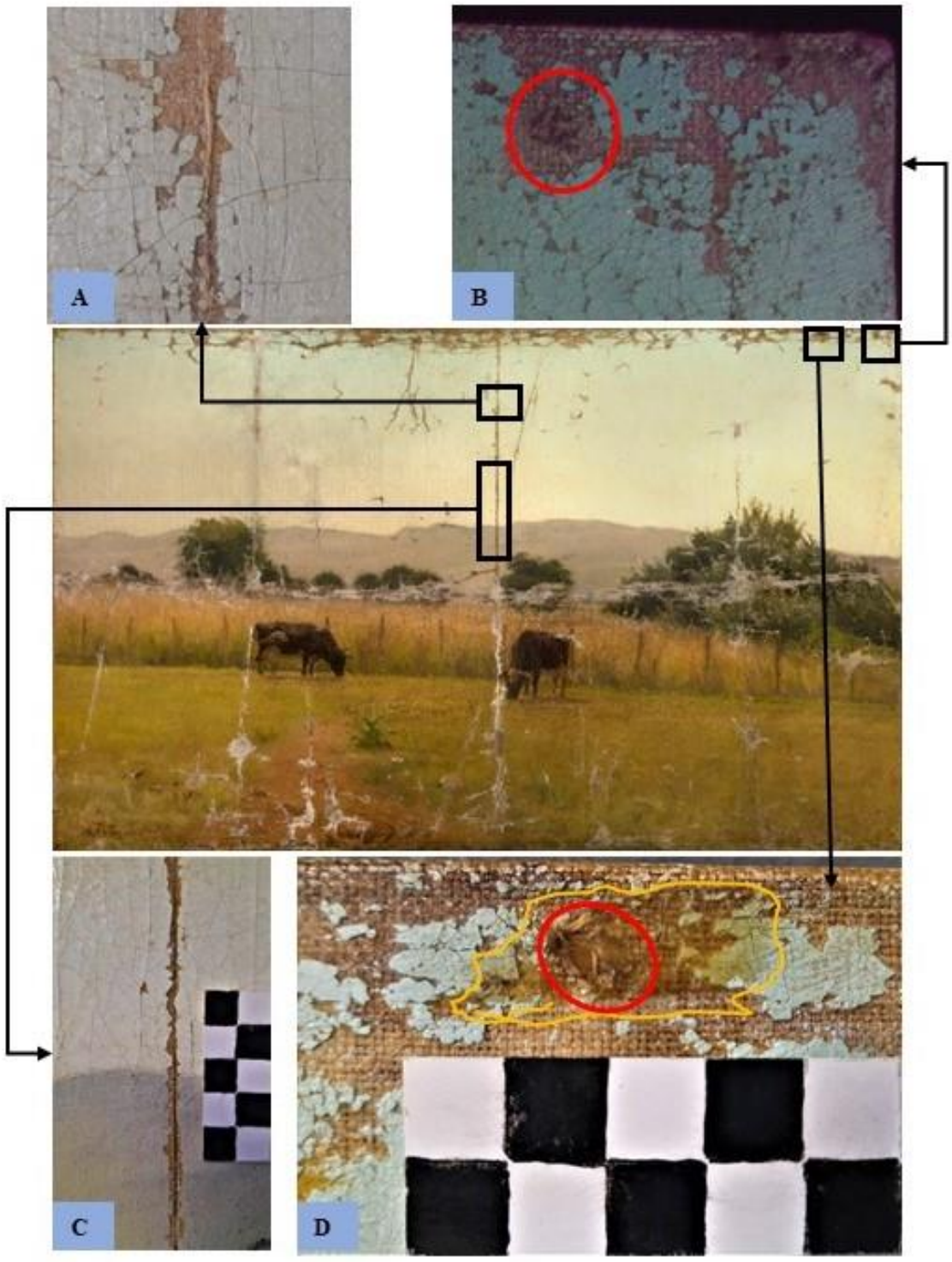


Figure 28: Details of the primary support on the recto of the painting.

Despite having multiple exposed and torn areas, the canvas generally seems to be in an overall stable condition and is well secured to the rigid secondary support. The main point of concern would be the slightly loose canvas thread at the centre of the picture plane (figure 28 A).

4.2.2 Secondary support

The painting's current secondary support is a rigid support, specifically a Masonite[34] board, as a result of its marouflage treatment in 1975. Marouflage was generally used for stabilising severely torn textile supports, such as this painting, because rigid supports are sometimes more effective than lining fabrics which cannot always eliminate the forces arising along the edges of tears (Nicolaus, 1999:131). Despite having been used in previous centuries, this technique only gets mentioned towards the end of the 19th century and gains more prominence in the 20th century with conservation practitioners both advocating for and warning against its use. Before the 20th century materials such as wood panels, pasteboards and metal sheets were used as rigid backing supports for marouflage due to availability; while at the onset of the 20th century more artificially produced materials such plywood, blockboard, chipboard, high-density fibreboard (such as the Masonite board used in this scenario), and aluminium sheets became available to be used for this technique (Nicolaus, 1999:132).

The board used is 6.4 mm thick as indicated by figure 29 C. Masonite has smooth side, onto which the painting is glued, and a textured side which is visible on the verso (see figure 29 B). There appears to be a manufacturer's mark in yellow on the verso of the Masonite board which faintly reads "Masonite" as seen in figure 29 D. There are inscriptions on the top right corner reading "95/10" and underlined "794 only" written in black permanent marker (see figure 29 A). These can possibly be framer's inscriptions. The board is entirely covered by some thin, transparent surface coating or sealant that has a glossy sheen and is unevenly applied (see figure 29 B). Figure 29 B shows what this coating looks like under 10x magnification. There is a small scratch

[34] Masonite was first developed in 1924 by William H Mason and the product was introduced in South Africa in 1948 (Masonite, [sa]). It is a type of pressed wood hardboard that is inexpensive, easily produced and popular amongst a variety of professions such as builders, artisans and artists. Masonite is made from steamed wood chips that are stretched into thin fibres and pressed under immense pressure to produce a solid panel. The long, thin fibres of which it is made provides it with a high bending and a high tensile strength (Orwell, 2017).

(see figure 29 F). This scratch exposes the board underneath the glossy surface coating as seen in figure 29 F 1, shown at 10x magnification. There are small wax residues in the bottom left corner (see figure 29 E and figure 29 E 1 at 10x magnification).

Structurally this board seems to be in an overall good, stable condition. Paintings that are marouflaged may be at risk of warping which may cause cracking, lifting and loss of the paint layer. Warping of the rigid support happens when water-based adhesives are used without attaching a protective interleaf to the reverse of the support (Nicolaus, 1999:132).

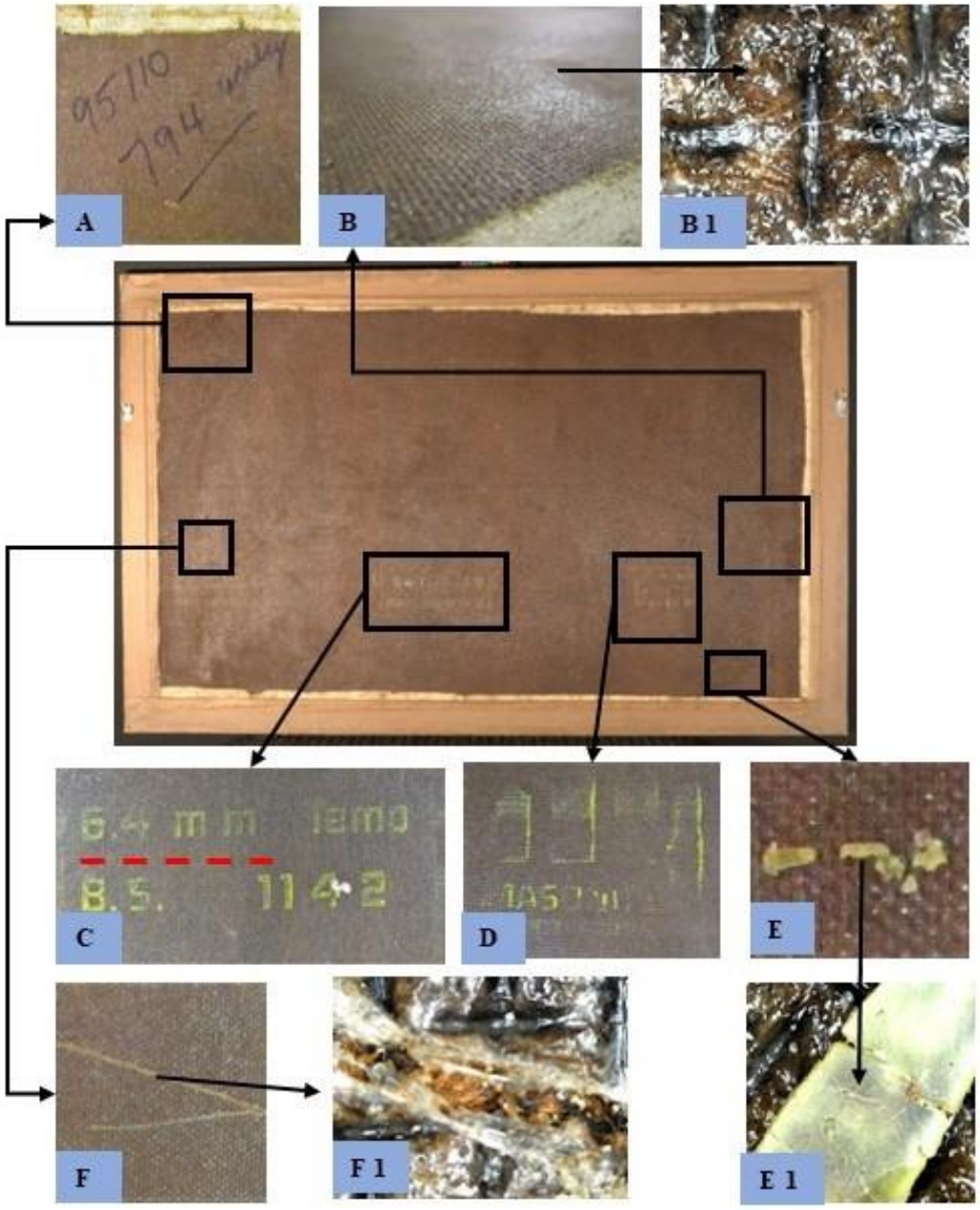


Figure 29: Details of the verso of the secondary support.

Although water-based cold glue was likely used for the marouflaging of this painting, the adhesive seems to have had no effect on the structure of the Masonite backing board since it does not show any signs of having warped or distorted. This could be due to the transparent gloss sealant applied to the backing board. It is difficult to tell whether the board was sealed off on both sides before the marouflage process or only on the reverse side afterwards. Nonetheless, the Masonite board is sealed off from interaction with moisture which could otherwise cause it to warp.

4.2.3 Ground

The ground layer has a cream white colour and extends beyond the painting's tacking margin at the back (see figure 30). This may indicate that the canvas was commercially prepared. If an artist or the artist's assistant primed the canvas, it would usually be after the canvas has been stretched onto a stretcher or strainer. Only the face of the canvas would be primed while the margins wrapped around the edges of the stretcher would remain unprimed. If the tacking margins up to the canvas edge are covered with ground but not painted it may suggest that the artist has used a pre-primed commercially produced canvas (Kirsh & Levenson, 2000:41). Other signs that indicate that a canvas had been commercially manufactured are stamps of the manufacturer's mark on the verso of the canvas. These stamps can help date the painting by consulting archival directories of the names, addresses and dates of the business of prominent dealerships (Kirsh & Levenson, 2000:41). Unfortunately, no such markings are currently visible as the canvas has been glued onto a Masonite board.

Red paint can be seen on top of the ground layer at the bottom lateral edge to the left, located near the artist's signature (see figure 30 C). This could be the same red paint used in the signature (see figure 21). Wax residues can be seen near the back right corner and along the upper lateral edge (see figures 30 A and 30 B).

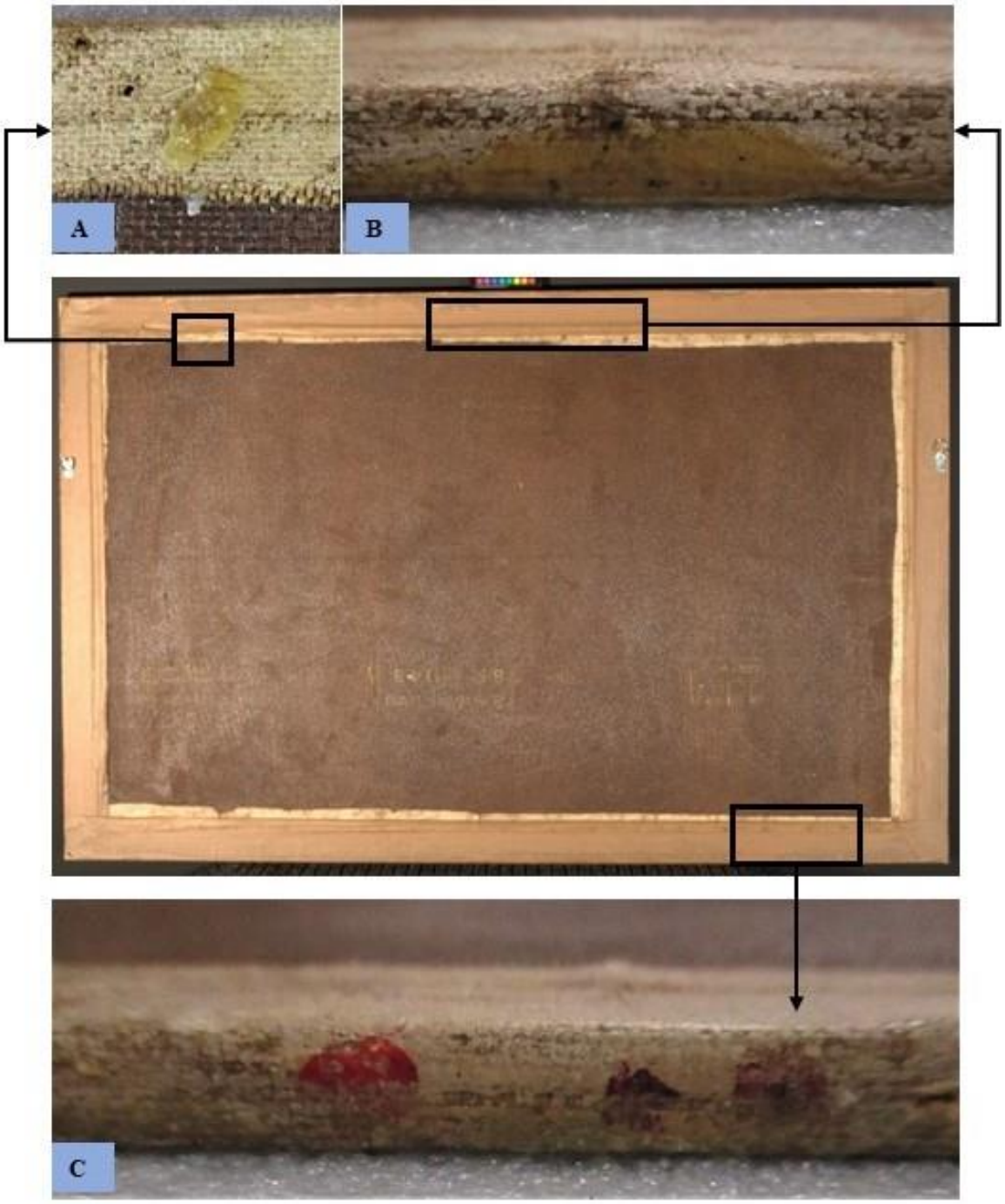


Figure 30: Details of the ground on the verso and edges of the painting.

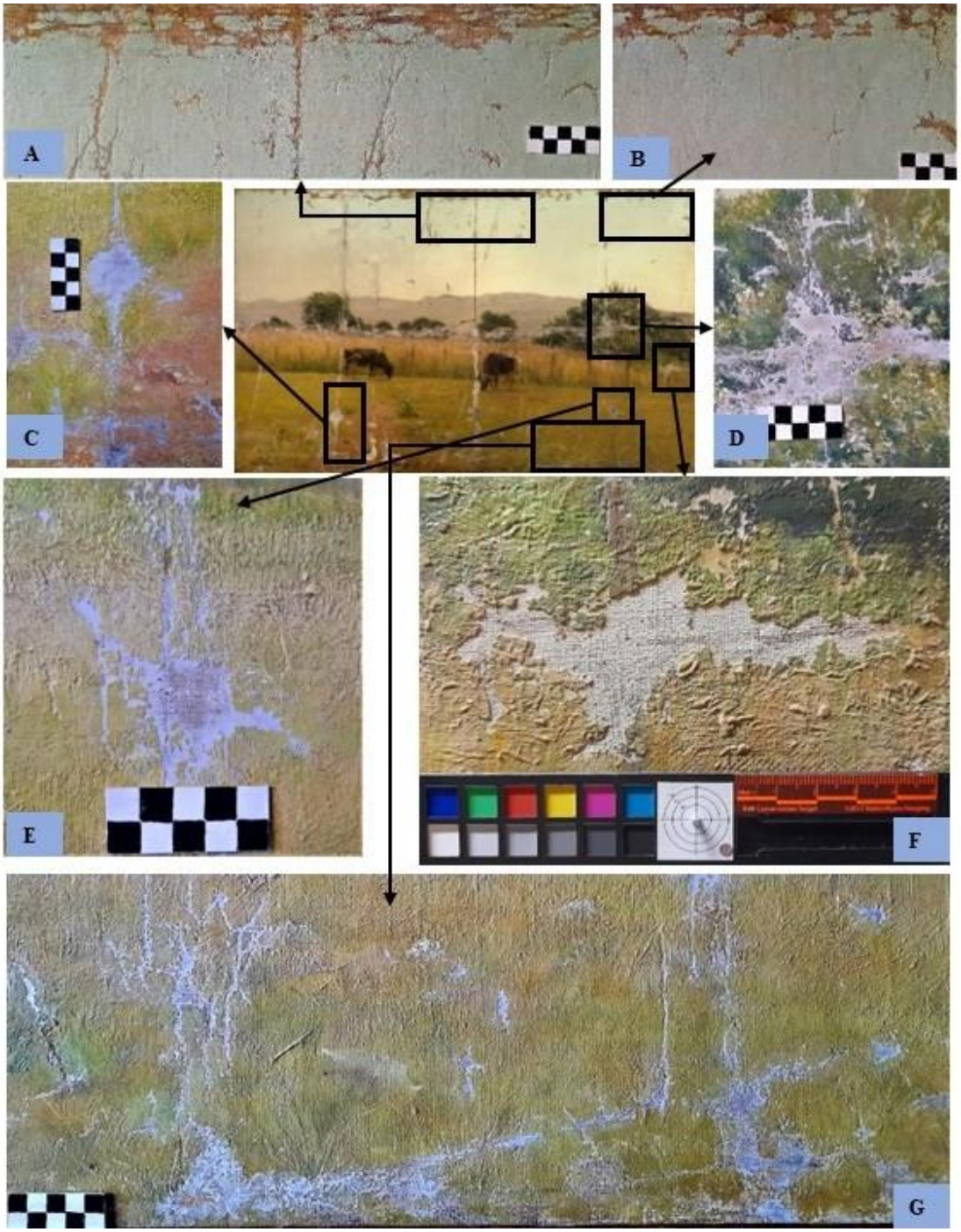


Figure 31: Mapped out details pertaining to the ground on the recto of the painting.

On the picture plane there is a substantial area of original ground exposure (see figure 31 F). There are multiple areas of extensive ground loss that exposes the canvas underneath (see figures 31 A and 31 B). Multiple areas of a white substance used as a filler in a past restoration treatment can be seen throughout the painting (see figures 31 C, 31 D, 31 E and 31 G).

This filler was introduced in 2016 when the painting was last treated and was part of the process to reintegrate areas of loss. Ms Markgraaf (personal communication 2022. March 24) stated that she used commercially produced, ready-mixed Polycell Polyfilla Mendall 90 as the filling material. Pollyfilla is a fill material initially intended for masonry but have been adopted by conservators and became popular in this field from the 1990s (Fuster-López, 2012:592). The Polycell Polyfilla Mendall 90 is a white, resin-bound filler that dries without shrinkage. It has good adhesion properties and is abrasion resistant as well as flexible to handle up to 15% within its substrate without cracking (Barloworld Plascon South Africa, 2003).

Although there are several and extensive areas of loss of the painting's original ground, the remaining areas of the ground appear to be in an overall stable condition.

4.2.4 Paint layers

The paint layers of *Cattle Grazing near Pretoria Zoo* are applied very thickly. This method of paint application is referred to as impasto and results in prominent surface textures that give the painting a three-dimensional quality as well as enhancing detail and illusionary effects of form and light (see figures 34 B and 34 D). The paint layers have an overall light tonal presence with a combination of muted, pastel, earthy as well as hints of bright colour use. There is extensive paint loss across the entire pictorial surface plane, especially in the three major horizontal and three vertical folds (see figure 32). These folds make it clear that the painting had been folded which caused extensive damage and paint loss prior to marouflage. This paint loss may also be referred to as delamination which is the failure of the cohesive properties that hold the paint and or ground to its underlying support, causing these layers to separate from each other and or the underlying substrate (Cultural Heritage Agency, Sa). There are areas of inter-layer delamination exposing underlying paint layers as well as the ground underneath (see figures 31 A, 31 B, 31 F, 33 C, 33 D, 33 E, 33 F, 34 A and 34 C).

Figure 32: Major areas of paint loss along three horizontal folds (red stippled lines) and three vertical folds (blue stippled lines).

Extensive areas of cracks are present throughout the painted surface. These cracks are more noticeable in the top half of the picture plane (the sky) which appears smoother in surface texture and more monochromatic. Although extensive cracks also exist in the bottom half, they appear less noticeable due to the heavy surface textures and the greater variety of colours present. The craquelure patterns are varied consisting of a network of vertical cracks that are connected by horizontal ones as well as occasional curved cracks (see figures 33 B, 33 C, 33 E, 33 F and 33 G). Diagonal cracks are also present and are most noticeable in the top left quarter of the picture plane (see figure 33 A). These cracks seem to run through the entire paint and ground layer as well as through the varnish layer (see figures 34 C, 40 B and 43) and are most likely ageing cracks. Ageing cracks occur over time and are caused by several factors such as the interaction between all the physical components of the painting; environmental, storage and display conditions of the painting; as well as the pigment – medium interaction within the layers of the paint structure. Ageing cracks usually extend through all layers of the painting, including the ground, the paint layers and also the varnish layer (Bucklow, 2012:288). These cracks can be found in all old paintings and typically appear as a dense network of thin, fine fissures with sharp edges that run in straight or slightly curved lines (Nicolaus, 1999:384).

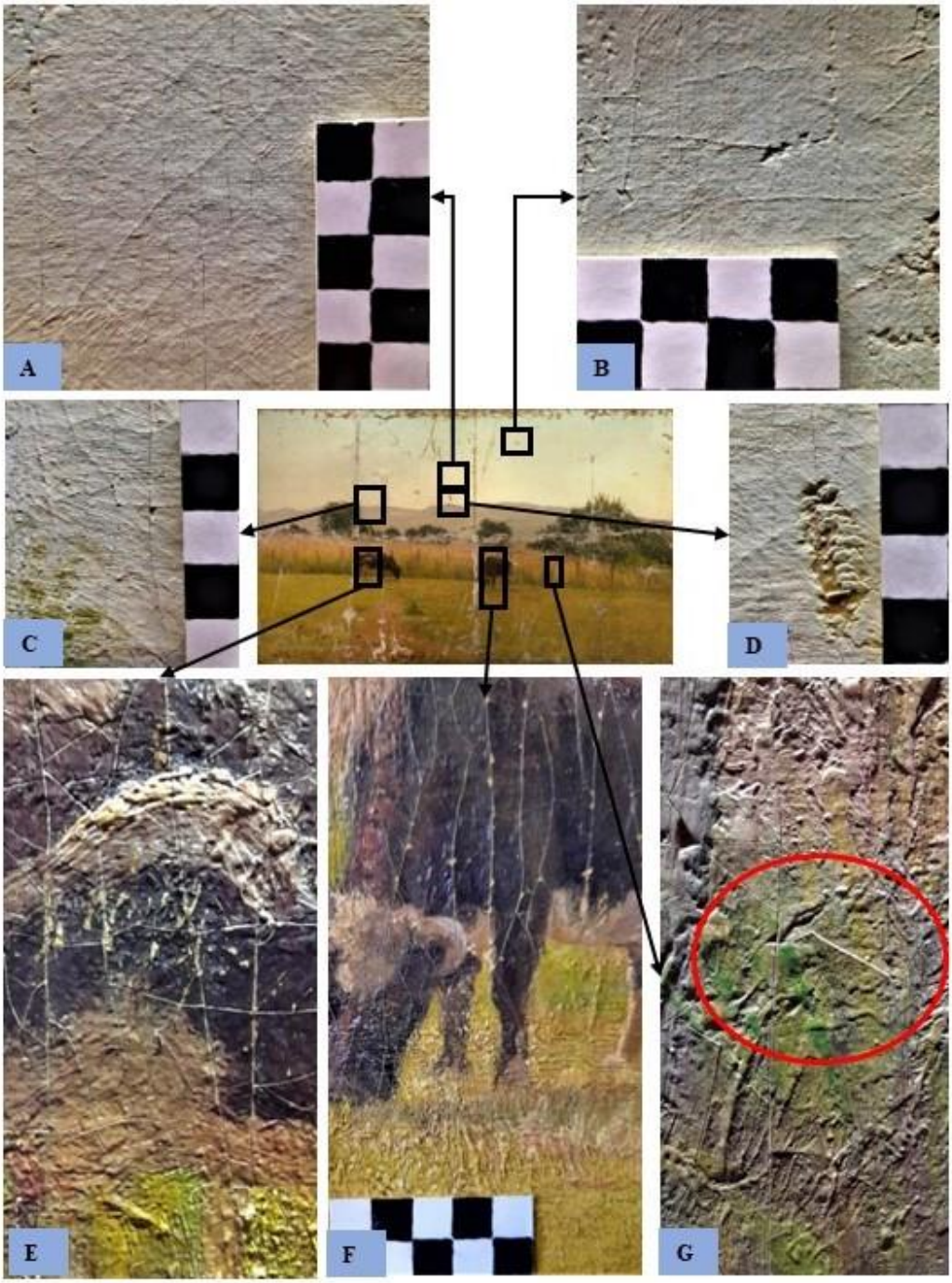


Figure 33: Mapped out details of the paint layer on the recto of the painting.

There are several areas of tenting. Tenting is the lifting between layers of paint usually along a network of cracks that results in the connecting sides to appear like a tent (Cultural Heritage Agency, Sa). On the painting areas of tenting are the most prominent along the vertical cracks, however they also appear horizontally and curved in some areas (see figures 33 B, 33 F and 34 F). There is small area of localised lifting of the paint layer (see figure 33 G, encircled in red). Despite the lifted edge of the paint layer,

this section is still secured to the surrounding paint and seems stable. An area of cupping measuring approximately 90 mm by 250 mm appears at the central left side of the picture plane (see figure 34 E). Cupping is the phenomenon whereby ageing cracks develop into flakes and the edges of these paint flakes turn upwards to resemble small "cups" (Nicolaus, 1999:385).

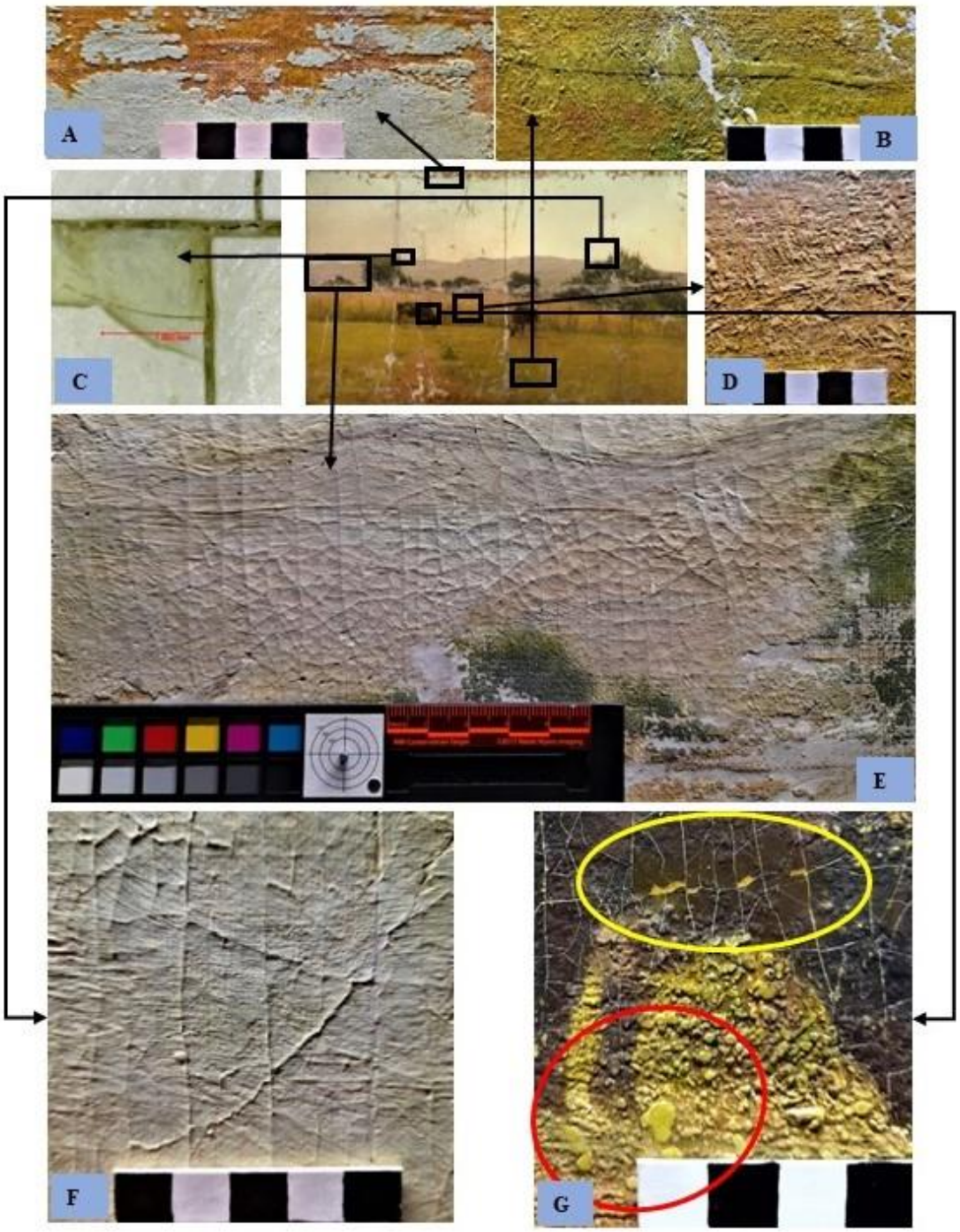


Figure 34: Details of the pertaining to the paint layer on the recto of the painting.

There are some localised areas of crushed or flattened impasto (see figure 34 G, encircled in red). This flattening of the raised paint texture is a result of the immense pressure applied to the paint layer during the marouflage treatment. Marouflage affects the overall surface structure of a painting since all paintings have particular structural characteristics that is dependent on the support on which they are painted. When a painting on canvas is transferred to a rigid support, some of its surface characteristics may be altered or influenced by the features of the new underlying support. The thinner paint layers may be impressed into the minute interstices of the original canvas and the weave pattern or texture of the canvas may transmit to the picture layer, changing its original structural surface appearance (see figure 40 A). The integrity of the picture layer is at stake when the painting is pressed into its hard auxiliary support without the use of an applied facing[35] to cushion, absorb and reduce the applied force. If the painting consists of prominent impasto while the facing being not soft enough and if the adhesive is applied too thickly a phenomenon known as 'negative-effect damage' occurs during the marouflage procedure. This happens when the pressure is not evenly distributed across the entire surface of the painting as the press is tightened due to inelasticity of the facing over the painting. The pressure only gets exerted on the protruding paint layers of the impasto which sink into the thick layer of adhesive underneath. The adhesive layer under the impasto areas gets pressed away sideways leading to the formation of swollen adhesive pockets which lift the flatter, smoother areas of the paint layers (Nicolaus, 1999:132).

As the painting was pressed onto the Masonite board, its heavily textured surface from the impasto caused an uneven distribution of pressure. The pressure was mostly exerted on the raised areas of the paint which sunk into the cold glue adhesion layer, causing the glue to move away sideways to form bulging pockets, lifting the paint in the smooth and flatter areas of the picture plane. As the glue aged and cured, it may have shrunk which left a gap between the lifted paint and the support. This process may have led to the formation of the areas of cupping (figure 34 E), tenting (figures 33 B, 33 F and 34 F) and lifting (figure 33 G) of paint along the network of cracks.

[35] A facing is the partial or complete covering of a damaged painting's recto with Japanese tissue paper to provide a layer of protection for the picture plane (Nicolaus, 1999:386).

There are several areas of wax impregnation from the painting's consolidation treatment in 1975. Wax has been used to consolidate flaking paint and ground since end of the 18th century and gained increasing popularity during the 19th and 20th centuries (Von der Goltz *et al*, 2012:371). This treatment using wax as consolidant affects every layer of the painting from the uppermost surface to the support as the wax requires heat in order to be used in melted form. Exposing the painting to heat causes the paint layers to soften, risking impasto flattening, and the wax to seep through the canvas and ground into the paint layers. This wax seepage can darken over time and thus distort the surface appearance of light-coloured grounds or areas of paint and can even obscure paintwork (Kirsh & Levenson, 2000:174). This consolidation treatment with wax, carried out in 1975, is visible across several areas of the painting as the wax have darkened and yellowed over time (see figures 28 D, 33 D, 34 A and 34 G).

Figure 35: Mapped out locations of brush hairs (encircled with yellow) and grass blades (encircled with green).

There are several brush hairs and blades of grass embedded in the paint layers (see figure 35). The brush hairs are identified as hairs from hog bristle brushes by comparing a brush hair in the painting (figure 36) with one from a hog bristle brush (figure 37) under microscopic magnification. This comparison showed a striking similarity between the two hairs. At first glance the blades of grass (figure 38) also appeared as brush hairs although upon microscopic magnification (figure 38) it became clear that it

was something else. A blade of grass from the Magaliesberg was sampled and inspected under a microscope (figure 39) to reveal similarities in both structure and colour to those found in the painting. The presence of grass in the painting suggests that van Wouw may have painted this landscape on-site *en plein air* which directly corresponds to the Realist and Impressionist conventions of working from direct life observation.

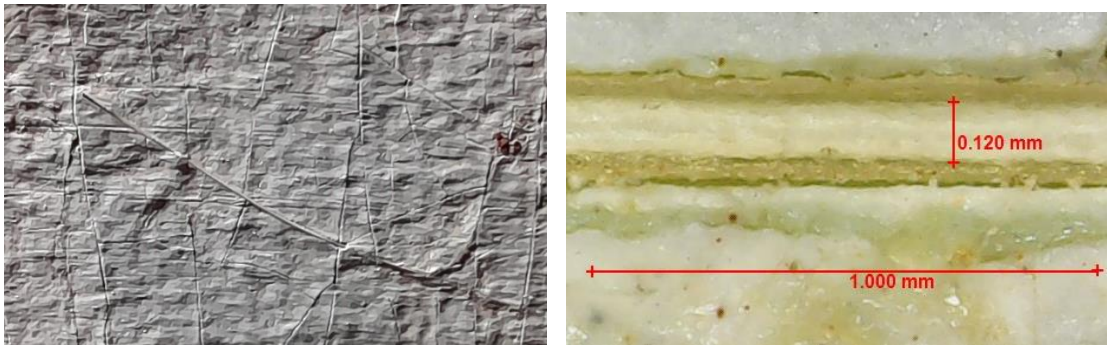


Figure 36: Brush hair under normal viewing conditions and under magnification to the right.

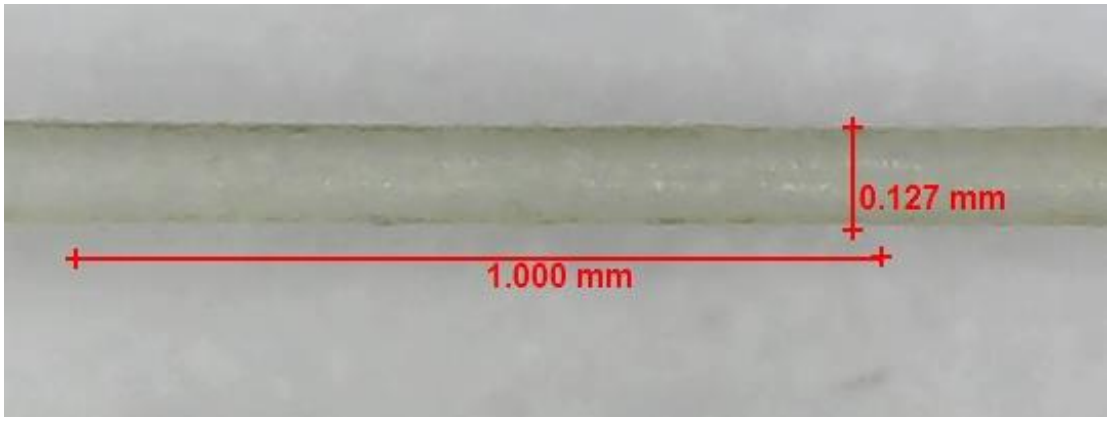


Figure 37: Hog bristle brush hair under microscopic magnification.

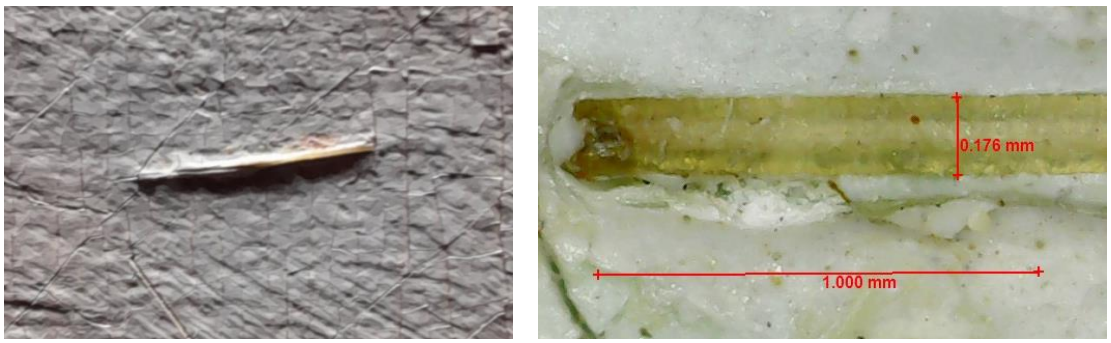


Figure 38: Blade of grass under normal viewing conditions and under magnification to the right.

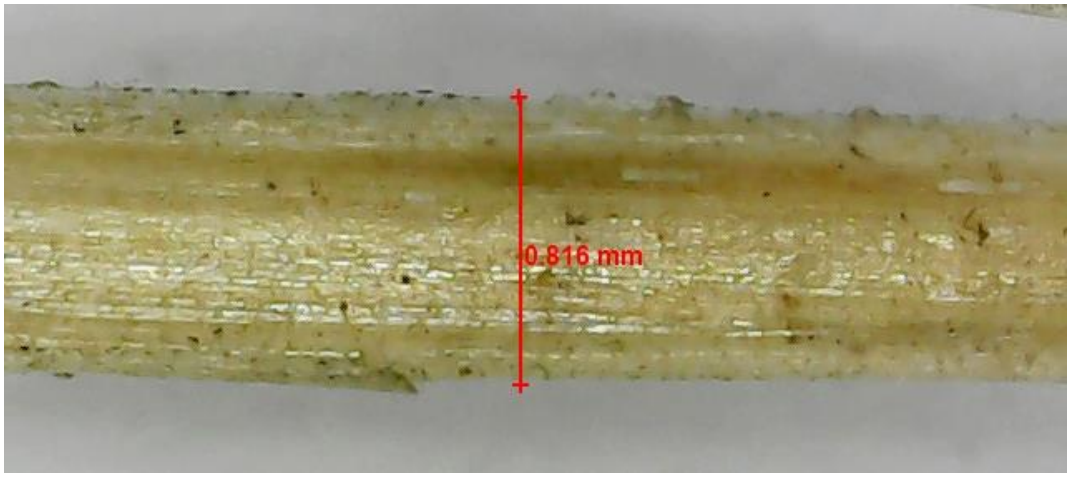


Figure 39: Blade of grass sampled from Magaliesberg (15/06/2022) under microscopic magnification.

While the paint layers of the painting show clear aesthetic deficiency in the extensive amount of material loss, cracking, as well as areas of flattened and lifted paint; the paint structure is still stable and securely attached to the underlying support. This indicates that its consolidation treatment with Lascaux 4176 Medium for Consolidation in 2016 still maintains the stability of the painting.

4.2.5 Varnish layer

At first glance the painting seems to be unvarnished with a matte appearance, however upon closer inspection and in different lightning conditions the painting has a slight surface sheen. A very thin layer of varnish can be detected, especially in the furrows and crevices formed by the impasto paint application (see figure 40). The varnish has a certain unevenness and some areas on the painting appear glossier than others. This very thin varnish layer along with its uneven distribution indicate that the varnish had been reduced in a previous treatment. Ms Markgraaf (personal communication. 24 March 2022) stated that the varnish had already been reduced before she treated the painting in 2016. The top layer of black paint loss revealing a light green layer underneath, seen in figure 33 E, may be as result of over-cleaning that occurred when the varnish was reduced.

The varnish that is left on the painting has discoloured to a yellow-brown colour through the chemical process of oxidation (see figure 40). On top of the varnish layer surface dust, dirt and grime can be seen under magnification; this especially evident in

between the impasto paint crevices and furrows (see figures 40 B, 41 and 42). There are several specks of insect excrement on the varnish layer all over the painting (see figures 41 and 43). The accretions in the form of surface dirt and the several spots of insect, possibly fly, excrement most probably accumulated on the surface of the painting during the time when it had been in storage after its treatment in 2016 and subsequently moved to the Van Wouw House in 2020.

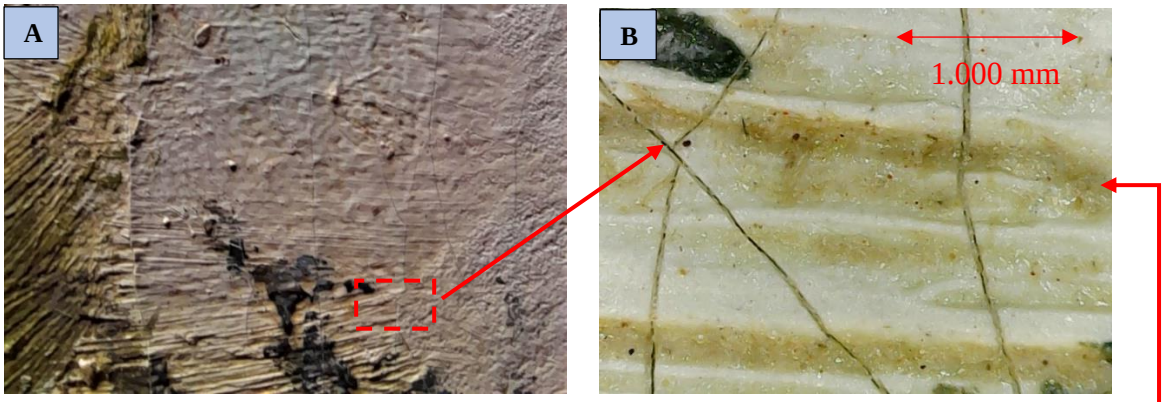


Figure 40: Varnish discolouration/oxidation in paint crevices. To the right is what it looks like under microscopic magnification. Note dust particles trapped in the furrows of the impasto and cracks extending into varnish layer.

Figure 41: Mapped out locational overview of numerous defects associated with the varnish layer. Insect excrement (see figure 53) is encircled with brown. The area of surface dirt and dust in between the impasto crevices (see figure 54) is marked with the purple square and the area of discoloured varnish visible in the impasto furrows (see figure 51) is marked with the red rectangle. The blue paint flakes on top of the varnish surface (see figure 55) are encircled with light blue.

Minutely sized light blue paint flakes that are most probably from the sky can be seen on the grass plane beneath the cows (see figures 41 and 44). It appears that these paint flakes are attached to the varnish layer. This observation provides an insight into how the painting was folded when it was discovered in Celliers's attic. The blue paint flakes indicate that the painting had been folded inwards along its width as the blue paint flakes from the sky can be found on the bottom grass area. It was then most likely folded in half since the central vertical fold displays the most paint loss along with the canvas being split resulting in a cleavage (figure 28 C). It was then probably folded in half once more as indicated by the outer two vertical folds.

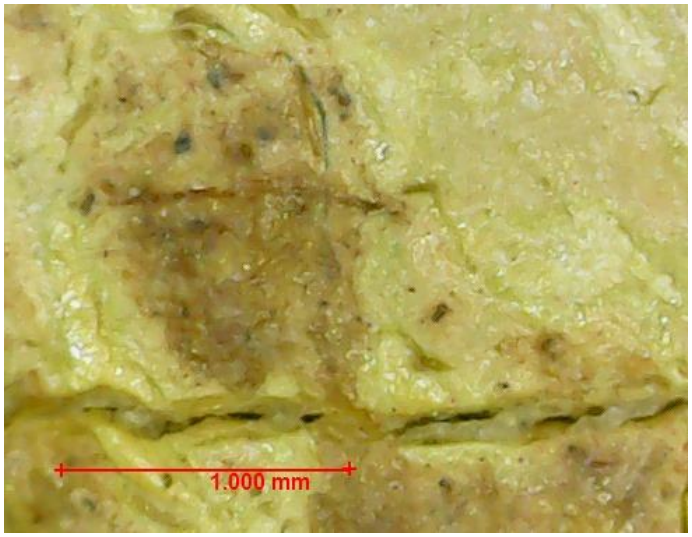


Figure 42: Dust and surface dirt in the impasto crevices under microscopic magnification. Note the horizontal crack extending through the varnish layer.

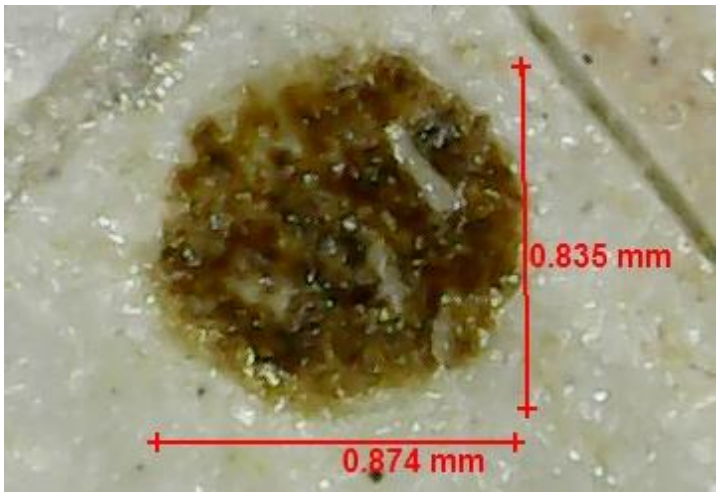


Figure 43: Insect excrement under microscopic magnification.

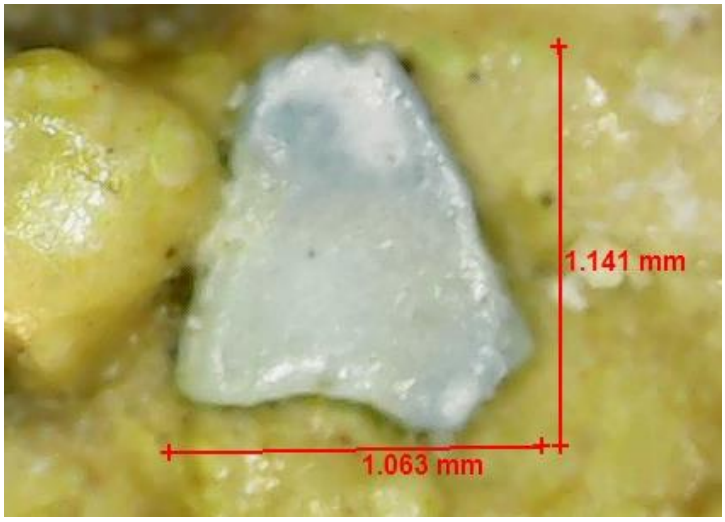


Figure 44: Blue paint flake under microscopic magnification.

Through this examination it has been determined that the varnish, although discoloured, does not compromise the legibility of the painting since it has been reduced and seems to be in a stable condition. The aspect of this component that requires intervention is the accumulated surface dirt since this can be damaging to the painting over time and is also a sign of neglect.

4.3 Technical photography

The following section will describe the observations made during the technical photography of the painting using the techniques described in chapter 3.4.

4.3.1 Normal reflected illumination

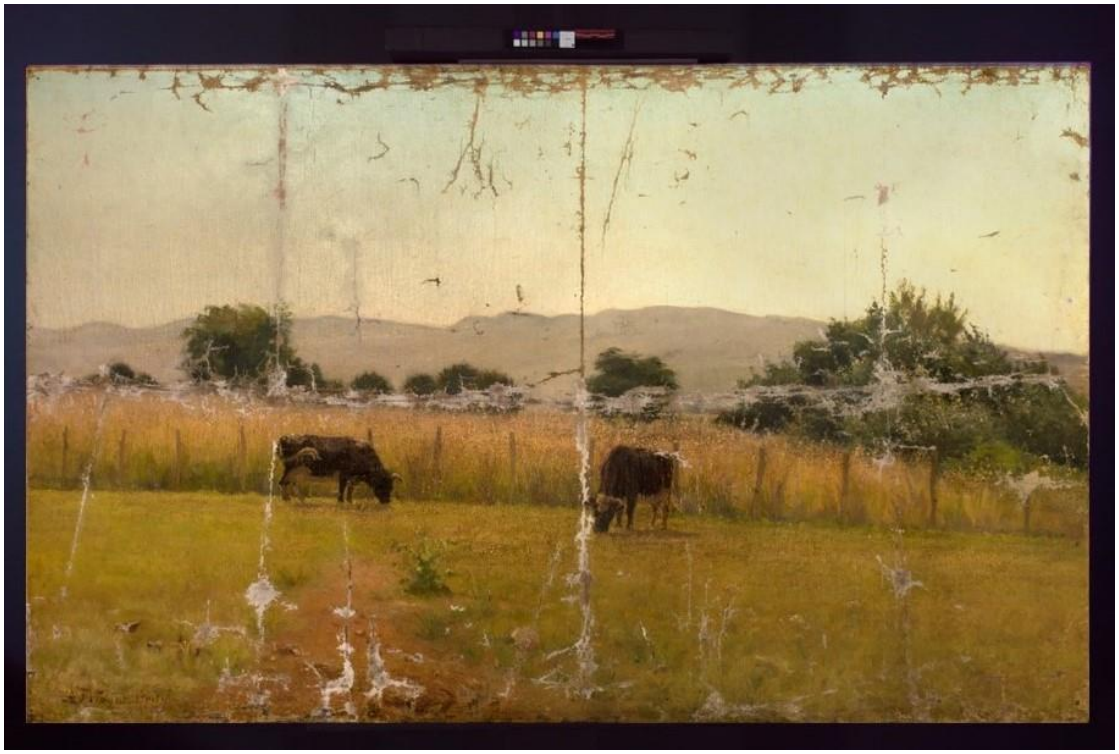


Figure 45: Normal reflected illumination photograph of Cattle Grazing near Pretoria Zoo. Photograph by Ms Thania Louw.

This photograph (figure 45) taken in the normal reflected light setting accurately represents the appearance of the painting under standard viewing conditions and acts as a reference image that can be compared or contrasted to photographs taken of the painting in different light regions.

4.3.2 Raking illumination

Figure 46: Raking light image of Cattle Grazing near Pretoria Zoo. Illuminated from the left side. Photographed by Ms Thania Louw.

This photograph of the painting taken under raking light illuminated from the left side (figure 46) reveals the textural aspect of van Wouw's painting technique. His thick impasto paint application appears most prominent throughout the centre of the picture plane. He used impasto to depict and describe the textural qualities of the grass in this landscape. The raking light image also reveals the extensive distribution of vertical cracks, tenting and cupping of the paint layers. This lighting condition also provides a better understanding of the depth of the paint and ground loss in relation to the thick paint layers.

The photograph of the painting taken under raking light illuminated from the top (see figure 47) once again reveals a prominence of the impasto applied towards the centre to define the grass. It however also reveals a slight depression of the paint layers all along the mountain ridge. This shows that van Wouw used a lot more paint to thickly build up the sky as opposed to a thinner paint application to portray the moutain ridge and trees in front of it.

Figure 47: Raking light image of Cattle Grazing near Pretoria Zoo. Illuminated from the top. Photographed by JA Elsenbroek.

4.3.3 Axial specular illumination

Due to the size of the painting, multiple photographs of it under axial specular illumination were taken to capture a more complete overview of its surface sheen (see figures 48-50).

Figure 48: Axial specular image of Cattle Grazing near Pretoria Zoo. Illuminated towards the right. Photographed by JA Elsenbroek.

Figure 49: Axial specular image of Cattle Grazing near Pretoria Zoo. Illuminated at the left centre. Photographed by JA Elsenbroek.

Figure 50: Axial specular image of Cattle Grazing near Pretoria Zoo. Illuminated towards the outer left. Photographed by JA Elsenbroek.

Illuminating the painting towards the right (figure 48) revealed a mild surface sheen that suggests the presence of a thinly coated varnish. Certain areas on the paint layer, especially on the mountain and the infilled areas, appear entirely matte. Illuminating

the painting at its centre left (figure 49) revealed a major glare area situated on the mountain next to the thicket of trees while illuminating the painting towards the outer left (figure 50) showed prominent glare located at the area of cupping (see figure 34 E), possibly due to an uneven surface causing more scattering of light. Certain parts have a more matte appearance – especially the trees, grass and infilled areas.

4.3.4 Oblique specular illumination

Figure 51: Oblique specular image of Cattle Grazing near Pretoria Zoo. Photographed by JA Elsenbroek.

The photograph of the painting taken under oblique specular illumination (see figure 51) also shows a surface glare spot where the light interacted with the painting at an angle. Areas of paint loss and infilling once again show a matte surface appearance. Both specular techniques suggested the presence of varnish, however some areas seem to reflect more than others.

4.3.5 Reflected infrared photography

The reflected infrared photograph (figure 52) reveals a possible occurrence of pentimenti on the painting. Pentimenti are signs of reworked areas in the paint layer. It refers to areas where the original paintwork is covered up by the artist with a revision

(Kirsh & Levenson, 2000:126). As indicated by the detail image (see figure 53 A) the slightly darker shape in the overgrown grass may suggest that van Wouw originally painted a third cow directly facing the one on the left. This shape looks similar, almost a mirrored image of the shape of the cow in profile situated at the left. This may suggest that there were initially three cows in the painting and that the artist may not have been satisfied with this composition and adjusted it by painting over the middle cow to remove it. It may also be possible that he decided to change the composition by removing this cow and adding one of the others. There may never have been three cows at the same time. The removed cow is smaller than the one closest to it, so he may have wanted to change the viewing direction of the second cow and place it more to the foreground. They are also uncomfortably close to one another, so it is possible that they may never have been in the painting at the same time. It is however equally possible that there may never have been a third cow and that the shape only seems arbitrarily similar to that of the other cow in the painting. Under normal light (see figure 54 A) this area also shows a darker tone that forms part of the overgrown grass and may not be overpainted at all.

Figure 52: Reflected infrared photograph of Cattle Grazing near Pretoria Zoo using the 850 nm infrared filter. Photograph by JA Elsenbroek.

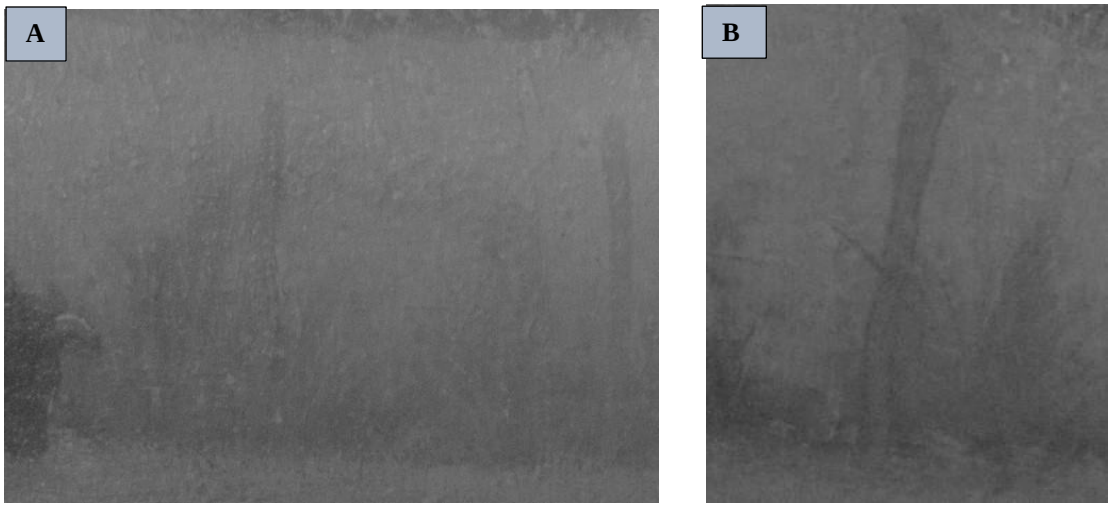


Figure 53: Slightly darker shape may suggest overpainted cow (A). Outlined fence pole (B).

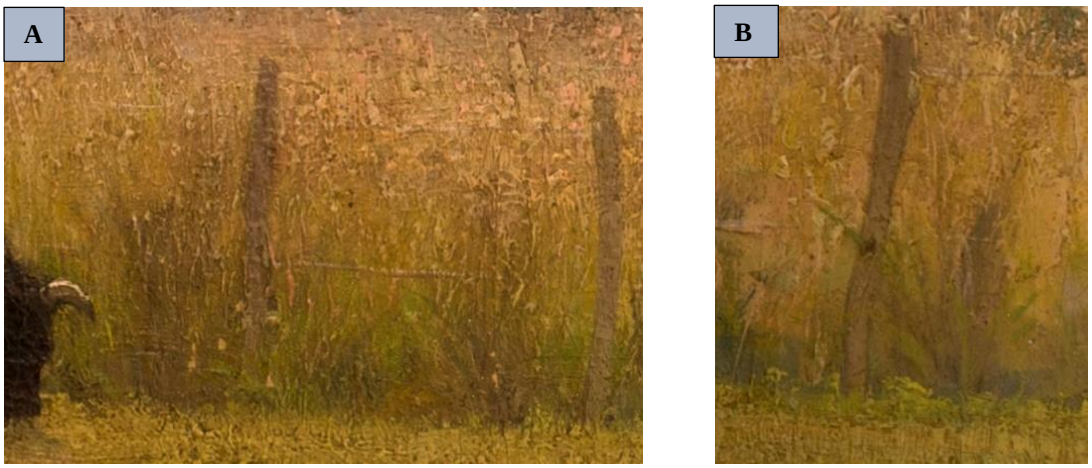


Figure 54: Figure 53 A under normal light (A). Figure 53 B in normal light (B).

Signs of under drawing may be observed on the fence poles (see figure 53 B). It is possible that van Wouw may have done preparatory sketch work in a carbon-based medium such as charcoal or pencil before applying the paint layers. However, when looking at these fence poles under normal light (figure 54 B), they are also outlined in darker paint for definition. It is therefore entirely possible that the infrared photograph shows this outline of the paint. This may suggest that van Wouw did not make use of any form of under drawing for this painting and that his technique was very direct.

4.3.6 Ultraviolet-induced visible fluorescence photography

Figure 55: UV-induced visible fluorescence image of Cattle Grazing near Pretoria Zoo. Photograph by JA Elsenbroek.

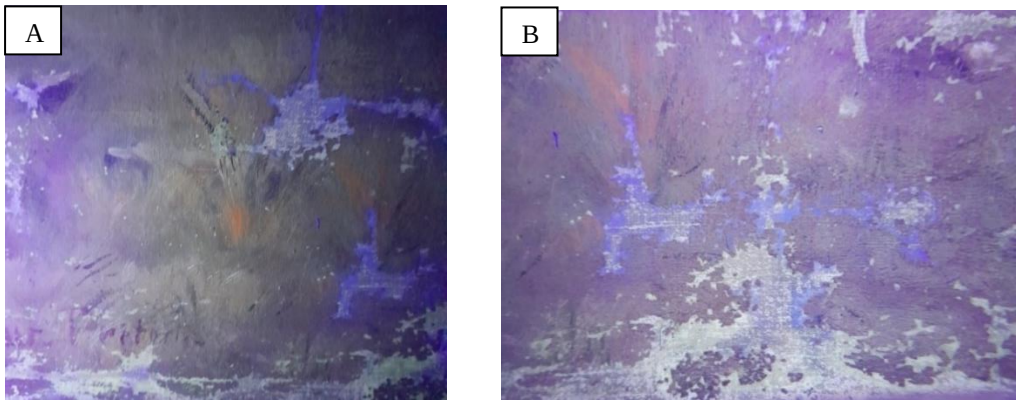


Figure 56: Detail showing orange fluorescence (A). Orange, purple and white fluorescence (B).

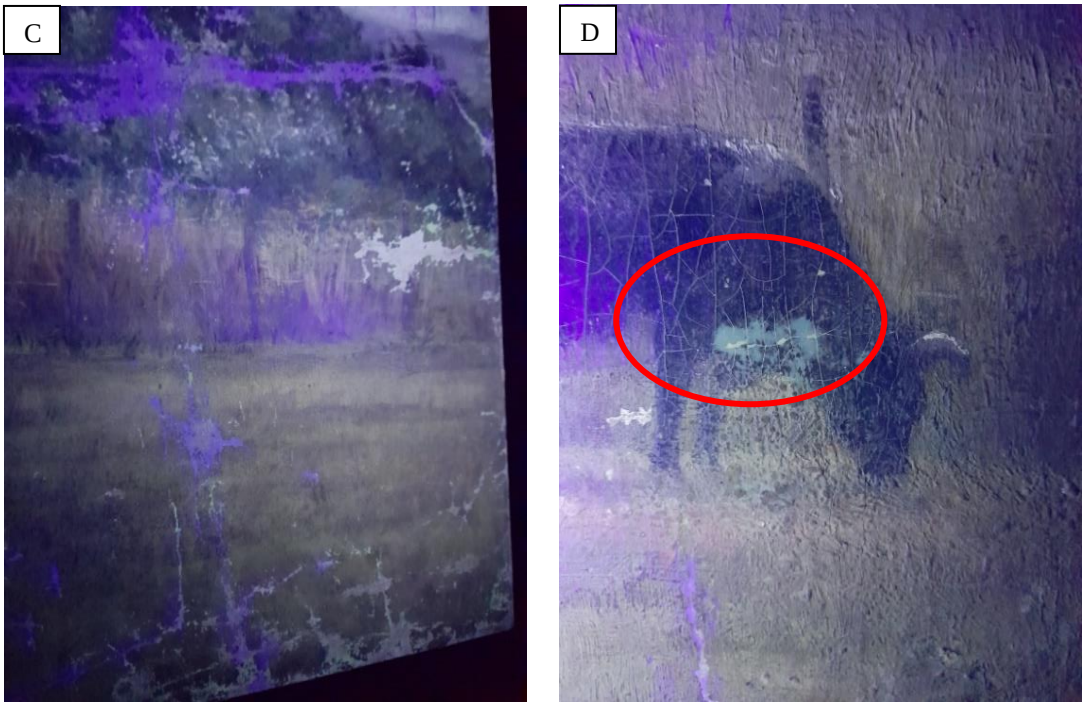


Figure 57: Fluorescence of ground, filler and wax (C). White-green-grey fluorescence of wax (D).

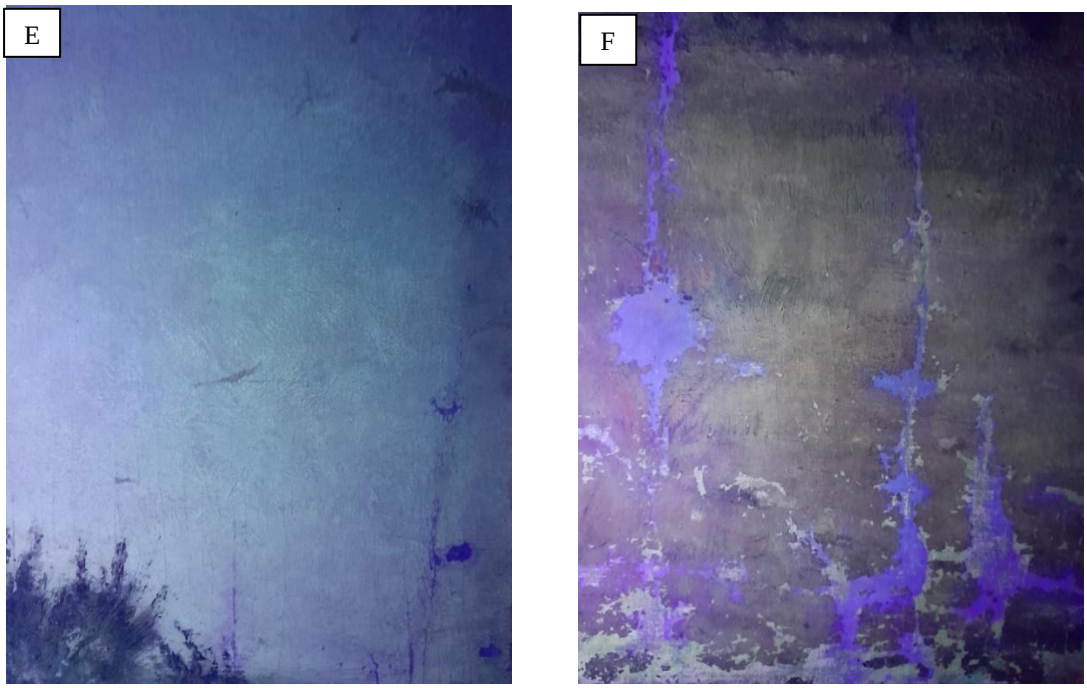


Figure 58: Light greenish fluorescence of varnish (E). Fluorescence of filler and wax (F).

Some preliminary determinations on the materials present on the painting were made based on the results of ultraviolet–induced visible fluorescence photography. Where possible X-ray fluorescence spectroscopy (XRF) was later used to confirm or deny these tentative diagnoses. This will be discussed in the next section (see chapter 4.4).

The orange fluorescence observed in the lower left of the painting may indicate the presence of a madder lake pigment (figures 56 A and 56 B). Madder lake has a dull orange fluorescence when exposed to UV radiation (Schweppe & Winter, 1997:124). The area of the exposed ground fluoresces a bright yellow-white under UV light (see figure 57 C). This may be indicative of the ground containing zinc white since this pigment fluoresces a bright creamy yellow (Measday, 2017). It could also infer the presence of leaded zinc oxide (lead white and zinc white) since this fluoresces a yellow to yellowish white (Carden, 1991:27). The wax that is embedded in certain areas of the painting fluoresces an off white colour (see figures 56 A, 56 B, 57 C, 57 D and 58 F). It is uncertain what type of wax this may be since some waxes fluoresce bright white (Simpson-Grant, 2000:2). The white infill material fluoresces a purple colour under UV light (see figures 56 A, 56 B, 57 C and 58 F). The thin varnish layer fluoresces a very slight greenish yellow (see figure 58 E) although it is difficult to see since the varnish layer has been significantly reduced. This light greenish fluorescence may infer that the painting had been varnished with dammar since it fluoresces a greenish white (Rivers & Umney, 2013:610).

The same handheld UV lamp was also used to illuminate the verso of the painting to take close-up photographs showing different fluorescence of materials present (see figures 59 and 60).

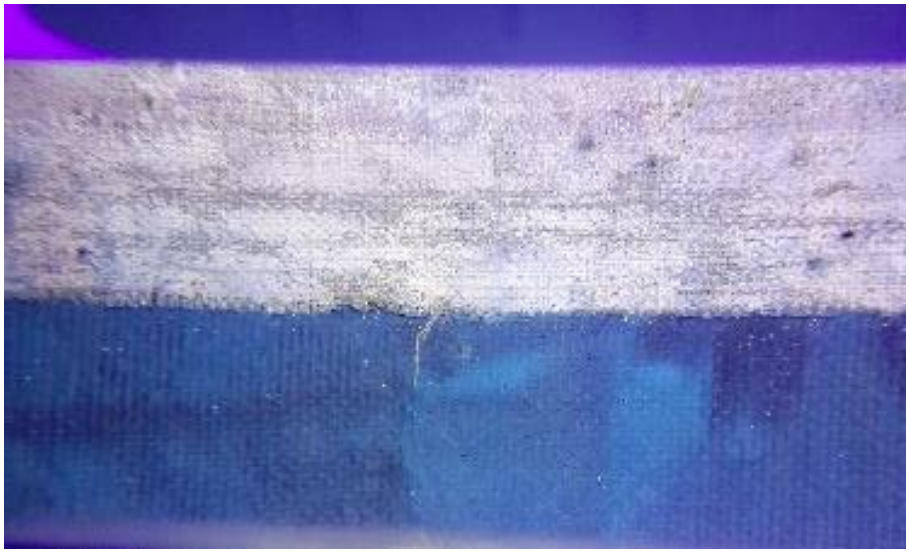


Figure 59: Slight orange of canvas with ground and yellow-green of sealant at the back.

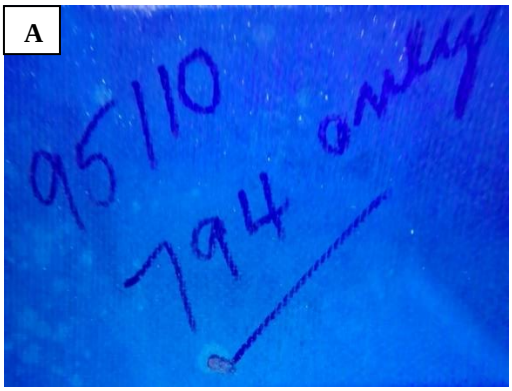
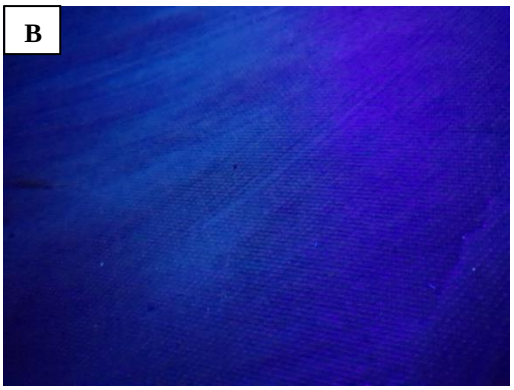


Figure 60: Sealant and inscription (A).



Yellow-green sealant/varnish at back (B).

The canvas with ground that extends to the verso of the painting appears to fluoresce a very slight orange (see figure 59). This may indicate that there is some lead white in the ground at the verso since lead white fluoresces a bright pale orange (Measday, 2017). The clear, glossy sealant on the verso of the painting applied to the Masonite backing board fluoresces a yellow green under UV light (see figures 59, 60 A and 60 B). It is uncertain what exactly this coating is, however it could possibly be dammar or mastic varnish or some other natural resin since these fluoresce a yellow to green under UV light (Measday, 2017).

The examination of the painting under UV light did not reveal any previous inpainting. It did however clearly indicate the presence and distribution of the wax and the white fill material, especially in some areas where these materials were not very clearly visible. It also provided insight into some of the pigments that may be present in the painting. Further inquiry into van Wouw's use of pigments for the painting required the use of X-ray fluorescence spectroscopy.

4.4 X-ray fluorescence spectroscopy (XRF)

Non-destructive XRF analysis was carried out on eighteen target areas on van Wouw's painting with the aim to determine the artist's use of pigments as well as the materiality of the fill material from its previous restorative treatment (see figure 61). The target areas were chosen according to specific elements of the painting. Starting with its original ground; then moving to the tones such as white and black; and then focussing on the colours: starting at the primaries – yellow, red and blue; then the secondaries – purple and green; and then composite colours – browns. Lastly, other parts of the painting were analysed such as the area that fluoresces orange under UV light (see figure 56) and the white fill material.

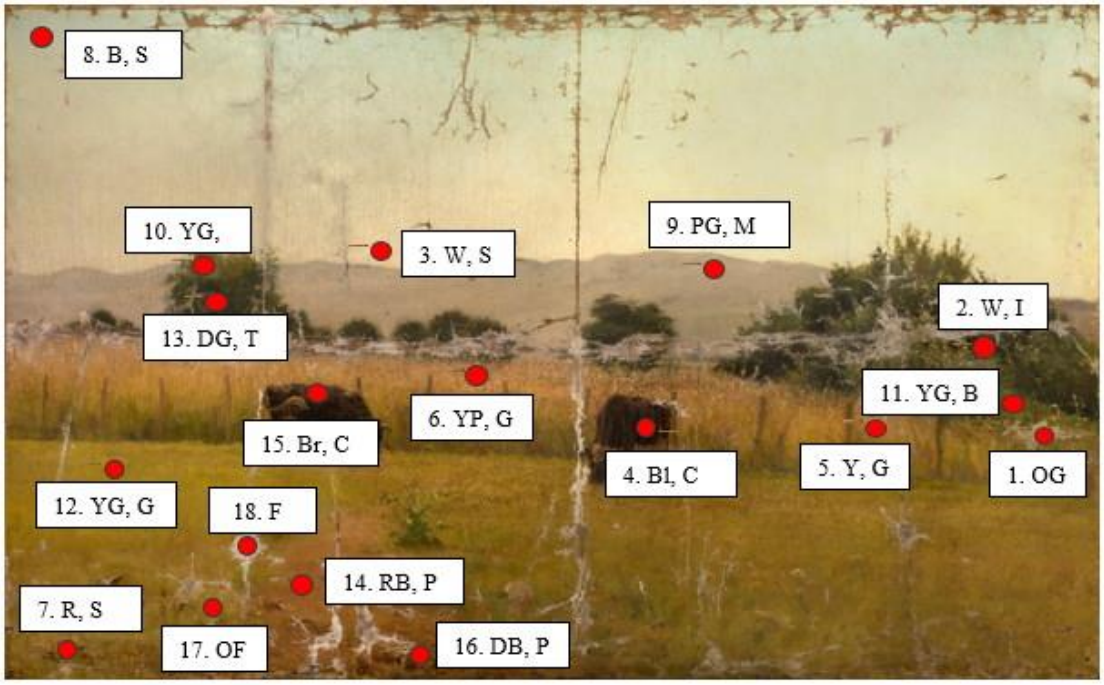


Figure 61: Target areas for XRF analysis on Cattle Grazing near Pretoria Zoo (c 1896).

1. OG – Original ground
2. W, I – White, impasto
3. W, S – White, sky
4. Bl, C – Black, cow
5. Y, G – Yellow, grass
6. YP, G – Yellow-pink, grass
7. R, S – Red, signature
8. B, S – Blue, sky
9. PG, M – Purple-grey, mountain
10. YG, T – Yellow-green, tree
11. YG, B – Yellow-green, bush
12. YG, G – Yellow-green, grass
13. DG, T – Dark green, tree
14. RB, P – Red-brown, path
15. Br, C – Brown, cow
16. DB, P – Dark brown, path
17. OF – Orange fluorescence
18. F – Filler

The results of these eighteen target areas are compiled into the table below (table 1) where sections are divided into their number and code corresponding to the references on figure 61, their description as located on the painting, the elements that were detected by the XRF and lastly the possible pigments as inferred by the spot analyses. The elements marked in bold indicate a major response signal whereas the elements in normal text show a minor response signal and the elements in italics indicate a very weak response signal. Relative amounts of the elements found in the painting are based on peak intensities shown by the XRF spectrometer and by no means act as a quantitative measurement of the elements present.

Table 1: XRF spot analyses (as shown in figure 61); number, code, description, elements detected, and possible pigments used.

No	Code	Description	Elements detected	Possible pigments
1	OG	Original ground	**Pb**, **S**, **Si**, *Hg*, *Fe*, *Ca*, *P*, *Sn*, *Zn*	Lead white, zinc white, chalk, gypsum
2	W, I	White, impasto	**Pb**, **Si**, Hg, Fe, *Ca*, *Ba*, *Cr*, *Zn*	Lead white, lithopone, mars black, chromium oxide green, viridian
3	W, S	White, sky	**Pb**, **S**, **Si**, *Ba*, *P*, *Fe*, *Zn*	Lead white, lithopone, zinc white, chalk, gypsum
4	Bl, C	Black, cow	**Pb**, Si, Fe, S, Ca, P, Ba, Hg, *Cr*, *Zn*	Bone black, ivory black, mars black, vermillion, cinnabar, lead white, chalk, gypsum
5	Y, G	Yellow, grass	**Pb**, **S**, **Si**, *Ba*, *Hg*, *Cr*, *Fe*, *Ca*, *P*, *Zn*	Yellow lead, lemon yellow, yellow ochre, raw sienna, barium chromate yellow, chrome yellow, zinc yellow, mars yellow, lead white, chalk, gypsum
6	YP, G	Yellow-pink, grass	**Pb**, Si, S, Hg, *Fe*, *Ca*, *Ba*, *Zn*, *Cd*	Lead white, chalk, gypsum, lemon yellow, yellow ochre, raw sienna, yellow lead, cadmium yellow, cinnabar, vermillion
7	R, S	Red, signature	**Pb**, Si, Fe, S, Ca, *Ba*, *Hg*, *Cr*, *Zn*	Vermillion, mars red, red lead, cinnabar, lead white, chalk, gypsum
8	B, S	Blue, sky	**Pb**, **S**, Si, P, Ca, Fe, *Ba*, *Zn*	Prussian blue, vivianite, indigo, lead white, chalk, gypsum
9	PG, M	Purple-grey, mountain	**Pb**, S, Si, Hg, *Ca*, *Ba*, *Fe*, *Zn*, *P*	Mars violet and or mixtures of red: vermillion, mars red, red lead, cinnabar, realgar with blue: Prussian blue, vivianite, indigo and or with blacks: bone black, ivory black, mars black; lead white, chalk, gypsum

10	YG, T	Yellow-green, tree	**Pb**, Si, S, Fe, P, Cr, Ca, *Ba, Sn, Zn*	Chromium oxide green, viridian, mixtures: blues - Prussian blue, vivianite, indigo with yellows - yellow lead, lemon yellow, yellow ochre, raw sienna, barium chromate yellow, chrome yellow, zinc yellow, mars yellow
11	YG, B	Yellow-green, bush	**Pb**, Si, S, Hg, *K, Cr, Fe, Ca, Cd, Ba, Zn*	Chromium oxide green, viridian, mixtures: blues - Prussian blue, synthetic ultramarine, vivianite, indigo with yellows - yellow lead, lemon yellow, yellow ochre, raw sienna, barium chromate yellow, chrome yellow, zinc yellow, mars yellow, cadmium yellow, lead white, chalk, gypsum
12	YG, G	Yellow-green, grass	**Pb**, Si, S, *Hg, Ba, Fe, Ca, Cr, P, Zn*	Chromium oxide green, viridian, mixtures: blues - Prussian blue, vivianite, indigo with yellows - yellow lead, lemon yellow, yellow ochre, raw sienna, barium chromate yellow, chrome yellow, zinc yellow, mars yellow, lead white, chalk, gypsum
13	DG, T	Dark green, tree	**Pb**, **S**, Si, Fe, Zn, Hg, *Cr, Ca, P*	Chromium oxide green, viridian, mixtures: blues - Prussian blue, vivianite, indigo with yellows - yellow lead, lemon yellow, yellow ochre, raw sienna, barium chromate yellow, chrome yellow, zinc yellow, mars yellow and or with blacks: bone black, ivory black, mars black, lead white, chalk, gypsum
14	RB, P	Red-brown, path	**Pb**, Si, S, Hg, Fe, Ca, Ba, *P, Zn, Mn*	Brown ochre, umber, sienna, Van Dyke brown, mars browns with red: red ochre, vermillion, mars red, red lead, cinnabar, realgar; lead white, chalk, gypsum

15	Br, C	Brown, cow	**Pb**, Si, S, Fe, Ca, P, Ba, *Cr*, *Zn*, *Mn*	Brown ochre, umber, sienna, Van Dyke brown, mars browns, bone black, ivory black, mars black, lead white, chalk, gypsum
16	DB, P	Dark-brown, path	**Pb**, Si, Hg, Fe, Ca, *Ba*, *Cr*, *P*, *Zn*, *Mn*	Brown ochre, umber, sienna, Van Dyke brown, mars browns, mixture with vermillion, cinnabar; bone black, ivory black, mars black, lead white, chalk, gypsum
Other				
17	OF	Orange fluorescence	**Pb**, Si, S, K, Fe, *Ca*, *Cd*, *Ba*, *Hg*, *Cr*, *Zn*	Madder lakes
18	F	Filler	**Si**, **Pb**, Ca, P, *Fe*, *Hg*, *Zn*, *Ti*	Lead white, chalk, gypsum, titanium white

XRF specialist and lecturer, Ms Maggi Loubser, assisted with the interpretation of the data[36]. Ms Loubser advised that the silicon (Si) detected in all the spot analyses (see table 1) may be due to the presence of silica-based surface dust and dirt on the painting and may not necessarily infer the presence of a silicon containing pigment.

4.4.1 Ground

Lead (Pb) is the most prominent element in the exposed ground of the painting (see 1. OG in figure 61 and table 1) detected by XRF showing the most intense spectral peak. Other elements detected are sulphur (S), calcium (Ca), iron (Fe) and zinc (Zn) (see figure 62). The dominant presence of lead indicates that lead white may have been primarily used as pigmentation for the ground. This is entirely feasible since lead white was the main pigment used in the grounds for painting supports throughout the 19th century (Stols-Witlox, 2012:177). This may also explain the recurrence of dominant lead spectral peaks in all the spot analyses (see figures 62 – 71) since the ground is always present beneath the paint layers.

[36] The raw collected data was imported directly from the XRF spectrometer and exported into an Excel spreadsheet in table form showing the peak intensities of elements found for every spot analysis conducted on the painting. This was used alongside software namely Artax and Bruker Instrument Tools that display the results in the form spectral graphs to interpret the results. The data that proved relevant to the study was then converted from the excel spreadsheet format into graphs showing the spectral peaks of the elements using Excel's graph function. The graphs in Excel were then exported to PowerPoint where the relevant spectral peaks were labelled and then converted into JPEG format. These JPEG images of the graphs are included to illustrate the findings (see figures 62 – 71).

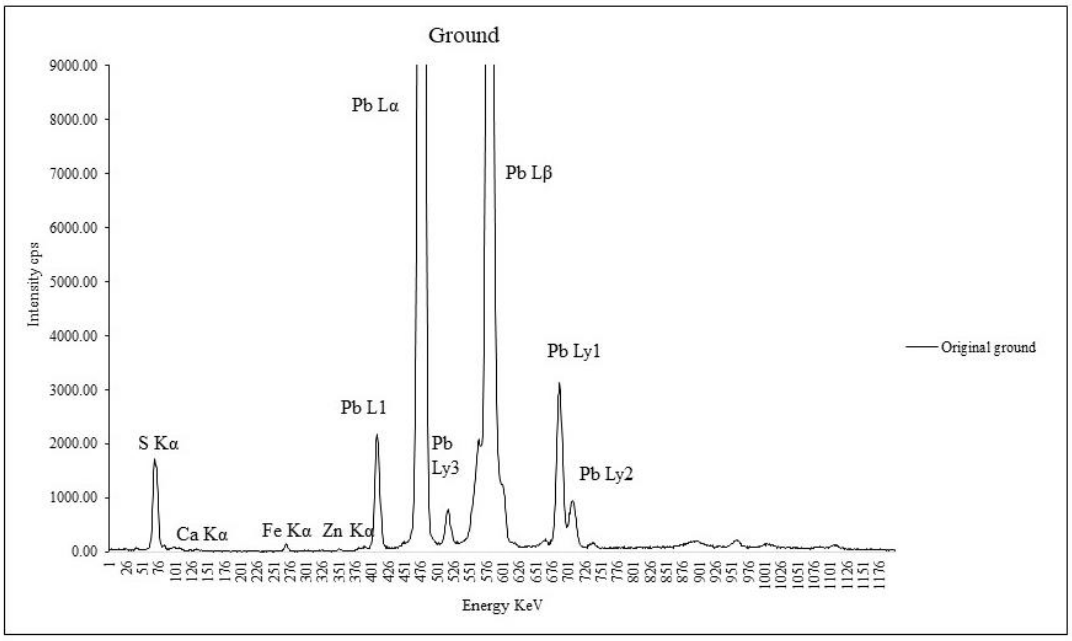


Figure 62: Elemental peaks of the original ground layer in Cattle Grazing near Pretoria Zoo (c 1896).

From the 19th century there was a rise in the market for painting materials and so these became commercially produced at an industrial scale with the grounds being applied to painting supports by the commercial manufacturers. With the industrial activity of the 19th century came an increase in air pollution which caused blackening of lead white ($PbCO_3$) as a result of a reaction of lead white with the sulphur in the air to form lead sulphide (PbS). To minimise the blackening of lead white in oil grounds zinc white, the only alternative to lead white with lesser tinting strength, was sometimes applied as a top coat over lead white and sometimes mixed with the lead white (Stols-Witlox, 2012:177). This may explain the presence of zinc in the ground of this painting.

Fillers such as chalk, barium sulphate, kaolin and gypsum were often added to 19th century grounds to make them more absorbent (Stols-Witlox, 2012:179). The presence of sulphur and calcium may indicate the use of chalk ($CaCO_3$) and gypsum ($CaSO_4$) in the ground. The iron present may be indicative of a slight tinting of the ground to make it an off-white with iron containing pigments such as mars black, yellow or brown ochre. It is also possible that the XRF detected residues of such iron containing pigments belonging to paint layers that have delaminated from the ground.

4.4.2 White

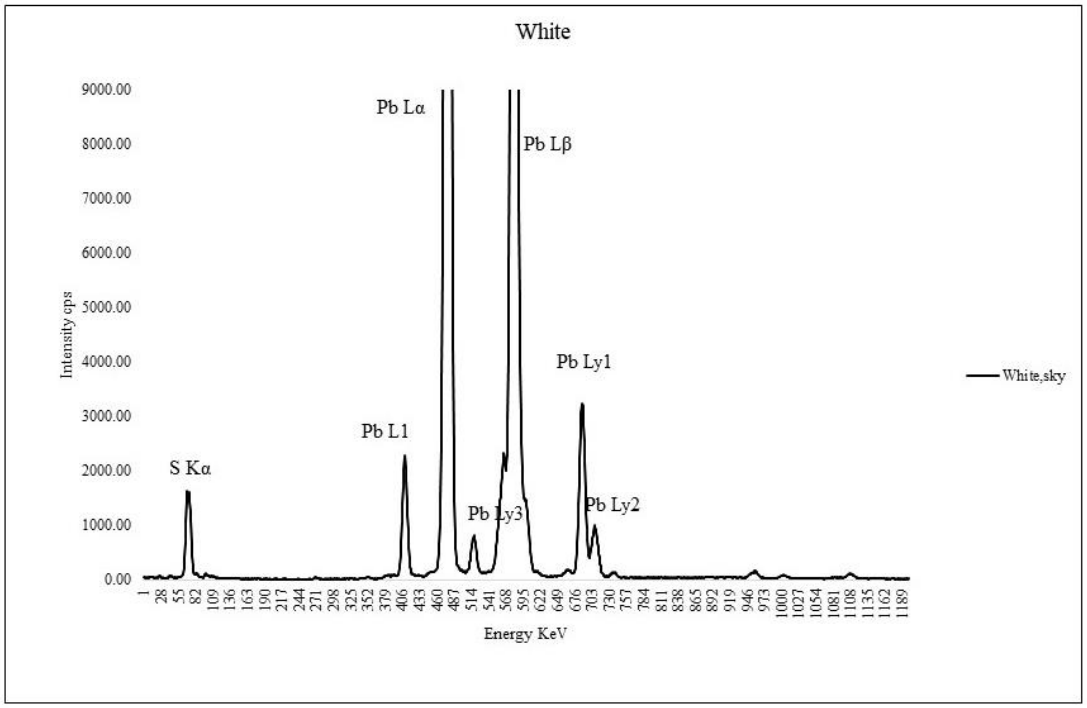


Figure 63: Elemental peaks of the white pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

The analysis performed on the area of the painting showing the purest use of white (see 3. W, S in figure 61 and table 1) revealed lead as the predominant element as well as a relatively prominent detection of sulphur (see figure 63). Although when comparing this spectral graph (figure 63) with the one of the ground layer (figure 62), they appear very similar, almost identical. This may indicate detection of the lead white ground with the presence of chalk and gypsum to account for the presence of sulphur.

Lead white was the only white pigment used in European easel painting until the 19th century when zinc white had been introduced to the market. Its use remained steady until the 20th century when it had been extensively replaced by titanium white (Gettens, Kühn & Chase, 1993:69). It is thus entirely feasible to suggest that van Wouw may have used lead white as the main white pigment for his painting.

4.4.3 Black

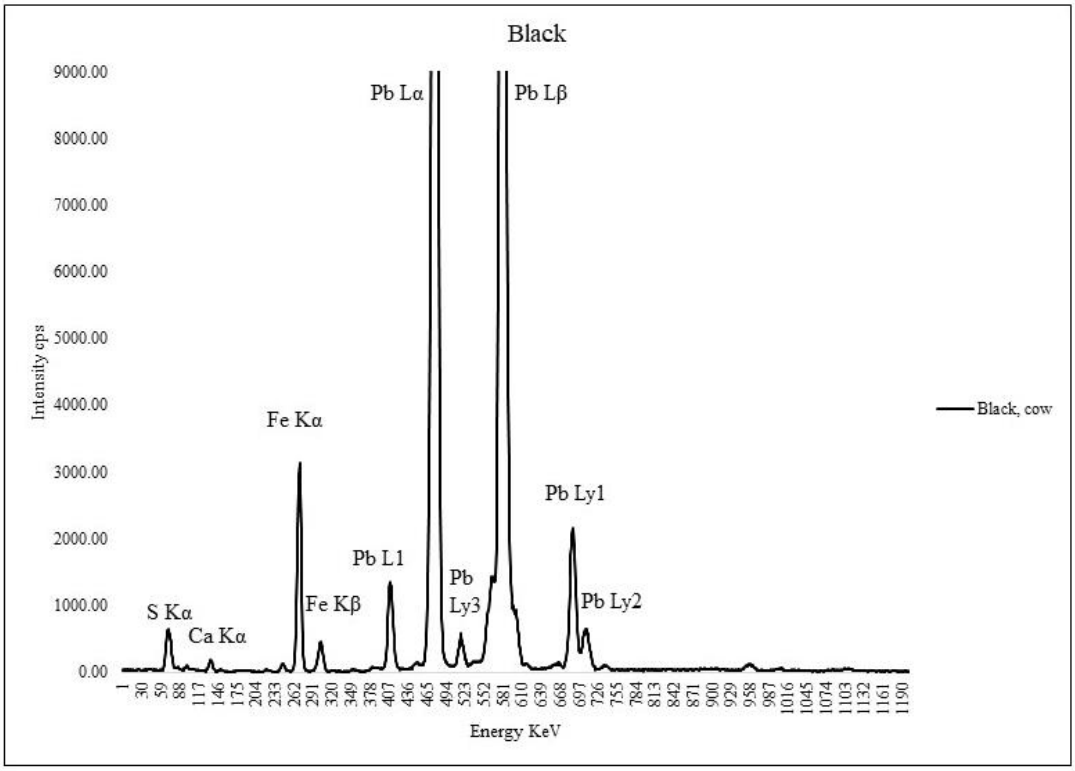


Figure 64: Elemental peaks of the black pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF analysis on the area with the most black on the painting (see 4. Bl, C in figure 61 and in table 1) once again revealed a predominant presence of lead, however the spectral graph (figure 64) shows a greater intensity of iron as well as calcium as compared to the previous spectral graphs. This may indicate that van Wouw may have used the iron-derived mars black. Mars black is a synthetic iron oxide pigment developed in the 19th century by heating iron oxide under controlled conditions (Barnett, Miller & Pearce, 2005:451).

Van Wouw may also have used the pigment bone black. This pigment has been in use since prehistoric times, is made from calcined bone or ivory and mainly consists of calcium phosphate ($Ca_3(PO_4)_2$) (Pigments through the Ages, [sa]). Bone black and ivory black are names used interchangeably to describe the same black colour derived from charring either bone or ivory.

4.4.4 Yellow

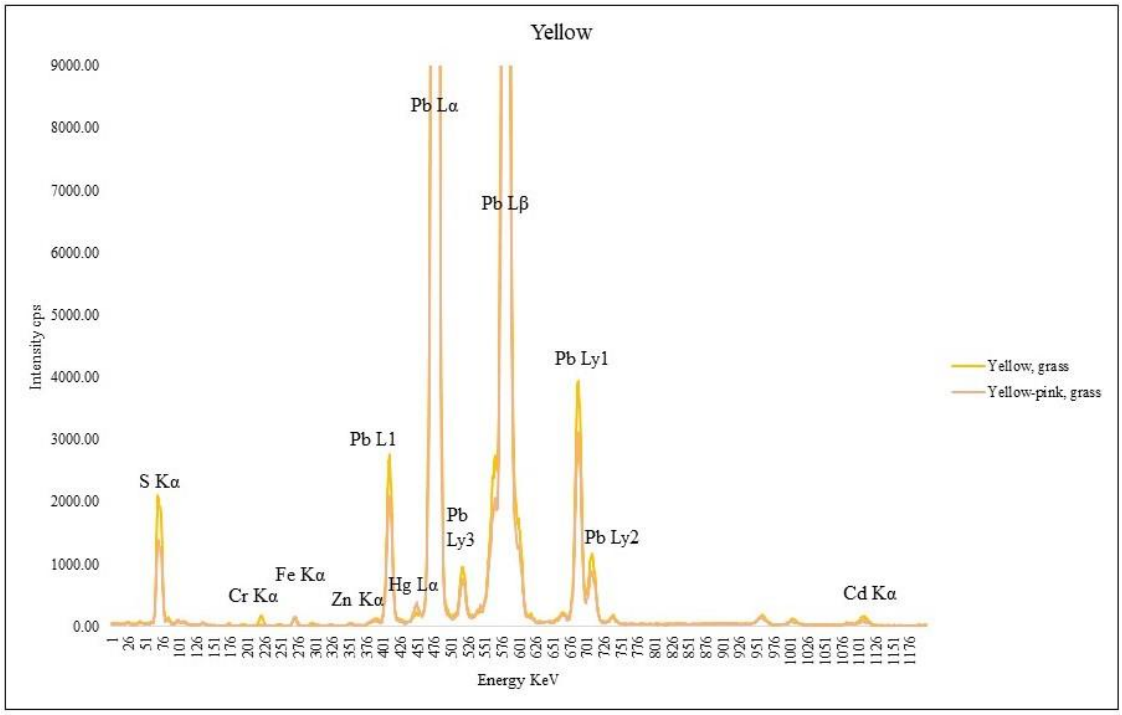


Figure 65: Elemental peaks in the yellow pigments present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF analysis was conducted on two target areas that displayed use of yellow (see 5. Y, G and 6. Y, P in figure 61 and table 1) although it simultaneously appears that the yellow had been mixed with other pigments as well. The spectral graph for both test spots (see figure 65) show once again predominant spectra peaks for lead. This may be from the lead white ground or it may indicate that the artist mixed lead white into the yellow paint to achieve a lighter tone.

The strong detection of lead may also suggest that van Wouw may have used lead-based yellow pigments such as chrome yellow and or lemon yellow. Chrome yellow consists of lead chromate ($PbCrO_4$) and can also sometimes contain additives and extenders such as calcium carbonate ($CaCO_3$), calcium sulphate ($CaSO_4$), lead(II) sulphate ($PbSO_4$) and barium sulphate ($BaSO_4$) (Kühn & Curran, 1986:188). This may explain the presence of chrome (Cr) as well as the sulphur (S) and trace amounts of barium (Ba) in the spot analysis. Lemon yellow is a pigment that may consist of barium chromate ($BaCrO_4$), strontium chromate ($SrCrO_4$), or a mixture of lead chromate with lead sulphate (Pigments through the Ages, sa). It may therefore very similar to chrome yellow as it contains the same elements that may be found in chrome yellow (chromium, barium, lead) except for a possibility of strontium.

The presence of zinc in the spot analyses may also infer the use of zinc yellow. Zinc yellow which is also known by the names of citron yellow, permanent yellow and ultramarine yellow is a zinc chromate ($ZnCrO_4$) pigment that has been in use since the beginning of the 19th century (Otero *et al*, 2017:2). Iron-based earthy yellow pigments such as yellow ochre and or raw sienna may account for the detection of iron in both spot analyses. It is also possible that van Wouw could have used cadmium yellow due to the presence of cadmium (Cd) in the one spot analysis. Cadmium yellow mainly consists of cadmium sulphide (CdS) and the pigment became availabe for artists around the 1840s (Fiedler & Bayard, 1986:67).

4.4.5 Red

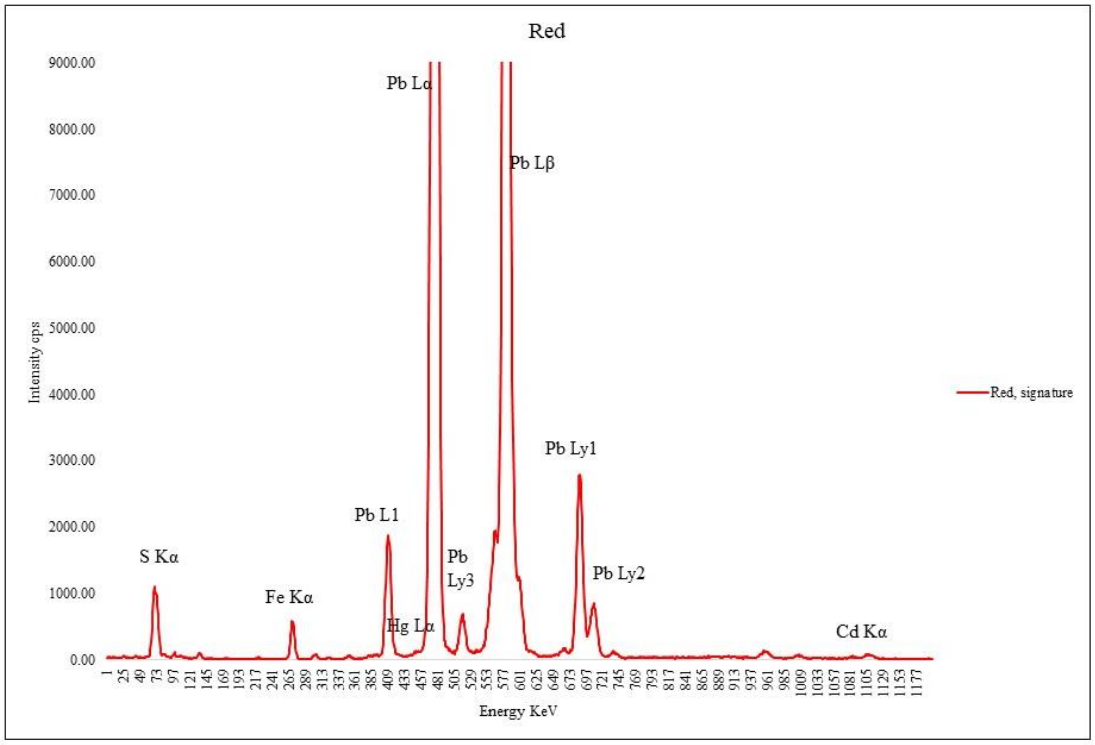


Figure 66: Elemental peaks in the red pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

The artist's most prominent use of red in the painting appears to be the red used for the signature (see figure 21). XRF analysis was carried out on a spot of this area containing red (see 7. R, S in figure 61 and table 1), however the spectrometer has a collimator of 8mm and so the yellow-green pigments adjacent to the thin red lines of the signature were included in the spot analysis. This is a factor that limits the certainty of the red pigment used. The spectral graph for the analyis of the red pigment (see figure 66) once again shows a predominant energy peak signal for lead. This may once again be due to

the lead white ground underneath. However, the presence of lead may also infer the use of the pigment red lead. Red lead consists of lead tetroxide (Pb_3O_4) which is chemically identical to the mineral minium and is one of the earliest artificially produced pigments that has been in use since antiquity (West Fitzhugh, 1986:109). The strong detection of iron may also suggest the use of red ochre or mars red. Red ochre is a natural occuring iron oxide which is also known as hematite and has been used as a pigment since prehistoric times. Mars red is an artificially produced, synthetic variant of red ochre which became avaible to artists from the 18th century (Pigments through the Ages, [sa]). The presence of the element mercury (Hg) may also suggest that the red of the signature could be vermillion. Vermillion consists of mercuric sulphide (HgS) and has been in use since ancient times. This pigment has also been referred to as cinnabar (Gettens, Feller & Chase, 1993:159). It is possible that van Wouw also used vermillion to achieve a yellow-pinkish tint in the test spot 6. Y, P (see in figure 61) due to the presence of mercury in the spectral graph (see figure 65).

The presence of cadmium may appear to suggest the use of cadmium red, however this pigment only became available in 1907 (Barnett, Miller & Pearce, 2005:451). This is more than a decade after the painting's approximate date of completion (ca. 1896) which makes its occurrence in the painting impossible. It is more likely that the detected cadmium may be from a possible presence of cadmium yellow in the yellow-green areas surrounding the red signature.

4.4.6 Blue

The XRF analysis of the target area containing blue in the painitng (see 8. B, S in figure 61 and table 1) once again revealed the most dominant spectral peak for lead (see figure 67). The blue appears extremely light to represent the clear, sparse sky which most likely suggest that van Wouw mixed a lot of white lead with the blue pigment to achieve this effect.

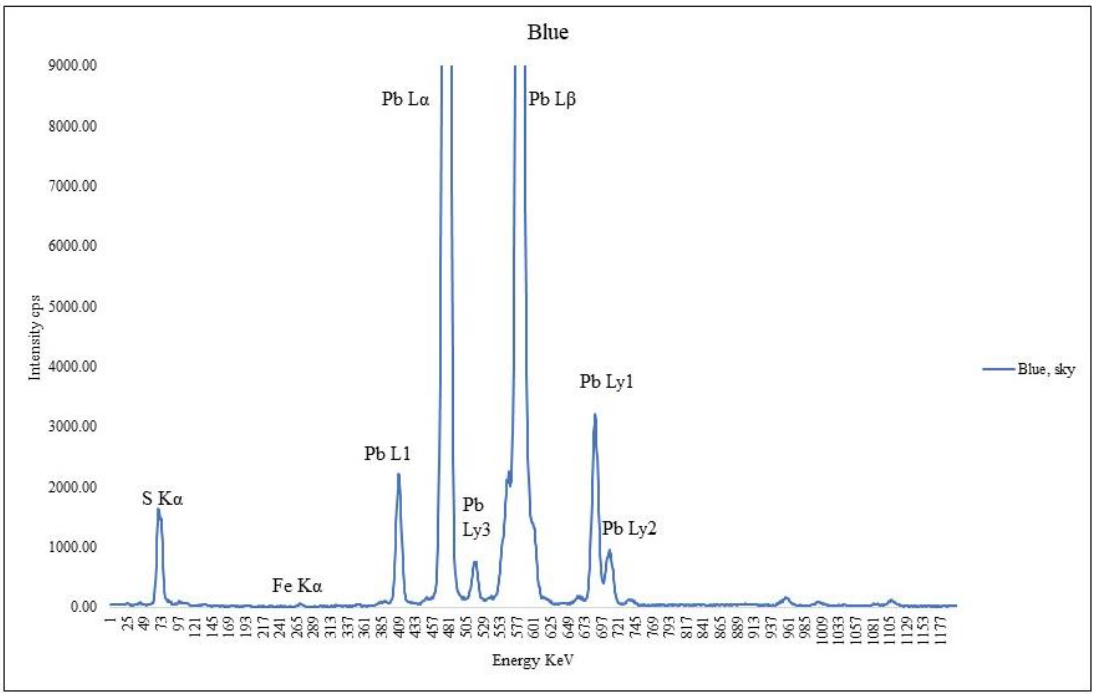


Figure 67: Elemental peaks in the blue pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

The detection of iron in this spot analysis may suggest the Prussian blue was used as the blue pigment. Prussian blue is a hydrated iron hexacyanoferrate complex ($Fe_4[Fe(CN)_6]_3 \cdot xH_2O$) and having been articially synthesised in the early 18th century it is often referred to as the first modern pigment (Berrie, 1997:191). Even though the spectral peak for iron in this analysis seems very low (see figure 67), it is possible that Prussian was used for the colour of the sky because this pigment has a very high tinting strength (Berrie, 1997:196). This means that a minute amount of this pigment will be able to tint a large amount of white to have a noticeable blue appearance. Moreover, this pigment has an excellent absorbance in the photographic infrared region of the spectrum of 700-900nm (Berrie, 1997:197). This means that if Prussian blue was used in the sky, the sky would appear darker in the infrared photograph. When looking at the infrared photograph of the painting (see figure 52) the sky does appear a darker uniform grey in comparison to the sky in the normal light photograph (see figure 45) all the way down just to the tip of where the mountain and horizon meet. This may further suggest that van Wouw used this pigment. Historic accounts also describe the tendency of this pigment to fade when exposed to light and to regain its blue colour when stored in darkness (Berrie, 1997:199). This may suggest that the sky in the painting could have originally appeared more blue than it currently does as the pigment could have faded from years of exposure to light.

Other blue pigments that could have been employed for the sky include indigo and vivianite. Indigo is a blue pigment that is used both as a dye and artist pigment. This pigment was prepared from plants until the end of the 19th century when a synthetic version of it was made commercially avaible in 1897 (Schweppe, 1997:81). Indigo is an organic pigment and can therefore not be detected via XRF. Indigo has been in use since ancient times and continues to be used as a textile dye, most notably to dye denim. As an oil paint pigment, however it was not used by painters after the 17th century although it continues to be used as a watercolour pigment (Schweppe, 1997:84). Vivianite, also known as blue ochre, is an natural occuring inorganic pigment that consists of hydrated iron phosphate ($Fe_3+2(PO_4)_4 \cdot 8(H_2O)$) (Natural Pigments, 2021). This pigment has seldom been found on European easel paintings, although it has been used in German medieval paintings, English medieval polychrome statues and in the School of Cologne to depict skies during the 13th and 14th centuries (Natural Pigments, 2021). Thus the likelihood that van Wouw used these pigment for his oil painting is low. It is more likely that he may have used Prussian blue.

4.4.7 Purple

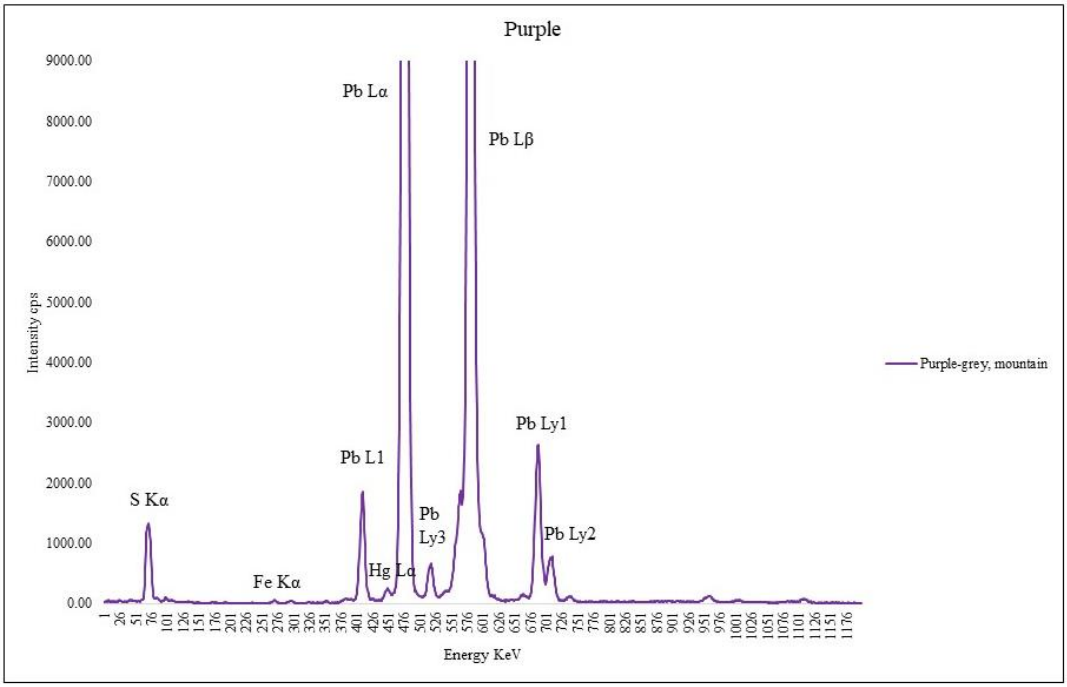


Figure 68: Elemental peaks in the purple pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF analysis on the seemingly purple (grey-purple) area of the painting (see 9. PG, M in figure 61 and table 1) once again revealed dominant lead spectral peaks along with sulphur, some iron and mercury (see figure 68). The presence of iron may indicate the use of mars violet to achieve a purple. Mars violet is a synthetic iron oxide pigment developed in the 19th century (Vasari Classic Artists' Oil Colors, 2022). On the other hand, purple is a secondary colour which is the product of mixing the primary colours blue and red together. It is entirely possible that van Wouw could have mixed a variety of colours to achieve this grey-purple. This could be a mixture of red lead (on account of the lead), mars red or red ochre (on account of the iron) or vermillion (accounting for presence of mercury) with Prussian blue (iron), indigo (organic) or vivianite (iron). It is also very likely that the artist may have mixed black (bone, ivory or mars black) and white (white lead) to the purple mixture to achieve this neutral grey-purple tone.

4.4.8 Green

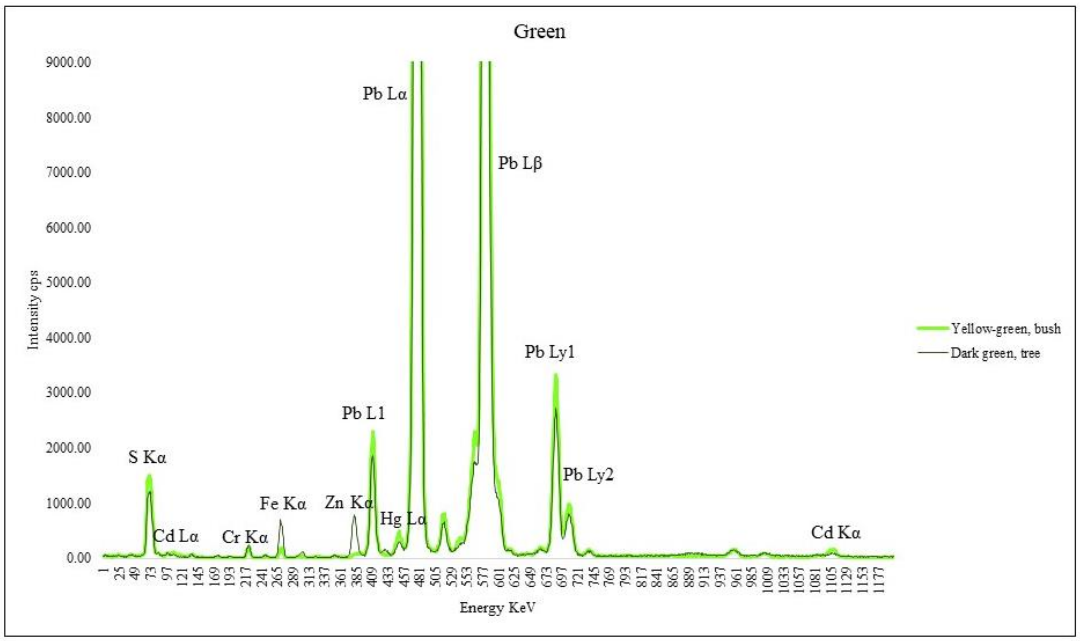


Figure 69: Elemental peaks in the green pigments present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF spot analyses were conducted on several areas on the painting to investigate the materiality of multiple tonal variations of green (see 10. YG, T; 11.YG, B; 12. YG, G & 13. DG, T in figure 61 and table 1). Only two of these four spot analyses (11. YG, B & 13. DG, T) are shown as spectral graphs (see figure 69) to compare the elemental composition of the lighter yellow green with that of the dark green. Based on an overview of the elements present in all spot analyses the green pigments that may have

been used by van Wouw are chromium oxide green and or viridian. Chromium oxide (Cr_2O_3) and viridian, also known as hydrated chromium oxide ($Cr_2O_3 \cdot 2H_2O$), are the only widespread green pigments based on the element chrome and both have been developed in the first half of the 19th century (Newman, 1997:273). The possible use of these pigments may explain the presence of chrome in the spectral graphs.

Since green is a secondary colour it is also entirely possible that the artist may have mixed a variety of yellows with blues and or black to attain a specific shade of green. The yellows incude chrome yellow, lemon yellow, zinc yellow, cadmium yellow, yellow ochre and raw sienna. The zinc (Zn) peak in the dark green spectrum (figure 69) may indicate that the artist possibly used zinc yellow as part of the mixture for the dark green. The blues may be Prussian blue, indigo and or vivianite and the blacks could be mars, ivory and or bone black. It is interesting to note the increase of the spectral peak for iron in the dark green spot analysis as compared to that of the lighter yellow green (see figure 69). This may imply that van Wouw used more of the iron containing Prussian blue or mars black pigment to achieve the dark green.

4.4.9 Brown

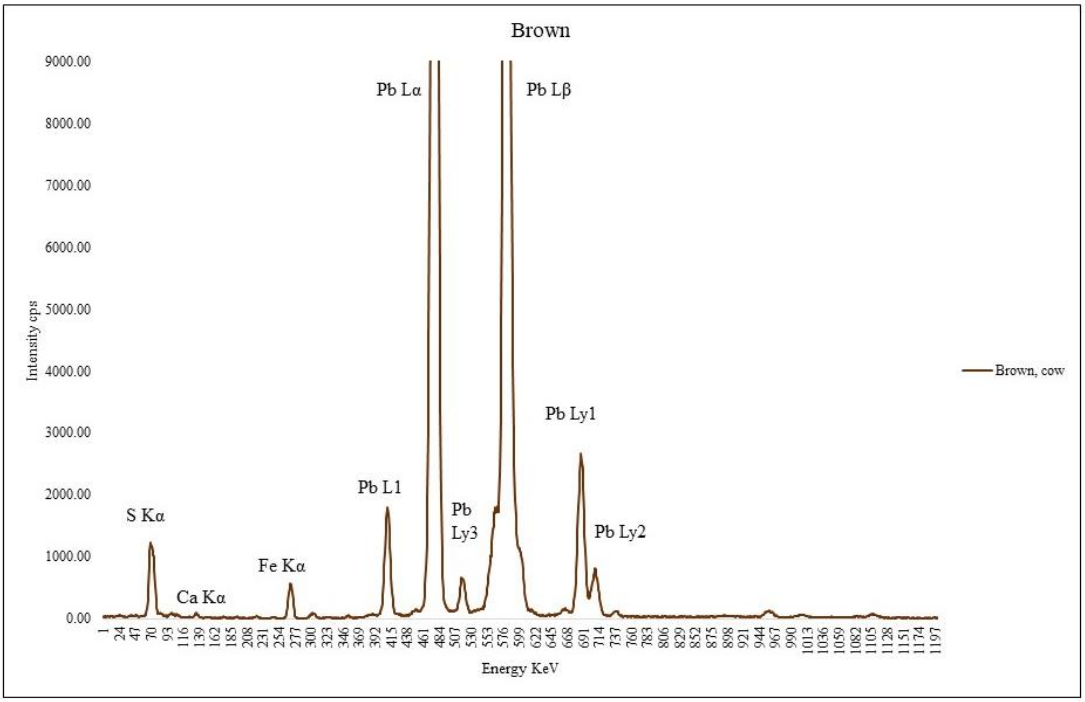


Figure 70: Elemental peaks in the brown pigment present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF analyses conducted on areas of the painting containing brown (see 14. RB, P; 15. Br, C & 16. DB, P in figure 61 and table 1) revealed a variety elements that were also detected in the previous analyses. The most prominent element detected, apart form lead and sulphur, is iron as shown in the spectral graph for the brown used on the cow (see figure 70). Brown pigments that van Wouw may have employed include brown ochre, umber, sienna, Van Dyke brown and mars brown. Brown ochre is a natural occuring iron oxide (Fe_2O_3) earth pigment that has been in use since prehistoric times. Brown ochres derive their colour from the presence of iron hydroxides that exist as mineral species such as brown hematite, also known as limonite ($2Fe_2O_3 \cdot 3H_2O$), and bog-iron ore which is also known as lymnite ($Fe_2O_3 \cdot 3H_2O$) (Handlong, 1969:54). Mars brown is the synthetic equivalent of the natural brown ochre. Umber is a natural earth pigment consisting of a mixture of iron and manganese (Mn) oxides and hydroxides. It is also be known as sienna earth and has been in use throughout history. It comes in two variations namely raw umber and burnt umber. Burnt umber is essentialy raw umber that has been calcined to make it into darker shades (Pigments through the Ages, [sa]). Van Dyke brown, also sometimes referred to as Cassel earth or Cologne earth, is a pigment that mainly consists of organic matter found in soil, peat and brown coal and has been in use since the late 16th century (Feller & Johnston-Feller, 1997:157). Even though Van Dyke brown mostly consists of organic matter such as humic acids, it does also contain partly hydrated iron oxides and manganese oxides (Pigments through the Ages, [sa]).

While it is probable that van Wouw may have used one or a combination of the abovementioned brown pigments, it is also possible that he could have mixed other pigments to attain a brown colour or to modify a brown pigment to have a different tone. Brown is a composite colour which means that it can be made by mixing the three primaries (yellow, blue and red) together. It is therefore possible that he could have used any of the previously discussed yellow, red and blue pigments to achieve his browns for the painting.

4.4.10 Orange fluorescence

One of the areas that showed an orange fluorescence under UV radiation (see figure 56 A) was analysed with XRF (see 17. OF in figure 61 and in table 1). Due to its orange fluorescence under UV radiation, it can possibly be a madder lake pigment. Madder lakes are a group of red to pink and purple pigments that are derived from roots of the

madder plant (rubia tintorum) and were most widely used in the 18th and 19th centuries (Pigments through the Ages, [sa]). Their colour varies depending on the organic colourants they contain such as alizarin, purpurin and pseudopurpurin and on their inorganic components such as calcium carbonate and precipitated compounds of aluminium, tin, iron or chromium with potash or iron (II) sulphate (Schweppe & Winter, 1997:112). The presence of many of these elements in the spot analysis such as sulphur, potassium, iron, calcium and chromium (see 17. OF in table 1) may be add to the likelihood that van Wouw could have used madder lake pigments in his painting.

4.4.11 Filler

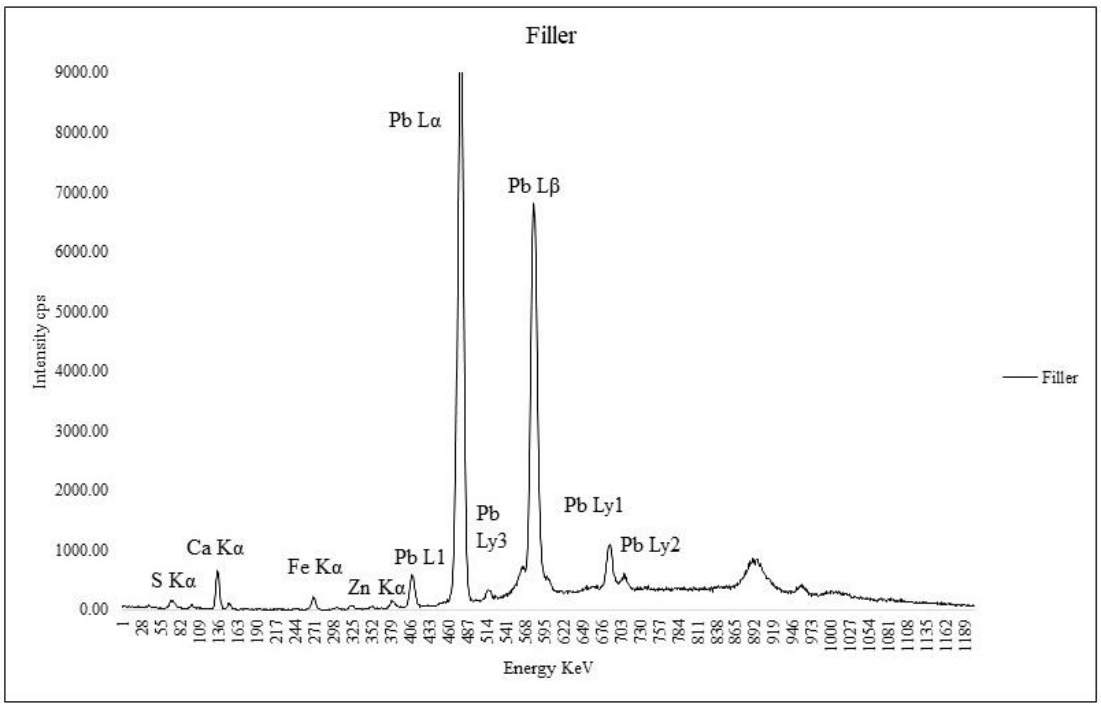


Figure 71: Elemental peaks in the white fill material present in Cattle Grazing near Pretoria Zoo (c 1896).

XRF analysis conducted on the white fill material that has been identified as Polycell Polyfilla Mendall 90 (see 18. F in figure 61 and table 1) revealed a strong detection of silicon, lead and calcium as well as a presence of sulphur, iron, zinc and titanium. On the spectral graph of the filler (figure 71) lead shows once again the predominant spectral peaks followed by calcium, sulphur and iron. The precise chemical composition of the Polycell Polyfilla Mendall 90 fill material is unknown. Being a contemporary commercially produced product that should not contain lead as pigmentation (since lead is a carcinogenic), the presence of lead in the XRF analysis may suggest that the XRF most probably detected the lead from the lead white ground

residues underneath the filler. The detected titanium may indicate a presence of titanium white used as pigmentation in the filler although its detection signal was very weak. The strong presence of silicon in the XRF analysis may suggest that this filler is silica based since current commercial ready-mixed fillers are often partially or completely made of hollow glass micro-balloons or other silicate particulates (Fuster-López, 2012:593). This makes the filler inert, lightweight and compressible. The micro-balloons are sealed bubbles which prevents the absorption of moisture and thus enables the material to dry without shrinking (Fuster-López, 2012:593).

Based on the insights gained from thoroughly examining *Cattle Grazing near Pretoria Zoo* as well as investigating the painting under various imaging techniques and analysing its pigments through XRF, I now turn my attention to discussing van Wouw's painting technique.

4.5 Van Wouw's painting technique

Van Wouw's use of a light to nearly white ground corresponds with the artistic trends of his time. White or nearly white grounds where predominant from the 1880s onwards to accommodate for the stylistic and technical requirements of artists, such as the Impressionists, that favoured the light ground's ability to reflect light and made the colours appear deeper and more brilliant (Stols-Witlox, 2012:178). Even though van Wouw's aesthetic output tends more to the stylistic genre of Realism, with his palette generally being more muted than saturated, his use of a light-coloured ground enabled him to capture the effects of the bright sunlight of the Highveld.

From the results of the XRF analyses done on areas of the painting exhibiting van Wouw's use of colours (see figures 62-70) it is clear that the presence of lead with the most intense spectral peaks is ubiquitous. Lead white has high a refractive index (high opacity) as well as a low oil-absorption index and can therefore manipulated into a workable paste (Gettens, Kühn & Chase, 1993:70). Van Wouw most probably used this opaque and pliable paste property of this pigment to achieve his impasto paint application which he used to delineate prominent surface texture in the grass, trees and built-up light masses for the sky (see figures 34 D, 46 and 47).

Van Wouw used oil paint to produce this painting, however it is uncertain what type of drying oil he used as a binder for his pigments. Tubed paints, invented by an American

portrait painter John Goffe Rand (1801-1873), were in use form the 1840s onwards which provided artists with a range of ready mixed colours in a portable medium (Harskamp, 2021). This enabled artists to work outside of the confines of a traditional studio or workshop towards painting on site, *en plein air*. Since it is known that van Wouw painted outdoors[37] it is probable that he used commercially produced tubed paint as this would have been more convenient. It is possible that he may have used linseed and or poppyseed oil since these were generally the most used throughout the 19th century while linseed and walnut oil was more used in the 18th century (Hermens & Townsend, 2012:213). Towards the end of the 19th century oil binding media with little to no specific indication of their contents were sold to and used by artists. Although more research on the binding media of this period is required, some sources suggest that some 19th century drying oil mixtures contained lead-based driers, natural resins and gums (Hermens & Townsend, 2012:213). If van Wouw's oil medium contained a lead-based siccative[38] this could also explain the pervasiveness of lead in all the XRF readings.

In oil painting, the paint is generally applied be means of one of two methods. The first type can be referred to as layering which involves the methodical built up of paint in layers at different stages. Some layers may be more or less opaque while others may be more or less transparent. Glazes are layers of paint that are transparent throughout while scumbles are paint layers that are opaque but applied in variable thickness to render it partially transparent. The layering technique always involves areas of transparent layers whereby the colour is the result of more than one paint layer. The second type of painting - *alla prima* painting or wet in wet painting – involves fairly opaque paints and lends itself to spontaneity of both design and brushwork. These two methods are not mutually exclusive since artists may use both within a single painting (Kirsh & Levenson, 2000:121).

Upon inspecting van Wouw's painting with its thick paint application it is clear that his handling of form relies on capturing the effects of the fleeting sunlight. This manifests itself through his use of broad, spontaneous, irregular, immediate and visible brushstrokes that corresponds with the paint handling techniques employed by the

[37] See chapter 2, Anton van Wouw - the painter.
[38] A siccative promotes drying.

Impressionist artists. Since the IR reflectograph (see figures 52 and 53) did not reveal any clear indication of some form of under drawings or preparatory sketches it is likely that he mostly painted in a direct manner, improvising the composition as it progressed according to the *alla prima* or wet in wet painting approach. This does however not mean that his technique did not involve layering. The top layer of paint loss seen on the cow to the left (figure 33 E) reveal traces of green and yellow from the grass behind it. This indicates that the background landscape with the light masses describing the grass must have been painted first, possibly left to dry until van Wouw painted the cow using layers of more transparent dark pigments such as black and browns. The raised paint where the horizon of the sky meets the mountain seen in the image of raking light lit from above (figure 47) also indicate that this built-up light mass was painted and possibly left to dry before the darker and more saturated greens of the tree extending beyond the mountain ridge to the left was painted in thinner, translucent layers.

From these observations it is possible to suggest that van Wouw applied his paint layers from light to dark. Starting with thick paint to establish the light masses, mixing his pigments with considerable amounts of lead white to achieve prominent surface texture as well as to accelerate the drying of these layers. Then working with more saturated and translucent colour glazes to convey the shadows and darker tones in more selective areas of the grass, trees and cows. As indicated by the XRF analyses (see table 1) the data from most target areas show more or less the same elements throughout with some variations in intensity which suggests that van Wouw, in addition to working in multiple layers, did not use pure colours but rather made use of various mixtures of pigments.

Other cues that shed light on van Wouw's painting technique are the several hog bristle brush hairs (figures 35 and 36) and blades of grass (figures 35 and 38) embedded in the paint layers. Some hairs found in the painting measure up to about 20 mm in length which indicate that van Wouw used large brushes for maximum and rapid paint coverage. Several areas of the painting also show streaked textures (see figures 36, 38 & 40) that are characteristic of the mark-making that can be achieved with these relatively hard hair bristles. Van Wouw may also have used other tools such as palette knives and the back end of his brushes to apply and scratch into thick paint to achieve certain textures. Thinner paint layers and glazes may have been applied more smoothly with softer bristle brushes such as sable and or goat hair. The presence of grass in the

painting indicates that van Wouw painted this landscape on-site *en plein air* which directly corresponds to the Realist and Impressionist conventions of working from direct life observation.

While van Wouw undoubtedly painted this work in the veld, it may also be possible that he did not complete this piece in one sitting on-site. This is evidenced by the fact that some paint layers had dried in-between applications. A photograph (see figure 72) from his personal album shows the same subject in a similar location (as seen in the mountain ridge on the horizon) albeit from a different angle. The trees in the photograph also appear similar to the clump of trees in the painting that is situated to the right. The photograph however does not show the fence nor the dirt path that feature in the painting while the horizon line in the photograph appears much higher with less of the mountain visible than in the painting.

Figure 72: Photograph of cattle grazing from van Wouw's personal photo album, date unknown. UP Museums: Anton van Wouw Archive, Van Wouw Personal Photographs. Photographer unknown.

It may be possible that van Wouw also used this photograph as a reference to work further on or even complete this painting in his studio. Or he may have used his memory or imagination to alter the composition, as may be seen in the possible removal of the

cow in the background (see figure 53 A). Alternatively, he may have returned to the site at a later stage to rework the painting. Though this is possible few artists started and finished their paintings on location. Even the most notable Impressionist, Claude Monet (1840-1926) painted on site, partially completing a painting before returning to his studio to apply the finishing touches at leisure (Claude Monet Paintings, 2020).

After discussing the material aspects of *Cattle Grazing near Pretoria Zoo*, I now focus my attention to the immaterial qualities of the painting which will lead to its treatment proposal.

CHAPTER 5
THE PAINTING AS IT CAN BE

This chapter sets out with an introduction to the various values, commonly referred to as the intangible aspects, that heritage material carries. These intangible qualities are typically based on personal or cultural perspectives and manifest in descriptive terms such as value, significance and meaning (Appelbaum, 2010:65).

In the following chapter the implications of attributing values onto cultural heritage objects will be discussed in general. Once various different types of values have been explored, the discussion will move to the particular values that are both explicitly and implicitly present in *Cattle Grazing near Pretoria Zoo* (c. 1896). The values specific to this painting provide greater insights into the significance that it holds. The painting's significance as well as the needs of the custodian influence the determination of its ideal state which directly influences its treatment. Additionally, a discussion on contemporary conservation ethics as well as the implications of various treatment possibilities will guide and inform the decision-making in the conceptualisation of its ideal state. Lastly a treatment strategy aimed at best serving the painting's intended function will be proposed in a systematic manner.

5.1 The values attributed to heritage objects and finding the ideal state

Conservation is primarily concerned with maintaining heritage material in the present and into the future by evaluating its condition and significance, applying measures that stabilise and/or remedy existing damage, and or prevent future degradation (Pye, 2001:25). The fundamental task of conservation is to preserve surviving materials and the evidence they contain (Wallis, 2015:260). Preservation usually occurs out of a desire to show others, or to remind ourselves, of a value that is attached to an object. The values of an object are seldom self-evident and so it is essential to uncover why the preserved object is important and how it can be preserved (Caple, 2000:32).

Values encompass the feelings and attitudes of people toward an object along with their motives for keeping and wanting to preserve it. Value is multifaceted, which makes a rigid and fixed conservation decision-making approach highly problematic. The

conservator is therefore tasked to determine how the custodians, other stakeholders and themselves value the object and how these values relate to its conservation treatment.

Before values specific to van Wouw's painting can be determined it is first necessary to introduce and briefly explain the many and various values attributed to heritage material at large.

Appelbaum (2010:66) identifies the following values, namely:

- **Art value:** includes objects with some aesthetic appeal which were either created as art such as paintings, sculpture and prints, or appreciated as art despite having been created for another purpose including music, religion, politics, weaponry, utensils, etc.
- **Aesthetic value:** is applicable to objects that have appealing colour, texture, shape, line, design, intricate or skilled craftsmanship, deterioration, age, or subject matter.
- **Historical value:** historical value is linked to the availability of information that creates an authentic link with a particular event or time period.
- **Use value:** characterises objects that have a continued physical function.
- **Research value:** includes objects that are valued for the information they contain such as natural specimens, archival records, archaeological artefacts.
- **Educational value:** objects of which there are many and that do not have significant other values and can be used for teaching and demonstrations in hands on sessions.
- **Age value:** an object has age value when it looks old, it has a certain patina of age and evidence of wear and tear and that is part of its charm.
- **Newness value:** the appeal of the object is in its newness, whether this is an actual pristine condition or a crisp and modern appearance.
- **Sentimental value:** sentimental value is linked to the custodian's direct personal experience with objects, particularly those that were part of their childhoods.
- **Monetary value:** refers to the market value and fair price that a willing buyer is prepared to pay to a willing seller. This shifts over time depending on provenance, fashion, interests, and speculation.

- **Associative value:** objects with associative value have demonstrable connections to a person with a considerable amount of fame. Associative value can turn into historical value if/when the fame turns to historical importance.
- **Commemorative value:** is reserved for those objects created purposefully to commemorate a particular person or event.
- **Rarity:** rarity value is based on the availability of having other similar objects in existence, which if there are few drives up the significance of other values.

Some of these values are culturally based such as art value, while others are completely personal and subjective such as aesthetic value. The various reasons for which an object is valued may also be prone to change over time according to social and geographical contexts (Henderson & Nakamoto, 2016:68). The value of an object is thus a complex social construct that shifts constantly with styles, market conditions, change in ownership and does not correlate in a reliable or predictable way with changes in physical state. As such the overall 'value' of an object is ordinarily not a very useful concept for conservators, but the types of values that an object has can guide decision making as to the desired outcome of treatment.

In addition to identifying the values an object holds for its custodians, the future use of an object will also determine its treatment, and so it is vital to determine both and these in turn will inform which values are highlighted or downplayed during conservation treatment and ensure that the object is physically able to withstand its intended use.

A good example would be that of an old painting with darkened varnish. If the painting is identified to have age value, this means that aesthetic satisfaction is derived from its natural signs of decay and deterioration. Thus, conservation treatment may be focussed on ensuring the object is stable but retaining as much of its external age patina including discolouration, fly specks and dirt which all add to that old feeling. Although dirt can be identified as a marker of age, it is usually seen as a sign of neglect and can nearly always be removed without compromising an old object's appearance of age such as age cracks (Appelbaum, 2010:106). Thus, if the painting has extensive age cracks, removing the discoloured varnish may be acceptable as there is other evidence that denotes great age. Future use may however be the deciding factor into whether to retain or remove the darkened varnish. If the painting is to be exhibited in an old Victorian

period house museum where Victorian aesthetics favoured dark interiors, it would be best to retain the darkened varnish for an 'authentic' and seamless appearance as a bright painting would seem out of place (Appelbaum, 2010:177). However, if the future use would be in an art museum, it may be desirable to 'freshen up' the artwork and remove the old varnish which may otherwise affect legibility and appreciation of the artwork.

Another example of how certain values may dictate the treatment outcomes of artworks would be the views of the artist James Abbott McNeill Whistler (1834-1903) on the restoration of his paintings. Whistler's paintings are executed in oils that are predominantly in hues of cool greys, blues and blacks. When the varnish on his paintings ages and discolours to yellow coupled with accumulated surface dirt, these colours dramatically change to greenish hues while the overall dark tonality of his paintings lightens. These changes heavily compromise the artist's intended aesthetic for his work. As such Whistler himself preferred that his paintings be routinely cleaned and revarnished to maintain their aesthetic integrity (Hill Stoner, 1997:109). In this case it is evident that the overruling value determining the treatment decision-making is the paintings' aesthetic value according to the artist's intent.

5.2 The values specific to the Cattle Grazing near Pretoria Zoo

With Appelbaum's identified values for heritage objects in mind, I now turn to *Cattle Grazing near Pretoria Zoo* to determine which of these values are appropriate and relevant to the case study. The values that the painting holds for its current custodian need to be acknowledged since the way in which the painting is valued directly affects its desired treatment outcome. In addition, identifying all the values held by *Cattle Grazing near Pretoria Zoo* is a mitigation strategy to ensure that no value is inadvertently compromised during treatment (Appelbaum, 2010:87). A successful treatment therefore entails the fulfilment of the custodian's needs both at present and in the long term, this being somewhat complicated as custodians and/or the values placed on the artwork may change over time (Appelbaum, 2010:68). As such, re-treatability[39] should be emphasised in decision-making as far as possible, although bearing in mind that this is not always possible (Udina, 2020:210).

[39]Previously referred to as "reversibility". Reversibility is often still interchangeably used with re-treatability. These terms are explained in more detail in section 5.3.1.

The painting most certainly has art value. The creator's intent for the painting was to be foremost an artwork. Van Wouw lived and made the painting during the time in which art museums had already been established and flourished in the Western world which most possibly influenced his desire to be an artist from a very young age. Van Wouw pursued this desire by enrolling at the Rotterdam Academy of Fine Art, becoming a sculptor's apprentice, working a stucco worker, teaching drawing and painting as well as advertising his artistic skills for commissions. Van Wouw fulfilled his desire by leading a professional art career and becoming recognised as an important artist in South Africa. He received and completed monumental state commissions, held successful solo art exhibitions and was awarded an Honorary Doctorate by the University of Pretoria for his contributions to sculpture, and also received the Medal of Honour for sculpture by the Academy of Science and Art. Van Wouw's art holds a significant place in the art historical canon of South Africa and his art forms part of the permanent collections of several art museums and galleries across the country. The painting is currently owned by the University of Pretoria who started their official art collection by acquiring artworks, including this painting by van Wouw from 1976 to about 2012 (De Kamper 2022/07/19). The painting is thus valued by its custodians as cultural heritage with art value. As an historical artwork it also serves as a good example of the Western artistic conventions, namely Realism and Impressionism, and their influence on the development of South African art as seen through a Western lens around the time of its creation.

The painting additionally has aesthetic value, or had. Due to its extensive damage from past storage and treatments, the painting's aesthetic value has been significantly compromised, and it could be argued that if it was in good condition or restored, its aesthetic value would increase. The painting's current custodian, Mr G De Kamper (2022/07/19), states that the painting currently has little aesthetic value and that the white infillings leave the painting quite unappealing.

The painting's historical value is rooted in its obvious connection to its creator, Anton van Wouw, who became an important historical figure in South African art history. Van Wouw is considered the forerunner of Eurocentric realist sculpture in South Africa. The historical value of the painting can arguably extend into its conservation treatment history during the 1970s upon its donation to the University of Pretoria and also speaks to the historical development of conservation as a practice. The conservation concept

of re-treatability often means that past treatments are systematically removed and all physical examples and evidence are lost, surviving only in treatment records and publications. Since the marouflaging and wax consolidation as stabilising treatment for paintings are no longer considered appropriate treatment since they cannot be successfully removed without causing further damage to the painting and therefore not worth the risk. The presence of these past treatments on the painting forms part of its history.

The painting does not have newness value since it is not meant to look new and pristine. It is more than 120 years old and belongs to the older and more traditional stylistic conventions of Realism which van Wouw favoured. This gives the painting age value and so signs of age such as the discoloured varnish, canvas and cracked paint should be accepted. The painting does not have any clear sentimental value. While there may still be surviving descendants of its late owner (Ms Stegmann), the current curator and custodian of the painting Mr De Kamper (2022/07/19) states that the painting has no other stakeholders apart from the University of Pretoria. According to Mr De Kamper (2022/07/19) the painting has no monetary value in its current state, nor will it have a market value if it is restored; in fact, market value has no actual impact on the work in the museums. The painting's research value is self-evident in the compilation of this research paper, and any other potential future research. The painting acts as a historical record, a carrier of information as it bears evidence about South Africa's, especially Pretoria's, history. The painting visually documents the appearance of a certain area in Pretoria at around 1896 before the South African War and the later modernisation, industrialisation and urbanisation of the city.

The painting has educational value in the sense that the various components that make up a traditional oil painting and outdated conservation treatments are clearly visible in this work and can thus be used for demonstrative purposes to further painting conservation students' understanding of this category of museum objects, as well as of the visible effects of certain past treatment procedures that are no longer practised.

It could be argued that the painting has associative value. The painting's explicit associative value lies in its obvious connection to its famed creator, Anton van Wouw. Another, more implicit aspect of associative value resides in its, less conspicuous, connection to the famous Afrikaans language activist and poet Jan FE Celliers to whom

van Wouw gifted the painting. The painting bears the hallmarks of its improper storage in an attic which is directly tied to Celliers's ownership thereof and thus forms an intrinsic part of the painting's history. The painting's associative value intertwines with its historical value.

The painting is valued by the University of Pretoria Museums and its custodian for its rarity since van Wouw was not well known for painting and thus forms an important part of showing his artistic versatility (De Kamper, 2022/07/19). To give an indication of the rare status of van Wouw's paintings, the Anton van Wouw archive list fewer than 50 paintings, whereas a painter such as Frans Oerder has painted over 500 works and Jacobus Hendrik Pierneef more than 3000 (De Kamper, 2022/07/19). Despite not having an automatic effect on the painting's treatment objective, rarity is an aspect that makes the custodian and museum value this painting, and thus want to have it displayed.

5.3 Determining the ideal state of the painting in relation to its values

After having ascertained the specific values of *Cattle Grazing near Pretoria Zoo*, it is now time to determine its ideal state as informed by these values, in addition to the custodian's intended function for the painting's future. A certain function of an object has specific requirements connected to it, thus having the knowledge of the object's intended function as informed by its values is vital at the onset of the decision-making process (Appelbaum, 2010:71). This aligns with the conservator's aim of extending the lifespan of the values that define the object as cultural heritage (Kapelouzou, 2012:176).

In order to establish an object's ideal state, inquiry into and a review of an object's values enable the conservator to decide which components will be preserved and in what state the object will function at its optimal level. These considerations will not only improve the treatment outcomes but will also enhance the object's meaning to its custodian (Appelbaum, 2010:87).

According to Mr De Kamper (2022/07/19) the painting has no function for the museum in its present state with the white fill, as it is deemed unsightly. However, the current intent for the painting is to have it displayed in the foyer of the Van Wouw House to act as a teaching example for conservation students. Therefore, the painting has meaning and educational value for the Tangible Heritage Conservation programme. Another part of the painting's function is to keep the history of the Van Wouw House alive in accord with the initial agreement with Dr Anton Rupert to have a room of the

house be set aside to exhibit van Wouw's artworks (De Kamper, 2018:144). It therefore also has historical value linked to the Van Wouw House.

In the previous section it has been established that the painting has art value, aesthetic value, historical value, research value, educational value, associative value and rarity value. Most of these values are not independent of each other since they elaborately connect to enhance the painting's meaning and intended function which will affect the outcome of its ideal state. For instance, the painting's position in an accepted artistic genre and style grants it art value and qualify its aesthetic value. Its historical value informs its associative value, and contributes to its educational value and research value. All these values are further enhanced by the rarity value of a van Wouw painting.

For the purpose of determining its ideal state, its art value and rarity may be disregarded since no treatment processes will change the fact that it is a rare artwork. This elimination may lead to the balancing of its aesthetic value with its historical value since its historical value may be understood as encompassing its associative value in addition to all the other values that fall under its intended function.

Its function requires the painting to be displayed and it is its current lack of aesthetic value that prevents it from being displayed in a museum setting. Its lack of aesthetic value is caused by its damage in the form of material loss but mostly its jarring infilling treatment. It is however, important to note that changes in an object's physical state, even severe material loss, does not always imply a severe loss in value. The aesthetic value of the same object could be considered so compromised as to be unusable for exhibition, as is the case of *Cattle Grazing near Pretoria Zoo*, unless it were exceedingly rare (Appelbaum, 2010:116). While in this case, the painting's deterioration diminishes its aesthetic value, it does not take away from its historical value as it in fact intensifies it.

Its previous treatment in 2016, especially the infilling for loss compensation and reintegration, suggests that the custodian who instructed the treatment foregrounded its aesthetic value. Its current custodian, Mr De Kamper, curator of the University of Pretoria's Art Collection, however values the painting's provenance and the provenance of its damage since he feels that it forms an intrinsic part of the painting's history (De Kamper, 2022/07/19). From these accounts it becomes evident that conservation outcomes differ from custodian to custodian; and what may be desired by

one curator may be detested by another (Oddy, 1996:9). Having consulted the painting's current custodian, it is clear that its historical value outweighs its aesthetic value in that its ideal state should retain evidence of its history – the damage it accrued in Celliers's attic.

In accord with its intended function, its educational value also outweighs its aesthetic value. To prioritise its potential to be used as a teaching example, it is proposed to maintain the signs of damage and areas of material loss since these areas reveal some of the component parts of an oil on canvas painting such as the ground layer and canvas support. Another feature that should be retained is the wear in the upper pigment layer on the cow (see figure 33 E) making the layers below visible. This should be left as it is for two reasons, the first being that it reveals an aspect of the artist's painting technique and could contribute to students' understanding and insights into the multi layered composition of oil paintings. Secondly, as this damage is likely from over-cleaning of the varnish during conservation treatment, it can also be used to demonstrate the risks involved in the removal of a painting's varnish with unsuitable materials or technique. Other signs of disfigurement or visual disturbances such as the flattened impasto from its marouflage treatment as well as the seepage and discolouration of wax on the picture plane are primary evidences from treatments that were common in earlier conservation practices. Although currently outdated and not recommended, these historical treatments also contribute another historical as well as educational aspect to the painting. As such, all these aspects of the painting should be left unaltered.

The painting's past unresolved restoration treatment in the form of the white infills also adds to the painting's educational value, showing an aspect of the restoration process, and can also be considered a part of the painting's history since they are a testament to the treatment the painting had undergone in 2016. These fills should therefore not be removed.

There is however still an aesthetic aspect, besides its damage, that prevents the artwork from being displayed, namely the white infillings. The painting's custodian explicitly states that he finds the fills on the painting quite unpleasant and distracting, and that he would prefer the work with no restoration at all since it makes it more interesting (De Kamper, 2022/07/19). This request to maintain the painting's history through its damage will be acknowledged and the retaining of the painting's past treatments will

be considered in the treatment decision-making procedure as it forms the core of the painting's ideal state. Before treatment decisions can be proposed it is necessary to delve into conservation ethics for a more informed judgment on how the treatment should be approached.

5.3.1 Ethical considerations

Codes of ethics play a necessary role in providing the decision-making process with a foundation that is indispensable for conservation practice (Caple, 2000:59). An ethical framework promotes the proper care of historic material along with the evidence it contains. Ethical guidelines equip the conservator with the knowledge to protect heritage material against harmful influences, as well as promoting order, consistency and fairness in the preparation and execution of conservation treatments. Guidelines define good practice for the benefit of owners, professionals and practitioners (Wallis, 2015:262). Conservation principles and ethics were agreed upon for the first time internationally in the Athens charter of 1932 and since then numerous charters, recommendations and resolutions have been published, initially by UNESCO (United Nations Educational, Scientific and Cultural Organization), then ICOMOS (International Council on Monuments and Sites) and then by the Council of Europe (Wallis, 2015:262). Since their inception, codes of ethics for conservation have been and are still frequently revised and amended which makes it clear that conservation ethics are complex and ever evolving (Caple, 2000:60). The complexity that arises in these ethical ideals is the extent to which they can realistically be carried out in any given setting since it is difficult to gauge the degree to which any of these guiding principles should be followed in isolation (Caple, 2000:62). Another challenging aspect linked to conservation ethics and guidance is the fact that charters and policy statements do not generally deal in specifics which makes the decision-making on the detail of a practical action difficult (Wallis, 2015:263).

According to the Code of Ethics and Guidance for Practice (2000:4) of the Canadian Association for Conservation of Cultural Property (CAC) and the Canadian Association of Professional Conservators (CAPC) the integrity of the heritage material must be respected by the endeavour to promote the longevity of its material components and immaterial qualities through the means of minimal intervention. The integrity of the object includes its original intent, use, history and evidence of provenance. Insights

into, and respect for, the object's integrity must be informed by studying the object as well as consulting the owner and, if applicable, the creator (CAC & CAPC, 2000:4).

Minimal intervention has become a dominant approach in conservation in the second half of the 20th century and has developed as a gentler alternative to highly interventive and irreversible treatments that permanently changed the appearance of paintings in the past (Villers, 2004:3). The painting in question had undergone invasive treatments in the mid-1970s as evident in the marouflage process that permanently altered its textural quality through the flattening of impasto and the wax consolidation that darkened areas of the picture plane where it seeped through. As is suggested by the phrase, minimal intervention entails only conducting treatment(s) that are absolutely crucial and appropriate for the conservation of heritage material with the aim of doing rather less than more. As a conservation term, "minimal intervention" is problematic because it is not a complete statement since it does not have a clear aim. The concept should rather be defined for a given object over a given time in a given set of conditions. It is a more sympathetic approach (Caple, 2000:65).

Conservation ethics and guidance for practice also necessitate that before any treatment(s) can be conducted, a thorough treatment proposal must be developed and presented to the owner or custodian of the object. Since the painting in question's treatment proposal form the end result of this research paper, a more elaborate discussion on what such a proposal entails can be found in section 5.4.

During treatment all the steps must be thoroughly recorded including the date of treatment, descriptions of the treatment(s) and materials used as well as any observations. The structure, materials and condition of the object as well as the relevant history of the object that have been uncovered during research must be recorded, described and presented in the treatment report (CAC & CAPC, 2000:6).

Conservators aim to use materials and techniques that, as informed by current knowledge, align to the treatment aims and have the least adverse effect on the object. Ideally, the only materials that should be used for treatment should be able to be removed with minimal risk to the original material. These materials and techniques should also not hinder future treatment or examination (CAC & CAPC, 2000:6). In the past the term "reversibility" was used to denote treatments and materials that can be easily removed and was considered a golden rule in modern conservation. Although in

current practice it is increasingly considered an idealistic myth (Muñoz Viñas, 2002:25). As usage of the term became popular in the 1970s it also became more apparent that no treatment is, strictly speaking, completely reversible. In reality all cleaning treatments are irreversible and any contact with a material leaves a few molecules present on the object (Caple, 2000:64). Since the late 1980s the term's usage saw a decline and the term "retreatability" has been proposed to replace it (Muñoz Viñas, 2002:25). This is because the notion of being able to undo or remove conservation work and being able re-treat it in the future remains a desired treatment aim. Therefore, if the term reversibility is used to mean retreatable, or the ability to remove previous treatment it remains a viable expression of a conservation ideal (Caple, 2000:64).

Further recommendations by conservation ethics and guidance for practice stipulate that no aspect of the heritage object may be altered nor should any material be removed from it without necessary justification. If material removal or alteration is needed, the object must first be documented in its existing state. Material removed should be kept as part of the documentation of the object where relevant and with the owner's consent (CAC & CAPC, 2000:6).

The requirements of the owner or custodian may involve alteration of the object's current state in the form of restoration and reconstruction. These are ways of re-establishing significant aspects to heritage material by re-introducing components to objects that have losses with the aim of re-establishing legibility. If such measures are taken on, they must be completely documented, executed without deceitful intent and to a minimal extent. The presence and extent of any restorations or reconstructions must be able to be detected, however it is not necessary for them to be noticeable (CAC & CAPC, 2000:7).

As informed by contemporary conservation ethics and guidance for practice the treatment on the painting should be limited to what is absolutely necessary to conserve the significance of the painting. This minimal treatment should also make use of materials that can be removed with ease, not introduce any hazardous risks to or change original material and endorse future treatments. If restoration or reconstruction to promote legibility or to reduce unpleasant aspects are to be used, these interventions should be of a detectable nature. Since the ethical and guiding principles for practice

are context dependent, it is first necessary to consider the various treatment options that can be employed before deciding on a final treatment proposal.

5.3.2 Weighing out the options

It is important to understand that the conservator's decisions govern the appearance of an object and thereby have a direct influence on how the viewer perceives it (Philippot, [1983] 1996:227). The conservator is therefore tasked with the responsibility to undertake a critical judgement on the work itself (Philippot, 1996:228). This responsibility necessitates the conservator to consider a range of treatment options along with their implications to reach an optimal treatment outcome that respects the life of the object as well as the requirements of the custodian. There are various ways of achieving the painting's ideal state and some treatments may be more suitable than others. So far it has been established that the painting has historical value and thus not all signs of wear and deterioration should be removed to best serve its purpose and retain its meaningful qualities. In adherence to the guiding approach of minimal intervention and the custodian's preference for retaining the painting's historical evidence, untreated areas where the original ground and canvas of the painting is exposed should be left as they are. While keeping this limit in mind, it is equally necessary to remember that the painting's current aesthetic appearance prevents it from serving its intended purpose. Its required treatment can therefore be understood as an intervention to reconcile the historical with the aesthetic.

If the painting's aesthetic value had been prioritised, its treatment would entail complete restoration of the pictorial plane. Restoration may re-establish the painting's potential unity provided that it be done by respecting the artwork's authenticity. It is important to understand that the act of restoration can never re-establish the original state of a painting. It can however only show the present state of the original materials. Even if restoration could determine the original state of a painting as the artist may have intended it, it would still not be able to eradicate the effects of time. Effects such as aging cracks and discolouration of certain pigments and varnish can be considered as the painting's patina (Philippot, [1966] 1996:373).

For full pictorial restoration, imitative retouching and even reconstruction would constitute the painting's treatment. Imitative retouching, also referred to as invisible or mimetic retouching, aims to replicate the colour, tone, texture and reflective qualities

of the surrounding original paint so that the disruption caused by the damage cannot be perceived (Albertson & Murray, 2011:85). Integration of losses may include imitating of the craquelure throughout the areas that require retouching. Artificial craquelure, whether cosmetic (painted on the surface) or structural (crack made to extend through the infills), promotes the visual integration of the surface texture. Artificial craquelure that is applied to the structure of the infills also acts as expansion joints that can respond to the movement of the support, reducing the risk of separation from the original and providing more stability for the retouched areas (Philippot & Philippot, [1959] 1996:338). This approach is mainly suitable for paintings that are in a relatively good condition where only a minimal amount of interpretation through retouching is needed (Albertson & Murray, 2011:85).

In cases where there are large areas of paint loss that include areas where important subject matter is missing, it may be challenging to determine with certainty what has been lost. Complete reconstruction may be an unjustifiable treatment option for paintings where the extent of losses is significant (Digney-Peer *et al*, 2012:610). As such, complete reconstruction would entail the need to imagine what needs to be re-created. Such reconstructions become particularly unethical where losses are in critical areas of an image, such as a whole eye missing from a face or a whole head missing from a body, and the restorer invents an eye or head from their own imagination. Inpainting should not be regarded as a hypothetical process that promotes a semblance of completeness at the cost of authenticity. It should rather be seen as a way of re-establishing the visual exchange between the artist and the viewer that rests on the totality of the painting as it was originally intended by the artist. Inpainting should be limited to the area of loss and should not cover original paint. When inpainting is done correctly it leads to a more authentic viewer experience (Albertson & Murray, 2011:80). Another way of dealing with the reintegration of large areas of loss is for the conservator to create an imitative reconstruction by consulting and comparing similar works of the same artist that are in a good condition or historical photographs of the work. This method is based on art historical awareness and may only be carried out once all stakeholders have been consulted. This solution is usually considered controversial and should only be employed in response to an extreme situation where other options are unfeasible. If the painting is to be publicly exhibited, wall text should

accompany it to inform the viewer of its compromised condition (Albertson & Murray, 2011:85).

Although areas of paint loss in *Cattle Grazing near Pretoria Zoo* extend to large areas, these areas do not show the absence of crucial details and it always remains clear where certain elements are positioned in the pictorial plane such as where the sky is, where the mountain begins and ends, where the trees and bushes are situated and where the grass covers the composition. Van Wouw's painting technique also does not incorporate minute details but rather relies on broad and gestural brushstrokes to convey pictorial information. Keeping these factors in mind, it would be possible to re-integrate the losses in this painting completely without having to resort to a hypothetical approach.

Ultimately, the imitative or invisible inpainting to reintegrate the painting's material loss would effectively appear to erase its history of being stored in Cellier's attic. A history that is intrinsically connected to the painting and valued by its custodian. Such a treatment would not achieve the painting's ideal state.

Another approach to reduce the distracting nature of the lacunae on the pictorial plane of a painting is to use a type of discernible or visible inpainting, also referred to as differentiated or evidenced inpainting (Albertson & Murray, 2011:85). A lacuna, a gap that is caused by material or paint loss, is an interruption of the figurative pattern of the pictorial plane in the sense that its shape and colour disturb the legible unity of the painted image. A lacuna grabs the viewer's attention so that its pattern becomes foregrounded which pushes the rest of the painting back to the status of a background. The lacunae therefore detract the painted image's position as the main subject and replaces it to become the focal point (Brandi, [1963] 1996:341). Visible inpainting approaches are used to lessen the prominence of the lacunae by pushing them back to place the focal point on the painted image. In the case of *Cattle Grazing near Pretoria Zoo*, the white infilled lacunae are more visually distracting than the areas of exposed canvas. Since the oxidised canvas appears in variations of neutral brown, it recedes and the eye blends it into the painted image, especially in the bottom half of the picture plane where the artist used variations of greens and earthy browns as seen in figure 3 taken before the painting's treatment in 2016. Comparing the appearance of the painting

before and after its 2016 treatment, it is clear that the white infills appear very jarring and give the painting an unresolved appearance.

A remedy to the disturbing effects of unattractive white fills can be a type of visible retouching in which areas of loss are toned with a neutral colour to push the prominence of the distracting infilled lacunae into the background. This neutral toning often consists of a single neutral colour (such as a grey or brown) that is applied to subdue areas of damage and can be rendered as a specific hue or as a modulated tone to avoid the appearance of an unnaturally flat field (Nadolny, 2012:581). In the case of this particular painting, a single neutral grey tone may not suffice as it may not blend in with the surrounding variations of the brownish colour of the exposed oxidised canvas. The better approach may be to apply modulated tones that match the colour variations of the discoloured exposed canvas to the white infills with the aim of masking them. This neutral inpainting approach allows the conservator to present the work respectfully while at the same time acknowledging its fragmentary condition (Albertson & Murray, 2011:86).

After considering the possible avenues of treatment along with the implications of their outcomes, I now provide the treatment strategy that would best serve the painting's intended function.

5.4 Treatment proposal

Before any form of treatment can be carried out on the object in question, it is firstly necessary to report the findings from its examination as well as recommendations for its treatment to its owner or custodian. Since the findings and observations from its examination have already been discussed, this section focusses on the reasons and aims for the painting's treatment, an evaluation of the resources that will be used during treatment, alternative approaches if viable, as well as the potential risks that may be involved in the treatment process. A treatment proposal is an obligatory pre-treatment process to acquire the necessary permission from the custodian or owner to proceed with the treatment (CAC & CAPC, 2000:6), and manage expectations.

The first step in the painting's treatment will entail the consolidation of the loose canvas thread in the central fold of the picture plane (see figure 28 A). This is necessary because there may be a risk of dislocating this loose thread during the dry-cleaning process that follows. It is proposed to use Lascaux 4176 Medium for Consolidation as

the consolidant since this acrylic dispersion resin has a very low viscosity when used undiluted with excellent penetration capabilities and adhesive strength (Marriott, 2010:34). Lascaux 4176 Medium for Consolidation can be diluted with water to lower its viscosity to increase its penetrating quality (Marriott, 2010:34), however the use of water on the exposed canvas of this painting is not advised since the canvas will expand upon wetting and shrink upon drying which will cause deformations. The consolidant (undiluted) will be applied to the canvas thread using a fine small round tip brush (R0 or R1 will suffice) after the thread has been positioned into place using forceps. Excess consolidant can be reduced by gently rolling a cotton swab over the consolidated area. The use of Lascaux 4176 Medium for Consolidation is suitable for the consolidation of the loose canvas thread because there is no wax in this area that may prevent adhesion, the consolidant has good stability upon aging, does not yellow and remains readily soluble with aromatic hydrocarbons, esters and ketones and can thus be removed in the future if needed (Marriott, 2010:34).

After the consolidated area has thoroughly dried, the painting's accumulated surface dirt will be removed. The surface dirt on the painting is in the form of foreign matter and comprises of dust and dirt particles in its impasto crevices (see figure 42) and the several spots of insect excrement (see figures 41 and 43). It will first be attempted to remove the surface dirt using dry cleaning methods. Soft long-haired brushes (such as a Japanese Hake brush) can be used to remove loose dirt from the surface of the painting. This is usually done in conjunction with a microfibre cloth used to deposit any dirt picked up from the brush and avoid redeposition of loose dirt on the painting's surface. The dirt that is found imbedded in the impasto crevices may be challenging to remove following this method. Hand rolled cotton swabs with a pointed tip may be used to try remove the dirt in these areas. Soft make-up sponges may also work to remove the dirt in the impasto crevices since they are soft and flexible making them especially suitable for precise cleaning and surfaces that are sensitive to pressure (Van den Burg & Seymour, 2022:22). Most of these sponges are made of isoprene rubber, styrene butadiene rubber or mixtures of both and can be sourced at most local pharmacies. Some contain added cleaning solutions that may leave residues on the painting's surface, therefore these sponges should be soaked in demineralised water to remove any additives and then dried prior to using them for dry cleaning (Van den Burg & Seymour, 2022:22).

Adhered dirt (such as the insect specks) may not respond to these dry-cleaning methods and so small tests can be done with a moist (not wet) cotton swab with demineralised water, avoiding any exposed canvas. Saliva (natural or synthetic) can also be tested if the demineralised water proves ineffective. Saliva consists of about 98% water and several other substances including electrolytes, antibacterial compounds and various enzymes. The main enzyme in also the most common enzyme used in conservation which is α-amylase. In addition, saliva contains many important ions such as calcium, phosphate and fluoride, which all help with the ionic exchange with particulate dirt on the surface and dirt 'pick up' (Van den Burg & Seymour, 2022:40). After cleaning with saliva, the saliva residue must be cleared with demineralised water and using a soft tissue to dry the surface afterwards to ensure that water exposure is as limited as possible.

The remnants of the already reduced varnish (see figure 40) should not be removed since it does not disturb the legibility of the painting. It also shows one of the component parts of an oil painting which adds to the painting's intended educational function. Although barely noticeable at first sight due to its reduction, the discolouration of the painting's original varnish can be viewed as its patina. Since the painting is valued for its history and forms part of the oldest Western oil paintings in Pretoria, the patina of the discoloured varnish can be regarded as the testament of time and should be respected. Once the surface dirt on the painting is removed, the treatment can proceed to the areas of loss and resolving aesthetic concerns.

As previously mentioned, the painting carries the hallmarks of improper storage conditions, with major horizontal and vertical fold lines exhibiting extensive paint and ground loss, tiny but widespread pinprick losses as well areas of paint showing past evidence of lifting, tenting and cupping brought about by cohesive failure between the paint layers and the ground. Despite these areas of damage, the painting is currently in a stable condition due to extensive consolidation treatments that included marouflaging and wax consolidation in 1975, and then further consolidation with Lascaux 4176 Medium for Consolidation in 2016. The painting is therefore structurally sound and does not require any further intervention for its stability. There are, however aesthetic concerns that needs to be addressed and resolved.

The painting's visible signs of damage affirm the painting's interesting provenance, bear testimony to its history and are valued by its custodian as a result. The disfiguring elements form the painting's past treatments also carry educational value that is important for its intended function. The white fills, however detract from the painting's already little aesthetic value which makes it unable to be displayed to serve its intended function. The wishes of the custodian require that the distracting nature of these infills be reduced.

Although infills can usually be reduced with mechanical action and through the use of solvents, it is very difficult to completely remove a previous filling, especially from canvas due to the fibrous structure of the material which can mechanically lock in particles and more problematically, absorb liquids. Polar solvents (like water and ethanol) cause swelling of the canvas fibres and can dissolve the coloured degradation products of the canvas, leading to deformation, discolouration and further degradation (Böhme *et al*, 2020:1). Mechanical removal entails the use of a scalpel to scrape the fill material down to powder form which can then be removed with a vacuum cleaner. Mechanical removal should be limited and done very gently due to the risks of scraping and cutting through the surrounding and underlying original material such as the paint layers, ground and canvas support which will result in unwanted irreparable damage. Solubility tests, using cotton swabs, carried out on a small area of the filler indicated that water and ethanol (polar solvents) were very effective at reducing the white fills on *Cattle Grazing near Pretoria Zoo*.

The reduction of the infills is however unsuitable for this painting. Firstly, because the fills carry the same educational value as the other treatment additions and nothing can justify their removal to be prioritised over the other past treatment residues such as the adhesives and wax. Secondly the reduction process would be highly invasive and not adhere to the standards of minimal intervention, as well as risking damage to original material. Thirdly, the fills also help to stabilise the painting's structure by protecting the exposed canvas from fluctuations in temperature and RH as well as dirt build up. The most suitable remedy to the distracting nature of the white infills would then be to mask them through neutral retouching that matches the colour of the oxidised canvas.

Conservators in museums overwhelmingly use synthetic resins with pigments for retouching. Such synthetic resins include Paraloid ® B-72 (Lowry, 2010:87), Laropal

A 81, Regalrez® 1094, MS2A, Mowilith 20 (Koneczny, 2010:67) and Aquazol® (Ubaldi *et al*, 2017:67). Other commercially available retouching paints that are formulated for conservation use include Gamblin Conservation Colors (finely milled pigment bound in Laropal A 81) (Dunkerton, 2010: 94) and QoR watercolours (pigment bound in Aquazol®) (Ubaldi *et al*, 2017:68).

Due to availability factors the use of QoR watercolours is proposed for the use of the neutral inpainting. These watercolours are manufactured by Golden Artist Colors and are currently the only commercially produced watercolours that have Aquazol® as their binding medium instead of plant-based gums (Ubaldi *et al*, 2017:68). Aquazol® is a synthetic polymer composed of poly(2-ethyl-2-oxazoline) with good physical-chemical properties, it is soluble in a variety of organic polar solvents and has a relatively low toxicity. These qualities make it a versatile medium for its use as a consolidant, adhesive and especially as a binder for retouching colours (Ubaldi *et al*, 2017:67). When applied thinly as a binding medium for retouching colours, Aquazol® has an opaque matte appearance whereas applied thicker it has a glossy sheen similar to the consistency of oil paint. Aquazol® can be dissolved in water, alcohol or acetone or in mixtures of water and alcohol or water and acetone for retouching (Arslanoglu, 2004:13).

It is proposed to use QoR (mainly earth pigments to match the discoloured brown canvas) with ethanol to thin the paint out for a matte finish to resemble the appearance of the exposed canvas. Ethanol as thinning medium is preferred over water since it evaporates at a much quicker rate than water and therefore minimising any risk of introducing prolonged contact of moisture with the exposed canvas which may otherwise cause it to deform.

If matching the colour and texture of the exposed canvas with the QoR watercolours becomes very challenging, another more experimental approach to neutral inpainting can be tested. This approach entails the use of toasted cellulose powder that can be used as a pigment to match the colour of the oxidised canvas more accurately and easily. Although this technique is not common for the use in the retouching losses on easel paintings, it has been used with great success by conservators to retouch stains and blemishes on canvas (Digney-Peer *et al*, 2012:626). The reasoning behind this method is that the toasted cellulose will effectively mimic the colour and tone of oxidised

canvas since the canvas primarily consists of cellulose. The toasting of the cellulose powder simulates the oxidation process whereby the heat that is introduced to the cellulose powder catalyses the oxidation reaction. This oxidised cellulose powder is then mixed into a solution of Aquazol® in ethanol that acts as a binding agent to adhere it to the white fills to obscure their distracting appearance.

This method was tested using plain cellulose powder, enveloping it in tin foil and heating it on an induction stove at around 180ºC at time intervals ranging from 5 to 20 minutes (see figure 73). The various toned cellulose powders (according to how long they have been toasted) were mixed with a solution of 10% Aquazol® 200[40] in ethanol and applied to a white-primed canvas board. Aquazol® 200 is commonly used as binding medium for retouching pigments at a concentration of 10% in a polar solvent (Arslanoglu, 2004:13). As shown by figure 73 the plain cellulose powder basically appears the same white as the primed canvas board but darkens the longer it is toasted.

This tonal variety of the browns obtained in the toasted cellulose (shown in figure 73) can be used to exactly match the surrounding oxidised canvas, both in colour and texture, on the distracting white infills. The Aquazol® that is used as the binding agent for both QoR colours and the toasted cellulose powder will be well suited since it has a matte appearance when applied thinly, it does not support mould growth (Arslanoglu, 2004:14) and can be easily removed with ethanol or acetone. It will also be detectable under UV examination which will show as dark spots.

[40] Aquazol® comes in molecular weights of 50, 200 and 500. The molecular weight used depends on the nature of treatment. Aquazol® 500 forms the strongest bond whereas Aquazol® 50 has the best penetrating capacity. Aquazol® 200 is in between Aquazol® 500 and Aquazol® 50, having better penetration than Aquazol® 500 while also having a greater bonding strength than Aquazol® 50 (Arslanoglu, 2004:10).

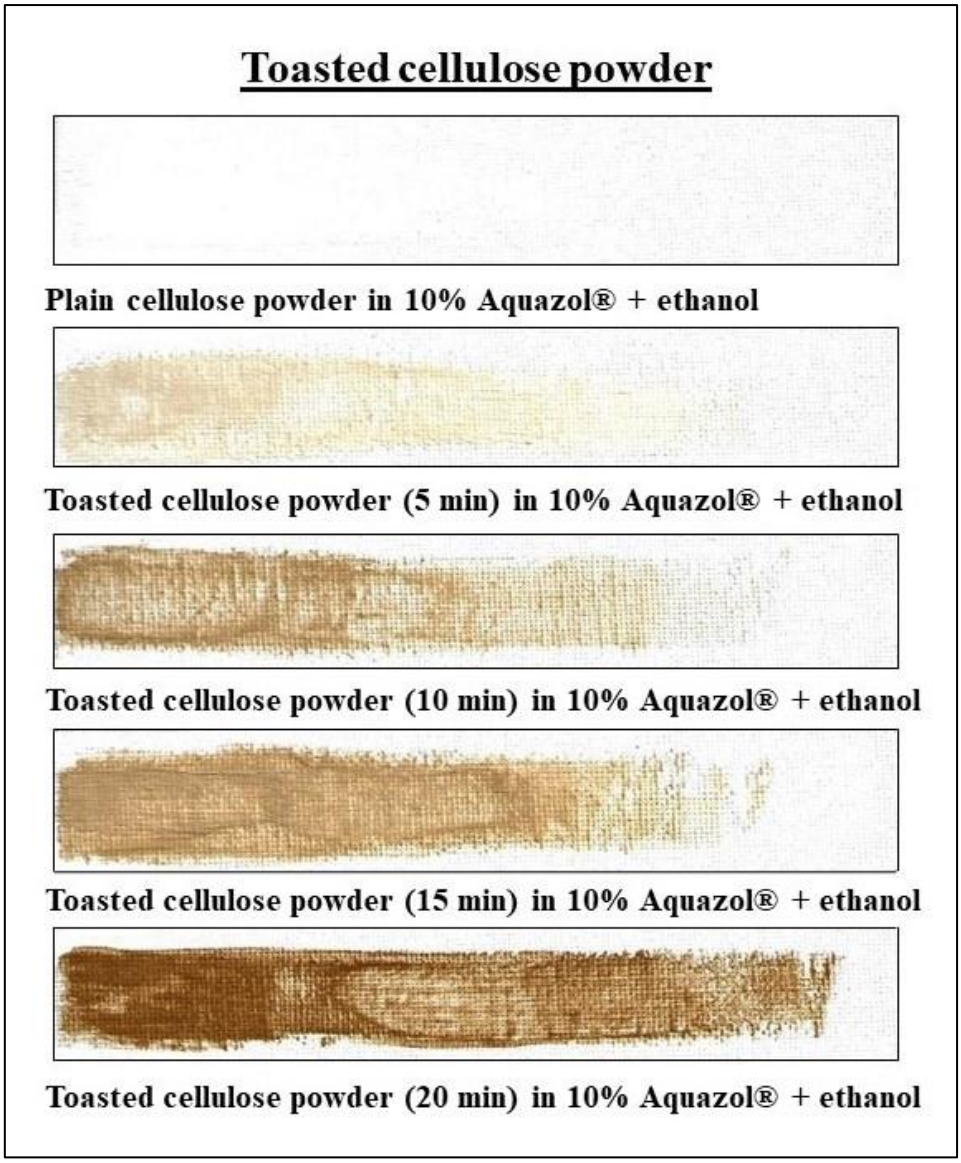


Figure 73: Diagram showing the variations in tone and colour of cellulose powder toasted at different time intervals. Created by JA Elsenbroek.

A drawback of using Aquazol® as a binding medium that needs to be considered is its reactivity to high levels of RH in which it may form a gel and thereby loses its bonding strength (Arslanoglu, 2004:14). This however only happens at very high levels of RH and may not be of any risk to the painting due to the climate of where the painting will be displayed.

The painting will be displayed in the foyer of the Van Wouw House which is essentially a corridor that leads into rooms on either west and east sides, the north side of the room is the entrance to the house and has a door that wis usually open which leads outdoors and is situated about 2.5 meters from the painting's intended display location to the

right. To the south there is a door (usually closed) that will be right next to the painting to the left, leading to a roofed veranda. The Van Wouw House does not have climate control systems that maintain constant temperature or RH levels; however, Pretoria's average annual RH is around 51%, reaching its highest average monthly RH of 62% during January and its lowest average monthly RH of 35% in September (Weather Atlas, 2022). This climate more or less corresponds with the recommended RH of 50% (+/- 5%) for the long-term preservation of artworks (Byrne, 1995:108) and will not threaten the adhesion properties of the Aquazol® nor will it cause the exposed canvas to deform.

It will not be necessary to apply a coat of final varnish to the painting after the fills have been retouched since the painting's intended display environment will not be exposing it to climatic extremes. Varnishing the painting may also alter the appearance of the old restorations to some extent which may decrease some of the painting's educational value. This varnishing treatment also does not contribute to the historic value of the damage the painting accrued when it was in Celliers's possession. Moreover, the introduction of new varnish to the painting may not align with the guidelines of minimal intervention since it is not a necessity. The application of new varnish will also affect later treatments in that the removal of this varnish in the future may also remove the wax consolidation residues and the painting's original varnish, both contributing to the painting's educational value.

In accord with the painting's current values, this treatment proposal adheres to the intended function of the painting which is to be displayed in the foyer of the Van Wouw house to keep the history of the house alive as well as to act as a teaching example for conservation students. The previous signs of restoration on the painting imbues it with educational value whereas the visible damage on the painting has historical value. Both of these values are retained by not filling more areas of loss nor removing old restorations, and not hiding the history value through invisible retouching, but retain it by neutral retouching that matches the colour of the canvas. Moreover, all materials used in the neutral inpainting are archival, detectable, compatible with the painting's original material and can be easily removed. This treatment therefore respects the authenticity of the painting and adheres to the requirements for minimal intervention by not removing any material nor adding unnecessary material.

CHAPTER 6
CONCLUSION

The research set out to devise a feasible treatment strategy for Anton van Wouw's *Cattle Grazing near Pretoria Zoo* – a damaged oil on canvas landscape painting that had already been treated in the past. These treatments include marouflage to a rigid board, consolidation with wax and partial infilling of losses. As an emerging conservator, treatment decision-making is a daunting task, made all the more complex when faced with a previously treated work of art. Barbara Appelbaum's (2010) treatment methodology suggests following a methodical approach in eight steps which can facilitate conservation decision-making and was tested on the present case study. By applying this methodology have found that this strategy helped a great deal in formulating a suitable treatment strategy for the painting. It helped to compartmentalise various aspects about the case study to attain a sense of clarity in recognising what course of action to follow.

The first step of the treatment strategy entailed positioning the painting within its art-historical context which began by discussing its creator Anton van Wouw. Van Wouw, who came from humble means, embarked on his life's mission of becoming an artist from a young age in the Netherlands, the country of his birth. He emigrated to South Africa with the hopes of making artistic contributions to a newly formed country, however his hopes were initially met with disappointment. By persistently advertising his skills and meeting influential people, he eventually rose to fame by taking on and completing several state-funded monumental commissions. He fulfilled his dream by becoming, what many art historians consider, South Africa's father of Eurocentric sculpture. As such, not much has been written on the artist's paintings. This research emphasises that van Wouw was not only a sculptor but also a painter in his own right who influenced one of South Africa's most celebrated landscape painters - J H Pierneef.

This research has shown that van Wouw's painting oeuvre, mainly consisting of landscapes, is grounded in the Realist and Impressionist art conventions and while the artist knew about the latest art trends of his time, his artistic preference remained traditional throughout his life. *Cattle Grazing near Pretoria Zoo* is such a landscape.

The investigative and analytical techniques conducted on the painting revealed that van Wouw made use of the painting materials and pigments that were common for painters to use in the 19th century and also revealed much about van Wouw's painting technique. Such an inquiry is significant since van Wouw's use of pigments or painting materials have never before been studied or recorded. It may be suggested to conduct further analyses on van Wouw's other paintings with the future aim of compiling a reference library on the materiality of his painting oeuvre.

The examinations on *Cattle Grazing near Pretoria Zoo* also revealed the painting's past storage conditions in the attic of Jan F E Celliers – van Wouw's brother-in-law to whom the artist gifted the painting – as well as the past treatments the painting had undergone after its donation to the University of Pretoria's Art Collection. As a result of these treatments the painting is currently in an unexhibitable state which prevents it from serving its intended function. In order to be displayed, it requires a form of treatment that aligns with the values it holds for its custodian. Consultation with the painting's custodian foregrounded the historic and educational values of the painting, while its aesthetic is diminished in its current state. Therefore, a treatment strategy that reconciles the historic with the aesthetic had to be formulated whilst adhering to contemporary conservation ethics.

These ethical principles require that the authenticity of the artwork be respected, that interventions be kept to a minimum, that the applied treatment will be detectable and not close the door to subsequent treatments. In alignment with these guiding principles and the values of the painting, a suitable treatment has been proposed. This treatment is geared towards the painting's intended function – to have it displayed in the Van Wouw house to uphold the history of the house and to be used as a teaching example for conservation students.

The treatment proposed that signs of the painting's previous restoration be retained for its educational potential and that the visible damage be kept to keep the painting's history and provenance alive. The painting's educational value is maintained by not adding more fills to lost areas nor removing past restorations or signs of treatment; the historical value is retained by masking the existing fills through neutral retouching that mimics the colour of the exposed canvas instead of invisible retouching. The materials used in the neutral retouching are conservation grade and will not discolour upon

ageing, they remain detectable and they can be removed with ease without affecting re-treatments in the future. The painting's authenticity is respected as the treatment is confined to what is necessary by not applying any more materials than what is needed to ensure that *Cattle Grazing near Pretoria Zoo*, and its associated values, may continue into the future.

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APPENDICES

APPENDIX A: UP MUSEUMS INTERNAL LOAN FORM

UNIVERSITY OF PRETORIA MUSEUMS INTERNAL LOAN FORM

Item ID	
Tag nos. / Acc. nos.	300656
Type of item	Van Wouw,A – Grazing Cattle
Lender Detail	
Name & Surname	I McGinn
Personnel No.	02615584
Email address	
Telephone No.	
Responsible OU	E05605
Department	THC
Location	
Campus	Van Wouw House
Building	Van Wouw
Office Number	1 Foyer

This painting was donated by Ms Mimmie Stegmann (Wife to medical dr G Stegmann) originally belonged to her father Jan FE Celliers, gifted to Celliers by Van Wouw. Celliers was Van Wouw's brother in Law. In the original minutes of the Art Committee Prof Schoonraad claims that there is only a small amount of restoration to be done. According to the newspaper Oggendblad 04/06/1975 the painting was found in the Attic of Celliers' House.

SPECIAL TERMS OF AGREEMENT:
Tangible Heritage Conservation is allowed to use the artwork as a class example; Do tests; Annalise; Research and publish on the painting. Copies of all reports, photographs and research data will be lodged with the responsible curator as part of the collection records.

GENERAL TERMS AND CONDITIONS:

1.1 The item should be returned to the UP Museums if it is no longer used or required and may not be stored in the Department;

1.2 The item may not be transferred to another person, office or location without consent by the Curator. The custodian is responsible for the transfer on the asset management system;

1.3 If the item is accidently damaged, misplaced, lost, moved or exhibits signs of deterioration, breakage or frame failure, the Curator should be informed immediately;

1.4 The item may not be altered, changed or reframed without consultation with the responsible curator and remains the permanent property of the University of Pretoria Museum's art collection;

1.5 The custodian that loans the item(s) bears all responsibility and costs for its adequate hanging, safety, security, care and handling while on temporary loan;

1.6 Proof and date the item was returned to the UP Museums should be retained for control purposes.

Lender Signature: .....
Date: 14 March 2022.....

OFFICE USE:

.....
Designated Signatory: University of Pretoria
Curator UP Museum Collections

...14 March 2022.....
Date Removed

Approved [X] Condition check [X]

.....
Date Returned

UPM-IL2020

APPENDIX B: SIGNED LETTER OF PERMISSION

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

School of the Arts
Tangible Heritage Conservation

12 May 2022

Permission request to photograph and conduct materials analysis on your van Wouw painting(s)

Dear Sir/Madam

My name is Hannes Elsenbroek and I am currently in the process of writing a Masters mini dissertation for the requirements of the M(Soc)Sci Tangible Heritage Conservation at the University of Pretoria. The study is provisionally titled *An examination and discussion of the conservation decision-making process using Anton van Wouw's Cattle Grazing near Pretoria Zoo as case study.*

The research aims to develop a realistic and feasible conservation treatment proposal for a damaged landscape oil painting by Anton van Wouw, completed at around 1896. The research envisages conducting a thorough materials analysis of the painting, as knowledge about the painting's materiality and artist's use of material forms an integral part in the conservation decision-making process. The painting used for the case study belongs to the University of Pretoria (UP) Museums collection and is one of three paintings by van Wouw that the University of Pretoria owns.

In order to better understand the artist's style and materiality it is vital to access other paintings by van Wouw. Permission is thus requested to photograph your van Wouw painting(s) for stylistic and technical comparison and to conduct non-invasive and non-destructive analysis for materials identification, confirmation and or comparison. The analytical methods are of a nature that requires no sampling of any material on the painting(s) and include but are not limited to ultraviolet and infra-red photography, and portable x-ray fluorescence. The painting(s) will be handled with the greatest of care and analytical technique can be conducted in situ so that works do not have to be transported and so eliminating any risks of damage to the painting(s).

If you agree to grant permission to study your painting(s), the data collected will be used and your identity revealed in the study with your permission. The data will be used for art conservation and academic purposes and will be archived at UP School of the Arts for 15 years. Unfortunately, you will not receive any compensation for your participation and no benefits can be promised. However, the hope is that your participation will contribute to the knowledge base of artist's materials, specifically painting materials by van Wouw.

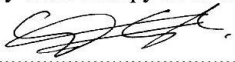
Any questions you may have about this study can be directed to Hannes Elsenbroek at 082 063 0294 or hanneselsenbroek@gmail.com, or the dissertation supervisor Isabelle McGinn at 083 953 0587 or isabelle.mcginn@up.ac.za.

Kind regards
Hannes Elsenbroek

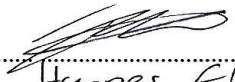
Research Consent Form

Participation in this study is strictly voluntary. If you agree to participate but later decide to change your mind, you may withdraw at any time. Withdrawal from this study has no consequences or penalties.

Statement of voluntary consent:
When signing this form, I am agreeing to voluntarily participate in this study. I have had a chance to read this consent form, and it was explained to me in a language which I understand. I have had the opportunity to ask questions and have received satisfactory answers. I understand that I can withdraw at any time. A copy of this Letter of Permission has been given to me.

Signature: 
Print name: PIRK OEGEMA
Capacity: FUNCTIONAL HEAD
Permission to reveal my identity in the study: Yes..✓.. / No.....
Date: 30 JUNE 2022
Place: PRETORIA

By signing below, I indicate that the participant has read and, to the best of my knowledge, understands the details contained in this document and has been given a copy.

Signature: 
Print name: Hannes Elsenbroek
Date: 30/06/2022
Place: Pretoria Art Museum