

**Waste as a resource:**  
**An exploration of sustainable processes in the**  
**Ceramics Studios of UKZN through the practice and**  
**creative production of Natasha Jane Hawley**

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EXAMINER'S COPY

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Dissertation submitted in partial fulfilment of the requirements for the degree of  
Master of Art in Fine Art, Centre for Visual Art,  
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## DECLARATION

Submitted in fulfilment / partial fulfilment of the requirements for the degree of  
~~.Masters of Fine Arts...~~, in the Graduate Programme in ~~.School of Arts, Humanities~~  
 University of KwaZulu-Natal, Pietermaritzburg, South Africa.

I, ~~.Natasha Jane Hawley.....~~, declare that

1. The research reported in this thesis, except where otherwise indicated, is my original research.
2. This thesis has not been submitted for any degree or examination at any other university.
3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.
4. This thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:
  - a. Their words have been re-written but the general information attributed to them has been referenced
  - b. Where their exact words have been used, then their writing has been placed in italics and inside quotation marks, and referenced.
5. This thesis does not contain text, graphics or tables copied and pasted from the Internet, unless specifically acknowledged, and the source being detailed in the thesis and in the References sections.

Natasha Hawley  
Student Name

20 August 2018  
Date

Mrs Michelle Rall  
Name of Supervisor

  
Signature

## **Acknowledgement and thanks**

My heartfelt gratitude goes to my supervisor Michelle Rall, for her patience and kindness and for guiding me through the writing and practice of this research.

I hereby acknowledge the financial assistance of the Centre for Visual Arts at the University of KwaZulu-Natal, through the support of the Rita Strong Scholarship towards this Masters degree and associated research. I confirm that the opinions expressed, content and conclusions determined are my personal submissions as those of the artist/author and are not necessarily to be attributed to the Centre for Visual Arts and/or the University of KwaZulu-Natal.

My eternal appreciation goes to my family and their whole-hearted support at every step of this Masters research degree and my pursuit of an artistic career as a whole.

Special thanks to Shaun Money for his unwavering ability to support, understand and encourage me during the undertaking of this research.

My special gratitude goes to my friends, inside and outside the Centre for Visual Arts, for offering their knowledge, humour and support whenever I needed it. I am grateful for the continued inspiration and open-mindedness, for sharing of ideas and opportunities, and for their on-going encouragement.



## **Abstract**

The following study is a practice-based research project that incorporates theoretical and practical components in order to identify more sustainable systems in the Ceramics Studio of the CVA and to understand the relationship between, process, media and concept in the creative practice of the researcher, Natasha Hawley. The studio based practice focuses on a Zero Waste philosophy, altering existing studio practice and integrating waste as a medium. The main concepts of practice include experimentation, sustainable practice, waste as an aesthetic medium, visual art materiality theory and cultural materiality theory.

The theoretical framework integrates sustainability and materiality. An in-depth examination of the effects of waste on the environment supports the context and relevance of a sustainable approach on which this study is based. An interrogation of materiality theory pertaining to the visual arts and social systems provides insight into the embodied meaning of the vessel in my work. This exploration is reinforced by the studio practice, which reflects on the physical qualities and processes of the media.

The style of writing pertaining to creative practice in this research has been based on the reflection, reflexive style as prescribed by the practice-based research approach. This discussion focuses on the physical and historical materiality of my key media and the vessel form, and the contribution of process to embodied meaning. Images and journal references are accompanied by in-depth descriptions of the media and process in order to establish their fundamental connectedness. Additionally the modes of display and contribution by peer-review in the set up of the final exhibition illustrate the importance of appropriate display tactics.

## **Key Words**

Waste, resource, discarded materials, Ceramics Studio, the vessel, clay, ceramic, change, practice, process, sustainability, Zero Waste, materiality, embodied meaning, experimentation, exploration, practice-based research, exhibition

## Prefatory Note

The following procedures have been adopted

1. In this research the creative practice of the researcher, Natasha Hawley, is the focus of this discussion. As a result the first person is used when referring to my own work and concepts, and when incorporating my own experiential knowledge into discussions.
2. The Harvard short form of referencing and citations is used in this text. A list of references cited in the text appears at the end of the dissertation.
3. This dissertation consists of five chapters with subsections, in which text and thumbnail images are combined.
4. I, Natasha Hawley, take all photographs of my work; for all other photographs the photographer is credited in the caption, except in the cases of where the photographer is not cited and/or unknown by the original source.
5. Dimensions of complete works are included in the captions of the images as they appear in text. Measurements are given in centimetres in the order of height x Width.
6. In-text images are labeled as 'Figure' while images that appear in Appendix 1 are labeled as 'Illustration'. Figures and Illustrations are numbered consecutively. A List of Figures and List of Illustrations are supplied after the Table of Contents.
7. When referring to the Ceramics Studios, part of the Centre for Visual Arts of the University of KwaZulu-Natal: Pietermaritzburg campus, I have used uppercase 'Ceramics Studio' to distinguish between the various studios mentioned in text.
8. During the reflective process of writing, my own journals were referenced as primary sources. Pages from these journals are included as primary sources in the

List of References at the end of the dissertation. They are un-paginated and therefore not cited in-text. These were included in the final exhibition of works for examination.

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## Glossary

**Bisque:** pottery, which has been fired once, without glaze to a temperature just before vitrification (980° Celsius)

**Earthenware:** ceramic ware fired between 1000° Celsius to 1154° Celsius

**Flux:** a melting agent causing silica to change into a glaze

**Glaze:** an impervious silicate coating

**Greenware:** unfired clay

**Kiln:** a furnace for firing pottery or melting glass

**Leatherhard:** the stage between plastic and bone-dry

**Mullite:** forms crystals in firing that strengthen the clay body

**Prozzolan:** a broad class of siliceous and aluminous material

**Stoneware:** ceramic ware fired between 1200° Celsius and 1326° Celsius

## **List of Abbreviations**

**ANC-** African National Congress

**CSAC-** Central School of Arts and Crafts

**CVA-** Centre for the Visual Arts

**DEA-** Department of environmental affairs

**EPA-** Environmental Protection Agency

**GHG-** Greenhouse Gases

**PBR-**Practice based research

**PMB-** Pietermaritzburg

**UKZN-** University of KwaZulu-Natal

**ZWP-** Zero Waste Philosophy

## Chapter One

Chapter one is intended to contextualise the personal foundations of my chosen topic as well as detail the theoretical basis from which I will conduct this research.

### Background

This research has developed out of my own creative practice and life experiences. The following section I will briefly explain what led me to research sustainable and environmentally friendly studio practice from the perspective of a practitioner.

When first introduced to ceramics while studying towards a degree in Fine Arts, I was instantly drawn to the elemental and tactile nature of clay and the endless possibilities it had to offer. Taylor (2017: 512) likens the nature of ceramics to a bridge between art, alchemy and science and the idea resonates with me. Lined up along the walls of the glaze room are bottles of foreign and exotic powders inviting experimentation, the process requiring testing and chemical metamorphosis under extreme heat with the promise of discovery at every new combination. The qualities of clay and the processes of experimentation and investigation form the basis of this research.

During Honours (2014) I embraced the alchemical nature of glaze chemistry and focused on crystalline glazes; performing controlled experiments and adjustments accompanied by rigorous documentation. Growing crystals in the glaze matrix requires twelve hours of continuous controlled heat work in an electric kiln (Figure 1), a frustrating challenge when our country was experiencing nationwide blackouts implemented by Eskom (Smith 2014). Having to re-fire kilns as a consequence of these outages made me extremely conscious of the amount of energy I was drawing to create artworks.



In 2015 our family suffered the loss of two grandparents. Having to sort through and



**Figure 1**, Hawley, N.  
2015. Detail of crystalline  
glaze, ceramic fired to  
stoneware. Photo: Natasha  
Hawley.

discard a considerable amount of objects from the accumulated physical matter of a person's life had a great impact on me. It is a simultaneously painful and joyful experience to share memories and then have to throw away items that have no value other than sentimental attachment. It caused me to question the value we ascribe to objects; why something as simple as a piece of paper could be cherished in one setting yet discarded in another. Through this situation I became

aware of the potent nature of sentimental value and became interested in how and why materials can affect us in such a profound manner.

Following these events I began constructing vessels using casts of emotionally weighted objects; in hindsight I was trying to immortalise these items so that I could contentedly surrender them, these vessels became a way of paying my respects. The form referred indirectly to death through its urn-like qualities and as such, developed into a container of meaning. My creative practice became a process of letting go of material possessions and coming to terms with death. Consequently the vessel has taken on a significant role in my ceramic work.

Discarding such large quantities made me aware of the value we assign to material possessions in our society. As a result I became more conscious of the consequences of this phenomenon through the presence of waste in our day-to-day lives (Walsh, Formanek, Loo, & Phillips 2016). Subsequently I began to see waste everywhere, for instance: while scuba diving, I noticed its presence in the form of discarded plastic and glass bottles (National Geographic 2017), at the Ceramics Studio in the form of packaging waste and catchment sink sludge and in my hometown of Pietermaritzburg in particular, waste can be seen in nearly every street, overflowing from rubbish cans and accumulating in drains (Pillay 2016).

Being mindful of waste I began research into environmentally friendly practices and aligned myself with the concept of sustainability. When I embarked on a Masters research degree I initially intended to create a kiln fuelled by discarded material.



**Figure 2,** Hawley, N. 2016.  
Firing pallet kiln, Photo:  
Natasha Hawley.

In working towards this goal in 2016, I attended a workshop presented at our Ceramics studio by Midlands potter Lindsay Scott who has years of experience in building and firing kilns fuelled by sources alternative to electricity. Under Scott's guidance and together with my colleagues we built a kiln from clay, sand and sawdust and fuelled it using discarded packing pallets

(Figure 2). Through this experience I came to realise the latent potential of materials that are discarded everyday. Therefore after originally thinking my research would focus exclusively on firing I began an exploration into sustainability and the potential waste it had to offer.

It was at this point that I came across the Zero Waste Philosophy (ZWP), (the approach will be discussed fully in chapter two) (Liss 2016). It provided a step-by-step guide toward changing the way materials flow through our society in an effort to eliminate waste from production processes thus resulting in sustainable practice by placing less strain on the environment. Subsequently I adopted the ZWP (Liss 2016) whereby every by-product is redesigned to become a resource for future use. In the short time I have been studying these issues, they have become noticeably more prevalent in the media on a national and global scale: people are becoming more aware and receptive of the negative impacts of waste on our environment. I intend to build on this responsiveness and demonstrate the potential of waste in a ceramic setting.

The vessel is a form that resonates with me; it has developed into a container of meaning in my work. Thus I will use the form, its surface appearance and content in order to explore the potential of waste materials as an art medium, in an effort to prompt the viewer to re-examine their relationship with waste.

### **Introduction to study**

My practice-based (PBR) MARA-F will comprise interrelated thesis and creative practice in the investigation of more sustainable processes in a ceramic studio setting. In doing so the artworks produced will draw attention to the sociological and environmental implications of our relationship with waste. In approaching the subject

of sustainability, waste has become the fulcrum around which I base my practice; as such, I have adopted the Zero Waste philosophy. This approach seeks to eliminate waste from the making process by redesigning existing systems and reintroducing discarded materials as a resource, thereby reducing the strain on our environment. I will implement this proposed solution in my creative practice to assess its viability in a ceramics studio setting. As the focus of this Masters research is on sustainable ceramic processes and the message conveyed through the products of my creative practice, I intend to highlight the throwaway culture of our present-day society and the consequent impact on the environment through the materiality of the artworks created. In doing so I will also question the social value systems associated with waste.

This dissertation fulfils the written requirements of a PBR research (PBR) Masters in Fine Arts while the experimentation, creation and presentation of original artworks demonstrate the research outcomes (Candy & Edmonds 2010). The terms ‘practice-based’ and ‘practice-led’ are a point of contention. According to Coumans, *practice-led* research can be submitted independently of the creative outcomes whereas *practice-based* research relies on practice in order to fully comprehend the study (2003: 65- 66). Based on this interpretation I will refer to the approach and methodologies used in this research as ‘practice-based research’ (PBR).

The PBR approach acknowledges my creative practice as a valid investigative tool, integral to the understanding of the research (Gray & Malins 2004: 3). It is a methodology that moves from problem to solution using knowledge based on research and knowledge acquired through art making (Sullivan 2006: 19-35). The products that emerge from this research will be presented in the form of an exhibition and will be submitted alongside written research components.

A PBR approach to research will demonstrate the integrative nature of practice and research; as such these two components are interdependent and must be examined as a whole (Gray & Malins 2004). I intend to explore more sustainable ways of making within the functional learning environment of the Ceramic Studio, part of the Centre for Visual Arts (CVA) at the University of Kwa-Zulu Natal (UKZN). Through research into sustainable practice, I have adopted a Zero Waste Philosophy (ZWP), which offers a practical, theoretical and philosophical approach to waste (reducing

waste places less strain on our environment thus resulting in sustainable practice) (ZWIA n.d.). Using this philosophy I will assess current systems and processes in the Ceramics Studio to identify areas that produce waste. The principles of ZW: reduce, re-use, recycle, rethink and recover, will then be applied to my studio practice. In doing so my creative practice will be employed as key demonstrative tools of these changes to process and material additions. Form, surface appearance and waste generated in the making process of these vessels will be assessed in order to determine whether the solutions presented by the ZWP are viable in a Ceramic Studio setting. Through their materiality, the vessels created in this exploration are intended to draw attention to the detrimental effects waste has on our natural environment while simultaneously demonstrating its potential as a medium. The resulting vessels are valid research tools but also unique works of art in their own right.

## **Chapter Structure**

This dissertation is comprised of five chapters. The theoretical parameters of this research are laid out in the chapter one. I have briefly discussed my background and motivations for this study and have introduced the basic structure of a PBR Masters research degree. The following section will outline my aims and objectives in order to formulate a set of research questions. This will be succeeded by a detailed description of the PBR design and a heuristic approach to inquiry. In fitting with the qualitative and flexible nature of PBR, which allows for the use of various approaches to research, I have chosen an interpretive paradigm. Akin to heuristic inquiry, this paradigm recognises the unique and subjective nature of reality as interpreted through my worldview. Following this the methodology and methods of my research will be defined. A review of literature will highlight my key texts; in dealing with sustainability these are largely newspaper and Internet based in order to keep abreast of current information. Finally, I will briefly describe the theoretical framework of sustainability and materiality, which will be explored in depth in chapter two.

Chapter two is intended to provide a comprehensive discussion of the theoretical frameworks introduced in chapter one. The significance of sustainability and the Zero Waste theory in a material orientated society will be located through an investigation into waste and its impact on the environment. An examination of materiality theory in terms of visual art and culture will explore the key aspects of my creative practice:

clay, waste and the vessel. This will provide a basis from which to interpret the content of the artworks.

Chapter three aims to consider sustainable ceramic studio processes. A brief exploration of the development of British ceramics will locate the current systems in place at the Ceramic Studio and contextualise my role as a studio ceramist. The theoretical framework of sustainability and Zero Waste methodology introduced in chapter one is intended to firstly, inform the evaluation of existing Ceramic Studio processes, secondly enable me to identify unsustainable practices and finally form a basis from which to propose sustainable solutions.

In chapter four I will assess the viability of ZWP in the Ceramics Studio environment. In doing so I will draw upon a range of artists and related projects that are consciously striving to make their practice more ecologically friendly, in order to formulate solutions to the corresponding waste. I will then implement these changes in my creative practice and assess the outcomes in terms of their viability in the Ceramics Studio setting.

The vessels I make in my creative practice, which will be presented in as an exhibition of works that will accompany this dissertation, form the focus in chapter five. Effects of altered practice as demonstrated by the artworks will be discussed in terms of the theoretical frameworks discussed in chapter two. I will consult my reflective journal and photographs to discuss works in progress, process and completed pieces.

A conclusion discussing my findings will draw together the frameworks of sustainability and materiality, methodologies, contextual histories and my creative practice to revisit and address the research questions. Using a reflective discursive style the outcomes of this project are concluded as a whole. I will then contemplate further questions and possible directions this research could take.

## **Research Problem**

The fulcrum of this study is waste; how it is generated, how it can be reduced and how it conveys a message.

Waste, trash, junk, garbage or rubbish are all terms that refer to material that is unwanted and discarded (Full Cycle n.d.). As a current and internationally recognised term, I will refer to the discarded materials discussed in this research as ‘waste’ (ZWIA n.d). I have identified two categories where waste is generated. First, studio-generated waste: clay, glaze, water and catchment sink sludge. These are by-products of the making process and are determined by the projects given to learners; as such the materials are specific to our Ceramic Studio. The second category is comprised of more general student-generated waste: foil, glass, plastic, newspaper, metal, tea bags and filter coffee granules. I have included student waste, as students are an integral part of this learning environment.

In conducting preliminary research I have identified the ZWP as an approach to sustainable practice that resonated with me. Through this Masters research I will investigate the practicality and effectiveness of this philosophy in the studio context. A parallel aim of this study is to use the vessel to convey a message to the viewer. As the ZWP suggests, I will use waste as a resource by employing it as a medium in my creative practice for example, using polystyrene as an addition to the clay body. Clay and waste form my primary media and are combined within the vessel structure. Applying visual and cultural material theory will enable me to explore the reading of these pieces.

## **Aims and objectives**

I will establish PBR methodologies in order to effectively address and fully answer my research questions. As a researcher-practitioner (Gray & Malins 2004: 23), I aim to investigate more sustainable practices that eliminate or reduce the waste produced my making process. Toward this goal, I will employ the ZWP as a method that aims to redesign systems to prevent the generation of by-products and use these as a resource

(ZWIA n.d.). For example, polystyrene waste is used as a resource when utilised as an art medium. Applying the PBR methodology of action-reflection, my practice will act as a demonstrative tool of these changes to process and enable me to assess the outcomes. The resulting artworks are intended to illustrate the impact of waste and question the viewer's perception of this material (Gray & Malins 2004: 74).

The methods offered by the ZWP in combination with the methods of action-reflection presented by PBR will be tailored to address the research questions.

Furthermore these will assist in the integration of practical and written components as required by the PBR approach (Gray & Malins 2004: 74). Employing these within an academic context will generate knowledge that is rigorous and transparent (Sullivan 2010, Gray and Malins 2004 & Candy 2010).

Next, it is important that the research is relevant and as such it will be situated within a greater historical background. The context I inhabit is one of a studio ceramist living in a time when the wellbeing of our natural environment is at the forefront of humankind's collective future. Thus I will briefly investigate the significance of sustainability in the 21<sup>st</sup> century by tracing its fairly recent origins (Brundtland report 1987). Following this I will explore the relevance of the Zero Waste approach by illustrating the detrimental affects of waste on the environment (ZWIA n.d.).

I intend to understand the connection between the materials I have used and the meaning embodied in the artworks I have created (Sofaer 2007). As such I have explored the theory of materiality pertaining to the key aspects of my practice: waste, clay and the vessel.

The following chapter will contain a brief exploration of relevant international and national ceramic histories in order to locate my role as a studio ceramist working within the CVA Ceramics Studio. In researching sustainable Ceramics Studio practices I have identified other artists and projects working toward economic and environmentally friendly ways of making (Harrison 2013). These will illustrate the current sustainable trend in ceramics and provide dynamic solutions toward Zero Waste studio processes.

I have chosen to investigate the ZWP as a means of achieving more sustainable practice. Thus my practical research will be made up of my creative production

centred on the fulcrum of waste. The resulting artworks will be presented as an exhibition as a partial requirement of a PBR Masters research degree.

The ZWP encourages the reintroduction of waste as a resource; therefore I will integrate various discarded materials into my creative practice. For example, merging clay and glaze waste into the vessel format. The creative products act as investigative tools to assess whether the philosophy is viable in the Ceramics Studio setting. Changes I make will be evaluated according to form, surface appearance and content.

The waste I have observed in studio, around my hometown and in the natural environment through scuba diving, has inspired me to tackle this issue in my practice. I intend to make aesthetically pleasing vessels that challenge the viewer's perspective of waste while simultaneously drawing attention to the detrimental effects of waste on our environment. Therefore a key element of this research is embodied meaning. Both the processes and matter I have used affect the reading of this message (du Preez 2008: 33). As such the Zero Waste alterations to my practice and my use of waste and clay within the vessel form, all contribute to meaning embodied in the artwork. In order to understand this meaning I will explore the concept of materiality pertaining to visual art and cultural theory, applying it to process, clay, waste and the vessel form.

The display of these artworks is intended to contribute further meaning. Therefore I will briefly investigate concepts of the exhibition as a model for artefact display and the exhibition as an environment (Pekarik 2002) The exhibition will act as a creative synthesis of conceptual and theoretical components, substantiated by documented records of the thought process (Moustakas 1990).

## **Research Questions**

I have identified two key areas to be addressed in this research.

The first set of questions deals with Ceramics Studio practice, identifying existing processes and possible solutions towards more sustainable alternatives.

Is the ZWP a viable practice in the Ceramics Studio of the CVA?

- Why is sustainable practice a necessity?



- What are the current processes in place at the Ceramics Department?
- What systems are unsustainable through their production of waste?
- What improvements can be made?
- Are these methods successful in eliminating waste?
- Can these solutions be applied to the Ceramics Studio?

The second set of questions will analyse the effects of these changes on my creative outcomes with a focus on embodied meaning.

How can the vessels I create challenge the viewer's perspective of waste?

- What effect have altered processes and combinations of materials had on the artefact in terms of visual materiality?
- How does material culture theory pertaining to clay, waste and the vessel contribute to the message in my creative practice?
- How does the combination of these theories portray the impact of waste on the environment and inspire the viewer to re-examine their perspective of discarded materials?
- How can the exhibition be used to emphasize the importance of sustainability?

Through this research I intend to investigate the viability of the ZWP within the Ceramics Studio, draw attention to the problem of waste and provoke an interrogation of the value we place on discarded materials. The proposed research questions will be met through the objectives discussed above. My practice will be carried out and evaluated in terms of a theoretical framework of sustainability and materiality.

## **Practice-based Research and heuristic inquiry**

Practice-based research (PBR) employs 'reflective practice' as an investigative tool in conducting research therefore as a 'practitioner-researcher' I must integrate the theoretical framework of sustainability and materiality in my creative practice in order to address my research questions (Gray & Malins 2004: 22- 23). Consequently appropriate frameworks should be established at the outset and the methodology must be explicit and transparent, yet flexible and protean as dictated by the research questions (Niedderer & Roworth-Stokes 2007).

Linda Candy defines PBR research as ‘an original investigation’ where creative practice is key to fully understanding the research; accordingly my creative outcomes in the form of ‘artefacts’ must be included in the evaluation of this study in order to substantiate and contextualise the research (Candy 2006: 3).

In order for research to be considered valid it must be relevant, transparent and credible (Gray & Malins 2004: 22, Sullivan 2010). Ensuring relevance, practice and theory will be located and contextualized within a broader framework. Situating concepts within their associated histories enables the practitioner to seek new insight by considering past and present practice (Leavy 2009: 17). Waste and environmental concerns are specific to our current location in time while clay has contributed to the cultural ‘world order’ (Livingstone & Petrie 2017: 20). Thus through the theory of social materiality, materials used in this study draw their meaning from a greater technical, conceptual and historical discourse (Sofaer 2007: 3). Transparency and therefore validity are made possible by a cyclical process of research, action, documentation, reflection and reflexivity that in turn leads back to research (Gray & Malins 2004, Hamilton 2008: 20). Thus the design validates the relationship between research, documented evidence of the contribution to knowledge and practice. I will employ this cycle as an action-reflection methodology in conducting research; evidence of which will be presented in journals documenting and reflecting on studio-based practice. Credibility and trustworthiness are contributed to through dynamic and intuitive ‘knowing’ or embedded knowledge, specific to the artist’s experience with the medium (Gray & Malins 2004: 22). As a ceramic practitioner my experiential and tacit knowledge have developed over several years, reflective journaling and documentation of processes attempt to make this knowledge transparent.

This research will be undertaken using a heuristic method of inquiry as a qualitative means of merging investigation and personal experience, with the aim of making new discoveries (Ings 2011: 227). In fitting with a PBR approach and interpretive paradigm, I have taken on a primary role as the source and processor of thought (Gray & Malins 2004: 21). Thus the art produced becomes autobiographical in nature as data is collected and interpreted according to my personal worldview (Ings 2011). This approach will allow me to analyse studio-based practice in terms of how the frameworks of sustainability and materiality have shaped my experience and

contributed meaning to my creative production (Moustakas 1990: 15-27). Making new discoveries requires total immersion in the research problem, materials, ideas and the surrounding environment; as such introspection, reflection and reflexivity are key actions (Taylor 2017: 513, Moustakas 1990: 9). Imagination, subjectivity and intuition in the form of tacit and embedded knowledge are encouraged as modes of critical and creative problem solving (Ings 2011: 228). A fundamental aspect of heuristic inquiry is flexibility therefore as Moustakas suggests, I have established an emergent methodology, the design of which is tailored to the objectives of the research (1990: 15-27).

A potential disadvantage of this approach is that it is a method of problem solving for which no formulae exist, instead knowledge is discovered through intelligent guesswork and informed questioning (Ings 2011: 227). In the case of this study, aspects of heuristic inquiry will be incorporated into the methodologies to establish knowledge based on my interpretation. Following this, the focus lies with the exploration of relationships between meaning and the self rather than producing a singular verifiable truth (Ings 2011: 227). However in conjunction with a PBR approach, the highly subjective and personal nature of this inquiry is made accessible and transferable through peer review, supervisor input, journaling and an exhibition (Moustakas 1990: 35- 37). Heuristic inquiry will enable me to draw together the core themes and essences of my experience into a 'creative synthesis' (Moustakas 1990: 37) or exhibition of artworks, in partial fulfilment of a Masters research degree.

I have chosen a paradigm of interpretivism with the understanding that my worldview is unique, subjective and shaped by my experiences (Sullivan 2006: 19-33). The researcher is required to become immersed in their subject matter in a real world setting (Gray & Malins 2004: 130). Validity tends to be high due to the cultivation of insight and context, adding richness and depth of data (Antwi & Hanza 2015).

## **Methodology and methods**

Within a PBR approach it is essential that practice plays a part both in the research methodology and in developing dynamic, creative and rigorous research methodologies (Gray & Malins 2004: 16). Thus ‘artistic’ methodologies are often pluralist in approach, merging multiple methods that relate to both theory and practice (Gray & Malins 2004: 72). I have chosen a multi-method approach shaped by the theoretical frameworks of sustainability and materiality.

I have chosen an action-reflection methodology as a flexible, holistic and cyclical approach that will assist me in answering my research questions. (Gray & Malins 2004: 31). This is informed by the overarching PBR approach employed in this Masters research degree, which moves from problem to solution based on a cyclical process of research, action and reflection (Gray & Malins 2004: 22). I have utilised it in both the practical and written elements of this research. Work enters a cyclical process of action and reflection as knowledge gained in making and research influences subsequent works. Thus it is comprised of two phases: The action phase involves research, making and documentation and generates both primary and secondary data. Primary data will be generated through making, observation and a qualitative survey of existing studio processes (Gray & Malins 2004: 98). The making stage is the principle generator of primary data through action and as such is included as a research method: firstly as a mode of investigation into changing processes, and secondly as a research outcome in evaluating and interpreting the affects of these changes (Candy 2006). The results will be documented in visual journals using sketches, descriptions and photographs (Gray & Malins 2004: 102-109). Secondary data will be accumulated through research using qualitative methods of gathering and refining ideas. This information, sourced from books, journals, online sources and newspaper articles, will assist in substantiating and contextualizing my research by providing multiple authorities (Savin-Baden & Major 2013).

The reflection phase entails a reflective analysis of the outcomes, which in turn leads back to reflexive research and action (Ferrance 2000: 9). A critical analysis of methods of making, materials and outcomes will accompany the documented artefacts

in process and upon completion (Gray & Malins 58). The validity of these outcomes will be negotiated through peer and supervisor input, journaling, an exhibition, reflection and reflexivity (Moustakas 1990: 35- 37). Reflective journaling will consider how concepts of process, metaphor, materiality and sustainability embed meaning within a framework of heuristic inquiry. Methods of self-dialogue, immersion and indwelling enable me to evaluate these concepts within my internal frame of reference (Moustakas 1990: 15-27).

In meeting my aim of exploring more sustainable studio practice, I have adopted a philosophy entitled Zero Waste, which aims to eliminate waste from the making cycle. This is intended to achieve sustainable practice by reducing the strain on the environment. The philosophy, which advocates altering the way materials move through our society by changing the approach to resources and production, will be employed as a methodology (Liss 2016). I have adapted five principles of this theory into methods comprised of reduce, reuse, recycle, recover and re-think. Reduce encourages the use of less resources, re-use promotes the use of a product in ways that retain its function or value, recycle refers to materials that are altered and reintroduced into the making process and recover requires us to salvage materials from mixed waste. Finally, rethink prompts the redesign of linear systems, where raw materials enter and waste is a by-product, into cyclical systems where waste becomes a resource for future use. These changes will be documented through photographs and written descriptions in order to illustrate the process and outcomes in a studio setting. (ZWIA n.d.). These methods will be covered in more detail in chapter four where they are assessed in the Ceramic Studio setting.

In implementing the Zero Waste methodology, I have constructed the 'ceramic-scientific' methodology, which will guide my application of proposed changes to ceramic practice and assist in evaluating their outcomes (Gray & Malins 2004: 15). The nature of ceramics is both artistic and scientific and fundamental to this research, therefore I have formulated the ceramic-scientific methodology. This will incorporate the scientific aspects of ceramic practice into an experimental research design that offers a guided methodological approach to experimental research. In achieving a certain quality the potter must work with an infinite number of variables, found in material combinations, glaze application, firing and re-firing, therefore this area

requires technical knowledge and incorporates specific experimental methods, for instance glaze testing. (Rhodes 1987: 15). In order to generate replicable and reliable information, certain aspects of this investigation will be carried out using a predefined set of methods pertaining to an experimental research design. However, as I have chosen specific materials to test it lacks randomization, therefore the approach is defined as a quasi-experimental design (Kothari 2004: 14). Methods include the use of a control and variable, systematic experimentation, documentation, observation and evaluation to collect data and assess outcomes in answering research questions (Kothari 2004: 95- 97). However, considering that subjectivity is present due to the heuristic approach to inquiry and qualitative methods of reflection and reflexivity are fundamental to this research, an informal approach will be applied to keep the design flexible.

## **Theoretical framework**

The approach to this research is founded on PBR and heuristic inquiry. My dissertation is structured so that practice drives the development of theory; therefore research questions may evolve further during research (Gray & Malins 2004). This process gives rise to a theoretical framework, which will be used to guide and evaluate theory and making (Candy & Edmonds 2010: 11). It is necessary for the framework to be open, flexible and emergent so as to incorporate multiple concepts and themes that grow out of practice (Gray & Malins 2004: 134). This section situates my understanding of research in a paradigm of inquiry. It then goes on to introduction to frameworks of sustainability and materiality which will be followed by an in depth exploration in Chapter Two.

I have chosen a paradigm of interpretivism with the understanding that my worldview is unique, subjective and shaped by my experiences (Sullivan 2006: 19-33). The researcher is required to become immersed in their subject matter in a real world setting (Gray & Malins 2004: 130); as such I have approached this research through the lens of sustainability and materiality in the Ceramic Studio setting. Thus validity is high due to the cultivation of insight and context, adding richness and depth of data (Antwi & Hanza 2015).

### **Sustainability**

According to the South African Department of Environmental Affairs, to be sustainable is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations (DEA, 2016). To work sustainably requires us to look for alternatives that place less strain on the environment (DEA 2016: 28). This means re-evaluating our use of energy, materials and processes (ZWIA n.d.).

I aim to decrease or eliminate waste from the ceramic making process in an effort to reduce the strain on our environment thus realising more sustainable practice. In meeting this goal I have adopted the Zero Waste Philosophy (ZWP) as a sustainable approach focused on waste. According to the Zero Waste website (ZWIA 2016), this theory aims to emulate cycles that exist in nature whereby all waste becomes a resource for future use. Eliminating or reducing waste by-products in a studio context is intended to create a closed-loop system thus facilitating a more maintainable relationship with materials that is constant and symbiotic (Liss 2012, WHO 2015: 8). I will investigate this philosophy in the Ceramic Studio setting as in my creative practice.

### **Materiality**

A central theme explored in my work is how visual art and social materiality theory affects the message conveyed in an artwork (Sofaer 2007: 3). Merging clay and discarded materials in the form of studio and student packaging waste are intended to question our perception of the material through their aesthetic interactions and associated roles in our society.

Materiality theory explores the issues surrounding the physical presence and matter of an object. Material makes art tangible; it inhabits the same environment as the audience, it engages the senses and encourages and sustains communication between object and viewer (eds. Bal & Hernández-Navarro 2011: 11- 12). According to Joanna Sofaer there are two main approaches pertaining to materiality: art theory and material culture theory (2007: 2). The terms cultural materiality and social materiality have been used interchangeably (Sofaer 2007: 2- 3). The first relates to the ways in which

artists handle their physical media, how works are given life by concealing or revealing materials, process and techniques, ‘in other words, it is about the ways in which art objects provoke an aesthetic response’ (Sofaer 2007: 2). While this approach is significant to my study, it does not fully encompass the issues of materiality I aim to explore. The second approach considers the relationship between people and objects in a material culture setting and provides further insight toward investigating my creative practice. As we are part of a material based society, materials have the ability to influence the way we perceive and understand reality (Sofaer 2007: 3). Sofaer discusses this theory, focusing on how people in society relate to material objects (2007: 4). In this way materiality is not solely confined to an aesthetic function; it is simultaneously capable of transmitting encoded messages, meanings and identities to a viewer (Sofaer 2007: 2).

Although these approaches to materiality theory focus on different aspects they can be used in combination (Sofaer 2007: 3). Du Preez holds that the unique embodiment of a message is captured in the physical thus the matter from which an art object is made holds great significance. It is this meeting of materiality and concept through which the message is realised (Du Preez 2008: 40). I will employ both approaches in establishing historical and conceptual context for the materials I have used and apply these when creating and evaluating my creative practice to gain insight into how media can meaningfully contribute to concept.

## **Review of Literature**

The following review of literature will discuss the key texts employed in the approach to research, theoretical frameworks, methodology and histories (Gray & Malins 2004: 166).

I have chosen to use a PBR approach following Gray and Malins, *Visualising Research: a Guide to the Research Process in Art and Design* (2004), as a guide to the process of research using practice. The text details a variety of methods used in conducting observation, constructing pluralist methodologies visualisation, concept mapping, practice as research, experimentation with materials and reflection in action



(2004: 30). *Practice Based Research: A Guide* by Linda Candy (2006) has informed my understanding of the artefacts role in practitioner research, frameworks and their potential influence on the research process. I have utilised Candy's definition of the term 'practice-based' research where the integration of research and practice is integral to understanding. *Managing Heuristics as a Method of Inquiry in Autobiographical Graphic Design Theses* by Welby Ings (2011) defines heuristic inquiry and provides useful examples for carrying out this investigation (2011: 227). *Heuristic Research: Design, Methodology and Applications* (Moustakas 1990), has been key to understanding the depth of this mode of inquiry; detailing practices of intuition, meditation and indwelling to discover connections, which are then made valid through 'rigorous definition', careful collection of data and methodical analysis (Moustakas 1990: 15).

I have used *Principles for Zero-Waste Communities* (2015) to inform a Zero Waste methodology. This is supplemented by online articles, newspapers and journals as a means of keeping up to date with the constantly evolving research on waste and its effects. Sustainability is defined using the African National Congress (ANC) Department of Environmental Affairs (DEA) 2012. As information on sustainability, I will use journals, newspaper articles and online sources to keep up to date with evolving concepts and current thinking.

I have selected artists and projects dealing with a range of sustainable techniques sourced from *The New Ceramics: Sustainable Ceramics* by Robert Harrison (2013).

Joanna Sofaer's *Material Identities* (2007) offers a description of materiality detailing the impact materials have on a viewers perception of a piece. I have based the evaluation of my artefacts on this collection of essays to analyse the role artworks have in constructing and conveying social identities. Merging visual and cultural materiality theory I have utilised Amanda du Preez's article *(Im)Materiality: On the Matter of Art* (2008) which discusses the significance of concept as portrayed through materials used in art making.

The following texts relate specifically to the visual and social materiality of the key areas of my creative practice in the form of the vessel, waste and clay. *The Ceramics Reader* (Livingstone & Petrie 2017) informs the materiality of both clay and the

ceramic vessel. Daniel Rhodes in *Clay and Glazes for the Potter* (1973) provides technical knowledge. My interpretation of materiality in the visual arts is and critical analysis of my work is based on the essay entitled *The Modern Pot* in the publication *Shifting Paradigms in contemporary ceramics: the Garth Clark and Mark Del Vecchio collection* (Clark & Del Vecchio 2012) and *The Architecture of Ceramic Vessel* (Adu-Gyamfi, Boahin & Padditey 2013). I have used *What we Leave Behind* (Jensen & McBay 2011) to inform the material theory of waste

Selected essays from *The Ceramics Reader* (Livingstone & Petrie eds. 2017) and Garth Clark's *The Potters Art* (1995), offer historical survey of ceramic processes. Vurovecz's thesis *Hilda Ditchburn: A Teacher and Pioneer of Stoneware Ceramics in Southern Africa* (2008) locates studio tradition in the Ceramics

In this chapter I have outlined the parameters, methods and key texts employed in conducting the following research.

## Chapter Two

This chapter serves to contextualise my creative practice. Firstly the theoretical framework of sustainability will be briefly examined indicating its recent origins and the emerging need for sustainable global development. This will provide context for the focused discussion of the ZWP. I will then demonstrate the relevance of this philosophy in the 21<sup>st</sup> century by detailing the effects of waste on our natural and man-made environment. The second section of this chapter focuses on the theory of materiality. Visual art and social materiality theory will be explored in relation to the three key aspects of my creative practice: waste, clay and the ceramic vessel. The information presented in this chapter will provide a point of reference for the investigation of the Ceramic Studio processes presented in Chapter Three and the discussion of meaning embodied in the subsequent artefacts in Chapters Four and five.

### Sustainability and the Zero Waste Principle

Sustainable development can be defined as the ability to create and maintain a symbiotic relationship in which humans and nature can exist in productive harmony to support present and future generations (DEA, 2016). Thus, sustainability depends on the harmonisation of three core dimensions: social inclusion, economic growth and environmental protection (UN n.d). The environment forms the basis upon which economic and social pursuit is founded and is at the centre of all life and all production (Viederman 1993).

In 1969 humans saw our planet from space for the first time. We were able to look down on a small fragile sphere dominated not by the activity of man but by clouds, soil, greenery and oceans. However the inability of mankind to integrate our activities into the patterns of nature is fundamentally changing our planet and causing life-threatening hazards (Brundtland 1987: 11). The 1980's were marked by a growing awareness of the urgent and complex problems of global warming, evidenced in encroaching deserts and a depleting ozone layer. Environmental degradation, once seen as a side effect of industrial wealth, became an issue of survival for developing nations (Brundtland 1987: 8). Recognising the need for humanity to be in harmony

with the environment, the General Assembly of the United Nations (UN) published the *Report of the World Commission on Environment and Development* or the *Brundtland Report* (1987) as a global agenda for change. Developing and industrialized nations were brought together to delineate human rights, the most basic of which are the rights to drinking water, sound housing and adequate food, all of which are wholly reliant on a healthy environment (Brundtland 1987: 2).

Viewing Earth from space allowed us to study our planet as a holistic organism, dependant on the well-being of all its parts (Brundtland 1987: 11). We became aware that the environment does not exist as a separate entity to human needs, ambitions and actions. The ‘environment’ is where we live and ‘development’ is what humans do in attempting to improve our situation, as such the two are inseparable (Brundtland 1987: 8). Many serious survival issues people face are related to unsustainable development where huge pressure is placed on the planet’s forests, land, water and natural resources. The Brundtland Commission served an urgent notice based on the latest scientific evidence: ‘the time has come to take decisions needed to secure the resources to sustain this and coming generations’ (Brundtland 1987: 11). To this end an agenda for sustainable global development was put forward as a pathway toward our common future (Brundtland 1987).

Toward the end of the 20<sup>th</sup> century waste was identified as one of the most significant environmental threats to human health (Brundtland 1987). Waste management is a challenging and demanding undertaking with serious implications for human wellbeing, environmental preservation, economy and sustainability. In searching for sustainable ways to deal with this issue the 2015 World Health Organisation report promoted a conscious movement toward a circular economy (WHO 2015: 4). The principle of a circular economy rests in a closed loop system. The objective is to reduce waste by ‘closing the loop’ of product lifecycles, through a more assertive approach to recycling and re-use, resulting in less strain on the environment and the economy (WHO 2015: 8). Part of this system involves promoting re-use and stimulating ‘industrial symbiosis’, with the aim of converting one industry’s by-product into another industry’s material input or resource (WHO 2015: 9). For example, the incineration of industrial and municipal waste produces a by-product in the form of ash. Due to the ‘pozzolanic’ properties of this material, it is used as a

partial replacement in cement. This form of use increases the value of the product considerably (Surathkal 2016).

### **The Zero Waste Philosophy**

The ZWP offers a methodology toward implementing this closed loop system. However, it takes a step beyond the ‘reduce, re-use and recycle’ based methods of the closed loop system (WHO 2015: 4). It aims to restructure production and distribution systems to prevent the generation of waste. Where waste *is* generated as a by-product, it is then reintroduced as a resource (IZWA n.d.: 1). The ZWP is a profoundly different way of thinking that changes our approach to resources and production.

The ZWP aims to redesign systems to emulate balanced cycles that exist in nature, whereby all resources are reused (ZWIA n.d.) This is achieved by redesigning linear processes to become cyclical processes; production methods are altered to reduce waste and ensure by-products re-enter a cycle where they become a resource for future use (ZWIA n.d.). The ZWP builds on the sustainable principles of ‘reduce’, ‘reuse’ and ‘recycle’, to include ‘recover’ and ‘rethink’. These are as follows. Reduce: what supports the use of less material and less toxic material? Reuse: how can we use products we already have in ways that retain their value, usefulness and function? Recycle: how do we ensure materials are put back in the materials cycle? Recover: what can be salvaged from mixed waste? And Rethink: how do we re-design systems to avoid needless and/or wasteful consumption? (ZWIA n.d., Liss 2016). As the Zero Waste movement is in its beginning stages, currently producing zero waste is an ideal rather than an inflexible target however changing how materials flow through our society is the first step towards eliminating waste from the system (Liss 2016).

### **Waste as the Fulcrum**

The fulcrum of this research is waste. I will define this material in order to outline the parameters of this study and through a brief history, locate its position in the 21<sup>st</sup> century.

Waste, trash, junk, garbage or rubbish can be defined as any material that is unwanted and discarded (Full Cycle n.d.). It may consist of by-products generated by a manufacturing process in the form of industrial, agricultural, mining or commercial, or

from household and community activities (Full Cycle n.d.). For the purpose of this research I will refer to this material as 'waste'. From a utilitarian perspective the user is at the centre of utility and so the labelling of something as 'waste', is dependent on the user. In other words, waste is matter of perspective (Jensen & McBay 2011: 8). Therefore by its very definition, waste is a concept associated only with humans. By contrast natural systems do not produce waste as every by-product is designed to become a resource for future use. Production and decomposition have evolved to be in perfect balance with each other meaning that waste produced in one cycle, acts as a foundation for the next. For example: a pear drops from the tree and begins to rot on the ground, the decaying flesh acts as a rich fertilizer for the seeds within and so a new pear tree springs from the 'waste' of the old. This system, which we refer to as the Circle of Life, is a closed cyclical loop design ensuring sustainability and stability (Full Cycle n.d.). Humankind however, participates in linear systems, which are highly destructive to the environment. For example: Styrofoam (expanded polystyrene) is produced using finite resources in the form of crude oil and is non-recyclable. It has a single use life span and once discarded, is buried in landfills, burnt in incinerators or enters the natural environment where it is eaten by animals or slowly decays and contaminates water with styrene: an endocrine disruptor and cancer-causing chemical (Bideaux 2016). Production in linear systems requires raw materials and generates waste (Full Cycle n.d.).

Waste became an issue with the advent of cities. Previously waste was produced in small quantities and comprised of biodegradable substances that were beneficial to the land or non-biodegradable but harmless matter for instance broken pottery (Jensen & Mcbay 2015: 26). However in densely populated cities waste began to accumulate in large amounts with less and less space where it could be dumped safely. (Jensen & Mcbay 2015: 27).

Until the mid 1900's, the majority of household waste was made up of cinders and dust from coal and wood burning stoves. The rest was comprised of organic matter and residents were required to sort their waste similarly to our recycling process today (Jensen & Mcbay 2015: 38). Our wasteful habits are a fairly recent phenomenon based on an economy of abundance adopted after the World War II (Jensen & Mcbay 2015: 21). The development of urban waste removal systems led to a paradoxical result. The regularity and convenience of garbage disposal led to an increase in the amount of

garbage produced. The ease of disposal encouraged the creation of disposable products and eventually contributed to the establishment of our throwaway society (Jensen & Mcbay 2015: 44). Accordingly the composition of human garbage has changed dramatically over the past century.

Current waste disposal systems are not capable of dealing with the complexity of our waste and as a result even first world countries now dispose of two thirds of their household waste in landfills and incinerators (Jensen & Mcbay 2015: 41). According to an article published in The Guardian (2013) millions of tonnes of e-waste is being shipped to Asia and West African countries in order to avoid the costs of recycling. On average each American individual generated 29.5 kilograms of e-waste per year with Britain contributing 21 kilograms per person in 2013 (Vidal 2013). Thus in a 21<sup>st</sup> century setting, waste is a symptom of a material based society built on abundance. This disposable approach and scale of production has led to an unprecedented volume of waste present in our environment. No other society in history equals our willingness to discard something before it is completely worn out. During the early 20<sup>th</sup> century one person would produce around 41 kilograms of packaging waste per year, only one hundred years later that number has risen to 565 kilograms per person per year (Jensen & Mcbay 2015: 40).

### **The effects of waste on the environment**

The following section deals with the results of this unsustainable relationship by exposing the impact of waste on a global, national and local level, thereby illustrating the importance of a Zero Waste approach.

As far back as the 1960's the effects of waste on our environment have been evident. Jacques Cousteau (1910-1977) a keen adventurer and the pioneer of scuba diving, described the dire relationship we have with our environment: 'Water and air, the two essential fluids on which all life depends, have become global garbage cans.' Sir David Attenborough (1926- ) is a world-renowned naturalist and broadcaster, best known for his series of natural history documentaries. Speaking at the launch of his new series Blue Planet II, created 16 years after Blue Planet I, he called on the global community to cut back on plastic use, saying that the series reveals the devastating effects plastic has had on the ocean in just over a decade (Ruddick 2017). 'We've seen

albatrosses come back with their belly full of food for their young [...] you think it's going to be squid, but it's plastic. The chick is going to starve and die' (Attenborough 2017). Attenborough states that every individual's actions have an impact on the ocean; 'we have a [...] direct effect on the oceans – and what the oceans do then reflects back on us' (2017). His voice adds to the growing global calls for the reduction of plastic.

According to an investigation by The Guardian, one million plastic bottles are bought every minute, more than eight million tonnes of plastic flows into the ocean per year and billions of people around the world are drinking water that is contaminated with plastic micro particles (Ruddick 2017).



**Figure 3**, National Geographic. (2018). Albatross chick, stomach filled with plastic. [image] Available at: <https://news.nationalgeographic.com/2018/03/great-pacific-garbage-patch-plastics-environment/> [Accessed 30 April 2018]

Our culture demands continuously cheaper goods produced from unsustainable products; thus waste is a prolific material in our natural environment (Bertoli 2015). Currently the lifespan of an object as waste is typically far longer than its lifespan as a useful tool (Jensen & Mcbay 2011: 15). A plastic fork that accompanies a takeaway is used for five minutes, hypothetically if that fork took one year to degrade it would have been useful for only six one-hundredths of a second. In reality plastic can take up to 1000 years to

decompose fully. Furthermore, the carbon plastic is made from uses crude oil, which has spent millions of years underground. The fork's usefulness spans an imperceptibly short instant in time (Jensen & Mcbay 2011: 15). This is true with almost every physical man-made object on this planet be it cars, toasters, computers or fast food containers. The sheer scale of production of disposable items is cause for concern; the global production of polythene shopping bags has exceeded 5 trillion per year. This form of waste is so prevalent that in South Africa we have dubbed it as our 'national flower' (Jensen & Mcbay 2011: 15). However the issue extends beyond aesthetics as plastic bags clog sewage systems, pollute the oceans, kill animals that ingest them and take decades to break down fully (Jensen & Mcbay 2011: 15). Plastic shopping bags degrade into microscopic particles that get absorbed into the ecosystem by entering water tables or being consumed by animals (Bertoli 2015). When humans consume



plants and animals these chemicals enter our bodies and contribute to our chemical body burden: the build up of chemicals in our tissues over a lifetime (Bertoli 2015). According to an article in the Independent (2017) the average person can ingest up to 11 000 pieces of micro plastic per year through seafood. Many of these substances are considered endocrine disruptors, which are detrimental to the reproductive systems of humans and animals as they mimic and change hormonal activity (Full Cycle n.d.).

The stresses placed on the environment by the waste we produce, reduces its capacity to supply new raw materials (Bertoli 2015). Disposing of, rather than recycling



**Figure 4,** MNN (2018) An estimated 8 million metric tons of plastic enters the oceans worldwide in a typical year. [image] Available at: <https://www.mnn.com/earth-matters/translating-uncle-sam/stories/what-is-the-great-pacific-ocean-garbage-patch> [Accessed 20 April 2018]

materials places more of a burden on natural systems through the energy and resources it takes to replace them. Current methods of waste disposal are unsustainable (Full Cycle n.d.). In many cases the financial cost of dealing with the environmental impact by landfills far outweighs the standard charge for this service. The ecological cost is equally great; negatively affecting habitats, biodiversity, wildlife and water tables. However, much of this waste, although intended for dumpsites, ends up spread across the landscape by wind, human activity, water and natural disasters in the form of tsunamis, hurricanes and earthquakes (Bertoli 2015).

The adverse effects of waste are evident on a global level; a well-known example can be seen in the Great Pacific Garbage Patch. First described in 1988, was formed and continues to be added to by marine pollution gathered in one area by oceanic currents (McLendon 2016). According to an Environmental Protection Agency (EPA) report 80% of this marine debris is made up of trash that was destined for landfills and the other 20% from accidental or deliberate at-sea losses from ships and fishing traps and gear. It is estimated to be anywhere from 700,000 to 15,000,000 square km's in size.

The effects of this waste can be seen by studying marine animals and ourselves. Besides the dangers of wildlife getting entangled and suffocating in the floating debris, the threat also exists on microscopic level. The suspended garbage absorbs organic pollutants from seawater in the form of PCB, DDT and PAH. PCBs can cause

neurotoxic and immunotoxic effects. The US National Toxicology Program classifies DDT as moderately toxic and PAHs have been linked to stomach, bladder, lung, liver and skin cancers (Bostrom *et al.* 2002). The Great Pacific Garbage patch is just one of many discovered in oceans around the globe. The United Nations Ocean Conference has estimated that the oceans might carry more plastic than fish in weight by the year 2050 (McLendon 2016).

Municipal solid waste is a large contributing factor to climate change after agriculture and industry. According to a report undertaken for the European Commission (2001)



**Figure 5,** The Daily Times. (2016). By 2035, about 170 communities will face chronic inundation. [image] Available at: <https://www.ucsusa.org/global-warming/global-warming-impacts/when-rising-seas-hit-home-chronic-inundation-from-sea-level-rise#.WsSRdNNuaRs> [Accessed 20 Jan 2018]

waste management results in significant amounts of the three most detrimental greenhouse gases (GHG), carbon dioxide, methane and nitrous oxide.

The ever-increasing presence of these gases is expected to result in significant global warming within the next few decades (Smith *et al.* 2001: 20). The ‘greenhouse effect’ refers to the warming process that occurs in our atmosphere, without this protective layer the planet would be cold and uninhabitable (National Geographic n.d.). The amount of greenhouse gases present in the atmosphere directly affects the temperature of our planet

(National Geographic n.d.). Historically the Earth has seen regular shifts of 5°C between ice ages and the global temperatures today. These changes typically happen over hundreds of thousands of years however research predicts temperatures could increase by 10° C by the end of the century (National Geographic n.d.). The effects are measurable in real time (Bradford & Pappas 2017).

With GHG levels higher now than in the last 650 000 years, the melting of ice sheets in Greenland and Antarctica are predicted to raise sea levels significantly, bringing about more extreme weather in the form of intense hurricanes, an increase in lightning strikes, major storms, flooding and droughts and endangering certain animal species (National Geographic n.d.). The decreasing sea ice also means less sunlight is reflected back into the atmosphere and is absorbed by the darker water of the oceans, perpetuating the cycle of melting ice. In the last century sea levels have risen by a rate

of 3 millimetres per year. It is predicted that water levels will increase by almost a meter by 2100, displacing roughly half of the Earth's population. The compositions of oceans are also affected by global warming as carbon dioxide is absorbed by seawater, increasing its acidity. Since the 1700's the ocean has become 25 per cent more acidic; negatively affecting marine organisms that make shells out of calcium carbonate, which dissolves in acid (Bradford & Pappas 2017). Coral bleaching, a phenomenon where coral eject their symbiotic algae, is a prime indicator of ocean health. The Great Barrier Reef in Australia has seen large portions of coral bleaching in 2016 and 2017; a stress reaction to too warm waters, pollution or unbalanced acidity levels (Bradford & Pappas 2017).

Human activity has contributed to a rise in greenhouse gases triggering faster weather pattern changes than living things are able to adapt to (Bradford & Pappas 2017).

Warmer temperatures are favourable to many disease-causing pathogens, which previously confined to tropical areas, are expected to kill many plant and animal species. According to a 2013 report by the Nature Climate Change Journal, if left unchecked these and other effects of global warming will lead to the extinction of up to half of Earth's plants and one-third of the animals by 2080 (Bradford & Pappas 2017).

The effects of waste are similarly apparent at South Africa. According to an article



**Figure 6,** Binath, S. (2014). *City plans to tackle litter issue.* [image] Available at: <http://publiceyemaritzburg.co.za/15480/war-litter-city/> [Accessed 12 Jan. 2016].

published in Sunday Times (2016), South Africa is facing a crisis as landfills reach saturation point. 90% of our waste is not recycled resulting in 108 billion tonnes being deposited in dumpsites throughout the country every year (Savides 2016).

The Department of Environmental Affairs (DEA) warns that if this volume of waste continues SA will run out of landfill space within the next decade (DEA 2011). Each year as the population increases, so does the volume of waste generated. The article warns that the ineffective

management of landfill sites means that waste is becoming a serious issue in a throwaway society (Savides 2016).

On a local level the effects of waste are evident in my hometown of Pietermaritzburg. In an article published by the Witness (2016) Sabelo Nsele details the damage caused by a fire at the city's dump.

The Pietermaritzburg (PMB) fire department was unable to extinguish the blaze as combustible gases generated by decomposing waste trapped deep below the surface of the landfill provided fuel for the fire (Nsele 2016). The acrid smoke affects individuals with pre-existing respiratory problems; specifically the elderly and young children are at increased risk of developing health related difficulties. Littering and a build up of rubbish are among the leading causes of storm water drain blockages. According to an article in News 24 (2016) drains blocked with rubbish in Pietermaritzburg caused



**Figure 7,** News 24 (2016). Members of the PMB Fire Department monitor the fire at the dump [image] Available at: <http://news24.com/SouthAfrica/News?channel=king-smoke-shrouds-city-20160809> [Accessed 11 Jan 2017]

flooding of roads, shops and houses after a severe storm. Drains along the sides of roads are constantly blocked with rubbish and debris and often lead to flash floods. The overflow of water results in the degradation of roads, storm water drains and sewage pipes (Pillay 2016).

This research has demonstrated the urgent need for people to rethink their relationship with waste. Due to the nature of our throwaway

society waste is a pervasive problem that affects the environment on a global, national and local scale (Jensen & Mcbay 2015: 21). Since the environment is at the centre of all life and all production (Viederman 1993) this is a challenge shared amongst all humankind regardless of race, class, gender and age. Thus, ZWP is an exceedingly relevant approach to production and consumption, which works toward sustainable processes that place less strain on the environment (ZWIA n.d.). In employing the Zero Waste methodology I will be using waste as a resource as discussed further in chapter four and five. Using discarded materials as medium in art making is intended to challenge our perception of waste and in doing so reduce the flow of waste into the environment. The following section deals with our societal perception of waste.

## Materiality

This section aims to explore our perception of waste, clay and the vessel using visual art and social materiality theories, in order to understand our embedded response to them (Sofaer 2007: 3). I will discuss the theories of materiality in order to apply them to each aspect of my creative practice, which will then be presented in individual sections pertaining to waste, clay and the vessel.

Central to the themes explored in my work are the materials I have used and the form in which they are merged. As discussed in chapter one, materiality is the theory of how material qualities and the materials themselves are perceived, interpreted and understood (Mills 2009: 2). In terms of visual and historical art theory, Joanna Sofaer describes materiality as the potential of art to elicit an aesthetic response read through material engagement between the viewer and artwork (2007: 2). However, she goes on to say that, in a social context, materials also have the ability to transmit encoded identities, messages and meanings (Sofaer 2007: 2). The contemporary ‘art object’ can be distinguished by its capacity to influence material negotiations between often competing embedded social distinctions (Geismar 2004: 43). In this way, the materiality of objects categorized as ‘art’ reveals a series of ‘cross-cultural encounters and exchanges’ (Geismar 2004: 43). Thus, understanding the materiality of ‘art objects’ themselves, allows us to disentangle complex systems of embodied meaning (Geismar 2004: 56). This approach emphasises how our relation to physical material assigns significance to an artwork. Amanda du Preez holds that materiality is a fundamental aspect of art as the medium acts as a conduit for concept, concluding that we should judge art by its content (what it means) as well as the material through which it manifests itself (how it matters) (du Preez 2008: 30). Therefore, the material used to create an artwork assumes meaning from its physical qualities; the aesthetic response it elicits and its association with non-physical matter; the role it plays in society (Sofaer 2007: 2).

The artefacts produced in this study exist as evidence of my process of exploration into the nature of things; meaning is reframed through the juxtaposition of materials contained within the vessel form (Mills 2009: 2). In acknowledging the materiality of

these artefacts the following section explores the technical, conceptual and historical discourses of the three key aspects of my creative practice: waste, clay and the vessel. My choice in utilising waste is informed by the Zero waste methodology, which encourages the use of waste as a resource. I have used clay as my preferred medium and it acts as a binding instrument. Under the heat of firing these two materials transform in unexpected ways, resulting in unpredictable and unique new substances. The vessel is a dominant form repeated throughout my creative practice. This structure resonates with me as a container of meaning; in this study I have employed it as a research tool.

### **Materiality: the culture of waste.**

Waste constitutes a significant medium in my work. A key aim of this research is to use waste as a resource, as recommended by ZWP. This involves a sequence of experimentation, as the interactions of various discarded materials in combination with clay under the extreme heat of firing, are unknown and unforeseeable. Often the vessels that emerge from the kiln are exciting demonstrations of the aesthetic potential of waste. Growing out of this aim, waste is employed as an art medium intended to make the viewers aware of their perception of discarded materials and the impact it has on the environment. I have used discarded materials made up of student and studio-generated waste, as detailed in chapter one. In order to understand the underlying influence of discarded materials on my practice and its interpretation, the following section explores the technical, practical and conceptual histories of waste.

According to historian Daniel Miller, the 20<sup>th</sup> century was marked by a shift; our culture has become ‘to an increasing degree a material culture...’ (1987: 3). This concept has become more embedded with time and waste serves as primary evidence of this phenomenon (Jensen & McBay 2011). As established in the aims and objectives of chapter one waste can be defined as any material that is unwanted and discarded (Full Cycle n.d.). The origins of the words ‘trash’, ‘rubbish’ and ‘garbage’ are colloquial and fundamentally neutral, denoting fallen leaves, rubble and the leftovers of a slaughtered animal respectively (Jensen & McBay 2011: 7). However in the 21<sup>st</sup> century the word ‘waste’ is surrounded by negative connotations. ‘Waste’ emerged from the Latin *vastus* meaning ‘empty or desolate’ and *vastare* meaning ‘to

lay waste' (Jensen & McBay 2011: 8). The same origins developed into the words 'devastate' or 'devastation' meaning 'to lay waste completely' (Jensen & McBay 2011: 8).

The issue of waste is a fairly recent occurrence. The 1920's marked growing urbanisation; with space becoming an issue in over-populated cities, large amounts of waste needed to be packed into small spaces (Jensen & Mcbay2015: 26). A trend toward disposability in consumer items led to a municipal garbage problem. Landfills and incinerators presented the two main solutions (Jensen & Mcbay 2015: 38). An unfortunate consequence of urban garbage collection systems was that it became easier to throw things away and consequently led to an increase in the amount of waste (Jensen & Mcbay 2015: 43). In 2018 the sheer scale of its production is overwhelming, 'If you stopped sleeping and did nothing but watch plastic bags being produced at a rate of one per second, it would likely take nearly two thousand lifetimes to observe only one year's worth of plastic bag production' (Jensen &McBay 2015: 17).

As a material, waste is surrounded by overwhelmingly negative connotations (Jensen & McBay 2011). This is partly contributed to by human evolution. Municipal solid waste contains decaying, putrescible materials such as meat and vegetables. As organic matter rots, it attracts bacteria that feed on the amino acids present in protein, producing gasses and liquid (Miller 2005). The gases contain the molecules cadaverine and putrescine and tend to evoke a strong reaction of disgust. A foul odour is indicative of pathogens: viruses, bacterium or other microorganism that can cause disease (Engelhaupt 2013). Our embedded aversion to waste is due to instincts that have evolved over time; those who avoided rotting animals and other sources of infection tended to live longer and as such they were more likely to pass on their genes. In contrast, carrion flies and rats are attracted to the smell that emanates from rotting protein. These are carriers of disease therefore we also tend to avoid the area foul odours emanate from (Engelhaupt 2013).

The nature of waste has changed significantly since the advent of industrialisation and in the last two decades e-waste has contributed considerably to the composition of household and industrial waste. These are electronic goods made up of a vast number

of materials including toxic substances such as cadmium, lead, mercury, flame-retardants and arsenic (Vidal 2013). These leach into the environment and contaminating water sources, air and soil. These according to the World Health Organisation, simply living in the vicinity of a landfill can pose serious health risks; residents are exposed to pollutants through inhalation, contact with this polluted water or soil and through the consumption of affected water and products (WHO 2015: 14). Various studies have found an increased risk of cancer and birth defects in people living within two kilometres of a waste disposal site (WHO 2015: 14). Incinerators are intended to reduce the volume of solid waste and in recent times are designed to capture energy released by burning garbage either as heat or by converting it to electricity. However, a by-product of the process is 'fly ash' which contains numerous hazardous heavy metals including manganese, nickel, chromium, vanadium, arsenic, lead and mercury. Similarly, multiple studies have found that close residential proximity to incinerators increase rates of cancer, lymphoma, spontaneous abortions and preterm births while exposure to hazardous waste can lead to a host of diseases that attack the liver, bladder, lung, stomach, respiratory, circulatory, blood and digestive systems (WHO 2015: 15- 17).

The negative attitude to trash is so powerful that it extends to human beings who work in close proximity to this material. Millions of people across the world sustain themselves and their families by gathering reusable and recyclable materials others have discarded (Samson 2009: 2). Although their work is significant to the recovery and transformation of refuse, society's attitude toward trash reflects its attitude toward 'trash pickers' and as a result these individuals are socially stigmatised, sometimes even labelled 'untouchables' (Jensen & McBay 2015: 48, Samson 2009: 3).

Through this research I have explored the reasons why waste has an overwhelmingly negative reception in society. According to du Preez the use of media contributes to the material embodiment of the content thus due to its cultural implications, waste is an actively provocative material (2008: 33). I have used both studio and student-generated waste as a medium to convey a message. It is my intention to change our attitude toward waste by establishing the potential of discarded materials. Therefore in utilising waste as an art medium, its expected value is subverted by intentionally eliciting an aesthetic outcome.



### **Materiality: the nature of the clay and its transformation into ceramic**

I have utilised clay as the primary medium in my creative practice. It possesses a unique flexibility, malleability and versatility; qualities that have enticed me to deliberately disrupt the structure of the earthy body with foreign materials. Clay acts as a unifying instrument, binding the various discarded materials in its unfired plastic state and upon firing, fusing these vastly different substances into a new material. The physicality of the process and natural inclinations of the material results in clay becoming a carrier of marks, recording the experience of making (Phillips 2010: 22). The field of ceramics is deeply rooted in the evolution of humankind. Various practical functions, technical uses and conceptual achievements form an underlying influence on both my practice and its interpretation and as such will be discussed below (Raby 2015: 3).

Archaeological excavation of ancient civilisations has founds ceramic making a prevalent practice across vastly different civilisations separated by time and space. It forms an expansive traditional technology and art form reaching as far back as 37 000 BCE (Raby 2015: 3, Maniatis 2009: 2). The material is unique in its use for both functional and symbolic objects; its metamorphic qualities have assimilated it with creation myths in various religions (Livingstone & Petrie 2017: 11). In a contemporary setting ceramics are still a constant in our lives; fulfilling domestic functions as containers of sustenance, receptacles of bodily waste and as a provider of shelter in the form of bricks and tiles. Additionally it serves diverse industrial functions from electrical insulation to cladding on the Space Shuttle (Livingstone & Petrie 2017: 11). Through its transformative abilities and its persistent and intimate connection with daily life ceramics gains its power as an artistic medium, fulfilling dynamic artistic roles as a vehicle for the exploration of material and culture (Livingstone & Petrie 2017: 11).

It is this potent ability of clay and ceramic to act as a metaphor and symbol that enable the artefacts produced in this study to embody meaning. Clay's transformation into ceramic forms a metaphor in my creative practice, referencing the diffusion of waste into the natural environment through the process of decay. Chemical and physical transformations take place in the clay during firing. As the temperature increases it

dries out becoming exceedingly fragile, organic material in the body begin to burn away releasing gasses trapped in the walls. Then, at a certain temperature, the heat acts upon these the particles causing them to rearrange and form new bonds, growing, fusing and crystalizing in the final stages (Rhodes 1973: 17). Thus clay transmutes from a malleable plastic material into an impervious rock-like substance, finally emerging from the kiln as a permanent and impermeable material in a mere six hours (Rhodes 1973: 16). Clay, once a wet plastic material, is transformed into an impervious robust material that is used daily and associated with wholesome sustenance (Hamer 1986: 59). Plastic, like ceramic, is a manufactured durable and impermeable material. Its durability is one of the reasons why, like pottery, it is used so prevalently in our daily lives. It is this quality that also makes plastic so difficult to break down (Cho 2011). Water and UV rays destabilise and weaken the chemical bonds that make up certain plastics. As plastics disintegrate various gases and chemicals will be released. The 'plastic soup' is dispersed by the actions of wind and water and spread over expansive distances, infusing into the environment. Plastics not consumed by sea-life, will seep into lower levels of the ocean thus permeating every level of the aquatic ecosystem (Cho 2011). When we consume seafood, we ingest these pollutants thus plastic is able permeate every level of our existence (Cho 2011).

In its simplest form, clay is a by-product of the decomposition of igneous rock and thus is symbolic of the earth in my work (Hamer 1986: 60). Frank and Janet Hamer define clay as 'a heavy, damp, plastic mineral that 'sets' upon drying and can be changed by heat into a hard, waterproof material' (1986: 59). In its plastic state clay can be readily formed into a variety of shapes. I use clay as a binding agent for the integration of various waste materials. The formation process is often used as a metaphor for the creation of man as the primordial substance is shaped into 'diverse, beautiful and enduring objects' (Livingstone & Petrie 2017: 11). Similarly my creative practice functions as a metaphor; clay is pressed into rigid symmetrical vessel moulds referencing the generic mass-produced nature of industry. However, as with *Container in Excess I* (2018), the reference to nature is found in the spontaneity employed in filling the mould, which results in complex and abstract surface detail. I have used clay scraps and the waste accumulated over a period of one year from my creative practice, to form the body of this piece, taking unmeasured handfuls and pressing the mixture into random areas of the mould. Sometimes the material comes away leaving

a muted impression of the various colours in the mixture. I have built up the interior by letting the materials dictate their placement through their attachment to Plaster of Paris.



**Figure 8**, Hawley, N., *Container in Excess I*, 2018.  
19 x 18cm Clay and mixed waste, earthenware.  
Photograph: Natasha Hawley

The results cannot be predicted due to the complexity of waste employed in the making. Once complete the piece is exposed to air for an extended time causing the clay to dry to a leather-hard consistency and then to bone dry where it becomes brittle. The evaporation of moisture has caused it to warp as the clay has shrunk more than the waste. The drying out period exposes faults where material additions cause uneven drying and interfere with the structure.

At this point the unfired clay is at its most fragile (Frisinger 2012: 20).

In the kiln clay undergoes several irreversible chemical and physical changes in its transformation into ceramic (Rhodes 1973: 14). The material, previously soft, plastic when wet, easily disintegrated and weak becomes rock-like and impervious to water once fired. The first change brought about in firing is the completion of the drying where chemically combined water is driven off the body at 350°C (Rhodes 1973: 15). At 573°C the clay body is completely dehydrated, at this stage it is at its most fragile and has lost its plasticity and will no longer disintegrate in water and as such, cannot be reclaimed. Oxidation takes place up until 900° causing organic and inorganic matter to burn off (Rhodes 1973: 16). In the early stages of oxidation, the clay components, which are not in oxides, decompose. In this phase certain waste materials such as plastic, paper, polystyrene, tea leaves and coffee granules will burn away leaving behind air pockets that alter the surface and disturb the artefact's structural integrity.

Between 800-1000°C, the vitrification process begins (Rhodes 1973: 17). This results in tightening, hardening and glassification giving fired clay its characteristic durable,

dense, rock-like properties. This hardening is caused by gradual melting and fusing of various clay components. With the advancing heat, the more fusible particles will melt into small glassy beads, which soak into the surrounding area binding molecules and leading to further fusion. This process is significant as an allegorical reference in my creative practice. As seen in figure 9, the waste has fused into a rigid impermeable substance similar to ceramic, however it has bulged, cracked and separated as the surrounding clay body fuses and shrinks causing it to warp. The bulges extend farther into space and the colours have become bolder in firing. The ceramic component is



**Figure 9**, Hawley, N. 2018. Detail: *Container in Excess I* 19x 18cm. Studio-generated waste, earthenware. Photograph: Natasha Hawley

only just able to carry these additions. Interactions of waste materials and clay in the kiln act as a metaphor for their interactions in the environment; the degradation of earth as decomposing waste particles saturate land, water, fauna and flora. The strength of fired clay is the result of the

various crystalline structures that grow within the clay body. For instance, Mullite contributes cohesion and strength by lacing the structure together. Shrinkage occurs during vitrification from 800 to 1250° C. Ceramic is relatively indestructible; although a piece of pottery may break, the shards will remain unchanged for millennia (Rhodes 1973: 16).

Clay is part of the earth and acts as a metaphor in my work. Once fired it becomes a permanent substance, acting as an imitative record of the experience of making and firing (Livingstone & Petrie 2017: 11). The ceramic process can never be fully controlled; there are simply too many variables in the composition of materials, firing, equipment and methods used (Frisinger 2007: 33). It is these qualities, accidents and imperfections I utilise and emphasize as a means of conveying my message; read through visual traits that evoke feelings and emotions.

### **Materiality: the vessel form**

An investigation of the vessel's historical and contemporary social functions will highlight the significance of this form in my work. Clay and the vessel are closely connected concepts through their deep-rooted history. In prehistoric times the unique properties offered by clay resulted in a variety of structures including decorative and votive objects, vessels and building materials (Clark 2004: 23). As such the vessel became an indispensable functional object that has inevitably infiltrated cultural behavioural systems (Raby 2015: 53). Thus, the materiality of the vessel becomes a significant factor in understanding my creative practice. A fundamental aspect of the PBR approach is employing creative practice as an investigative tool; therefore the vessels I create act as containers of knowledge, gaining meaning through the making process, which is mediated by the ZWP.

The term 'vessel' can traditionally be defined as "a hollow or concave utensil, such as a cup, bowl, pitcher, pot or vase, used for holding liquids or other contents (Adu-Gyamfi, Boahin & Padditey 2013: 554). Prehistoric fired pottery containing food and water encouraged a sharing environment where a single vessel could benefit many in a community. It is in meeting essential needs as a daily carrier of sustenance that the vessel has solidified its material connection to the land and its symbolic connection to the human body (Raby 2015: 3). The vessel form serves a utilitarian function beyond that of a container for food or liquid, it exists equally as a social agent and artistic container of meaning (Forni 2017: 25-33). Due to its prehistoric roots and its use as ritual containers, prestige objects and daily domestic wares, the vessel has played a significant role in the 'world order' established by culture (Rawson 2017: 19). The following text explores the various roles of the vessel as metaphorical, symbolic and artistic containers.

The ceramic vessel is typically associated with the domestic sphere however it can acquire embodied meaning through its production and context. A prime example of meaning gained through process can be seen where the ceramic vessel has served functions associated with death; namely as containers of offerings such as food and liquid placed beside the deceased, as well as holders for human remains (Frederick & Jewitt 1878: 2). In ancient Britain, sepulchral or cinerary urns were made to hold the Calcined remains of adult family members while immolation urns, sometimes placed

in the mouths of cinerary vessels, held the remains of infants (Frederick & Jewitt 1878: 3). Furthermore the making process of these vessels held significance; when a tribe member passed away, their closest female relative would dig clay from the ground where they fell, form the urn, decorate it to the taste of the deceased and then position it in the funeral fire. Once cool, the ashes and small memorial articles would be placed in the cinerary vessel over which a mound was raised (Frederick & Jewitt 1878: 5). This type of vessel may function as a simple container however through process and context, it takes on substantial meaning as a metaphorical vessel ushering the soul into its next life.

Symbolically the vessel is often compared to and intimately linked with the human body through its age-old function as a container of life giving sustenance (Raffa 2014). If bodies are containers of vital substances in the form of blood, semen and saliva, it can also be argued that pots, as containers of vital substances in the form of food and water, are bodies. As a container directly linked to early human survival it has become representative of the human body; foot, belly, neck, lip and mouth (Forni 2017: 33). Classically the female body is viewed as a vessel, accepting sperm and producing eggs (Raffa 2014). In the Babessi community in Cameroon, the moulding of clay is likened to the process underway in the womb of a pregnant mother (Forni 2017: 27). A womb is a vessel within a vessel being a cradle that receives, grows, protects and nurtures life. The breast is a vessel, which produces and bestows milk (Raffa 2014). Thus vessels are essential symbols pertaining to life; receiving, preserving and facilitating the cycle of birth, life, death and rebirth on a physical and metaphysical level. In this context I have employed the vessel as a symbol for the Earth and a metaphor for the environment; the ultimate vessel whose life cycles are the source of our own (Raffa 2014).

Up until the mid 1950's, the Western world considered ceramic vessels a craft form and fundamentally domestic. It was at this point, based on a growing move toward the ceramic vessel as an art object (Clark 2004: 102), that Peter Voulkos (1924- 2002) and his contemporaries challenged the traditions that bound clay to its domestic function (Phillips 2010: 22). The ideas presented by Voulkos are pertinent to and assist in

contextualising my use of the ceramic vessel in an art setting. By utilising wheel



**Figure 10**, Voulkos, P.  
*Sevillanas*, 1959. Ceramic, 57x 75  
inches. Destroyed in Earthquake.

thrown vessels Voulkos alluded to the time-honoured vessel form, effectively endowing these everyday objects with traits of the familiar, traditional domestic life.

However, breaking and deforming these symbols enabled Voulkos to build powerful comparisons between art and life and so challenged the traditional standards of craft and sculpture of the times (Chattopadhyay 2001).

This approach emphasises how our relation to the cultural materiality of the vessel assigns significance to an artwork (Geismar 2004: 56). The vessel is used as a vehicle for exploration in my research. Its familiarity and domestic connotations make it an ideal vehicle for the

interrogation of embedded cultural value systems associated with waste. Voulkos engaged with the clay allowing it to record his practice and in doing so it became evidence of chance and accident as an essential part of all human activity. Through the process of PBR, my creative practice is employed as an investigative tool thus the artefacts produced function as a record of the materials and processes utilised in their making.

Today the contemporary vessel can be defined as ‘an object that presents the formal essence of a pot, exaggerated to reveal personal artistic vision uninhibited by pragmatic issues of function influenced by culture’ (Adu-Gyamfi, Boahin & Padditey 2013: 555). The vessel’s presence through millennia and its continued extensive role in our everyday lives has led to the form being a pertinent object in global culture (Raby 2015: 3). The connotations of the ceramic vessel are still rooted in the domestic sphere thus the form is a symbolic container, which artists now use to investigate our world and reflect the nuances of our society and culture (Weida 2011: 1).

The discussion presented here is intended to investigate the multiple meanings and connotations of the materials and form used in my creative practice. As an aim of this research is to understand the reading of the artworks produced, I have endeavoured to address the visual art and cultural theories of materiality pertaining to these areas (Sofaer 2007: 2). According to du Preez, the medium gains meaning through its

content (what it means) and through its physical manifestation (how it matters), therefore I have applied the theories of materiality to each of the inextricably linked areas of my practice; waste, clay and the vessel, in order to understand the encoded messages they transmit (2008: 30, Sofaer 2007: 3). These will be drawn together in my discussion of artworks in chapter five.

In a 21<sup>st</sup> century contemporary context the physical work exists as evidence of the artists' process of exploration into the nature of things; meaning is reframed through the juxtaposition of materials contained within a form (Mills 2009: 2). Generally waste is surrounded by negative connotations due to its connection with disease and illness and negative effects on our natural environment, the basis upon which all life and all production is founded (Viederman 1993). In comparison clay is an organic material with a prominent and profound connection to the earth and the everyday (Weida 2011: 1).

Once fired clay becomes a permanent substance, allowing us to connect with ancient civilisations and explore the vast reaches of space. The merging of clay as an organic substance and waste as man-made matter in the kiln represents their convergence in the real world. At times these promote an aesthetic experience provoking an interrogation of our perception of waste, other times the waste has weakened and marred the clay body serving as a comment on its detrimental effects. Merging clay and waste in the vessel form contributes to the material embodiment of the message in my work, which can be read through the resulting aesthetic experience and associated societal roles (Sofaer 2007: 2). I will elucidate on this point when discussing my artefacts in chapter five.



## Chapter three

Through a discussion of sustainability, the ZWP and waste in chapter two, the relevance and necessity of sustainable practice has been established. This chapter will investigate current Ceramic Studio processes with the aim of identifying more sustainable practice. The development of British ceramics will be briefly discussed in order to locate the current systems in place and contextualise my role as a studio ceramist. Firstly I will evaluate the existing Ceramic Studio processes, then employ the Zero Waste methodology to identify unsustainable practices and finally, form a basis from which to propose sustainable solutions.

### Brief History

This section is intended to provide a context for ceramic practice employed in the Ceramic Studio of the CVA. Studio tradition is heavily influenced by British ceramics and as such it is important to give a brief historical survey before proceeding with studio practice.

According to ceramic historian Garth Clark (2004) writing on the history of ceramics in Britain, potters have inhabited four stages of development: the peasant potter, the industrial potter, the art potter and the studio potter. The technical ceramic processes employed define each of these phases.

Although convention suggests a large gap between functional ‘craft’ and conceptual ‘art’, ceramics tends to overlap purpose and creative influence (Phillips 2010: 22). There is considerable tension when discussing the issue of functionality in ceramics. As such I have put aside the problematic definitions of ‘art’ versus ‘craft’ as a debate that is not key to this research. Doing so allows me to explore my subject matter without being overcome by this ever-present argument (Phillips: 2010: 21).

The peasant potter can be defined by the simple, functional, easily replaced wares they produced for the lower-class public. They were distinguished by their integrity and honesty and for their use of local materials and practical design (Clark 2004: 25).

Initially, individuals created pottery for their small and immediate communities as a means of storage cooking (Clark 2004: 23). Following the Neolithic period, people began to adopt a more settled lifestyle, which led to significant advancements in pottery production including the kiln, kick wheel and various glazes (Clark 2004: 22). As cities began to develop, pottery making was removed from the realm of individual artisans creating domestic vessels for the family and came to be produced by small groups of potters living near clay deposits at the edges of cities (Nado 2007: 226). By the 15<sup>th</sup> century the peasant potter, a product of several generations involved in the craft, worked out of small potteries producing simple yet finely crafted wares (Clark 2004: 38). This tradition still survives today, with families of potters producing wares for their local communities (Jones 2017: 180).

Out of the 17<sup>th</sup> century rose the second, industrial stage of potters accompanied by a multitude of technical discoveries and global exchanges (Clark 2004: 26). International trade brought with it Chinese high-fired ware, porcelain and most westerner's first contact with a teapot. The graceful forms and perfectly proportioned bodies greatly impacted the aesthetic understanding of the time. The new European artisan and mercantile class had emerged during the mid 17<sup>th</sup> century generating a demand for ceramics thus resulting in factories (Clark 2004: 39).

With the industrial revolution in the 18<sup>th</sup> century manufacturing processes increased in scale and volume resulting in mass-produced wares and division of labour was established to ensure efficiency for a lower cost of production. Josiah Wedgwood pioneered automated decoration thereby cutting down the cost of painted wares (Clark 2004: 50). Ceramic design entered into education as the concept of 'applied art' was adopted in specialised art and craft schools, ensuring high artistic standards were available for manufactured goods. 1854 ended Japan's 220 year isolation from the west and brought an influx of Japanese ceramic ware (Clark 2004: 97). The Oriental aesthetic movement led to an idealizing of the arts and romanticising of the potter. However, it also led to a revolt against the unfeeling and dehumanising qualities of mechanisation (Clark 2004: 101).

Thus the artist-potter emerged around 1870, however came to an end shortly afterward in the 1920's. It acted as the transition phase between industrial potter and studio

potter, allowing the studio potter to access the same artistic autonomy as a painter or sculptor (Clark 2004: 105). The founding of the Arts and Crafts Exhibition Society in 1888 led to commencement of the Arts and Crafts movement. Its roots were established in the writings of John Ruskin, who saw art and design in a social rather than industrial context (Clark 2004: 106). However pottery was still practiced within a factory setting hence there existed a divide between design and execution through the division of labour, as such pieces tended to be academic and devoid of life. Nonetheless artist-potters were encouraged to express their own style and for the first time, the artist was able to sign their creation. This contributed to the elevating the status of the 'pot', similar to a painting or sculpture (Clark 2004: 107). The early 1900's saw many potteries close down due to a decline in public interest and a weak economy, World War I sealed the fate of the art-pottery movement and the studio potter emerged (Clark 2004: 132).

Between WWI and WWII ceramics arose as a new art form championed by the studio potter (Harrod 2017: 128). The studio potter was likewise in revolt against the extreme mass-produced nature of ceramics, however they found art-potters lacking in technique and disapproved of the trend-based decoration. The studio potter is characterised by their full autonomy over the ceramic making process, 'digging the clay, creating the clay body, building a kiln, throwing, decorating, glazing and firing' (Harrod 2017: 128). Two influential camps had risen out of the Arts and Crafts Movement; William Staite Murray who saw clay as a fine art material and Bernard Leach who believed in the Oriental philosophy of beauty based in utility. Leach's traditionalist aesthetic philosophy weathered the great depression and World War II and along with Lucie Rie, Hans Coper and Ruth Duckworth, he led studio pottery into the 21<sup>st</sup> century (Warshaw 2011, 13). Although styles have changed dramatically from the Leach period, studio ceramics is still characterised by the potter's full autonomy over the making process: this no longer translates into digging one's own clay, rather it signifies that the ceramist is in complete control of the outcome.

### **The Ceramics Department**

At the turn of the century, as Britain was experiencing the advent of the arts and crafts movement and the splendour of Chinese high-fired wares, production in South African

was limited to a few small studios and factories (Vurovecs 2008: 24). These dealt mainly with earthenware as high-fired utility wares were supplied by Britain, Holland and China. However, following the advent of World War II (1939- 1945) Britain focused its resources on the war and so South Africa was compelled to rely on its own production. Consequently, pottery became very profitable and many small potteries were set up around the Transvaal, Pretoria and Witwatersrand (Vurovecs 2008: 24).

Following the growing trend around ceramic education in Britain, a pottery studio was set up in 1945 by Professor John Oxley, a graduate of the Central School of Arts and Crafts (CSAC) in London and head of the Fine Arts Department the then, University of Natal. The course was offered as a technical module on par with a contemporary diploma. Oxley was joined shortly afterwards by Hilda Ditchburn, a colleague and fellow student of the CSAC (Calder 2012: 64). Ditchburn spent many years in correspondence with Leach and Cardew with the aim of building SA's first stoneware kiln, which she successfully completed and fired in 1954 (Vurovecs 2008: 46). She was particularly inspired by Cardew's practicality and resourcefulness and tried to work with locally sourced materials wherever possible. Leach's philosophy of beauty found in function; influenced her style of making which was quiet, sturdy and technically excellent.

During her time Ditchburn taught the art of making from conception to completion, focusing on scientific material theory and glaze chemistry, hand building, wheel throwing, decorating, glazing and decoration within a domestic utilitarian framework (Vurovecs 2008). In 1969 the ceramics course was elevated to a major subject in the Fine Art Degree. Macintyre-Reed originally from Britain, was appointed lecturer along with Ditchburn in 1972 (Calder 2012: 65). He introduced experimental methods, sculpture and accidental beauty. Through a shared passion they shaped a new era of ceramic art in South Africa; challenging conventions and expanding the coursework to include more sculptural work and educating learners on the history of western ceramics. Following Macintyre-Reed's resignation in 1976 and Ditchburn's retirement in 1987, the lectureship position was taken up by recognised ceramic artist Juliette Armstrong, who graduated from (the then University of Natal UN) UKZN with a Masters in Sculpture. Contemporary ceramist Ian Calder, having also achieved a Masters from UN, joined her later and together they introduced innovative casting

methods, bone china and indigenous traditional pottery to the art history syllabus. Upon Armstrong becoming ill in 2010, Michelle Rall, also a ceramic artist with a Masters research degree from UN joined Calder and continued as the ceramics lecturer after his retirement in 2015.

Since joining the Ceramics Department in 2012 I have experienced the long-standing tradition of ceramic art and scientific knowledge, which underpins the teaching in the Ceramics Studios during my undergraduate years and has continued to be the context of my Masters research.

### **Current sustainable processes**

Currently, there are several waste mitigation measures which were put in place by the department's first lecturer, Ditchburn. These have been continued and improved upon as technology and funding allows. I will discuss these by how what methods are used, and depending on the waste produced, provides a Zero Waste oriented solution.

#### **Clay recycling**

- Left over clay scraps deposited into large water-filled bins
- Separate bins designated for white and red clay
- Clay reconstituted into studio mix clay
- Re-used repeatedly in this fashion
- Although mechanised, process is time consuming and requires large amounts of energy, time and water
- Recycling process generates energy and water waste
- Learners do not understand the effort or process
- Students add large quantities to recycling bins

A possible solution would be to teach students to recycle their own clay scraps, thus bringing awareness to the waste generated and labour it entails

#### **Catchment sink**

- Washing up area is fitted with a catchment sink

- Sink captures heavy particles of glaze oxide waste and clay



**Figure 11,** Catchment sink. Hawley, N., 2018

- Successfully prevents harmful quantities of oxide from entering the environment through drains
- Captures a clay-glaze waste material that cannot be separated for reuse
- Cleaned bi-monthly, un-fired material stored in black bins

A possible solution to this is to rethink this waste material's potential as a resource in some way. Additionally, to avoid build up and plumbing blockages, the sink should be cleaned every week and the resulting materials fired to prevent powdered toxic materials from being spread across the environment. Once fired it should be disposed of by a company specialising in toxic waste removal.

### **Damp cupboards**

- Damp cupboards designed to keep clay damp when work is in progress and needs to be stored
- Series of mesh shelves suspended over a container of water
- Mesh allows the base to be similarly saturated to the rest of its body
- Water is continuously evaporating making the interior of the cupboard moist
- Clay is prevented from drying out before it is ready to be fired and thus avoids unnecessary recycling

### **Drying cupboards**

- The drying cupboards store clay pieces that are intended for bisque firing
- Rows of slatted shelving that facilitate even drying of a piece
- Clay at bone-dry consistency becomes exceedingly fragile and so the cupboards are a sheltered space where they are able to dry in safety
- Broken bone-dry wares cannot be easily fixed and are recycled

### **Studio glaze**

- First and second year projects are glazed with a 'studio mix'

- Mixture of multiple glazes in the form of leftovers and small test quantities
- Separated out into light and dark, earthenware and stoneware and mixed up as studio glazes

### **Staggered firing schedules**

- Many of the kilns used simultaneously
- Draws a large amount of energy
- Staggering schedules so that kilns don't reach temperature at the same time reduces energy and prevents the kiln from tripping

### **Kiln shelves**

- New kiln shelves are composed of silicon carbide
- Hollow inside
- Extremely light weight and durable
- Reduce the power needed by the kiln to reach its temperature

### **Programmable electric kilns**

- Controllers that have a built-in set of firing schedules
  - Choose a schedule based the needs of pieces
  - Prevents waste in the form of breakages and explosions if thick wares are fired slowly
  - A technical assistant is employed to assist students in firing.



**Fig 12,** Kiln and controller.  
Hawley, N., 2018

### **Toward more sustainable studio practice**

This section aims to examine studio process in order to identify more sustainable Ceramic Studio practice. This will be achieved firstly, by identifying existing practice, secondly detailing sustainable processes in place, then identifying practice that could be improved and finally formulating suggestions for improvements based on the ZWP.

The Ceramics Studio is a part of the Centre for visual Arts at the University of KwaZulu-Natal. Therefore, our studio is a functional learning environment where students are educated in the ceramic arts from first year through to a PhD level. Because the studio is a learning environment, I have focused this investigation on a first and second year level into Ceramic Studio processes. These can be divided into stages of making, firing, glazing and re-firing, which will be explored in tabulated format below.

### **Making**

<b>Studio practice</b>	<b>Effective practice</b>	<b>Ineffective practice</b>	<b>Suggestion for improvement</b>
Student receives measured amount of clay	Prevents beginners from creating large badly made wares that need to be recycled		
Surfaces cleaned removing clay from the tables	Cleaning is part of studio safety- clay dust can lead to silicosis	Water is wasted when washed down the sink	Series of buckets for washing up where water is reused
Works in progress are kept in damp cupboards	Prevents clay from drying out and having to be recycled		
Completed pieces stored in the drying cupboards	Clears working space and ensures even drying		
Clay scraps are recycled	Clay is recycled- reducing new resources	Students contribute large amounts to recycling	Students taught to recycle their own clay- become aware of and responsible for their waste

Table I: Processes of making in the Ceramics Studio of the CVA



### Bisque Firing

Studio practice	Effective practice	Ineffective practice	Suggestion for improvement
Pieces stored in the drying cupboard until there are enough wares to fill a kiln	Filling a kiln reduces energy wasted on firing multiple half packed kilns	Saturated green ware requires longer firing schedules and damages the kiln elements	Fire wares when bone dry
Kiln is tightly packed and wares are stacked	Ensures economical use of electricity		
Shorter wares positioned on the bottom shelves, taller wares at the top shelves	Saves space for more effective packing		
Bisque set to a slow firing schedule	Ensures wares are properly dry and thick pieces don't explode	Longer firing schedule draws more electricity	Allocate marks for evenly thin walls to encourage awareness

Table II: Processes of bisque firing in the Ceramics Studio of the CVA

### Glazing

Studio practice	Effective practice	Ineffective practice	Suggestion for improvement
Bisque ware is wiped down before glazing	Prevent glazes crawling and pulling off the clay body	Sponges are wet repeatedly and water is washed down the drain	A series of buckets for washing up in where water is reused
Studio mix glaze is used to glaze wares	Small amounts of glaze are consolidated into studio mix glazes		
Glaze is applied by dipping	Body is evenly covered by glaze	Large quantity of glaze is used as it soaks into the body	Supervised dipping in short amount of time to reduce glaze
Glaze is applied by sponging	Small amount of glaze is used		
Glaze is applied by spraying	Even coverage and spray booth captures excess glaze	Dispersing fine glaze particles in the air is a health hazard and glaze waste	Proper equipment and face masks
Glaze is applied by brushing	Relative amount of glaze is used		
The foot is wiped clean	Avoid glaze melting onto the kiln shelves during firing	Water and glaze particles are washed down the sink	Series of buckets for washing up in where water is reused
Once dry the wares are packed	Prevents glaze defects and moisture damage to the elements		

Table III: Processes of glazing in the Ceramics Studio of the CVA

### Glaze firing

Studio practice	Effective practice	Ineffective practice	Suggestion for improvement
Once dry, wares are packed into the kiln	Prevents glaze defects and moisture damage to the elements		
Pieces are packed tightly, carefully into the kiln with nothing touching	Prevents glaze surface melting and fuse to one another		
Shorter wares are positioned on the bottom shelves, taller wares at the top shelves	efficient packing		
Glaze firing is a set schedule	Prevents incompetent firing and electricity wastage		
Kiln fired to earthenware	Draws less energy than stoneware		
Kiln fired to low stoneware (1200° C)	Uses less electricity than high stoneware (1260° C)	Draws a lot of energy to reach these high temperatures	Consider what pieces need to go to stoneware and why

Table IV: Processes of glaze firing in the Ceramics Studio of the CVA

This investigation into processes within the Ceramics Department has yielded a practice that is fairly sustainable owing to its waste mitigation processes. In evaluating these processes I have come to appreciate the systems that we currently have in place. The tabulation presented above is evidence of my exploration of the various studio processes, in an effort to identify further solutions using the ZWP. Firstly, a series of

washing up buckets could be installed to reduce water wasted in cleaning up, secondly teaching students to recycle their own clay would result in a better understanding of the process and its water, energy and time consumption. Waiting until pieces are bone dry and marking students according to wall thickness will decrease drying time and energy expended in firing. Supervised glazing will reduce the amount of glaze used and the proper equipment utilised when spray glazing will prevent illness such as silicosis and heavy metal poisoning, resulting in a more sustainable environment. Finally firing of wares to stoneware temperatures should be justified as this schedule draws large amounts of electricity. Considering these suggested improvements, overall I regard our studio to be environmentally conscious and inclined towards sustainable practices.

## Chapter four

This chapter follows on the identification and suggested alteration of Ceramic Studio practice discussed in chapter three. Here I intend to detail a selection of solutions and their implementation in my creative practice. I will approach this investigation using the methods adapted from the Zero Waste principles, dividing my practice into sections entitled 'Reduce', 'Reuse', 'Recycle', 'Recover' and 'Rethink'. In each section I will identify the waste generated, accompanied by a description of its effect on our environment in order to draw awareness and validate the relevance of reducing the subsequent waste. I have based the formulation of these solutions on other artists or art projects working in similarly sustainable manners. Following this, I will implement each proposed solution, then discuss the result of these changes to my studio practice in terms of their contribution to embodied meaning, their effect on the reduction of waste and in terms of their viability in the Ceramics Studio.

### Reduce

When less is used and consumed it impacts directly on the amount of waste produced (ZWIA 2017). The Institute of Waste Management South Africa states that to reduce is to make a conscious decision to use less; in this case it can be applied to materials, energy and water (2015). Therefore I have approached this method with the question: what supports the use of less material and less toxic material?

I have identified energy waste as the focus of this section. Ceramic Studio energy waste is caused by excess use of electricity due to slow and extended firing schedules to bisque for heavy walled pieces and the inclusion of a second firing. However these are necessary steps when first learning to work with clay and cannot be foregone in this context.

The effects of wasting energy affect the environment on many levels. The U.S. Energy Information Administration (2017) states that electricity, although a relatively safe form of energy, affects the environment through its generation and transmission. Initially power plants require the clearing of land, access roads, railroads and pipelines

for fuel delivery. Burning fossil fuels to generate energy plays a leading role in global warming; contributing nearly 40% of total energy related Carbon Dioxide in the United States (EIA 2017). The burning of fossil fuels in the form of coal produce carbon dioxide, carbon monoxide, sulphur dioxide, heavy metals, nitrogen oxides and particulate matter (EIA 2017). Carbon dioxide contributes to global warming. Sulphur dioxide can exacerbate respiratory illness and heart disease and causes acid rain, which is harmful to aquatic organisms. Heavy metals, for instance mercury, have been linked to neurological and developmental damage in animals and humans alike, nitrogen oxides damage and irritate the lungs while particulate matter causes the brown haze of pollution over cities as well as asthma, bronchitis and lung disease (EIA 2017).

In South Africa our electricity is generated primarily through coal. According to Greenpeace (2016) coal mining is highly destructive to the environment resulting in massive changes to the landscape, displacement of communities and wildlife and contamination of ground water with pollutants. Using electricity more efficiently reduces fuels burnt and subsequent emissions of greenhouse gases and other air pollution. However if we were to turn to green energy these effects could be negated. Renewable sources of power such as wind, solar, geothermal and water do not contribute to climate change or air pollution, as no fuel is needed for combustion (EPA n.d.).

In order to reduce the amount of electricity used in my creative practice I began to explore methods of single firing. In my research I identified ceramist and author Dennis Parks, who is known for his unique firing techniques. His work is comprised of slip cast and wheel thrown utility-ware inspired studio works. I have used his book entitled *A Potter's Guide to Raw Glazing and Oil Firing* (1980) as a manual to effectively reduce energy consumption by eliminating a second glaze firing. Single firings were a widely accepted practice up until the 1700's; potters would dry glaze raw wares by dusting powdered materials onto unfired green ware (Clark 2004: 40). However as a means of decreasing breakages in an industry setting, green ware was first fired to bisque, coated with wet glaze and then re-fired (Clark 2004: 40). Parks challenges the assumption that clay has to be pre-fired in order to apply glaze saying that, provided the work is well made, one can raw glaze a variety of shapes.

Applying glaze is most successful when sprayed on, as opposed to dipping, which tends to dissolve the porous clay body and causes it to disintegrate as it soaks up water (Parks 1980: 28). Brushing on a glaze can result in marks on the clay body and



**Figure 13**, Hawley, N. 2017. *Raw Glaze Test Pieces*. 6x 5cm. Assorted earthenware and stoneware. Photo: Natasha Hawley.

pouring can cause the walls to become saturated and warp.

Depending on the composition of glaze and clay, a glaze might flake off the body due to incompatible shrinkage rates. This is easily remedied by including a small amount of bentonite or ball clay to help it adhere to the surface. The raw glazing technique may yield different results when the same glaze is applied to bisque ware as

organic compounds in clay burn off during biscuit firing and interact with the glaze materials (Parks 1980: 32).

I have utilised his methods in glazing raw clay at a wet, leather-hard stage. Glaze is applied by pouring into the clay vessel while it is still supported by the mould; the pour marks are visible on most pieces. An additional step I have taken in this section



**Figure 14**, Hawley, N. 2017. *Raw Glaze Test Piece*. 6x 5cm. Raw glazed earthenware and recycled glaze. Photo: Natasha Hawley.

is to use left over glazes and recycled mixes, which further reduces the amount of raw materials consumed. This is a practice already in effect in the Ceramics Studio. Faults that arise in this process can easily be corrected using Park's recommendations on material additions and changes to the clay body (1982).

I have taken inspiration from Park's use of slip casting and purpose built forms that are thin and lightweight, thereby reducing materials used and the energy required in firing these pieces. Figure 13 is a successful example of multiple vessels that require

reduced energy and clay. I created a plaster of Paris mould in order to make thin walled pieces; created using clay recycled into casting slip. Generally in comparison to hand building or throwing, the technique of casting is a low waste process in that it uses small quantities of material, easily recyclable, light, dries quickly and for this reason, takes less energy to fire. I have chosen the small structure because the sheer variety of glazes requires multiple test pieces. Informed by the ceramic-scientific methodology I have produced multiples of the same shape, in order to monitor the varying effects of each glaze by comparison. Test vessels are small, thin, lightweight appealing forms that are easily stacked so as to take up minimal space. In my creative process the act of making and materials used contribute meaning (du Preez 2008: 32), here process is indicated through subtle pour marks on the interior and recycled materials contribute to the message of sustainability. However, as the effects don't bring about significant changes in appearance, the titles of works allude to these alterations thus affecting the reading of a piece.

This section entitled 'Reduce' has identified energy as a resource that is wasted in the Ceramics Studio. After detailing its negative effects on the environment I have aimed to substantiate sustainable changes to practice. Dennis Park's single firing and slip casting techniques have informed these changes. Implementing the raw glazing, single firing method reduces the amount of energy that would normally be used in twice firing. However this is a technique unsuitable for beginners to the medium, as the raw wares need to be structurally competent to survive the process.

The second change to process is in the form of slip casting with recycled clay scraps. Due to the minimal amount of clay contained in their insubstantial structure and method of making, these tend to warp at stoneware temperatures. The thinness of the vessel walls result in an ethereal fragility that becomes more evident as the viewer leans over to consider the interior offerings of colour and texture. This technique has enabled me to reuse all of my clay scraps thus eliminating waste from my making process, additionally the thin walls contribute to the reduction of energy used in firing. Therefore I consider slip casting a viable method for use in the Ceramic Studio as a way of recycling and reducing the energy expended in firing.



## Re-use

The re-use method of Zero Waste asks what supports the better use of those products we already have in ways that retain the value, usefulness and function. Re-use extends the product's life cycle by reusing it for the same function or something completely different (IWMSA).

I have observed aspects of studio practice where students generate water waste. Currently water is used to clean hands and tools as well as floors, tabletops and counters. Cleaning the floors and surfaces using water from a bucket results in dirty water (grey water) that is then used to water the plants in our courtyard; because this by-product is utilized it is not classified as waste. However when washing up using the sink, relatively clean water is flushed into the catchment area and from there, into the drainage system. This can be considered a linear process where the by-product, water, produced from washing up is discarded.

Currently one per cent of the water that exists on our planet is available and viable for consumption, which acts as a limiting factor on the carrying capacity of the environment to support human life. A report published by the Department of Environmental Affairs, names South Africa as the world's 30<sup>th</sup> driest country (2011). The improvement of water-use efficiency, quality and conservation are considered a national priority by our government (DEA 2011). The overuse of water directly affects all communities; a shortage can lead to disease, starvation and illness (Mohsenin 2017). Agricultural livestock depend on fresh water, the lack of which can lead to food shortages. According to an article written by Ava Mohsenin, communications associate at WaterNow Alliance, water wastage negatively affects the environment in multiple ways. Diversion of fresh water away from aquatic environments to supplement agriculture results in many plants and animals becoming endangered (Mohsenin 2017). Additionally the process of water purification generates waste. Before water is fit for human consumption it needs to undergo a multitude of processes. The extraction, transportation and filtration alone require large amounts of electricity, time and money and produce dangerous by-products including methane, carbon dioxide, chlorine, ammonia, and hydrogen sulphide (Mohsenin 2017). Thus

wasting water equates to wasting energy as the many steps of water filtration, require non-renewable fossil fuels (Mohsenin 2017).

A solution can be drawn from the example of the waste mitigation system currently in place at the Fine Arts Department at Oregon University (Harrison 2013). During the mid 1990's the community, faculty and staff grew concerned about the environmental impacts of the art program. Following discussions, Professor Sana Krusoe and then graduate student, Nancy Frazier, began working on a system to deal with the water, glaze and clay waste. Eventually a solution was found through by using a series of buckets to reuse water multiple times, the rinse water was then used as a component in glazes (Harrison 2013).

The sinks in the studio at Oregon University have been boarded up so that there is no running water available in the space. Instead there are four large buckets of water specifically for washing hands and tools in. Each bucket in the sequence is cleaner than the last, effectively allowing students to thoroughly clean their hands without



**Figure 15**, University of Oregon. 2010. Four-bucket system at the University of Oregon is designed for capturing all glaze waste. Photo: Kristin Schimik. Available: <http://ceramicartsdaily.org/ceramics-monthly/tag/the-university-of-oregon/> [2016, August 03]

running water. Glaze particles sink to the bottom of the bucket, water is siphoned off and used as a glaze component and the particles are captured ready for reuse. This is a prime example of a linear system being redesigned into a cyclical system as water is transformed from a single use resource into a supply

that can be reused multiple times.

I have adopted this system of water buckets in my studio space at the Ceramics Department: I clean my tools, hands and surfaces using the same water. Particles tend to settle allowing the reuse of this water over a period of two weeks (depending on my making schedule). Once the water is no longer usable I let the particles settle and

water the plants using the grey water. The sludge that is left behind is added to a bucket where it is utilised at a later date.

This change in my practice has an invisible but direct effect, making an overarching contribution to the sustainable nature and environmental-friendliness of my pieces. Thus although imperceptible in the finished product, meaning is embodied through the process of making.

Reusing water in my practice has not led to any noticeable effects on the artefacts I create therefore I consider it a successful and sustainable change to practice. I feel that this solution can easily be implemented in the Ceramics Studio and result in a massive reduction in water waste.

## Recycle

This segment aims to address areas where waste materials can be put back into the materials cycle. This section differs from re-use where materials are used again, rather recycling involves the altering of materials in order to re-enter the production process.

The sustainable influence Bernard Leach and Michael Cardew had on Hilda Ditchburn



**Figure 16**, Recycling symbol for clear glass bottles, [https://en.wikipedia.org/wiki/Recycling\\_codes](https://en.wikipedia.org/wiki/Recycling_codes) Accessed 02 September 2017

is evident in the tradition of recycling upheld by the Ceramics Studio of UKZN today. As recycling of clay already occurs, I have focused on student generated waste materials. In integrating waste back into the making cycle I have chosen glass as a material that can be recycled into glaze.

Glass occurs naturally in our environment.

Archaeological findings suggest ancient Egyptian apothecaries in the third century BCE produced the first true glass, perhaps discovered accidentally as a by-product of metalworking which could have heated sand to extreme temperatures causing it to melt into glass (Martin & Macfarlane 2002). Glass is a non-crystalline amorphous solid with transparent qualities generally made up of silicate, soda and lime. It serves a multitude of varying functions in the twenty-first century including: windowpanes, tableware, use in data transmission and

art objects. Glass transmits, reflects and refracts light and lends itself to colouring, cutting and polishing, characteristics that make it highly desirable for decorative finishes (Martin & Macfarlane 2002). Glass is ideal for recycling as the material keeps its integrity during everyday use and is virtually infinitely recyclable. Before it enters the recycling process, glass is separated by chemical composition and colouring. Different types of glass become liquid at different temperatures, ranging from 1400° to 1600°C. According to an environmental impact assessment carried out by AGC glass Europe, the only negative action glass has is the CO<sub>2</sub> emissions emitted during melting (AGC glass n.d.).



**Figure 17**, Hawley, N. 2017. *Coral: Recycled Glass*. 40x 5cm, height varies. Glass frit substitute glazed to earthenware. Photo: Natasha Hawley.

Kofi Boateng's work (2002) utilising glass bottles as a substitute for frit in ceramic glazes has encouraged me to use the glass waste generated by students at our studio. Frit is used to make a glaze mature at a lower temperature (Rhodes 1987: 50). Boateng received a BA in art education from Nkrumah University of Science and Technology in Ghana. Due to economic hardship many ceramic studios in Ghana cannot afford to import frit, a common component in glaze (Boateng 2000). Boateng conducted research into utilising broken bottles from breweries, crushed into a fine powder and was able to formulate a number of glazes based on

his findings. His Research paper is entitled *Use of Discarded Broken Bottles as a Substitute for Frit in the Manufacture of Glaze* (Boateng 2000).

Inspired by Boateng's investigation I have crushed up and sieved broken glass bottles to extract a fine powder. Informed by the ceramic-scientific methodology I have chosen a control that can be compared with the frit-substitution glazes on order to monitor their effects. This glaze has three ingredients being a frit, kaolin and dolomite and matures at 1080°C. It results in a shiny crazed transparent surface. Figure 17

illustrates a series of vessels glazed using various powdered glass substituted for frit 510. The pieces were fired to 1080°C however the glass has not fluxed and instead has created a rough semi-opaque texture where thick. When fired to 1200°C the glaze melts, runs and crazes producing a shiny molten appearance. The glaze can also be successfully applied to green ware.

This method of recycling offers a unique glaze but requires time and labour, as glass needs to be finely crushed to be a viable frit substitute. The glass has resulted in roughly textured surfaces in muted tones that bring to mind sea foam or heavily textured coral. The control glaze, applied in-between each level provides a shiny contrast to this roughness. Here waste has produced aesthetic effects that serve sculptural pieces. The recycling of glass is less harmful to the environment than creating it from raw materials. Therefore although this provides a successful alternative to frit 510, reducing the use of raw materials through recycling, I consider this method impractical as it removes glass from the glass bottle recycling cycle thus perpetuating the making of new glass. In the Ceramics Studio setting it may be viable as instruction in glaze chemistry, however overall it is not recommended.

## **Recover**

The recovery stage asks what can be salvaged from mixed waste.

Mixed waste in the case of student-generated waste exists in the form of plastic, paper, glass, metal, teabags and used coffee grounds. I have incorporated these discarded materials into the clay body and as components of a glaze. In this section I have used plastic packets as an illustrative example.

Plastic shopping bags, sometimes referred to as ‘single-use bags’ are made of various types of plastic and have been used worldwide since the 1960’s. These are made from polyethylene derived from petroleum and natural gasses (Freinkel 2011). The United States International Trade Commission (2009) stated that 102 billion bags are used per year in the United States alone. Their chemical makeup and sheer volume makes this product a formidable threat to the environment. Plastic bags are the most prevalent form of waste on land and in the oceans. Degrading into micro particles and releasing

harmful chemicals, these plastics invade every level of the eco-system. Sea turtles, albatrosses, seals and their young often eat plastic bags as the material mimics the movement and colour of jellyfish. Once ingested it stays in the animals' stomach causing intestinal blockages that eventually lead to death by starvation (Schiller 2012). On land large build-ups of these can cause blockages to drainage systems causing flooding in populated areas as occurred in PMB in 2016 (Pillay 2016).

In dealing with the recovery aspect of the Zero Waste theory I have drawn on the work of Phil Rogers, a well-known ceramist working mainly with ash glazes and wood firing techniques. Rogers digs his own clay, uses slips from the area and tries to use as many local materials as possible. His work is simply decorated with a focus on the relationship between form, function and aesthetics using a limited amount of materials that he knows intimately (Rogers n.d). His research into collecting and testing wood ashes in glazes, has motivated me to test waste materials as a component in ash glazes. Using the methods outlined in his book *Ash Glazes* (1991) I formulated a glaze using the ash from plastic shopping packets. The packets are enclosed in a



**Figure 18,** Hawley, N.  
2017. Ash Glaze PSW. 5x  
3-cm. slip cast, stoneware.  
Photo: Natasha Hawley

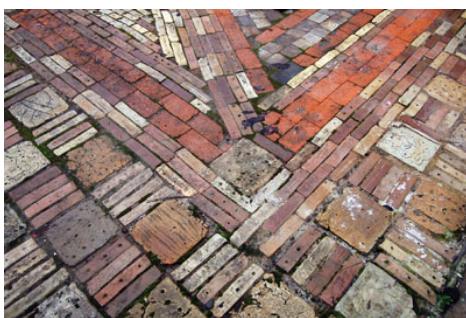
sagggar (a ceramic container sealed with clay so that no gasses escape) and fired up to bisque, which converts the plastic to ash. This is then retrieved from the sagggar, sieved and added to a tested glaze recipe. The test piece is fired to stoneware temperatures. Surprisingly the resulting glaze is an appealing creamy white colour with a smooth satin texture, as seen in Figure 18.

The material used in making this piece is highly detrimental to all forms of life as it is consumed by birds and animals causing starvation and due to the chemicals that leach into the environment. When viewing the piece its aesthetic qualities are in sharp contrast with its destructive properties. One drawback of this technique is the minimal amount of ash produced from plastic packets. Thus I have concluded that the energy expended in converting the waste to ash outweighs the use of this material as a resource and it does not pose a feasible undertaking in the Ceramic Studio. However in a commercial setting the plastic ash left over from the incineration process may provide an excellent glaze resource.

## Rethink

Having implemented all the above principles of the ZWP, the final step of the Zero Waste methods is ‘rethink’. This requires me to identify any waste that is still being produced in the ceramic making process. If waste is generated, can the process be redesigned to eliminate that waste?

Catchment sink waste is the main by-product generated by the ceramic making process. It is a combination of clay and glaze washed into the catchment area when student wash up; as this substance cannot be separated it holds no use as a workable glaze or a clay body. In its powder form the combination of clay and glaze can be hazardous; it often contains poisonous minerals and heavy metal oxides which can easily be dispersed by the wind or leach into the water table. For this reason this waste is meant to be fired it so that it transforms into solid after which it is taken to a dumpsite. Acquiring the materials needed in ceramic making contributes significantly to environmental damage through mining and transport. The extraction of heavy metals through mining contributes to higher concentrations of heavy metals and their widespread distribution in the environment; as such human exposure has increased significantly in recent years (Greenpeace 2016).



**Figure 19**, University of Oregon. 2001.

Patio pavers installed. Photo: Kristin

Schimik. Available:

<http://ceramicartsdaily.org/ceramics-monthly/tag/the-university-of-oregon/> [2016, August 03]

Similar to coal mining the principle causes of environmental damage by metal extraction and processing are waste products and mining operations.

Metals used in glaze formulation such as cobalt (Co), copper (Cu), manganese (Mn), nickel (Ni), chromium (Cr), iron (Fe), magnesium (Mg) and zinc (Zn) are essential nutrients required for various chemical bodily functions however, too much can have equally adverse effects affecting the kidneys,

brain and immune system (Tchounwou *et al* 2014). Chromium can lead to multiple



organ failure in high doses and silica causes a lung condition known as silicosis (Tchounwou *et al* 2014). According to an article published by the US National Institute of Health (1990), alumina (a common glaze ingredient), when present in large concentrations, is detrimental to terrestrial and aquatic freshwater organisms. It has been documented as an inhibitor of metabolic processes in mammals and birds. This metal is able to enter the terrestrial food chains through plants; high levels have an adverse effect on finer root systems, limiting nutrient absorption (Rosseland, Eldhuset & Staurnes 1990).

Once again I have drawn on the University of Oregon ceramic studios' work with ceramic waste materials in finding a solution to this source of mixed waste. The Oregon ceramic department set up a system of washing up buckets to recover clay and glaze waste, which was successful. However, there proved to be an excess of mixed glaze material (Harrison 2013). Arts lecturer Krusoe handed over the project to undergraduate Frazier who, with the help of fellow students, successfully produced usable paving bricks by combining the glaze and clay waste. This paver mix is formed into blocks, perforated and fired up to cone 1 (1154°C). Today these bricks are

donated to the university and members of the community, who hold them in high regard (Harrison 2013).



**Figure 20**, Hawley, N. 2017. *Vessel in Excess II* and *Excess-Clay II*, 45x 33cm, 7x 6. Studio-generated waste, earthenware. Photo: Natasha Hawley

Inspired by this dynamic use of waste I decided to collect all the waste I produce in my creative practice. This became a record of the amount and type of waste I generated over a one-year period. In a designated bucket I gathered materials left over from my making practice including metals, spilled engobes, tea bag

leaves, small pieces of paper, coffee grounds, clay scraps, plastic, spilt glaze and the sediment collected from the bucket used to wash up. The waste mix was first tested to bisque, earthenware and stoneware to establish its effects in fitting with the Ceramic-scientific methodology. Employing the heuristic framework I chose to replicate this piece in a larger format as it appealed to my personal sense of aesthetic. Waste was rolled out and pressed into the Plaster of Paris mould along with clay scraps to form contrasting areas of colour and texture. Fired to earthenware certain areas melted



while coloured areas either dulled or became brighter. Warping was minimal, as the waste and clay have shrunk at the same rate. This vessel is unique in that the waste I produce is exclusive to my practice and cannot be recreated. Utilizing only used and discarded resources effectively eliminated the use of raw materials and resulted in an artefact composed wholly of discarded by-products.

The catchment sink waste has produced unusual and unique visual and tactile qualities in firing. This change to practice has produced an aesthetic response that is in contrast to the material used in its making. As it is composed completely from waste products it is a prime example of the ZWP in action. Therefore it is my opinion that although that these materials require regular testing, the solution presented by the Oregon Ceramics Studio is an effective and aesthetic method of utilising potentially large quantities of this mixed waste.

## **Conclusion**

In researching a topic of Zero Waste in relation to a ceramic studio environment I have come to appreciate the systems that we currently have in place. Overall I consider our studio to be environmentally conscious and inclined towards sustainable practices.

Based on the analysis of studio practice in chapter three, I used the methods adapted from the ZWP and drew upon artists and projects working in a similar manner to identify possible sustainable changes to practice. In fitting with PBR I have used my practice as an investigative and demonstrative tool of these proposed solutions (Gray & Malins 2004). Through the use of ceramic-scientific methodologies in making and evaluating the effects of these changes, I have been able to identify several areas where waste can be mitigated including: slip casting, reusing water, raw glazing, utilising waste as a glaze and the use of catchment sink waste. Based on these outcomes I have further evaluated their suitability in the Ceramics Studio environment and elected several practices that can be applied, namely the reuse of water, slip casting techniques and the use of catchment sink sludge as a resource.

Through these methods of altering my practice to be more sustainable I have found that meaning is embodied through the physical manifestations in my work; whether it be through the materials used or the changes to making.

In other areas such as water re-use, these changes are not visible but still produce compelling results in terms of waste reduction and elimination.

## Chapter Five

Following the investigation and evaluation of the viability of the Zero Waste Philosophy in the Ceramics Studio setting CVA, I will now focus on my creative practice and the art works that have resulted in fulfilling this aim.

A key aim of this research is to understand the message conveyed by the vessel, which has been used as investigative tool of research. In creating these artworks I have utilised altered processes and experimented with various studio and student generated waste materials and clay, using the vessel as a means for exploration. In doing so I have employed the PBR, heuristic and ceramic-scientific methodology, through action and reflection, experimentation, informed subjective decision-making and experiential and tacit knowledge. The following chapter will employ a formal analysis of selected artworks using critical reflection on my purpose, processes and the meaning of my creative practice. This will be carried out using the theoretical frameworks of sustainability and materiality. Pages from my reflective journals included in appendix 1, will be referenced as substantiating evidence.

The vessels produced in this study are intended as art objects that influence material negotiations between often ‘competing embedded social distinctions’ as opposed to utilitarian wares that function in the domestic sphere (Geismar 2004: 43). As established in chapter two, clay and waste materials each have their own active roles in society therefore these materials and their processes contribute a distinctive discourse which comes into play in the interaction between artist, material and process during creative production (Spencer 2017: 15). Therefore there are number of contrasts between the artworks created in this context and the domestic vessel, pertaining to form, surface appearance and content. I have briefly described these here, as they are significant to my use of the vessel form in a cultural context.

In order to facilitate the scientific-ceramic methods of experimentation I have pared the vessel form down to a minimal container, often foregoing the foot, belly, neck shoulder and lip (See Reflexive journal 1), features that are associated with utilitarian wares. Due to the iconographic symbolism of the vessel the form becomes ‘an object

that presents the formal essence of a pot' (Adu-Gyamfi, Boahin & Padditey 2013: 555). The interactions of clay and waste affect the surface appearance of the vessel. Melting, fusing, warping, burnouts, cracking and staining, all result in a vessel that is unable to function as a container in the traditional sense. Rather, the form becomes a utilitarian container of meaning as opposed to a utilitarian container of food or liquid. My creative practice has been used as an exploratory and demonstrative tool of my investigation into the Zero Waste philosophy (Candy & Edmonds 2010: 5). As such, these vessels simultaneously function as literal containers of knowledge. I have drawn on the active social roles of clay and waste and utilised the form's embedded domestic implications as a familiar object from which to question embedded societal value systems.

In discussing my creative practice I have divided the artworks into two sections based on the nature of making and of display. 'Section one: Investigation' deals with the initial experimentation with studio and student-generated waste as a resource. My creative practice has been informed by a ceramic-scientific methodology. The presentation of this group of vessels is based on the modes of display utilised in a museum environment where the aim is to expand knowledge (Carlins 2015: 14). 'Investigation' forms a palette from which I have chosen the materials used in creating the body of works included in 'Section two: Application'. These vessels are more spontaneous and natural than forms and processes used in creating the 'Investigation' series. Drawing on aspects of heuristic inquiry my choice to carry through certain material combinations was based on my subjective sense of the aesthetic derived from my personal worldview and dependent on the experiential knowledge gained in the first body of works (Moustakas 1990 15-27). Their display is more organic, positioned on plinths allowing the viewer to move in and around the works in a three-dimensional space.

In order to understand the effects of altered processes and material additions on the vessels' message, I will detail the investigative nature of their making processes and then illuminate on the modes of display, as waste materials displayed in an exhibition context forms part of the contextualisation of my work (Pekarik 2002: 2). Following this, a formal analysis of the vessel's visual appearance in terms of colour, form, texture and weight, will act as an entry point into analysing its embodied meaning

gained through the Zero Waste methodology and materiality theory (Spencer 2017: 14- 15).

## **Section one: Investigation**

### ***Clay-Waste Vessel Series (2016- 2018)***

The *Clay-Waste Vessel Series* (2016- 2018) constitutes sixty-three vessels made with different waste materials, substances that are detailed in chapter one. Employing the Zero Waste principles I have used waste as a resource and consequently reduced the amount of raw materials in keeping with sustainable practice. Using methods of the ceramic-scientific research design, I have produced a set of three vessels made out of clay; fired to bisque, earthenware and stoneware (See figure 30, Appendix 1). These act as a control in evaluating the effects of discarded materials added to clay. I have used clay as a metaphor for the environment, natural and organic in its composition, while waste references the effects of our throwaway society. The process of their creation alludes to industry, mechanised, mass-produced, efficient and often detrimental to the natural environment (clay). My use of identical Plaster of Paris moulds to create repeated forms is evident in this format as each waste-clay vessel is initially almost identical. During firing the different materials are transformed and interact; fusing, staining and disintegrating to emerge from the kiln, often completely changed, resulting in pieces that lose the rigidity of the mould but are nevertheless still a series connected by the initial repetitive process of mould making. This process is used to establish the links in my work between industry and earth, the mechanical and organic and the man-made and the natural (Mills 2009: 33). The viewer's experience is impacted by the evidence of this mechanical process, becoming uncomfortable with the constrained form in juxtaposition to its organic transformation (Mills 2009: 1) (See figure 27, Appendix 1).

In order to challenge the negative way society views waste I have reframed the meaning of this material through its combination with clay in the vessel format, and displayed the outcomes in an exhibition setting (Mills 2009: 2). Through the action of waste on clay in the firing, these vessels are unable to function as utilitarian containers. The materials used are potentially extremely toxic, contaminating the clay

and anything it may contain. Therefore the form becomes a vehicle for exploration rather than a cup from which to drink. Thus the *Clay-Waste Vessel Series* (2016-2018) integrates several discourses. Through the discussion of selected examples that follow, I will demonstrate how these vessels are simultaneously containers of knowledge through the information recorded on each surface and containers of meaning through the materials used, evidence of process, the form they take and their mode of display.

In addressing the exhibition of these vessels I have aimed to emulate the experimental nature of their creation through modes of display. The Ceramic Studio is not just a creative space for producing artworks; it is also an alchemical sphere, which includes experimentation that resembles the research carried out in a scientific laboratory.



**Figure 21**, Hawley, N. 2018.  
Mounted wall display. Photo:  
Natasha Hawley

This is evidenced in the methods of observing, collecting, documentation, experimentation and recording results that forms part of the ceramic-scientific methodology. In order to evoke this aspect of practice I have positioned the vessels on glass shelving mounted along the walls of the exhibition space as evidenced in Figure 21. The formal layout and use of glass implies categorisation of phenomena with the purpose of presenting a viewer with knowledge, a similar visual trope to that of natural history museums (Bowry 2015: 117). True to the exhibition as an artefact display model, each vessel is given enough space so that the viewer can contemplate it as an individual artwork (Pekarik 2002: 9). Each series of

shelves is mounted symmetrically and precisely and each vessel is positioned equidistant from one another, this along with the glass acts as a metaphor for the inherent need to categorise and control that is unique to humanity (Figure 22) (Bowry 2015: 118).

I have employed the triptych as a mode of display that contributes to a unity of composition and perpetuates a cycle of viewing, leading to introspection (Bowry

2015: 171). The vessels are positioned three per shelf in a group of three shelves, mounted along three walls of the gallery. In reflecting on why I chose this method of display, I realised that it alludes to the circular nature of ceramic practice; making, firing and glazing, and the nature of PBR in action, reflection and reflexion. The shelves are deliberately positioned at specific heights (Figure 22). The middle shelf is



**Figure 22,** Hawley, N. 2018. Mounted wall display. Photo: Natasha Hawley

mounted at eye level for the average viewer, which allows the vessel to be seen straight on, emphasising its profile. The one below offers a view from above and so exposes the interior of the form, while the highest shelf is positioned so that the viewer looks up at the base of the vessel. Thus each vessel presents the viewer with a controlled perspective.

In contrast with the rigid display, the positioning of these vessels has been determined intuitively and mediated through peer review (Gray & Malins 2004: 73, Moustakas 1990: 23). In setting up a mock exhibition I experimented with the arrangement of vessels and came to the conclusion that the aesthetic experience was more significant than the presentation of ordered knowledge (See figure 31, Appendix 1). Consequently, instead of implementing a scientifically ordered arrangement, I positioned the vessels in a way that leads the eye through various colour placements and encourages the viewer to find their own connections by visually linking similar pieces and referring to labels (Gray & Malins 2004: 73). Likewise I employed peer review as a research tool in formulating titles. I had to consider how much information to give the viewer: whether to preference the exhibition as a communicator of ideas or as an artefact display model (Pekarik 2002: 2-3). After trying out several approaches I decided to position labels to the side of the shelving display so as not to interfere with the viewing of the object. The labels are simple titles of the work, which refer to the materials they composed of. They provide information and context without detracting from the contemplation of the artworks (Pekarik 2002: 2-3). Thus this mode of display perpetuates the scientific experimental aspect but also allows the aesthetic nuances of the vessel to be contemplated.

I will now discuss selected pieces from the *Clay Waste Vessel Series* (2016- 2018), which demonstrate the effects of process, material additions and display on the message they convey. A formal and iconographic breakdown enables a discussion of their material identity and broader discourses to enable the reading of the vessel (Spencer 2017: 14- 15).



**Figure 23**, Hawley, N. 2017. *Polystyrene-clay I*. 7x 6-cm. Polystyrene and stoneware clay body. Photo: Natasha Hawley

### ***Polystyrene-Clay I* (2017)**

Focusing on an individual from this series, I have chosen *Polystyrene-Clay I* (2017) seen in Figure 23, as an example of a vessel that utilises one of the most prevalent forms of waste. Initially my aim was to discover a waste-clay body that could be used on a large scale, eliminating waste while reducing the use of raw materials. As

a result of these test pieces I realised that an important aspect of this experiment is the aesthetic outcome.



**Figure 24**, Hawley, N. 2017. *Polystyrene-clay I, II, III*. 7x 6-cm. Polystyrene and stoneware clay body fired to bisque, earthenware and stoneware. Photo: Anda Dodo

Initially, working with this unfamiliar material I had no indication as to its transformation under firing.

*Polystyrene-Clay I* (2017), is an example of a vessel made from polystyrene and clay, fired to bisque. Shredded polystyrene was wedged into clay, thinly rolled out and compressed into the symmetrical

vessel mould. Using the experimental methods of the ceramic-scientific methodology, I repeated this design three times, to test its effects at bisque, earthenware and stoneware: pictured in Figure 24.

The form has a small three-centimetre base and flares gently upwards into an opening with a diameter of six-centimetres, almost equalling the height of the vessel. These



proportions mimic the triptych of their display and result in a form that is precarious, giving the impression that it is rising or floating. The vessel is pared down to the 'essence of a pot' as a complicated piece would detract from the effects of clay and waste, while additionally facilitating the casting technique (Adu-Gyamfi, Boahin & Padditey 2013: 555).

Once bone dry, I fire vessels to selected temperatures. During firing the polystyrene burns away leaving behind large pockets of air (Rhodes 1987: 17). These air pockets result in a heavily textured lightweight ceramic body. In some areas the polystyrene has bridged the walls and as it burns away, has resulted in voids that connect the interior and exterior spaces (Figure 25). At bisque temperature the form has kept its



**Figure 25**, Hawley, N. 2017. *Polystyrene-clay I*. 7x 6-cm. Polystyrene and stoneware clay body. Photo: Anda Dodo

shape and shrunk only slightly. The body has turned a buff off-white colour giving it a soft delicate appearance reminiscent of eggshells. The lip has become jagged and undefined, its constrained symmetrical form in contradiction to the pock marked body and tattered edges. I have fired this piece to bisque, deliberately

halting the hardening of the material. The air pockets speak of what was once present but is now absent, imbuing the piece with an organic quality through the absence of a toxic mass-produced material. Snaking cracks have formed between the burnt out impressions attesting to its precarious foothold in reality. The walls are now composed of thin slivers of clay layered at odd angles and in parts, evidenced by Figure 25, the interior of the walls are visible. Thus these walls become insubstantial divisions between interior and exterior space enabling the viewer a glimpse into the form from the outside and vice versa (Adu-Gyamfi, Boahin & Padditey 2013: 561).

The lip is a frayed extension into its environment reinforcing the fragility of the piece, suggesting the fragile, delicate qualities of eggshell and alluding to an environment that is increasingly at risk because of the excessive production and use of materials like polystyrene. The rim, walls, interior, exterior and position on the shelf, all attest to the vulnerability of this form, compounding a message of caution and hinting at the

role our actions have on what exists and what does not (Adu-Gyamfi, Boahin & Padditey 2013: 559). Contemplated as an individual, the small size and placement of this piece implies vulnerability; the interior is fully exposed to inspection while an exceedingly thin rim and perforated walls affirms its fragility and lightness (Adu-Gyamfi, Boahin & Padditey 2013: 561).

As evidenced in Figure 24, when the symmetrical form is viewed as part of a series it reflects the mass-produced nature of industry, a contrast to the organic nature of clay. This quality draws attention to the making process of slip casting, a technique widely used in ceramic industry. Its proportions indicate its lightness but also emphasise its precarious nature, implying that the form could lose balance, drop to the floor and shatter at the slightest unintended movement. The medium itself becomes a message; the addition of polystyrene subverts the connotations associated with clay (Erber 2006: 12). Clay is composed of the earth; it brings to mind natural elements of rock, water, soil and fire. Polystyrene juxtaposes these values, being a synthetically mass-produced throwaway substance. This new material offers a discourse on man-made materials and the effect they have on the earth.

Although this piece was made using one of the most pervasive forms of waste it has resulted in a buff rhythmically perforated surface that appeals to the eye and reduces the use raw material. The method of making has contributed to its acute fragility, allowing it to act as a metaphor for our relationship with the environment while simultaneously demonstrating the aesthetic potential of waste. The inclusion of waste and its effects in firing, result in a vessel that cannot function as a conventional domestic container. Instead it becomes a record of its materials and making process, finding new function as a container of meaning and knowledge (Candy & Edmonds 2010: 2).

### ***Copper-Clay II (2018)***

I have chosen *Copper-Clay II* as a second sample from the *Clay-Waste Vessel Series* (2016-2018). Copper is mined from the earth, processed and refined as opposed to manufactured, thus providing a contrast to origins of polystyrene. This vessel, fired to earthenware and positioned on the higher-level shelf (Figure 22), provides a different perspective.

This vessel was formed using copper filings and clay. These materials have been combined within the same mould as *Polystyrene-Clay I* (2017). At earthenware temperatures (1080 °C) copper filings have reacted with the clay producing a black and red stained body. The heat of the firing has caused the copper to melt, fuse and stain the surrounding body, producing hatched black growths that result in a sandpaper-like texture, also affecting the rim, which has grown ragged. The body appears to have fused into a more dense material, still earthy in appearance yet also metallic on closer inspection. Dull metallic black growths are hatched haphazardly, into areas of the dark rusted red surface. Its transformation in the kiln has caused noticeable shrinkage and slumping as compared to its partners. This has emphasised



**Figure 26,** Hawley, N. 2017. *Copper-clay II*. Ceramic and mixed media. 6.3x 4.8cm. Photograph: Natasha Hawley.

the wider opening, 5,1 centimetres above the small base 1,7 centimetres, causing it to be precariously balanced. The bold dark colours imply heaviness amplified by the slumped form.

Like clay, copper is also a material extracted from the earth and is used in ceramic practice as a glaze component. Added to an opaque glaze the oxide produces a coveted vibrant turquoise. When fired in an atmosphere starved of oxygen, copper transforms into a blood red glaze that is unique to its constitution.

At earthenware the copper in *Copper-Clay II* (2017) has fluxed and merged

with the clay body. Through firing it has become cold and heavy, transforming the lightweight thin clay walls into solid metallic surfaces. Textural hatching has burrowed into the smooth plastic texture of clay contaminating and polluting the earthy substance. Although uneven, the rim has softened and rounded leading the eye along the circumference of the opening, which encircles darkness, as if assessing the edges of a hole in the earth. The shrinkage and warping of this vessel hint at the impact it has made on the clay body, weighing it down and stifling the form that was intended to be ethereal.

The inclusion of this by-product, like *Polystyrene-Clay I*, results in a vessel that is not intended for domestic use. Although the body has fused and is impermeable to liquids, the rough texture and ragged rim dissuade the viewer from putting it to their lips. Even without knowing what it is made from, the textural rust coloured and harsh black hatched surface imply that it is not safe to drink from. I have placed this piece on the highest shelf to emphasise its shrinkage and to draw the eye upward. As a result it is viewed looking up at the base, drawing the eye upward. The exaggerated opening entices the viewer to look inside, however from this angle, the interior remains a mystery. Its small size in relation to other vessels in its series is emphasised by its position furthest away from the viewer.

Copper added to clay has resulted in a striking although small vessel. The deep reds bring to mind rust and the black hatching seems to grow from the body. It is unsuccessful as a vessel that aims to reduce raw materials due to the scarcity of this by-product. However as demonstration of the unknown potential of waste, it is an arresting artwork.

### ***Glass-Clay III (2018)***

The third vessel I have taken from the *Clay Waste Vessel Series* (2016- 2018) is *Glass-Clay III*. Previously in chapter four, I demonstrated the use of broken glass as a substitute for frit 510. I have selected this piece as an example of student generated



**Figure 27**, Hawley, N. 2017. *Glass-Clay III*. Ceramic and mixed media. 5.6x 3.9cm. Photograph: Anda Dodo.

waste that can be integrated in multiple ways. Additionally it provides a different firing temperature (stoneware) and alternative viewpoint as it is displayed at eye level on the middle shelf.

The vessel pictured in Figure 27 is an experiment using broken glass that has been crushed, sieved and added to the clay body, then compressed into the same plaster mould. The piece has been fired to 1200° C. During its climb up to

1200°, the glass turns to liquid and bubbles out of the clay body forming masses of small light green beads on the surface, upon cooling these harden, becoming a permanent record of their process (Figure 28) (Pers. Coms. glass workshop 2017). This extreme heat has caused the glass and the clay to fuse, warp, darken the body and shrink. The surface is highly textured and rough while simultaneously delicate, requiring sensitive handling.

Glass although made up of natural substances such as silica, requires a large amount



**Figure 28.** Hawley, N. 2017. Close up detail of *Glass-Clay III*. Ceramic and mixed media. 5.6x 3.9cm. Photograph: Anda Dodo.

of energy to produce (1700°C). It is a substance that we interact with on a daily basis for instance mirrors, windows and drinking glasses, while glass bottles are discarded most often. It is an unusual material in that it is in a perpetually viscous state, varying from a thin liquid at temperatures exceeding 1300°C, to a rigid material at room temperature (Boateng 2000: 72).

According to *Glass Fusing Made Easy* (2011), the glass globes are a result of silica, soda ash and limestone fluxing and fusing at extreme temperatures, at stoneware the carrying capacity of clay has been met; it can no longer accommodate the glass as it becomes agitated and begins to vaporise, forming bubbles. As the bubbles move toward the surface they drag oxides up through various layers and blossom out of the clay body, extending into space and covering the form with masses of tiny delicate glass globules (*Glass Made Easy* 2011). These opaque green growths cling to the clay surface like droplets, which appear as though they could be brushed off, emphasising the tenuous connection with their host. The darkened clay body has shrunk and warped, mimicking the effect of the pollution generated by electricity in firing glass to 1700°C.

The vessel is positioned directly at eye level and is placed between two quieter forms in order to emphasize the its activated appearance. Every available surface, including the rim of the vessel is disrupted by these small green baubles. Thus, with no smooth

surface on which to rest the profile becomes frenzied drawing the eye in all directions. The incredibly textural quality invites closer the viewer to pause for closer inspection. I have positioned this vessel at profile height to tempt the viewer to lean over and look inside (Figure 28) (Adu-Gyamfi, Boahin & Padditey 2013: 556).

I have found the incorporation of the ground glass to be successful in its demonstration of waste as an art medium. The aesthetic qualities of the pale green globules contrasted against the deep tan of the body present an eye-catching textural effect that is unique to this material. Removing glass from the recycling cycle creates a need for new glass, which requires large amounts of energy to produce thus making this option unsustainable.

## **Section Two: Application**

The *Clay Waste Vessel Series* (2016- 2018) mounted along the walls are precursors to the vessels presented in this section. Employing heuristic inquiry I have selected the clay-waste material combinations from the vessels that have emerged from ‘Investigation’, which satisfy my personal sense of the aesthetic (Moustakas 1990: 23). Following this I have employed the tacit and experiential knowledge gained in the making and experimentation with waste in *Clay Waste Vessel Series* (2016- 2018) and utilised it to create the vessels presented here. As such, methods of action, reflection and reflexivity inform these vessels (Moustakas 1990: 10). As is the case with *Polystyrene-Clay I* (2017) where a prevalent mass-produced form of waste, through its absence after firing, resulted in the aesthetic consideration becoming part of my work.

These vessels aim to simultaneously comment on the nature of waste while challenging the viewer’s perception of this material. A formal description of the making process and surface appearance act as entry points to the theoretical reading of a vessel through the frameworks of sustainability and materiality (Spencer 2017: 15). In attempting to challenge the negative social connotations around waste, I have deliberately created aesthetic vessels using waste and exhibited these in a gallery setting.



Owing to the nature of the ceramic vessel as a three-dimensional object, the gallery becomes a shared space between viewer and artworks (Adamson 2012: 41). I aim to make the viewer aware of themselves and their sphere of influence in order to draw their attention to the potential of their actions. I have emphasised the shared nature of this environment by positioning plinths so that the viewer is obliged to walk around and explore the gallery environment as seen in Figure 30. By intentionally displaying



**Figure 29**, Hawley, N. 2018, Test pieces. Detail of natural groupings Photo: Natasha Hawley

precarious and fragile ceramic pieces in a small area I intend for the viewer to become aware of their sphere of influence in navigating this environment (Figure 30) (Pekarik 2002: 5). Simultaneously I have endeavoured to create less formal, more organic groupings that contrast the formal display mounted on the walls (Figure 29). These intuitive groupings are intended to signify the transition from scientific on to artistic (Bowry 2015: 119).

As a scuba diver I am constantly in awe of our aquatic environment, the influence of which is obvious in my creative practice and display decisions. The act of scuba diving requires one to be extremely self-aware. Air contained within the dive suit acts as a floatation device, peak buoyancy is achieved when one can hover

horizontally mere centimetres from the bottom of the ocean floor, close enough to inspect a two centimetre nudibranch (a sea worm that resembles a squirt of brightly coloured toothpaste) but far enough away so as not to crush or damage coral and animals. For me, exploring the coral and small fish that call it home are extremely satisfying activities. Coral can be incredible fragile, hard, sharp, delicate, robust and textural, these are a source of inspiration in 'Organic'. Larger animals such as sharks, turtles and potato bass often swim up to partake in a mutual inspection. Therefore being aware of your body and surroundings ensures no harm comes to you or the environment.

While this is still a gallery space with work displayed on plinths, my aim was to emulate this feeling of wonder and exploration while instilling a sense of self-awareness. It was my intention to make the viewer aware of their relationship with

waste and the subsequent consequences for the environment; therefore I have



**Figure 30**, Hawley, N. 2017. *Exhibition layout*. Photo: Natasha Hawley.

endeavoured to inspire an awareness of oneself in relation to a constructed microenvironment (Bowry 2015: 100). This is achieved by drawing on a display model of the exhibition as an environment (Pekarik 2002: 5). Several plinths of

differing heights have been grouped together to mimic the naturally varying levels of an organic setting (Figure 30). However as artefact exhibition is the primary model, the artefact and its contemplation are the principle considerations, thus groupings are restrained to allow the viewer to contemplate pieces individually as well as part of a whole (Pekarik 2002: 2).

The following discussion has selected examples, which aim to challenge the viewer's perception of waste and simultaneously demonstrate its potential aesthetic qualities. I will explore the effects of sustainable practice on surface appearance and content, to draw out the material connotations of this new material in the vessel form.

### ***Glass Waste Coral Series (2017- 2018)***

*Glass Waste Coral Series* (2017- 2018) is a group of tall cylindrical vessels that demonstrate the ZWP by utilising glass waste used as a resource. I have chosen these as an example of an organic series that transmit scientific knowledge through their appearance (See figure 31, Appendix 1). These not only function as objects that make us aware of our actions through their precarious nature (Geismar 2004: 43), but also as vertical test pieces which substituted crushed glass frit for 510 in a glaze recipe. Utilising the ceramic-science methodology, each vessel has been divided into twenty-one sections and each section has been impressed with a corresponding pattern to enable the reading of information captured on the vessel (Figure 32). As well as its position on the cylinder, the pattern acts as a cipher for the amount of glass substituted.



Un-patterned areas glazed in the control recipe, divide the patterned sections and in



**Figure 31**, Hawley, N. 2017- 2018. *Glass Waste Coral Series*. 62x 9-cm dimensions vary. Earthenware and stoneware. Photo: Natasha Hawley

this way contrast is provided for every level of substitution. Soft colour reveals itself in a layered gradient, barely noticeable at the bottom developing upwards in subtlety more saturated tones. The texture of the glaze develops similarly; smooth on the bottom layer becoming exceedingly rough towards the top. Subtle colouring becomes emphasised when viewed against the sterile white background of the gallery. Each form is slightly off balance and asymmetrical, often leaning to one side as it tapers off at the lip, reminiscent of coral swaying in the ocean currents.

balance precariously as it leans into the space of its neighbour. The base is a continuation of the body providing an insubstantial setting for the tall expanse of clay

The scientific nature of these vessels is integrated with the organic forms on which they are based. The grouping suggests a common point of growth, each piece seeming to



**Figure 32**, Hawley, N. 2017- 2018. *Glass Waste Coral Series* detail. Earthenware and stoneware. Photo: Natasha Hawley

above it (Adu-Gyamfi, Boahin & Padditey 2013: 564).

This singular unglazed section of clay provides a contrast between the polished marble of the plinth and the raw treatment of the base. The base anchors a body that stretches upwards to the lip, suggesting a continuation of form reaching towards the light above. In a series, the horizontal pattern produces a rhythm that undulates suggesting swaying forms (Adamson 2012: 44). The groupings suggest repetition and in combination with the colouring and form, this series brings to mind underwater forests. In an effort to reduce clay the walls are very thin and combined with the leaning stance and small bases, the vessels hold visual cues that speak to us of fragility, preservation and the ocean.

Because of this we keep our distance, mindful of our movements and our position in

space (Adu-Gyamfi, Boahin & Padditey 2013: 558). Some groupings are displayed at a level where the viewer is enticed to lean over and look into their openings, instilling a heightened sense of awareness in relation to our actions. The muted colours of the glass-glaze, reference coral bleaching, one of the many consequences of man's actions on the environment.

### ***Clay-glaze waste vessel series (2017)***

This mechanised wheel-thrown series is a unique contrast to the other vessels on display; consequently their form is unique to the process.

The rich burnt orange vessels pictured in Figure 33, are made using the Ceramics Studio recycled clay (chapter 3) and clay-glaze waste from the catchment sink, in fitting with the ZWP. The form is balanced on a narrow elongated foot, which tapers in and then flares out toward a wide opening that tilts to the side. Informed by the ceramic-scientific methodology, these vessels are divided in two, as experiments to earthenware and stoneware. I have coated the interior of the earthenware vessels with a shiny glaze and the stoneware with a matte glaze as a



**Figure 33**, Hawley, N. 2017. *Clay-glaze waste vessel series*. 7x 5.2cm. Reconstituted clay body with clay-glaze waste decoration, fired to earthenware. Photo: Anda Dodo.

means of visually deciphering the firing range, and so contributing to the vessel as a container of knowledge (See figure 34, Appendix 1). Sink waste, comprised of clay and glaze waste, is applied in thick horizontal layers on the exterior and at the base of the interior. When fired to earthenware the glaze materials begin

to melt and form droplets. Firing causes areas to bubble and others to crystalize; yielding a curious sculptural potential along the surface. The thickly applied horizontal band of waste visually connects with the cylindrical vessel series and the *Clay-Waste Series* (2016- 2018).

The process of throwing centres clay in the middle of the wheel as it spins to produce vessels that are evenly thick and symmetrical. When removing the vessel from the wheel I have tilted it so that the form begins to lean, resulting in a more natural and communicative stance. The angled interior is offered to the viewer from a generous

opening implying a curiosity and receptivity (Adu-Gyamfi, Boahin & Padditey 2013: 562-561). By nudging these vessels off centre they have taken on human qualities, seemingly in dialogue with one another and inviting the viewer to join in. Therefore, although they are a product of mechanisation they, like the aesthetic character of waste, subvert our expectations: in this case, of strict symmetry and a dehumanised mass-produced product. Throwing rings have been left unsmoothed as a gesture of their mechanical origins (Mills 2009: 33).

The vessels are positioned on plinths in small groups of three's. Burnt orange colouring provides a sharp contrast with the smooth white marble of the plinth,



**Figure 34**, Hawley, N. 2017. *Clay-glaze waste vessel series*. 7x 5.2cm. Reconstituted clay body with clay-glaze waste decoration, fired to stoneware. Photo: Anda Dodo.

juxtaposing rock and clay both materials extracted, shaped and refined by human influence. These are placed so they can be looked down into and are based on the many vessel-like sponges that grow along the reef at Aliwal Shoal.

#### *Clay-Glaze Waste Vessel Series*

(2017) serve as a point of connection to other series through their horizontal use of waste, tilt, small bases, precarious form and repetition (Adu-Gyamfi, Boahin & Padditey 2013: 562-567). The abstract layered pattern encourages a rhythmic reading of the horizontally painted exteriors of *Glass Waste Coral Series* (2017- 2018) and their wide openings parallel the *Clay-Waste Series* (2016- 2018). The divisions imply geological layering of sediment and earth while the textural bubbling and dripping that seems to grow out of the terracotta surface, alludes to the layers of waste compressed and entombed in a landfill. Together these groupings interact to create cheerful vessels that challenge our expectations of both waste and mechanised making process (Bowry 2015: 141, Pekarik 2002: 9).

This vessel series is effective in its use of waste to form layers that reference multiple readings in the form of organic organisms and landfills. Additionally they subvert our expectations of a mechanised process, producing characterful interpretations.

### *Vessel in Excess II (2018)*

This vessel, pictured in Figure 35, represents the culmination of my current practice by utilising the waste generated in my making over a one-year period.

*Vessel in Excess II* (2018) was created using a cross section of material waste including spilt glaze and engobes, metal, plastic, clay, paper and teabags. The mixture



**Figure 35,** Hawley, N. 2018. *Glaze Clay Glass Ceramic Plastic Tea and Metal Mix vessel*. . 56x 47cm. Studio waste and clay scraps, fired to earthenware. Photo: Natasha Hawley.

was rolled out and pressed into a large mould together with clay scraps from a previous project. This is the largest form I have produced; it stands on a narrow 8-centimetre base flaring gently outward and upward to a wide rim of 47 centimetres. The large scale and thin walls contribute to its fragility.

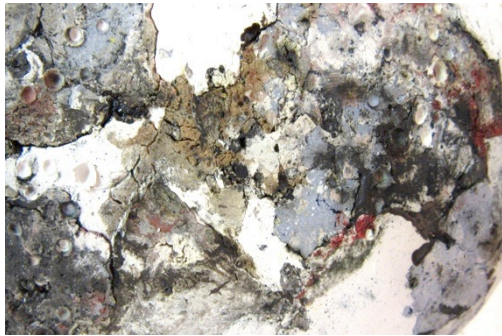
Fired to earthenware the raw colours have darkened and become bolder, in some areas brass trimmings have fused with the clay creating dark green thatched stains and in others a glaze has fired to a deep shiny blood red. Glaze in the clay produces glossy edged multi-coloured craters where the

ingredients have fluxed and run, or caused bubbling and puckering of the body (Figure 36). In some parts, combustible waste has burnt away leaving a surface textured with air pockets that weaken the structure. The contrasting white of the clay scraps breaks up the dark medley of colours into abstract patches of waste.

Various effects tested in the vessels of the *Clay-Waste Series* (2016- 2018) are mimicked in the surface of this bold yet fragile piece, creating a connection through time and space. *Vessel in Excess II* (2018) simultaneously references the *Polystyrene-Clay Vessel*, the *Copper-Clay Vessel* and the *Glass-Clay Vessel* through its visual qualities and material characteristics. The sculptural effects of the catchment sink waste on *Clay-Waste Series* (2016- 2018) are similarly captured on its surface. Finally it forms a connection with the *Glass Waste Coral Series* (2017- 2018), through the process of casting.



*Vessel in Excess II* (2018) has been positioned to stand-alone, placed on a high plinth so that the exterior takes precedence in viewing. In providing context and situating my



**Figure 36**, Hawley, N. 2018. Detail of *Glaze Clay Glass Ceramic Plastic Tea and Metal Mix vessel*. 56x 47cm. Studio waste and clay scraps, fired to earthenware. Photo: Natasha Hawley.

practice visually, this vessel is placed on a stand which acts as a framing device (Bowry 2015: 167) (See figure 39, Appendix 1). Due to the high temperatures employed in the making process, often waste materials like plastic, bisque and teabags are no longer recognisable. Therefore in order to communicate the aesthetic potential of waste and question material value systems, waste needs to be included in the display as a contextual device and as a reference to its pervasive nature. According to Bowry, the frame is a transitional object between furniture and artwork, separate from the piece but integral to its meaning (Bowry 2015: 167).

I have created stands using cut bands of discarded bottles and broken containers from the chemistry workshop. Pictured in Figure



**Figure 37**, Hawley, N. 2018. Detail of base. Bisque, glass, metal, plastic, oxides Photo: Natasha Hawley.

37 is a base cut from a discarded wine bottle; contained within is a layer of crushed beige bisque from a failed clay and tea vessel. The level above is made up of brass shavings and plastic while the uppermost section is a mixture of broken glass, bisque rejects and spilt oxides. The chemistry workshop container pictured in Figure 35, contains brass shavings, recycled clay, plastic, spilt engobes, glass, paper and tealeaves. The pouring lip and volume

indicators, which are visible along the side, allude to the scientific nature of ceramic making. Layers of waste contained within these glass stands represent materials that are present in the piece and allude to geological core samples, which function as a metaphor for the layers of waste coating our planet. Through repetition, the colours contained in the stand below connect to the vessel above.

This chapter has examined the message conveyed by the vessels on display. By juxtaposing clay, student- and studio-generated waste in the vessel format, I have combined their ‘competing embedded social distinctions’ and imbued the form with meaning (Geismar 2004: 43). Thus the vessel has become a container of knowledge and meaning as opposed to a domestic utilitarian piece. Knowledge is embodied through the framework of PBR; my creative practice has been used as an exploratory and demonstrative tool of my investigation into the ZWP in a ceramic studio setting (Candy & Edmonds 2010: 5). As such, the vessels I have created function as literal containers of knowledge evidenced through form, surface appearance and content.

Meaning is embodied through the cultural materiality of the materials and the vessel form, which has been used as a symbolic container of life: specifically of the environment, the basis upon which all life exists. Additionally, the domestic qualities of the vessel provide a familiar setting from which to question embedded societal value systems. The use of clay and waste in creating these vessels combine the complex social identities of these materials and imbue the artwork with content that is unique to its matter (Du Preez 2008:33). Therefore these vessels are able to deliver multiple readings based on their materiality (Sofaer 2007: 3).

Firstly the interactions of waste and clay in the kiln have resulted in vessels that are structurally compromised. I have intentionally created structures with thin walls and which are further agitated by the inclusion of waste, resulting in fragile forms that act as a metaphor for the tenuous balance between a material orientated society and the environment, which it exploits.

Secondly, evidence of the process of making, through mechanical or natural allusions, affects their reading (Mills 2009: 3). As is the case with *Glass Waste Coral Series*, which alludes to aquatic flora as opposed to *Clay-Waste Vessel series* which references industry. Thirdly, through methods of making and materials used I have created vessels that apply the ZWP and demonstrate the aesthetic potential of waste by using it as a medium. Thus challenging the viewer to question their perception of discarded materials through the subversion of the negative societal implications of this substance.

Finally meaning is embodied through display. In exhibiting these vessels I have chosen two modes of display; firstly as series of multiples symmetrically mounted on the walls of the gallery ('Investigation') and secondly as organic groupings set on plinths positioned around the room (Application) (Pekarik 2002: 1- 4). Wall-mounted displays represent the accumulation and presentation of information in the form of a mixed material palette, formally and symmetrically arranged to signify the experimental nature of this research and reference humankind's need to control and categorise their environment (Bowry 2015: 118). In Section two: 'Application', the vessels are grouped more organically on plinths and represent the artistic language that has grown out of the 'Investigation' palette. The display is intended to make the viewer aware of their actions in this environment, signifying the consequences of their actions in the natural environment. In order to provide context and situate my practice visually, certain forms are placed on glass stands containing the waste they were produced from (Bowry 2015: 167).

Through making I have arrived at new realisations and made new discoveries, which feed back into my creative practice through reflection and reflexivity (Candy 2006: 3). Together the vessels presented here form a creative synthesis of the research undertaken in this Masters research degree (Moustakas 1990).

## Conclusion

The central aims of this research were to investigate the relevance and validity of the ZWP in the Ceramic Studio setting using my creative practice, and to explore the message conveyed by the resulting artworks using theories of materiality and sustainability and their display. A series of research questions was formulated to guide the theoretical and practical research outcomes.

As a continuation of chapter one, the framework of sustainability along with a personal focus on waste, led me to the Zero Waste Philosophy, which has been defined and its relevance demonstrated through a description of the effects of waste on the environment. Understanding the social connotations of this material and my primary mediums, clay and the vessel, I located their cultural identities through the framework of materiality. Chapter three focused on the Ceramics Studio, contextualising the learning environment and ceramic traditions in place through a brief history and then identifying current processes and systems in order to propose more sustainable changes. A selection of these changes was implemented in chapter four using my creative practice to investigate their viability in a Ceramics Studio setting. Finally chapter five presented a discussion of the resulting artworks and employed visual and cultural theories of materiality in order to understand the reading of the vessel.

Through this investigation I was able to ascertain areas where the ZWP led to a reduction in waste and identify areas where the Ceramics Studio could make changes toward more sustainable practice. Implementing the solutions discovered through this research, for example: introducing water bins, staggering firing schedules, requiring students to recycle their own clay and setting projects that use the catchment sink sludge as a resource, will reduce water, electricity, clay and glaze consumption. A decrease in these areas directly impacts greenhouse gasses generated through transport and energy production, thereby developing sustainable practices by reducing the strain on our natural environment. However fully implementing Zero Waste Philosophy in a functional learning environment such as the Ceramics Studio it is not a viable solution. This is partly due to the Ceramics Studio's role as an educator in facilitating



learning from a first year level. Additionally the waste mitigation systems put in place by Ditchburn and improved on by subsequent lecturers have facilitated a studio tradition of sustainability.

The artworks that have emerged as a result of this study convey the investigative and communicative nature of research through their exhibition. Through my creative practice I found new understandings and made new discoveries, which informed my writing and fed back into my making process through reflection and reflexivity (Candy 2006: 3). Employing the theories of materiality, the meaning embodied in the vessel is revealed and the viewer's perception of waste is challenged by way of their aesthetic manifestation and sometimes, precarious display.

Through this Masters research degree I have come to realise the interconnectivity of people and actions and the environment. As Jacques Cousteau (1910- 1997) says: 'The sea, the great unifier, is man's only hope. Now, as never before, the old phrase has a literal meaning: we are all in the same boat.' Therefore although this investigation has found that it is not possible to completely eliminate waste due to its context as a learning environment, it identifies the learning environments significance: as a teacher of ceramists, the Ceramics Department of the CVA, has a moral responsibility to ensure that the students who emerge from it have an embedded responsibility towards sustaining the environment. With this in mind potential future research could include formulating a module on sustainable practices, both theoretical and practical, that could be introduced to the coursework so that future generations of ceramists are informed of the consequences of waste and thus become inherently sustainable in their own practice.

## Appendix 1

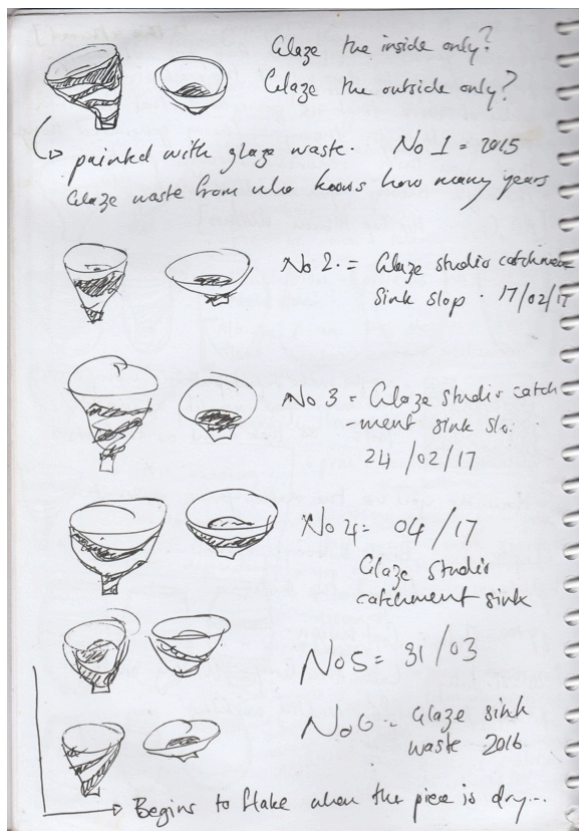


Figure 38, N, Hawley. Reflective Journal 1

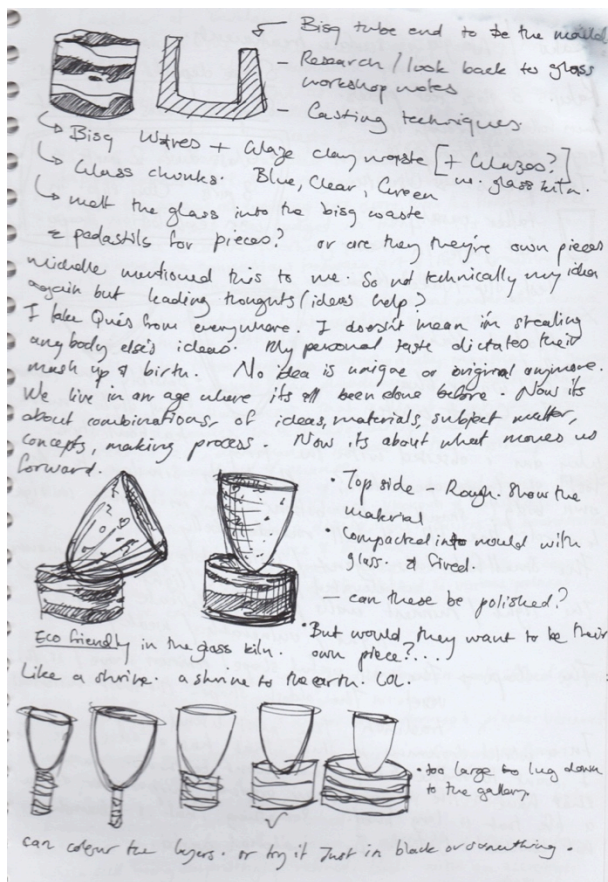


Figure 39, N, Hawley. Reflective Journal 2

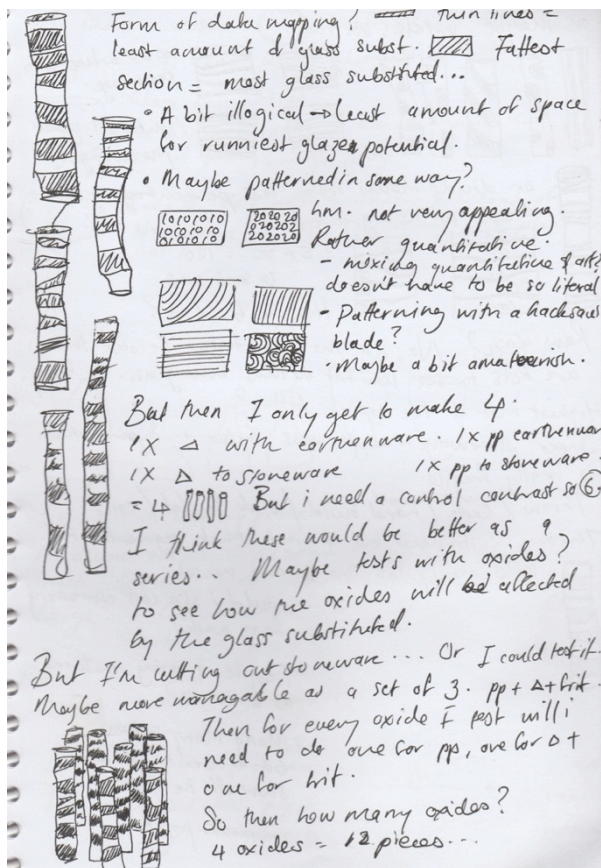


Figure 40, N, Hawley. Reflective Journal 3

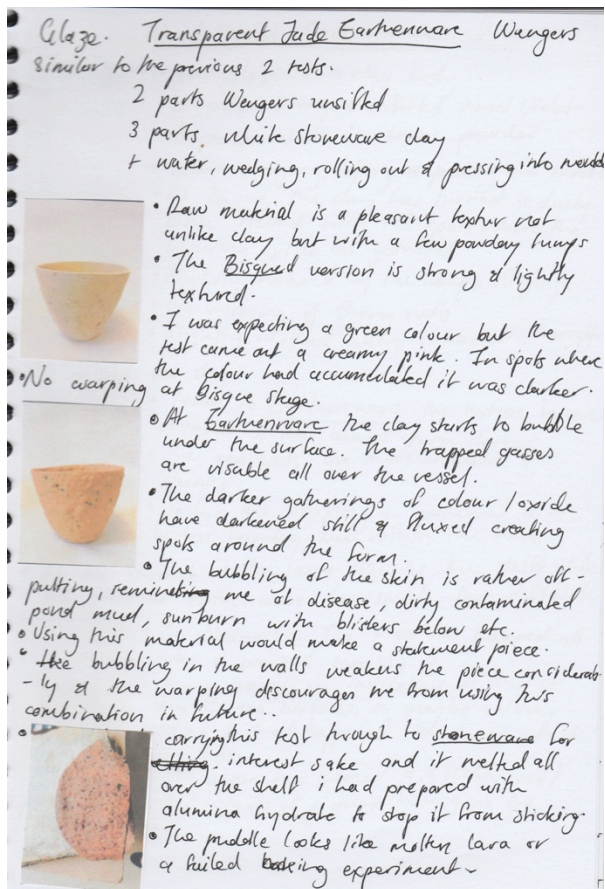


Figure 41, N, Hawley. Reflective Journal 4



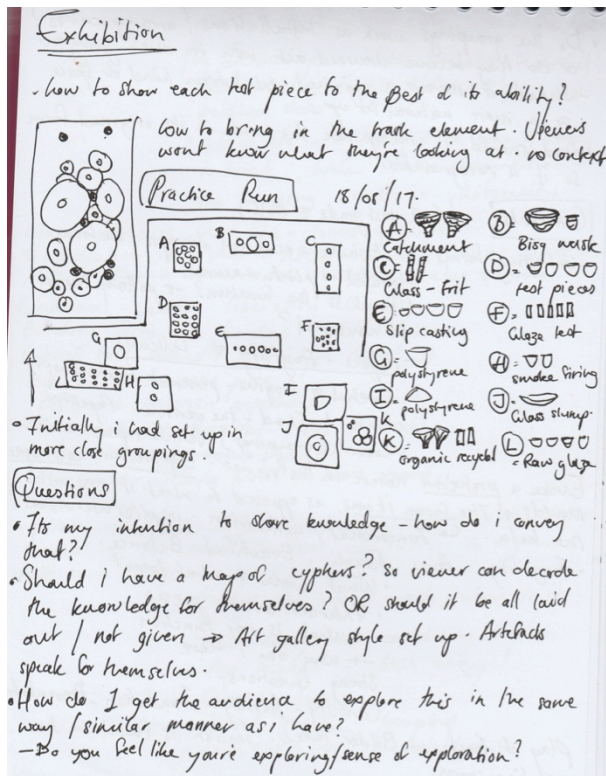


Figure 42, N, Hawley. Reflective Journal 5

## Appendix two



**Figure 43**, Hawley, N. 2018. *Glaze Tea and Recycled Clay Vessel*. 56x 47cm. Student generated waste and recycled clay, fired to earthenware. Photo: Natasha Hawley



**Figure 44**, Hawley, N. 2018. *Discarded Metal Mix vessel I*. 26x 12cm. Brass filings and clay scraps, fired to earthenware. Photo: Natasha Hawley.





**Figure 45**, Hawley, N. 2018. *Discarded Metal Mix vessel I & Discarded Metal Mix vessel II*. 31x 28cm & 26x 12cm. Brass filings and clay scraps, fired to earthenware. Photo: Natasha Hawley.



**Figure 46**, Hawley, N. 2018. *Recycled Bisque Discarded Glass vessel I*. 62x 28cm. Crushed bisque, glass and clay scraps, fired to earthenware. Photo: Anda Dodo.



**Figure 47**, Hawley, N. 2017. *Coral Test Series*. Varying heights. Recycled clay and recycled glazes, fired to earthenware and stoneware. Photo: Anda Dodo.



**Figure 48**, Hawley, N. 2017. *Glass-Clay IV*. Ceramic and blue bottle glass. 5.6x 3.9cm. Photograph: Anda Dodo.





**Figure 49,** Hawley, N. 2017. *Exhibition layout*. Photo: Natasha Hawley.



**Figure 50,** Hawley, N. 2017. *Exhibition layout*. Photo: Natasha Hawley.

## List of References

- Academia Education. 2012. *Fired up: conversation between kiln and collection*. [Online]. Available at: [https://www.academia.edu/7236529/All\\_Fired\\_Up\\_conversations\\_between\\_kiln\\_and\\_collection](https://www.academia.edu/7236529/All_Fired_Up_conversations_between_kiln_and_collection) [Accessed 17 August 2017]
- Adu-Gyamfi, E., Boahin, J., & Padditey, E. 2013, 'The architecture of ceramic vessels', *International Journal of Innovative Research and Development* 2(3), viewed on 22 August 2017, from <http://www.ijird.com/index.php/ijird/article/viewFile/35352/28548>
- AGC Glass Europe. 2012. *Environmental impact assessment*. [Online]. Available at: <http://www.agc-glass.eu/en/sustainability/environmental-achievements/environmental-impact> [Accessed 30 August 2017]
- Bal, M., & Hernández-Navarro M. A., (ed.), 2011, 'Art Matters: Metaphor, Materiality and Knowledge' in Bal, M. & M. A., Hernández-Navarro (eds.), *Art and Visibility in Migratory Culture: Conflict, Resistance, and Agency*, pp. 21-23, Editions Rodopi B.V. Amsterdam, New York
- Beale, C., 2017, 'David Attenborough says world must act now on plastics after witnessing its impacts filming Blue Planet II' *Independent* [online] 15 August, <https://www.independent.co.uk/environment/david-attenborough-plastic-ocean-sea-blue-planet-pollution-microplastic-a8001641.html> [Accessed 30 April 2018]
- Bideaux, A. (2016). Why Styrofoam is bad for your health and the planet | 1 Million Women. [online] 1millionwomen.com.au. Available at: <https://www.1millionwomen.com.au/blog/why-you-should-say-no-styrofoam/> [Accessed 20 March. 2018].
- Boateng, K., 2000, 'Use of discarded broken bottles as a substitute for frit in the manufacture of glaze', *Journal of the Kwame Nkrumah University of Science and Technology* 20(3), viewed 28 August 2017, from <http://dspace.knust.edu.gh/bitstream/123456789/5057/1/Kofi%20Boateng.pdf>
- Bowry, 2015, 'Re-thinking the Curiosity Cabinet: A Study of Visual Representation in Early and Post Modernity' Doctor of philosophy, University of Leicester
- Bradford, A., & Pappas, S., 2017, *Effect of Global Warming*, [Online]. Available at: <https://www.livescience.com/37057-global-warming-effects.html> [Accessed 28 November 2017]
- Brundtland, G. (1987). Report of the World Commission on Environment and Development: Our Common Future. [online] Available at: <http://www.un-documents.net/our-common-future.pdf> [Accessed 3 March. 2016].
- Cardew, M., *A Pioneer Potter*, London, Collins, 1988 [ISBN 978-0-00-412288-5](https://www.isbn-international.org/view/title/978-0-00-412288-5)

- Cho, R., 2011, *Our Oceans: A Plastic Soup*, [Online]. Available at: from <http://blogs.ei.columbia.edu/2011/01/26/our-oceans-a-plastic-soup/> [Accessed 04 May 2018]
- Clark, G. The Potters Art. London: Phaidon Press Limited, 1995.153
- Clark, Garth, *Michael Cardew*, London: Faber and Faber, 1976 ISBN 0-571-11305-2
- Cooper, E., 2000, *Ten Thousand Years of Pottery*, University of Pennsylvania Press, Philadelphia
- Department of Environmental Affairs (DEA), 2010- 2011, Annual Report, 2011, viewed 03 March 2017, from <https://www.environment.gov.za/sites/default/files/docs/water.pdf>
- Digitalfire. 2015. *Firing: what happens to ceramic ware in a firing kiln*. [Online]. Available at: [https://digitalfire.com/4sight/education/firing\\_what\\_happens\\_to\\_ceramic\\_ware\\_in\\_firing\\_kiln\\_200.html](https://digitalfire.com/4sight/education/firing_what_happens_to_ceramic_ware_in_firing_kiln_200.html) [Accessed 02 August 2017]
- Digitalfire. 2015. *Mastering glazes cone 6*. [Online]. Available at: [https://digitalfire.com/4sight/firingschedule/mastering\\_glazes\\_cone\\_6\\_firing\\_schedule\\_83.html](https://digitalfire.com/4sight/firingschedule/mastering_glazes_cone_6_firing_schedule_83.html) [Accessed 02 August 2017]
- Digitalfire. n.d. *Ceramic glossary of terms and links*. [Online]. Available at: <https://digitalfire.com/4sight/glossary/index.html> [Accessed 02 August 2017]
- Engelhaupt, E., 2013, *Why Death Smells so Deadly*, [Online]. Available at: <http://www.sciencenews.org/blog/gory-details/why-death-smells-so-deadly> [Accessed 26 February 2018]
- Environ Geochem Health. 1990. *Environmental impacts of aluminium*. [Online]. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/24202562> [Accessed 29 August 2017]
- Explain That Stuff. 2017. *Aluminium*. [Online]. Available at: <http://www.explainthatstuff.com/aluminum.html> [Accessed 29 August 2017]
- Falin, P., 2009, 'Connecting to Materiality: Engaging with Ceramic Practice', Master of Art thesis, University of Art and Design, Helsinki
- Ferrigno, T.H. (1967) *Rigid Plastics Foams*, 2nd edition. p. 207.
- Full Cycle. 2009. *What is waste and why is it a problem?* [Online]. Available at: <http://www.fullcycle.co.za/index.php/what-is-waste-and-why-is-it-a-problem.html> [Accessed 01 September 2017]
- Geismar, H., 2004, 'The Materiality of Contemporary Art in Vanuatu' *Journal of Material Culture* 9(1), 43-58

Glass Fusing Made Easy, 2011, *Boiling Glass*, [Online]. Available at: [www.glass-fusing-made-easy.com/boiling-glass.html](http://www.glass-fusing-made-easy.com/boiling-glass.html)

Govender, S., 2017. KZN fire fighters battle landfill blaze amid warnings of ‘highly toxic’ smoke. *Sunday Times News* [online], 11 August.

<https://www.timeslive.co.za/news/south-africa/2017-08-11-kzn-firefighters-battle-landfill-blaze-amid-warnings-of-highly-toxic-smoke/> [Accessed 01 September 2017]

Green Peace. 2005. *The future is GE free*. [Online]. Available at:

<http://www.greenpeace.org.au/ge/farming/canola.html>. [Accessed 01 September 2017]

Greenpeace, 2016, *About Coal Mining Impacts*, [Online]. Available at:

<https://www.greenpeace.org/archive-international/en/campaigns/climate-change/coal/Coal-mining-impacts/> [Accessed 24 February 2018]

Hawley, N. J. (2015-2018) Personal Journals of Natasha Jane Hawley 2015- 2018. Un-paginated and unpublished

Hills, D., 2001, *Heuristic inquiry and transpersonal research*, CCPE, London

Hong, J., 2003, *Material/ Materiality*, in *The Chicago School of Media Theory*, [Online]. Available at:

<https://lucian.uchicago.edu/blogs/mediatheory/keywords/materialmateriality/> [Accessed 12 April 2018]

Institute of Waste Management South Africa. n.d. *The six R's of sustainability*.

[Online]. Available at: <http://www.wasteplan.co.za/do-you-know-6-rs-sustainability> [Accessed 27 July 2017]

IOL, 2009, ‘Dumped medical waste could pose health risk’, *IOL*, [online] 29

November, <https://www.iol.co.za/news/south-africa/dumped-medical-waste-could-pose-health-risk-466145> [Accessed 26 February 2018]

Jensen, D. & McBay, A., 2011, *What we Leave Behind*, Seven Stories Press, New York

Lakoff, G., & Johnsen, M., 2003 *Metaphors we live by*. London: The university of Chicago press.

Livingstone, A. & Petrie K. (eds.), 2017, *The Ceramics Reader*, Bloomsbury academic, London

Maniatis, Y., 2009, ‘The Emergence of Ceramic Technology and its Evolution as Revealed with the use of Scientific Techniques’ in Shortland, A. J., Freestone, I. C., &Rehren, T. (eds), *From Mine to Microscope: Advances in the Study of Ancient Technology*, pp 1- 18, Oxbrow Books, Oxford

Merriam-Webster Online dictionary. n.d. *Recover*. [Online]. Available at: <https://www.merriam-webster.com/dictionary/recover> [Accessed 27 July 2017]

Merriam-Webster Online dictionary. n.d. *Recycle*. [Online]. Available at: <https://www.merriam-webster.com/dictionary/recycle> [Accessed 27 July 2017]

Merriam-Webster Online dictionary. n.d. *Reuse*. [Online]. Available at: <https://www.merriam-webster.com/dictionary/reuse> [Accessed 27 July 2017]

Miller, C., 2005, *The Smell of Garbage*, [Online]. Available at: [http://www.waste360.com/mag/waste\\_smell\\_garbage](http://www.waste360.com/mag/waste_smell_garbage) [Accessed 26 February 2018]

Miller, D. 1987 *Material Culture and Mass Consumption*. Blackwell Publishing, Oxford

Miller, D., 2018, *Materiality: an Introduction*, [Online]. Available at: <http://www.ucl.ac.uk/anthropology/people/academic-teaching-staff/daniel-miller/mil-8> [Accessed 12 April 2018]

Mills, C. M., 2009, 'Materiality as the Basis for the Aesthetic Experience in Contemporary Art', Masters thesis, Dept. of Fine Arts, University of Montana

MNM. 2016. *What is the Great Pacific garbage patch?* [Online]. Available at: <https://www.mnn.com/earth-matters/translating-uncle-sam/stories/what-is-the-great-pacific-ocean-garbage-patch> [Accessed 01 September 2017]

National Geographic n.d. *What is Global Warming?*, viewed 28 September 2017, from: <https://www.nationalgeographic.com/environment/global-warming/global-warming-overview/>

National Geographic, 2017, *Ocean Life Eats Tons of Plastic, Here's Why That Matters*, viewed 17 April 2018, from: <https://news.nationalgeographic.com/2017/08/ocean-life-eats-plastic-larvaceans-anchovy-environment/>

Nevada Museum of Art n. d., *Dennis Parks: International Ceramics*, [Online]. Available at: <https://www.nevadaart.org/wp-content/uploads/2014/05/CAE1216-Finding-Aid-WEB.pdf> [Accessed 28 September 2017]

Nsele, S., 2016. Choking smoke shrouds city. *News24* [online], 24 August. <http://www.news24.com/SouthAfrica/News/choking-smoke-shrouds-city-20160809> [Accessed 11 Jan 2017].

Parker, L., 2015, 'Nearly every sea bird is eating plastic', National Geographic, viewed 08 March 2017, from <http://news.nationalgeographic.com/2015/09/15092-plastic-seabirds-albatross-australia/>

Parker, L., 2018, 'Albatross chick, stomach filled with plastic', National Geographic. Viewed 30 April 2018, from: <https://news.nationalgeographic.com/2018/03/great-pacific-garbage-patch-plastics-environment/> [Accessed 30 April 2018]



Parks, D., 1982, *A Potter's Guide to Raw Glazing and Oil Firing*, Scribner Book Company, United States

Patlolla, A., Sutto, D., Tchounwou, P., & Yedjou, C., 2014, Heavy Metals Toxicity and the Environment, National Institutes of Health, viewed 13 March 2018, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4144270/>

Pekarik, A., 2002, 'Exhibition Concept Models', Office of Policy and Analysis, Washington, DC

Petrenko, V., & Korotchenko, A., 2012, Metaphor as a basic mechanism in art, Psychological Institute of Russian Academy of Education, Russia

Phil Rogers Pottery. 2017. *About my Work*. [Online]. Available at: <http://www.philrogerspottery.com/portfolio/pr-401-ash-glazed-yunomi/> [Accessed 20 August 2017]

Phillips, S., 2010, 'Metaphors with Clay: Embodying the Maker in the Made' Doctor of Philosophy thesis, University of South Australia

Pillay, K., 2016, 'Blocked drains worsen damage', *News24*, [online], 21 March, <https://www.news24.com/SouthAfrica/News/blocked-drains-worsened-damage-20160320> [Accessed 26 February 2018]

Pillay, K., 2017, "'Witness' warriors tackle illegal dumping in PMB", *Press Reader*, [online] 06 March <https://www.pressreader.com/south-africa/the-witness/20170306/281509340976411> [Accessed 26 February 2018]

Raby, J., 2015, 'Materiality, Memory, Metaphor- Convergences of Significance in the Ceramic Vessel' Doctor of Philosophy thesis, University of Brighton, UK

Raffa, J., 2014, The Feminine Symbolism of Vessels. *Matrignosis: A Blog About Inner Wisdom*, [Blog], Available at: <https://jeanraffa.wordpress.com/2014/02/12/the-feminine-symbolism-of-vessels/>

Recycling Day. 2017. *The South African event page*. [Online]. Available at: <http://www.recyclingday-sa.co.za/WhyRecycle.html> [Accessed 28 July 2017]

Rhodes, D., 1973, *Clay and Glazes for the Potter*, Pitman House Limited, London

Ruddick, G., 'David Attenborough Urges Action on Plastics After Filming Blue Planet II'. *The Guardian*, [online] 15 August 2017 <https://www.theguardian.com/environment/2017/oct/15/david-attenborough-urges-immediate-action-on-plastics-blue-planet> [Accessed 30 April 2018]

Samson, M. (eds), 2009, *Refusing to be Cast Aside: Waste Pickers Around the World*, WIEGO, Cambridge, USA

Santacruz, D. A., 2014, *Materiality, Techniques and Society in Pottery Production*, Walter de Gruyter GmbH & Co KG

Savides, M., 2016. What a waste! We are a throwaway nation and it's a crisis. *Sunday Times News* [online], 20 November. <https://www.pressreader.com/south-africa/sunday-times/20161120/281530815613991> [Accessed 03 December 2017]

Sculpture Magazine. 2001. *Peter Voulkos: clay, space and time*. [Online]. Available at: <http://www.sculpture.org/documents/scmag01/march01/voulkos/voulkos.shtml> [Accessed 12 September 2017]

Smith, A., Brown, K., Ogelvie, S., Rushton, K. & Bates, J., 2001, 'Waste Management Options and Climate Change', Final Report, Office for Official Publication of the European Communities

Sofaer, J. (ed.), 2007, *Material Identities*, Blackwell Publishing, London

Spencer, F., 2017, 'Narratives of Departure: A Body of Art and Literary Work Accompanied by a Theoretical Enquiry into the Process and Methodology of their Production' Doctor of Philosophy thesis, University of KwaZulu-Natal, South Africa

Surathkal, S., 2016, *Disposal of Incinerator Ash by Adding to Concrete*, [Online]. Available at: [https://www.researchgate.net/publication/266177642\\_Disposal\\_of\\_Incinerator\\_Ash\\_by\\_Adding\\_to\\_Concrete](https://www.researchgate.net/publication/266177642_Disposal_of_Incinerator_Ash_by_Adding_to_Concrete) [Accessed 30 April 2018]

Taylor, B., 2017, 'Environment, Art, Ceramics, and Site Specificity' in Livingstone, A. & Petrie K. (eds.), *The Ceramics Reader*, pp. 512- 517, Bloomsbury academic, London

United States Environmental Protection Agency (EPA), 2011, Marine debris in the North Pacific, viewed 02 September 2017, from <https://www.epa.gov/trash-free-waters>

Vidal, J., 2013, 'Toxic 'e-waste' dumped in poor nations, says United Nations', *The Guardian*, [online], 14 December, <https://www.theguardian.com/global-development/2013/dec/14/toxic-ewaste-illegal-dumping-developing-countries> [Accessed 30 April 2018]

Viederman, S., 1993, 'A Sustainable Society: What is it? How do we get there?', viewed 03 March 2017, from <http://www.georgewright.org/104viederman.pdf>

Vurovecs, C., 2008, 'Hilda Ditchburn: a teacher and pioneer of stoneware ceramics in Southern Africa', Masters dissertation, Department of Fine Arts, University of KwaZulu-Natal

Warshaw, J., 2011, *The Complete practical potter*, Helmes House, Wigston, Leicestershire

Wikipedia. 2012. High-density Polystyrene[Online], Available at:  
[https://en.wikipedia.org/wiki/High-density\\_polyethylene](https://en.wikipedia.org/wiki/High-density_polyethylene) [Accessed 02 September 2017]

Wired. 2012. *Plastic-filled albatrosses are pollution canaries*. [Online]. Available at:  
<https://www.wired.com/2012/08/albatross-midway-chris-jordan/> [Accessed 02 September 2017]

World Health Organisation, 2015, Waste and Human Health: Evidence and Needs, meeting at World Health Organisation, viewed 12 April 2018, from  
[http://www.euro.who.int/\\_data/assets/pdf\\_file/0003/317226/Waste-human-health-Evidence-needs-mtg-report.pdf?ua=1](http://www.euro.who.int/_data/assets/pdf_file/0003/317226/Waste-human-health-Evidence-needs-mtg-report.pdf?ua=1)