ROCK OF AGES
STONYFELL QUARRY

An archaeological investigation into Stonyfell Quarry’s contribution to a changing South Australian landscape

A thesis presented as the requirement for the degree of
B.Arch (Hons), in the School of Humanities, at the Flinders University of South Australia

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ABBREVIATIONS

BCR  Burnside Council Report
GRS  Government Record System
PRG  Private Record Group
WGL  Waterfall Gully

CONVERSION TABLE

Historical measurements

625 links = 1 perch
10,000 links = 16 perch = 1 chain
25,000 links = 40 perch = 2.5 chains = 1 rood
100,000 links = 160 perch = 10 chains = 4 rood
1 English acre = 43,560 square feet = 10 square chains = 160 square poles
Pole is also known as a Perch or Rod = 16.5 feet.
1 mile = 320 poles

Metric

1 inch = 2.54 cm
1 foot = 12 inches = 30.48 cm
1 yard = 36 inches = 3 feet = 91.44 cm
1 mile = 1.61 kilometres
1 acre = 0.4047 hectares

Sterling monetary unit pre decimalisation (1966 in Australia)

4 farthings = 1 penny
12 pennies = 1 shilling
2 shillings = 1 florin
5 shillings = 1 crown
20 shillings = 1 pound
21 shillings = 1 guinea
ABSTRACT

Quarrying as an area of archaeological inquiry has been under-researched in Australia. In general, while the archaeology of buildings and features on the landscape has been widely researched, the procurement of resources essential in the building of these structures has gained little attention. By researching the quarry site however, information beyond building style and location can be achieved. Identification of the resource, the methods used to win the resource and the way in which people worked the quarry, all have potential to add to existing research. The process of identifying building stone to its source through stone analyses allows the archaeologist to potentially identify the area of stone extraction. This thesis looks at the contribution made by Stonyfell Quarry to the development of the South Australian landscape from 1837 to 1955. The historical site of Stonyfell Quarry is an important area for historical archaeological study. Not only can it reveal the way in which stone was extracted from the landscape but also how this resource was used to develop a European colony in the new world. Adelaide is renowned for its beautiful stone buildings and owes much to the early quarriers of South Australia. Men using muscle power and few tools worked the quarries in the 1800s and produced a product that had many uses; cut stone for buildings and features, and crushed stone aggregate for constructing pathways, roads, tramways and railway tracks. The lives of the quarrymen who transformed the industry through time is reflected in the site and the local community buildings. The end use of the stone from Stonyfell Quarry is identified through primary source documentary evidence, oral history and stone analysis. By researching historical documentary evidence of the time, together with the physical evidence that remains on site and locally, an understanding of the contribution made by Stonyfell Quarry to the cultural landscape of South Australia is realised.
DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Christine Carolyn Bender
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Cover: The Quarry 1924 watercolour by Sir Hans Heysen with kind permission of Allan Campbell on behalf of the Heysen Family, The Cedars, Hahndorf

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Chapter 1 – INTRODUCTION

The broad aim of the thesis is to look at the way in which the landscape of the Mount Lofty Ranges in South Australia has been continually modified through the human action of quarrying. Specifically, it will examine the contribution of one particular quarry, Stonyfell Quarry, to the cultural landscape of the Ranges and beyond. The archaeological study is associated with the ‘Hills Face Zone Project’ (HFZP), a project that aims to identify and document the historical cultural impacts that have been made on the landscape of the Adelaide Hills Face Zone. The area covered by the HFZP comprises 80 square kilometres extending from the Willunga Hills, south of Adelaide, to Gawler in the north (Figure 1.1). The HFZP is an initiative of the Department of Archaeology, Flinders University. Boral Resources (S.A.) Limited, owner of Stonyfell Quarry is an industry partner in the HFZP and provided the impetus for this particular project.

Stonyfell Quarry in the suburb of Burnside is located 7 kilometres east of the Adelaide CBD at the eastern end of Stonyfell Road, Burnside, and on the western face of the HFZ (Figure 1.2). The site is and was one of the most productive quarries in the Adelaide area, and one of many that proliferated in the Mount Lofty Ranges during the establishment of the new colony of South Australia. Many quarry sites still exist along the HFZ; some are small rock scars on steep slopes, while other larger sites have been redeveloped or protected by councils within a park environment.
Figure 1.1 The Hills Face Zone, showing the location of Stonyfell Quarry.
The quarrying industry was an essential part of the early development of South Australia and an important part of its history. Stonyfell Quarry was the first quarry to operate in the Mount Lofty Ranges and began operating one year after the colony was founded in 1836. The aim of this study is to understand the contributions made by Stonyfell Quarry to the development of South Australia’s cultural landscape. This can be investigated through:

- Studying the growth and expansion of the site through the technological processes of the quarry itself and the archaeological traces that remain. By researching the history of the quarrying operations in the 1800s and 1900s, we can understand the present site.
• Researching the interrelated network of quarries of the day that operated in the area of Stonyfell Quarry and the Hills Face Zone to understand the changing industrial processes over time

• Determining whether the stone from Stonyfell Quarry can still be identified in standing structures or archaeological features in the surrounding landscape of today

• Researching working class people who are typically the under-researched, unrecorded ‘faceless’ and ‘voiceless’ men and women of past societies. Historical archaeological investigation of physical and documentary evidence that relates to the daily lives of the quarrymen will be researched so that a record of their achievements can be made

From its inception in 1836 the government of the new colony of South Australia began a rigorous building program of public works and private buildings. Building material was sought within the city limits and beyond. Quarrying became an essential industry in the development of Adelaide, together with brick making and timber cutting. In 1843, seven years after settlement, there were four stone quarries in operation (Allen, 1844:173). By 1867, the number of quarries in South Australia had increased to 140. These quarries were winning slate (15), building stone (120) and marble (5) (South Australian Parliamentary Papers 8, 1872:63).

It is the quarrying industry that has made Adelaide and South Australia unique in Australia. Adelaide, more than any other city, is renowned for the majestic stone buildings that were constructed throughout the 19th century. Initially quarries were located in close proximity to the city centre, one of the first being the area where the ‘Parade Ground’, King William Street, Adelaide is now located. The buildings that were constructed with stone from these quarries, either standing or as ruins, give archaeologists an opportunity to study the economic and cultural changes of past societies. Information gathered on the construction, size and layout of a building suggests to the archaeologist the status of its past occupants. The progressive nature of the transport network gives an understanding of how the immigrants conquered the isolating distances in order to develop far-flung areas.
In addition, quarry sites as historical repositories appear to have been overlooked by archaeologists. Information gathered from natural features and artefacts that have been left decaying on the site can illustrate obsolete industrial processes: a sheer quarry face over 20 metres high, for example, indicates that quarrying ceased prior to 1955 when the Health and Safety Act was enforced. This act limited the height of the quarry face to 65 feet (20 metres) (Mansfield, 1959:116).

It is only through researching quarry sites that historical archaeologists can hope to gain an understanding of the lives of the faceless workers of this industry, many of whom lost their lives in the dangerous work of quarrying. This thesis will be addressing the issue by combining historical documentation with archaeological spatial analysis of the Stonyfell Quarry site and geological analyses of stone from historical buildings.

Specific areas of investigation include:
1. What physical remains are still in situ on the quarry site and the local area of Burnside relating to the quarry industry at Stonyfell Quarry?
2. What information can be extracted from this?
3. How can the historical archaeology of quarries and quarrying advance the knowledge of the social and economic development of South Australia?
4. Can the stone used in the construction of local buildings and features be identified as being sourced from Stonyfell Quarry?

This thesis will identify the operations of quarrying at this site in order to recognise the sequence of operations and their contribution to the cultural landscape. In order to accomplish this several separate strands of archaeological material need to be investigated. There are many dimensions to the operation of the industry: the geology of the Stonyfell Hills area reveals the type of stone available and the geological structure determines the possible use of the stone. The method of processing the stone also progressively changed; these changes can be traced through the array of redundant machinery that now lies rusting in a designated area of Stonyfell Quarry. The function of the processed stone can be seen in the archaeological remains that exist on the quarry site and in the local area of Burnside and by researching historical records. Stone analysis is performed to determine the source of stone used in the
construction of local buildings and the distance that the stone was transported to its contracted destination gives an understanding of the gradual development of the colony and its communication systems.

Quarrying is an elusive business for archaeologists since with the advancement of the quarry operation, material evidence is destroyed and all that is left in most cases is the final working face of the quarry. Stanier states that historic quarry sites containing information of past workings need to be identified and recorded. This information has the potential to recognise “the labours of past generations of quarriers who made their districts so famous for stone and enriched the architecture of places many miles distant” (Stanier, 2000:360).

Quarrying, viewed from an historical archaeological perspective, has typically been under-researched. Archaeological research has been undertaken on quarry sites in Britain (Stanier, 2000; Major, 1975; Raistrick, 1972 and Todd and Laws, 1972) but there appears to be no published detailed archaeological studies of historic Australian quarry sites. While extensive archaeological research has been carried out on farming, mining and whaling sites in Australia, quarrying appears to have been neglected. Considerable historical archaeological research is required to advance knowledge of the contribution made to Australia’s early development by the quarry industry.

How then can we understand the contributions made by Stonyfell Quarry to the development of the South Australian landscape? Through historical archaeological inquiry the past quarrying operations of Stonyfell Quarry can be understood. Early stone structures and features on the landscape can be linked back to the development of the quarry industry. The initial demand for rubble stone and cut stone for buildings, drains and walls in the mid 1800s was followed by the demand for crushed stone as transport corridors were opened up. The chronology of stone use can inform us of the government’s infrastructure program, showing how the colony developed over a period of time. The physical remains that are visible on the landscape can be interpreted from a spatial and functional perspective. Throughout the archaeological inquiry, an ever-present thread traces the lives of men who worked the quarry and
processed the stone. In many ways the history of stone production parallels the social and economic development of South Australia.

The original owners of the Mount Lofty Ranges in which Stonyfell Quarry is located are the Kaurna people. A semi nomadic people who for thousands of years had travelled the land, hunting, foraging and trading with other Indigenous groups. At the time of white settlement they were estimated to be a population of several hundred. With the arrival of European settlers to the new colony of South Australia in 1836, the need for housing and shelter was urgent. Shelter for the new settler was at a premium; “The early settlers used canvas tents and imported prefabricated wooden houses, known as Manning houses. The use of brick and rammed earth (pisé) came in very early (…) later the fine building stones of the quarries of the Mount Lofty Ranges” (Fenner, 1931:241). Building materials were highly sought after, trees were felled from the surrounding hills and stone was extracted from the hillside. Quarrying became an essential industry in the building of the colony. Many Adelaide houses were built of stone due to its abundance and the relative scarcity of timber.

Urban growth necessitated the construction of transit corridors, linking the city of Adelaide with outlying rural areas. The roadways that were so essential to the new colony were first constructed with hand-broken quarried stone. As the population grew and resided further from the city centre, public transport became increasingly necessary. The first horse-drawn tram plied the thoroughfares of Adelaide in 1878; this tram system was the first of its kind in Australia. Likewise, the railway systems came into operation quite early: the first rail systems to operate in South Australia were Goolwa to Port Elliot and Adelaide to Port Adelaide in the 1850s (Fenner, 1931:173).

The Stonyfell Quarry has operated since 1837 to the present day in various forms. Over time it has had many owners and lessees. In 1939 a group of quarry owners amalgamated to form Quarry Industries Limited, and in July 1994 it became the property of Boral Resources (SA) Limited. The availability of rock in such close proximity to the city of Adelaide helped to make this quarry a major South Australian industry. In the early days of colonisation stone from this quarry played a major part in the construction of buildings and communication networks. Roads were
laid down, bridges and culverts constructed and rail tracks laid on beds of ballast. Roads were fundamental in the linking of communities for business and social travel and also for conveying goods and animals to outlying areas (Hewitt, 2000:14).

To understand how the quarry site operated in the 1800s and 1900s, the archaeologist must reconstruct the past site through physical and documentary evidence of the time; including historical records, maps, photographs and oral history. By recreating the quarrying operations of the time through researching the complexity and scale of the operation, together with its economic viability, we can gain an understanding of the workforce required for the quarrying operation (Davison, 1991:181).

Historical archaeology has been practised in Australia since 1960. While many industrial sites have been researched and analysed in the past, relatively few results have been published (Birmingham and Murray, 1987:8). These industrial sites offer an insight into past workings of the industry. Connah suggests that although little research has been conducted and published on industrial sites, they nevertheless require archaeological inquiry. The key questions he poses when researching industrial sites are ‘What were the raw materials, what manufacturing processes were used and what was the finished product?’ (Connah, 1988:127).

While industrial sites can illustrate the way in which goods were produced, they can also inform us of the social side of the production processes: the cost in human labour of producing these products. The Stonyfell Quarry industry has contributed to the development of South Australia by producing construction materials for many facets of society from 1837 to the present day. These facets include public buildings, grand villas and cottages, drainage works, walls for property division and communication networks to facilitate transportation of people and goods. The exact uses of the stone are little known, as are the life ways of the men who quarried the stone. As archaeologists we perceive the successes or failures of these men through the physical and textual evidence that remains of these people. Without these remains they become the mute and faceless of past societies (Connah, 1998:5). The study of tools and technology of a specific industry and the way they were used shows a pattern of production and management. The economic status of the quarrymen can be inferred by identifying where each one lived. This study has shown that workmen’s
housing took a range of forms from owner-occupied cottages and rental cottages to quarry camps and boarding houses. Our cultural heritage has been built on the achievements of past societies, by recognising their efforts we give them a place in the historical record.

The network of quarry sites around Adelaide and in the Mount Lofty Ranges are an important industrial phase in the history of South Australia. Many houses and public buildings were built with rough-cut stone from these quarries and crushed stone was invaluable in the construction of communication networks such as tramways, railroads and roads. The fact that quarries are under-researched in general suggests that archaeologists are unaware of the information that can be accessed through historical archaeological research on quarries and their contribution to the cultural landscape. Many of the stone buildings in the Stonyfell and Burnside areas are documented on heritage registers, the names of builders and architects are often well recorded, but the type and source of the stone is rarely stated, much less the working conditions that were necessary to produce these raw materials.

While much has been stated about the over reliance on documentary evidence in historical archaeology there are some cases where there is a paucity of documentary evidence such as “slaves and other economically and socially deprived groups” (Deagan, 1988:9). It is in such cases that historical archaeology is able to reveal information through analysis of materials used in the manufacture of the artefact, the time frame of manufacture and the use and function of the artefact.

This thesis then aims to research the Stonyfell Quarry from its beginning. Research into the quarrying operations at Stonyfell gives an understanding of progressive technological advances in the processing of stone, as the quarrying industry attempted to keep up with the demands placed on it by the developing colony of South Australia. Other quarries in the Mount Lofty area were also operating at the time and were competing with Stonyfell for local government contracts; three of these quarries will be studied for their methods of quarrying in order to gain a comparative picture of the place of Stonyfell within the wider industry.
Chapter 2 - Theory and Literature Review

The theoretical approach to this thesis is that cultural landscapes evolve through the interaction of the societies passing through it. Landscapes can inform us of the interaction of people and practices with the natural world. There are layers of landscapes, each layer when peeled back reveals a time exposure of past happenings and resources (King, 1996:249). The resources of the Mount Lofty landscape were seen as valuable assets to the new colonists, timber and stone were harvested from 1836 for the construction of buildings and features. The continual removal of these resources has changed the landscape over the past 168 years. Past human cultural behaviour can be observed through archaeological traces on the landscape; these artefacts and ecofacts can all be studied for information on technique, style and placement on the landscape.

There appear to be relatively few documentary records on how the landscapes were altered by ordinary people, as history has traditionally been written from ‘the top down’, denying the majority of early settlers a place in history. It is only through archaeological research, archival documents, historical photographs, maps and oral history that past cultural behaviour can be observed and ordinary people, such as the quarrymen of Stonyfell Quarry, can be recognised.

Chapter 3 - History

The history of South Australia is inextricably linked to the quarrying industry. South Australia became a colony in 1836. Based on the Wakefield System of immigration, the settlement of South Australia saw skilled hard-working immigrants and their families arrive in the new colony to settle and contribute to its development. This chapter follows parallels in the development of Stonyfell Quarry and the new colony of South Australia from the early years of settlement through to 1955. In 1954, amended legislation for ‘Benching’ was introduced: an act limiting the height of the quarry face to 65 feet that proved to be beneficial to the health of the workers (Mansfield, 1959:4). The changing technology from hand-broken stone to mechanical crushers and from horsepower to motorised transport is explored.
economic and social changes on the landscape are seen through the gradual increase in transport networks: roads, public transport and public buildings, giving recognition to the quarrymen of the 1800s and 1900s.

Chapter 4 - Methods

This chapter outlines the methods undertaken during the research of Stonyfell Quarry. Site surveys were conducted at the quarry site and three other historical quarry sites for an understanding of the methods and technology used in the quarrying industry during the 1800s and 1900s. Buildings and structures were photographed and recorded and historical maps, photographs and oral history were studied to understand the changing technology used in the processing of the stone. The method of transportation to designated sites and the distances of the sites from the quarry were calculated and documented. Stone analysis was undertaken to determine whether local buildings were constructed with stone from the quarry. Oral histories from past and present employees of the quarry and local historians were sought to give a more holistic view of the quarrying operations at Stonyfell. In each case the limitations of the research process have been outlined in order to clarify the approach undertaken by the author.

Chapter 5 - Results

The results of the research show that Stonyfell Quarry was a major contributor to the built environment. The quarry supplied stone to many of the communication networks in and around Adelaide, as well as some of the buildings of the late 1800s. The distance that the stone was transported from the quarry to the site is seen to have increased as the colony developed and transport corridors were expanded. Local buildings that were documented as having been constructed with local stone show visible similarity with stone from the quarry. In an attempt to positively identify this stone as having been sourced from Stonyfell Quarry sample stones from these buildings were compared with the source stone from the quarry. Although the results of this analysis were inconclusive, there is potential for further research in this direction. The lives and achievements of the men who worked in the quarry are identified through documentary evidence, standing structures and oral history.
Chapter 6 - Conclusion

This chapter takes an overall look at Stonyfell Quarry and the contribution that it made to the cultural landscape of South Australia. The history of the Stonyfell Quarry site has been studied and researched so that the contribution made by the quarrying industry to the cultural landscape can be understood. The geology of the landscape dictated its use, a vast repository of building material allowed for the intensive extraction of stone for construction purposes. Quarrying as a primary industry was developed through the need for building materials from the early days of settlement. There is substantial evidence that Stonyfell Quarry stone was a contributor in the development of the South Australian landscape. Buildings and communication networks were constructed with cut stone and crushed stone from Stonyfell Quarry from 1837 through to 1955 and beyond. The tools used in the processing of the stone improved over time with the new technological advances. The distance that the stone travelled from the quarry to the determined site increased as communication networks progressed. Historical buildings and features located on the quarry site and in close proximity to the quarry site show a high probability of having been constructed with Stonyfell Quarry stone. Through historical archaeological research of physical remains, oral history and historical records the quarrymen of Stonyfell Quarry have been given a voice in the historical record.
Chapter 2 – THEORY AND LITERATURE REVIEW

A comprehensive understanding of the archaeological problem at hand is essential before the initial stages of investigation can begin. The archaeologist must pose theories that will advance the existing archaeological knowledge of the site by asking specific questions. Although theories are posed at the outset of an investigation, these may change over the course of the study, possibly giving a wider interpretation of the site being studied.

Birmingham and Murray (1987:120) state that the foundation of good archaeological research rests on the questions posed. Testing the archaeological theory continually while developing archaeological methodology from a wide range of disciplines provides the information sought in past societies and helps to explain the archaeological record. The importance of archaeological studies is not just to add to the historical record but also to investigate “human cultural behaviour itself” (Birmingham and Murray, 1987:130).

Past human cultural behaviour can be observed through the identification and analysis of artefacts on the landscape, identifying the techniques that were employed in fashioning the artefact, the way in which it was used and the reason for its production. Other disciplines such as anthropology, geology and history assist in historical archaeological study. The geology of the Mount Lofty Ranges landscape on which Stonyfell’s quarrying industry has been built, for instance, reveals the type of stone extracted and the features of the stone: in other words, the most productive way in which the stone can be used. Through historical documentation and physical evidence a pattern emerges of the industrial development of Stonyfell Quarry and the contribution that it made to the new landscape of South Australia.

Theory is the critical analysis of thought, and is based on the archaeologist’s past life experiences and study that is associated with the archaeological problem under review. Hodder argues that “within the process of interpretation itself there is both observation and theoretical reconstruction, which are also in a relation of creative tension. Observation is linked both to data and theory” (Hodder, 1992:178).
Orser (1996:15-16), states that some archaeologists believe that theory is superfluous in historical archaeology, since most of the artefacts and sites studied by archaeologists are visible and easily recognised today. Many archaeologists, he suggests, see no reason for explaining the function and use of artefacts, believing it to be self-explanatory. It is insufficient to just document artefacts and features on a site without researching their historical context, since artefacts rarely have a single meaning. A concentrated study is required, guided by theory to understand the way in which an artefact was used, for what purpose and its relationship to the society of the time. Connah (1983:15) also makes the point that while it is important to document past archaeological sites before they disappear, it is more important to ‘problem orient what we do’.

To illustrate this point, Shackel (1993:47) made a study of the mundane toothbrush. By combining historical and archaeological information he was able to show how the placement of toothbrush bristles was related to larger concerns of social order and discipline in society. The toothbrush was invented in China and introduced to the West in 1498. Initially the bristles were haphazardly positioned but over time became neatly structured. Shackel proposed that the ordered rows of bristles were indicative of a new way of thinking, itself part of the importance of personal discipline in Western Society. In short, the toothbrush symbolised the ideas of discipline and order (Shackel, 1993:47).

This new way of thinking, encompassing discipline and organisation, can also be seen on the industrial landscape of the 19th century. As quarrying developed from a proto industry to industrialisation at Stonyfell Quarry, a more regulated industry evolved. Buildings and machinery were placed on the landscape in an organised way. Weighbridges were placed at the exits, magazines placed close to the quarry face and stables and workshops located close to the quarry floor away from the blasting area. Historical maps show the placement on the landscape of quarry buildings and structures that were necessary to the operation of the industry (for more information see chapter 5). Another way of investigating the contribution made by Stonyfell Quarry to the Adelaide landscape is through examining the physical remains of the quarry itself. The buildings on the quarry site today are no longer the original standing structures, over time their use and dimensions have changed. The former
quarry manager’s house has been altered to accommodate a laboratory for curing cement. The construction of the house, the materials used in its construction and the positioning of the house on the landscape all assist archaeological interpretation of building techniques, function and use of space.

The spatial archaeology of a site is defined as the relationship between buildings and features on the site. These spatial relationships can then be compared with physical and documentary evidence from previous times to expand the knowledge of site development. Human activities can be inferred through material evidence located on the site and the use of the landscape. It is the interaction of the relationship between these factors that form the spatial archaeology. The principal factors then are “raw materials, artefacts, features, structures, sites, routes, resource spaces and the people who ordered them”. The sites studied are not confined to settlements, they can be any area of human activity, such as “cemeteries, megalith tombs, caves, shelters, mines, quarries and centres of resource extraction” (Clarke, 1977:9).

Local buildings and features in Burnside that were constructed from stone during the 1800s and 1900s can be investigated to identify the probable source of the stone and to ascertain whether they were constructed of stone from Stonyfell Quarry. The quarry has produced stone for buildings and communication networks since 1837. To identify the exact location of Stonyfell Quarry stone, in the construction and development of South Australia is one of the main themes of this thesis.

While history can be explained as being a continuum of yearly events, Orser believes that modern history has disjunctions from previous times. The subject matter studied by historical archaeologists is significantly different from that studied by pre-historians and requires a “slightly different set of ideas and concepts (…) at least an innovative slant on old ideas” (Orser, 1996:15-16). By continually readjusting the theoretical input, an innovative recognition of Stonyfell Quarry’s contribution to the development of South Australia can be made. Stone analysis can be undertaken to compare stone from the quarry with stone used in the construction of structures and features on the landscape and possibly linking it to a specific quarry. The contribution that the quarry made to the built environment and to the wider social and cultural landscape can then be recognised.
A materialist viewpoint encompasses the belief that “the material, physical world should be given more significance than the ideal or mental world” (Johnson, 1999:192). This viewpoint on the utilisation of a landscape stresses how it is seen as a group of resources at various times: in this case during the pre-contact hunter-gatherer period and then later in colonial times as a resource for farming and mining. This viewpoint can lead to the “optimal foraging theory and other economic models for an understanding of how people exploited the landscape in a rational way” (Johnson, 1999:103).

With this understanding of the landscape the new immigrants to South Australia explored the land, seeking resources for use either in the colony or for export to England, such as stone and timber for building, and copper and gold for export. The rationalist viewpoint is rejected by postprocessual archaeologists however, who argue that humans moved through the landscape with ideas based on their life experiences (Johnson, 1999:103). In pre-contact times as humans moved through the landscape, conditions changed, bush fires and floods modified the landscape. Fires, either accidental or deliberately lit, promoted new growth, attracting animals to feed, the animals were then hunted for food by the Indigenous community. In turn the continuously changing landscape transmitted information to humans allowing them to read the landscape more astutely. In a similar way Europeans viewed the landscape with ideas based on their past life experiences. It can be argued that both theories have merit. Humans used the land according to their own particular needs, as was the case of the new immigrants to South Australia in their quest for building materials and economic profit, yet they were also constrained by their past experience.

While landscapes can be seen as a physical space that is utilised by humans, different perspectives can emerge. In Australia the Indigenous population and the new European immigrants saw the same landscape but viewed it differently. The Indigenous people saw it as a spiritual being, to be protected and managed as they passed through it, while the Europeans saw an untamed wilderness to be controlled and used in the economic development of their society (Hood, 1996:123).
The research carried out for this thesis shows the exploitation and intensification of the quarry industry. The exploitation of the natural resources of the Mount Lofty Ranges for building material was necessary to construct dwellings for the new immigrants of the colony of South Australia. As the population increased the colony developed and the extraction of the natural stone resources intensified. A change in quarrying methods was brought about by the introduction of new technology, thereby increasing production. The concept of intensification is a useful idea in the discussion of economic change: as populations increased so too the demand for produce and products, “whether the emergence of agriculture or the origins of industrialisation” (Dark, 1995:142).

Birmingham, (1988:161) expresses the view that the “expansion of the western world during the late eighteenth, nineteenth and twentieth centuries is reflected in human material culture on a global scale”. The results of the interaction between Australian colonists and the development of their society can be clearly seen in the material remains such as public buildings, houses and structures and communication networks, providing the most rewarding results in “urban historical archaeological study” (Birmingham, 1988:161). The chronology of the buildings and transport networks of Burnside can be traced through historical archaeological research to provide an understanding of the stages of development of the Burnside cultural landscape. The natural resources that were extracted from the landscape and used in the construction of buildings and features can be analysed to locate their source and the overall result of these extraction industries can be seen in the wider cultural landscape.

Landscapes can be seen as either natural or culturally modified. The natural landscape is seen as one that has been untouched by human hand; a desert or wilderness area for instance, but even vast tracts of desert or mountainous ranges have been managed in some way by past societies. The cultural landscape is one that has been modified by the human hand and that “physically embodies the history, structure and contexts of human behaviour in such a way that they are not readily separable from each other” (Hood, 1996:123). The use of resources found on the landscape can aid in identifying material culture and settlement patterns.
The landscape of Stonyfell Quarry is dynamic, a continuum of change from the early
days of the colony. Operations on this site have progressed through new technology
and social development. As an industrial site that extracts stone for processing and
sale it has produced stone for a myriad of uses. The men who worked the quarry
from 1837 transformed the quarrying industry through continual innovation and
expansion of technology, thereby increasing production and profits. Their daily
working lives can be studied through physical and documentary data and oral history,
as well as through their achievements; the structures and features that have survived
can be seen on the landscape of today. The industrial landscape is a unique canvas
on which the innovativeness of past generations can be assessed. The remains of
buildings and machinery inform us of past processes, of trial and error that led to
either the success or failure of the industry. Theory and method are the fundamentals
for all archaeological studies. The study of artefacts, site layouts and landscapes,
together with documentary evidence, enables the archaeologist to synthesise the
research and expand the body of knowledge (Gordon and Malone, 1994:15).

Buildings, structures and features convey information to the archaeologist on
construction techniques, materials, style, use and placement on the landscape. Sites
can be studied for their geographic location, the spatial layout of buildings, natural
features and changing use over time. It is not possible to definitively say what past
societies thought or why they formed their societies in the way that they did, but
through archaeological research we can understand what they did and how they did it
(Lawrence, 1998:10). Artefacts as a source of past history can communicate data on
age, material use, style and symbolism. From this information archaeologists can
gain knowledge of past lives. Ivor Noël Hume maintains that artefacts are ‘signposts
of the past’ (Orser and Fagan, 1995:75). The purpose of archaeology is to explain
what happened in the past as well as to describe it, giving a holistic viewpoint.

Adaptation to the environment by the immigrants of the mid 1800s onwards can be
traced through the materials and construction techniques of particular buildings.
Building techniques can sometimes be traced back to the builder’s country of origin,
in South Australia the early builders were from England and Germany. Much thought
was given to the placement of the home on the landscape. The harsh climate of South
Australia, with its blistering summers and flooding rains, meant that protection from
the elements was essential. Thick walls and verandahs gave protection from inclement weather. Buildings are particularly informative in that they reveal “patterns of human behaviour” (Connah, 1988:63). A more substantial structure may indicate that the occupants were intent on long-term occupation, while more tenuous structures could be viewed as temporary habitation. The same theory applies to artefacts: non-portable artefacts suggest a permanence of habitation while portable objects suggest a more temporary stay. Lawrence Cheney (1992:37) states that “the analysis of physical and documentary data occurs in the context of historic ethnography, that is, as part of the exploration of the whole cultural system of the people being studied”.

Valerie Hill’s archaeological study of a Welsh village near Castlemaine in Victoria takes a similar stance to reveal the evidence of past cultural activities at the site. Hill suggests that the vast exploitation of the landscape in the extraction of mineral resources and the settlements that emerged during the 19th century was a “reflection of the relationship that existed between people and their surroundings at this time” (Hill, 1998:60). This historical data allows inferences to be drawn about the way people adapted to their new landscape, the resources that were most valued and the way the people modified the landscape (McCann, 1992:121).

Similarly the population of colonial Adelaide adapted to their environment by making use of the natural resources that were available, including timber and stone from the Mount Lofty Ranges. As the city expanded with the growth in population the demand for land and housing became greater and families moved out into the surrounding areas where they formed villages. In the development of these villages, houses, public buildings, churches and schools were constructed and roads, tram and rail tracks laid down. Many of these buildings and features were constructed with stone from the local quarries and are still visible on the landscape.

Stonyfell Quarry is one of the few remaining historical quarry sites in South Australia that can be studied to reveal the past activities of the industry, the winning and processing of the stone and the distribution of the finished product for use. The stone was an important resource and contributed widely to the development of the South Australian landscape.
Chapter 3 – HISTORY

Background history on the establishment of the Colony

The Colony of South Australia was founded on the Wakefield System, named after Edward Gibbon Wakefield who first devised the concept. This entailed a systematic colonisation of the colony, in particular determining the type of immigrant that was needed to make the colony successful - young, respectable and hardworking people. Land was first sold in London in 1834 when the colony of South Australia was officially established. The land was sold to free settlers at not less then twelve shillings per acre and the monies raised from land sales assisted new immigrants with their passage to Australia. By 1856 the population of South Australia had reached 104,000 people, many of whom were more middle class than the immigrants that landed in the eastern states prior to 1850 (Gurry, 1984:150). The South Australian immigrants were mostly family groups arriving from the United Kingdom, although Lutheran groups from Germany also immigrated and established market gardens, orchards and vineyards (Gurry, 1984:150). Those eligible for emigration were “Artisans, agricultural and other labourers, miners and gardeners under 50 years of age; single female domestic servants, or widows (without children under 12), not exceeding 35 years of age, the wives and children of married emigrants” (Harcus, 1876:129).

Early building construction

The first immigrants found a scarcity of housing. Many remained on the ships at Port Misery (later named Port Adelaide) until lodging could be found. Not surprisingly the new settlers, in their quest for shelter, used the most available resources: timber and stone. The landscape of Adelaide and the surrounding hills was found to be rich in stone and relatively scarce in timber. Stone was abundant in creek beds and stony outcrops in the hills of the Mount Lofty Ranges and the areas of Magill, Burnside and Mitcham were all quarried for their local stone. This was mainly bluestone, freestone and sandstone, varying in colour from shades of beige to dark brown depending on the iron content (Stanier, 2000:39). Many extraction scars on the slopes are still visible today.
The initial houses consisted of one or two rooms and were constructed of any available material; canvas, bark and mud (pisé or wattle and daub), timber and stone. Some of the immigrants brought a home with them; a pre-fabricated house, with collapsible walls made of wood. This house was known as a ‘Manning’ house named after its designer. In 1838 locally constructed portable homes were advertised, measuring 12x14 feet (3.66 metres x 4.27 metres) and 16x20 feet (4.68 metres x 6.10 metres). These were made from stringy bark and erected within the town limits at a cost of £60 (Kwan, 1987:22).

The history of the South Australian quarrying industry began in the Hills Face Zone of the Mount Lofty Ranges in 1837. The site was once the domain of the Kaurna people. These traditional owners were a semi nomadic people who accessed the resources of the land during seasonal occupation. In 1836 the white settlers from Europe arrived; hungry for land ownership they moved into the Ranges and exploited the resources, dispersing the traditional owners. In the early days of settlement, many settlers felled their own timber and purchased a stick of dynamite to blast their own stone from sites such as Hardy’s Quarry at Glen Osmond (Stacey, W. pers. comm., 20th October 2002). In 1858, as a precaution against house fires, legislation was introduced banning the use of wood in the external walls of buildings, thereby increasing the demand for solid stone construction. In 1861, only one in every four homes was made from wood and by 1881, this had decreased to one in ten homes (Figure 3.1 and Figure 3.2). The remaining houses were constructed of stone, brick or concrete (Pikusa, 1986:59). Throughout history stone has been highly regarded for building construction. Many public buildings and stately homes in Australia have been built with various types of stone; each selected for its specific attributes portraying strength and durability (Connah, 1988:64).
Figure 3.1  Proportion of Stone Housing versus other building materials - 1861

Burnside Housing 1861 (261 Dwellings)

- 78% Stone
- 8% Concrete (Pise)
- 7% Stone/Brick
- 7% Wood
- 7% Wood/Mud etc

Source: Burnside Council District Map 1856-1860

Figure 3.2  Proportion of Stone Housing versus other building materials - 1881

Burnside Housing 1881 (675 Dwellings)

- 85.48% Stone
- 5.63% Wood
- 2.81% Brick
- 2.07% Concrete
- 1.19% Concrete/Brick
- 0.15% Concrete/Wood
- 0.59% Gal. Iron
- 0.30% Stone/Brick
- 1.19% Stone/Concrete

Source: Book of Assessment for the District Council of Burnside for year ending June 30th 1882
The first 25 years of settlement saw the majority of building construction from limestone, found in most areas of Adelaide, North Adelaide and the northern plains. Located near the surface it was easily quarried and many of the buildings of the area are built of this stone rubble. The stone was also a source of lime, a necessary ingredient of mortar (Pikusa, 1986:59). By the late 1850s, once the limestone quarry sites in and around the city of Adelaide had been depleted, the builders began looking further afield (Marsden, et. al, 1990:238). The geological formation of the Mount Lofty Ranges showed great promise and quarries proliferated throughout the ranges. Bluestone became more popular than limestone and brick during the 1850s and many types of buildings were constructed with this stone (Marsden, et al., 1990:27).

During the period 1860 – 1890, sandstone became the preferred material for public buildings. Although more expensive than bluestone, sandstone was easier to work due to the fact that it could be cut and sawn with a greater degree of accuracy. Freestone, a material that was less expensive, softer and easily shaped, came onto the market in the late 1800s and was used to face the front walls of houses that were otherwise constructed completely of brick. This style of building continued for the next 50 years “preserving the appearance of the traditional stone façade well into the twentieth century” (Pikusa, 1986: 60). Bricks were hand made and expensive in 1838 and sold for 50 or 60 shillings per thousand. In 1860, the price had been reduced to between 35 and 50 shillings per thousand, making the price comparable to that of building stone (sold at 3 shillings to 3 shillings and sixpence per cubic foot) (Pikusa, 1986:61). In the 1890s, with the advent of cheaper mass-produced bricks, quarries were forced to diversify, consolidate or close.

In the years 1910 – 1914 there was a population increase in South Australia which in turn created a building boom. Houses were built larger and the building materials were cheaper as brick replaced stone. With the reduction in the cost of building around 1910, new homebuyers came into the market (Marsden, 1980:43). A surge in public housing occurred in 1938 beginning in Woodville Gardens (Marsden, 1980:55). The increase in house construction in turn influenced an increase in road construction and is a pattern documented in most suburbs (Figure 3.3).
Communication Networks

As the colony progressed, new roads were constructed, initially following the footpads of the Indigenous people. Bullock tracks that once went vertically up hillsides were consistently realigned and improved upon as the mode of transportation improved. The early roads were an unsealed layer of stones, compacted by hoofs and wheels passing over them (Morton, 1996:21). The conditions of the early roads made travelling them an ordeal, especially in winter when heavy rains turned them into quagmires and in the summer when the dust from the roads became unbearable to both traveller and roadside resident. The dust proved a particular health problem, as horse manure and human sputum mixed with the dust of the road aggregate and penetrated the air causing breathing problems (Morton, 1996:21).

An improved system of road construction was the Macadam road building technique. Due to its relative cheapness, the South Australian government chose to adopt this technique in 1869. The method was to layer the road surface with six inches (15cm) of broken stone weighing no more than six ounces, laid to a depth of ten inches, with
drainage ditches on either side of the road. After a few weeks of vehicle compaction a further six inches of metal was laid. A road of this type, some eighteen feet wide, cost approximately £88 per mile (Cossons, 1993:238). Metal was sourced from Stonyfell Quarry for much of the road construction in Adelaide and surrounding districts. The Parade, Norwood was one of the “first streets to be metalled (...) at a cost of nine pence per yard including the cartage of materials” (Blackburn, 1953:32). This sum is equivalent to £66 per mile, although the width of the road is not stated. Stonyfell Road, leading to the Stonyfell Quarry was built according to the Macadam technique with stone sourced from Stonyfell Quarry, although the year is not known (Green, S. pers. comm., 3rd September, 2002) (Figure 3.4).

Figure 3.4  Macadam Road Building Plan

In the early days of 1849, licensing users of the roads provided partial funding of the main roads. These licences ranged from £1 for a springcart to £2 for a wagon (Fenner et. al. 1936:203). District roads were funded by the District Boards assessing occupiers of land up to nine pence per acre. Licence fees for vehicles were repealed in 1850 and provision made to repay monies that had been collected (Fenner et al.
In 1888 the main roads of the colony were placed under the control of Corporations and District Councils (Blackburn, 1953:32). Later, in 1923, the first bituminous concrete roads were constructed, and in 1926 the Commonwealth began to fund state roads (Marsden, 1980:48-49).

As the colony increased in population, new villages formed on the outskirts of Adelaide. By the late 1870s when townships spread to distances greater than casual walking distance - an acceptable distance for walking is usually between two to two and one half miles (3.2 – 4 kilometres) from the centre of the city (Williams, 1974:434) there was a demand for short haul public transport. A relationship between transportation and new housing developments was instrumental in raising land prices. Land prices in the Kensington and Norwood areas, for example, rose between 200% and 300% after the construction of the tramway (Williams, 1974:442). The cost of servicing each block of land with utilities played a crucial part in the way these blocks were divided. The rectangular block, deep, with a narrow road frontage was adopted after 1870 when water and sewage were introduced. Stone was the major material used in the construction of houses, especially with the increase in the number of rooms per house that occurred in the 1860s and 1870s (Williams, 1974:452-457).

Railways were also an important phase in the development of South Australia. The mid 1850s saw the opening of the first railway (horse drawn) from Goolwa to Port Elliot. The Adelaide to Port Adelaide line was established in April 1856, followed by the Adelaide to Gawler line in October 1857. Crushed stone for ballast from the local quarries was used in laying the foundations for the train lines. Railways were used for the transportation of copper ore and farm produce from the 1860s; particularly from the copper mines in Kapunda, Burra and Moonta. The pace of railroad building increased between the late 1870s and late 1880s, it then began to plateau, picking up slightly again in 1905 and more rapidly in 1915 through to 1920, a time of increased motor traffic (Figure 3.5). Quarry Industries Limited was successful in tendering for a S.A. Railways Adelaide contract on 20th December 1940 for the supply of 10,000 tons of ballast at eight shillings per ton. This ballast came from Stonyfell Quarry (Mins of Mtg. Q.I. Ltd. 4/2/1941- Boral Archives, ‘A’ file, black tin).
Trains and tram networks during the 1870s and 1880s serviced the citizens with public transport and allowed those that could afford it the opportunity to live in healthier sections of the countryside, along the transport corridors and away from the city’s industrial effluent (Forster, 1999:11). Adelaide had no pre-industrial housing to abolish and could therefore plan leafy suburbs for the enjoyment of her citizens. Compared with the United Kingdom land was cheap and the incomes higher. These facts were instrumental in allowing 50% of Australian families to own their own home by the end of the 19th century, unlike the U.K. where only 10% of the population were home owners at this time (Forster, 1999:13).

In the boom years of the 1870s and 1880s housing, communications and transportation were developing rapidly. Adelaide was the first capital city in Australia to have a street tramway system (Gibbs, 1978:5). Initially trams were pulled along steel tracks by horse. The horse drawn trams commenced operation in 1878, and were operated by private companies. The first tram line, opened on June 10th 1878 by the Adelaide and Suburban Company (Dallwitz and Marsden, 1986:20),
travelled from Kensington Road, Burnside to Adelaide every half-hour for a fare of three pence. Encouraged by the building boom of 1881 – 1883 the Adelaide and Suburban Company built two additional tramlines from Adelaide to Burnside and Magill. The cost of running trams was considerably less than running rail and the construction of the tram tracks was easier (Williams, 1974:439). The tram shed and stables to accommodate 120 horses were located on the northwest corner of Shipsters Road and Regent Street, Kensington (Gibbs, 1978: 5), (Figure 3.6).

Figure 3.6  Horse Drawn Tram at the Burnside Tram Shed, 1896


The communication networks were an important development in the new colony; roadways, railways and tramways linked outlying villages, isolated rural settlements and ports to the city centre. The first main road to be completed was the Adelaide to Port Adelaide road built by the South Australia Company; Governor Gawler opened it in May 1839. Building of the Great Eastern Road through the hills commenced in June 1841 and operated for six years with a toll. The Adelaide to Gawler road was established in 1842, the Greenhill Road was opened in 1858 and the Magill Road in 1859. Figure 3.7 shows the approximate development of 6000 miles of main roads from 1854 to 1928. Included are 300 miles of bituminous roads that were constructed after 1923.
History of Quarrying at Stonyfell

Stonyfell was the first quarry to open in 1837 and is still one of the leading quarries in the Mount Lofty Ranges. The geological formation of the Mount Lofty Ranges ensured an abundant source of raw material, such as quartzite, freestone and bluestone for building. The quartzite rock is of Cambrian and pre-Cambrian age. Resistant to erosion, unlike the sandstone, it is a hard rock and can be difficult to break in a particular way unless along it’s bedding lines. The availability of stone in such close proximity to the township aided in making Adelaide and the surrounding areas renowned for its magnificent stone architecture. Other quarries were also operated within the Mount Lofty Ranges (Figure 3.8). The number of quarries is indicative of the wide availability of stone that ensured short distances of transportation. Some of the historical quarrying areas can be seen on the South Australian landscape of today as rock scars, while others have been rehabilitated or reclaimed as building sites and parks.
Figure 3.8  Historical Quarry Sites in the Hills Face Zone

Source: Drew, 1980, Mineral Occurrences of Mining Activity Plan
### Legend - Historical Quarry Sites in the Hills Face Zone

<table>
<thead>
<tr>
<th>Name</th>
<th>Alternate Name</th>
<th>Commodity</th>
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<tbody>
<tr>
<td>1. Para Hills Quarry</td>
<td>Teisseries Quarry</td>
<td>Quartzite</td>
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<tr>
<td>2. Kickebach’s Quarry</td>
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<td>Quartzite</td>
</tr>
<tr>
<td>3. Tee Tree Gully Quarry</td>
<td>Quarry Industries Ltd.</td>
<td>Quartzite</td>
</tr>
<tr>
<td>4. Highways Dept.</td>
<td></td>
<td>Quartzite, Dolomite</td>
</tr>
<tr>
<td>5. Glen Ewin Quarry</td>
<td>Brown &amp; Thompson’s</td>
<td>Sandstone</td>
</tr>
<tr>
<td>6. Hannaford’s Quarry</td>
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<td>Sandstone</td>
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<tr>
<td>7. Tee Tree Gully D.C.</td>
<td>Water Gully Quarry</td>
<td>Quartzite</td>
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<tr>
<td>8. Highercombe D.C.</td>
<td>Klopper’s Quarry</td>
<td>Quartzite</td>
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<td>9. Yatala Stockade Quarries</td>
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<td>Quartzite, Slate</td>
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<td>10. Walker’s Northfield Quarry</td>
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<td>Quartzite, Slate</td>
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<tr>
<td>11. Coull’s Quarry</td>
<td>Anstey’s Hill Quarry</td>
<td>Quartzite</td>
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<td>12. Lange, LGS</td>
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<td>Sandstone, Clay</td>
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<td>13. Wakefield’s Quarry</td>
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<td>Quartzite</td>
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<tr>
<td>14. O’Neil’s Construction Ltd.</td>
<td></td>
<td>Quartzite</td>
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<td>15. Payneham &amp; Campbelltown DC</td>
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<td>Quartzite</td>
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<td>16. Pitman’s Quarry</td>
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<td>Sand &amp; Gravel</td>
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<td>17. Bide Estate</td>
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<td>Sand &amp; Gravel</td>
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<tr>
<td>18. Montacute Blue Metal</td>
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<td>Dolomite</td>
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<td>19. Rockdale Quarries</td>
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<td>20. Maryvale Quarry</td>
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<td>22. White Rock Quarry</td>
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<td>23. Ashton Quarry</td>
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<td><strong>24. Stonyfell Quarry</strong></td>
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<td>25. Greenhill Quarry</td>
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<td>26. Crafer’s D.C. Quarry</td>
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<td>Quartzite, Slate</td>
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<td>27. Dunstan, John &amp; Son Ltd.</td>
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<td>Dolomite, Slate</td>
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<td>28. Capper’s Quarry</td>
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<td>Slate</td>
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<td>29. Glen Osmond Quarry</td>
<td>Hardy’s Quarry</td>
<td>Clay, Shale</td>
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<tr>
<td>30. Glen Osmond Quarries</td>
<td>McElligott’s Quarry</td>
<td>Quarzite, Slate</td>
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<tr>
<td>31. Union Quarry</td>
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<td>Quartzite</td>
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<tr>
<td>32. Eagle Quarry</td>
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<td>Quartzite</td>
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<tr>
<td>33. Brownhill Creek Quarry</td>
<td></td>
<td>Quartzite, Slate</td>
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<tr>
<td>34. X.L. Quarry</td>
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<td>Quartzite</td>
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<tr>
<td>35. Mitcham Quarries</td>
<td>Ayliffes, Princes, Tilley’s</td>
<td>Quartzite, Slate</td>
</tr>
<tr>
<td>36. Anderson’s Quarry</td>
<td></td>
<td>Moriarty’s.</td>
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<tr>
<td>37. Stirling D.C. Quarry</td>
<td></td>
<td>Quartzite</td>
</tr>
<tr>
<td>38. St Peter’s Quarry</td>
<td>Torodes Quarry</td>
<td>Sandstone</td>
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<tr>
<td>39. Tee Tree Gully D.C.</td>
<td>Roadside Quarry</td>
<td>Sandstone</td>
</tr>
<tr>
<td>40. Trolta, G</td>
<td></td>
<td>Sandstone</td>
</tr>
<tr>
<td>41. Golden Grove</td>
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<td>Slate</td>
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</table>
During the 1880s and 1900s the main product of Stonyfell Quarry was crushed stone. This product was used for the construction of roads and train tracks. Apart from its use in communication networks, Stonyfell Quarry stone was also used in the construction of buildings and other standing structures. There are several key buildings and features that are known from historical sources to have been erected with stone from Stonyfell Quarry. Many houses and features built in the early years of settlement and in close proximity to Stonyfell Quarry have a high probability of having been constructed with stone from this source.

**Known Uses of Stonyfell Quarry stone**

*The Adelaide Gaol*

The construction of the Adelaide Gaol located in Gaol Road, Thebarton, Adelaide is documented as having begun in 1840 by the successful tenderers Borrow and Goodier, who were owners of a building company in Adelaide (Marsden et. al. 1990: 237). The northeastern and eastern walls were completed in 1841 and were constructed with random rubble from Stonyfell Quarry that was worked at the time by Richard Eales Borrow (*Advertiser*, 1954:8; *Observer*, 1923:59). The estimated cost of construction was £17,000, but due to escalating costs, by mid 1841 with the gaol only half built, Governor Gray stopped the project (Marsden et. al. 1990:237).

*Clayton Congregational Church c1882*

Clayton Wesley Chapel and Burial ground complex on Section 288 in the Hundred of Adelaide is located at the eastern end of Norwood Parade, Burnside. Stone from Stonyfell Quarry was used in the building of this church in 1882 (*The Advertiser*, 1954:8). The base of the church was constructed with local bluestone (Young, 1984:2). Henry Dunstan worked Stonyfell Quarry from 1867 and was a Deacon of the church (Steinberner, 1987:6). The Clayton Congregational church’s foundation stone was laid in June 1882. Henry Dunstan’s son-in-law, Rev. Thomas Hope was pastor of the church from 1874 – 1890 (Warburton, 1981:254).

*Undelcarra c1852*

The *Undelcarra* mansion had its beginnings in 1852. Built for the Debney family and named ‘The Laurels’. The house was constructed with roughly hewn local Stonyfell
quartzite with brick quoins and slate roof. In 1876 ‘The Laurels’ was sold to Simpson Newland who extended the building and re-named it *Undelcarra*, ‘under the hill with running water’ (Black, 1982:1-2).

*Retaining walls for Great Exhibition Complex c1887*

Stonyfell Quarry competed with other quarries that were also located in the Mount Lofty Ranges to supply stone for government works programs and private contracts. In 1886, Dunstan Limited, later known as Stonyfell Quarry, was awarded a contract to supply metal concrete for the building of the retaining wall for the Great Exhibition complex on North Terrace, Adelaide (Keays, 18th January, 1886). The Great Exhibition of Adelaide was to celebrate South Australia’s achievement of the first 50 years of settlement and was open from June 1887 to January 1888. Designed by Withall & Wells and built by William Rogers, the cost of the Exhibition building was £35,000 (Marsden et al., 1990:35). Demolished in 1963 (Marsden et al., 1990:44), the building was located on a North Terrace site, between Frome Road and Bonython Hall where the Napier building, University of Adelaide, is now located.

*Inclined Cycle Track c1888*

In 1888, the first inclined cycle track in Australia was laid down by tar paving and was located in sections 301 Pt.31,32,33,34 on the Parade at Kensington. The contract for this work was awarded to Dunstan Limited Quarry. The location of the cycle track was previously known as Shipsters Paddock, and was a recreational area for both colonists and Indigenous peoples. In the early 19th century Corroborees were held there involving 200-300 Indigenous people (Warburton, 1981:245). Henry Dunstan had established a Tar Paving and Road Metal Depot close by, at premises located between Tobruk and Dunstan Avenues, Kensington Park (Steinbemer,1987:12). In one year; April 1910 to March 1911, 3,805 tons of stone was used in tarpaving roads (Boral Archives, Series U, Box 4).

*Maintenance of horse drawn tram track c1898*

In 1898, Dunstan Limited was contracted to maintain 37 miles of the tramways in good order. To accomplish this, aggregate ballast from the quarry was used. During this time the quarry was very busy with the men working a shift and a half each day, breaking and carting the stone up to 7 miles (10.5 kilometres). The workplace was
extended at this time to facilitate the increase in demand (Keays, 10th August 1898). In 1910 further extensions were made to the quarry site (South Australian Department of Mines, 1923:13). The transport map of 1908 (Figure 3.9) shows the various routes of the ‘Horse Tram’, although the exact 37 miles of tram routes that Dunstan Limited Quarry were contracted to maintain is not stated.

Figure 3.9 Adelaide’s Public Transport System 1908

As road building techniques improved, 1901 saw the introduction of tar screening, followed by the use of asphalt in 1914 and bitumen in 1923 (Blackburn, 1953:32).
brochure promoting the sale of Stonyfell stone from Dunstan Limited lists products and services; those listed include construction of cricket pitches and tennis courts with bitumen (Dunstan Limited, n.d.: 8).

Adelaide Airport c1949
A lucrative contract awarded to Stonyfell Quarry was that of the new Adelaide Airport in 1949. This contract was to supply a third of the crushed stone required for the building of roads and runways on the site. The government sourced the stone from three quarries: Stonyfell, Greenhill and Tee Tree Gully. To increase the supply of stone for this project, the number 6 crushing plant at Stonyfell was worked under floodlight, crushing and loading 1000 tons per day (Green, S. pers. comm., 3rd September 2002). The airport was opened in 1955 at a cost of over £3 million.

History of the Stonyfell site
The background history of the Stonyfell site gives an understanding of how the landscape has evolved through the emergence of industrialisation in the Hills Face Zone of the Mount Lofty Ranges. The quarrying industry is inextricably linked to the cultural and economic development of South Australia through construction of buildings and communication networks that were so essential to the growing colony. During the nineteenth and twentieth centuries social groups were developing the colony of South Australia by way of “industrial growth, capital accumulation and colonial expansion” (Hinsley 1989 in Johnson, 1999:168).

Stonyfell Quarry
The first areas opened up for quarrying were in sections 1050, 905 and 1057 in the Hundred of Adelaide.

Section 1050 - James Edlin began quarrying this section in 1837 to supply building stone and slate. In 1850 it was operated by G. Walker Johnson and Arthur Hardy and known as Beacon Hill Quarry. The first sign of stone being advertised for building use was in 1851 (Figure 3.10).
Figure 3.10 The first sign of Stonyfell Quarry

BEACON-HILL QUARRY, NEAR THE SECOND CREEK.

G. W. JOHNSON, Glen Osmond-road, begs to inform the Civil Engineers, Architects, Builders, and public of the City of Adelaide and its vicinity, that he is now prepared to supply them with FREESTONE suitable for Bridges, Houses, Engine-beds, &c.

N.B.—Quoins, Blocking, String-courses, Coping, Caps, Posts, Sills, Steps, &c., at prices exceedingly low; also good material for Rubble Masonry and Road purposes, supplied at a cheap rate in the Quarry.

Source: South Australian Register, December 15th 1851.

Section 905 – this section was a land grant to John Dixon Piper, a London owner on 7th April 1841. Richard Eales Borrow (1790-1862), a relative of Piper, opened up this section for quarrying. It was stone from this quarry that was initially used in the building of the Adelaide Gaol (Observer, 1923:59).

Section 1057 – this section was granted to G. Walker Johnson of Glen Osmond in December 1851 (Steinberner, 1987:7). It was worked in conjunction with section 1050 by Arthur Hardy and G.W. Johnson and formed part of Beacon Hill Quarry (Warburton, 1981:52).

In 1858, the three sections 905, 1050 and 1057 were jointly owned by Algernon Sydney Clark, John Howard Clark and Henry Septimus Clark and Joseph Crompton, under the name of Clark/Crompton. Stonyfell was named by the fiancé of Henry Clark after the hills in England known as fells (Steinberner, 1987:7-8). Prior to this, the quarry was known as Beacon Hill Quarry.

David Packham (1832-1912) worked a quarry on section 905 that he leased from Clark and Crompton. Henry Dunstan (1841-1915) worked the quarry in partnership with Packham delivering stone. Henry Dunstan was born in Cranborne, Cornwall, England and immigrated to South Australia with his parents in 1846 (Burgess
In 1867 Dunstan took over the lease from Packham and worked the quarry on a royalty basis, installing a steam driven stone crusher in 1881. Prior to this the quarry had been worked by hand mining methods, and men wielding spalling hammers did the secondary stone breaking (Mansfield, 1959:115).

In 1883, Henry Dunstan leased the quarry from Joseph Crompton, and in 1888 purchased the whole of the Stonyfell estate from the Bank of Adelaide. The estate consisted of 223 acres of quarry, vineyard and hills (Warburton, 1981:53). The quarry then became known as Dunstan Limited, and supplied stone for many uses including crushed stone aggregate for road making and rail ballast (Figure 3.11). Many Burnside roads are constructed with stone from this quarry (Burnside Council Archives, 1869, 1873, 1916, 1917 and 1921).

In 1939, a group of quarry operators including Dunstan Limited, amalgamated to form Quarry Industries Limited. The Stonyfell Quarries Limited was a subsidiary of Quarry Industries and “purchased part sections 904, 905 and 1050A and adjoining sections 1057, 1175, 1176, 1177, 1178 and 1179 Hundred of Adelaide from Dunstan Ltd” (Mansfield, 1959:115) (Figure 3.12).

In 1950, the following quarries amalgamated to form Quarry Industries Limited:

- Adelaide Quarries Limited
- Anderson’s Quarries Limited
- Excavator’s Limited
- Glen Osmond Quarries Limited
- Linwood Quarries Limited
- Quarries Limited
- Quarry Transport Limited
- Rockdale Quarries Limited
- Stonyfell Quarries Limited
- Sand and Gravel Limited
- Torrens Valley Limited
- Tea Tree Gully Quarries (Boral Archives, ‘A’ file, black tin).
Figure 3.11 Henry Dunstan (on track), T. A. Keays (in white coat) and Quarrymen c1900

Source: Burnside Library History Section
Figure 3.12  Land sections purchased by Stonyfell Quarries Limited from Dunstan’s Ltd.

Source: Hallack, 1893:134
When Boral Resources (SA) Limited purchased the Stonyfell property from Quarry Industries Limited in July 1994, the land holding was approximately 313 acres. At present 47 acres are used for quarrying and the remainder is used as a buffer zone (*Johnny Green’s Journal*, 1985:2).

**Method of Operation**

By the late 1800s, many quarries were operating in the Hills Face Zone. Early stone was extracted by barring (levering) from the hillside, it would then fall to the ground to be loaded into drays and taken to road-work sites where it would be knapped (shaped) by hand to the required size. Once this source of rock was depleted, rock faces were formed and men known as ‘powder monkeys’ descended the quarry face on ropes, drilling holes for gunpowder placement which was then ignited, the blast bringing down many tons of rock. Although the ‘powder monkeys’ were expert at their trade, the scaling of the rock face was both “hazardous and slow” (Mansfield, 1959:4).

A crushing plant was installed at Stonyfell Quarry on the site beneath the quarry face and 25-cwt and 30-cwt skips ran on rails down the slopes to the tipplers. The rails in the late 1800s radiated from the main line into the quarry and skips were filled by hand with the aid of a stone fork and secondary breaking of the rock was achieved with the use of Waugh popping machines (Mansfield, 1959:5) (Figure 3.13).
The broken stone was loaded by hand onto horse drawn drays with a capacity of 6.5 tons and pulled by six horses. The company built their own wagons and stabled their horses, up to 150, at Kensington (Figure 3.14). Henry Dunstan who worked the quarry in 1881 installed a mechanical steam driven stone crusher (Hope 12”x 8” and rotary screens) which was thought to be the first in South Australia. The stone was broken to 2.5 inches (64mm), any flat stones falling into the bins below were knapped by hand and this crushed stone was sold to councils for tar paving. To feed the steam producing boilers timber was felled on the property (Mansfield, 1959:6).

Figure 3.14  Dunstan’s Stonyfell Quarries Teams 1916

Source: Burnside Library History Section

An astute businessman, Henry Dunstan increased profits by purchasing new equipment, and making changes to processing practices (Figure 3.15). Horses played an important role in the quarrying industry, transporting the processed stone from the quarry to the prescribed construction site. Stables and horse yards were set up below the quarry on the southern side of Stonyfell Road at the eastern end of Ferguson Park (Preiss, K. pers. comm., August 2002).

By the 1920s the quarry face was approximately 400 feet high (120 metres). As the industry developed, the 1920s saw a continued increase in technology such as solid-tyred motor trucks with a capacity of 4.5 tons being used for deliveries. Equipment also improved, the first compressors were put into operation, and tripod reciprocating drills and jackhammers were also introduced (Mansfield, 1959:4).
After the amalgamation of quarry owners in 1939 new equipment including “a Cletrac front-end loader and a steam shovel were purchased, roads were graded to the plant and motor trucks acquired”, leading to an increase in production (Mansfield, 1959:6) (Figure 3.16).

The distance that the stone was transported from its source at Stonyfell varied from short distances around the Burnside council area in the mid 1800s to the longer distances of Port Adelaide in the west, Brighton in the south and Enfield in the north by the late 1800s. The quarry tendered for contracts to supply stone to many District Councils during the 1800s and 1900s (Figure 3.17).
Figure 3.16 Production of processed stone at Stonyfell Quarry 1924 - 1955

Stonyfell Quarry Production

Source: Mansfield, 1959:121

Figure 3.17 Delivering Stonyfell Quarry stone to building site c1900

Source: Burnside Library History Section
Worker conditions in the quarry

The economic and social lives of the quarrymen who once worked the quarry can be traced through archaeological evidence, oral history, and documentary sources. These sources have shown that the men who worked in the quarry were strong and hardworking, able to adapt to the new technological processes of the time. The stone extracted through detonation fell to the quarry floor where it was broken by hand by quarrymen using spalling hammers who then loaded it into skips (Figure 3.18). They adapted from a hand worked quarry system to one that was steam driven and later a motorised system. Horse and drays from mid 1800 transported the stone, and later in the first quarter of the 20th century stone was transported by motorised transport.

Horse stables were situated at the eastern end of Ferguson Park; the men fed and harnessed the horses prior to leading them into the quarry where they were hitched to waiting drays. Although mining inspectors conducted inspections of methods and equipment employed at the quarry sites from the 1920s (Wells, n.d.), the dangers faced by the men prior to ‘Benching’ legislation being enacted were serious and sometimes life-threatening. The 1800s and early 1900s was a time when quarrymen were driven by hard work with few government safety mechanisms in place. It was the era when teamwork and self-reliance were paramount and survival everything.

Figure 3.18  Quarrymen breaking and loading stone into skips c1920

Source: Burnside Library History Section
The lives of the men who worked in the quarry are an essential part of this thesis, although the written records of actual working conditions written by the workmen themselves is sparse, the exception being the letters written by Thomas Keays, (1858-1909) who was a supervisor at Stonyfell Quarry. His letters span twelve years, from 1880 to 1902, and cover his arrival in South Australia from Canada. He remarks on the cost of living and government policies of the day. A letter to his brother in 1886 tells of the depression, with men walking the streets looking for work and people starving. The letters also tell of family life in South Australia from the late 1800s, of his wife and children and his continual fight with ‘hay-asthma’ (this was possibly silicosis). He describes his illness as like a heavy weight on his chest when lying down, saying that dust or escaping gas or any nasty choking smell will cause it. He also writes of his accident at the quarry, of being struck by a stone from a crusher.

This was not unusual, men were often struck by falling or flying stones. Keays writes of an incident where “a man got his skull cracked here yesterday, a stone from a blast struck him on the head – serious case” (Keays, May 10th 1893). Other accidents occurred, when after long periods of rain, the rock within the quarry face could become unstable and fall, injuring the quarrymen below. Such a case occurred in 1883 when quarryman Michael O’Neill, while loading a dray was hit on the head by a large quarry stone that fell from 100 feet (30 metres) above. The blow proved fatal and a verdict of accidental death was proclaimed (The Chronical, November 10th 1883:11).

Accidents at the quarry site were prevalent prior to the Health and Safety Act of 1954. Many accidents were due to the height of the quarry faces that had to be detonated by ‘powder monkeys’. These men were agile and proficient in their work, although on occasions short cuts were taken in the preparation for detonation with disastrous and sometimes fatal results. Such was the case in February 1929, in Chambers Gully, Frederick Bowron a 48 year old ‘powder monkey’ was 80 feet (24 metres) up the face and used a prohibited metal ‘blowpipe’ to charge a hole. His action resulted in an unplanned explosion killing him and two other men (South Australian Register, 28 Feb. 1929). In 1954 legislation restricting the height of the quarry faces to 65 feet was introduced, this was to improve the working conditions of
the men engaged in quarrying. It was not until 1955, after legislation was passed restricting the height of quarry faces that a benching system was introduced in the quarry (Mansfield, 1959:116; Green, S. pers. comm., 3rd September 2002).

Statistics collected by the Department of Mines in South Australia show just how dangerous it was working in the quarrying industry (Table. 3.1). The quarry face, sometimes as high as 400 feet (120 metres), was treacherous to climb for the ‘powder monkeys’. Steps were cut into one side of the quarry face for access to the top. The men below were in danger from the falling rock and equipment failures. The quartzite rock dust (silica), released while crushing the rock was a particular threat to the men’s health and many contracted the disease of ‘silicosis’. Silicosis is a disease of the lungs, particles of the silica causing scarring and decreasing the elasticity in the lungs, and making breathing laboured. The shortness of breath weakens the lungs making them less resistant to diseases such as bronchitis and tuberculosis. Once workers had contracted the disease they became known as ‘dusters’ in the quarry industry, and were put on light duties (Green, S. pers. comm., 3rd September 2002).

Records from the 1920s (Wells, n.d.) show that mining inspections were conducted on quarrying sites throughout the Ranges, safety equipment was inspected and dust minimisation was addressed. In 1951 the Mines Department purchased meters for the purpose of assessing the dust particles in the air where the crusher men worked. The quarry owners co-operated by installing water sprays and exhaust systems to reduce the dust hazard. Further minimisation of dust was achieved by spreading the crushing plants further apart and transporting the stone by conveyor belts rather than bucket elevators (Mansfield, 1959:10). Silicosis was not only confined to quarrymen; miners also succumbed to the disease that was known to them as the ‘black spit’. Blainey (1978:301) states that Australia was slow in combating this disease, despite receiving information on its causes and the associated mortality risk from Cornwall, England. Dr Walter Summons in 1907 for example stated that in Bendigo, ten miners were dying of this disease for every accidental death in the mine (Blainey, 1978:301).
Table 3.1 Table of Deaths and Injuries in South Australian Quarries

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Accidents Reported</th>
<th>Persons Killed</th>
<th>Persons Disabled for more than 14 days</th>
<th>Year</th>
<th>Number of Accidents Reported</th>
<th>Persons Killed</th>
<th>Persons Disabled for more than 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1909</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1933</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1910</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1934</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1911</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1935</td>
<td>7</td>
<td>3</td>
<td>4</td>
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<td>1912</td>
<td>1</td>
<td>1</td>
<td></td>
<td>1936</td>
<td>13</td>
<td>2</td>
<td>11</td>
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<tr>
<td>1913</td>
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<td>2</td>
<td></td>
<td>1937</td>
<td>15</td>
<td>3</td>
<td>12</td>
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<td>1914</td>
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<td>1</td>
<td>2</td>
<td>1938</td>
<td>14</td>
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<td>13</td>
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<td>1917</td>
<td>2</td>
<td></td>
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<td>1919</td>
<td>1</td>
<td></td>
<td></td>
<td>1943</td>
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<td>15</td>
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<td>1920</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1944</td>
<td>6</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>1921</td>
<td>9</td>
<td>3</td>
<td>6</td>
<td>1945</td>
<td>19</td>
<td>1</td>
<td>18</td>
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<tr>
<td>1922</td>
<td>9</td>
<td>2</td>
<td>9</td>
<td>1946</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1923</td>
<td>17</td>
<td>2</td>
<td>18</td>
<td>1947</td>
<td>19</td>
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<td>1924</td>
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<td>1948</td>
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<td>1925</td>
<td>7</td>
<td>2</td>
<td>5</td>
<td>1949</td>
<td>25</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>1926</td>
<td>19</td>
<td>3</td>
<td>16</td>
<td>1950</td>
<td>14</td>
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<td>8</td>
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<td>6</td>
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<td>7</td>
<td>4</td>
<td>3</td>
<td>1953</td>
<td>18</td>
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<td></td>
</tr>
<tr>
<td>1930</td>
<td>3</td>
<td></td>
<td>1</td>
<td>1954</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1931</td>
<td>5</td>
<td></td>
<td>2</td>
<td>1955</td>
<td>18</td>
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<td></td>
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<tr>
<td>1932</td>
<td>2</td>
<td></td>
<td>3</td>
<td>1956</td>
<td>18</td>
<td></td>
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</tr>
</tbody>
</table>

Source: South Australian Department of Mines “Mining Review” 1909-1955
Note: ‘Disabled’ = Loss of limbs, broken limbs, burns and sprains

An article, “Compensation for Silicosis” appearing in *The Advertiser Newspaper*, 14 June, 1940:59, details a scheme to be implemented under the *Workman’s Compensation Act* for employees working in industries where they were exposed to silica dust. From the 1st July a fund was to be set up to compensate for silicosis, to be maintained by both the employer and registered workmen.

**Employee numbers at Stonyfell Quarry**

In the late 1800s approximately 60 men were employed at Stonyfell Quarry. The men employed in the quarrying industry were managers, ‘powder monkeys’, labourers, wheelwrights, machinists, blacksmiths and quarrymen. In the years between 1912 and 1920 the number of men working in the quarry each year averaged 24 (Boral Archives, Series R, Box 2). In 1923 the quarry was employing 36 men and producing 200 tons of metal per day (Dallwitz and Marsden, 1987). By 1951, 71 men
were employed: 4 ‘powder monkeys’, 5 machine men, 6 shovel drivers, 3 floor-men, 25 private owner drivers, 21 plant men, 2 welders, 1 carpenter, 1 steel sharpener and 3 general labourers (Mansfield, 1959:10).

The men who extracted and processed stone at Stonyfell Quarry are recognised for their contribution to the built environment of Adelaide and surrounding suburbs. The evidence of their existence is all around in the buildings and features, roads and rail tracks that have been constructed with stone from the quarry. The Stonyfell quarrymen have also left their footprint on the much trodden pathways through Ferguson Park, Stonyfell, a route travelled by the men to the quarry stables where horses and carts were harnessed and driven into the quarry for loading stone (Figure 3.19).

Figure 3.19 Quarrymen’s Track, Ferguson Park.

Photo: C. Bender, looking northwest.
In England in the 1800s women were employed in the quarrying industry to trim and split slate, then to load the slate onto ships from drays, for a wage that was 40% less than a man’s. Women continued to be employed in quarrying up until the Edwardian era 1901-1910, (Schwartz, 2000:122-124). In contrast the author has found no evidence of women working in the quarry industry in South Australia before 1940, when they began working as clerical staff. Minutes of a meeting dated February 14th, 1940, list ten female office staff at Quarry Industries and from 1942 to 1948 Mrs. Joan Coombe was employed at Stonyfell Quarry as the typiste and ledger keeper (Boral Archives, Series P, Box 1).

**Wages and conditions**

In 1849 it was stated that new immigrants working in the quarry industry could expect to earn between 21 and 30 shillings per week and have full employment (Wilkinson, 1849:72). Historical statistics show that the minimum weekly wage (stated in dollars) of male adults, according to industry in South Australia, increased from 1891 to 1955 and that the workers in the quarrying and mining industries were better paid than workers in other industries. The 10% decrease in the basic wage in 1931 was due to the government taking emergency measures during the depression (Whitelock, 1977:171) (Table 3.2). Quarrying was a difficult and dangerous occupation. The working conditions were hard and dangerous, the danger component in quarrying, necessitating higher wages than other occupations.
Table 3.2  Minimum Weekly Wage of Male Adults by Industry in $

<table>
<thead>
<tr>
<th>Year</th>
<th>Mining Quarrying</th>
<th>Engineering Metals Vehicles</th>
<th>Textiles Clothes Footwear</th>
<th>Food Drink Tobacco</th>
<th>Saw milling Furniture</th>
<th>Paper Printing</th>
<th>Building Construction</th>
<th>Railway Services</th>
<th>Road &amp; Air Transport</th>
<th>Shipping Stevedoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1891</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1910</td>
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<td>1925</td>
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<tr>
<td>1935</td>
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<td></td>
<td></td>
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<tr>
<td>1945</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>1955</td>
<td></td>
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<td></td>
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</tbody>
</table>

Source: Vamplew, 1987:156

Strikes were rare in the industry, but in December 1941 the quarrymen went on strike for a higher wage of £5/13/-/. The quarry management offered the workers £5/10/-, which was 6 shillings above the award but the men refused. Negotiations commenced between the quarry management and the A.W.U. and eventually the workers settled for £5/10/- (approximately $11.00), (Boral archives, Series A Box 2). The standard weekly hours of work for male adults in the quarrying industry in Australia gradually decreased from 47.59 hours in 1914 to 39.69 hours in 1955 (Vamplew, 1987:158).

The living conditions of the quarrymen varied. Some of the men lived in worker’s cottages while some lived in quarry camps and boarding houses. Worker’s cottages in the nearby suburbs of Kensington and Norwood either owner occupied or rented can be identified today as once housing blacksmiths, carters, wheelwrights and stablemen (South Australian Directory, 1893:103,299). Thomas Edgar Hill, was a
skilled wheelwright and worked at Stonyfell Quarry in the late 1800s, he owned a stone cottage in Desaumarez Street, Kensington Park (Preiss, K. pers. comm., August 2002). Henry Dunstan, owner of Stonyfell Quarry also lived in Kensington Park in a brick and stone house of five rooms with a stable (Steinberner, 1986). Unlike in England in the late 1800s, home ownership in South Australia was affordable to both the wealthy entrepreneur and the worker; land was plentiful and relatively cheap and wages were high. In the 1920s some quarrymen who worked in John Dunstan & Son Quarry lived in a quarry camp located in the Waterfall Gully area, (South Australian Register, 28 Feb. 1929). It was not until after the Second World War that the quarry owners began to provide housing for their employees. Whether it was out of a sense of social responsibility or the lack of suitable public housing is not known. In 1948 Buckland House, a two-storey mansion of 12 rooms located at 333 Marion Road, Marion, was purchased for the sum of £8,500 by Quarry Industries Limited (Boral Archives, Series P, Box 1). The house and land was used as a boarding house for quarrymen and their families and as a depot for quarry trucks. The house was built of bluestone and was set on 3 acres 1 rood 28 perches (Certificate of Title volume 1806 folio 15). An immigrant workforce was contracted through the Australian government to work for Quarry Industries Limited. Buckland House became home to many immigrants fleeing war torn Europe and seeking a new life in Australia. The cost of the men’s board and lodging at Buckland House was £2 per week, an amount that was deducted from their weekly wage (Boral Archives, Series P, Box 1). There is no pattern of social progression or hierarchy detected, the cottages most probably housed families while the quarry camps catered to the itinerant or single male and the boarding house was an economical way for new arrivals to settle while adjusting to their new society.

Other Historical Quarries

Stonyfell Quarry was one of many quarries that operated in the HFZ, each competing for contracts to supply stone. Other major historical quarry sites operating at the same time as Stonyfell Quarry in the Mitcham and Burnside area were:
**Scotts Quarry - C 1800s**

Location: Section 248 in the Hundred of Adelaide.

Stone from this quarry was used in the construction of the Law Courts building (Ex Charles Moore building), Engineering and Water Supply building, and breakwaters at local beaches. Oxen at the rate of two loads per day carted the stone (Wells, n.d.).

**James Grylls Quarry – 1838-1860**

Location: Section 266 in the Hundred of Adelaide. Located Caithness Avenue, Beaumont, 4 miles east of the Adelaide CBD.

There is a plaque set in similar stone to that which was quarried marking the first location of commercial quarrying in South Australia for the extraction of flagstones for building purposes. Part of the Supreme Court is possibly built with stone from these quarries (Coleman, 1956:41).

**Anderson’s Quarries – 1849**

Location: Sections 1140, 247E in the Hundred of Adelaide.

Geology: Quartzite and sandstone.

This quarry processed building stone, eight men were employed (Wells, n.d.).

**Glen Osmond Quarry – 1851-1980**

Location: Section 295 in the Hundred of Adelaide.

Quarry type: Hillside Quarry.

Geology: Shale, bluestone.

Opened in 1851 by Arthur Hardy. In 1859 Arthur Hardy formed the Glen Osmond Quarry and Silver Lead Mining Company. It was later worked for road metal. In 1882 Glen Osmond Quarry Company Limited purchased a twenty-one year lease from Arthur Hardy for the purpose of producing road metal and screenings installing crushing equipment with six head of stampers on April 18th 1883 (Gill, 1905:77).
The quarry also produced clay for the nearby brickworks in the 1920s and ceased operation in 1980. Many Adelaide houses were built with the stone from this quarry. It has been recorded that Scots Church on North Terrace was built of bluestone from Glen Osmond (Marsden et al., 1990:115).

**West Mitcham Quarry - c1852**

Location: Section 1141 in the Hundred of Adelaide.
This quarry produced building stone for Bethlehem Lutheran Church, Flinders Street, Adelaide, street kerbing and road metal (Wells, n.d.).

**Greenhill Quarry – 1943**

Location: Sections 1052, 1056 and 1057 in the Hundred of Adelaide on the southwestern hillside of Slape’s Gully adjoining Stonyfell Quarry.
Quarry type: Hillside Quarry.
Geology: Sandstone and quartzite.

**Stone Bros. Quarry, Glen Osmond - n.d.**

Location: Section 1079 in the Hundred of Adelaide.
This quarry produced a small quantity of building stone (Wells, n.d.).
Chapter 4 – METHODS

Completion of this thesis involved a number of closely related tasks:

- Historical/archival research
- Geological research
- Site surveys
- Stone analysis

Historical Archival Research

The main source of historical data on Stonyfell Quarry is contained in the Boral Resources (SA) Limited archives, held in the Archaeology Department, Flinders University (to be transferred to State Archives 2005). This data was presented to Flinders University to be catalogued with the help of State Archives, Netley, and details some of the quarrying operations from the many quarries that are now part of Boral Resources (SA) Limited. The archives date from 1910 – 1993. In August, September and October 2002, the author examined twelve boxes of un-catalogued data, notes were taken and documents and maps copied for relevant information on Stonyfell Quarry. Information on the quarrying operations of the day relate to contracts for the sale of stone, progressive technological changes, equipment purchased, accidents and working conditions of those employed in the quarry as well as trading accounts.

To fully understand the contribution made by Stonyfell Quarry in the social and economic development of South Australia, however, other historical information had to be gathered from libraries and archives, both in the city of Adelaide and the local area of Burnside. These include information on buildings erected between 1836 and 1900 and communication networks between 1836 and 1955. In August 2003, research was carried out on newspaper cuttings, recorded on microfiche, pertaining to quarrying that are held at the Department of Mines, Grenfell Street, Adelaide. Information sought was of quarrying accidents and instances of silicosis. This research proved difficult due to the small sizes of the print and the sometimes blurry and dark quality of the microfilm, also the lack of reporting of these instances.
In August 2003 the author paid a visit to the Mitcham Historical Society to discover the number of quarries being worked in the Mitcham area during the 1800s and 1900s. While researching historical documents the author found that Thomas Arthur Keays (1858-1909) had been a supervisor at Stonyfell Quarry during the late 1800s when Henry Dunstan was the owner of the quarry. Letters written by Thomas Keays to his family in Canada are housed in the Mortlock Library, Adelaide. The Mortlock Library is the South Australian repository for primary source non-government archival documents. Thomas Arthur Keay’s letters began in June 1880 and culminated in 1902 and are a rich source of social and economic history over a period of 22 years as seen through the eyes of a Canadian immigrant (PRG 356, Mortlock Library).

Other information found in the Mortlock Library led to a search for the now demolished Exhibition Building of 1887/88, the site on which Henry Dunstan, then owner of Stonyfell Quarry had a contract to build a retaining wall. Documentation was also sought at the National Trust Archives, Leigh Street, Adelaide. This search proved unsuccessful, however maps and documents on the Exhibition Building were found at the Adelaide Archives, Waymouth Street, Adelaide.

Geological Research

In October 2002, documentary research into the geological formation of the Mount Lofty Ranges was conducted. Geological books were consulted at Flinders University and the Adelaide University and soil maps of the Stonyfell Quarry area were consulted at Burnside History Section of the Burnside Library. Discussions were held with Paul Whiffen, current manager of Stonyfell Quarry on the rock being extracted today and its use. A meeting was also arranged with a previous geologist of Stonyfell Quarry, Charlie Barnes, to learn of sedimentological and tectonic history of the Mount Lofty Ranges that resulted in the layering of quartzite, sandstone and slate.
Site Surveys

Stonyfell Quarry

To understand how the quarry operates today and to locate past traces of quarrying operations, site surveys were carried out at Stonyfell Quarry. The quarry is operational six days each week, Monday to Saturday and unaccompanied surveys of the site were not allowed during this time. The first survey was carried out in August 2002 with the permission of Paul Whiffen, Manager Environment and Properties at Boral Resources, who accompanied Pam Smith, Janine Hook (cultural tourism honours student), Stan Green (retired transport manager of Stonyfell Quarry) and the author. Prior to the survey, a meeting was arranged in the office of Boral Resources within the quarry site. Stan Green a former employee of Stonyfell Quarry, spoke on past operational activities of the quarrying industry. This informal oral history was followed by a car tour of the Stonyfell Quarry site. Paul Whiffen drove us into the quarry and proceeded to describe the present quarrying operation and buildings. The route followed the main track up to the top of the quarry where the superseded machinery was located and Stan Green explained its past use.

This survey of decommissioned equipment located at the top of the quarry site enabled the author to see first hand the size and complexity of the mechanisation once operated at the quarry site. Further more detailed site surveys at Stonyfell Quarry revealed features and buildings that had evaded the march of progress. These features and building structures were recorded and photographed in detail (see chapter 5). The equipment used to record these features was a ranging pole, compass, Global Positioning System unit (GPS) and Pentax MZ60 camera. All photographs, bearings and measurements were documented on site recording sheets.

Other surveys of Stonyfell Quarry followed in September 2002. Janine Hook and the author accompanied by Paul Whiffen again drove into the site to gain additional information on building construction dates, stone production and working conditions. Maps relating to the quarry are held at the quarry office on site; these were studied by the author who found that the only map in the time frame of this study was a map dated 1953. This was a Department of Mines map depicting a general topographical
and geological plan of Stonyfell Quarry consisting of boundaries, contours and diamond drilling proposals.

On March 30th 2003 the author accompanied by Lothar Bender again visited the entrance to the quarry site, an area outside the secure area that had not been previously surveyed. A sub-surface drain was located, a wall ruin, a corrugated iron shelter half buried in the ground and a weighbridge building. These structures were all measured and photographed and their construction materials and GPS coordinates documented.

Four accompanied visits to the working quarry site were achieved, three to observe and discuss the past and present workings of the quarry and one to gather source stones. Permission was granted and keys obtained to the quarry site on Sunday October 6th 2002. The author accompanied by Lothar Bender entered the quarry site and proceeded to photograph and record buildings *in situ* (one of which has since been demolished). The demolished building was a crushing plant constructed of wood and corrugated iron, erected in 1953 and demolished in 2003 (see chapter 5). All features were documented with a MZ60 Pentax camera, compass, scale, tape measure and GPS. A further visit to the quarry was organised in May 2003 to measure and draw a floor plan of the manager’s house and early cottage.

To identify the changes made to the site, the author sought aerial photographs from Mapland at Netley, South Australia. The earliest aerial photograph available was black and white, dated January 10th 1949, (approximate scale 1:3960) (Appendix A). It shows the quarry site and surrounding area. However, the buildings and features on the site were very difficult to distinguish. The 1949 aerial photograph was then compared to another dated October 28th 2002, (approximate scale 1:3790) (Appendix B) to reveal the extent of recent phases of quarrying activity.

**Adelaide Gaol Site**

This site was surveyed on January 9th 2003 by the author. Of particular interest were the gaol walls that were constructed in 1841 by Borrow and Goodier, using Stonyfell Quarry stone. The walls and towers were measured and photographed with a Pentax MZ60 camera, compass, and GPS.
Exhibition Building Retaining Wall Site

The Napier Building, University of Adelaide is now built on the Exhibition Building site. On November 17th 2002 Lothar Bender and the author surveyed the site at the rear of the Napier Building. The retaining wall of 1887 that was constructed with Stonyfell Quarry stone is still in situ and was measured, photographed and GPS positioned for future reference.

Local Buildings and Features

Research into local heritage buildings and features of Burnside was undertaken to identify the source stone used in construction. To do this the Project Burnside Heritage Survey was consulted. Unfortunately the source stone of the buildings was rarely documented. A pedestrian survey of the old Burnside area found many buildings and features dating from the 1800s and 1900s that were built of local stone. However, an investigation of where the stone was sourced became an essential component of this thesis. To establish a connection between the stone of local buildings and source stone from Stonyfell Quarry an analysis of these stones was necessary.

To do this a group of buildings in the close vicinity of Stonyfell Quarry was selected for stone analysis. These buildings had all been documented in the Burnside Heritage Survey as having been constructed with ‘local’ stone in the late 1800s (Dallwitz and Marsden, 1987). To endeavour to match this local stone with that of the stone from Stonyfell Quarry, a site visit was required. In March 2003, accompanied by Paul Whiffen, sample source stones were extracted with a hammer from the old quarried rock face. Three source stones were taken from different areas of the quarry and measured approximately 500mm x 400mm x 300mm. The first source stone was taken from the oldest part of Stonyfell Quarry c1900 that was worked prior to the act of ‘Benching’ and still retains a 400 feet high quarry face known as ‘Dun’s Quarry’. It is not known if the name ‘Dun’s refers to Henry Dunstan, the past owner, or Dunn, a past quarry manager. The second source stone came from the mid section of the quarry, a section quarried post 1955, and the third source stone was taken for comparison from Greenhill Quarry, the quarried area that adjoins Stonyfell Quarry. Four sample stone fragments measuring approximately 35mm x 15mm were
collected from the following buildings. All samples were taken from the broken segments of each building with the permission of the managing bodies.

- The original Burnside Council Chamber
- St David’s Church Hall
- The Knightsbridge Baptist Church
- Chiverton stable and coach house

All samples were then sent to Professor Robert Nesbitt, School of Ocean and Earth Science, at the University of Southampton, UK, for analysis.

**Analysis of Stone**

Identification of the samples was carried out using a standard petrographic microscope. This involves prior preparation of a thin section of the material followed by examination using a microscope equipped with a polarised light source. Preparation of the thin sections (see below) involves cutting and grinding the stone down to 30 microns thickness. Petrographic examination of thin sections allows both identification and estimation of the volume percentages of each of the constituent minerals and most importantly, the inter-relationships of individual grains can be determined. Using this technique comparative analysis can be made between the source building stone and the materials collected from the individual buildings. (Nesbitt, R. pers. comm., 27th February 2003).

Thin sections of the samples were prepared in the following manner:

1. Using a diamond saw two cuts were made through the specimen to give a wafer thin slice of rock.
2. One side was smoothed off and then that side stuck with epoxy onto the glass slide.
3. The glass slide was then presented to a thin precision saw, which took more of the rock off the glass slide resulting in a very thin section of stone.
4. Finally the slice was polished down until it was 30 microns thick and a cover slip added.
The petrographic microscope is designed to allow examination of the thin section with a polarised light source. Using a combination of a single polariser (plane polarised light) and two polarisers (crossed nicols) individual minerals can be identified using their optical and crystallographic characteristics (Nesbitt, R. pers. comm., 27th February 2003). Following the initial examination, photographs were taken of various critical parts of the thin sections. These were then used to compare sample and possible source. The results of the petrographic study are presented in sections 5.33 to 5.39.

Limitations to Research

Stonyfell Quarry is operated under the ownership of Boral Resources (S.A.) Limited. The continuous operation of the workings of the quarry has placed limitations on surveying the quarry site. Each site visit required the author to have permission and an escort from the Boral Resources operation. At times this was difficult to achieve due to pressure of work at Boral. Pedestrian surveys were not conducive to the workings of the quarry, where machinery and large fully laden trucks drive down the quarry track to the weighbridge six days each week. Occupational health and safety regulations applied and all persons entering the quarry site were required to report to the weighbridge manager for registration and supply of an orange vest with fluorescent safety stripes and a hard hat, both of which had to be worn when on site. A difficulty was encountered at the Burnside Council Chambers archive when the author was informed that the State Archives had removed all historical documents including the documentation relating to the early contracts that were awarded to the quarrying industries of Burnside. These contracts and other historical documents meant that the author had no means of accessing them until after State Archives had catalogued them, as a result this information could not been included in this thesis.

Oral History

In addition to archival and archaeological research, oral history also constituted an essential component of the research process. Stan Green, now retired, once held the position of Transport Manager at Stonyfell Quarry. His knowledge and memory of the time he spent working at Stonyfell has assisted in this research. Stan was first informally interviewed in August 2002, in a group environment with others
attendance. Based on Stan’s vast knowledge of past quarrying operations the author was keen to conduct a taped interview of his experiences in the quarrying industry and in particular the time he spent at Stonyfell. Arrangements were made for the use of a recording machine from the State Library and a date was set, a list of possible questions was sent to Stan for his consent. At this stage of the arrangement he declined to be interviewed stating that he did not want his words on tape. Paul Whiffen arranged one other meeting with Stan Green at the quarry office; those in attendance were Paul Whiffen, Pamela Smith and the author. The reason for this meeting was for Stan to identify and date some old photographs of the quarry site that appeared to have been taken c1920. Stan Green has a vast knowledge of the quarrying processes and work related experiences having worked on many of the Quarries Industry Limited sites, including Stonyfell, for over 40 years. While his memory was lucid, it was difficult to get him to focus only on material that was relevant to Stonyfell Quarry. All information relating to the quarry was noted for inclusion in this thesis (See Appendix C).

Ken Preiss, an author and local Burnside historian is a member of the Friends of Ferguson Park, an organisation that preserves and maintains the historical flora of the park. He was consulted on October 8th, 2002, for information on the route that the Stonyfell quarrymen took through the park on their way to the quarry. He was most knowledgable of the quarrymen, as his grandfather, Thomas Edgar Hill (b.1867), had worked for Henry Dunstan as a wheelwright at Stonyfell Quarry in the late 1800s. Ken Preiss met with the author and identified the location of the quarryman’s track, which was subsequently recorded.

Margaret Preiss, a Burnside historian, informed the author of the early development of the Burnside area and then accompanied the author to sites where stone gutters and kerbing had been laid, and stone walls of varying height and early church halls and shops had been constructed using local stone. Structures and features of particular interest were photographed and recorded with a GPS, and this information was then documented on a site-recording sheet.
Comparative Quarry Surveys

Three other quarry sites were also surveyed for comparison in working methods of operation. These sites were Magill Stone Mines (Magill), John Dunstan’s Quarry (Burnside), and Sleeps Hill Quarries (Mitcham). These quarries are all located in the Hills Face Zone of the Mount Lofty Ranges and were operational during the nineteenth and twentieth centuries.

Investigation of quarry sites was undertaken in order to:

- Establish the type of stone being quarried at each site through documented geological research
- Describe the quarry site – mined, hillside, summit or valley and the size of the quarrying operation
- Determine the process used for stone extraction
- Determine secondary processes such as cutting, crushing and screening
- Determine the power source used for lifting stone
- Determine if there were buildings in and around the quarry sites instrumental to the quarrying operation including blacksmith’s shop, office, engine house, magazine for storage of explosives, mason’s stone dressing huts, shelters, cribs, storage bins for road stone, worker’s houses and villages
- Determine the methods of moving stone from extraction sites to processing and loading areas such as via tracks, tramway, railway and aerial ropeway (Stanier, 2000:36-38)

A pedestrian survey at the Magill Stone Mines was carried out on November 20th, 2002 by the author and George Van Holst Pellekaan. There are three mines, one on council reserve land and two higher up the slope on private property. There is no visible evidence of building remains on the site. The ranging pole was positioned for the photographs, giving a relationship to size of adits and interconnecting galleries. Compass readings and GPS position were also taken and the information documented on a site-recording sheet.

John Dunstan & Son’s Quarry is located in Chambers Gully, Burnside (GR 61 29947/54 287701). It is a hillside quarry and covers approximately 47 acres and was
operational from 1910-1944. The geological formation consists of quartzite and bluestone. Three pedestrian surveys were conducted on this site, the first on October 21st 2002 by the author and George and Paddy Van Holst Pellekaan. The second survey was conducted on October 27th 2002; those present were the author, Michael and Manon Staiger and Lothar Bender and the author and Lothar Bender conducted the third survey. The approach to the site is from Waterfall Gully Road, Burnside. The function of the stone was for building construction, road aggregate and rail ballast (Boral Archives, Series I, Box 2). All evidence of historical quarrying operations, steps cut into the quarry face, foundations for the stone crushers, secondary blasting of rock and loading bay was photographed and recorded.

Pedestrian surveys were also carried out at Sleeps Hill Quarries by the author, Lothar Bender and George and Paddy Van Holst Pellekaan on November 3rd, 2002. This site is approached from High Street, Belair (GR 61 23647/54 281532). Sleeps Hill is a series of 12 hillside quarries covering approximately 700 square metres. Each quarry produced quartzite and slate during the operational period 1916 – 1950. The evidence of secondary processing and transportation methods were recorded photographically, together with compass and GPS bearings.
Chapter 5 – SURVEY RESULTS

Development and growth of Stonyfell Quarry 1837 – 1955

The site has been worked since 1837 and many of the structures that were associated with quarrying operations in the past have been dismantled and removed as the quarry site expanded. The earliest method of quarrying was by barring and levering the rock from the hillside, either by hand or with the aid of explosives.

In 1867 the blasted stone was hand broken with sledge- hammers and the finer screening done with knapping hammers. Hand mining was the method of extraction until 1880 when spalling hammers were used to break the stone into 12-inch pieces. In 1881 to improve productivity, the crushing of stone was mechanised when Henry Dunstan, the lessee of Stonyfell Quarry, purchased a steam driven stone crushing machine. This machine, a ‘Hope Breaker’, was the first of its kind to be used for stone breaking in South Australia (Steinberner, 1987:10).

The Stonyfell Quarry face was worked on two levels until 1923. As the quarry progressed it gradually converted to one face reaching a height of approximately 400 feet (South Australian Department of Mines, 1923:13). The quarrymen, known as ‘powder monkeys’, became skilful in negotiating the hard rock face. They lowered themselves down the face on ropes and drilled into the rock face to insert the gunpowder for blasting. With the fuse lit, the ‘powder monkeys’ retreated back up the quarry face while the men below took cover inside heavily insulated buildings.

The stone was carted down to the stone crushers by means of an incline tramway, consisting of one line with a siding halfway up the track that enabled the skips to pass one another (Figure 5.1). The momentum of the loaded skips descending enabled the empty skips to ascend to the top of the quarry for loading; they travelled at 4 miles per hour (6.5 kilometres per hour) ensuring a regular supply of stone (The Pictorial Australian, August 1890:107). The iron rails of the tramway were fixed to red gum sleepers (Green, S. pers. comm., July 2002). There is no physical evidence of this tramway today.
The first map of the Stonyfell Quarry area is one of 1883 showing the layout of quarrying operations of the time (Figure 5.2).

In 1910 the cracking plant was extended and producer gas replaced steam power (Steinberner, 1987:14). Tar paving and cracking used 3805 tons of stone between April 1910 and the end of March 1911 (Boral Archives, Series U, Box 4). Tripod reciprocating drills and compressors became available in the 1920s and profits were increased through continually upgrading equipment and changing production practices. A four and one half-ton capacity motor truck aided in the delivery of stone in the early 1920s (Mansfield, 1959:120).

In 1923, the average production by 36 men was approximately 200 tons per day of all size stones. The Hadfield’s jaw-type machines 24 x 13 inch size were used to break the large stones and the gyratory breaker dealt with the small stones that passed through the grizzly bars. After reaching two conveyor belts the stone was then graded in revolving screens and directed into the appropriate bin where it was then released through trap doors to waiting horse drays or motorised lorries (South Australian Department of Mines, 1923:13). The drays carried up to 6 ½ tons of stone and were drawn by six horses (Mansfield, 1959:118). A track through Ferguson Park that the quarrymen walked to reach the stables and quarry is still evident (Appendix A & B).

The 1938 quarry map (Figure 5.3) shows the changes that were made to the site over time. The two buildings located in close proximity to the quarry floor were the blacksmith’s shop and compressor. These buildings were for sharpening tools and supplying air for the drills used in the drilling of boreholes for detonation. The magazine storage for the explosives was also sited close to the quarry floor, and two dumps were positioned on the edge of the quarrying area. The plant with chimney was in the centre. At the opposite end from the quarry floor were the two weighbridges, the sand washing plant, the tar-shed and the stables.
Figure 5.3 Stonyfell Quarry Map 1938

Prior to 1953 when the crane was introduced, a portable winch with wooden legs and chain was constructed. With the help of this apparatus four men were able to lift large blocks of stone to the top of the quarry for processing (Green, S. pers. comm., July 2002).

**Examples of machinery and equipment purchased for use at Stonyfell Quarry (Boral Resources (SA) Limited Archives).**

1910 Horrocks Roxbrugh earth scoop purchased for the sum of £3.
Rex Motor Cycle, 3.5-horse power for the sum of £65.
Two new crackers (replacement for broken ones) for the sum of £27,300.
Cletrac front-end loader and steam shovel and motor trucks to work alongside the horses (Steinberner, 1987:20).

1941 Cletrac loader (Tractor).
Hadfield crusher, 24x13 inch.
Roll jaw, Holt loader 24x14 inch.
5 ton tipping truck

1942 D7 Tractor with front-end loader attached.
1943 Symons cone crusher.

1946 D7 Bulldozer – 1
Holts – 2
Speeder – 2
Harman – 1
Crusher 30x18 inch
D4 Tractor with front-end loader.

**Archaeological description of buildings and structures on Stonyfell Quarry site**

Eight original historical structures and features were located on the quarry site. Of these some are ruins while others remain in a remarkably good condition and are currently used for quarrying operations. These structures and features were surveyed and recorded, and are plotted on the mud map (Figure 5.4).
Figure 5.4  Mud Map of Stonyfell Quarry Site

Mud Map drawn by C. Bender 2003 (no scale).
The Manager’s House c1870

Location: On southern side of the upper track.
GPS: 61 31666N 54 287922E

This manager’s house was constructed with un-coursed bluestone from the quarry (Dallwitz and Marsden, 1986:28) (Figure 5.5). Over time, carports, sheds and verandahs have been attached to the house obscuring its original exterior design. The house is currently used for quality control and the curing of cement. The window and door surrounds are brick quoined and the roof is of corrugated iron. The front door has a fanlight measuring 600mm x 300mm. A hallway leads from the front door to the rear of the house; there are two rooms on either side of the hallway each having a fireplace. At the rear of the house on either side of the verandah there is a room, and below the northeast room a cellar measuring 2980mm x 2980mm. The cellar is entered by a stairway of ten steps, each constructed with seven bricks and hardwood to a width of 870mm. (Figure 5.6).

Figure 5.5 The Manager’s House, Stonyfell Quarry

Photo: C. Bender, looking south.
Past occupants of Manager’s House

1910  James Lewis Avery, married Agnes Dunstan (daughter of Henry Dunstan) on March 30th, 1910 (Cobiac, 2001:837)
1942  Alf Brewer (Green, S. pers. comm., July 2002).
1950  Ken Dunn, at the rear of the house was an orange orchard, where Ken Dunn’s cow grazed (Green, S. pers. comm., July 2002).
**Early Cottage c1800s**

Location: At the rear of Manager’s House.
GPS: 61 31758N 54 287951E

This early cottage was constructed with stone from the quarry (Figure 5.7). The walls are of un-coursed random rubble and cement. Above the window and doorway are stone lintels measuring 940mm x 160mm. The many cut marks visible on the lintels are evidence of hand cutting methods used in the past for dressing stone. The door is of wood (6 wooden planks), the height of the door is 1680mm. The doorstep is also of wood. The roof is no longer original having been replaced with corrugated iron. There are no brick quoins on this building.

![Figure 5.7 Early Cottage, Stonyfell Quarry](Photo: C. Bender, looking west.)

**Wall Ruin**

Location: Attached to south wall of early cottage
GPS: 61 31758N 54 287951E

This wall is in a ruinous state, measuring 6.7 metres in length and 570mm in width and aligned in an east west direction. It has been constructed with un-coursed
random rubble and cement. Its function and age are unknown (possibly a remnant of stables or workshops).

The Original Weighbridge Building c1870

Location: West of the present day weighbridge on the south side of the track leading into the quarry site.

GPS: 61°29'79.4"N 54°28'79.86"E

The weigh station supervisor during the daily operations of the quarry worked in this weighbridge building recording the amount of stone transported out of the quarry. It is no longer in use, all of the openings have been boarded up with cement bricks measuring 300mm x 110mm. The weigh station mechanism is no longer in situ, it was possibly positioned at the front of this building. The building is rectangular with a gable roof, a style popular from 1840 on. The walls measure 5.59 metres x 5.12 metres in length and a height of 2.97 metres with an overall building height of 3.83 metres. The building walls were constructed of random rubble and cement with red brick quoining around the windows and doorways (3 brick) each brick measuring 300mm x 75mm. There are cement lintels above the windows, doorways and service opening. It has a wooden floor and doorstep. The doorstep measures 850mm x 230mm and is 70mm thick, with evidence of dry rot. The service opening has a width of 1.83 metres with a height of 960mm. The roof is of corrugated iron with wooden eaves in a state of deterioration (Figure 5.8). Ted Fergusson was one of the weigh station supervisors in 1940 (Green, S. pers. comm., July 2002).
**Sub Surface Drain c1900**

Location: 36 metres north east of present day weighbridge.
GPS: 61 31695N 54 288107E

The drain is sub-surface and runs beneath the lower quarry track. Constructed of dry stone walling with timber bracing it has a depth of 1500mms. There are two exposures to the drain with a separation distance of 20 metres, both running downhill in an east west direction. The uppermost exposure has been sealed with a black iron grate covering the surface while the lower exposure is open (Figure 5.9). It is in fair condition despite the timbers of the lower drain having rotted and collapsed into the drain. The water flow has not been greatly restricted. This drain is to be buried in the near future (Whiffen, P. pers. comm., July 2002).
Wall Ruin c1900

Location: 43 metres east from present day weighbridge on southern side of track.

GPS: 61 31695N 54 288107E

This wall has been constructed with random rubble and cement. It is un-coursed. The length of the wall is 4 metres and the height 2.8 metres, the thickness of the wall is 550mm (Figure 5.10). Inquiry into the purpose of this wall has proved unsuccessful, although a photograph dated c1920 shows a similar wall as part of the loading bay (Figure 5.11).
Figure 5.10  Wall Ruin – Stonyfell Quarry

![Figure 5.10](image)

Photo: C. Bender, looking south.

Figure 5.11  Stonyfell Quarry Loading Bay c1920

![Figure 5.11](image)

Source: Burnside Library History Section
Corrugated iron structure, storage shed/crib (age unknown)

Location: 10 metres west of the present day weighbridge on southern side of track.

GPS: 61 31695N 54 288107E

This structure is half buried in the hillside, 50% is visible. The roof is of corrugated iron and covered with 160mm of earth. There is a drainpipe running from the roof into the ground. The walls are also of corrugated iron and are in a state of disrepair. An opening in the centre of the north-facing wall (possibly a window) measures 600mm by 600mm (Figure 5.12). Inquiry into the purpose of this building has yielded little information, other than the possibility of it having been used as a crib or for storage (Weighbridge Supervisor, pers. comm. May 6th 2003). Warburton (1981:22) in her book The Paddocks Beneath, writes of an Italian immigrant, Crezzenzo Capaldo, who came to Australia from Estonia in 1927 and lived in a tin shed at Stonyfell for nine years while working in the quarry. This may be the remains of his shed, although at present this is unproven.

Figure 5.12 Corrugated iron storage shed/crib - Stonyfell Quarry

Photo: C. Bender, looking southwest.
**Dun’s Quarry Face c1890s**

Location: South east of 1962 crushing plant  
GPS: 61 29962N 54 285506E  

The height of Dun’s quarry face is approximately 120 metres. The rough surface of the face shows the extraction methods employed by the quarriers in the late 1800s and early 1900s. Although steps are shown on the c1938 map, no steps ascending the face are visible today. The exposed stone is of varying colours; from creamy beige through to dark brown and black depending on the iron content within the stone. To the left of Dun’s quarry face can be seen the original escarpment between the present day ‘Benching’ system of quarrying (Figure 5.13).

**Figure 5.13 Dun’s Quarry Face to the right of present day benching - Stonyfell Quarry**

![Image](image_url)  
Photo: C. Bender, looking south. Note the original escarpment between the two quarried areas.

The structures and features are located in an area outside the stone extraction and processing area. The two main buildings are the manager’s house and the weighbridge station, both essential for the running of the quarry. The manager’s house has been well constructed. The weighbridge building was also well constructed and purpose built as is evident by the service window. The early cottage appears to have been constructed earlier than the manager’s house, since it is more
crudely built of roughly placed random rubble. The lintels above the doorway and window are complete stone blocks that have been cut by hand, and tool marks are evident. The function of the wall ruin that adjoins the rear wall of the cottage is not known. The sub-surface drains on the lower section of the site indicate that drainage was a necessary infrastructure for the quarry floor. The road into the quarry, past the original weighbridge station has possibly been realigned with redundant structures being demolished. The wall ruin was possibly part of the old loading bay c.1920 or possibly is the remnant of past cottage or stable as shown on maps 1883 and 1938 respectively. The corrugated iron shelter was half buried intentionally or has been partially buried through subsequent changes to quarrying operations. Dun’s sheer quarry face shows evidence of earlier quarrying methods, and the darker rock colour is due to many years of weathering.

At the ground level of the quarry floor there are individual buildings housing machinery for crushing stone for sand and cement. The structures house the machinery for processing the stone and are constructed of corrugated iron and wood. Further into the quarry site there are metal buildings linked together with vibrating conveyor belts that convey crushed stone to various crushing machines for sizing. Once reduced to the required size the crushed stone is then disgorged onto spoil heaps for sale.

**Overlay of Stonyfell Quarry maps**

The three Stonyfell Quarry maps show the continuous expansion of the area. Although of slightly differing scales and allowing for possible errors in the compilation of the older maps, by overlaying the quarrying sections of each map inferences can be made about the location and approximate date of archaeological features (see Figures 5.14, 5.15, 5.16).
**Stonyfell Quarry Map 1883**

The 1883 map is the first known map of Stonyfell Quarry, located at the eastern end of Stonyfell Road in Sections 289, 905, 1050 and 1057. Two quarried areas are marked; one in section 905 and the other in section 1057. An engine house and crusher are located in section 1050 and cottages are located north of the engine house in section 1050. An un-labelled building on the northern border of 1050 is also shown on maps 1938 and 2002 as ‘Wine Cellars’.

**Stonyfell Quarry Map 1938**

The hand drawn map of Stonyfell Quarry dated 1938, shows Sections 904, part section 1050A and 1057. The weighbridge is located on the southern side of the roadway leading into the quarry in section 904. There is an uphill track leading in a southeasterly direction six metres past the weighbridge building. A tar shed is passed on the northern side of the upper track, and a further 100 metres along on the southern side of the track is the manager’s house. These buildings are located in section 904. Further along this track there is a workshop on the left followed by a stable. The 1938 plant and chimney are central to the quarry site. Further into the quarry there is a bridge and a tank.

At the end of this track there are four quarry floors, including the floor of ‘old top quarry’. The old top quarry is possibly the quarry marked on the 1883 map in section 1057. The former truck line of 1872 is shown running from the floor of the old top quarry to the central track of the quarry in part section 1050A. At the quarry entrance on the lower track, wine cellars are marked on the northern side followed by a garden, fence line and vineyard. On the southern side there is another weighbridge a sand washer and shed. Further along, the track opens out to reveal the four quarry floors. Just east of the northern quarry floor there is a magazine for the storage of explosives and east of the magazine is a blacksmith’s shop and a compressor to provide air for the drills. Beyond the blacksmith’s shop steps to the top of the quarry face are marked. A slate dump is located west of the northern quarry.
Figure 5.14  Stonyfell Quarry Map 1883

Figure 5.15  Stonyfell Quarry Map 1938

Figure 5.16  Stonyfell Quarry Map 2002
Stonyfell Quarry Map 2002

Aerial survey map 6107 shows many buildings on the site, historical wine cellars and modern workshops and offices. The historical buildings and features surveyed for this thesis are highlighted on the map.

- The weighbridge building
- Manager’s house
- Early cottage and wall ruin
- Sub-surface drains
- Wall ruin
- Corrugated iron shelter

The consistent features on all three maps are quarried areas, vineyards and wine cellars. Map 1883 shows an unmarked structure at the entrance to the quarry, this is possibly the wine cellar that is shown in the same location on maps 1938 and 2002. The cottages documented on map 1883 are located in the same area as a stable on map 1938 and a wall ruin on the 2002 map. There is no archaeological evidence of the engine house and crusher that is shown on map 1883. Section 904, in which the Manager’s house and early cottage with attached wall are located, is not drawn on the 1883 map. However these two structures are shown on maps 1938 and 2002. The sub-surface drains are in line with the washer and drain on map 1938. The weighbridge building is shown on maps 1938 and 2002. The corrugated structure is not shown on any of the maps.

The Manager’s house in section 904 is documented as having been constructed c1870 (Dallwitz and Marsden, 1987). Section 904 does not appear on the map of 1883.

The Manager’s house and early cottage located in section 904 are shown on the maps of 1938 and 2002. Section 904 was an 80-acre grant in 1841 to Harry Osborne and purchased by George Dean Sismey in 1850. In 1852, Sismey built a large family residence in the style of an English hunting lodge and named it ‘Clifton’ (Coleman 1956: 75; Warburton, 1981:34). The East Torrens assessment book for 1853-1870,
on 25th March 1854, documents a stone house, offices and garden and section of land with an annual value of £200 (GRS 8715/1/P). The property was offered for sale in 1865, but no buyer was found. In 1871-72, Nathaniel Knox became the leasee and after seven years of leasing the property he purchased it outright (Coleman 1956: 75; Warburton, 1981:34). Knox possibly built the Manager’s house although there is no reference to a rate assessment in the East Torrens assessment books that end in 1892 (GRS 8715/1/P).

Through archaeological research of the construction of these structures it can be inferred that they were both constructed between 1840 and 1900.

**The Manager’s House, Stonyfell Quarry**

- The roof is a hip roof, a style popular from 1840 to the current date.

- The most prominent external section of this building is the northern elevation. The three other sides of the building being obscured by corrugated overhangs and carport. The original verandah extended to 1.7 metres, it is no longer *in situ*. The external wall constructed with random bluestone is 360mm thick; this would infer a date between 1840-1910.

- The wall height is 3.6 metres, a wall height that was popular until the turn of the century (1900) (Persse and Rose, 1981:144).

- The windows are quoined with five bricks followed by five indented bricks. The window head is brick arched. The two windows at the front of the house (2000mm x 970mm) have two panes one above the other and the southern windows (1730mm x 900mm) have four panes. Prior to 1840 in the ‘Old Colonial Period’ windows had twelve panes. Around 1860, with the availability of larger glass panes, window sashes either held one or two panes of glass (Apperly et al., 1989:42); (Stapleton 1983:38).
• The quoins on the northern wall are red brick (five bricks followed by five indented bricks); this method of quoining allowed the corners of buildings together with door and window openings to be squared. Quoins were either three or five brick coursed, the five coursed quoins being the earlier (Pikusa, 1986:60). This technique of quoining was popular from 1840 – 1875.

• The skirting boards throughout the house are 230mm and door architraves 130mm.

• A segment of a terra cotta air vent with cut out heart shape pattern is located at the base of the front wall, it appears to be of an early age although no information was found to date this artefact.

A few metres to the east of the Manager’s House there is a one room cottage that possibly predates the Manager’s House, this also does not appear on the early map of 1883, possibly for the same reasons that the Manager’s house does not appear.

_Early Cottage, Stonyfell Quarry_

• The roof is a gable design, the original roof has since been replaced with corrugated iron. The gable design was popular from 1840.

• The most prominent exposure of this building is the northern elevation. No bricks have been used in the wall construction; rough-faced stones form the corners of the building and openings. The walls measure 2350mm in height and are 360mm thick, a wall thickness popular from 1840 to 1910.

• The lintel above the door and window is a solid piece of stone (60mm x 940mm) that shows knapping marks (20mm) along each edge.
• There is the remnant of a wall adjoining the southwest corner of the cottage aligned in an east west direction. The length is 6.7 metres and has a thickness ranging from 430mm to 570mm. This is indicative of early wall construction from 1840 to 1910 (Persse and Rose, 1981:144). The past function of this wall is unknown.

**Present day quarry site and equipment**

• Benched quarry site with five quarry faces each being worked to a height of 20 metres (65 feet). The original escarpment can be seen between the high face of Dun’s Quarry and the present day ‘benched’ quarry.

• Elevated weighbridge station. This structure is constructed of corrugated iron. Located in the centre of the track that leads into the quarry, entrance is gained by climbing a metal stepladder. On exiting the quarry site, trucks loaded with sand or stone are weighed on the weighbridge located on the south side of the weighbridge station.

• Crushing plant. This plant crushes stone and sand for the treatment of cement. The building is constructed of iron and tin with a metal conveyer belt. It has an overall height of 13 metres. The corrugated shed at the top of the crushing plant measures 5.5 metres wide and has a height of 4.5 metres (Figure 5.17).

• Crushing plant. The building is constructed of metal, its function was to crush stone to required size and then transfer the crushed stone to a collection chute (Figure 5.17)

• Group of crushing plants with conveyor systems located at centre of quarry. The conveyor system conveys stone from one size crusher to the next allowing the stone to be minimised to the exact size (Figure 5.18).

• Number 5-plant c1953 is an old crushing plant (dismantled February 2003). This plant consisted of three buildings of differing heights, constructed with wooden palings, metal siding and corrugated iron roofs. Its purpose was to crush stone to a prescribed size (Figure 5.18).

• Conveyor belts and metal chutes disgorge processed stone product onto spoil heaps of varying size.
Figure 5.17  Stonyfell Quarry Plant
Crushing Plant – Sand Plant          Crushing Plant and Dun’s Quarry Face

Photo: C. Bender, looking south      Photo: C. Bender, looking south

Figure 5.18  Stonyfell Quarry Plant
Stonyfell Quarry Complex          No.5 Crushing Plant 1953, demolished 2003

Photo: C. Bender, looking south      Photo: C. Bender, looking south east
**Superseded machinery used in past quarrying operations**

Undated superseded quarrying machinery is located at the top of the quarry site in an allocated area. Among the rusted and abandoned machinery are relics from past quarrying operations and include:

- Transportable corrugated iron shed with relocatable hooks attached, for ease of relocating to other sites (Figure 5.19)
- Single toggle-jaw crusher, manufactured by Pegson Telsmith Hadfield of Sydney, Australia, constructed of cast iron and used to crush stone (Figure 5.19)
- Link belt CA vibrating screen, the manufacturers plate states that it was supplied by Link-Belt (SA) P/L, Adelaide, South Australia, under license from FMC Corp. USA, owner of the trademark. The link belt is constructed of iron and rubber and used to sort stone of various sizes
- A Fraser & Chalmers Ltd. Erith, England No. 62 stone crusher, petrol driven with the metal petrol tank mounted on the top. This stone crusher is constructed from cast iron and used for crushing stone to the required dimension (Figure 5.20)
- Crushing cones of iron used in the stone crusher (Figure 5.20)
- Conveyor belts made of rubber and iron used to convey blasted stone to the crushing shed

![Figure 5.19 Stonyfell Quarry Machinery](Photo: C. Bender, looking west)
![Figure 5.19 Stonyfell Quarry Machinery](Photo: C. Bender, looking east)
Sourcing quarry material in Adelaide and the local Burnside area

Archival research in both Adelaide and Burnside has identified specific geographic areas in which the stone from Stonyfell Quarry was used. Local buildings both public and private have been identified as potentially being constructed from Stonyfell material, as well as sporting areas and areas of infrastructure.

Adelaide Gaol Walls

Location: Gaol Road, Thebarton.
GPS: 61 34401N 54 288499E

Borrow and Goodier were awarded the contract to build the gaol in 1840, however, due to the escalating costs, the contract was terminated prior to completion. The perimeter walls walkways and two watch towers that were constructed in 1841 by the building company, Borrow and Goodiar were the north eastern wall (53 metres), the eastern wall (60 metres) and the southern wall (140 metres). The wall construction is random rubble and cement and the two towers were constructed with large stone
blocks and rubble, one tower is castellated (Adelaide Gaol Visitor’s Guide, n.d.) (Figure 5.21).

Figure 5.21 Adelaide Gaol

Gaol Wall 1841

Gaol Wall with castellated tower

Photo: C. Bender (looking southwest)

Photo: C. Bender (looking southwest)

Retaining Wall – Exhibition Building c1887-88

Location: The rear of the Napier Building in the University of Adelaide grounds.

GPS: 61 33059N 54 281200E

Dunstan Limited of Stonyfell was awarded the contract to build a retaining wall for the Exhibition of 1887-88 (Keays, 1886). The wall was constructed with cement render over stone rubble. The length of the wall is 54.2 metres and its height 4.9 metres (including stone capping of 450mm). A section of the wall has deteriorated exposing an area of piše and rock rubble (Figure 5.22). The wall runs in an east-west direction and has a wrought iron railing that has been painted green. The railing measures 620mm in height, with the uppermost rail measuring 50mm in width. The entrance at the rear of the Exhibition Building led from the parklands. This entrance
consists of 29 steps in total. Nineteen of the slate steps, each with a width of 3.2 metres lead from the eastern side of the entrance up to a central slate platform. From the platform ten slate steps, measuring 6.1 metres in width ascend at a right angle from the central slate platform to the promenade area. The nineteen slate steps that were originally on the western side of the entrance have been removed; the outline of the step placement is still visible. At the base of the steps is an ornate façade consisting of four Grecian columns. This façade is in poor condition with cracks and staining due to weathering and lack of maintenance. Some of the slate steps have areas of exfoliation.

Figure 5.22 Exhibition Building Retaining Wall

Burnside cycling track c1888

Location: Olympic Sports Field (formerly Kensington Oval), The Parade, Kensington Park, Burnside. Section 300 in the Hundred of Adelaide

GPS: 61 33135N 54 285533E

In 1874 this land was known as Shipster’s Paddock when it was purchased by Burnside Council for a recreational park. The contract to build the first inclined cycling track in Australia was awarded to Henry Dunstan of Stonyfell Quarry who tar paved the surface of the track (Steinberner, 1987:12).
**Roadways**

Burnside Council archival records show contracts awarded to quarries for the supply of road metal in the 1800s and 1900s. Some examples of contracts that were awarded to Stonyfell Quarry stating the year, location, amount of stone required and the price (Table 5.1). In 1921, three pence per yard was added to the price for stacking.

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Amount</th>
<th>Price</th>
<th>Stacking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>Penfolds Road</td>
<td>250 cubic yards</td>
<td>4/2d yd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parkside &amp; Forstane Road</td>
<td>Blue grey metal</td>
<td>4/5 1/2d yd</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fountain Road</td>
<td>200 yds grey metal</td>
<td>4/8d</td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td>Parkside Road</td>
<td>100 yds gravel</td>
<td>3/2d</td>
<td></td>
</tr>
<tr>
<td>1872</td>
<td>Ferns Road</td>
<td>200 yds grey metal</td>
<td>4/1d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Penfolds Road</td>
<td>no amount stated</td>
<td>3/8d</td>
<td></td>
</tr>
<tr>
<td>1873</td>
<td>Fountain Road</td>
<td>no amount stated</td>
<td>4/9d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Parkside Road</td>
<td>gravel screenings</td>
<td>3/3d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prescots Road</td>
<td>screen gravel</td>
<td>3/11d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ferns Road</td>
<td>grey metal</td>
<td>5/6d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Burnside Village</td>
<td>grey metal</td>
<td>5/6d</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wyatts Road</td>
<td>grey metal</td>
<td>5/6d</td>
<td></td>
</tr>
<tr>
<td>1888</td>
<td>Private Street off Flinders Street</td>
<td>no details</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Private Street off Albert Lane</td>
<td>no details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1916</td>
<td>Henry Street, Kensington Park</td>
<td>80 tons metal</td>
<td>not quoted</td>
<td></td>
</tr>
<tr>
<td>1917</td>
<td>No address given</td>
<td>5000 gallons distilled tar</td>
<td>7 3/4d gal</td>
<td></td>
</tr>
<tr>
<td>1921</td>
<td>Magill Road</td>
<td>200 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Kensington Terrace</td>
<td>100 yards metal</td>
<td>9/-</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Toorak</td>
<td>600 yards metal</td>
<td>9/-</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>North Kensington</td>
<td>200 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Kensington Park</td>
<td>350 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Burnside Road, Kensington</td>
<td>150 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Burnside Road, Burnside</td>
<td>100 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Halletts Road</td>
<td>200 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Penfolds Road</td>
<td>150 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Magill Village</td>
<td>50 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Corryton</td>
<td>100 yards metal</td>
<td>8/9d</td>
<td>3d per yard</td>
</tr>
<tr>
<td></td>
<td>Burnside Village</td>
<td>100 yards metal</td>
<td>9/9d</td>
<td>3d per yard</td>
</tr>
</tbody>
</table>

*Source: Burnside Council Archives, Duplicate Minutes of Burnside Council from September 27th 1869 – February 10th 1873; Letters from Burnside District Clerk August 11th 1916, September 10th 1917, January 24th 1921*
**Railways**

Stonyfell Quarry aggregate ballast was also used along the train tracks. In December 20th 1940, Stonyfell Quarry was awarded a contract to supply S.A Railways, Adelaide, with 10,000 tons of ballast at 8 shillings per ton (Boral Archives, ‘A’ file, black tin).

**Tramways**

In 1898 Henry Dunstan’s quarry at Stonyfell was awarded the contract to supply stone and ‘maintain in good order’ 37 miles of horse drawn tram-track (Keays, 10th August 1898). There are no documents stating the exact location of the tram-track that was to be maintained, but the transport map of 1908 (see Figure 3.9) gives an indication of possible routes.

**Adelaide Airport**

Location: West Beach, South Australia.
GPS: 61 30633N 54 274671E

In 1949 Stonyfell Quarry was awarded a contract to supply stone for the building of runways and roads at the Adelaide Airport. The contract was to supply one third of the stone, the other two thirds supplied by Tee Tree Gully and Greenhill Quarries. The airport was opened in February 1955 (Green, S. pers. comm., August 2002).

**Distance stone travelled from Stonyfell Quarry to contracted destination**

An example of contracts awarded to Stonyfell Quarry for the supply of stone shows the distance that the stone travelled and the relevant years (Table 5.2 and Figure 5.23). While this is just a sample of contracts awarded to Stonyfell Quarry, it gives an indication of the increased distances travelled with the development of the colony and state, and also the increase in councils requiring processed stone.
### Table 5.2  Stonyfell Quarry - Burnside Council contracts for supply of stone.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>DESTINATION AREA</th>
<th>DISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1873</td>
<td>Parkside</td>
<td>5 kilometres</td>
</tr>
<tr>
<td>1873</td>
<td>Burnside</td>
<td>2 kilometres</td>
</tr>
<tr>
<td>1873</td>
<td>Kensington</td>
<td>2 kilometres</td>
</tr>
<tr>
<td>1888</td>
<td>Adelaide</td>
<td>7 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>Woodville Council</td>
<td>14 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>Hindmarsh Council</td>
<td>10 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>Payneham Council</td>
<td>5 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>St Peter’s Council</td>
<td>6 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>Kensington and Norwood Council</td>
<td>4 kilometres</td>
</tr>
<tr>
<td>1939</td>
<td>Adelaide Council</td>
<td>7 kilometres</td>
</tr>
<tr>
<td>1942</td>
<td>Salisbury</td>
<td>20 kilometres</td>
</tr>
<tr>
<td>1950</td>
<td>West Beach</td>
<td>14 kilometres</td>
</tr>
</tbody>
</table>

Source: Burnside Council Archives and Quarry Industries Limited, Boral Archives

Historical sources show the areas where Stonyfell Quarry stone was delivered, together with the delivery charges. From the coloured dots, it is clear that during the war years of 1942 there was an increase in government demand for processed stone along the coast and Port River and also within an eight mile radius of the city centre (Figure 5.23). The government placed restriction on the quarries during the war years, petrol was rationed and the government had priority in sourcing stone from quarries.
Buildings and features that have a high probability of having been constructed with Stonyfell Quarry stone

The heritage registers of Burnside list the local stone buildings of the era but the source of the stone is undocumented (Dallwitz and Marsden, 1986:26). However, there is a high probability that some of the stone buildings and features constructed in the Adelaide and Burnside area in the 1800s and 1900s were built with stone from Stonyfell Quarry, the closest quarry site to these buildings. To test if this is the case,
sample stone from four of the buildings was sent away for analysis together with source stone from Stonyfell Quarry.

**Original Burnside Council Office c1869**

Location: Glynburn Road, Burnside. Section 320 in the Hundred of Adelaide.
GPS: 61 31602N 54 286292E

This building was built for the Burnside Council in 1869. It was designed by the architect George Soward, in a simple symmetrical cottage design with a front verandah that faces west (Figure 5.24). There are two windows on either side of the front door. The walls were constructed with local bluestone and the surrounds of the doorway and windows are of red brick quoined. The roof is constructed with corrugated iron and the concave verandah is also constructed with corrugated iron with supporting wooden posts. A stone sample from this building was collected for analysis.

![Figure 5.24 Burnside Council Office](image)

Photo: C. Bender, looking east
St David’s Church Hall c1887

Location: Glynburn Road, Burnside. Section 320 in the Hundred of Adelaide.
GPS: 6131615N 54286293E

This building is the original St David’s Church of England. The foundation stone of this building was laid on 10\textsuperscript{th} January 1887. A more modern church on the southern section has superseded this church that is now used as a Church Hall. The walls have been constructed of local bluestone and quoined with red brick (3 brick). The roof is corrugated iron and the style is Simple Gothic Revival (Dallwitz and Marsden, 1987). The church hall faces west and has a buttress at each front corner, with three buttresses on both the north and south walls (Figure 5.25). A sample of stone was collected from this building and sent for analysis.

Figure 5.25 St David’s Church Hall

Photo: C. Bender, looking east
Knightsbridge Baptist Church c1884

Location: 455 Glynburn road, Leabrook. Section 320 in the Hundred of Adelaide.

GPS: 61 31952N 54 286236E

This church was built in 1884 (Helm, n.d.). The walls were constructed from local bluestone and the quoins are smooth rendered, the roof is of corrugated iron. There is a high probability that the stone came from the Stonyfell Quarry located two kilometres to the east. The church faces east, the entrance porch has been designed with three arches, above which are three Gothic style windows. The southern and northern walls each have four windows of the same style. The walls are 600mm to 900mm thick. A classroom was added to the west wall of the church building in 1906, slightly recessed with a doorway on the north and south walls and two windows on the west wall. The rubble stone of uneven face is laid in rough mortar along tuck-pointed white coursing (Figure 5.26). The stones are of varying hues of beige to dark brown. The stone varies in size and the distance between the horizontal coursing is irregular. The east wall has two columns of bluestone coursed rubble, one is 1.23 metres x 6.8 metres, the other 1.3 metres x 6.8 metres. The remainder of the wall is rendered cement, as is the west wall. The measurement of the west wall is 11.55 metres, the centre of which has a 3.64 metre outward curvature. A stone sample from this building was sent for analysis.

Figure 5.26 Knightsbridge Baptist Church Southern Aspect

Photo: C. Bender, looking northeast
Chiverton Mansion, Cottage and Coachouse/Stable c1881 (now St Peter’s Girls School)

Location: St Peter’s Girls School, western end of Stonyfell Road, Burnside.
Section 289 in the Hundred of Adelaide.
GPS: 61 29960N 54 285512E

John Thomas Nankivell built Chiverton in 1881. The two-storey mansion of 27 rooms was originally situated on nine acres. It was constructed of coursed bluestone with smooth rendered quoining (Figure 5.27). At the rear of the main residence are two buildings: a coach house with stable under same roof and a two-roomed cottage. These buildings are built of un-coursed bluestone rubble and have red brick quoining (3 brick) around the windows and doorways with a corrugated iron roof. The colonial cottage has two rooms, a single painted brick chimney services the two fireplaces in the centre of the building. The window surrounds are bevelled and the window at the southwest end of the building has evidence of having once been a doorway, (a segment of slate step is still in situ beneath the window). The east-facing wall is constructed with un-coursed bluestone and cement (Figure 5.28). With their close proximity to the Stonyfell Quarry (one kilometre at the eastern end of Stonyfell Road), it is highly probable that the stone for these buildings was sourced from Stonyfell Quarry. As a result sample stone was collected from the coach house/stable and sent for analysis.

A floor plan of the two-roomed cottage was measured and drawn by the author and Lee Clark on June 2nd 2003, in order to calculate the amount of stone used in the construction (Figure 5.29). The approximate amount of stone and red brick quoining used in the construction of the cottage is 30 cubic metres. This amount was arrived at from the following calculations:

- Total surface area of the walls - 93.64 square metres.
- Total area of the openings, (windows and doors) - 9.91 square metres.
- Net surface area - 83.73 square metres.
- Wall thickness - 0.36 metres.
Figure 5.27  Chiverton Buildings
Chiverton Mansion Entrance  Chiverton Coach House and Stables

Photo: C. Bender, looking south east
Photo: C. Bender, looking south east

Figure 5.28  Chiverton Cottage

Photo: C. Bender, looking west

Figure 5.29  Chiverton Cottage Floor Plan (Scale 1:50cms)

Floor Plan measured by L. Clark and C. Bender, Drawn by C. Bender
Clayton Wesley Church and Burial Ground Complex c1856, c1862, c1875

Location: Eastern end of Norwood Parade, Burnside. Section 288 in the Hundred of Adelaide.

GPS: 61 33177N 54 284662E

There are four buildings on this site that have been constructed with local stone. The first chapel was built in 1856 faces west and is of a simple Gothic Revival style. Known as the ‘Lecture Hall’, it was constructed with sandstone and is randomly tuck-pointed with red brick quoining surround the windows and doorways. There are three Gothic style entrances to the chapel with three windows above. Buttresses have been constructed on three sides of the chapel, the eastern wall is shared with the ‘Gallery’, built in 1862 of coursed bluestone rubble with red brick quoining (5 brick), it has a portico at the eastern end of the south facing wall (Figure 5.30). The eastern wall of the Gallery is shared with ‘Hope Hall’. This hall was built in 1875 of coursed sandstone construction with each stone stippled, a style known as ‘bird pecking’ (Field Geology Club of South Australia, 1997, 4-14) (Figure 5.31), the base is of coursed bluestone (Dallwitz and Marsden, 1987). The stable at the rear of the complex is crudely built of un-coursed random rubble (Figure 5.30).

The source of the stone used in the construction of these buildings is not clear, although the stone used in some sections is visibly similar to that used in buildings at the quarry. All of these buildings have been constructed with local stone and due to the close proximity of Stonyfell Quarry there is a probability that it was from here that the stone was sourced. There were no sample stones taken from this site since only a few sample stones could be analysed due to cost and time constraints. A decision was made to only take sample stones from four buildings that were the closest to the Stonyfell Quarry site. If the analyses proved successful in identifying source stone then other structures could be tested at a later date.
Figure 5.30  Clayton Wesley Church and Burial Ground Complex

The Gallery c1862  The Stable

Photo: C. Bender, looking north-east  Photo: C. Bender, looking south

Figure 5.31  North wall of Hope Hall

Example of ‘Birdpecking’

Photo: C. Bender, looking south

Guttering, Kerbing and Boundary Walls

Location:  Rochester and Young Streets, Burnside.
GPS:  61 32041N 54 286092E – Rochester Street
GPS:  61 31735N 54 286465E – Young Street

Quarried stone was also used in the construction of local infrastructure, such as street gutters, kerbing and boundary walls. The gutter located at Rochester Street, Burnside, is formed with irregular sandstone blocks and laid out with a curved base to channel the rainwater and allow a free flowing action toward the drainage system.
The kerbing is formed with bluestone blocks measuring 400mm x 180mm aligned along the edge of the footpath (Figure 5.32). The boundary wall of the property in Young Street, Burnside, was constructed with random rubble and cement to a height of 1.4 metres. Glass shards were cemented into the top as an extra deterrent to trespassers.

**Figure 5.32  Burnside Guttering and Kerbing**

![Burnside Guttering and Kerbing](image)

*Photo: C. Bender, looking south*

**Results of Stone Analysis**

Source material was taken from two areas of the Stonyfell Quarry site: an area known as Dun’s Quarry that was quarried c1900 and a mid section of the quarry. A sample source stone was also taken from Greenhill Quarry, an area on the western slope of Stonyfell Quarry. This source material was sent to Professor Nesbitt together with sample stone from four local Burnside buildings for analysis. It was hoped that an absolute match would identify local buildings that had been constructed with stone sourced from Stonyfell Quarry. The following descriptions are taken from a report provided by Prof Nesbitt (pers. comm. February 2003).
Stonyfell Quarry Stone Sample 1 (mid section)

This stone is best described as a feldspathic quartzite. Both sections are dominated by quartz and one has very fresh fragments of potassium feldspar indicating that the source rock was reasonably close (the quart and feldspar are derived from pre-existing rock such as granite or less likely, another sediment). Both sediments have abundant sericitic material. The texture suggests some recrystallisation i.e. the original quartz shapes are in the process of being destroyed (Figure 5.33). None of the building samples match this.

Figure 5.33 Stonyfell Quarry Sample Stone

Photo: R. Nesbitt 2003 Petrographic Microscope. Field of view 1.5mm.
**Dun’s Quarry Stone Sample 2**

The two thin sections appear to be very much like the Stonyfell source stone i.e. quartzite or feldspathic quartzites (Figure 5.34).

**Figure 5.34 Dun’s Quarry Sample Stone**

Photo: R. Nesbitt 2003 Petrographic Microscope. Field of view 1.5mm. Note the large microcline grain in the centre of the field of view. The remaining grains are dominated by quartz and the weakly coloured material between the grains is sericite.

**Greenhill Quarry Stone Sample 3**

This source stone is quite different from Stonyfell and Dun’s Quarry stone. It is essentially a bedded clay-rich rock with distinct bands rich in quartz. Technically it could be called a phyllite. It is interesting because of the preservation of the bedding and the fact that quartz grains show little or no signs of strain. In other words it is possible to see the original shapes of the “sand”- grains which are now preserved within the (originally) clay material. Because of metamorphism the clay has been “cooked-up” and is now re-constituted as a phyllosilicate mineral such as sericite and/or chlorite (Figure 5.35).
Sample Stones from Local Burnside Buildings

Knightsbridge Baptist Church, Burnside, sample 4

This sample stone is similar to the Greenhill Quarry stone but has a much stronger metamorphic fabric. There is one layer that has quite large grains (=clasts) and this is sandwiched between finer layers dominated by silt-size grains. In other words the source rock was much closer to where the layer was deposited and then the source area changed from proximal (close) to distal (distant) giving much finer, more clay-rich material (Figure 5.36).

It cannot be guaranteed that the Knightsbridge sample stone came from Greenhill since similar material could also have come from Stonyfell or Dun’s quarries, depending on where the source stones were gathered. The divergence from the quarry samples may simply be due to the fact that the sampling of the other source stones may not have picked up ‘clay-rich’ layers.
Original Burnside Council Building, sample 5

This sample is similar to the Knightsbridge Baptist Church stone but lacks the course grain layer (Figure 5.37).

Figure 5.37 Original Burnside Council Sample Stone
**St David’s Church Hall, Burnside, sample 6**

This sample is a low-grade phyllite or pelite and the constituent minerals are fine grained. The degree of ‘cooking’ is not so great as at Greenhill. The texture of this rock is not found in any of the other samples (Figure 5.38).

![St David’s Church Hall Sample Stone](image)

*Photo: R. Nesbitt 2003 Petrographic Microscope. Field of view 1.5mm.*

**Chiverton Coach House and Stable, Burnside, sample 7**

This sample is very much like the source stone of Greenhill. It is quartz-rich pelite (Figure 5.39).

![Chiverton Coach House and Stable Sample Stone](image)

*Photo: R. Nesbitt 2003 Petrographic Microscope. Field of view 3.0mm.*
Summary of Stone Sample Results

All of the building stone samples are dominated by a ‘clay-rich’ type rock. Within any sedimentary sequence, however, there will be alternations of quartz-rich and clay-rich layers. When these are metamorphosed several things happen. If there is nothing but quartz, then the quartz changes shape to accommodate the compaction and higher temperatures. If there is a small amount of clay in the sequence, this re-crystallises as chlorite or sericite and wraps around the quartz grains (the Stonyfell sample exhibited this attribute). In the clay-rich parts of the sequence, depending on the amount of strain suffered, the rock takes on a cleavage which is controlled by the sericite/chlorite (=clay). If the strain is low, the sand or quartz grains sitting in the mud retain their original broken shape (they are called “clasts”), but as the metamorphism increases the quartz suffers strain and recrystallises. The analysis of the material suggests that petrographic examination of the material is a promising technique in the analysis of sources of the building stones. However a more detailed sampling of the quarry sites is required to establish the range of variation within any singled site. This combined with detailed mineralogical studies such as heavy mineral analysis could serve to provide unique characteristics of each quarry site (Nesbitt, R. pers. comm., April 26th 2003).

In summary, none of the results were conclusive. The source stones from Stonyfell and Dun’s quarry sites are similar in that they both contain feldspathic quartzites that are derived from a pre-existing rock such as granite. The Greenhill Quarry site, which is located on the western slope of Stonyfell Quarry, contains a bedded clay-rich rock with distinct bands of quartz. The sample building stones are all dominated by clay-rich type rock. While some of the sample stones show similarities in structure with the source stone from Greenhill Quarry there is no conclusive match. This is not to say that the sample stones did not come from Stonyfell Quarry, since the sampling of the quarry stone from the Stonyfell site may not have been selected from the clay-rich layers. The analysis of the stone was an innovative way to attempt to identify stone buildings with the quarry from where the stone was sourced, however further research into the way that stone can be analysed is needed.
Stone Function

The source material from Stonyfell and Dun’s Quarry is dominated by quartz and is therefore ideal for road aggregates. The source material from Greenhill Quarry can be broken in a controlled way and is therefore suitable for building blocks and possibly described as bluestone. The term ‘bluestone’ is not a recognised geological term as such and is purely local. In other words, a bluestone in the UK need not be the same as one in Adelaide (Nesbitt, R. pers. comm., April 26th 2003). Bluestone is a term generally covering silt stones and shale, which are generally blueish-grey when fresh and which, by virtue of regular fracturing and jointing in the ground, can be quarried in appropriate shapes and sizes for building, i.e. in blocks. “Many of the joint faces (planes) of bluestone are lined with thin iron oxide coating which gives rise to the characteristic reddish yellowish brown colours of the surface of the stone” (Young 1984:1-2).

A comparative study of neighbouring quarries

Three other historical quarries were surveyed for similarities or variations to Stonyfell Quarry. With the exception of the Magill Stone Mines, they appear to have been operated in a similar mode to that of Stonyfell Quarry, that is, worked mainly for processing road metal and rail ballast.

Magill Stone Mines (Cavity Quarries) – c1840s.

Location: Sections 1083 and 918 in the Hundred of Adelaide, 5 miles East of Adelaide at the rear of Penfold’s Winery, on Rawson Penfield Drive, Magill.

GPS: 61 32862, 54 288571

Quarry type: Summit Cavity quarries.

Geology: Dense dark grey bluestone, slate, and freestone.

This portion of land consisting of 89 acres was first granted to Edward Custle and Lance Low on January 18, 1848, for the sum of £367 sterling (Connell et. al. n.d.) Cornish miners first opened up the mine. The stone won was bluestone, a stone that was used in the construction of buildings in and around Adelaide. Slate and freestone
were also mined and road metal was produced. In 1844 Cornish miners, following the ‘tribute’ system also carried out small-scale mining of copper. “The tribute system was a contract under which miners gave the mine owner a fixed proportion of all the metal they mined” (Bromell & Hanning, 1981:34,38).

The approach to the mines is a track that winds through a reserve at the top of Rawson Penfold Drive, Magill. The narrow track meanders through olive trees along the gully floor and gradually rises to a plateau where the mines are located (GR 61 32864/54 288570) on approximately one acre of land.

It is a mined quarry and there is evidence that it was worked in the pillar and stall method (Figure 5.40). There are three large galleries that are interconnected by windows in adjoining gallery walls (Figure 5.41) each having their own entrance. The lower mine has a small alcove carved into the south wall, possibly to hold a candle or lantern for illumination purposes.

The stone blocks were possibly removed with a portable crane to the outside of the mine where they would have been cut to required size by the mason. However, there is no evidence of this operation due to significant landscaping of the site by the present owner. There is evidence of past small quarrying operations lower down the hillside on the northern slope.

The South Australian Register ran the following advertisement between December 7th 1854 and January 10th 1855:

To be sold, Section 1085, containing 89 acres situated on the face of the hills near Dr. Penfold’s contains a Quarry of splendid Building Stone, also Copper, and is well timbered. For cool and salubrious building sites it is unsurpassed (...) For further particulars apply to E.C. Gwynne Esq. (Young n.d.:2).

While the section number differs from 1083, it is thought to be incorrect, (i.e. a printing error) as the area is unique to section 1083 (Young, n.d.:3). There is no evidence of this stone being used on local building, nor is there any documentary evidence of the stone’s final destination (Young, n.d.: 2).
Figure 5.40  Magill Stone Mines (Pillar and Stall method of Stone Mining)

Photo: C. Bender, looking south.

Figure 5.41  Magill Stone Mines (Galleries)

Photo: C. Bender, looking southwest.
John Dunstan & Son Limited Quarry – 1910-1944

Location: Sections 1052 and 1054 in the Hundred of Adelaide in Chambers Gully, Waterfall Gully Road, Burnside.

GPS: 61 29947, 54 287701

Quarry type: Hillside.

Geology: Quartzite, bluestone and slate.


Although stone quarrying began in 1863 in Chambers Gully by John Hallett and Joseph Stilling, on land then owned by Sir Samuel Davenport, it was not until 1910 when John Dunstan & Son Limited began operating that large scale quarrying began. This continued until April 6th 1944. (Certificate of incorporation of a company January 18th, 1929, Boral Archives).

Several large quarry faces were worked and a crushing plant was erected and settling ponds were established that extended to the entrance of the quarry (Olivier et al. 1999). In 1927 total employment was 42 men, 32 of whom worked in the quarry producing approximately 300 tons per day. Quarrying ceased in the early 1950s when benching legislation was introduced to restrict the height of the quarry face to 20 metres (65 feet). The quarry face had reached 40 metres (120 feet) by this time. Horses were used to pull stone laden drays, carts and trolleys from the quarry face to the crusher (Waterfall Gully, 1986).

Chambers Gully is entered from Waterfall Gully Road, Burnside. The quarry workings begin 100 metres into the gully on the northern side of the creek and southern side of the hill. The quarry workings continue along the gully for approximately half a mile. Some 400 metres into the gully hidden behind an overgrowth of vegetation, 12 steps are located (Figure 5.42). These steps have been fashioned to a depth of 16 inches (40.5cm) and are 35 inches (88.5cm) wide allowing the quarrier to climb the quarry face.
Figure 5.42  John Dunstan & Son Limited Quarry (Steps on Quarry Face)

Photo: C. Bender, looking west.
Evidence of concrete foundations used to support the stone crusher together with wire ropes cemented into the ground can be seen above the stone walled loading area. Metal skips and tram track lie indiscriminately around the site.

Further along the gully the quarry face opens up resembling an amphitheatre, and reaches approximately 40 metres high. At the base of the quarry is an assemblage of extracted rock. One rock has a borehole that has been drilled for secondary blasting known as ‘popping’, another rock lying in an assemblage shows evidence of hand splitting. In 2003, during National Archaeology Week, the archaeology department of Flinders University excavated a site along the gully thought to have been a miner’s cottage. There is evidence of past gold mining activity in the gully during the early days of settlement. The excavation revealed crude randomly placed stone walls that had been constructed into the bank with an attached fireplace (Figure 5.43). It is not known who occupied this shelter, although there is reference to a quarry worker named Peter Laar, living in the gully in 1927. His humpy is said to have been constructed with rocks and built into the side of the hill (Tour Guide No. 4, 1986:8).

Figure 5.43 John Dunstan & Son Limited (Possible Quarryman’s Shelter)

Photo: C. Bender, looking east.
The act of quarrying was very dangerous. The men who worked the quarry, either in the placement of dynamite or the breaking of stone, faced many dangers. Climatic conditions in the gullies meant that low cloud and fog rolling in enveloped the gullies and obstructed vision. Sometimes the accidents proved fatal, such as the one documented in *The South Australian Register* of February 28th 1929, when three men were killed in an accident at J.D. Dunstan & Son Quarry, two ‘powder monkeys’ aged 46 years and 25 years and a trucker aged 24 years. The cause of the accident was the inappropriate use of a ‘blowpipe’ when charging a hole on the face of the quarry 80 feet (24 metres) from the floor. Government explosive regulations prohibited the use of the ‘blowpipe’ when holes were being charged, only wooden tampers were allowed. The newspaper article lists one of the men killed as having lived at the quarry camp, the location of which the author has been unable to discover. It is possible however, that the men camped in the wool shed that was located in Woolshed Gully, further along Waterfall Gully Road.

The cost of quarrying and transporting the stone was high. In 1912 ten cases of gelignite were purchased from Elder Smith for the sum of £19 sterling. In 1913, forty kegs of powder were purchased from Harris Scarfe for £25 sterling and the cost of chaff for the horses was £3-17-6 sterling per ton (Boral Archives, Series I, Box 1). In 1913 the average cost of quarrying a ton of stone was one shilling, three and one-third pennies. Cracking was the same amount and carting was two shillings, eleven and one-third pennies, totalling five shillings and sixpence. The average price received for a ton of stone was six shillings and ten pence, the difference being one shilling and four pence (Boral Archives, Series I, Box 1).

**Sleeps Hill Quarries – 1916 – 1950**

Location: Sections 1080, 1074, 1143, 1146, 1147 & 1148 Hundred of Adelaide. Consisting of 12 quarries.

GPS: 61 23660, 54 281508

Quarry type: Hillside & Valley quarries.

Geology: Quartzite, slate and limestone.

Area size: 500 by 600 metres approximately
These quarries were opened up in 1916. Owned by Adelaide Quarries Limited 1919 they were the leading producers of crushed rock in South Australia in the 1920s, employing 100 men. The rock was crushed to produce aggregate and sand for construction purposes. After the depression of the 1930s quarrying diminished and the quarries were closed about 1950.

The quarry was worked by cutting small ledges into the quarry face, these ledges were up to 40 metres high. This enabled the ‘powder monkey’ to drill holes with a compressed air drill and insert dynamite. The holes were then fired in unison by electrical detonation, bringing down the stone. The face was then made safe by barring down any loose stone. Large stone blocks were further reduced by blasting and then broken manually it was then loaded into side-tipping rail trucks and transported to the storage bins above the crushing plant (Figure 5.44). The stone from the higher quarries was dumped from the trucks into a bin and reloaded into 6 ton trucks operated on an incline track (Figure 5.45). As the loaded truck descended to the crushing plant the empty truck was pulled up to the quarry area by means of a wire cable. In 1924 a flying fox was installed to handle large blocks of stone for use in breakwaters (Primary Industries and Resources SA, June 2000).

Figure 5.44  Sleeps Hill Quarry (Side Tipping Rail Truck)

Photo: C. Bender, looking northwest
A schedule dated 1941 shows the extent of the Plant and Machinery at that time.

**Stone Crushers:**
- 1 No. “Bigelow” by J. Martin & Co. with 28 inch by 33 inch front jaws and 32 inch x 32 inch back jaws.
- 1 “Jacques” 24 inch x 14 inch.

**Elevator:**
- Complete with buckets.

**Conveyors:**
- 1 with 126 feet of 15-inch rubber belt, and 1 tripper (self-propelling).
- 1 with 70 feet of 15-inch rubber belt.

**Screens:**
- For ballast ¾ inch and ¼ inch screenings.

**Bins:**
- With 18 delivery chutes – 2 for sand, 1 for ¼ inch, 3 for ¾ inch, 12 for ballast.

**Air Compressor:**
- 7 inch x 6 inch Twin Cylinder Perry Compressor (Ingersoll Rand Patent) driven by 35 H.P. Crompton Parkinson Motor No. 10249.
- 2 inch G.I. compressed air pipeline to Quarries.

**Electric Motors:**
- 1 English Electric 50 H.P. 970 R.P.M. Serial No. X8975B.
- 1 “Century” 60 H.P. 1440 R.P.M. Serial No. 202861.
Small Plant: - 2 Chain blocks.
- 2 Anvils, 2 Hand Drills.
- 3 Vices.

Buildings: - Office, Store and Chaff Shed, 2 Blacksmith’s shops (1 out of repair), Stable, 2 shelter sheds, 1 open shed, all of Galvanised Iron.
- 1 Air compressor shed.
- 1 Shed or Dwelling House.
- Railway telephone.
- Concrete Tanks, 1 large and 4 small  (Memo of Agreement between SA Railways Commissioner and Sleeps Hill Quarries Limited, 20th August 1940), (Boral Archives, File A, black tin).

In 1920s two crushing plants were erected on either side of the valley and connected by a siding to the railway (Figure 5.46). Rock was fed into a primary jaw crusher and then into a ‘secondary gyratory crusher’, it was then screened and graded and deposited into divided bins according to size.

Comparisons can be made between Stonyfell Quarry, John Dunstan’s Quarry and Sleeps Hill Quarries during the early part of the 20th century. Their method of processing stone was similar in that they all used mechanical stone crushers of varying sizes. The stone was transported around the site via tramway and skips. The main function of the stone was for rail ballast and road foundations. The stone was transported from the quarry to the contracted destination by horse and dray in the early years of operation and later by motorised trucks. The quarries competed with each other for lucrative government rail and road contracts. The working conditions for the quarrymen were similar, the work was arduous and dangerous and government controlled their wages. The quarrymen lived close to the quarry site either in cottages or campsites. The Magill Stone Mines were worked in a manner of pillar and stall mining. The author has found no archaeological evidence, either physical or documentary, of the processing of stone at this mine, or how the stone once knapped, was transported down the hill to the road below.
Figure 5.46  Sleeps Hill Quarry (Crushing Plant Foundations)

Photo: C. Bender, looking south
Chapter 6 – CONCLUSION

The Hills Face Zone Project was the impetus for studying the cultural impact of quarrying during the 19th and 20th centuries in the Mount Lofty Ranges. The Stonyfell Quarry site has been studied and researched through historical archaeology so that the contribution made by the quarrying industry to the development of the South Australian landscape can be better understood. The first Colonial Treasurer of South Australia, Sir Osmond Gilles, appraised the quartzite at Stonyfell and remarked ‘they were eminently suitable for paving the streets of Adelaide’ (Selby, 1984:118). Sir Osmond was correct in his observation, for the quarry site was first operated in 1837 and continues today. The quarry has continually expanded in the quest for stone to supply stone products to the society of the day. As a result it has been instrumental in the continuing development of Adelaide and the surrounding areas.

The direction taken in this thesis was to understand how the quarrying industry, and specifically Stonyfell Quarry, contributed to the development of the South Australian cultural landscape. To expand the body of knowledge on historical quarrying operations in the HFZ from an historical archaeological perspective, documentary research and archaeological surveys were conducted. Research of the archival records and site surveys have proved valuable sources of information on quarrying methods and technology. Although Stonyfell Quarry is only one of many quarries that operated in the Mount Lofty Ranges, its story is typical and its longevity in many ways makes it the perfect case study.

In order to assess the placement of stone on the landscape of South Australia, structures and features constructed with Stonyfell Quarry stone in the local area were searched for. Archival records revealed an absence of information detailing the precise source of much of this stone, many documents simply listing the use of local bluestone, without stating the quarry from which it was sourced. To compensate for this omission a geological approach was taken. Stone analysis was undertaken to determine if sample stone from buildings and features on the local landscape could be matched to their quarry source. The results from this approach however, were
inconclusive, largely due to the nature of the geology of the quarry areas where the source stones were collected.

The problems of sourcing stone from the quarry were compounded by the fact that the area where the stone could feasibly have come from has been long since quarried out. Professor Nesbitt’s analysis of the sample stones from both buildings and quarry site reveals the difficulty of matching stone taken from a present day position in the quarry to that of stone quarried 120 years ago. Charlie Barnes, the Stonyfell geologist (now retired), agreed that due to the continual quarrying and difference of stone structure in various locations, it would be quite difficult to match stone that was quarried in the 1800s to that which is quarried today (Barnes, C. pers. comm., September 16th 2003). The geology of the landscape, Cambrian and Pre-Cambrian quartzite and sandstone rock yielded a vast repository of building material allowing for the intensive extraction of stone for a variety of construction purposes.

Research of the historical quarry site itself has proved informative, the standing structures and equipment that were used in past quarry operations have been documented for future study and shows the dynamics of the quarrying industry in the 19th and 20th centuries. The beginning of the quarrying industry in the Mount Lofty Ranges saw the use of basic hand tools such as levers and knapping hammers. This work initially done by hand was slowly mechanised, steam crushers were first introduced onto the quarry site followed by petrol and electrical driven crushers. Inquiry into how the quarry operated during the 19th and 20th centuries has shown the progression of industrialisation. As the technology developed, the quarry site became more organised with workshops and buildings to house new machinery. The chronology of the quarry maps and the redundant machinery on the quarry site show the evolution of industrialisation.

Other historical quarries in the Mount Lofty Ranges were traced through historical archaeological research. Historical maps showing the location of the many quarries in the Ranges was an important part of this research in order to determine the network of the quarrying industry and how Stonyfell Quarry fitted into this span. The maps show how important the western scarp of the Mount Lofty Ranges was to the colonists of the time, for within the hillside was a resource that enabled them to build
villages, townships and rural communities that were in turn linked by transit corridors. Quarrying as a primary industry has developed through the need for building materials from the early days of settlement. The quarries located in close proximity to Stonyfell Quarry were compared for their modes of operation. With the exception of the Magill Stone Mines, which was mined rather than quarried, the other two quarrying operations, John Dunstan & Son Quarry and Sleeps Hill Quarries, have shown that they were operated in a similar manner to that of Stonyfell Quarry. The winning and processing of stone was identical, and its function was to provide the government and the public with processed stone for building infrastructure in the developing colony. The government contracts were mainly for the supply of stone for roads and ballast for railway tracks.

The Altered Landscape

The landscape of the Mount Lofty Ranges has been altered by the quarrying industry. The area where Stonyfell Quarry is located was once an area of rolling hills interspersed with gullies and small creeks. The higher reaches of the ranges were selerophyll forests and the lower reaches and plains were open woodland of the savannah type with peppermint gums (*Eucalyptus odorata*) and bluegums (*Eucalyptus leucoxylon*) (Fenner, 1931:220). The European immigrants in 1836 viewed the landscape as a resource for building a new community. They extracted stone and felled the trees in order to develop a European colony. The continual drive in developing the colony has changed the landscape of the Mount Lofty Ranges and the plains below from a semi-natural landscape to a highly developed cultural one.

Consultation with geologists, historians and archivists has assisted in understanding the quarrying industry as it relates to Stonyfell Quarry. Primary source documents identify where processed stone from Stonyfell Quarry was used in communication networks in and around Adelaide. The communication networks that were developed during the expansion of the colony are documented and can be accessed through historical archives in South Australia. The physical evidence of these roads, rail lines and tramways however, is buried under layers of macadam, ballast, tar and asphalt, having been continuously remade and realigned and can now only be revealed through archaeological excavation. The features that were laid down during the development of South Australia in the way of stone gutters, drains and kerbing are
still visible in the council area of Burnside. Buildings and structures on the landscape are also identifiable through primary source documents and archaeological evidence. The buildings in the Burnside area that have been documented as having been constructed with local stone did not display a definite match with the stone sourced from Stonyfell Quarry as the stone analysis was unproven. Future research and a more detailed method of stone analysis may confirm that the stone samples and the source stone do share a commonality.

**Industrialisation of quarry sites**

This thesis has shown the importance of historical archaeological study of quarry sites. It has shown how the dynamics of the quarrying industry can be accessed through the progression of quarrying operations that have been conducted to win and process the valuable resource, first with animal and man power and later with innovative machinery. The patterning of industrialisation can be linked to the development of the South Australian landscape: the heightened demand for new communication networks for the increasing population led to the need for innovative machinery to process stone. It is important for the historical archaeologist to document past industrial sites while the evidence is still *in situ*. During the time of researching Stonyfell Quarry, No. 3 crushing plant of 1953 has been demolished and superseded and redundant machinery that for many years lay rusting at the top of the quarry, has since been sold for scrap metal. Through the researching of a quarry site, past life ways may be understood and the hard working quarrymen of the 19th and 20th centuries who for decades were the faceless and voiceless, can be identified and given a voice in the historical record.

**The quarry workers**

Primary source documents such as the Keays letters together with oral history and historical photographs have been an informative area of research for this thesis from which an understanding of the workings of historical quarries and the past lives of quarrymen can be seen. The work practices were identified through historical photographs, superseded machinery and the function of the processed stone. The dangers of quarry work are evident from the documents that list the accidents and deaths caused by falling stone and unplanned detonations. There would have been a
sense of camaraderie, a bond linking the men together, each man dependent on the
other for his safety. There is no evidence of housing being provided for the men at
Stonyfell Quarry, other than for the manager. There was however, a quarry camp for
the men working at John Dunstan’s Quarry in Chambers Gully. No archaeological
evidence was found in Chambers Gully although the men may well have been
housed in a woolshed in an adjoining gully. Post World War II, a boarding house was
established to house immigrant quarry workers and their families. Many of these
immigrants came from Eastern Europe as displaced persons. The quarrymen
produced a product that was essential to the development of South Australia and their
contribution can be traced through the archaeological structures and features that
remain on the cultural landscape of today.

**Future Research**

The physical remnants on the landscape today are fossil records of a vital industry.
By analysing the archaeological evidence of the site an understanding of the
development of the cultural landscape of South Australia is gained, from the tentative
beginnings of bridle paths and mud brick dwellings to macadam roads linking
villages and towns. Further study of the contribution made by Stonyfell Quarry stone
to the South Australian landscape is possible through a comprehensive understanding
of geological procedures in stone analysis. A more in-depth characterisation of the
mineralogy of the stone could be undertaken to determine the relative proportions on
any one site. The thin section petrography that was undertaken for this thesis could
also be expanded, to include the heavy mineral assemblages such as zircon, sphene,
garnet, ilmenite, chromite (any mineral that has a high density and therefore is
concentrated by natural panning). These minerals are indicators of the source rocks,
which determine the heavy mineral assemblage. By crushing the rocks and carrying
out separation techniques, such as floating off the lighter materials in liquid of the
appropriate density such that the heavy minerals sink, more accurate analysis of the
stone could be conducted. This method of stone analysis however, can be quite

The investigation carried out on Stonyfell Quarry has allowed for a more dynamic
view of quarrying. This area of research has shown the difficulties in linking stone
constructions with the quarried source stone. It has also shown the rewarding information that is available to the historical archaeologist in revealing the past quarrying operations and the lives of the men who worked in the quarry processing stone for the development of the cultural landscape of South Australia.
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APPENDICES

Appendix A  1949 Aerial Photo of Stonyfell Quarry
Appendix B  2002 Aerial Photo of Stonyfell Quarry
Appendix C  Oral History, Stan Green.

ORAL HISTORY - Stan Green, former Transport Manager of Stonyfell Quarry, retired 1987.

NB: Notes only – not a transcript - names of accident victims have been suppressed.

In 1950, 50 men worked the quarry 1,000 tons a day was processed. I began work in the southeast quarry at age 22 years. 1946-47 I went to the southeast. Dunstan produced bitumen at Stonyfell Quarry. Water on Stonyfell site was originally from bores.

John Dunstan & Son, Waterfall Gully had a Hadfield Crusher, this saved blasting – 13”x18” crusher. Accident at John Dunstan and Son – Waterfall Gully, 8 men buried in rock, plus horses and drays, 2 men killed.

Rock from Stonyfell, Greenhill and Tea Tree Gully crushed all rock for Adelaide Airport. John Keane was 30 years old when he ran Quarry Industries Limited in 1939

30 Contractors dragging metal out of Torrens – Hindmarsh and Thebarton built with sand from Torrens. Sand screening was done at Tramway Bridge.

Q.I. had a sand washing plant at Marden. Sand was used for concrete and plastering. Sand washing was also done at Stonyfell. In 1955 the sand washing plant was near weighbridge. Turnbull – Mayor of Woodville was also a carter for Stonyfell.

During the war years (WW11), Quarry Industries’ Smithfield Quarry built all of the buildings, explosive and ammunitions factory at Weapons Research Establishment (WRE), Salisbury.

In 1944, J.J. Williams ran White Rock Quarry, now Pioneer - I fired first gelignite. There is a 16”x9” Drum Crusher on display at Pioneer.
Stone was originally hand knapped and then loaded by hand into drays and weighed at the weighbridge located at the Tower Hotel, Magill Road, Magill. Rockdale Quarry – Badman’s Quarry on Montacute Road had 3 tractors.

Stonyfell Road was built as a Macadam Road (small stones compacted in road). 1954 – Benching at Stonyfell. 65 feet Act. Quarry owners fought this act bitterly but it had to be implemented by 1955. At Stonyfell 4 men made ledge for crusher. Road was carved in from Uraidla. A 36”x24” Crusher was placed on a Roger Trailer and pulled into place. ---- dropped dead and in 1937 Son of ---- was blown off face of quarry. Quarrymen had to buy own boots. 400 ‘Pops’ were drilled into the face then plugged with gelignite. There was a Beethoven Exploder that fired 300 (electric – wound it up) able to have delayed detonations. Quarry Manager’s ticket was required for Quarry Managers – they must have ‘Powder Monkey’ experience.

Stonyfell Quarry was an orange orchard prior to quarry. Electricity Trust of South Australia (ETSA) fired rocket up to the top of Stonyfell Quarry for the power line. This line produced electricity for the 9 inch Crusher at No. 6 Plant.

Merryvale Quarry was close to Rockdale, Merryvale has now closed down. River View – Gorge Road was sold to O’Neils now known as Southern Quarries, ---- was crushed in bin. O’Neils built Mascot Airport with the runway out to sea. It was built under floodlight during the war.

Rockdale quarry, explosion caused by Lithite 450’ - 3 men died, bore hole, jam in powder through copper tube, 2 plugs of gelignite.

20 men died from ‘silicosis’. Silicosis Fund now Quarry Safe. ---- was the blacksmith, the blacksmith sharpened steel for Powder Monkeys. In the 1950s ---- had silicosis, he lived on the Norwood Parade, Magill. Now Crush men work in air-conditioned rooms. The Mines Inspector came around to dust test with instrument, there were many men called ‘Dusters’ who had the disease.

Still Bin at Stonyfell was originally at Pococks.