University of Southern Queensland

Faculty of Engineering and Surveying

Mapping of an Old Mine Site for Heritage Purposes

A dissertation submitted by

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Abstract

This research investigated combining the use of modern surveying techniques and the Internet for the documentation of the historically significant information contained within an industrial heritage site. A cost-effective and economical procedure has been developed for the capture of the data in the field and the presentation of this data in a web site.

The industrial heritage sites of Australia contain a vast resource of historical information. These sites are perhaps the most difficult reminders of our past to deal with in terms of conservation and preservation. The industrial sites under the greatest threat are abandoned mine sites. These abandoned mines often pertain directly to the past development and growth of many regional areas, thereby providing an important link to the pioneering men and women of the district.

By using the abandoned Silverspur mine near Texas, this project has researched the application of surveying and the Internet in the collection and documentation of the historical data associated with such a site. The project has found that the application of this technology for these purposes is possible, and could be employed by a mining company or relevant heritage committee. The compilation and presentation of this data before it is lost will provide the public with a valuable insight into Australia's past.

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Limitations of Use

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Certification

I certify that the ideas, designs and experimental work, results, analyses and conclusions set out in this dissertation are entirely my own effort, except where otherwise indicated and acknowledged.

I further certify that the work is original and has not been previously submitted for assessment in any other course or institution, except where specifically stated.

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Signature

26/10/04

Date

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Chapter 1.

Introduction

While significant natural areas or man made landscapes may be conserved through an understanding of ecology, and appropriate management and planning control; and historic houses can continue in their existing uses as dwellings; sites such as historic mines, early factory complexes, redundant bridges or railway stations now left abandoned by line closures present far greater conservation solutions.

It would be unrealistic to expect that all these sites could be preserved. However the Trust does advocate strongly the documentation and assessment of these sites so that informed decisions can be made.

(The National Trust (New South Wales) 1988, p.i)

1.1 Outline of the Study

The importance of industrial heritage sites as a link to Australia's past is not to be underestimated. Those under the greatest threat are abandoned mine sites. As greater demands are placed on the earth's natural resources, the preservation of these sites cannot be guaranteed. Newer and more efficient methods of mineral extraction mean many of these old sites are once more considered economically viable. Reworking of these sites inevitably results in the destruction of anything of historical value.

Whilst surveying technology is used extensively in the setout and control of mining operations, the use of this technology in the preservation of mining information of a historical nature is limited. This study intends to focus upon the use of this form of technology combined with the Internet as a means of capturing and presenting this data. The relevant data is outlined in Section 3.2.1.

1.2 The Silverspur Mine

Silverspur is an abandoned silver mine situated 12 km East of the township of Texas on the Stanthorpe – Texas road. Founded in 1892 the mine proved to be extremely productive during it's early years, but the mine's isolation finally forced it's closure in 1926. Since 1926 the mine has experienced interest from several companies intending to rework the site. The latest of these companies is Macmin Silver who is currently conducting an extensive exploratory drilling programme with the view of reworking the site.

Figure 1.1 Silverspur Mine showing Head Gear over Main Shaft

The site is bounded by the Texas – Stanthorpe Road to the north, Dumaresq River Road to the east and slag heaps to the south and west. Much of the original mine equipment has been removed. An inspection of the site reveals headgear standing over the main shaft, the remains of boilers and crushers lying around, the scattered remnants of smelters and chimneys and remains of the internal rail system.

1.3 The Problem

Industrial sites are arguably the most difficult reminders of our past to deal with in terms of preservation and conservation (The National Trust of Australia (NSW), 1988,p.i). Of these, old mine sites are the most under threat. As newer more efficient methods of mineral extraction become available, many old mine sites are being reworked. Abandoned mine sites are attractive to mining companies for a number of reasons including:

- New methods of mining allow ore missed previously to be economically extracted, and
- Advances in smelting technology have made possible the extraction of ore from old slag heaps.

Any further work carried out at these sites usually results in the destruction of anything of historical value or a reduction in their cultural value to the community.

The last few years have seen rapid changes in surveying equipment and associated technology. This new technology is particularly suited to the rapid and accurate collection of data. An excellent example to which this technology can be applied is the collection of the historical information contained within an industrial heritage site for subsequent presentation.

As the availability and usage of the Internet increases, so too does the range of applications to which it can be applied. One such use is as an information source where the information can be readily and freely accessed.

If old mine sites were able to be documented in an effective and efficient manner, then the public would have a permanent record of these links to the past.

1.4 Objectives

The objective of this research is to preserve the historically significant information contained within an industrial heritage site. By investigating the possibility of combining modern surveying techniques and the Internet, a cost-effective and economical procedure for the preservation of the historically significant information of industrial heritage sites will be developed. An abandoned mine site (refer Section 1.2) is used to enable the suitability of the proposed methods to be demonstrated. As outlined in later chapters, particularly Chapters 3 and 4, this involved developing procedures for the capture of the data in the field and, presentation of the data in the public domain.

A web site was produced for the area of interest, incorporating data obtained during historical research and field acquisition, as well as other attributes outlined in Chapter 5.

1.5 Dissertation Overview

A review of material pertaining to the use of modern surveying equipment, the texts specialising in the chosen software and the sources of historical information are covered in Chapter 2 *Literature Review*. The relevant theory involved and applied to this project is also explored. This gives an insight into the background of, and basic theory behind modern surveying equipment and the Internet.

Chapter 3 *Data Acquisition Methodology* covers the acquisition of the historical and cadastral data required for the successful completion of the field component of the project. The development of a routine for the collection of the data at the mine is then described. This section then leads into the description of the field operations for both the detail and cadastral components, including methodology and equipment used.

One of the key aspects of this project was the compilation of the site plan detailing the original layout of the mine. Chapter 4 *Information Processing* details the methods used to create this site plan from the raw field data and to produce a plan in a format that is both legible and compatible for viewing on a web site.

Chapter 5 *Web Development* begins by outlining the reasons behind the decision to use Microsoft FrontPage as the web design software. The various techniques used to create a successful web site are then explored, followed by a description of the techniques employed in the creation of the project web site. The chapter concludes with the publication of the web site on the Internet.

Chapter 6 *Analysis and Discussion* evaluates the procedures, techniques and results of the previous chapters in relation to the aims of the project. Future developments in the procedures are discussed including the incorporation of different technologies into the field component. Limitations in the scope of work are discussed as well as future developments to further streamline the process.

Conclusions reached over the course of the project, and recommendations regarding further work to be undertaken are detailed in Chapter 7, *Conclusions.*

1.6 Summary

The documentation and assessment of industrial heritage sites is a step towards the recognition of these sites as links to our past. These sites can take many forms including abandoned railways, factories and unused bridges. Old mine sites however often pertain directly to the past development and growth of many regional areas. For this reason the recording and documentation of these links to our past will enable the public to better understand the history of Australia.

The use of modern surveying equipment, in conjunction with the Internet, would appear to be a highly efficient method of collecting and documenting the historical information found on an industrial heritage site. A web site will enable users to access the Internet to find out information that may include:

- the location of the mine;
- the layout of the mine;
- the mine’s history; and
- the level of current activity at the mine.

The determination of the best approaches and methods for the technology to be used is required to ensure an effective and efficient outcome.

Chapter 2.

Literature Review

2.1 Introduction

The growing number of old mine sites being reworked has resulted in the need for a cost-effective procedure for the capture and presentation of historical mine data. The further work carried out at these sites usually results in the destruction of anything of historical value or at best a reduction in their cultural value to the community.

The Silverspur mine (refer Section 1.2) is an abandoned silver mine dating back to 1892. In its current state the mine site provides the public with a record of Australian mining history. This historical display is under threat as the mine site is presently subject to an exploratory drilling program with mining operations likely to commence in the near future.

This project will investigate the possibility of combining modern surveying technology with the Internet to develop a technique that:

- provides a fast, economical method of data collection;
- utilises technology already available to a mining company or government department;
- records data in an easily processible format; and
- allows for the display of this data in a publicly accessible domain in a format that can support pictures, maps and text .

This chapter will therefore review the modern methods of surveying data acquisition applicable to this project. In addition literature relating to web design and the history of the Silverspur mine are reviewed. Also included are brief descriptions of the principles underlying modern surveying technology and the Internet, provided for those not fully conversant with either.

2.2 Technology Review

To satisfy the equipment requirements listed above, the fieldwork was carried out using a total station and data recorder. GIS / GPS applications were not considered for this project due to time and money constraints.

Publicly accessible information is stored in many locations and formats including libraries, State Archives and museums. However, nowhere is information as readily and quickly accessible as that which is displayed on the Internet. A web site is one of the most popular ways of displaying information on the Internet.

2.2.1 Surveying Technology

It is widely recognised that the use of the modern day total station with data recorder can be utilised to perform standard surveying tasks in a manner that is cost-effective and within the desired parameters of accuracy (Elfick et al 1995, p.xv).

Over the last 100 years there has been a constant but gradual improvement in the quality of surveying equipment. McCormac (1991, p.85) notes that within the past few decades the pace of improvement has quickened tremendously as the Electronic Distance Measuring (EDM) instruments and total stations have come of age. This new technology has revolutionised distance measurement and data collection. While the complexity of the equipment has increased most of the operations are now automated and require less skill than traditional instruments.

Elfick et al (1995, p.72) notes that the first EDM instrument was introduced in 1948, followed by a second in 1957. Called the *Tellurometer*, it was capable of measuring distances up to 80 km. The value of these early devices to the surveying profession was immediately apparent; however they were expensive and not readily portable.

The first generation of widely used EDM's were large, stand-alone models, whilst the second generation were smaller and commonly mounted on top of theodolites. In the current generation EDM's have been combined with electronic theodolites. The resulting devices, called Total Stations can simultaneously and automatically measure both distances and angles. When coupled with electronic data recorders they can record this information electronically, ready for direct transmission to computers and data processors.

M^{c}Cormac (1991, p.205) defines theodolites as instruments that are manufactured to determine horizontal and vertical angles and to prolong straight lines. They enable the user to make precise observations of horizontal and vertical angles. Theodolites have graduated glass circles (the horizontal and vertical circles) for angle measurements. The design of the electronic digital theodolite resembles the traditional theodolite, but they are able to automatically resolve angular values and display them in digital form.

Elfick et al (1995, p.144) notes that total station instruments combine three basic components – an EDM instrument, an electronic digital theodolite and a computer or microprocessor – into one integral unit. Total stations can automatically measure horizontal and vertical angles and slope distances from a single set-up. From this data they can instantaneously compute horizontal and vertical distance components, elevations and coordinates while having the capability to store this data.

The use to which a total station will be put in the course of this project – to record the features of historical significance within the Silverspur site, enabling a map of the mine site to be produced, orientated to the original mine lease boundaries – is an excellent example of one of its many uses. The map of the site must be related to cadastral boundaries to enable correct orientation. This means that a total station / data recorder combination is ideally suited to this application, coupling traditional surveying techniques with the processing and data storage capabilities of the total station.

2.2.2 The Internet and World Wide Web

In 1993 a computer program called the Mosaic browser transformed the Internet from an academic tool into a telecommunications revolution. The arrival of the Internet brought about an information revolution. Megabytes of data, on almost any topic imaginable, are now available at your fingertips.

Morgan (2001, p.5) notes that the origins of the Internet date back to the early 1960's when the US Department of Defence's Advanced Research Projects Agency (ARPA) developed a small network of computers called ARPANET. Krol (1994, p.13) agrees, stating that the Internet was born about 20 years ago, out of an effort to connect together a US Defence Department network called ARPANET and various other radio and satellite networks. Morgan (2001, p.5) continues by describing ARPANET as a high-speed digital post office, passing small packets of information from one computer to another. It allowed scientists to share data and access remote computers.

In 1973, according to Morgan (2001, p.5), ARPA started research on a project called internetting, which developed technologies to allow different networks to communicate with each other. However it took around 10 years for scientists to develop a common technology to be used on all computers on the network. Gillies and Cailliau (2000, p.7) observe that many different networks using many different protocols have been developed, and the Internet is the result of connecting them all together.

Morgan (2001, p.4) defines the Internet as the global network of computers that are all connected together. Gillies and Cailliau (2000, p.6) agree, describing the Internet as a collection of computer networks talking to each other using packet switching. All communication between computers on the Internet happens by cutting data up into small packets and sending them through a system of electronic routing stations to their destinations.

The World Wide Web (the Web) has become so successful that it has become synonymous with the Internet; but in reality the two are quite different. Gillies and Cailliau (2000, p.1) describe the World Wide Web as an encyclopaedia, telephone directory, record collection and Speakers' Corner all rolled into one, and accessible through any computer.

Gillies and Cailliau (2000, p.1) use the following comparison to make the distinction between the Internet and the Web: 'the Internet is like a network of electronic roads criss-crossing the planet… The Web is just one of the many services using that network and just happens to be the most popular'. Morgan (2001, p.4) makes the distinction by stating that if the Internet is made up of computers connected together then the World Wide Web is a collection of documents, sounds, videos, digital images and information of all sorts, all connected by HyperText Markup Language (HTML).

The Web exists because of programs that communicate between computers on the Internet. The Web could not exist without the Internet however; the Web makes the Internet useful.

2.3 Information Sources

Due to the everyday nature of the surveying involved with the project, a review of published material identifying previous work dealing with similar objectives or outcomes was not conducted. Instead reference books were reviewed to determine the best approach to the work involved with the project.

Similarly, the amount of material available pertaining to web site design is overwhelming. For this reason the research texts were limited to those readily available publications that specialised in web site design using Microsoft's FrontPage software.

2.3.1 Detail Survey Theory

M^{c}Cormac (1991, p.308) notes that as the use of computers has become more widespread, a new method of assembling and processing topographic data has been developed utilising the technology of the total station. The topographic data assembled in this manner forms what is known as a Digital Terrain Model or DTM. A DTM consists of a series of numerical values that represent the two coordinates of points in a horizontal grid or coordinate system and the corresponding elevation of each point. Elfick et al (1995, p.243) concurs, stating that the data collected is an array of points whose horizontal positions are given as 2 coordinates. Such three-dimensional arrays provide a digital, spatially correct representation of the relief and features of an area.

Elfick et al (1995, p.246) notes that the radiation method of data collection with a total station is an accurate and efficient use of resources. In the radiation method the total station is set up on each traverse station and the distance and horizontal and vertical bearings to the desired points and features measured and recorded.

Elfick et al (1995, p.173) notes that a traverse is a series of consecutive lines whose lengths and directions have been determined from field measurements, while traversing is the act of establishing traverse stations and making the necessary measurements. M^{c}Cormac (1991, p.220) agrees, describing a traverse as consisting of a series of successive straight lines that are connected together and, the process of measuring the lengths and directions of the sides of a traverse as traversing, the purpose of which is to determine the positions of certain points.

2.3.2 Cadastral Survey Theory

M^{c}Cormac (1991, p.394) observes that cadastral surveying is concerned with the location of property boundaries and the preparation of drawings that show these boundaries. Elfick et al (1995, p.365) mentions that the earliest surveys were made to locate or relocate boundary lines. M^{c}Cormac (1991, p.394) agrees, noting that the location of property boundaries began before recorded history, and for all of the subsequent ages it has been necessary for the surveyor to re-establish obliterated land boundaries, establish new boundaries and prepare boundary descriptions.

Much has been written about the principles of reinstatement. Reinstatement as noted by the Australian Consulting Surveyors (ACS) (1996, p.1-14) is a critical component of the work of cadastral surveyors that often presents interesting and challenging problems. Solutions to these problems cannot be set in stone as every component of the cadastre has a unique identity and variation.

Elfick et al (1995, p.365) also recognises the difficulty in retracing old lines, observing that the surveyor must exercise acute judgement based on education, practical experience and knowledge of land laws. Modern-day surveyors are confronted with a multitude of problems created over the past two centuries under differing technology and rules and regulations that now require professional solutions. Elfick et al (1995, p.365) continues by noting that these problems include defective compass and chain surveys; incompatible descriptions and plans of common lines for adjacent parcels; lost or obliterated corner and reference marks; questions on riparian rights; and legal decisions on cases involving property boundaries.

The ACS (1996, p.5-4) recognise that it would be impossible to give even a summary of how to perform actual rural reinstatements. Instead they provide a set of principles to be used for rural reinstatement.

These principles as laid out by the ACS (1996, p.5-5 – 5-11) include:

- a knowledge of the types of historical rural reference marks used in the past.
- gaining familiarity with the historical surveyors and their work in various districts.
- recognising the importance of occupation.
- having the knowledge to ‘Straighten a Fence Post’, and
- being able to ‘Make a Start’.

2.3.3 Web Design Reference Texts

A web page (Morgan 2001, p.5) is an Internet ‘document’ that can be accessed by Internet users with a HTML browser such as Microsoft Internet Explorer or Netscape Navigator. Web pages are written using HTML (HyperText Markup Language), a language that uses text and a defined set of commands (known as tags). The tags have two distinct functions. They either define the text display style or, make the text act as a link to another page. By providing the browser with a unique address, you can open the page pointed to by that address (Morgan 2001, p.5).

For reasons outlined in Chapter 5, *Web Development*, Microsoft’s FrontPage software has been chosen for the design of the web page. Three readily available texts specialising in FrontPage software design were used during the course of the project. While each manual’s objective is the same; i.e. to have the reader create a web site using FrontPage, each takes a different approach.

All books however, assume a basic level of knowledge relating to computers including:

- familiarity with the Windows Interface; and
- familiarity with the Internet.

“FrontPage 2002 – A Beginners Guide” by Chinnathambi (2001) aims to teach FrontPage by covering the basic skills, such as learning to interface through to the more complex skills such as saving form data to a database. The major features of FrontPage are covered in detail with step-by-step instructions enabling the reader to test their knowledge.

The content in “FrontPage 2002 – A Beginners Guide” is organised so that any module can be read and the topics understood, however the author recommends reading the entire book from beginning to end for a complete understanding of FrontPage. All the concepts and major features of FrontPage are divided into separate modules with Tips and Notes interspersed throughout. The Tips and Notes provide more detail or information when needed. Each module begins with several goals setting out what can hope to be achieved from that module.

“FrontPage 2002 – A Beginners Guide” consists of 16 modules spread over 4 sections. Section 1, ‘Planning and Creating a Site’, covers the basic commands. Tips are given relating to the design and structure of a web site. Section 2, ‘Designing and Publishing Web Pages’, covers the more advanced, essential features necessary to create an interesting web site. This, the largest section of the book, covers such topics as Inserting Images, Using Tables and Publishing a Web Site Online. Sections 3 and 4, ‘Making Your Site Interactive’ and ‘Doing More with FrontPage’ cover the advanced features of FrontPage and HTML programming language.

All features in “FrontPage 2002 – A Beginners Guide” are covered in detail, including step-by-step instructions. While helpful, this amount of information makes it difficult to find information quickly and working through the text a time-consuming process.

Dornfest's (2001) book "FrontPage for Dummies" concentrates on the practical information required to build a well designed, attractive and easy-to-navigate website. As the title suggests, the book is not aimed at experts, rather those who wish to get up to speed with FrontPage quickly and with a minimum of fuss.

"FrontPage 2002 for Dummies" is designed as a reference book enabling straightforward sourcing of information. It is divided into 6 sections. Section 2, 'Creating Envy-Inducing Web Pages', is the most relevant to the first-time user. Section 1 covered the basics while Sections 3 to 6 concentrated on the advanced features of FrontPage.

"FrontPage 2002 for Dummies" lives up to its promise: relevant information can be easily and quickly found, and once found the instructions are clear, concise and easy to follow. This gives the user the ability to access the information relevant to the task at hand without the need to search through irrelevant material.

"FrontPage 2002 in easy steps" by Price (2002) is basically a tutorial that takes the reader through the processes required to design a web site using FrontPage. While the first section briefly covers the Internet, computer requirements and the features of FrontPage, the remainder of the book is dedicated to the design of a web site. To gain full advantage from this book it is necessary to download a tutorial from the Microsoft web site. "FrontPage 2002 in easy steps" then proceeds to guide the reader through this tutorial, designing a web site from a text document.

"FrontPage 2002 in easy steps" is not designed as a reference book making specific information difficult to find. It instead takes a hands-on approach to teaching requiring the user to access the tutorial and work through the book from start to finish.

Due to the differing formats of each text factors such as personal preference, previous experience, design requirements, time frame etc. will determine which is the most suitable text for the task at hand. The end result, regardless of the text used should however be the same; i.e. a professional quality web site.

2.3.4 Historical Texts

The Silverspur mine commenced operation in 1892. Finally closing in 1926 the mine has seen only sporadic activity since. Geological Survey Reports and Queensland Government Mining Journals provided the bulk of the information regarding the mines operation until 1926. These reports, authored by Government geologists include maps, photos and a variety of information regarding the mine at the time of their visits. Providing a history of the mine from formation to the current day is the Texas Historical Society's booklet "Silverspur c1892 – c2002".

A comprehensive report by Ball (1904), Government Geologist assigned to the Texas – Stanthorpe district, on the Silverspur mine provided historical information including the circumstances surrounding the mines discovery and subsequent formation of the Silverspur Mining Company.

Ball (1904) gives valuable, in-depth descriptions of many facets of the mine and its operation, in particular:

- descriptions of the surface plant and its layout;
- detailed descriptions of the shafts; and
- detailed explanations of the treatment processes.

Ball (1904) provides an important insight into the mine's operation, layout and the processes used. Ball (1904) has broadened the scope of the geological report to include the more general features of the mine, enabling a mental picture of the mine at its peak to be created.

The next recorded visit to the mine was by the then Assistant Government Geologist, Saint-Smith in 1913 (Saint-Smith, 1913). The visit was to enable Saint-Smith to examine the mine and to offer advice as to the best direction in which to prospect for further ore bodies.

Saint-Smith (1913) only briefly touches on the history of the mine but does mention that the mine was starting to suffer due to its comparative isolation. Reference is made to the earlier report of Ball (1904), therefore Saint-Smith (1913) only covers the operations carried out subsequent to 1904.

Work carried out at the mine between 1904 and 1913 was conducted entirely below the 300 ft (91.4 m) level. Saint-Smith (1913) covers these operations in detail. No reference is made to any developments in the surface operations of the mine however a number of photographs are included (Saint-Smith, 1913: 467,468).

Saint-Smith (1913) concentrates on the geological aspects of the mine and as a result the report only yielded a few points of interest relevant to my research. An important point noted by Saint-Smith (1913) was that the company was already beginning to investigate alternative measures for survival, hoping the future lay in the immense heaps of metal bearing slag. This slag had been accumulating since the mine's inception and represented a splendid asset if it could be treated successfully.

Ball revisited the mine in 1918 (Ball, 1918) to inspect the mine and advise the management as to future prospecting. Ball (1918) describes the main developments of the mine from inception to 1918 enabling a chronological listing of the mine's development to be produced. Developments catalogued by Ball (1918) included:

- updates of the surface plant and crushers;
- details of the underground operations; and
- the levels of output.

Mention is also made by Ball (1918) of the possibility of the Company retreating the slags. Realising the effect the mine's isolation has on these future plans some space is given to exploring the likelihood of a railway being constructed from Inglewood to Texas and onto Silverspur. Developments in both the survey of the rail line and the passing of a Bill in Parliament authorising construction of the rail line are mentioned by Ball (1918).

The report by Ball (1918) concentrates mainly on the geology of the region but still proves to be an important record of the development of the mine. From this report one is able to plot the growth of the mine to its peak in 1908, and then the subsequent decline until 1916 when the Company sought to reconstruct due to financial difficulties.

In 1971 the Mount Carrington Mine Limited dewatered the underground workings and applied to the Department of Mines for assistance. The visiting geologists report (Kay, 1975), while mainly dedicated to the results of the drilling programme contained numerous pieces of information of benefit to my research.

Kay (1975) concentrates the historical component of his report on the mines decline and the reasons leading to its closure and is the only author to mention the possibility of the mine having closed in 1914 due to the war.

Of particular interest to my research was the inclusion by Kay (1975) of a production table, which although incomplete still provided figures for the material yielded from 1892 to 1969. Kay (1975) also included a map of the mine site showing the location of the shafts and some of the remaining features of the mine. As outlined in Chapter 3 this map was used to determine the basic layout of the site and to develop an approach to mapping the mine.

Perhaps the most significant source of information detailing the history of the mine is the booklet produced by the Texas Historical Society and compiled by Colleen Glasser. The booklet was compiled from interviews, personal recollections, newspapers, journals, magazines and photographs collected by members of the Texas Historical Society over the last 30 years.

Entitled “Silverspur c1890 – c2002”, the booklet documents the history of the township of Silverspur. However, because of the village's intrinsic relationship with the mine there is an entire chapter devoted to the history of the mine, including the period from 1950 to 2002.

Considerable time and effort, no doubt all of the volunteer variety, has been put into this booklet. Interspersing anecdotes from original mine workers and village residents throughout the text has ensured the preservation of many of the stories surrounding this period of mining history in South-East Queensland.

2.4 Summary

The purpose of this chapter was to give an insight into the background of, and basic theory behind modern surveying equipment and the Internet. The evolution of surveying equipment and capabilities was explored as well as the information revolution now widely known as the Internet.

Section 2.3 *Information Sources* reviews material pertaining to the use of modern surveying equipment in order to determine the best approach to the work involved with the project. This research indicates that the radiation method of data collection is ideally suited to this task. The section continues by reviewing three readily available publications specialising in FrontPage software design. The publications are reviewed according to the layout of the book, the ease with which specific information can be found and the helpfulness of the book in relation to this project.

Finally, the historical texts used to compile the historical section of the web site are reviewed. These texts are reviewed in relation to their extent, scope and relevance to the research.

Chapter 3.

Data Acquisition Methodology

3.1 Introduction

In order to satisfy the objectives of this project it was necessary to create a web site that would preserve the historical aspects of the Silverspur mine. Essentially this required the creation of a plan detailing the historical layout of the mine, integrated onto a web site with the necessary historical information.

The main components of this project were separated into two elements: those being related to activities conducted in the field; and those conducted in an office environment. As with any particular project there were a number of ways that certain elements of the project could have been conducted. The purpose of this chapter is to discuss why the chosen methods were decided upon, and to detail how they were employed.

3.2 Pre-Field Organisation

There were certain tasks that had to be completed prior to commencement of the field component at the Silverspur mine. These tasks, outlined in the following sections, related primarily to gathering the relevant historical information, cadastral search information and the associated planning of the field procedures.

3.2.1 Identification of Relevant Features for Inclusion

Prior to venturing into the field it was necessary to determine exactly what was to be located. Basic spatial details of the site were identified as being necessary to include, as were features of historical significance.

Inclusion of the historically important features was integral with the objectives of the project. Features to be included were determined after researching the history of the mine and were deemed to include:

- the mine shafts;
- the headgear;
- the roast heaps;
- the remaining rail lines; and
- the mill site.

3.2.2 Historical Information Acquisition

An integral component of the project was the collection of historical information relating to Silverspur for inclusion on the web site. A number of Geological Survey Reports and Queensland Government Mining Journals were obtained from the Department of Natural Resources, Mines and Energy (DNRM & E) library while the booklet *'Silverspur c1890 – c2002'* was obtained from the Texas Historical Society.

The journals and survey reports contained a wealth of information on all aspects of the mine necessitating a decision to be made regarding which information was to be included. Therefore to assist in the compilation of the history the research was divided into two separate but complimentary areas: the history of settlement in the Texas region and, the history of the mine. The mine history was separated further with the research concentrating on the following areas:

- operational history;
- the shafts; and
- surface operations.

Geological information was not included due to its complexity.

3.2.3 Development of Data Acquisition Routine

As outlined in Section 3.2.1 detailed research into the history of the mine was carried out in order to identify features of historical significance. Through a combination of old photographs and the historical texts, approximate locations of the mines features were determined. These locations were then plotted roughly on to the plane table survey included in the 1975 report of Kay.

At this stage it was decided that an initial visit to the mine site was required prior to formalising the data collection procedure. Once on site, and using the knowledge gained from the historical research I was able to:

- confirm the layout of the mine;
- determine exactly what features were remaining;
- determine the state of these remaining features;
- determine the approximate locations of missing features; and
- obtain photographs for inclusion in the web site.

Identification of the locations of absent features i.e. smelters and boilers, was aided by the old photographs and remaining physical features. These physical features included old concrete slabs, lines of bricks from collapsed chimneys and remnants of the internal rail system. These historical features are no longer identifiable or are missing completely, due to a number of reasons including decay, weathering or having suffered at the hands of looters and souvenir hunters. An approximate field sketch of the site was completed while at the mine showing locations of both the remaining and absent features.

Combining the field sketch with Kay's plane table survey enabled an approximate traverse to be marked out. The traverse was designed to allow collection of all relevant data with the minimum number of traverse stations. At this stage the need for a permanent baseline was recognised and its position also determined. The baseline was required to enable the traverse to be 'swung' at the completion of the cadastral component. The field sketch can be found in Appendix B.

3.2.4 Cadastral Information Acquisition

To orientate the mine plan it was intended to tie into the boundaries of one of the mine leases that had been placed over the mine. A Basic Land Information Map (BLIN) was obtained form the DNRM & E along with a list of surveys done in the area. From this information the following plans were purchased:

- S 5181 – This is the original plan of allotments for Silverspur Township done in 1901. Some of these allotments are on the northern side of the Stanthorpe – Texas Road from the mine site, and others to the east.
- MPH 14454 – This plan subdivides the portions surrounding the mine and was completed in 1934.
- IS 119550 – This is an identification survey from 1984 of all the allotments subdivided on S5181. This plan also connects into two corners of M.L. 312. See Appendix C.
- IS 119592 – This is an identification survey from 1995 re-marking a number of the allotments from S5181.
- SP 139705 – This is a survey plan subdividing land to the north of the mine.

In addition to the above plans copies of M.L. 54 and M.L. 312 were also purchased. M.L. 54 was the original lease over the mine and M.L. 312 the lease taken out by Mt. Carrington Mines in 1971.

From studying the assembled information it was determined to try and tie into the boundaries of M.L. 312 using IS 119550 as the datum plan. A copy of IS 119550 can be found in Appendix C. This would involve reinstating the boundaries of the allotments fronting the northern side of the Stanthorpe – Texas Road. Time constraints would prevent a more detailed survey; however after consultation with my supervising surveyor it was considered that this would provide an adequate basis for the orientation of the mine plan.

3.2.5 Equipment Organisation

The spatial locations of the historical features of the mine were to be located by total station and data recorder following a basic traverse network as determined in Section 3.2.3. As such, arrangements were made to obtain a Geodimeter System 600 total station with onboard data recorder, Geodimeter prism sets and tripods for both the detail and cadastral components of the fieldwork.

3.3 Field Component

The field component associated with the production of the site plan involved two phases: the collection and recording of the desired information (the detail survey), and the survey work required to provide a datum for the plan (the cadastral component). The various methodologies by which these two phases were carried out are outlined in the following sections.

3.3.1 Preparation and Equipment

The equipment used for both the data collection and cadastral phases of the project was in good repair and recently calibrated when the survey was carried out. The equipment used consisted of a Geodimeter System 600 Robotic total station with on-board data recorder, Geodimeter prism sets and surveying tripods.

All surveying equipment, consumables and necessary safety gear were provided courtesy of John Dee & Associates Pty Ltd, a Brisbane based surveying company.

3.3.2 Detail Survey Component

Following the initial site visit, and as outlined in Section 3.2.2 a field sketch (see Appendix B) showing the preliminary locations of a traverse around the mine site was produced. The traverse was designed to enable collection of all relevant data with the minimum number of set-ups. A permanent baseline was also incorporated into the traverse.

Once in the field the initial task was therefore to establish the baseline stations. These stations consisted of a dumpy peg placed within the fenced compound-surrounding shaft No.4 and a Hilti nail placed in the concrete footings of the headgear. The durability of these two stations was deemed to be suitable for the duration of this project.

Using the field sketch as a guide, the five traverse stations were determined. The stations were simply marked by dumpy pegs, these being considered adequate as the stations were occupied only the once. The locations of the stations were chosen from the approximate positions marked in the field sketch with the final position chosen on the basis of the following factors:

- its inter-visibility between the backsight station and approximate foresight location; and
- the amount of information that could be collected from the location.

As a result a number of the stations ended up in elevated positions atop spoil heaps or slag dumps. (See Figure 3.1) The necessary safety precautions were observed during occupation of these stations.

Figure 3.1 Traverse Station, Silverspur Mine.

Due to the layout of the site, time constraints and the desire to keep the number of traverse stations to a minimum, the baseline stations were not occupied traverse stations. They were instead radiated to from traverse stations No.s 1 & 3 (see Appendix D for a copy of the Field Notes), with a check distance measured between the two baseline stations at the completion of the traverse. This check distance was within ±0.001 m of the calculated distance. The baseline, as calculated from the traverse radiations was therefore accepted.

The traverse was at this stage, conducted on a purely arbitrary datum, the intention being to swing the traverse by means of the baseline at the completion of the cadastral component. An arbitrary backsight was therefore set to a baseline station (Station No.2 in the field notes) and a foresight read to the second traverse station (Station No.3). The forward bearings were read in both Face Left and Face Right configuration, checked against each other, and the average taken as the forward bearing. The distance to the forward station was also read a number of times and automatically averaged by the instrument. This procedure was also followed for the connection to the second baseline station, resulting in the accurate projection of the baseline.

At the completion of reading the forward bearing and distance, and before moving to the foresight station, the information identified during the initial site visit (refer Section 3.2.2) was collected. The Geodimeter 600 is a robotic, servo driven total station enabling full operation of the instrument from the prism pole. The full robotic mode was however, not utilised for this survey as the safe traverse of the terrain required the full concentration of the person holding the prism. Instead, the instrument was operated in Autolock mode. Set in this mode, and using a Geodimeter 360º tracking prism, the instrument will continuously track the prism, enabling the instrument operator to concentrate fully on the task of data entry. The data entered for the purposes of this project consisted of:

- Point number, automatically incremented by the instrument;
- Code or descriptor of feature being located; and
- Prism height.

Communication between the two parties was assisted by the use of hand-held radios reducing the likelihood of communication problems. The person with the prism would therefore communicate via radio the code and prism height for each point to the instrument operator. A simple series of codes was used to identify the relevant features. Regular checks of the backsight during station occupation enabled a check to be maintained on the accuracy of the data being collected.

Using the above approach, both the spatially relevant features and historical features of the mine were accurately located and identified by radiation from each of the control traverse stations. Field time was minimised by combining the detail survey with the control traverse.

While at the site a more comprehensive field sketch was completed to assist with data reduction and site plan development. (See Appendix E).

3.3.3 Cadastral Survey Component

It was intended that the cadastral component of the fieldwork would follow IS 119550. Staying on the northern side of the Stanthorpe – Texas Road the plan was to tie into sufficient marks to enable the Original Survey Posts (OSPs) at the north-eastern and south-eastern corners of M.L. 312 to be found and connected to. This side boundary of M.L. 312 would act as a datum for the mine plan. It was also necessary to connect to the baseline placed during the control traverse around the mine.

Widening of the Stanthorpe – Texas Road made initial identification of the location of the Lots 101 to 111 difficult. The two Original Pegs (Ops) on the eastern boundary of Lot 111 were eventually found allowing a rough datum to be calculated. Using this rough datum the two Original Iron Pins (OIPs) at these corners were also found and a more substantial datum calculated. This datum was then used for the remainder of the field component. Traversing west along the Stanthorpe – Texas Road it was discovered that road widening had removed the OIP located at the bend in Lot 102, however the OIP on the south-western corner of Lot 101 was found.

From the connection to this OIP a connection to the OSP at the south-eastern corner of M.L. 312 was calculated and subsequently found (see Figure 3.2).

Figure 3.2 OSP at the south-eastern corner of M.L. 312.

The OP and OIP at the north-western corner of Lot 101 were also found and connected to. The traverse was continued along the Stanthorpe – Texas Road to the south-western corner of Portion 47, before continuing north to connect to the OIPs on the western boundary of Portion 47.

From this traverse station the OSP at the north-eastern corner of M.L. 312 was calculated, subsequently found and then connected to. Any relevant occupation and original marks were also connected to during the course of the survey. The traverse was then extended to connect to the two baseline stations placed in the mine site (Refer Section 3.3.2).

The fieldwork was carried out using a combination of traditional traverse techniques and with the instrument in full-robotic mode. Once a datum had been calculated the next marks to be located were identified and computed. The instrument was then placed in full-robotic mode to search for the marks. Marks such as Ops or Fence Posts were connected to using the remote prism however the OIPs and OSPs were connected to by reading two faces to a prism set over the relevant mark. Combining these two techniques enabled the fieldwork to be completed by one person in a minimum amount of time.

3.4 Summary

The work described in this section forms an important step in the procedure and is vital to the successful completion of the project. The acquisition of historical and cadastral information is fundamental in the planning of an efficient approach to the problem of data collection. For this reason it must be done prior to the fieldwork. The accurate and efficient collection of field data and orientation of the plan was important, as was the manner in which the data was recorded. The next step, information processing, is considered in detail in the next chapter.

Chapter 4.

Information Processing

4.1 Introduction

The majority of the office tasks involved in the successful completion of this project were associated with the creation of the site plan and the design of the web site. The web site design will be covered in Chapter 5 while this chapter will concentrate on those tasks contingent upon the successful creation of the site plan. These tasks include the reduction of the field traverse, the downloading and processing of the stadia data and the re-instatement calculations necessary to orientate the site plan. The purpose of this chapter is to illustrate how the above tasks were completed.

4.2 Preparation and Equipment

All the hardware, software and peripherals used in this section of the project were supplied by John Dee & Associates Pty Ltd. Hardware consisted of a HP48 calculator, desktop computer and the associated plotters and printers. The software used to complete this project included Microsoft FrontPage, Microsoft Word, Foresight CDS Premium, AutoCAD LT 2002 and Geodimeter Software Tools. Foresight CDS Premium is a software package specifically aimed at the survey and civil professions being capable of data viewing, editing and conversion. The Geodimeter Software Tools package is required to download data from the Geodimeter data recorders.

4.3 Data Reduction

Upon completion of the field activities the first task to be undertaken was the reduction of the raw data. This data included the control traverse for the detail survey, the detail stadia file and the cadastral reinstatement information.

4.3.1 Cadastral Data

The reinstatement calculations necessary to determine the swing for the control traverse began by sketching the lot boundaries and reference marks located in the field. The field traverse and radiations to survey marks were then added to this sketch. All calculations were now based on this sketch.

The field datum was calculated from readings taken to two OIPs approximately 50 metres apart. Checks between marks further apart resulted in an adjustment of +0º00’33” being applied to the field bearings. This datum was then held for the remainder of the reinstatement.

The reinstatement calculations proceeded in a straightforward fashion. No major differences were noted between my work and that of IS 119550. An identification sketch prepared using Foresight and AutoCAD is attached as Appendix F. The sketch and survey were completed in accordance with the *Surveyors Act 2003* and the *Survey and Mapping Infrastructure Act 2003* and under the guidance of my supervising surveyor Mr. John Dee.

Once the reinstatement was complete an adjustment was calculated for the baseline. Comparing this baseline bearing to the one calculated during the control traverse would enable a swing to be calculated and the control traverse adjusted accordingly. The baseline as calculated from the control traverse read 129º37’42” for 52.943m as opposed to 130º50’31” for 52.943m calculated from the cadastral data. The agreement in distance confirms the accuracy of the baseline while the calculated adjustment of +1º12’49” could now be applied to the control traverse.

4.3.2 Control Traverse Data Reduction

Prior to downloading the stadia file from the data recorder, the control traverse was reduced. As the control traverse had been booked manually, all data reduction calculations were carried out using a HP48 calculator and Quickclose software.

The traverse was analysed to determine the misclose error. A misclose of approximately 0.002 m (or 1:206 000) was identified after closing the traverse back to the start point. It was felt it was unnecessary to apply any adjustment to the traverse as this misclose was determined to be sufficiently accurate for the purposes of this project.

Having confirmed the accuracy of the traverse, it was time to compute the bearing and distance between the two baseline stations. This value was compared with that calculated in Section 4.3.1 so a swing could be computed for the control traverse. As noted in Section 3.2.2 the baseline stations were not part of the traverse, instead their positions were determined from traverse stations No.s 1 and 3. The similarity in the distance between the baseline stations as calculated during the cadastral component and the control survey gives confirmation as to their accuracy. A swing of + 1º12’49” was calculated and applied to the control traverse.

Once the swing had been applied to the control traverse bearings a set of coordinates were calculated for each traverse station. Assigning the arbitrary values of 1000.000 (Easting) and 1000.000 (Northing) to traverse station No.1, the coordinates for the remaining stations were calculated using the Quickclose program.

4.3.3 Stadia Data Reduction

The data was downloaded from the Geodimeter data recorder via the Geodimeter Software Tools package in a raw format. After initialising a new job in Foresight CDS Premium, this raw data file was opened and displayed as an electronic data file prior to storing the data in the database.

The stadia file consists of a series of columns representing point number, horizontal angle, vertical angle, slope distance and code. Inserting the previously calculated control station coordinates at the start of the stadia file forces Foresight to adopt these coordinates for the control stations throughout the stadia file. Assigning the same point numbers to both the control traverse stations and the detail stations ensures this process is straightforward. It also ensures that the detail stations are 'held' at the same coordinates as the traverse stations, ensuring the accuracy of the detail survey.

At the completion of this process a quick visual check of the stadia file was done to check for any obvious coding or numbering errors. Once satisfied as to the validity of the data, the information was processed and stored in the database by the means of an automatic process within the Foresight software.

At this stage the data is displayed in a 2-D plan format as a series of spatially related points. Each point has a number of attributes assigned to it being a point number, code and vertical height. In the case of this project there was no intention to apply contours to the site plan so the vertical heights were ignored. Accurate contouring requires a lot of extra fieldwork to ensure the correct representation of banks, gullies etc. through the use of breaklines. In keeping with the philosophy of the project it was decided at an early stage not to contour the site plan, therefore keeping the fieldwork component to a minimum.

Some minor editing of the data was required at this stage for example, adding in the fourth corner of a shed that was not able to be located in the field. Points belonging to the same feature i.e. a shed or shaft opening were then joined using the Strings function. This function draws a line or 'string' between the nominated points so an outline of the feature is displayed and stored in the database. Foresight has the option of a code library that allows the process to be completed automatically, however this function was not utilised during the course of this project. This was due to the unfamiliarity of the other field party member with the unique code set that must be used with this feature.

Once the basic data editing and stringing steps are completed the data is ready to be exported from Foresight. The data is exported in a .dwg format ready for direct insertion into AutoCAD and further editing.

4.4 Site Plan Development

Once the data was in a .dwg format the next stage in the development of the site plan was to use AutoCAD to further edit the data to produce a site plan ready for insertion into the web site.

The data exported from Foresight consisted solely of that located during the field survey. As noted in Section 3.3.2 a comprehensive field sketch (See Appendix E) was completed while at the mine site. This field sketch was then used as a guide in the preparation of the final plan.

Information on the field sketch that was relevant to the site plan included:

- descriptions of the features;
- areas of trees, slag heaps etc.; and
- the outlines of some features that were not able to be fully located in the field.

This information was combined with the survey data to produce a site plan to scale, showing the mine layout with the relevant historical and spatial features identified and located. Finally a title block, scale bar and north point were added to complete the plan. A copy of the completed plan can be found in Appendix G.

At the completion of the editing stage the plan had to be converted to a format that would allow it to be published in a legible form on the web site. Within the printer options AutoCAD offers a 'Publish to Web' selection. This procedure writes a JPEG file that can be imported into the web site as a picture. Unfortunately the resulting image was unclear and the text illegible.

It was found by using the Acrobat PDF Writer option the plan could be converted into a PDF format. When viewed using Adobe Acrobat the resulting image is clear and legible. FrontPage is unable to open and display PDF images as it can JPEGs, but a hyperlink can be used to open a PDF file. Clicking on the hyperlink will open the image using Adobe Acrobat. This has the advantage of giving the visitor a clear image that they can zoom, scroll or print as they can with any other PDF file in Acrobat.

The disadvantage of course is the requirement for Adobe Acrobat to view the site plan. Being unable to find any other suitable way to display the site plan, and considering the availability of the Acrobat software combined with the above advantages of viewing the image with Acrobat, I felt it unnecessary to persevere with trying to make the JPEG image legible.

4.5 Summary

One of the key aspects of this project was the compilation of a site plan. It was envisaged that this plan would detail the layout of the original mine, as determined from the remaining features and historical research. This chapter has detailed the methods used to create the site plan from the raw field data and to produce a plan in a format that is legible and compatible for viewing on the web site. Chapter 5 will now cover in detail the creation of the web site.

Chapter 5.

Web Site Development

5.1 Introduction

Prior to commencing any work with the web design it was determined that the software package chosen as the basis of the web site would need to satisfy certain key criteria. These criteria reflect the philosophy of the project, i.e. the design of a simple and economical method of capturing, recording and displaying historical mine data. Therefore to be considered suitable the software had to be:

- Windows based;
- readily available;
- user friendly; and
- be supported by a ready source of technical literature.

From the large number of web design software packages commercially available Microsofts’ FrontPage was chosen for this project. The purpose of this chapter is to outline the reasons for choosing Microsoft FrontPage as the software package with which to create the web site, and to outline the steps taken in the creation of the site.

5.2 Microsoft FrontPage Software

Research into the available software packages showed that most satisfied the criteria listed in Section 5.1. However the fact that FrontPage is included as a component of the Microsoft Office XP Professional Edition and hence already a part of most peoples software inventory, was enough to convince me that it would form a suitable basis for this project. The version used for the duration of this project was FrontPage 2002.

Further advantages in favour of FrontPage 2002 include:

- FrontPage 2002 is a software package that allows both website creation and website management.
- Because FrontPage 2002 was designed as part of the Office XP package all procedures and processes are familiar.
- Once the website is created FrontPage 2002 enables the site to be maintained, monitored and updated.
- FrontPage 2002 offers pixel-precise positioning and layering that enables absolute and relative positioning of page elements including graphics and text.
- The pre-designed themes provide ready-made settings for a consistent look across each page and the web site.
- Data can be integrated directly into FrontPage 2002 from all other Office applications, and
- FrontPage 2002 allows the user to preselect the type and version of browser and web server to display the web site.

5.2.1 Hardware Requirements

To gain full advantage from the FrontPage software it is recommended that the following components be used:

- A Personal Computer with a Pentium III processor or equivalent;
- Windows 98 or a later Windows version;
- 128 MB (max) memory for the Windows application;
- 165 MB hard disk space with 115 MB on the hard disk where the operating system is installed;
- A CD-ROM;
- VGA display adapter; and
- A Microsoft Mouse or compatible pointing device.

John Dee and Associates Pty Ltd provided the computer hardware and software used throughout the project.

5.3 Web Site Creation

There are a number of stages involved in the creation of a web site. Depending on the complexity of the proposed site and individual requirements, the exact processes will vary. What follows is a description of the steps taken in the design and creation of the web site for the Silverspur mine.

5.3.1 Defining the Requirements

The first and possibly most important step in the process of web site creation is to decide exactly what the intended purpose of the site is. Without this knowledge it is difficult to achieve a good balance between the information included on the site and the site's overall design.

The purpose of the Silverspur web site can be summarised in the following dot points:

- It is to be a source of information for people interested in the mine; and
- It is to act as a record of the mine's history.

With these objectives in mind, the following ground rules were adhered to:

- the site navigation was to be kept simple and straightforward;
- the font types, font colours and font sizes were chosen so as not to overwhelm visitors but rather to make reading as easy as possible;
- the colour scheme was to enhance the message rather than distracting site visitors;
- the layout was to be simple and avoid cluttering; and
- the Home Page, being the primary entry point to the site, was to be designed to give visitors a sense of the site without having to scroll excessively.

5.3.2 Designing the Web Site

A web site consists of a Home Page plus the associated web pages, graphics, documents, multi-media and other files that it references. As the web site is constructed the separate web pages are created and then strung together using hyperlinks. Hyperlinks are highlighted words and pictures inside the page that visitors can click on, switching them to a different location, page or web site.

The web site is stored in a folder or directory and there can be other folders nested within the main folder. The Home Page is normally the main folder and is also known as the root or parent directory. There are no limits on the number of sub-folders, however the simpler the layout the better. As can be seen in Figure 5.1 I have kept the Silverspur website layout very simple.

Referring to Figure 5.1 it can be seen the layout consists of the Home Page as the parent directory, with the first sub-directory consisting of the main web pages. These are the History page, the Mine page, the Mine Plan page, a Photo Gallery, a Safety page and a Feedback page.

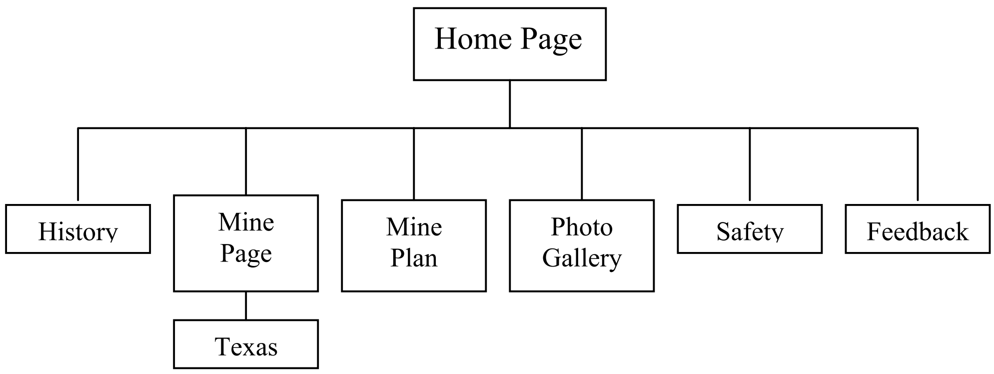

Figure 5.1 Layout of the Silverspur Web Site

A second directory is attached to the Mine page and contains information on the Texas region. This layout keeps the navigation simple while still satisfying the requirements listed in Section 5.3.1.

FrontPage offers a number of templates, which lay the groundwork for a web site. Choices include:

- a customer support based web site template;
- a personal web site template;
- a project orientated web site template;
- a one-page web site template; and
- an empty web site template.

The Silverspur web site was created using the personal web site template. This template is designed to form the basis of a personal web site but it suited the purposes of this project because it featured a simple navigational layout, a photo collection page and a Home Page. The template already contained text, hyperlinks and graphics that were rearranged to suit the purposes of this project.

5.3.3 Creating the Components

As mentioned in Section 5.3.2, a template containing text, hyperlinks and graphics was used to create the web site. The purpose of this section is to describe how this template, and others were adapted to suit the needs of this project.

Web site creation begins with the Home Page, the most important page on a web site. Not only is it the default page, but it is also the first page visitors see and it contains links to the other pages. Because it is the default page, items such as background colour, text styles and page headings for the entire web site are defined here.

Similar to the web design templates FrontPage offers a variety of themes consisting of different sets of design elements and colour schemes that can be applied to the pages to give them a consistent and attractive appearance. The themes offer a quick and easy way of adding interest to the pages and give them a professional look.

The template *'Artsy'* was chosen as the base template for the page layout and modified to reflect the intended purpose of the site. Applying the template to the Home Page, which is also the default page, enabled the overall appearance of the site to be managed from the one page. Changing the templates background colour, text styles and banner layout produced a layout that was easy to read and informative.

The Banner was modified to include a photo of the mine, the title of the web site and Hyperlinks to the pages in the sub-directory. The background colour and text styles were modified so as to create an easy-to-read style.

The Home Page (See Appendix H.1) is set up to introduce visitors to the site and to give them a sense of what the site is about without excessive scrolling. It includes a short introductory section explaining the purpose of the website and project, a photo of the mine and an information section at the bottom of the page. The information section includes a short section on the history of the mine, a section detailing the latest news concerning the status of the mine and a brief section on Macmin Silver including a link to the company's web site.

The History page (See Appendix H.2) describes the history of the Silverspur mine and was compiled from a combination of Mine Wardens reports and the Texas Historical Society's publication *'Silverspur c1890 – c2002'*. To break up this large body of text the history section is divided into the following segments:

- Early History: This section briefly covers the early history of the Texas region prior to the opening of the mine. This information was included to provide some background to the mine history that follows.
- Silverspur – Discovery: In addition to detailing the discovery of the mine, this section also includes information on the first lease on the mine and covers the mine's operations until 1894.
- Silverspur 1894 – 1917: This large section describes the most productive period in the mines history. It details, in chronological order, the major events at the mine during this period.
- Silverspur 1917 – 1950: This section covers the decline of the mine and subsequent closure.
- Silverspur 1950 – present: Since 1950 the mine has seen sporadic attempts at reworking as outlined in this section. Information is also included on Macmin's current efforts.

The Mine page (See Appendix H.3) describes the mine layout, mining processes used at the mine and the mine workings. To make the information more manageable it is divided into the following sections:

- The Mine: This is a brief history of the mine that provides a short introduction without repeating too much of what is mentioned on the History page.
- The Geology: Another short section explaining that the geology of the mine is only touched on briefly within the site.
- The Shafts: This section includes detailed descriptions of the dimensions, levels and history of the six shafts sunk at the mine.
- The Mine Layout: A description of the surface layout of the mine.
- Treatment Processes: A brief description of how the raw materials were treated at the mine.
- Roasting: A detailed description of the roasting processes used at he mine to remove the ore from the raw material.
- Reverberatory Furnace: Included in this section are detailed descriptions of the two furnaces used for refining including dimensions and layout.
- Pyritic Smelter: A section detailing the pyritic smelter that was built at the mine but never used.
- Rock Crusher: A short section on the rock crushers used in the treatment process.

Hyperlinks at the top of the page direct the reader to the relevant sections. Likewise Hyperlinks at the end of each section redirect the reader back to the top of the page. Further Hyperlinks throughout the text redirect the reader to photos of the relevant objects.

The Mine Plan page (See Appendix H.4) contains the mine layout plan produced in Section 4.4. As mentioned in Section 4.4 the best results were obtained by converting the AutoCAD image to a PDF formatted image. This was then imported into the website. When FrontPage creates a web site, a directory is created that contains a series of folders. These folders include folders for I*mages*, *Home Page* files and *Index* files. The index folder contains the web pages and photo thumbnails while the images folder contains any graphics that are to be displayed on the web site.

To display the mine plan it was necessary to import the PDF file into the images folder of the web site and then create a Hyperlink on the Mine Plan page to this file. Activation of the Hyperlink opens the mine plan in Adobe Acrobat resulting in a clear image that can be zoomed, scrolled or printed, as with any other PDF file in Adobe Acrobat. Also included on the page is a short description of how the plan was produced and the methods used.

The photo gallery page (See Appendix H.5) was set up using the photo page that was part of the Personal Web Site template used to create the site. With this template FrontPage enables images to be displayed in a thumbnail format with a Hyperlink to the full-sized image. A thumbnail is a small version of a photograph or graphic. Thumbnails are used because small pictures take less time to load than the full image, therefore reducing the sites overall load time. Visitors are then able to click on the images they want to see in a full-size format without having to wait for all the images to load.

The photos were taken using a standard SLR style camera on print film. When the film was processed the resulting images were burnt onto a CD in a JPEG format. The required photographs were then copied into the web site *Images* folder and placed into the Photo Gallery using the Picture editor.

The photos were divided into the following four groups according to subject:

- Shafts;
- Head Gear;
- Mine Equipment; and
- The Internal Rail System.

All thumbnails are Hyperlinked to their full image. Captions are included on the Photo Gallery page above each thumbnail. The number of photos was kept to minimum while still trying to give a feel for the mine site, so as not to slow down the loading of the site excessively.

The Safety page (See Appendix H.6) is included to highlight the risks associated with a visit to the Silverspur site. Potential hazards are listed and tips given on how to minimise these risks. Emergency contact numbers for the region are also included.

Included, as a sub-page to the Mine page, is a page describing Texas and the surrounding region (See Appendix H.7). Attractions, highlights and features of the region are described. This page is accessed via Hyperlinks (on the word Texas) on the Home Page, the Safety Page and from the Mine page.

Finally a Feedback page (See Appendix H.8) was created to allow visitors to the site to leave their comments and/or thoughts. The page was set-up using a feature called a *form.* A form is a collection of text boxes that allow users to submit information by typing their messages into the relevant text boxes. Activation of the Submit button will send this data to a pre-defined location; in this case my personal e-mail address.

5.3.4 Publishing the Web Site

At the completion of the web site the next step was to publish the web site so it could be displayed and accessed on the Internet. To publish to the Internet it is necessary to have an Internet Service Provider (ISP), the web server location and a user name and password. Publishing or uploading, involves copying all the files and folders incorporated with the web site to the desired web server.

The ISP chosen was fastmail, a Melbourne based company. They were chosen for no other reason than the fact that I already have an email account with them, making the publication of the web site a straightforward and relatively cheap affair. Publishing proved to be a straightforward task completed by simply following the instructions provided by the ISP.

5.4 Summary

Chapter 5 began by outlining the logic behind the decision to choose FrontPage as the web design software. It should be stressed that FrontPage is one of dozens of commercially available web design software packages and, that the purpose of this project was not to prove the worthiness of one over the other. Rather, as demonstrated in this chapter, the purpose of the project was to show that by using an off-the-shelf software package it was possible to create a web site of a professional standard.

The creation of a successful web site requires a careful and thoughtful approach to design and layout. There is an endless combination of factors that contribute to the design of a successful web site, but what is hoped to be achieved is a pleasing balance between the information included on the web site and the overall design.

Chapter 6.

Analysis and Discussion

6.1 Introduction

The aim of this project was to investigate the possibility of combining modern surveying practices and the Internet in the preservation of a culturally significant site, such as an abandoned mine. A procedure was developed and in order to evaluate its worth a mine site was chosen, surveyed and the data displayed on a web site. This chapter evaluates the procedures, techniques and results of this work in relation to the aims of the project, before discussing future developments and applications.

6.2 Discussion

A procedure was developed whereby the work was completed in a series of logical steps. Proceeding in this manner the aims of the project were realised in a timely and efficient manner. The procedure consisted of the following steps:

1. Historical Research;
2. Site Inspection;
3. Development of Survey Routine;
4. Fieldwork component;
5. Office work component;
6. Creation of web site; and
7. Publication of the web site.

The historical research component was the logical starting point. Historical texts and documents can be found in a number of places including archives, libraries and the relevant government departments. In this instance the DNRM & E Mines library proved to have a wealth of information. Local historical societies and community members were also a source of information.

Obviously the amount of historical detail to be displayed on the web site will be the determining factor in relation to time spent on historical research. A balance needs to be achieved between the amount of information displayed and the time spent researching. In the case of the Silverspur mine it was decided not to include geological information due to its complexity. For this reason a company or organisation following this procedure may want to involve several people, each knowledgeable in a different area, to be involved in the research. Their efforts can then be combined on the website as a complete history of the site in question.

The knowledge gained during research will highlight the historical features of the mine enabling a mental picture of the mine in its heyday to be formed. Putting this mental image on paper prior to the site visit will greatly assist in the formation of a plan for the fieldwork component.

Factors such as the information gained during the historical research and the state and location of the site will all influence the field component. For example a large and extensive site with many remains may involve several days of work whereas a relatively small, bare site such as the Silverspur site may only involve only a day or two of work. Any historical site will contain a number of remaining, recognisable features and a number of features of which there is very little if anything, remaining. Regardless of size or remains, the aim is however the same: to capture enough information to enable an original site layout to be produced.

The methods chosen to complete this fieldwork component will obviously vary depending on the surveyor and the equipment used. This project showed the use of the total station / data recorder combination to be a quick and economical means of capturing this information.

The importance of including the people who will be doing the fieldwork and data processing in the research component will be evident. Familiarisation of the history and original layout of the site will help with the identification of remaining features and in determining the possible locations of the missing features.

Downloading and data processing procedures will also be dependant upon the equipment used and software available. Compilation of a useful plan of the historical site will involve the combination of field data with that gleaned from the historical research. Investigation of the field data will confirm the locations of the remaining features enabling the locations of missing features to be determined. These missing features can then be added to the field data to produce an overall layout the original site.

Software chosen for the creation of the web site will be a personal choice. However, this project showed that a readily available software package like Microsoft FrontPage is capable of producing a web site of professional quality.

6.3 Future Developments and Applications

The original purpose of this project was to design a procedure that a mining company could use to preserve culturally significant sites prior to redevelopment. Reality however would indicate that those likely to be involved in work of this nature would be government departments or bodies such as the National Trust. The procedure developed will however be as equally applicable to these institutions.

Applications for government use include documenting the state of sites that contain hazardous material prior to capping, using the data obtained to determine lease conditions and, documenting the state of sites prior to the granting of a new lease. Organisations such as the National Trust may find such a procedure helpful in the assessment of sites that form part of the nations industrial heritage. This data will enable sound decisions to be made regarding the preservation of such sites.

The ready availability of surveying equipment dictated that the fieldwork for this project was conducted using such. However the use of equipment such as a Real Time Kinematic (RTK) GPS system could significantly reduce the field component. Due to factors such as tree cover or locations in deep gorges, a GPS may be inferior to the traditional methods used during this project. Obvious benefits of using a GPS include:

- Single person field party;
- Reduction of field time;
- Possible reduction in costs; and
- AMG coordinates provide the necessary datum.

Further developments may involve the integration of the original procedure with a Geographic Information System (GIS). This would certainly be feasible for a government department. The possibilities are endless; maybe even one day a statewide database of historic mine sites could be possible.

6.4 Limitations

Over the course of this project certain factors were overlooked to enable the project to be completed within the required timeframe. It was originally intended to include plans of the underground workings within the historical component. Upon inspection it was felt the size and complexity of these plans would negate any advantages gained from displaying them, although descriptions of the shafts and underground workings were included.

The geological aspects of the mine were given only a brief mention on the web site. The scope and complexity of the geological information contained within the Geological Survey Reports means that the summation of this data would be best left to an expert. The collection of data within the site would also be ideally conducted under the auspices of an expert or experts, who are able to note in greater detail the remains present. The cost of requiring specialists to be present during the fieldwork component then becomes an issue that must be assessed to determine the feasibility of such a requirement.

6.5 Summary

Given the limitations outlined, the completed procedure still demonstrates that the use of modern surveying techniques combined with the Internet is an excellent way to efficiently collect and document the historical data associated with an old mine site. With development the procedure can be further streamlined making it an attractive proposition for the management of culturally significant industrial sites.

Chapter 7

Conclusions

7.1 Introduction

The underlying goal of this project was to demonstrate the suitability of combining modern surveying techniques with the Internet as a means of documenting and recording the information contained within an industrial heritage site. A procedure was developed and a suitable site chosen to enable the suitability of the proposed methods to be demonstrated. By choosing the Silverspur site as the basis of this project, acknowledgment is made as to the role the mine played in the development of the Texas – Silverspur region. This chapter will examine the need for a procedure to collect and document the data remaining on historical sites and recommend further action that should ideally take place.

7.2 Summary

This project has shown that the application of modern surveying techniques combined with the Internet is a practical and efficient means of collecting and documenting the historical information present within an abandoned mine site.

Total stations and data recorders have been developed for a wide range of applications and uses. They are now widely used to perform surveying tasks such as data collection and boundary marking, in a manner that is both cost-effective and within the desired parameters of accuracy. A total station / data recorder combination is ideally suited to the work involved in this project as it couples traditional surveying techniques with the data processing and storage capabilities of the total station.

If the conservation of industrial heritage sites is to actually benefit the community, then the documentation of these sites must be readily available to the public. Publicly accessible information is stored in many locations and formats however, nowhere is information as quickly, freely and readily accessible as that which is displayed on the Internet. The display of historical information in this manner will increase the cultural significance of these relics and remains of our industrial past.

It is the belief of the author that the historical importance associated with industrial heritage sites cannot and should not be ignored. Of these, mine sites in particular often pertain directly to the past development and growth of many regional areas, thereby providing a link to the pioneering men and women of the district. Many of these old mines are falling victim to redevelopment and something needs to be done to document these sites before they are lost forever. The development of a procedure to record and document this historical information seemed an ideal starting point for the preservation of this information for the benefit of the community.

7.3 Further Work

The historical information documented at these sites would be ideally integrated into a government department or suitable heritage committee (the National Trust) database. This database could then be used to highlight the important role these sites play in the preservation of our past to the State Authorities that own or control these sites. It is unrealistic to expect the preservation of all these sites, but at least this way there is an everlasting historical record of these sites.

Having recognised the need for, and having developed a procedure to record and document culturally significant industrial sites is but a start. The procedures and equipment used for the purposes of this project need to undergo a cost-benefit analysis to determine their financial suitability. As mentioned in Section 6.3, the next stage in the development of this procedure is the integration of GPS / GIS technology into the field component. In conjunction with this, a suitable and easy to use and access Internet based database will need to be developed to ensure the community is made aware of, and embraces the information that is available to them.

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Appendix A

Project Specification

The University of Southern Queensland

FACULTY OF ENGINEERING AND SURVEYING

ENG 4111/4112 Research Project
PROJECT SPECIFICATION

FOR: **JOHN MARTIN GIBSON**

TOPIC: MAPPING OF AN OLD MINE SITE FOR HERITAGE PURPOSES

SUPERVISORS: Dr. Frank Young
Glenn Campbell

ENROLMENT: ENG 4111 – S1, Ex, 2004;
ENG 4112 – S2, Ex, 2004.

PROJECT AIM: This project aims to investigate the possibility of combining modern surveying techniques and the Internet as a means of recording, documenting and presenting the historical information contained within an abandoned mine site.

PROGRAMME: **Issue B, 4th October 2004**

1. Research and document the mine's history.

2. Prepare the historical component of the project.

3. Determine the best method of surveying the site and collect field data as appropriate.

4. Use the field data to produce a plan of the mine's original layout.

5. Evaluate the different web site creation software packages available and decide on one to use.

6. Create a web site using the chosen software, incorporating the mine plan and relevant historical information.

7. Evaluate the procedure used as a means of capturing and presenting this form of data.

As time permits:

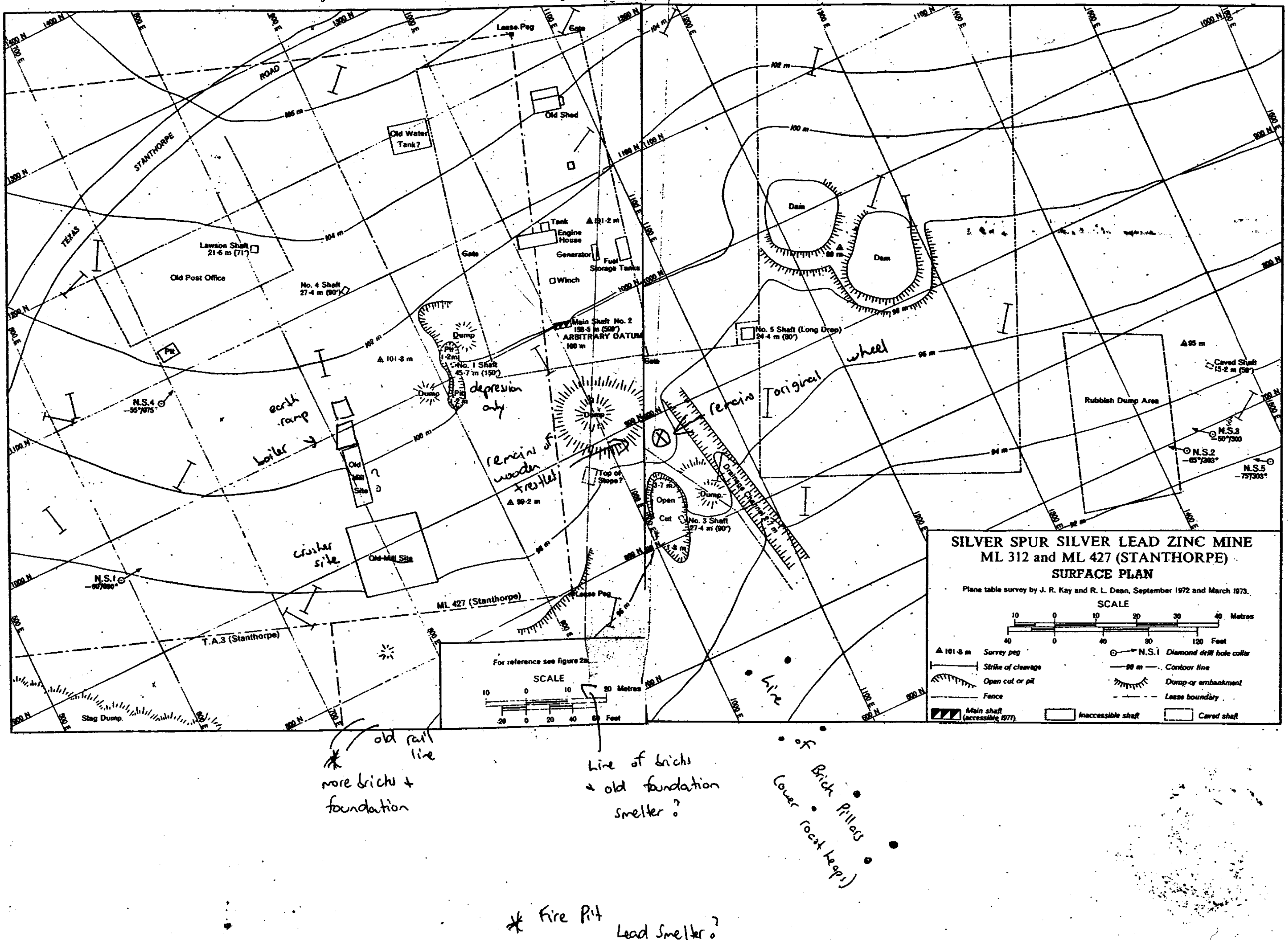
8. Include maps of the underground workings if sufficient information can be sourced.

AGREED: __________ (Student) __________, __________ (Supervisors)

4 / 10 / 04 6 / 10 / 04 7 / 10 / 04

Appendix B

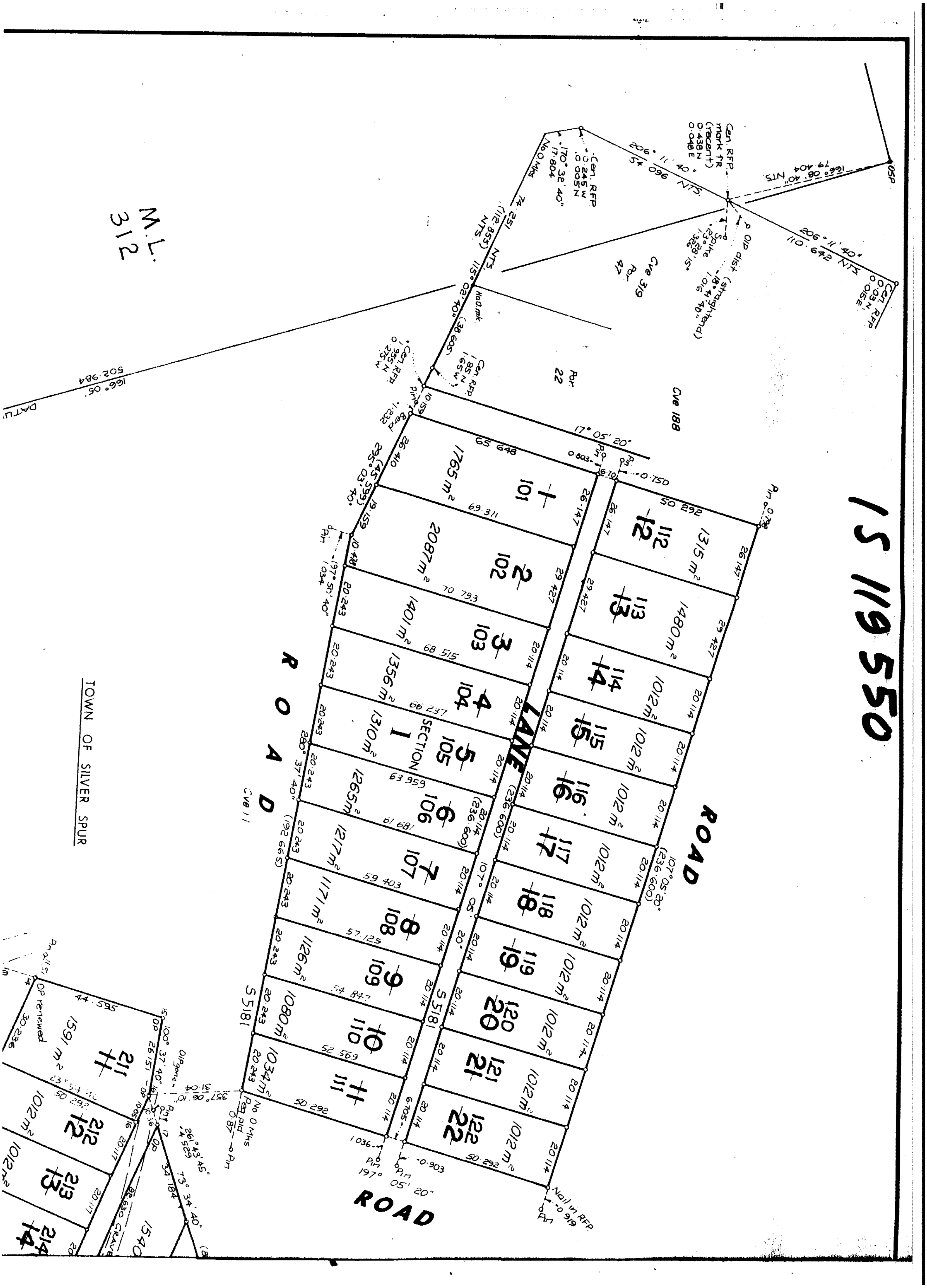
Initial Field Sketch

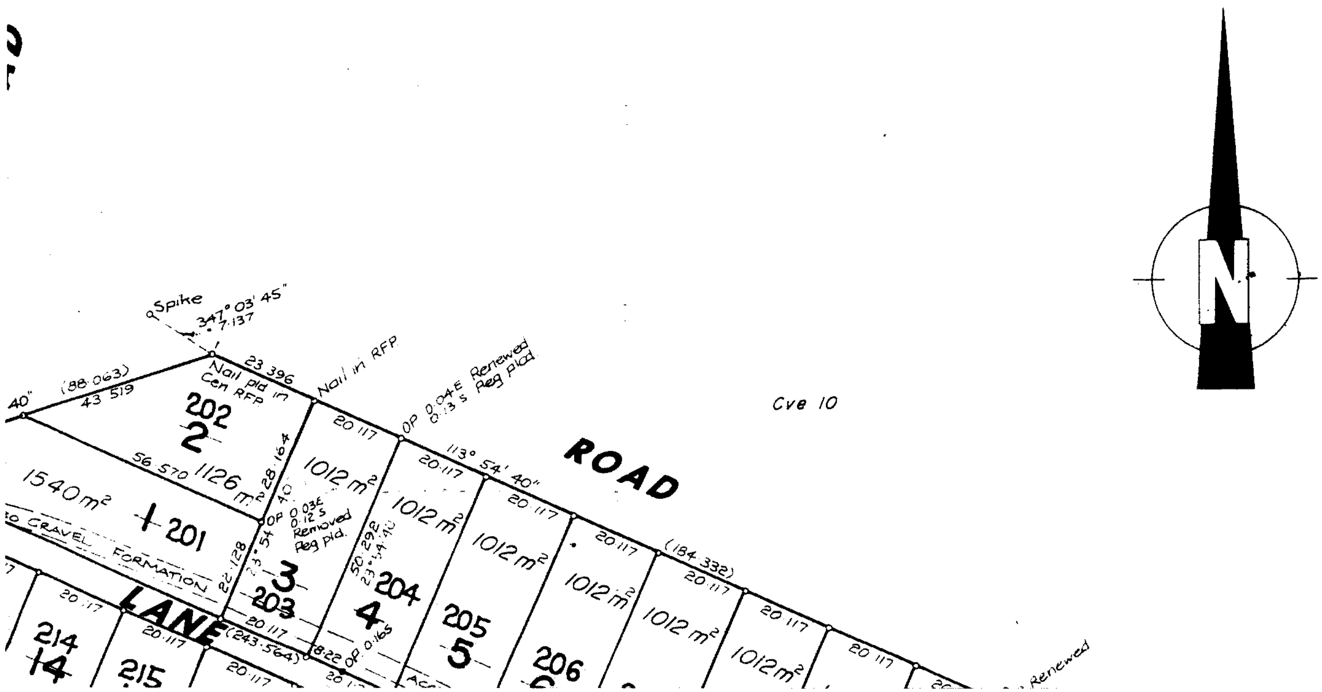

SILVER SPUR SILVER LEAD ZINC MINE
ML 312 and ML 427 (STANTHORPE)
SURFACE PLAN
Plane table survey by J. R. Kay and R. L. Dean, September 1972 and March 1973.
SCALE
Metres
Feet
Survey peg
Strike of cleavage
Open cut or pit
Fence
Main shaft (accessible 1971)
Diamond drill hole collar
Contour line
Dump or embankment
Lease boundary
Inaccessible shaft
Caved shaft
For reference see figure 2a.
Old Shed
Old Water Tank?
Lease Peg
Gate
ROAD
STANTHORPE
TEXAS
Lawson Shaft 21·6 m (71')
Old Post Office
No. 4 Shaft 27·4 m (90')
Tank
Engine House
Generator
Fuel Storage Tanks
Winch
Main Shaft No. 2 158·5 m (520')
ARBITRARY DATUM
No. 1 Shaft 45·7 m (150')
Dump
Pit
Old Mill Site
Top of Stope?
Open Cut
No. 3 Shaft 27·4 m (90')
Drainage Channel
No. 5 Shaft (Long Drop) 24·4 m (80')
Dam
Rubbish Dump Area
Caved Shaft 15·2 m (50')
N.S.1
N.S.2
N.S.3
N.S.4
N.S.5
ML 427 (Stanthorpe)
T.A.3 (Stanthorpe)
Slag Dump
depression only
earth ramp
boiler
crusher site
remains of wooden trestles
remains
original wheel
line
old rail line
more bricks + foundation
Line of bricks + old foundation smelter?
of Brick Pillars (cover roast heaps)
* Fire Pit
Lead Smelter?

Appendix C

IS 119550

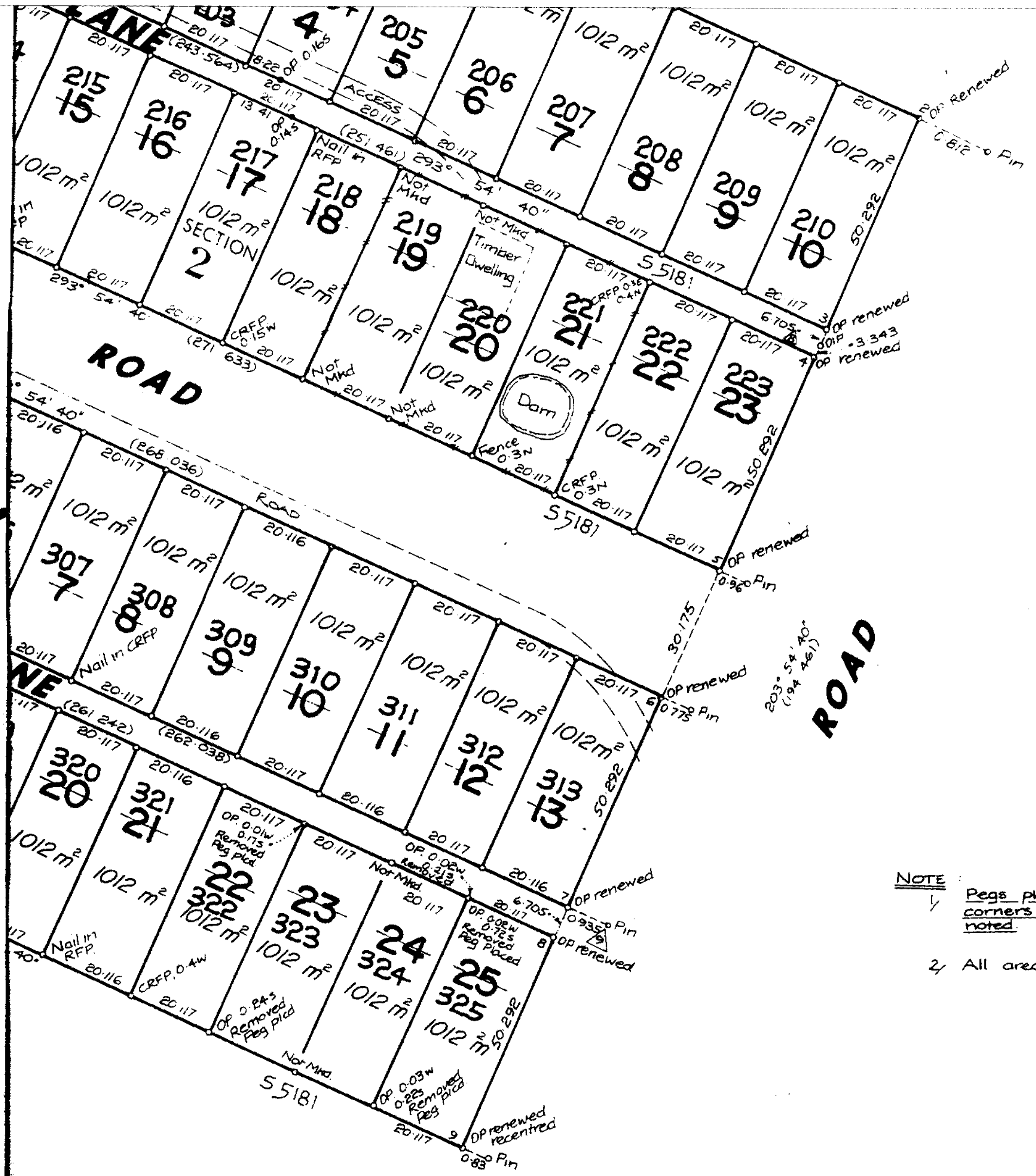

IS 119550
IS 119550
Mining Lease Boundary
DATUM
OSP
145.979 NTS
255° 19' 20"
TOWN OF SILVER SPUR
ROAD
ROAD
17° 06' 40"
(183.035)
50.649
50.649
33.957
39.952
26.635
23° 54' 40"
50.292
OP renewed
No O Mks
Peg pld
314
14
1859 m²
301
1
1189 m²
315
15
1012 m²
302
2
1012 m²
316
16
1012 m²
303
3
1012 m²
317
17
1012 m²
304
4
1012 m²
318
18
1012 m²
305
5
1012 m²
319
19
1012 m²
306
6
SECTION 3
1591 m²
30.236
213
13
1012 m²
214
14
1012 m²
GRAVEL FORMATION
Nail in RFP
20.117
20.116
30.39


15 119 550
M.L. 312
TOWN OF SILVER SPUR
SECTION 1
LANE
ROAD
ROAD
ROAD
Por. 22
Por. 47



15119550

SAUNDERS HAVILL ASSOCIATES
Consulting Licensed Surveyors
537 Boundary St., Spring Hill,
BRISBANE. Q.4000. Phone 221 6305



IS 119550

NOTE:
1/ Pegs placed at all unoccupied corners unless otherwise noted.
2/ All areas shown are deed areas.

537 Boundary St., Spring Hill, BRISBANE, Q.4000. Phone 221 6305

PROJECT:

IDENTIFICATION SURVEY OF SECTIONS 1, 2 and 3

TOWN AND PARISH OF SILVER-SPUR

COUNTY OF CLIVE

SHIRE OF INGLEWOOD

Lot on plan descriptions :-
Lots 101 - 122, 201 - 223 and 301 - 325 on Plan S5181

I hereby certify that Ross William Gordon, Surv. Grad., for whose work I accept responsibility, identified and remarked the boundaries as shown hereon.

22-11-84 LICENSED SURVEYOR

DATUM:

IS.119550 CISP

SURVEYED: RG, AT, RS.	Date 9-11-84
DRAWN: S. McL.	Date 22-11-84
SCALE. 1:1000	REF. No. 217 N 1060/82 related

Appendix D

Control Traverse Field Notes

△1 Dumpy

115° 59' 44"

30.276

△2 Dumpy behind shaft

△1 Dumpy

10° 00' 00"

Silver Spur Mine

3/4/04

Control Traverse for Detail Survey.

49.913

△ 3 Dumpy on leap
rear popped lead

10°	00′	00″
115°	59′	44″
221°	59′	30″
115°	59′	45″

△ 1 Dumpy

115° 59′ 44″

				△4	Dumpy		
					B.S. 3		
			317°	05' 57"	4° 46'	59"	
				172.916			
				△4	Dumpy on Rock Heap		
295°	59'	44"					
184°	46'	57"					
73°	34'	14"					
184°	46'	59"			Nail in Conc		
					3° 35' 44"		
					18.086		
184°	46'	59"					
3°	35'	44"					
182°	24'	30"					
3°	35'	45"		△2	Dumpy		
			184°	46' 59"	B.S. 1		
					295° 59'	44"	

			107.964			
			(5)	Dumpy		
4°	46'	59"				
317°	05'	56"				
269°	26'	59"				
317°	05'	59"				
			(4)	Dumpy		
				B.S. 2		
		317°	05' 59"			

△ 6

					B.S	S
		63°	15'35"		182°	39'	39"

95.810

△ 6 Dumpy behind old mill

137°	05'	57"
2°	39'	40"
228°	13'	19"
2°	39'	38"

△ 5 Dumpy

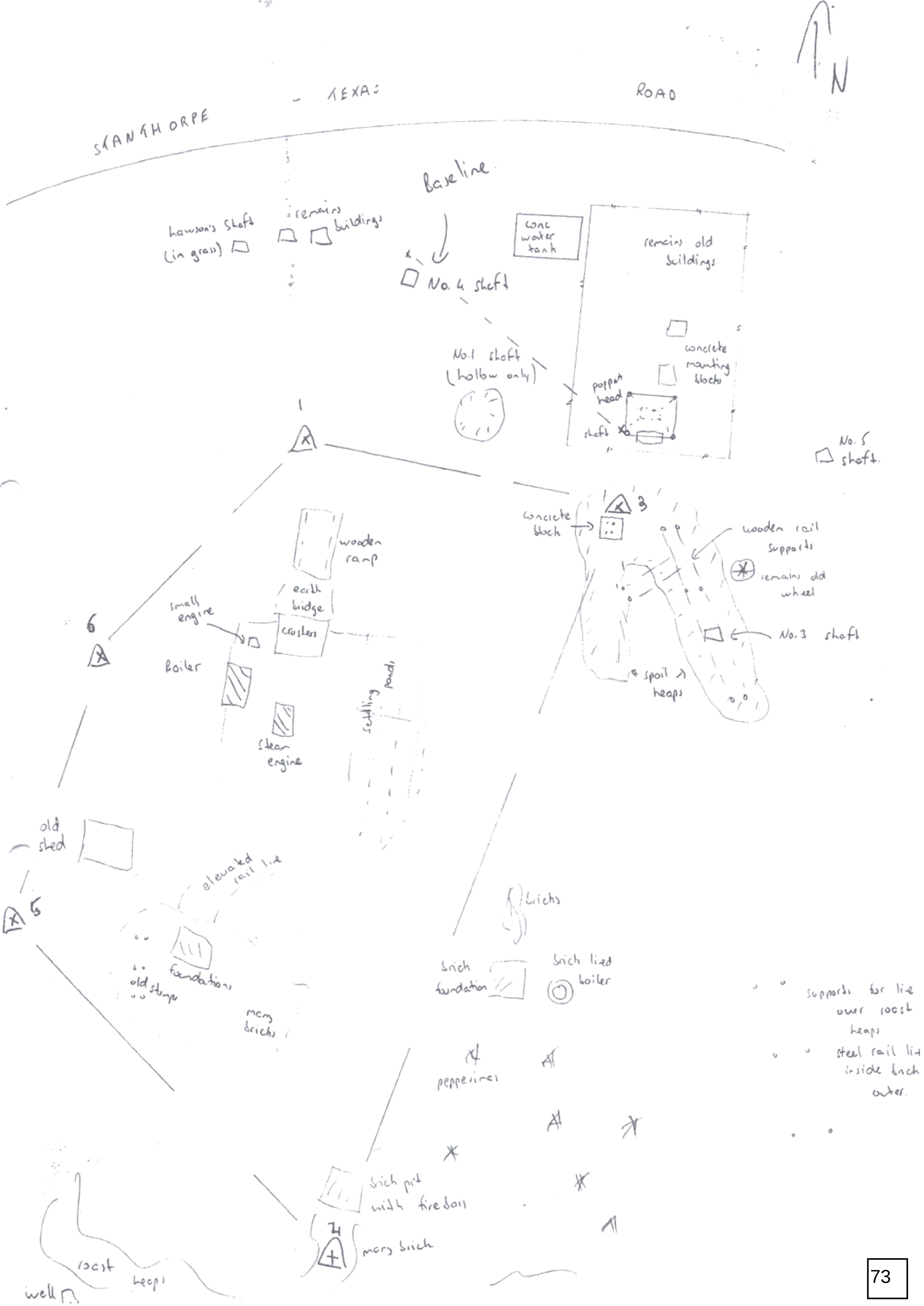
2°	39'39"			
		137°	05'	57"

			43.163			
			Δ 1	Dumpy in Dwy		
182°	39'	39"				
63°	15'	37"				
303°	51'	29"				
63°	15'	34"				
			Δ 6		BS	5
		63°	15' 35"		182°	39' 39"

	1130	0.310 to F.S.L.		from top of stake		
28/04	04					
	1410	−0. 437 to FSL.		from top of stake		
	1411	+0. ~~248~~ 270 to F.S.L.		from ground.		
	1939	−0. ~~260~~ −0.245 to F.S.L.		from top of stake		
R.L.	of	Crown opposite	new	Power Pole =	1.99	5
		Dawbridge		19/4/04		
		1.127				
		Misclose 1:20	6 000			
		∠ Misclose	0° 00' 16"			
			49.973			
			△3			
243°	15'	35"				
116°	00'	00"				
348°	44'	24"				
116°	00'	00"				
			△1	Dumpy		
				BS.	6	
		116°	00' 00"	243°	15'	35"

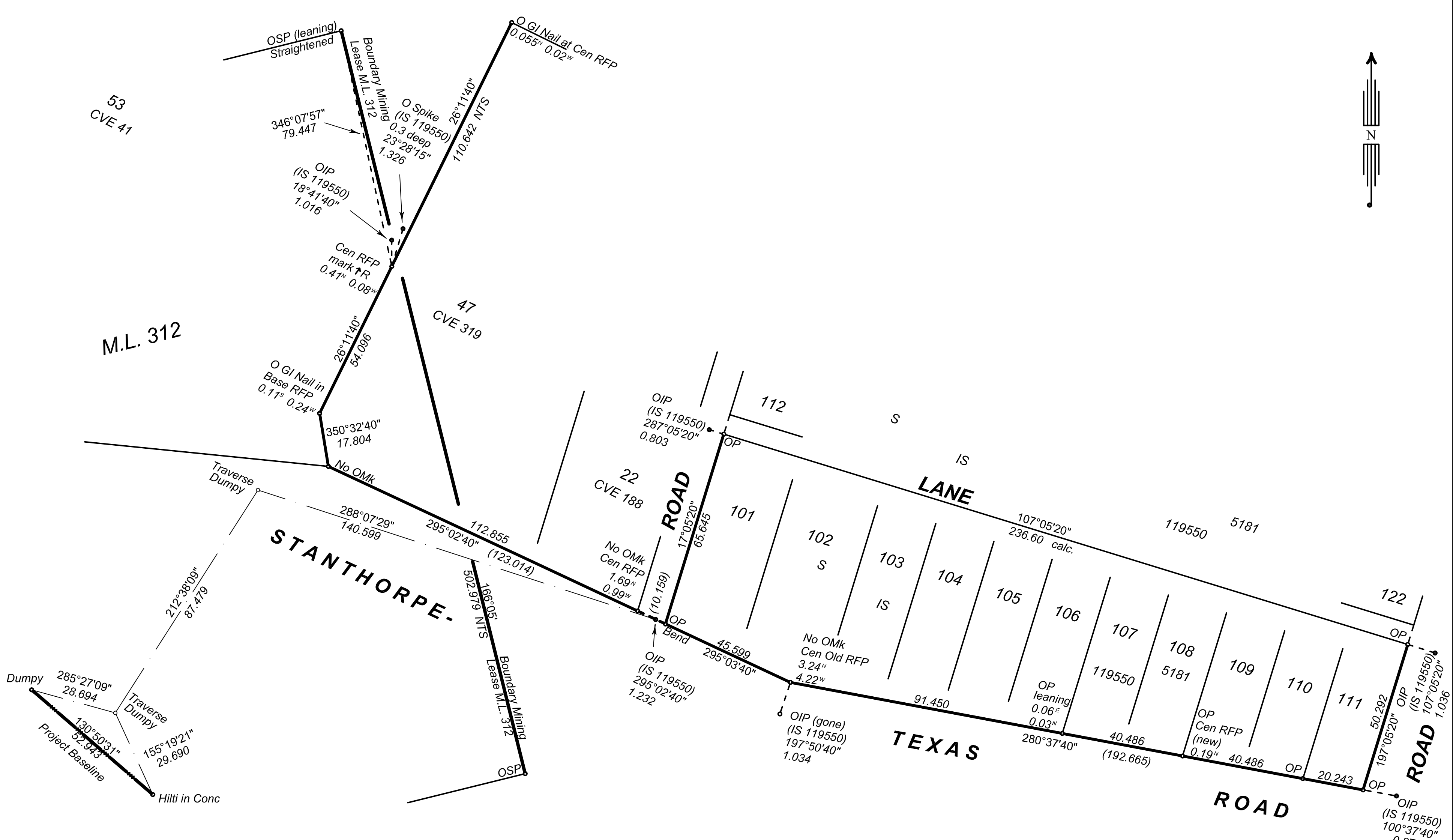
Appendix E

Final Field Sketch


N
STANTHORPE - TEXAS ROAD
Baseline
Lawson's shaft (in grass)
remains buildings
No. 4 shaft
conc water tank
remains old buildings
concrete mounting blocks
poppet head
shaft
No. 1 shaft (hollow only)
No. 5 shaft.
1
3
concrete block
wooden rail supports
remains old wheel
No. 3 shaft
spoil heaps
wooden ramp
earth bridge
small engine
crushers
6
Boiler
settling ponds
steam engine
old shed
elevated rail line
5
foundations
old stumps
many bricks
bricks
brick foundation
brick lined boiler
supports for line over roast heaps
steel rail line inside brick outer.
peppercorns
brick pit with fire bars
4
many brick
roast heaps
well

Appendix F

Identification Sketch



JOHN DEE & ASSOCIATES PTY LTD ACN 010 272 090 hereby certify that *the Company has* surveyed the land comprised in this plan and that the plan is accurate, that the said survey was performed in accordance with the *Survey and Mapping Infrastructure Act 2003* and the *Surveyors Act 2003* and associated Regulations and Standards and that the said survey was completed on *31/08/04*.

John Dee, Director

Anne Louisa Dee, Director

Date:

Prepared by:
JOHN DEE & ASSOCIATES PTY LTD

Consulting Surveyors
ACN 010 272 090
50 Prospect Street
Fortitude Valley 4006
PH: (07) 3252 3777
FAX: (07) 3252 1291
EMAIL: jdass@acenet.net.au

Identification Survey of
Part of M.L. 312

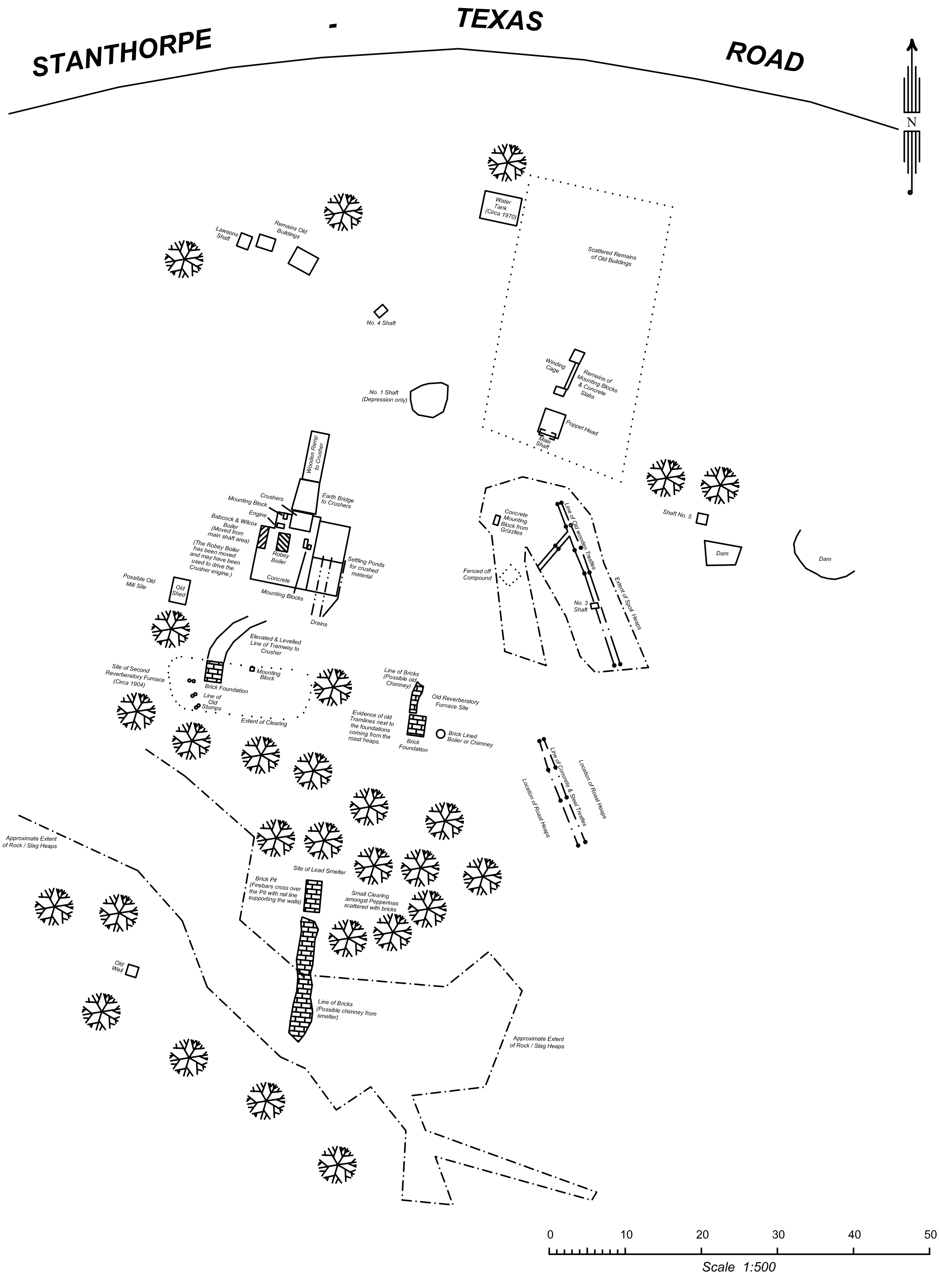
Parish: Silverspur   County: Clive

Important Note:
This plan is of an Identification Survey and, as such, should be used only for the purpose for which it was prepared. Owners or puchasers should be aware that if utilising or building to the boundary, the author of the plan or consulting surveyor of choice should first be contacted in case boundary locations on this or adjoining Lots carries higher than normal risk. John Dee & Associates Pty Ltd therefore can accept no responsibility for failure to use this plan within the limitations intended.

Address:	Date:	Scale:	Job No:	Checked:
Silverspur Township, Stanthorpe - Texas Rd.	**11/09/04**	**1 : 1250 at A3**	**N/A**	

Appendix G

Completed Silverspur Mine Plan



Scale: 1:500 (A3) 1:750 (A4)	Date: 03/04/04	Project: Mine Plan of Silverspur Mine for display on Silverspur Website	Description of Property: M.L. 312	Disclaimer: This plan was produced for a thesis done in conjunction with the University of Southern Queensland. No responsibility is taken for the accuracy of the information shown thereon, or from actions arising from uses of this plan for purposes for which it was not intended. This plan is solely intended as a diagrammatic representation of the mine for display on a web site.	Client: **University of Southern Queensland**
Drawn: jmg	Surveyed: jmg	Level Datum: N / A	Parish: Silverspur County: Clive		

Appendix H

Silverspur Mine Web Site

Appendix H.1

Silverspur Mine Web Site - Home Page

SILVERSPUR MINE

[Home] [History] [The Mine] [Mine Plan] [Photo Gallery]
[Safety] [Feedback]

Welcome to the Silverspur Website.

(Brought to you by John Dee & Associates)

This web site was constructed as part of a thesis conducted in conjunction with the Faculty of Engineering and Surveying at the University of Southern Queensland.

The underlying goal of the thesis was to demonstrate the suitability of combining modern surveying methods with the Internet as a means of documenting and recording the information contained within an industrial heritage site.

Using the abandoned Silverspur mine site as an example of an industrial site and by combining simple survey practices, some historical research and Microsoft's FrontPage software, it was hoped to provide an example of how this could be done.

This page was last updated on 11-09-2004.

Silverspur mine showing existing head gear and remainder of the elevated tramways.

SILVERSPUR MINE	NEWS	MACMIN SILVER
A little History: Silverspur is an abandoned silver mine situated approx. 12km east of the township of Texas on the Texas - Stanthorpe road. The mine was opened in 1892, finally ceasing operations in 1926. the site has been worked sporadically since, with Macmin Silver the latest to commence an exploratory programme.	**Latest news and status of the Silverspur Mine site:** Site last visited on 29/08/04. Macmin Silver have commenced an exploratory drilling programme in the old Silver Spur site. This is to compliment drilling operations already underway in the Twin Hills area.	**About Macmin Silver:** Macmin is a silver focused company whose primary project is the Texas Silver Project. The company maintains equity in New Guinea Gold and the junior Australian explorers Malachite Resources NL and TasGold Ltd. More information can be found at www.macmin.com.au

(Top)

Appendix H.2

Silverspur Mine Web Site - History Page

SILVERSPUR MINE

[Home] [History] [The Mine] [Mine Plan] [Photo Gallery]
[Safety] [Feedback]

History

This section of the web site describes the history of the Silverspur Mine and is divided into the following sections.

Early History - Settlement ***Silverspur - Discovery*** ***Silverspur 1894 - 1917***

Silverspur 1917 - 1950 ***Silverspur 1950 - Present***

The information has been compiled from Mine Warden reports found in the Department of Natural Resources, Mines & Energy library and the Texas Historical Society's publication 'Silverspur c1890 - c2002'.

Early History - Settlement:

Prior to 1836 settlers were restricted to a surveyed line called the Limits of Location. The Limits of Location encompassed an area of about 200 miles within a radius of Sydney. Land within this boundary was bought and sold in the usual way, but the settlers were restricted to this area.

1836 saw this region experience a drought. As a result the settlers moved out over the Limits of Location Line in search for more fertile lands. Land outside the Limits was unofficially occupied by these settlers and they became known as squatters.

In a response to the rush for land the British Government via its NSW representative, Governor Bourke, passed regulations allowing graziers to run stock on stations of unspecified extent outside the Limits of Location for an annual payment of 10 pounds. This allowed the squatters to obtain a licence conferring title (Glasser, 2002).

These regulations saw the Europeans' search for land gather momentum. More and more land was opened up for grazing, changing the face of Australia forever.

The explorer Allan Cunningham had in 1827 travelled from Sydney as far north as the present day location of Warwick. Cunningham reported very favourably on the land through which he had travelled. However, his next trip to the area in 1828 would have far larger implications. Travelling this time from Moreton Bay, Cunningham was to discover and name Cunninghams Gap, the gateway to the Downs.

The Texas region saw the first settlers move in to occupy runs along the Dumaresq River in 1840 (Glasser, 2002). By the end of 1849 there were runs selected along both sides of the Dumaresq from its beginning at the junction of the Severn and Mole Rivers to well past present day Texas. Gunyan, on which the Silverspur mine lies, was settled in 1854 by William Cox (Glasser, 2002).

At this stage supplies came from the Hunter Valley or Moreton Bay by bullock teams. Small settlements were beginning to form along these early tracks and near the larger stations. Texas began to form around a crossing of the Dumaresq River. The town continued to grow around the crossing until a flood in 1890 convinced the residents to relocate the town to its present location, further up the ridge.

Gunyan continued to operate as a grazing lease, becoming established as the Gunyan Hereford stud in 1888. However, tobacco had become the main crop grown along the Dumaresq by 1876. By 1890 Gunyan had followed suit and became the first grower of tobacco on a large scale in Northern NSW (Glasser, 2002).

(Top)

Silverspur - Discovery:

By 1890 there were already 3 mines operating in the area: Silver King which only yielded small deposits, the Texas Copper Mine which was opened in 1890 and closed 4 years later because it never paid and Silver Crown, a silver/copper mine.

Local legend has it that it was two Gunyan stockmen out splitting timber for fence posts who discovered the mine. While searching for timber they found some quartz. The stockmen took their find to the Texas Copper Mine. The find looked promising so a small syndicate was formed with the operators of the Texas Copper Mining & Smelting Company mine. An exploratory shaft was sunk, but little sign of copper was found so the site was abandoned.

A John Quinn of the Texas Copper Mine applied for a lease on the abandoned area and Mining Lease 54 was granted on 1st October 1892 (Glasser, 2002). Not wanting to be left out, the former syndicate members formed a new group and gave the mine its Silverspur moniker.

This new group sent a sample of the ore from the shaft to Messers Stokes and Hall, metallurgists based in Brisbane. The assay returned a favourable result. Mr. Hall then visited the mine in 1892 to advise on it. That same month Mining Lease 54 was purchased from John Quinn by the new syndicate (Glasser, 2002).

The syndicate had trouble commencing operations so Mr. Hall, recognising the potential of the mine offered to work at the mine. The terms of the agreement struck between Mr. Hall and the syndicate saw Mr. Hall working at the mine at his own expense for the first 3 months, rent free, with an option for a renewal of the lease for 12 months subject to the conditions specified at the time. Mr. Hall commenced on the 1st May 1893 and almost immediately succeeded in making the mine pay handsomely. At the end of his term he claimed a third share as per the agreement and appointed Mr. H G Stokes as mine manager. this arrangement was to exist for many years with continuing good results (Glasser, 2002).

This group formed the Silverspur Mining Company No Liability in 1894 and worked the mine until 1917. It was responsible for most of the mine's development and production (Ball,1918).

(Top)

Silverspur 1894 - 1917:

The next 4 years saw very favourable results and the company distributed dividends exceeding 20,000 pounds in this time. Little work was done by the company outside the boundaries of ML 54 to prove an extension of the ore body. However, the Silver Spur Extended Company, holding adjoining leases sunk Lawsons Shaft in 1897. *(Hyperlink to Shaft page).* The fault was located and followed for 100ft, but as no more ore was found the effort was abandoned.

1899 saw the completion of a new 20 ton furnace. Unfortunately later that year it was found the gossans were almost exhausted, forcing the management to find other methods of smelting. To aid in prospecting a hand diamond drilling plant and air compressor were purchased in 1899, and rock drills installed. An Austin pyritic smelter was erected for the more economical treatment of sulphides and a blast furnace built to aid in the recovery of lead from the slag. The operation of the furnace was hampered by the presence of zinc and its use abandoned towards the end of 1901. *(Hyper to Smelter page).*

A big ore body was discovered following the opening up of the 300ft level in 1902. This discovery was regarded by many as ensuring the permanency of the mine. Considerable additions were made to the plant in 1905, including the rebuilding of the reverberatory furnace and the sinking of the main shaft below the 300ft level in 1906.

A Sydney company, Silverspur Proprietary sank a shaft to 150ft close to the southern boundary of ML 54 in 1907. The results were less than encouraging and this venture was also abandoned while still in its infancy.

With a throughput of more than 9000 tons of ore,1908 represented the zenith of the company's activities. Even with the discovery of further ore bodies at the 400ft level, production continued to fall away until 1913. This was the last year credited with any output, less than 3000 tons.

Decrease in production during 1909 was blamed on the disorganisation caused by the dismantling of the two reverberatory furnaces and the building of one of double capacity. Enthusiasm was sparked during the year by the improvement of gold values in the ore, but this was not to continue.

The decline of the copper content of the ore during 1912 began to have a serious effect on the production so the management started to investigate the possibilities of retreating the slags. (The copper content of the ore is necessary to collect the silver and gold during smelting). It was estimated the slags contained 400 000 pounds worth of metal.

The completion of the railway survey to join Inglewood to Texas and Silverspur was completed in 1912 encouraging sinking of the main shaft to the 500ft level. Unfortunately silver values were much below expectations and management were forced to abandon smelting operations in 1913.

During 1914 the Company's efforts to prospect by driving the 500ft level were being subsidised by the Mines Department. Work was however suspended before anything of value was found. 1914 also saw the passing in Parliament of a Bill authorising the construction of the railway from Inglewood to Silverspur. Mine management were of the opinion that there was little future in pursuing the option of treating the slag dumps until the completion of the rail line. The passing of the Bill in Parliament would be the closest Silverspur would come to getting a rail line as no further action was ever taken by the Railways Department.

A new ore body was discovered by Mr. Hall on the 150ft level in 1916, but the company was now suffering from a shortage of funds. Later that year permission was sought from the Federal Treasurer to reconstruct by forming a new company called Silverspur Limited. The company was to be funded by an issue of debentures on account of immediate requirements with a provision for a further issue of shares at the end of the war, or completion of the railway.

(Top)

Silverspur 1917 - 1950:

Production of the new company was limited, being hampered by poor recoveries of ore, low prices of metal, the inflow of water into the lower levels, high transport costs and a lack of funds. After several years of intermittent production the mine was closed in 1926.

In 1930 Mr. Hall was still exploring the possibilities of selling or processing the slag dumps, but these options were always thwarted by the spectre of high transportation costs. Only the completion of the railway to Silverspur could have made either of these options viable.

In 1932 all mine buildings including the poppet head were still standing. All the mine equipment was sold at auction in 1939. The chimneys were blown down, the bricks carted away and during WW11 the railway lines were pulled up, the buildings pulled down and the wire ropes removed from the poppet head.

(Top)

Silverspur 1950 - Present:

The expectation that there was still mineral to be found at the mine site or surrounding area has continued to attract miners and companies to the area. The current leases 312, 316 and 317 were taken out in 1950 by Mr. M. H. Cutlack. Surface exploration was carried out in the preceding years by several companies with options to buy the mine. The fact that the existing mineral was at a depth of 500ft was considered a deterrent and it was not until 1970 that the leases were sold. Mt. Carrington Ltd. purchased the leases, the slag heaps and the surrounding areas.

Mt. Carrington Ltd. proceeded to de-water the mine and erect the steel poppet head which still stands today. The underground workings were sampled and the conclusion reached that there was insufficient ore to justify commencing mining operations. A surface drilling programme was then commenced with assistance from the Department of Mines with similarly disappointing results.

Since 1983 the slag heaps have continued to attract interest even to the point of one company, Pyrotech Resources N.L. planning to build a $7 million mobile smelter at the site. The company believed there to be $20 million worth of zinc within the slag heaps. For reasons unknown, this venture also fell by the wayside.

Current interest in the area is centred around the Texas Silver Project by Macmin Silver Ltd. While their operations will be initially centred in the Twin Hills area (to the north-west of the Silverspur site) they have also purchased the Silverspur leases. By adding the Silverspur lease to the Twin Hills property it is hoped that use can be made of any remaining Silverspur deposits. A limited programme of diamond drilling has been undertaken at the site with the future of the site still unknown.

Appendix H.3

Silverspur Mine Web Site - Mine Page

SILVERSPUR MINE

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The Mine

This section of the web site describes the mine layout, mine workings and mining processes used at the mine and is divided into the following sections:

The Mine   Geology   The Shafts   Mine Layout   Treatment Processes   Roasting

Reverberatory Furnace   Pyritic Smelter   Rock Crusher

The information has been compiled from Mine Warden reports found in the Department of Natural Resources, Mines & Energy library and the Texas Historical Society's publication 'Silverspur c1890 - c2002'.

Information regarding Texas and the surrounding region can be accessed from here.

The Mine:

The Silverspur mine was unique in Queensland because the deposits being worked consisted of huge partly isolated leases. This structure necessitated a large amount of dead work to enable exploitation of the deposits. Although a shaft was sunk on each deposit, it had to be connected with the other shafts for ventilation, exploration and exploitation. These factors made the total expenses of mining unusually great.

At its peak about 30 men were employed in connection with mining alone, this number being roughly divided with half working below the surface and half above. Early recollections (Glasser, 2002) indicate that as many as a further 600 men were employed in relation to the mine. These men were engaged in wood cutting and timber, lime and matte carrying.

As a result of the large number of men employed by the mine the township of Silverspur came into being. By 1895 a request was made to the Department of Public Instruction for a Provisional School with already 14 children listed as school age. The welfare of the village was however inextricably linked to the prosperity of the mine and after the mine's closure in 1926 a number of businesses left. By 1936 the last general store had closed and the closing of the school in 1960 and the Post Office in 1969 saw Silverspur join the list of Australian mining ghost towns.

Top

Geology:

It is intended, within the bounds of this report, to only touch briefly on the geology of the mine.

The prominent structural feature within the upper part of the mine is Stokes Fault, which has a west-northwest strike and a near vertical dip.

The Silverspur deposit has many features in common with the group of base metal deposits described as 'stratiform sulphides of marine and marine-volcanic association' (Kay, 1975).

Top

The Shafts:

The shafts at Silverspur are small (3ft by 6ft or 9ft) when compared to other similar operations. The main shaft was however enlarged during its working life.

The levels were large and only needed timbering in the large stope passages. Water inflow became a problem towards the end of the working life of the mine and has continued to be a problem for those companies who have tried to reopen the shafts.

No. 1 Shaft:

This prospecting shaft which is 150ft deep was begun on a small outcrop of copper stained gossan containing a little silver. It is vertical to 60ft and then underlies steeply to the east and bottom.

The ore body was worked out with the gossan on the 60ft level worked for a distance of 130ft north and south. At the 100ft level the average width of the gossan was 10ft and a prospecting drive known as 'Hall's Folly' was carried 100ft to the north-northeast of the main fault.

At the 150ft level the ore was worked over a length of 85ft and for a width of 1 - 20ft. The body was thought to have pinched out here.

No. 2 Shaft (Main Shaft):

No. 2 Shaft or, as it has been referred to previously, the main shaft, was begun with the idea of striking the No.1 ore body. It instead struck the No.2 ore body. The shaft was sunk to an eventual depth of 520ft. The shaft was used as the main hauling shaft due to its central location. For a long time its dimensions above the 200ft level were 9ft by 3ft and below that 11ft by 4ft. The upper part was eventually stripped down to the same dimensions as the lower section.

Eight main levels were developed at 59ft, 78ft, 98ft, 151ft, 200ft, 298ft, 400ft and 498ft. Extensive driving and stoping was carried out at these levels.

Mt. Carrington Ltd. dewatered and systematically mapped this shaft in 1971, coming to the conclusion that the possible and probable remaining ore reserves were insufficient to justify recommencing mining operations.

No. 3 Shaft:

The No.3 Shaft was begun on a small outcrop of gossan 70 ft long and 1 - 8 ft wide, but the large amount of water in the lode prevented further progress for a number of years. When the water problems were finally overcome, the deposit proved to contain some of the richest ore found at the mine and as a result it was quickly worked out.

At the 50ft level the body was 100ft long and up to 30ft wide.. On the 90ft level the ore was 20ft wide a little north of the shaft, gradually contracting to a faulted face 60ft from the shaft.

Further water problems prevented the shaft being sunk below the 90ft level.

No. 4 Shaft:

The No. 4 Shaft was sunk in 1896 after the discovery of the No.4 ore body. The ore body was discovered during a drive along the fault from the No. 1 ore body. The shaft was sunk to a depth of 90ft allowing the ore body to be worked out.

The ore body was not highly zinciferous but was rich in lead and silver.

No. 5 Shaft:

The No.5 Shaft, also known as the 'Long Drop' was sunk to a depth of 80ft. A fissure - thought to be parallel to the main fault line of the mine was struck, but no ore was found.

Lawsons Shaft:

This is the only other shaft in the immediate vicinity and is just outside the lease area. It is 200 ft north-northwest of the No.1 Shaft. Lawsons Shaft is 71ft deep, with a cross-cut 20ft long to the fault on the north.

This shaft was sunk by the Silverspur Extended Company in 1897. The shaft located Stokes Fault, but as no ore was discovered work was discontinued.

(Top)

Mine Layout:

With all shafts connected to the main shaft and due to the shafts central location, all material was lifted out of the main shaft. The material was raised via a wooden poppet head constructed from local timber by a Mr. W J Collins sometime in the 1890's. (Glasser, 2002). The poppet head was described as having 4 platforms, the bottom one being rather large and the top one the size of a small room with 2 big wheels on top.

This original was apparently blown down sometime in the 1950's by whoever had the lease at the time. The current steel poppet head was erected by Mt. Carrington Mine Ltd in 1971, having been made by an engineer in Drake. (Glasser, 2002).

Winding was originally done by a 12-horsepower engine geared to a 4-foot drum and supplied with steam by a 52-horsepower Babcock and Wilcox boiler. In the same building was a Westinghouse Standard 12-horsepower engine and air-compressor, delivering air at 70 lb pressure to the two rock drills which were used in the mine for exploration purposes.

(Top)

Treatment Processes:

The ore, once raised was run in 'trucks' on an overhead tramway and tipped onto an upper grizzly (or separator) which consisted of 1 inch bars at 2 inch intervals. The material which passed through the upper grizzly then fell over a second (1 $^1/_4$ inch by $^3/_8$ inch bars and 1 inch spaces).

The fines, (material not trapped in the grizzlies) was distributed amongst the smelter, roast heaps and spoil heaps. By far the majority of the fines were sent to the roast heaps and in 1904 Lionel C. Ball, Government Mining Warden estimated the heaps to contain about 1500 tons (Ball, 1904).

(Top)

Roasting:

The coarser and medium ore from the grizzlies was then trucked directly along a tram line running over the roast heaps and tipped where necessary. The roast heaps, or kilns as they were called were built up over 2 feet of fire wood.

The coarsest material (material from the upper grizzly) was thrown down first to a depth of 4 feet. The material from the second grizzly was then thrown and knapped down. All this work was done by a gang of four men.

The heap was finally covered with a thin layer of fines. This was to prevent draughts and the fusion of the ore. The heaps were 15 yards long, 5 yards wide, 6 ft deep and contained about 500 tons of ore.

The logs were fired after the application of the fines. Once the ore was heated to a certain intensity it was able to smoulder for weeks without the further addition of fuel. The timber used to fuel the heaps came from the surrounding area. The trees were big ironbarks which provided a good source of long, hot burning fuel. The mine's consumption of timber was so great it was found necessary to construct a small sawmill on site. The immediate vicinity of the mine was soon stripped of available timber forcing the timber getters to travel further and further in search of suitable timber. The mine's appetite for timber is till evident today in the bare hills and plains surrounding the mine.

The roast took 2 to 3 months. This burning heap of silver ore emitted a plume of dense smoke which was said to cover everything it touched with a yellow coat of fine dust. The discolouration was caused by the presence of sulphur in the smoke, and the smell was described as nauseating. Despite a small percentage of arsenic present in the smoke it was generally regarded as being not of any danger to one's health.

(Top)

Reverberatory Furnace:

The roasted ore was carted to the trucks and trammed to the reverberatory furnace into which it was deposited from above. The furnace was of a single hearth type and took a total charge of 84 cwt, of which 14 cwt was lime. This took 6 or 7 hours to put through making a total of 15 tons per day.

In 1905 a new reverberatory furnace was erected. The dimensions of the new hearth were 15 ft by 30ft, an area of 362 square feet. This made it one of the largest copper furnaces in Australia at that time with an estimated capacity of 25 tons per day.

The hearth, which had a fall of 6 inches over its 30 ft consisted of a layer of course fire brick, layed on two courses of ordinary brick above concrete. This was supported by 3 arches through which air circulated for the double purpose of cooling the hearth and becoming heated itself before admission to the furnace. The roof was 4 feet above the hearth at the upper end and 3 ft 6 inches at the lower. The fire grate was 5 ft in length, and the furnace had 3 side doors for ravelling and a top hole at the lower end. There was a lining of chrome brick on the sides where the matte touched. A considerable amount of experimentation took place in the construction of the chromite bricks. The chromite was obtained from Wyalda in NSW costing £2 a ton by the time it reached the mine.

These 2 furnaces were dismantled in 1909 and replaced by one of double capacity. No information could be found on the dimensions of this furnace, but it also must have been one of the largest furnaces in Australia at the time.

Silver, gold, lead and copper were extracted from the ore in the reverberatory furnace. Figures for 1901, kept by H. A. Stokes (then mine manager) illustrate the amounts of each material being extracted:

Material Type	Quantity/Value	Monetary Value for 1901
Silver	47,440 oz @ 2s.3d	£5 337
Gold	59 oz @ £4	£236
Lead	22 tons	
Copper	26.5 tons @ £55	£1 457 10s

(Ball, 1904)

(Top)

Pyritic Smelter:

Before opening out on the 300ft level the mine managers predicted that the ore would be much poorer in both silver and zinc then the ore from the higher levels. It was therefore decided to install a modern pyritic blast furnace, but before the blast furnace was used it was found that very little decrease had in fact taken place.

It was therefore decided not to use the blast furnace, the reason being that $^1/_3$ of the silver would be lost by volitisation with the lead fumes due to the carbonaceous fuel.

The furnace was made by Austin and included many of the latest improvements, some even being considered at the time to be experimental. Its estimated capacity was thought to be in the region of 125 to 170 tons a day.

It was circular in section. The crucible was lined for 2 ft from the base with chrome brick, above which was 2 feet of hollow air-cooled casting and then 2 ft 6 inches of water jacket surmounted by a brickwork shaft 5 feet high. The firebrick lined tueyeres (an Austin patent) were designed to act like blow pipes, producer gas (formed in a patent generator consuming wood) being mixed with the blast air at the moment of admission to the furnace. The reducing fusion and most intense action were therefore concentrated at the mouths of the tueyeres.

Another unique Austin feature was the feeding apparatus. designed to obviate fusion of the charge at the mouth of the furnace. Fumes and gases were to be taken off below the charging floor and conducted to a settling flue, before passing to the stack.

(Top)

Rock Crusher:

A 'Giant' rock crusher with 9 by 15 inch jaws, worked by its own 10 horsepower engine was used for crushing the lime and quartz, or siliceous ore from the mine. This crushed material was used in the smelting process.

(Top)

Appendix H.4

Silverspur Mine Web Site - Mine Plan Page

To display the mine plan please click on the hyperlink below. This will open the plan in Adobe Acrobat which will allow you to view and print the plan.

The plan was produced from a field survey completed in August 2004 and is orientated off Mine Lease 312.

images/spur1 Model (1).pdf

Appendix H.5

Silverspur Mine Web Site - Photo Page

SILVERSPUR MINE

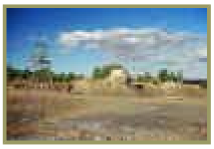
This photo gallery showcases a number of images from the Silverspur Mine. The images are grouped as follows:

Shafts **Head Gear** **Mine Equipment** **Internal Rail System**

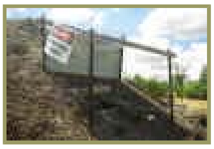
Please click on the image for a larger view.

Shafts:

No. 2 (Main Shaft) with head gear and the remains of the rock crushers in the foreground.



No. 3 Shaft



No. 4 Shaft

Top

Head Gear:

Head gear with the remains of the rock crushers.

Remains of the original head gear wheel.

Top

Mine Equipment:

Part of the original reverberatory furnace.

Photo showing brick lining of furnace section.

Babcock & Wilcox boiler used to drive the winch for the main shaft.

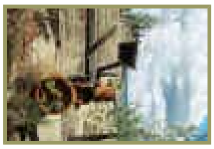
Steam engine evident in early photos, possibly used to drive crusher.

Part of the 'Giant' Rock Crusher.

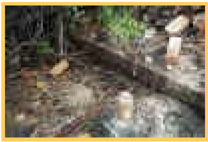
Engine from the Rock Crusher.

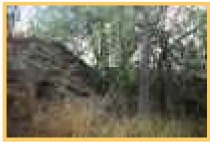
Grizzly Mounting Block

Brick Pit from Lead Smelter showing firebars and supports.



Elevated and levelled tramway from crusher to second reverberatory furnace.





Example of the bricks found at the site. (These are from a furnace as evidenced by the molten material coating the brick.

Example of the slag material.

Top

Internal Rail System:

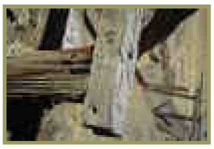
Rail supports from Grizzly to Roast Heaps.

Brick reinforced support legs through the roast heaps.

Close-up view of legs.

Remains of the line to the reverberatory furnace.

Close-up view of wooden support legs.

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Appendix H.6

Silverspur Mine Web Site - Safety Page

SILVERSPUR MINE

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Safety

Mine sites by their very nature are areas of high risk. The site at Silverspur is no exception. With open shafts, loose, steep slag heaps and long grass hiding such hazards as old timber, equipment and wildlife it is not a place for the naive.

Before visiting Silverspur, familiarise yourself with the mine layout. Take the time to study the map and notice where the areas of potential hazard lie. This will be helpful once you are at the mine site. Also take a copy of the local emergency contact numbers, a map of the region and a first aid kit. Obviously the knowledge of how to use the first aid kit is essential.

Texas, climatically, is a region of contrasts, experiencing extremely cold winter nights and having the potential to be very hot during summer. Take appropriate clothing suitable to the timing of your visit, noting that summer nights can also be cold.

There is no drinking water or facilities of any kind at Silverspur and very little shade. As a result dehydration, especially during summer, is a constant risk. Please ensure you have adequate water supplies for the intended level of activity and duration of your visit.

A significant risk, and one not only confined to the mine site, is the very real risk of snake bite. The mine site and surrounding areas have large tracts of long grass and there is plenty of old timber and iron sheets lying around. These are all attractive hideouts of snakes. Common sense is the best approach to avoiding snake bite; only walk in areas of long grass if you have to, and then only when wearing sturdy footwear and leg protection, never pick up pieces of timber or iron which may be lying around, and if you do see a snake never try to kill it. Trying to hit a snake with a lump of timber or shovel only seems to annoy them.

Contact Numbers:

POLICE: (07) 4653 1420 or 000

AMBULANCE: (07) 4653 1333 or 000

FIRE: 000

HOSPITAL: (07) 4653 1233

DOCTOR: (07) 4653 1363

Appendix H.7

Silverspur Mine Web Site – Texas Information Page

SILVERSPUR MINE

TEXAS

TEXAS - the place to relax, unwind and enjoy a real 'back-to-nature' experience - fishing, camping, swimming and sightseeing.

Appreciate the natural beauty, historical features and the warmth and friendliness of the TEXAS people.

Take a pleasant break in town and enjoy some real TEXAS hospitality. TEXAS has a diverse array of shops and services which cater for an ample range of consumer needs.

Situated on the attractive Dumaresq River, Texas offers excellent fishing, great camping spots and the serenity of rural landscapes.

The surrounding bushland abounds with native fauna and an extensive selection of colourful wildflowers.

Primarily a sheep and cattle grazing area, TEXAS boasts a variety of other industries including logging, orchards, small crop farming, saw milling, feedlots and a growing tourist industry. Local stock breeding pursuits range from cattle and sheep (fine wool), horses, deer and cashmere goats and ostrich and pig farming.

Fishing:

Texas has possibly some of the most picturesque fishing spots that you could ever find. With the Dumaresq flowing within a few hundred metres of the town one could not wish for a better place to while a few hours trying their luck.

The fishing has been enhanced by the Texas Fishing Club's efforts along with some Government assistance in restocking the river with over 600,000 Golden Perch (Yellowbelly) and Murray Cod fingerlings.

There are reserves with excellent fishing and camping areas within easy driving distance of Texas.

Other attractions include the old Texas township, the Silverspur mine, the Beacon Lookout, Glen Lyon Dam and the nearby national parks in both NSW and QLD.

For more information on the area and accommodation options the Texas Visitors' Association can be contacted on (07) 4653 1245.

This information was compiled from the Texas Visitors' Association Inc. Texas Visitor's Guide.

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Appendix H.8

Silverspur Mine Web Site – Feedback Page

SILVERSPUR MINE

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[FrontPage Save Results Component]

Feedback:

I welcome any comments or questions about the web site,

the Silverspur mine or my thesis.

Your Name:

Your E-mail Address:

Your Comments:

Submit Reset