SUMMARY OF STATE HERITAGE PLACE

REGISTER ENTRY

Entry in the South Australian Heritage Register in accordance with the *Heritage Places Act 1993*

NAME: Green Farm Lime Kilns, Monarto

PLACE NO.: 26598

ADDRESS: Ngarrindjeri Country

Monarto Safari Park

63 Monarto Road

Monarto SA 5254

(CT 6297/539 D122491 A11, Hundred of Monarto)

STATEMENT OF HERITAGE SIGNIFICANCE

Built by local agriculturalist George Green in the 1880s, the Green Farm Lime Kilns, Monarto are uncommon surviving examples of the lime kilns that were established across country areas of South Australia during the second half of the nineteenth century. Lime production, known as lime burning, was fundamental to the development of South Australia's early building industry, providing quicklime for mortar and plaster. The lime kilns were built to service the construction of buildings at the farm and for the local district and supplemented the farm's income while utilising the limestone cleared from paddocks. The Green Farm Lime Kilns at Monarto are an exceptional example of the class, displaying characteristics at a higher level of integrity and intactness than is typically found in the state.

RELEVANT CRITERIA (under section 16 of the Heritage Places Act 1993)

(b) it has rare, uncommon or endangered qualities that are of cultural significance

Criterion arguments have considered the *Guidelines for State Heritage Places*:

The place should demonstrate a way of life, social custom, industrial process or land use which is no longer practised, is in danger of being lost, or is of exceptional interest. This encompasses both places which were always rare, and places which have become scarce through subsequent loss or destruction.

Places will not normally be considered under this criterion if their rarity is merely local, or if they appear rare only because research has not been done elsewhere, or if their distinguishing

characteristics have been degraded or compromised, or if they are at present common and simply believed to be in danger of becoming rare in the future.

The Green Farm Lime Kilns, Monarto are uncommon surviving examples of nineteenth century lime kilns demonstrating the industrial process of small-scale lime burning. Lime production, known as lime burning, was once a common industrial process that played a critical role in the development of South Australia's building industry in the nineteenth century. Lime was a necessary ingredient in mortar and plaster, with nearly every nineteenth century building using these products somewhere in their structure.

Most lime in the nineteenth century was produced in small-scale kilns built to service the construction of a particular building or local district. Many were established by enterprising farmers looking to supplement income while utilising the stone cleared from paddocks. Commercial lime kilns began to emerge in the late 1880s, with some smaller operations such as the lime kilns at Stansbury expanding to service the Adelaide market. The advent of rail transport and the increased production of cement in central locations in the early twentieth century resulted in the demise of most small-scale lime kilns. Over time, most of these disused kilns fell into disrepair, and few intact lime kilns from the nineteenth century remain to demonstrate the process of lime burning. While lime is still produced today, it is manufactured using different industrial-scale processes.

George Green built his 'D' type lime kilns in the 1880s to produce lime for his farmstead and the surrounding district. Of the small-scale lime manufacturers that demonstrate lime burning in the nineteenth century, including the Former Lime Kiln and Dolomite Quarry at Woodside (SHP 12900) and the two stone lime kilns at the Peake Historic Site in Oodnadatta (SHP 12624), the lime kilns built by Green display a higher degree of integrity and intactness. While the lime kilns entered in the Register under criterion (b) demonstrate commercial lime production, the lime kilns at the Green Farm demonstrate a similar level of integrity and intactness to them. It is for these reasons that the Green Farm Lime Kilns, Monarto are an uncommon demonstration of nineteenth century small-scale lime kilns that enable a once common industrial process to be readily understood and appreciated.

(d) it is an outstanding representative of a particular class of place of cultural significance

Criterion arguments have considered the *Guidelines for State Heritage Places*:

The place should be capable of providing understanding of the category of places which it represents. It should be typical of a wider range of such places, and in a good state of integrity, that is, still faithfully presenting its historical message.

Places will not be considered simply because they are members of a class, they must be both notable examples and well-preserved. Places will be excluded if their characteristics do not clearly typify the class, or if they were very like many other places, or if their representative

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qualities had been degraded or lost. However, places will not be excluded from the Register merely because other similar places are included.

The lime kilns at the Green Farm are a member of the class of place known as nineteenth century lime kilns. Lime kilns were critical to the colony's early building industry, providing lime for mortar, plaster and concrete. Agriculturalist George Green built the lime kilns during the 1880s to produce lime for his farm and the surrounding district. The Green Farm Lime Kilns, Monarto demonstrate many of the principal characteristics of nineteenth century lime kilns (see Comparability/Rarity/Comparison), including:

- proximity to raw materials, in this instance limestone and mallee wood,
- often located on farms, in this instance the Green Farm,
- brick and/or limestone construction,
- 'D' type form,
- built into the face of a bank of hillside,
- firing area with recessed floor,
- multiple firing portals,
- fire brick lining, in this case double brick lining of the eastern kiln,
- intermittent output operating in pairs,
- wood fuelled.

During the twentieth century many of the fire bricks used to line the eastern kiln were repurposed for other buildings on the property including the restored Bretag cottage in the 1920s, however the fire bricks in the western kiln remain. In 2010 volunteers removed the soil surrounding the lower portions of the lime kilns and repaired portions of the masonry.

In comparison to other nineteenth century lime kilns in South Australia, the Lime Kiln at Stansbury (SHP 16680) also demonstrates many of the principal characteristics of the class. However, the Stansbury kiln was only a single kiln operation but includes additional related infrastructure such as a bagging area. Nineteenth century kilns in South Australia more typically operated in pairs as demonstrated by the Peake Historic Site – Ruins of Overland Telegraph Station, Oodnadatta (SHP 13624) and the Dingley Dell Homestead Site, Flinders Rangers (SHP 11760). Consequently, the lime kilns at the Green Farm are an exceptional example of a nineteenth century lime kiln, displaying characteristics that are of a higher quality of integrity and intactness than is typically found in the state.

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SITE PLAN

Green Farm Lime Kilns, Monarto   **PLACE NO.:** 26598

Monarto Safari Park, 63 Monarto Road, Monarto SA 5254

Green Farm Lime Kilns, Monarto, 3401 Old Princes Highway, Monarto SA 5254 (CT 6297/539 D12249 A11, Hundred of Monarto)

N ↑

LEGEND

- Parcel boundaries (Indicates extent of Listing)
- Existing State Heritage Place(s)
- Outline of Elements of Significance for State Heritage Place

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SITE PLAN (DETAIL)

Green Farm Lime Kilns, Monarto   **PLACE NO.:** 26598

Monarto Safari Park, 63 Monarto Road, Monarto SA 5254

Green Farm Lime Kilns, Monarto, 3401 Old Princes Highway, Monarto SA 5254 (CT 6297/539 D12249 A11, Hundred of Monarto)

Elements of heritage significance include (but are not necessarily limited to):
- Two masonry lime kilns with double-brick lining,
- Setting within the hillside, with earthen ramps on either side.

Elements not considered to contribute to significance of place include (but are not necessarily limited to):
- Structures associated with the Bretag/Green Farm Complex.

N ↑

LEGEND

▭ Outline of Elements of Significance for State Heritage Place

COMMENTARY ON THE LISTING

Description and notes with respect to a place entered in the South Australian Heritage Register in accordance with the *Heritage Places Act 1993*

Physical Description

Two attached, rectangular D-type lime kilns set into a hillside near the centre of a farmstead, flanked by earthen ramps. The kilns are built from coursed and rubble limestone with double fire-brick lining to the interior of the firing chamber of the western kiln and remnant fire brick lining to the eastern kiln. The firing chambers measure 5 x 4 x 2.5 metres each. The firing chambers are supported by bricks and iron bars, with ash boxes beneath. Four fire and red brick archways are spaced along the front wall.

Elements of Significance:

Elements of heritage significance include (but are not necessarily limited to):

- Two masonry lime kilns with double-brick lining,
- Setting within the hillside, with earthen ramps on either side.

Elements not considered to contribute to significance of place include (but are not necessarily limited to):

- Structures associated with the Bretag/Green Farm Complex.
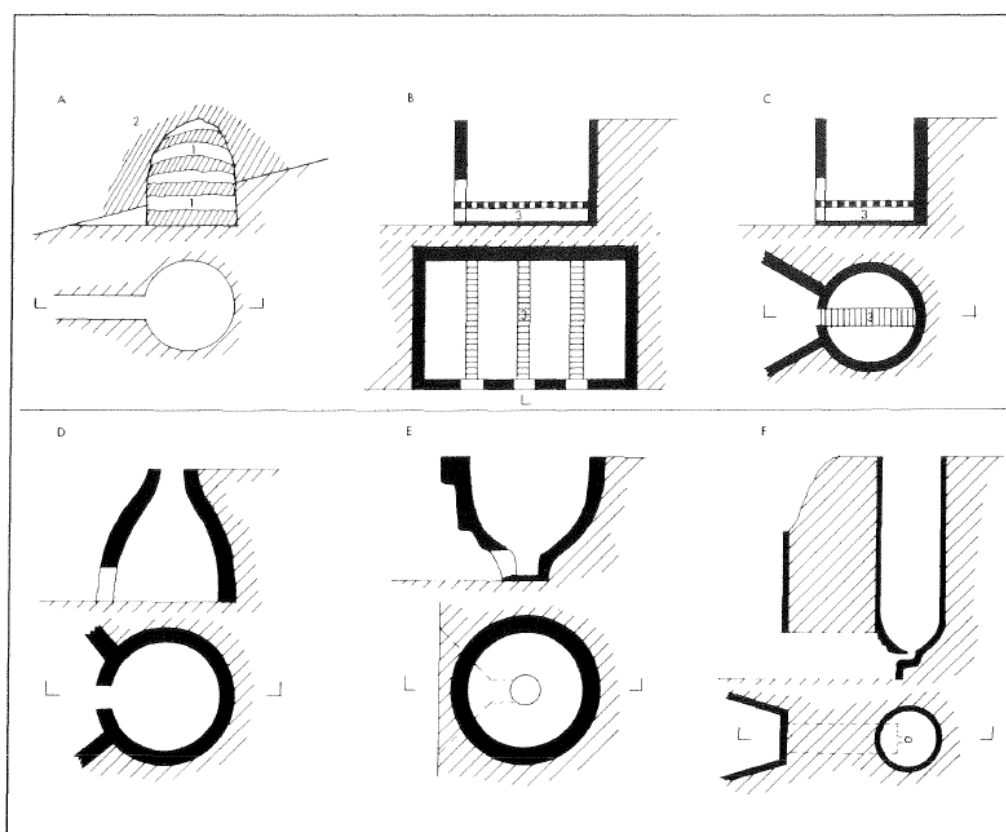
History of the Place

The South Australian Lime Industry

Lime kilns were used to reduce local limestone, a sedimentary rock comprising calcite or calcium carbonate ($CaCO_3$), or seashells, into powdered common lime or quicklime. Lime was essential to the building industry as a key component of mortar, lime plaster, whitewash and cement. Limestone is comprised of calcium carbonate ($CaCO_3$), which when burnt breaks down in a process known as calcination to create lime (calcium oxide CaO).[1] The lime could then be slaked with water to form calcium hydroxide ($Ca[OH]_2$), which is mixed with sand to make mortar or used in other lime-based building products.[2]

Lime was used in nearly every nineteenth century building in South Australia in one form or another and lime kilns were established in areas where limestone, dolomite or sea shells were abundant.[3] Lime kilns were mostly small-scale and built to service one building operation or to supply a particular district.[4] Many were established by farmers to supplement income while utilising the surface stone cleared from paddocks.[5]

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The most common variety of lime kiln in South Australia was the intermittent kiln, which was loaded, fired, then allowed to cool before reloading.[6] Subtypes included flare kilns, where the fuel and stone were kept separated, and mixed feed kilns, where the fuel and stone were loaded in alternating layers, with the thickest layer of fuel, usually composed of brush and kindling, forming the base.

In mixed feed kilns, the load was lit from the bottom and allowed to burn without further attention.[7] Firing took between 48 and 90 hours, with the degree of burning achieved judged by forcing an iron bar through the lime from the top, and by observing the shrinkage of the load.[8]

Due to the time and labour required to operate intermittent kilns they typically worked in pairs to produce an almost continuous output, one kiln being fired while the other was cooling.[9] Continuous kilns, which were designed so that fresh fuel and stone could be placed in the kiln and burnt lime withdrawn without interrupting the continuous burning process, resolved these issues.

Figure 1. Diagram of the major kiln forms. A. Pit-burn kiln; B. D-type kiln; C. Small cylindrical shaft kiln; D. Inverted cone (bottle) kin; E. Inverted bell kiln; F. Continuous feed shaft kiln. The lime kilns built by George Green are D-type kilns (top centre).

Source: Michael Pearson, *The Lime Industry in Australia – An Overview*, p.29.

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The most common form of intermittent kiln was the D-type kiln and its variations, the bottle kiln and the inverted bell-shaped kiln (Figure 1). D-type kilns, so named as they resemble a 'D' in plan,[10] were dug into the face of a bank with a vertical masonry wall built across the front of the pit, creating a firing chamber. Two or three ash boxes were built below the kiln floor and covered by iron bars or brick. The ash boxes opened through the front wall of the kiln, with an arched fire door or doors above, which allowed fuel and stone to be loaded and lime unloaded. D-type kilns were typically 4 to 7 metres long, 2 to 4.5 metres broad and 3 to 4 metres deep.[11]

Commercial scale lime kilns emerged in the late 1880s, producing lime predominately for the Adelaide market. This coincided with the advent of rail transport and, after the turn of the century, the increasing production of cement in central locations bringing about the demise of most country lime kilns in South Australia.[12]

The Emergence of Mixed Farming

The founders of South Australia envisaged a primarily agricultural colony. Under Edward Gibbon Wakefield's theory of 'systematic colonisation', the land was surveyed in contiguous blocks with surveys preceding land sales to prevent the dispersal of colonists into remote areas.[13] The basic unit of survey was the hundred, a parcel of approximately 100 square miles, in turn subdivided into a patchwork of small farm units averaging 80 acres, just large enough to support a single family.[14] This approach was to provide as many people as possible with access to land and encourage an equitable distribution of wealth.

Mixed farms became commonplace in the second half of the nineteenth century as wheat growers supplemented farm income and sought to become self-sufficient.[15] Farmsteads often included a cow for dairy products, sheep for meat and poultry for meat and eggs. Sheep and chickens were often fed the lower-quality grain not fit for sale.[16] Enterprising farmers also took up trades such as blacksmithing. Structures were often built to support these activities.
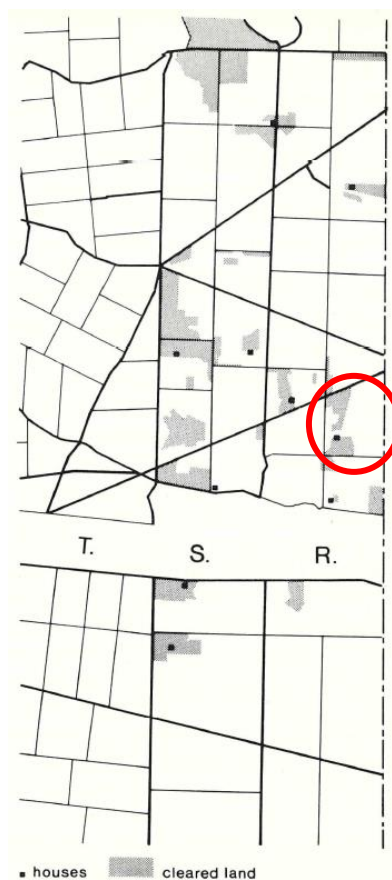
The Hundred of Monarto

The hundred of Monarto is located approximately 65km south east of Adelaide and comprises part of the eastern plains between the Mount Lofty Ranges and the River Murray. The Ngarrindjeri people are traditional owners of most of the hundred and prior to European arrival, numerous camping places were located near the river where there was a supply of food and water.[17] One known camping place was located at a water reserve on Salt Creek, near the boundary between the hundreds of Monarto and Mobilong. As agricultural settlement spread into the hundred in the late 1840s, Ngarrindjeri people lost access to food, water and cultural sites. Many Ngarrindjeri people moved to Mount Barker or Murray Bridge to seek work or provisions administered by the government.[18]

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The hundred of Monarto was surveyed in 1845, proclaimed on 30 November 1847,[19] and named after a Ngarrindjeri elder known to Europeans as Queen Monarta.[20] At the time of European settlement, the hundred was comprised of mallee scrub and soils considered inferior for agriculture and substantial deposits of surface limestone. Bringing the land into production was difficult due to the extent of clearing required, low rainfall and the lack of surface water.[21] Many farmers excavated large, underground tanks to store water.[22] Prior to the invention of mechanised ploughs or techniques such as 'mullenizing,' the land was cleared and cultivated gradually by hand, usually by axe.[23] The stone brought to the surface during clearing was often used in the construction of farm buildings and fences.[24]

In 1867, to encourage settlement into the mallee scrub, the drier eastern plains of the hundred were surveyed and put up for public auction under the regulations of the *Scrub Lands Act 1866*.[25] The Act allowed blocks of up to one square mile in certain defined areas to be offered on 21-year leases. The leases were auctioned with the highest bid becoming the annual rental, with the right to buy at the statutory minimum price of one pound per acre. The lessee was required to clear one twentieth of the land each year for 20 years or until all the arable land had been cleared.[26] By 1870, 32 leases had been taken up within the hundred of Monarto.[27]

Figure 2. Cleared land and established houses in the eastern portion of the hundred of Monarto in 1870. George Green's section is circled in red.

Source: Williams, p.142

Green Farm

On 11 July 1867, portions of sections 245 and 252-255 were purchased as leaseholds at public auction by George Green who intended to grow wheat.[28] By 1870, Green had successfully cleared a large portion of section 253 and built a home (Figure 2).[29]

Over the following decades, Green established an experimental 'Trial Farm,'[30] gradually expanding operations to include sheep and dairy farming, blacksmithing and lime production. The first structure built by Green was most likely a shelter constructed with mallee root walls and a mallee branch roof, which was still standing in c.1892 (Figure 3). To the immediate south-east of the shelter, Green built a wattle and daub family homestead, using Callitris pine posts and golden wattle slats.[31] The walls were in-filled with a mixture of small limestones, mud and straw before being plastered with a coat of lime mortar. Later, Green extended the homestead east,

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building a cottage with a large living room and kitchen, fireplace, and two bedrooms. This extension was constructed of limestone, insulated with mud mortar and rendered inside and out with lime mortar and whitewashed.[32] Nearby, Green built a small limestone room with freestone corners and shallow skillion roof, with a half-cellar attached on its southern side.

Figure 3. George and Jemima Green at the Trial Farm c.1892. Structures from left to right (indicated by arrows): Limestone room with cellar at rear, earth and stone cottage, wattle and daub cottage, blacksmith's shop, and the mallee root shelter.

Source: Monarto Safari Park

To the north-east of the family residence, Green constructed two intermittent D-type, mixed feed lime kilns which were used to burn lime for the local building industry.[33] The two limestone kilns were built at different times after 1882, with the eastern kiln erected first. Both kilns were originally double lined with firebricks sourced from Nairne brickmaker J. S. Watts.[34] Green's fuel of choice was likely mallee which grew in abundance nearby. During the twentieth century, many of the fire bricks from the eastern kiln were salvaged to build other structures across the site.

Green put Sections 245 and 253 up for sale in March 1899, along with his adjacent holdings on sections 256, 254, 252 in the hundred of Monarto, and section 210 in the hundred of Mobilong. The property totalled 1,020 acres of 'valuable' farming and grazing land, with improvements including a dwelling house of five rooms and cellar, a blacksmith's shop, two lime kilns, two permanent wells, three cement-lined tanks and one large tank for stock. The property was sub-divided into six paddocks which were all 'exceedingly well fenced' and 'mostly sheep-proof.'[35] The property failed to sell, and the property remained with Green until his death on 22 December 1905.[36]

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In 1906, Green's estate was sold at a clearing sale, including stock comprising 98 mixed merino sheep and five draught horses, implements and sundries.[37] The land was sold for a lump sum of £1,000 along with an allotment in Murray Bridge.[38] The new owners were Monarto farmers James Hutton and John Thomas Winch who share farmed the property.[39] Hutton was also a chaff and grain merchant, operating out of nearby Murray Bridge.[40]

In 1921, the farm was acquired by Friedrich August Bretag.[41] The Bretag family settled in the Monarto area at the same time as Green, with Friedrich's grandfather, Johann Karl Wilhelm, and father, Johann August, purchasing scrub leases nearby in the hundred of Monarto.[42] The farm remained in the Bretag family for almost fifty years, passing to Johann's son Friedrich Wilhelm (Bill) in 1927, and subsequently to his youngest son, Hugo Wilhelm Bretag in 1931.[43]

During the 1920s, Bill Bretag extended the homestead considerably to accommodate his wife Caroline and their four children Fred, Nora, Hulda and Hugo.[44] To do so, he filled in the cellar, built up its walls to create a new room, and added an additional room with a fireplace and chimney on its eastern side. Bill added a porch with bullnose verandah to the southern side, as well as a lean-to kitchen, also with a fireplace, and utility room on the northern side with galvanised iron walls. The new four-roomed cottage was covered with a corrugated-galvanised-iron half-hipped roof.[45] The kitchen had a chimney with open fireplace. Fire bricks taken from Green's long-retired lime kilns were used to build the kitchen fireplace and chimney and to form the keystone segmental arches over the windows on the southern elevation.[46]

Following Bill's death in 1944, his son Hugo took over the property. Hugo grew grain and bred prize-winning pigs,[47] while his wife Rita baked bread, biscuits and cake using a beehive oven in the former blacksmith's shop. In 1947, Hugo and Rita converted the stable and stable yard into a dairy. Hugo and family friend Herb Braendler built a room to the south of the stable to house a cream separator. In 1950, the grain store was converted into a two-roomed residence and in 1953, deterioration of the original homestead led the Bretag family to move into a new timber house.[48]

In 1973, the property was acquired by the state government as part of their plan to establish a satellite city at Monarto. When this project failed in the early 1980s, the allotment was offered back to the Bretag family. Like many other families who had re-established elsewhere, the Bretags did not accept the offer, leaving the land unoccupied. In 1983 the state government established the Monarto Zoological Park (now Monarto Safari Park), which opened to the public in 1993. Today the Green Farm forms part of the Zoo, serving interpretive and educational purposes.

In 2001, a preliminary archaeological study was undertaken by Flinders University's Department of Archaeology and in 2010 some of the structures on the site were excavated and partially repaired, including the lime kilns and the underground water

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tanks.[49] The Monarto Ruins Restoration Committee was established in 2008 to stabilise and care for Green Farm ruins.

Chronology

Year	Event
Late-1830s	Early European settlers divide the area now comprising the hundred of Monarto into pastoral leases of between 60 and 160 acres.[50]
1839	John Watts starts his brickmaking business, producing some of the first South Australian bricks in Hindmarsh.
1845	The first survey of the area which becomes the hundred of Monarto is conducted by Corporal Henry Ide of the Royal Sappers and Miners.
1847	The hundred of Monarto is proclaimed in November.
1858	The Watts family move to Nairne and continue their brickmaking business.
1863	The boundaries of the hundred of Monarto are revised in December.
1866	The *Scrub Lands Act* is passed.
1867	**The leases for sections 245, 252, 253 and 254 of the hundred of Monarto are advertised for sale and subsequently purchased by agriculturalist George Green (b.1830-d.1905).**
1869	The Monarto Post Office opens.
1870	The Monarto School opens.
1871	The Monarto Methodist Church is built. Green is a trustee.
1876	The stump jump plough is invented by Richard Bowyer and Clarence Herbert Smith.
1879	Joseph Samuel Watts joins the family brickmaking business in Nairne.
1880s	**Green constructs the lime kilns on section 253.**
1882	The District of Monarto is proclaimed. Green is elected one of the first councillors.[51] The first meeting is held at the Wesleyan Methodist Church.
1885	Green becomes Chairman of the District Council of Monarto (serving until 1889). The District Council of Monarto builds its Chambers on part of section 206.
1886	**Green receives a Land Grant for section 253 in the hundred of Monarto in October (CT 507/184).**
1889	Green is appointed Chairman of the Local Board of Health.[52]
1891	Green retires as councillor and is appointed J.P. of Monarto.[53]
1892	The South Australian Portland Cement Company is founded.

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1906	**Following Green's death in 1905, farmers James Hutton (b.1878-d.1937) and John Thomas Winch acquire the Green Farm. Winch leaves the venture in 1911.**
1911	The Monarto School closes.
1913	Monarto South School opens.
1921	**Friedrich August Bretag (b.1882–d.1959) acquires the Green Farm.**
1927	**Friedrich Wilhelm (Bill) Bretag (b.1876 –d.1944) acquires the Green Farm in October (CT 1856/113).**
	Bill Bretag extends Green's room and half-cellar into a two-roomed cottage.
1931	**Friedrich August Bretag builds a masonry above-ground tank adjacent to the stable.**
1935	The District Council of Monarto holds its last meeting before amalgamating with the District Council of Mobilong.
1946	**Hugo Wilhelm Bretag (b.1918 – d.2003) acquires the property.**
1947	**The horse stable is converted to a dairy. A milk separator room (creamery) is added by Hugo Bretag and Herb Braendler.**
1950	**Hugo Bretag converts the grain store into a small house. A brick stove is added to the building.**
1953	The homestead is vacated by the Bretag family.
1959	The Monarto South School closes.
1970s	The Dunstan Labor government proposes to establish a satellite city at Monarto on 16,000-hectares, with a projected population of 200,000.
1972	Land in the Monarto area is acquired by the state government and placed under the control of the Monarto Development Commission.
1973	**Section 253 is acquired along with others by the Monarto Development Commission.**
1976	Plans for the satellite city are deferred due to lack of funds.
1980	Plans for the Monarto satellite city are abandoned.
1982	Land controlled by the Monarto Development Commission is returned to the administration of the District Council of Murray Bridge.
1983	**Section 253 is transferred to the Minister for Environment and Planning.**
1983	The Monarto Zoological Park is established by the state government.
1990s	The roof is removed from the stable compound.
1993	The Monarto Zoological Park opens to the public.

2001	**A preliminary archaeological investigation undertaken by the Department of Archaeology at Flinders University commences at the Green Farm in February.**
2008	The Monarto Ruins Restoration Committee is established by Tim Jenkins and Allan Bretag.
2009 – 2010	**Repairs to the Green Farm ruins begin in 2010 with assistance and funding from the Construction Industry Training Board.**
	Slumped earth surrounding the lime kilns is removed and the masonry walls are cleaned and partially repaired.
	Horse stable compound is partially repaired.
	The underground water tanks are excavated and repaired. The square tank is completely rebuilt in its original location.
2019 - 2020	**The two-roomed cottage built by Bill Bretag is repaired as a result of a bequest from Rita Bretag.[54]**
	The Monarto Zoological Park becomes known as the Monarto Safari Park.

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/the_measure_of_land#:~:text=To%20encourage%20settlement%20on%20them,bid%20
becoming%20the%20annual%20rental.

Department of Primary Industries and Regions, 'Livestock,' History of Agriculture in South
Australia, https://www.pir.sa.gov.au/aghistory/industries/livestock.

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SITE DETAILS

Green Farm Lime Kilns, Monarto   **PLACE NO.: 26598**

Monarto Safari Park, 63 Monarto Road, Monarto SA 5254

DESCRIPTION OF PLACE: Two limestone and brick D-type lime kilns.

DATE OF CONSTRUCTION: c.1882 – c.1899

REGISTER STATUS: Nomination: 9 February 2023

                             Provisional Entry: 27 June 2024

                             Confirmation: 14 November 2024

CURRENT USE: Interpretive display by Zoos SA

                             1983 -

PREVIOUS USE(S):   Lime manufacture

                             c.1882 – c.1899

BUILDER: George Green

                             c.1882 – c.1899

LOCAL GOVERNMENT   Rural City of Murray Bridge
AREA:

LOCATION: Monarto Safari Park

LOCATION: **Street No.:**   63

                             Street Name: Monarto Road

                             Town/Suburb: Monarto

                             Post Code: 5254

LAND DESCRIPTION: **Title Reference:** CT 6297/539 D122491 A11

                             Hundred: Monarto

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PHOTOS

Green Farm Lime Kilns, Monarto　　　　　　　　**PLACE NO.: 26598**

Monarto Safari Park, 63 Monarto Road, Monarto SA 5254

The D-type lime kilns built by George Green in the late nineteenth century.

Source: DEW Files, Dec 2023

Lime kiln fire door archways.

Source: DEW Files, Dec 2023

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View of the eastern lime kiln firing chamber through the front archway. The elevated chamber is held up by iron bars and bricks, with the ash box below.

Source: DEW Files, Dec 2023

Fire brick stamped 'J.S. Watts'. Bricks like this are scattered around the site.

Source: DEW Files, Dec 2023

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Interior of the eastern lime kiln.

Source: DEW Files, Dec 2023

Interior of the western lime kiln. This kiln retains its double-layered fire brick lining.

Source: DEW Files, Dec 2023

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[1] Pearson, 'The Lime Industry in Australia,' p.28.

[2] Lime is still used today for a variety of purposes, including mortars and plasters in the building industry, in agriculture to open and lighten clayey soils and improve other soils in various ways, and in a variety of chemical and industrial processes.

[3] R.K. Johns, 'Limestone, Dolomite and Magnesite Resources of South Australia,' Geological Survey of South Australia, Department of Mines, Bulletin No.38 (1963), p.12.

[4] Pearson, 'The Lime Industry in Australia,' p.33.

[5] Weidenhofer Architects, 'Heritage of the Yorke Peninsula: General Report,' Department for Environment, Heritage and Aboriginal Affairs, September 1998. p.31.

[6] Pearson, 'The Lime Industry in Australia,' p.28.

[7] Quoted in Jane Harrington, *An archaeological and historical overview of limeburning in Victoria*, Heritage Council Victoria (2000), p.9.

[8] In the process of burning the limestone undergoes a loss of approximately 44 percent in weight and 12 to 20 percent in volume. This shrinkage is the primary way in which the operators judged that the process was complete. See Pearson, 'The Lime Industry in Australia,' p.28.

[9] Pearson, 'The Lime Industry in Australia,' p.31.

[10] A 'D' type kiln did not always need to have rounded sides. See Pearson, 'The Lime Industry in Australia,' p.30.

[11] Pearson, 'The Lime Industry in Australia,' p.30.

[12] Pearson, 'The Lime Industry in Australia,' p.32.

[13] D.W. Meinig, *On the Margins of Good Earth: The South Australian Wheat Frontier, 1869-1884* (Adelaide: Rigby Limited, 1962), p.9.

[14] Meinig, *Margins of Good Earth*, p.9.

[15] Department of Primary Industries and Regions, 'Livestock,' History of Agriculture in South Australia (accessed 23 May 2024), https://www.pir.sa.gov.au/aghistory/industries/livestock.

[16] Alan Jones, 'Farmers and their towns,' *Terowie Workshop: exploring the history of South Australian country towns*, ed. A.F. Denholm, Susan Marsden and Kerrie Round (Adelaide: University of Adelaide, 1991), p.94.

[17] Lucy Abbott and Mervyn Hein, *Range to River: recollections of Rockleigh, Pallamana and Toora* (Tailem Bend: Abbott and Mein, c.1989), p.9. Quoted in the 'Eastern Plain Heritage Survey,' p.55.

[18] Ross, 'Aboriginal History of the Monarto Area,' p.1.

[19] *Monarto 1847-1986*, published to commemorate the 'Back to Monarto' 15/3/86 in conjunction with the S.A. Jubilee 150 celebrations (Murray Bridge: Murray Kwik Print, 1986), p.3.

[20] Betty F. Ross, 'Aboriginal History of the Monarto Area,' Department of Environment and Conservation (Adelaide, 1974), p.1.

[21] Michael Williams, *The Making of the South Australian Landscape: A Study in the Historical Geography of Australia* (London and New York: Academic Press, 1974) p.136.

[22] Bruce Harry & Associates and A & P Kloeden, 'Eastern Plain Heritage Survey,' prepared for the Department of Environment and Natural Resources (South Australia, 1996) p.72.

[23] Meinig, *Margins of Good Earth*, p.103.

[24] Weidenhofer Architects, 'Heritage of the Yorke Peninsula,' p.26.

[25] Department of Primary Industries and Regions, 'The Measure of the Land,' History of Agriculture in South Australia (accessed 23 May 2024), https://pir.sa.gov.au/aghistory/land_settlement_in_sa/land_the_basis_of_sa_settlement/the_measure_of_land#:~:text=To%20encourage%20settlement%20on%20them,bid%20becoming%20the%20annual%20rental.

[26] PIRSA, 'The Measure of the Land.'

[27] Williams, *South Australian Landscape*, p.140.

[28] Williams, *South Australian Landscape*, p.139. And *South Australian Weekly Chronicle*, 'Advertising,' 8 June 1867, p.8.

[29] Cooper's sketch, SGO 1702 and 1745½ 1870 (in).

[30] His property was described as such in his wife Jemima's obituary notice. See *The Express and Telegraph,* 'Family Notices,' 3 October 1896, p.4.

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31 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

32 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

33 Owen and Steele, 'Monarto Zoological Park Archaeological Project 2001.'

34 Brick maker Watts & Son opened a factory in Nairne in the early 1860s. The bricks used at Green Farm, stamped 'J.S. Watts' in the frog, refer to the company's second-generation brick maker Joseph Samuel, who was running the Nairne factory from 1882. This indicates the kilns were built after that time. See Joseph Samuel Watts and Estelle Watts, 'Watts brick business, 183801985' (Nairne: J.S. Watts, 1990), p.2-4.

35 *The Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'Advertising,' 31 March 1899, p.2.

36 *The Express and Telegraph*, 'Advertising,' 17 September 1902, p.4. And *The Register*, 'The Country,' 27 December 1905, p.3. And *The Advertiser*, 'Family Notices,' 10 January 1906, p.6.

37 *The Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'The Southern Districts,' 23 February 1906, p.3.

38 *The Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'The Southern Districts,' 2 March 1906, p.2.

39 *Advertiser*, 'Obituary,' 16 January 1937, p.16.

40 *Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'Advertising,' 5 March 1920, p.4.

41 SAILIS, CT 507/184.

42 *Adelaide Observer*, 'Last Thursday's Government Land Sale,' 13 July 1867, p.8.

43 SAILIS, CT 507/184.

44 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

45 Owen and Steele, 'Monarto Zoological Park Archaeological Project 2001.'

46 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

47 *The Chronicle*, 'The Bretags, pioneers of Monarto,' 26 July 1974, p.24.

48 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

49 Owen and Steele, 'Monarto Zoological Park.'

50 The Rural City of Murray Bridge, 'Monarto Masterplan – Working Plan: Monarto's Character,' Council Working Paper #3, 4 June 2015 (updated October 2016), p.8.

51 *The Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'Government Gazette Items,' 13 October 1882, p.3.

52 *South Australian Weekly Chronicle*, 'Monarto,' 19 January 1889, p.13.

53 *The Mount Barker Courier and Onkaparinga and Gumeracha Advertiser*, 'Our District,' 2 October 1891, p.3.

54 Monarto Safari Park, 'Bretag Homestead,' interpretive signage.

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