a small round rock, or Island

...reshaping Nobbys

James Cook, 1770
The Purpose of this Study

- The year 2010 celebrated the bicentenary of Lachlan Macquarie’s term as Governor of NSW.
- Amongst his many achievements was the Macquarie Pier, a breakwater which joined Nobbys to the mainland at the mouth of the Hunter River at Newcastle.
- Some doubts have existed as to Nobbys’ height before the breakwater was commenced. New evidence is now presented to suggest 43 m.
was Nobby's really 62m high?
The 1818 and 2010 Panoramas

- In 1818, an insight into the development of Newcastle can be gleaned from the watercolour painting by Edward Close. He sat at the top of Nobbys to paint that scene.

- By comparison with the view from Nobbys today, the area known as Signal Hill, now Fort Scratchley, was much larger in extent. This indicates that much of the early material to build the breakwater came from that eastern side.
The Timeline

- The timeline gives a long term geological perspective of our changing sea-level.
- The important dates for European involvement with Nobbys and the Macquarie Pier are presented, so that the question:
  
  “How high was Nobbys?”

may be meaningfully discussed.
120,000 BP – sea level +5m
20,000 BP – sea level -120m
7,500 BP – Nobbys becomes island
? Awabakal dreaming story
1770 – Cook - “a small round rock”
1801 – Barrallier “Coal Island 203 feet”
1810 – “Nobbys” name first used
1818 – Macquarie Pier started
1822 – work on Pier suspended

Nobbys timeline 1
Nobbys/Whibayganba
1833 – intermittent work on Pier
1836 – Col. Barney restarts work on Pier
1839 – Pier construction from Nobbys end
1846 – Pier completed
1852 – Legislative Council – lighthouse
1854 – Tunnel and blasting?
1858 – Lighthouse operational

Nobbys timeline 2

**Nobbys/Whibayganba**
Nobbys now

Nobbys/Whibayganba
Take a Close Look at Nobbys

- The key geological features which you can discern on Nobbys now are:
  - the horizontally layered rocks rising up from the base. These are known as the ‘Nobbys Tuff’, reasonably hard rock also known as ‘chert’;
  - Immediately below the top, there is a grey layer of shale and coal. This is very important to note as this layer is always shown by early artists.
  - There is an intrusive, near-vertical, dyke of igneous rock which has risen up a fault line in long distant geological time.
Depictions of Nobbys

- The next slide was used in a 2005 study of Nobbys and shows, in a simple way, what buildings are there now and their heights.

- The following slide shows Terry Callen’s concepts of what Nobbys may have looked like from 1770 to 1852. Note that these illustrations are not necessarily to scale.

- Captain Cook was the first European to describe Nobbys in his journal of 1770.
looking northeast

Nobbys now

adapted from EJE (2005)

sea level

a small round rock, or Island

Nobbys/Whibayganba
Nobbys 1770-1858
by Terry Callen

a small round rock, or Island
Nobbys/Whibayganba
Thursday 10th. In the PM had the wind at S by W with which we stood in shore until near 6 o’clock when it lashed in 23 fathom water being about a mile from the land and as much to the southward of Cape Three Points. In the night the wind veered to WSW and WSW and in the morning to SW, having the advantage of a slight moon we made the best of our way along shore to the northward at noon we were by observation in the latitude of 32° 53’ 50’’ and longitude 158° 00’ 06’’ &t; and about 2 leagues from the land which extended from N 41° 8’ &t; 41° 8’ a small round rock or island lying close under the land bore of 82° 00’ Deep 5 fathoms 4 2% leagues. At sun rise in the morning found the variation to be 8° East. In the Latitude of 33° 2.8 a little way inland is a remarkable rock that is shaped like the crossing of a horse which is past about 90 fathoms in the forenoon.
Ensign Francis Barrallier 1801

- In 1801 Ensign Barrallier and other British naval officers and men undertook a magnificent survey of Newcastle Harbour and the Hunter, Patterson and William Rivers. It was a most detailed and accurate survey and took about six weeks in an open boat.

- Mostly it was just the position of the shore line, some hills and river depths which were shown, but upon showing ‘Coal Island’ (later Nobbys) he added a height of 203 feet (approx. 62 metres).

- This height has been accepted and unchallenged as true until now.
a small round rock, or Island

Barrallier 1801

- 203 ft
- (62m)

cliff line

Nobbys/Whibayganba
Other Height Determinations

- In 1839, America sent a major expedition to study Australia. Dana, a prominent geologist, visited Newcastle and described Nobbys.
- In 1828, Thomas Mitchell (later knighted) became Surveyor-General. He visited Newcastle and undertook an extensive survey. His work has only recently become available for study as his field-book was “found” in 2007.
- Captain Bull was placed in charge of constructing a lighthouse on Nobbys from 1852 and made several measurements.
estimate – Barrallier, Dana
survey – Mitchell, modern
measurement – Bull, Dana
landscape comparison – art works
image interpretation – art works, geology

How high?

Nobbys/Whibayganba
Barrallier 1801

Lewin (1807) watercolor

a small round rock, or Island

Nobbys/Whibayganba
Thomas Mitchell’s Survey

- Mitchell used a theodolite to measure angles in a horizontal plane between prominent features in Newcastle. He also measured angles in a vertical plane in order to calculate heights. His work was as accurate as one could expect in 1828, recording his angles to the nearest one minute of arc. (This would relate to an uncertainty in the height of Nobbys of about 0.4 m, given his location when he observed it).

- Mitchell was a great draughtsman and his field-note sketches of Newcastle are astonishingly precise.

- Mitchell’s field-notes record for the first time the local Awabakal name for Nobbys ... Whibayganba.
Mitchell's surveys

a small round rock, or Island

Nobbys/Whibayganba
Mitchell's vertical observations

v,w – Nobbys
n – barracks
a – Signal hill
i – old flagstaff
m – church
h – hospital
g – mill (obelisk)

station at end of wharf

a small round rock, or Island
Nobbys/Whibayganba
Mitchell's vertical observations

**a small round rock, or Island Nobby's/Whibayganba**

height\(= 1494 \text{m} \times \tan(1°39') = 43.0 \text{m}\)
Mitchell 1828

Nobby - or Whibayganba

a small round rock, or Island

Nobbys/Whibayganba
Mitchell’s Results for Height

- Mitchell made several observations around Newcastle to prominent features and when these are calculated, heights may be derived.

- The heights so obtained are within a range of less than a few metres of the accepted heights of those features (such as the obelisk) today.

- We can be fairly certain that Mitchell’s calculated height for the top of Nobbys of 43 metres is a good estimate.
Mitchell’s Sketch of Nobbys superimposed on a recent photograph

photo taken from north end of Fort Scratchley

1828 - 2010

Nobbys/Whibayganba
In 1852 Captain Bull made detailed surveys of Nobbys. Some of Nobbys had been removed for the construction of Macquarie Pier, but interestingly his plans show that most of the conglomerate rock on the top and above the shale layer was intact. This was presumably because conglomerate was a very poor material for use in a breakwater construction.

Some of the harder chert had been removed to make the ‘roadway’ up to the top of the shale layer. This is where he planned to erect a light-house.
conglomerate
37ft (11.3m)
shale & coal
12ft (3.7m)
chert
93ft (28.3m)

Capt Bull 1852
Nobbys/Whibayganba
What was the top of Nobbys like?

- Geological strata can be tracked and traced across the countryside. The same layers as we now see at Nobbys can be found, in profile, at other similar locations around Newcastle.

- The next slide shows the terrain at nearby Bar Beach (about 5 km away). The ‘tuff’, then the shale and coal layer can be seen, and on top is some conglomerate. Note that it has the very same vertical jointing as Thomas Mitchell showed in his sketches of Nobbys.
road cutting, Memorial Drive

the missing top?

a small round rock, or Island

Nobbys/Whibayganba
Captain Bull and Nobbys today

- The next slide shows Captain Bull’s survey of Nobbys overlain on a present day photograph.
- The amount of conglomerate left on top in 1852 can be seen, as can the amount of chert removed to make way for the roadway to the light-house.
- Of general interest is the near-vertical intrusive dyke shown on Capt. Bull’s sketch.
vertical exaggeration on 1852 image has been removed
The early landscape artists who depicted Nobbys had skills of a very high calibre and were very accurate in depicting the relative positions of landscape features.

By using a simple surveying technique which invokes the principles of a perspective projection, it is possible to estimate the height of features, such as Nobbys.
The key element is that we must know where the artist stood (height above sea level). We know this for several scenes around Newcastle.

If the line of sight from the artist to the top of Nobbys was to proceed to and finish at the horizon, then the artist would be at the same height as Nobbys. If Nobbys appeared below the horizon, then the artist was at a higher elevation than the top of Nobbys. Consider the following slides.

By means of a simple ratio and knowing the height of the artist, we can determine the height of Nobbys.
View from station at windmill (obelisk)

height above sea level = 69m

\[ h_N = 72 \text{ pixels} \]
\[ h_N = 114 \text{ pixels} \]

\[ h_N = 72/114 \]

\[ h = 69 \times 72/114 \]

\[ = 43.5 \text{m} \]

Landscape comparison

a small round rock or Island 
Nobbys/Whibayganba
Landscape comparison

from Prospect Hill
69m

Lycett
1818?

from Newcomen St
(S side of Newcastle
Club) 35m

Bauer
1804

Rae
1849

a small round rock, or Island
Nobbys/Whibayganba
Image interpretation

Nobbys/Whibayganba

Lewin 1807

Close 1820

Mitchell 1828

height to top of Nobbys scaled
height to top of coal known

a small round rock, or Island

32m

49m

45m

43m
Results

- From the art works, and any European ‘interference’ at Nobbys, a height value of Nobbys was repeatedly obtained in the range 42 to 49 metres.

- Mitchell and Bull agree on a value of approx 43 metres for the top and 32 metres to the shale.

- There seems to be no justification at all for Barrallier’s 203 feet (62 metres)! It is best we remember him for a magnificent exploratory survey of the rivers and hinterland.
looking northeast

1800 profile

adapted from EJE (2005)

sea level

Nobbys now

a small round rock, or Island

Nobbys/Whibayganba
a small round rock, or Island

...reshaping Nobbys

James Cook, 1770