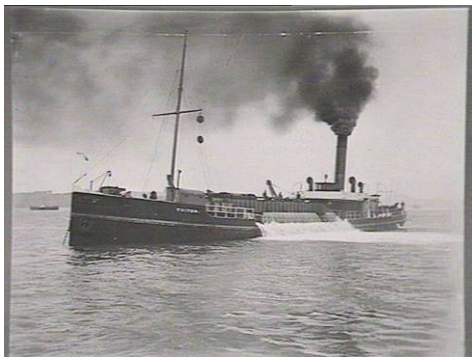
# Port of Clarence

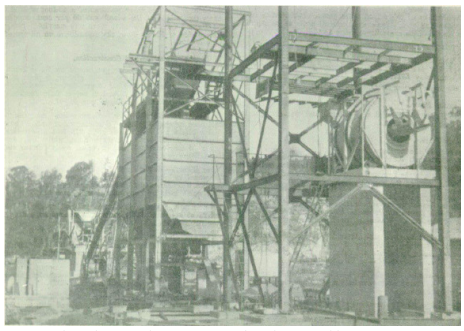
## Nomination for

## Engineering Heritage Recognition

*Angourie Quarry*

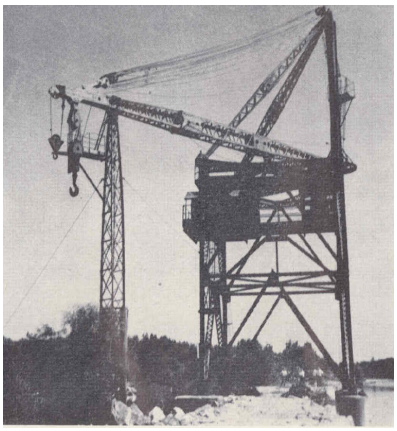


*Suction Dredge "Triton"*



*Block Making yard, Ilarwill Quarry*

*Ashby Dry Dock*



*Iluka 40t crane*

*Iluka Tramway Relic*

Nomination Prepared for Engineering Heritage Australia (Newcastle)

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Appendix B Paper by Walter Shellshear
Appendix C Paper by Floyd & Druery

# 1. Introduction

This Heritage Nomination Proposal has been prepared by Greg Mashiah on behalf of Engineering Heritage Australia (Newcastle).

The Port of Clarence's construction, which spanned a 109 year period, enabled provision of a reliable transport service between the Clarence Valley in Northern NSW and Sydney. The Clarence River was navigable for 67km from its entrance at Yamba and, following establishment of port works, the local road network was developed to service various wharves located along the river.

The Port of Clarence extended from the river entrance at Yamba (initially called Clarence Head) and Iluka, upstream nearly 50km to Grafton. The main component of the Port of Clarence is the entrance works, which was constructed in four stages:

- Stage 1 – Moriarty's Scheme (1862-1889)
- Stage 2 – Sir John Coode's Scheme (1893-1903)
- Stage 3 – 1914-1917
- Stage 4 – *Clarence Harbour Works Act* (1950-1971)

To facilitate construction of the entrance works, several quarries and associated tramways were also constructed. Up to five dredges operated to keep the river channels open for shipping, and a dry dock was constructed at Ashby to service the maintenance dredges. The port included twenty wharves located between the entrance at Yamba and Grafton.

Development of the Port of Clarence is associated with several eminent Australian and international engineers and politicians:

- **Edward Orpen MORIARTY**, Engineer-in-Chief for Harbours and River Navigation with the NSW Department of Works from 1858 to 1889,
- **Walter SHELLSHEAR**, Deputy Chief Engineer of NSW Public Works,
- **Sir John COODE**, British consulting engineer considered by many to "probably be the most distinguished harbour engineer of the nineteenth century" (Crawford, 1989)
- **Cecil West DARLEY**, Engineer-in-Chief for Harbours and River Navigation with the NSW Department of Works from 1890 to 1896 and Engineer in Chief from 1896 to 1907,
- **Sir George BUCHANAN**, British consulting engineer
- **Sir Earle Christmas Grafton PAGE**, Member for Cowper (1919 to 1961), Deputy Prime Minister (1922-1929) and Caretaker Prime Minister (1939)
- **Sir Henry PARKES**, Premier of NSW and "Father of Federation"
- **The NSW Public Works Department (PWD)** built the basic infrastructure of the State including the port works. The PWD developed coastal engineering knowledge and practice, and hydraulic modelling practice in NSW.

The Port of Clarence is considered to have **national** significance under five of the heritage assessment criteria, **state** significance under one of the heritage assessment criteria and **other than national or state** significance under one of the heritage assessment criteria. Its heritage value is therefore considered worthy of recognition by Engineering Heritage Australia with an Engineering Heritage National Landmark.

# 2. Heritage Marker Nomination Form

The Administrator
Engineering Heritage Australia
Engineers Australia
Engineering House
11 National Circuit
BARTON ACT 2600

**Name of work:** Port of Clarence
The above-named work is nominated for an Engineering Heritage National Landmark.

**Location, including address and map grid reference if a fixed work:**
The river entrance works are located at Yamba and Iluka, as shown on the locality map on the following page, and it is proposed that the interpretation panel be located at these works. A working Dry Dock is located at Ashby, approximately 15km upstream of the entrance. Associated remnant works include disused quarries at Yamba, Iluka, Angourie and Ilarwill and tramway remnants at Angourie and Iluka.

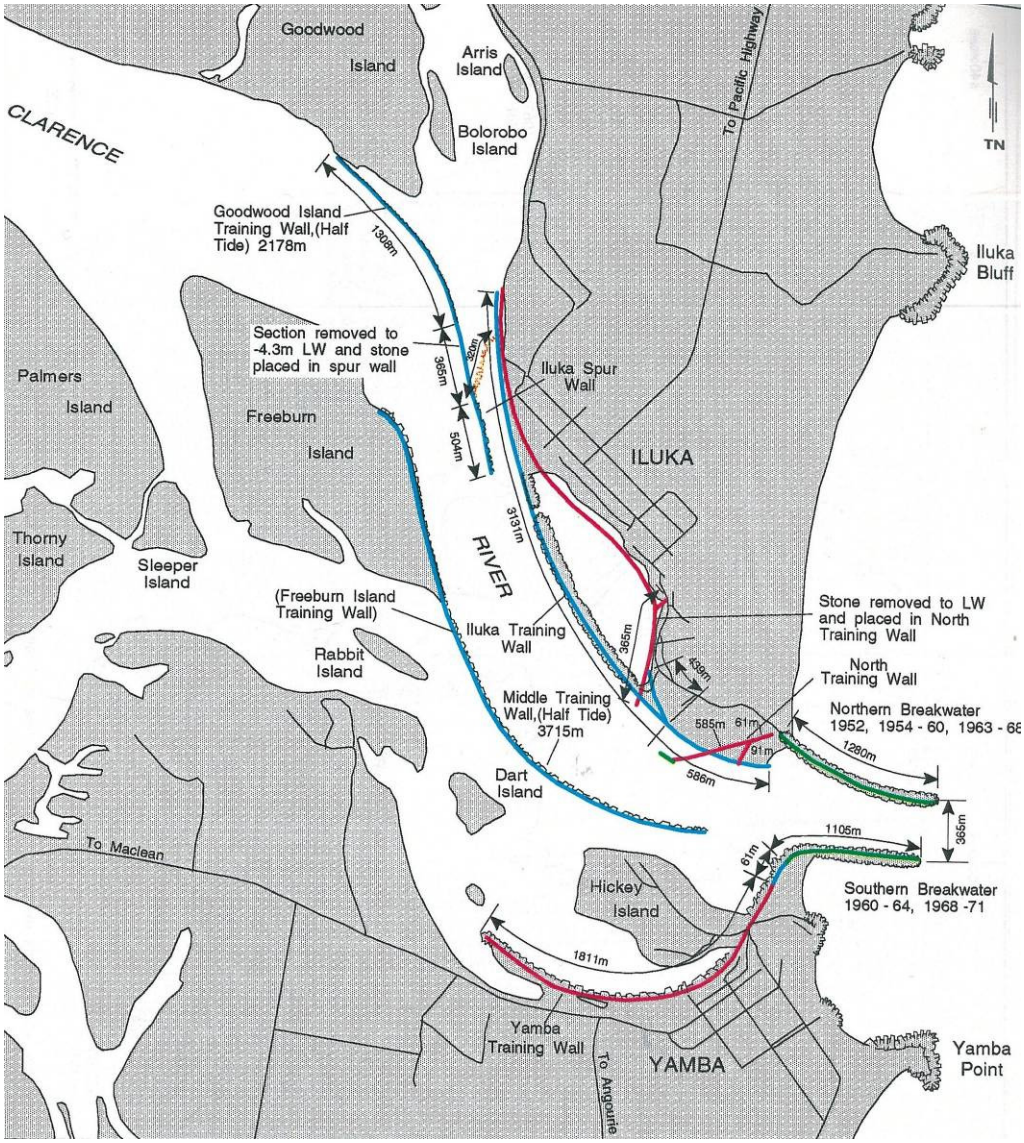
**Owner (name & address):**
The river entrance works are NSW Crown Lands. Some of the Iluka remnants are located in Bundjalung National Park. The Ashby Dry dock is owned by Roads and Maritime Services. Goodwood Island Wharf is owned by Sydney Ports Corporation

The Crown Lands Division of the NSW Department of Primary Industries has been advised of this nomination and the relevant letter of agreement for the ceremony at Yamba is attached (Appendix A).

**Access to site:**
All existing and remnant components of the Port Works (other than Ashby Dock. Goodwood Island wharf and the Ilarwill quarry) can be accessed by the public.

**Nominating Body**:
Engineering Heritage Australia (Newcastle)

Chair of Engineering Heritage Australia (Newcastle)
Date:




Map showing the key components of the entrance works (PWD, 1995)

Red – 1862 to 1889 (Moriarty Scheme)
Blue – 1893 to 1903 (Coode Scheme)
Orange – 1914 to 1917
Green – 1950 to 1971 (*Clarence Harbour Works Act,* 1950)

# 3. Historical Background

## 3.1 Introduction

Coltheart and Fraser (1987) indicate:

> *Waterways were the vital transport routes to the European settlers in the Australian colonies…coastal shipping was equally important in intercolonial trade, particularly in the transport of goods and people along the coastline of New South Wales. Although there were few good harbours, this remained the most efficient and economical means of transport until the completion of the South Coast railway to Nowra in 1892 and the North Coast railway in the 1920s. While inland river transport rapidly declined after the completion of the trunk railway lines in the 1880s, the coastal rivers remained vital to commerce for almost another half-century. Coastal engineering works were essential to the efficiency of this trade and involved improving the entrances to the rivers through training, establishing and maintaining navigable channels by dredging, and erecting lighthouses and signal stations at dangerous points along the coastline.*

The Clarence, which is the largest coastal river in New South Wales (NSW), is located approximately 550km north of Sydney and 300km south of Brisbane. McSwan (1978) suggested that, being navigable for 67 km from the entrance, the Clarence River could be used for greater penetration by ships from the sea than anywhere else in Australia. Shipping has played a key role in Clarence Valley's transport history, particularly between the arrival of the first steamship on the Clarence River, *King William IV* in May 1839 and the departure of the last scheduled coastal steamer from Grafton, the *MV Wyrallah*, on 9 March 1954 (Lee 2003). Thereafter, the few irregular ships played only a relatively minor transport role. For 94 of this 115 year period coastal shipping provided the only reliable transport between the Clarence Valley and Sydney, and significant engineering infrastructure was constructed to support this link. Prior to completion of the Sydney to Armidale railway in 1883, the Clarence Valley also served as the main port for the NSW Northern Tablelands (Gillespie 1988; Glencross-Grant 2009).

In addition to coastal shipping linking the Clarence Valley with Sydney, over this period there has been continual agitation for construction of a "deepsea" port". Gallagher (1979) defines deepsea port as "a port with sufficient depth of water to permit the direct export of cargo to inter-colonial or foreign countries", and writes:

> *There have been many dreams throughout the short history of New South Wales which have captured the imagination of men to become dominant motivating forces in the society which has evolved along the New South Wales Coast. Perhaps none has been so recurrent as the dream of the greatness which deepsea port development would bring to towns and districts distant from Sydney.*

McSwan & Switzer (2006) suggested that the "history of navigation and transport on the Clarence is one of evolution from a role of virtually total dependence to a minor one".

## 3.2 Shipping Serving the Port of Clarence

### 3.2.1 Intra-State (Coastal) Shipping

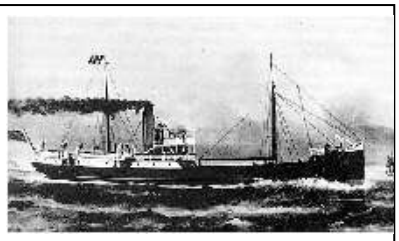
As well as the larger towns of Yamba (also called Clarence Heads), Maclean and Grafton, other towns and villages such as Iluka, Palmers Island, Lawrence and Ulmarra were also served by coastal shipping. The NSW Roads and Traffic Authority (RTA) (2006) indicated that "roads long focused on serving river ports and jetties, rather than on long distance travel". Lee (2003) suggested that there were three broad periods of regular coastal shipping operations in the Clarence River:

> *In broad terms, the first period from about 1842 to 1855 was one of uncertainty and frustration for local inhabitants as they had to tolerate an unreliable service offered by essentially experimental steamships. The second period, from February 1855 to August 1891, was a sorting out period as (the) three firms vied for business, but fares and cargo rates had to be higher than they might have been because of the duplication of services and limited nature of the potential market. The third period, from August 1891 to March 1954, was one of stability where good-quality ships provided a very reliable service at reasonable rates.*

The third period covers operation by the North Coast Steam Navigation Company (NCSNC) Ltd, which during that period was the sole coastal shipping company to regularly serve the Clarence River.


The NCSNC service was relatively intensive and Richards (1996) indicated that the 1908 Clarence River trade required three modern saloon (passenger) steamers (*SS Kyogle* of 702 tonnes, *SS Kallatina* of 646 tonnes and *SS Nymboida of 563 tonnes*), with two other steamers (*SS Macleay* of 398 tonnes and *SS Tintenbar* of 667 tonnes)

handling cargo which could not be accommodated by the saloon boats. The largest NCSNC vessel in regular Clarence River service was the *SS Ulmarra* (924 tonnes).



*SS Macleay.*

Following completion of the Sydney to South Grafton railway in December 1923, passenger traffic travelling by coastal shipping declined and ended during the 1930s (Lee 2003). Regular cargo traffic continued for two more decades, and Appendix 3 in Richards (1996) summarises cargo shipped from the Clarence River in 1940, with sawn timber, molasses, sugar, zircon and butter as the major items carried. In February 1953 the NSW Government Department of Railways granted bulk-loading contracts at rates more than 50 per cent below ordinary rail rates, which was a key factor in NCSNC shareholders voting to place the company into voluntary liquidation in February 1954 (Richards 1996). The last NCSNC vessels serving the Clarence River were the *SS Bonalbo* and the *MV Wyrallah*, with the latter departing Grafton for the final time on 9 March 1954 (Lee 2003).

*MV Wyrallah (AWM)*

Richards (1996) indicates that, under new owners, the *SS Bonalbo* continued to service the Port of Clarence until 1957. Raw sugar was also shipped from Harwood Mill to the CSR refinery at Pyrmont in Sydney with, bulk loading facilities of 60 tonne per hour capacity being commissioned on 9 August 1954 (Lee, 2003). The *MV Poolta* transported the last load of raw sugar from Harwood Mill to Pyrmont in 1980.

### 3.2.2 Inter-State and Overseas Shipping

While intra-state trade represented the majority of shipping, the Port of Clarence was also used for interstate and overseas trade. Evidence given to the 1886 Royal Commission on Water Conservation (cited in Stubbs, 2008) indicates that timber was being exported to New Zealand and that there were also "six large vessels constantly trading between the Richmond and Clarence Rivers and Melbourne." Stubbs (2007) indicates that the timber export trade "continued for many years… in each of the three years 1906-1908, about 1.5 million super feet of hardwood was shipped direct from the Clarence River to New Zealand.", while Lee (2003) notes that until the 1930s "the fast Tasman Clipper *Huia* took cargoes of timber to New Zealand". After the demise of the NCSNC, the Port of Clarence continued to be visited by "timber carrying steamers mostly trading to New Zealand, of which the *James Cook* was the most regular visitor into the 1950s" (Lee, 2003).

As outlined in Section 3.3.3 Goodwood Island Wharf was opened in 1969 and Lee (2003) indicates that this resulted in "a revival of ocean shipping, although now based on specialist trade with South Pacific islands rather than providing the basic link to Sydney".

## 3.3 Port Improvement Works

### 3.3.1 Clarence River Entrance Works

Clarence River entrance works are generally grouped into four stages, as shown in the Figure on page 5 of this nomination:

- Stage 1 – Moriarty's Scheme (1862-1889)
- Stage 2 – Sir John Coode's Scheme (1893-1903)
- Stage 3 – 1914-1917
- Stage 4 – *Clarence Harbour Works Act* (1950-1971)

#### 3.3.1.1 Moriarty's Scheme 1862-1889

In 1860 Sir Henry Parkes, visited Grafton and publicly promised financial support for breakwater construction (McSwan 1978). The Engineer-in-Chief for Harbours and Rivers Branch of the NSW Public Works Department (PWD), EO Moriarty, proposed a scheme to construct short breakwaters and rock training walls on both sides of the river entrance. Construction work on the southern breakwater commenced in 1862, using rock quarried from the adjacent Pilot Hill. The Grafton *Examiner* (cited in The Courier, 1862) reports that the foundation stone for the breakwater was laid on 29 September 1862, with between 400 and 500 persons travelling from further up the river on the steamer *Grafton*:

Pilot Hill Quarry, Yamba

> *About 1 o'clock, the ceremony of laying the stone took place, the wife of Captain Hill, P.M., smashing a bottle of champagne over three huge stones, weighing upwards of nine tons, as they glided off the truck into the water. Three cheers where then given for the Clarence River Breakwater.*

However, McSwan (1978) indicates that a shortage of funds slowed progress. Work on the northern breakwater commenced in 1874, using rock quarried from Iluka Bluff and transported to the worksite by tramway. Smith (2004) outlined the various contracts let for works undertaken as part of this scheme while McSwan & Switzer (2006) indicated that "as time progressed it was clear that the work was not going to plan, and was in fact described as a fiasco". Construction of the northern wall was abandoned in 1889, although part of the north training wall, now called "Moriarty's Wall", remains.

#### 3.3.1.2 Sir John Coode's Scheme 1893-1903

In 1884 Walter Shellshear, an engineer who worked in the Public Works Department and had an interest in coastal engineering (although never employed in that capacity) presented a paper to the Royal Society of NSW on proposed solutions to the three most troublesome river bars – the Clarence, Hastings and Richmond. The solution Shellshear proposed in his paper drew on the experience of English consulting engineer Sir John Coode, who was "probably the most distinguished harbour engineer of the nineteenth century (Crawford, 1989), and also experiences of training the entrance of the Tyne River in England. Coltheart & Fraser (1987) indicate:

> *The reasons why these sand bars form and the best means of eliminating them were at issue in a sustained controversy from the 1880s. The Engineer-in-*

*Chief for Harbours and Rivers, E.O. Moriarty, was the authority on these coastal engineering matters for thirty years, until his retirement and the establishment of the Parliamentary Committee on Public Works in 1889. Moriarty differed from the position taken by Shellshear and disagreed with Coode as well on the causes of movement of sand along the coast and the most effective method of resolving the problem of barred river entrances.*


Angourie quarry

Notwithstanding Moriarty's position, in 1885 the PWD invited Sir John Coode to examine and make recommendations for entrance works on a number of NSW North Coast Rivers, including the Clarence River. Coode's plans, submitted in 1887, were broadly similar to Shellshear's proposal and recommended modification to the main breakwaters, building of internal training walls and breakwaters and removal of a rock reef at the entrance. E.O. Moriarty retired in 1888 and was replaced as Engineer in Chief for Harbours and Rivers by C.W. Darley. Commencement of the works proposed by Coode were approved by the *Clarence River Improvement Act, 1890* and commenced in 1893; however, Darley modified Coode plan by adding a middle training wall (Gallagher, 1979).

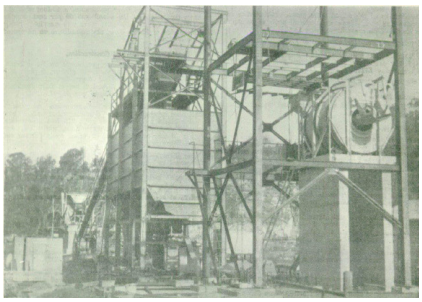
As the Pilot Hill quarry was exhausted, rock was brought by tramway from a new quarry at Angourie (5 km south of Yamba). The overburden thickness made the Angourie quarry too expensive to operate (McSwan 1992), and a new quarry was approved at Ilarwill, near Maclean, in November 1898. While most NSW breakwater works used igneous rock, the material from the Ilarwill Quarry was hard sandstone. Rock was transported the 25 km to Yamba by punt. When work on Coode's scheme ceased in 1903, the Goodwood Island (Half Tide), Middle (Half Tide) and Iluka training walls had been completed, but the main breakwaters had not been constructed and the reef had not been removed. Lee (2003) suggests that, following the completion of these works "the river was deemed navigable for ships of up to 4,000 tons gross drawing ten feet (3m)".

### 3.3.1.3 1914-1917

The main work undertaken in this period was the 1916 realignment of a section of the Goodwood Island wall with the Iluka wall (Coltheart 1997). Although further breakwater construction was authorized in 1919 by the *Clarence River (Northern Breakwater) Construction Act*, work stalled due to lack of funds (McSwan 1978).

### 3.3.1.4 Clarence Harbour Works Act 1950-1971

The last phase of entrance improvement works ironically commenced as regular coastal shipping was finishing. Following political pressure for construction of a "deepsea port" on the Clarence, the *Clarence Harbour Works Act, 1950* provided for construction of a 1280 m northern breakwater and extension of the southern breakwater by 548 m, with a width of 427 m between the breakwaters, and removal of Moriarty's Wall and the rock reef (PWD 1995). Construction commenced in 1952, with rock for the inshore section of the walls obtained from the Ilarwill Quarry, supplemented by 40 tonne concrete blocks also cast in the quarry and transported by


Block Making Yard, Ilarwill

barges towed by tugs to Iluka and Yamba (McSwan 1978). In 1962 it was decided to reduce the internal width between the breakwaters to 366m. The last concrete block was positioned on 14th May 1971 "with much tooting and flag waving" (McSwan 1978). Cranes and barges associated with the quarrying and transport were disposed by auction (Strange, 1973). Removal of Moriarty's Wall and the rock reef, which is claimed by the traditional Aboriginal Yaegl owners as a sacred site known as "Dirrangun", has not proceeded.

**3.3.1.5 Success of Entrance Works**

Gallagher (1979) notes that there were fundamental differences of opinion between Moriarty and Coode about the concept of entrance works:

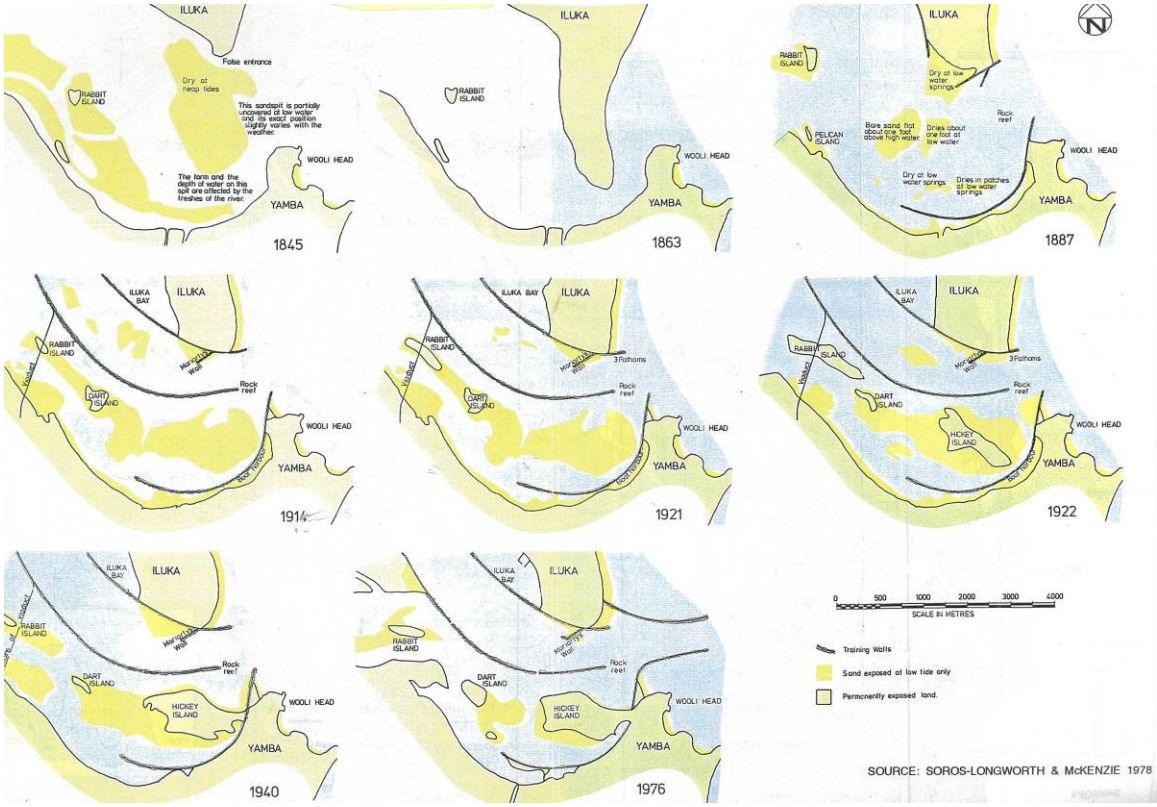
> *Moriarty sought to co-operate with observed natural forces by trying to discover how they usually operated and then seeking to design works which were in harmony with them; Coode sought to use force against force to turn the power of river, tide and flood to scour out a channel fixed by stone…professional and popular opinion were divided over [Moriarty's] operations at the mouth of the Clarence.*

Gallagher (1979) also notes that political influences impacted on the effectiveness of Coode's works:

> *[Coode] warned specifically against the dangers of embarking upon a project of insufficient scope and extent, advising that it was better to leave entrances alone than to undertake the partial construction of works which would always produce works which were less than satisfactory. The second principle enunciated by Coode was the need to maintain a strict order and rate of construction of works if they were prove successful. The engineers of the Department of Public Works could never be sure of having control of this aspect…because the decisions about which works should be built, the order of construction and the finance to undertake them were ultimately the decisions of other people who were not engineers.*

The entrance works have resulted in significant morphological change in the Clarence River entrance. Prior to construction of the entrance works floods caused significant changes to the shape of the river entrance and the location of navigable channels (Soros Longworth & McKenzie 1978).

Moriarty's works resulted in the formation of shoals in the centre of the entrance and near the southern wall; Coode's scheme resulted in a relatively stable entrance bar while the 1950 to 1971 works resulted in the bar advancing seawards and reducing in width. Despite the piecemeal nature of the works, the objective of a more stable entrance has been achieved, and no major entrance training works have been undertaken since 1971 (PWD 1984).




*Changes to the Clarence River Entrance (Soros, Longworth & McKenzie, 1978)*

### 3.3.1.6 Extant Engineering Heritage


Iluka Tramway remnants

In addition to the current training walls, remains of associated construction works exist. The quarries at Angourie subsequently filled with water and are known today as "Blue Pool" and "Green Pool", while a physical remnant of the Angourie to Yamba tramway is a shallow cutting at Angourie known as "Spooky Valley". Remains of large timber piles adjacent to Rabbit Island were originally part of the viaduct for transport of construction material to Middle Wall (National Parks & Wildlife Service 2007). The "Gantry Wall" at Yamba, named after a large gantry crane which lifted rocks and concrete blocks from barges onto a train for construction of the south breakwater, forms part of the southern limit of Yamba Bay, while the Pilot Hill quarry has been converted into a picnic area with the quarry face clearly visible below the Yamba lighthouse. There are remnants of the tramway at Iluka Bluff in Bundjalung National Park, although Smith (2004) described these as "rusted ruins". The Angourie pools, Spooky Valley, Iluka tramway tracks, Iluka crane block and breakwater and Yamba Gantry walls are listed as items of environmental heritage in the Clarence Valley Local Environmental Plan (LEP) 2011. The Ilarwill quarry, although currently unused, could be reactivated in the future to provide additional maintenance material; however, associated transport equipment has largely been removed.

## 3.3.2 Dredging

### 3.3.2.1 Introduction


Suction Dredge *Triton*

The majority of Clarence River dredging operations were conducted between 1890 and 1950, and peaked around 1910 when over 700,000 tonnes of material is recorded as being removed (PWD 1995). Gallagher (1979) notes that the introduction of sand-pump dredges into the PWD dredge fleet in 1890 which, until that time had consisted exclusively of ladder and grab dredges, had a significant impact on productivity with more silt being raised in the five years to 1895 than in the previous thirteen years. PWD Annual Reports include returns for up to five dredges working in the Clarence River during a calendar year. With the cessation of regular shipping the need to maintain a shipping channel to Grafton decreased. Coltheart (1997) indicates that annual dredging was undertaken until at least 1965 to maintain a thirteen feet channel to the CSR sugar mill at Harwood. Following a 1969 review the PWD dredge fleet was retired over the next few years, and "though the work of the dredges was never over, their day was done" (Coltheart, 1997). The last PWD Annual Report to specifically mention dredging Clarence River channels is 1975-1976, although the PWD Annual Report for 1976-1977 indicates "the dredge 'C.S. II' operated in the Clarence River at Yamba." Occasional contract dredging is still undertaken to maintain a six metre channel to the Goodwood Island wharf with NSW Waterways giving environmental approval in 2008 for on-going maintenance dredging to remove up to 30,000 $m^3$ of sand per annum (EcoLogical Australia 2007).

### 3.3.2.2 Ashby Dry dock


Ashby Dock in 1938

Between 1898 and 1900 the PWD constructed Ashby Dry Dock at Green Point, Ashby to service dredges associated with the Harbour and River Works. The successful construction Contractor for Ashby Dry Dock was John Wishart & Sons for a tender price of £3,540 (Nash 2002). Prior to commencing excavation a coffer dam of timber piles with timber sheeting around the river edge and bags of clay on the land end, was created around the proposed dock. The dock was excavated in sandstone, and lined with a 0.3 m thick concrete skin, with a keel block in the base. The dock gates, of galvanized iron frame with timber siding, were operated by a counter-balance. Associated site buildings included a blacksmith's shop and a carpenter's shop. In 1931 the dock was extended by 9 m to permit larger vessels, and between 1958 and 1960 was further extended by 18 m and raised 2.1 m in height by forming up a concrete buttress dowelled into the existing wall, then backfilling with rock and fines and retaining by a grouted rubble retaining wall. Additional works undertaken during the latter upgrade included installation of new hydraulically operated steel gates, crane, wharves and pumps at a total cost of £62,000 (RTA 2004).


Ashby Dock today (with ferry)

With decreasing dredging activity and cessation of cane barge haulage in the early 1970s, maintenance of Department of Main Roads (DMR) vehicular ferries became the main activity at Ashby Dock. The dock was transferred to the DMR in 1977, and is still used today for vehicular ferry maintenance.

RTA (2004) indicate that Ashby Dock is a representative example of a late 19th century stone dry dock in NSW, and is an endangered example of a late 19th century non-military working dry dock excavated from bedrock. The dock demonstrates changes in construction technologies, such as the remnant coffer dam and the original hand hewn dock excavation, while the extensions were constructed using explosives and more sophisticated plant and equipment. The Ashby Dry Dock has continuously provided facilities for maintenance of river craft for over 100 years, and is assessed as having "State" heritage significance (RTA 2004).

### 3.3.3 Wharves


Maclean Wharf

By 1884 the PWD had constructed four wharves along the Clarence River, expanding to twenty wharves by 1892 (Coltheart 1997). The importance of some towns varied over time. For example, Lawrence competed with Grafton as the major outlet for transport of produce from the Northern Tablelands until about 1860 (Hall 1977; Gillespie 1988). At its maximum extent Lawrence had four wharves but, as discussed in Glencross-Grant (2009), with later road improvements much of this trade was redirected to Grafton. Despite the opening of the railway to Tenterfield in 1886, limited trade through Lawrence was undertaken until at least 1897 and the Lawrence NCSNC wharf continued in use until regular coastal shipping ceased in 1954 (Gillespie 1988).

The main wharves serviced by the NCSNC were Yamba, Maclean and Grafton which, in addition to the Government Wharf, ultimately also had a railway and NCSNC wharf (Dunn 2002). The railways and NCSNC also constructed wharves at South Grafton. One hazard for wharves was the regular flooding with, for example, the public wharf at Palmers Island being washed away in 1945 and not replaced (McSwan & Switzer 2006).

The public wharves have generally been removed, with only remnants of the structures remaining. However, in 1969 a large deepsea wharf 70 metres long was constructed at Goodwood Island, a few kilometres upstream of the entrance, at a cost of $250,000 (McSwan 1978). Promotional material indicates that the wharf, which handles approximately 12,000 tonnes of cargo per annum, can serve vessels in excess of 100m (SPC, 2012).

# 4. Heritage Assessment

## *4.1 Basic Data*

**Item Name:** Port of Clarence

**Other/Former Names:** Port of Yamba (name of current operating port)

**Location (grid reference if possible):** see location map on page 5 for entrance works

**Suburb/Nearest Town:** Major towns associated with the Port of Clarence engineering heritage are Yamba, Iluka and Maclean. The town of Grafton formed part of the Port, but there are no extant Port of Clarence engineering heritage items at that location.

**State:** New South Wales

**Local Govt. Area:** Clarence Valley Council

**Owner:** NSW Crown Land, Roads and Maritime Services, National Parks & Wildlife Service, Sydney Ports Corporation

**Current Use:** Port

**Former Use (if any):** Nil

**Designer:** NSW Public Works Department (PWD): Primarily EO Moriarty (Engineer in Chief for Harbours and Rivers 1858-1899), Consulting Engineer Sir John Coode (1887) and engineers of the PWD Harbours and Rivers Branch. The PWD Manly Hydraulics Laboratory undertook hydraulic modelling of the port.

**Maker/Builder:** NSW Public Works Department using day labour

**Year Started:** 1862 **Year Completed:** 1971

**Physical Description:** Training walls, disused quarries, disused tramways, dry dock, wharf

**Physical Condition:** Good for the training walls, dry dock and wharf. Limited remnants of quarries and tramways.

**Modifications and Dates:** On-going maintenance of training walls using locally quarried stone

**Historical Notes:** (see separate details in Section 3)

**Heritage Listings (information for all listings):**

- Angourie Point pools (former quarries), Angourie Reserve (including Spooky Valley tramway cutting), Ashby dry dock, Iluka Crane block and breakwater, Iluka tramway tracks, and Yamba Gantry walls are listed as items of environmental heritage in Schedule 4 to the *Clarence Valley Local Environmental Plan, 2011*.
- Ashby Dry Dock is included in the RMS Section 170 Register and is assessed as being of "State" Heritage significance

## 4.2 Assessment of Significance

### 4.2.1 Historical significance

Coltheart and Fraser (1987) indicate:

> *Waterways were the vital transport routes to the European settlers in the Australian colonies…particularly in the transport of goods and people along the coastline of New South Wales...Coastal engineering works were essential to the efficiency of this trade and involved improving the entrances to the rivers through training, establishing and maintaining navigable channels by dredging, and erecting lighthouses and signal stations at dangerous points along the coastline.*

Although the first steamship visited the Clarence River in 1839, shifting shoals near the river entrance meant a reliable shipping service could not be maintained until port works were constructed. Coastal shipping was very significant in developing transport links to the North Coast of NSW because, prior to the opening of the railway line between Sydney and South Grafton in 1923, it provided the only reliable transport link. RTA (2006) indicates that "roads long focused on serving river ports and jetties, rather than on long distance travel". While shipping passenger traffic declined after the opening of the railway, coastal shipping still provided significant transport of cargo to the Clarence Valley until the Second World War when many of the ships were requisitioned for naval service.

Prior to completion of the Sydney to Armidale railway in 1883, the Port of Clarence also served as the main port for the NSW Northern Tablelands (Gillespie 1988; Glencross-Grant 2009). Kass (2009) suggests that while completion of the railway to Armidale "had threatened to draw off trade…the effect was not as severe as feared", and it was only the reduction of rail freight rates to the Tablelands in 1888-9 "in order to draw trade away from Brisbane (which) caused a marked decline in goods shipped". Gourlay (1996) summarises the historical significance of northern NSW river ports:

> *Subsequent exploration and particularly the search for the coveted red cedar timber along the northern coast of New South Wales led to the establishment of towns in the various coastal river valleys. These were almost always located on the estuaries of the rivers, often at the upstream limit of navigation at that time. Transport to and from these centres was by sea with coastal shipping entering the rivers and using their tidal waterways to reach the towns. As ships became larger and more numerous and shipwrecks more frequent the need to provide for the safe navigation of the often unstable, shallow and dangerous river entrances became urgent. During the late*

> *nineteenth and early twentieth centuries most of these coastal rivers, such as the Hastings, Clarence, Richmond and Tweed Rivers, required the construction of entrance breakwaters and estuarine training walls.*

One of the main exports from the Port of Clarence was timber, and the development of the Port assisted with the development of this trade. Stubbs (2007) suggests:

> *The export of north coast hardwood sections for construction purposes accelerated in the 1880s in line with demand created by the boom in public works, particularly railway construction and port improvements in New South Wales and Victoria. This was added to by the demand for railway sleepers and construction timbers within and outside the British Empire…for the year to 30 June 1889 a total of 1,284 piles and girders, 1.6 million Sft of sawn hardwood and 72,733 railway sleepers were shipped from the Clarence to Victoria and New Zealand.*

Lee (2003) notes that North Coast hardwoods were in particular demand in New Zealand because cobra worm (Teredo) resistant turpentine was much sought after as piles and jetties.

The rocky reef near the river entrance, which is known as *Dirrangun,* is a Dreaming place of great power and significance within the cultural landscape of the local Aboriginal people (Heritage Concepts, 2007). The reef has survived the numerous Acts of Parliament authorising its removal, and Bella Laurie of the Jigara tribe at Yamba told Roland Robinson (cited in Lee, 2003) that:

> *And the white people asked my father if it would be right if they blew that stone up. My father said 'No. If they did all the sea would rush in. She's supposed to block it.' That's the true think that the old people told me....My father told the white people, 'Don't touch that rock.' The white people tried and it rained and rained and wouldn't allow any boat to go to sea. They had to leave that stone and it's still there today.*

Due to its key role in developing European settlements in both the NSW North Coast and Tablelands regions and its link to the timber export trade, the Port of Clarence is considered to have "State" engineering heritage significance under the historical significance criteria.

### 4.2.2 Historic Individuals or Association

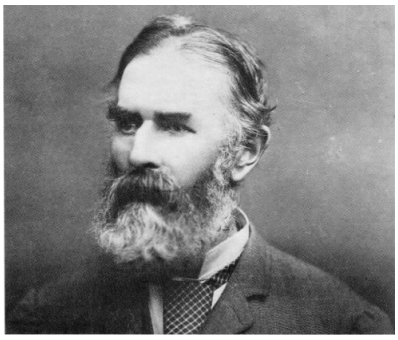
Prominent individuals associated with development, design and construction of the Port of Clarence are:

Sir Henry **PARKES** (1815-1896), "Father of Federation", visited Grafton in 1860 and publicly promised financial support for Clarence River breakwater construction (Coltheart, 1997). In 1883 he is reported in the Sydney Morning Herald (cited in Gallagher, 1979) as stating "The engineering problem of making the Clarence entrance safe cannot possibly be an insoluble one".

Sir Earle Christmas Grafton **PAGE** (1880-1961) Member for Clarence from 1919 until 1961, Deputy Prime Minister from 1922 to 1929 and Caretaker Prime Minister for 14 days in April 1939 was Federal Member for Cowper, which included the Port of Clarence. Coltheart (1997) indicates "the agitation and political organisation which sprang from visions of a deepsea port on the Clarence grew stronger

throughout the 1920s, still dominated by the influential figure of Earle Page after he became Treasurer in the first Federal coalition government in 1922."

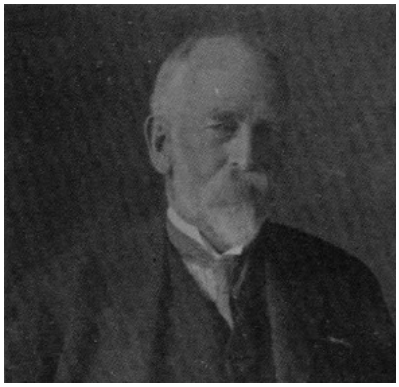
Edward Orpen **MORIARTY** (1825-1896) was born in County Kerry and educated at Trinity College, Dublin. He worked as a cadet constructing the breakwater on the Isle of Portland. He emigrated to Australia and in 1849 became an assistant in the Surveyor-General's Department. From 1853-1855 he was engineer and surveyor for the Steam Navigation Board and from 1855-1858 he was engineer for the Hunter River improvements. In 1858 he became engineer-in-chief for harbours and river navigation in the NSW Department of Works, a position he held until 1889. Moriarty proposed a scheme to construct short breakwaters and rock training walls on both sides of the Clarence river entrance. Construction work on the southern breakwater commenced in 1862 and work on the northern breakwater in 1874 (Powell, 1974).



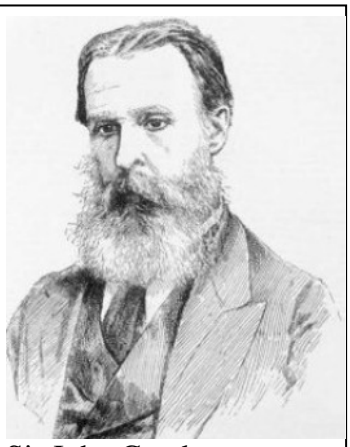
EO Moriarty (Coltheart & Fraser, 1987)

The reason why sand bars formed at entrances and the best means of eliminating them were the subject of a sustained controversy in the 1880s, and "Moriarty differed from the position taken by Shellshear and disagreed with Coode as well on the causes of movement of sand along the coast and the most effective method of resolving the problem of barred river entrances" (Coltheart & Fraser, 1987). While Moriarty was on leave prior to his retirement, his successor as Engineer-in-Chief for Harbours and Rivers, CW Darley, ordered the implementation of Coode's scheme (Coltheart, 1997). Part of the north training wall is now called "Moriarty's Wall"

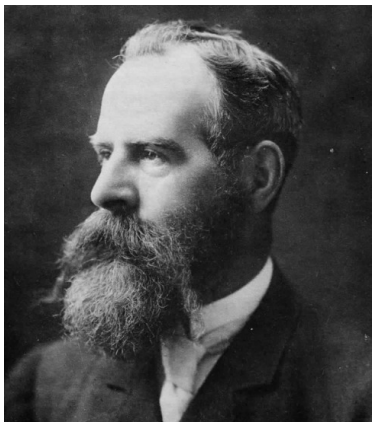
WALTER **SHELLSHEAR** (1856-1939) was born in London and graduated in engineering at Glasgow University. In 1879 he emigrated to New South Wales and joined the New South Wales Public Works Department in the Roads Branch, transferring to the Railways Branch in 1882. He was greatly interested in coastal engineering (although never employed in that capacity) and on 4 June 1884 presented a paper entitled "On the Removal of Bars from the Entrances to our Rivers" 4 June 1884 (see Appendix B), which proposed a solution differing significantly from Moriarty's proposals. Shellshear corresponded with Sir John Coode regarding river entrance processes, and Sir John Coode's 1887 scheme, which was adopted for the Port of Clarence entrance works, was broadly similar to that proposed in Shellshear's paper. Shellshear retired in 1921 and died at his home in Greenwich in 1939. He was an active member of such learned societies as the Royal Society of New South Wales, to which he belonged from 1881 to 1922. In evidence to a Public Works Parliamentary Committee in 1889 Shellshear remarked that "improving these bar-bound rivers is a favourite study of mine. I have taken a great deal of pains with it". (Coltheart & Fraser, 1987)



Walter Shellshear (Coltheart & Fraser, 1987)


Sir John Coode

Sir John **COODE** (1816-1892) was "probably the most distinguished harbour engineer of the nineteenth century" (Crawford, 1989) and Gallagher (1979) suggested that his "name was associated…with a standard of excellence in harbour works construction and to the people of New South Wales he represented the very best which England had to offer with a reputation which made him an unquestioned authority in this field". Coode was born at Bodmin, Cornwall, studied civil engineering under James Rendell of Plymouth and was elected a member of the Institute of Civil Engineers in 1849. In 1885 he visited Australia and examined various ports and harbours from Fremantle to the Gulf of Carpentaria, including the Port of Clarence. His report to the NSW government in 1887 recommended the building of two moles or piers to act as breakwaters and training banks and the removal of the rocky reef across the entrance to provide a fixed navigable entrance and reduce damage from floods and tides, although finance did not permit construction of this scheme in full. Two years after delivering his report on the Port of Clarence, Sir John Coode was elected as president of the Institution of Civil Engineers; a position he held from May 1889 to May 1891. He died at Brighton, England on 2 March 1892. (Crawford, 1989)


Cecil West Darley

CECIL WEST **DARLEY** ISO (1842-1928) entered a 3-year pupilage under Mr. W. R. Le Fanu, M. Inst. C.E. in 1860 and emigrated to NSW in 1867, joining the Harbours and Rivers Department of New South Wales under Mr. E.O. Moriarty. He was appointed Engineer-in-Chief for Harbours and Rivers, New South Wales in 1889 and promoted to the position of Engineer-in-Chief Public Works Department in 1896 until being appointed Inspecting Engineer under the New South Wales Government in London in 1901, which position he held until his retirement in 1907.

Darley was responsible for constructing Coode's scheme for the Port of Clarence, although he added a middle training wall to Coode's original design. His 40 years of meritorious service was recognized by conferment of the Imperial Service Order. He was elected a Member of the Royal Society of NSW in 1876 and the Institution of Civil Engineers in 1879, was a Member of Council in 1901, and served as the Australian representative Member on that body until 1904. Darley was also significant in other areas of civil engineering, being responsible for the design of the thinnest concrete arch dam in the world at Medlow (Coltheart & Fraser, 1987)

**Sir George BUCHANAN** (1865-1940) was described by the Sydney Morning Herald (1925) as a "world-famous consulting engineer and specialist in harbour, river, railway and dock works." He was chairman and chief engineer of the Rangoon Port Trust for 15 years and engineer-in-chief of the Dunedin Harbour Trust for 5 years,

and was also reported as having undertaken consulting work in Venezuela, Canada, Argentina, Spain, Jamaica and England. He had served as an engineer in the British Army during the First World War, being promoted to the rank of Brigadier-General and shortly after was knighted. He was principal of the consulting firm CS Meik and Buchanan (which is a predecessor of engineering consultancy Halcrow) from 1920 to 1923, but Halcrow (1993) indicates that about 1923 he was expelled from the Institution of Civil Engineers for supposedly criticising and condemning the proposals of another engineer and offering his services uninvited.

Sir George was commissioned by the Commonwealth Government in 1925 to undertake a study of "suitable places for the construction of deep water harbours both from the point of view of trade and defence" (The Age, 1925). His report suggested the Port of Clarence should rank next to Melbourne for port development.

The post World War II Port of Clarence works were associated with several PWD Principal Engineers, Harbour & Rivers:

- Harry F Searl (1936-1945),
- EOK Green (1946-1957),
- Athel A Ford (1963-1966), and
- CD Floyd (1969-73).

Given its association with several prominent NSW engineers who were instrumental in developing coastal and estuarine engineering knowledge and practice in Australia, eminent British consulting engineers Sir John Coode and Sir George Buchanan and nationally important politicians Sir Earle Page and Sir Henry Parkes, the Port of Clarence is considered to have "National" engineering heritage significance under the "historical individuals or association" criteria.

### 4.2.3 Creative or Technical Achievement

The Port of Clarence was constructed over a 109 year period, and demonstrates evolution in both coastal engineering design and engineering construction techniques between the mid 19th century and the mid 20th century, and the implementation of hydraulic modelling techniques for NSW.

The Port of Clarence was significant in the development of coastal engineering knowledge and practice in NSW. Gallagher (1979) claims "the Clarence was, in fact, to be the test of whether anything permanent could be done with success to the entrances of the rivers". Coltheart (1997) comments that "most of the breakwaters at the coastal river entrances were built without the scientific knowledge we now have of the high energy wave environment that characterises the New South Wales coastline. Earlier engineers learned by trial and error. They observed the results of their attempts to maintain navigable channels through the river entrances." The Port of Clarence provided a prime example of this process. Moriarty disagreed with Coode (and Shellshear) on the causes of movement of sand along the coast and the most effective method of resolving the problem of barred river entrances. "Shellshear, and many others, maintained that the existing river works undertaken by Moriarty's Branch were directed at the results, rather than the causes, of the problem" (Coltheart and Fraser, 1987). By inviting Sir John Coode to provide "international best practice" advice, the PWD built on its 30 year experience and adopting his advice (which differed markedly from that of its own Engineer in Chief for Harbours and

Rivers, EO Moriarty) demonstrated that it was prepared to undertake continuous improvement. As noted in Section 3.3.1.5 of this nomination, Moriarty's works resulted in the formation of shoals in the centre of the entrance and near the southern wall. Floyd and Druery (1976) indicate that Moriarty's scheme "did not progress sufficiently to draw any conclusions on its effects". Coode's scheme resulted in a relatively stable entrance bar which Floyd & Druery (1976) note "with frequent dredging served reasonably well for coastal shipping". In later years, a major hydraulic modelling study of the river entrance works was undertaken (PWD, 1971) and monitoring actual river behaviour was reported internationally (see Floyd & Druery's paper in Appendix C).

Gallagher (1979) concluded regarding the early engineering works:

> *… river entrances…were a perplexing problem for the engineers who were expected to keep them navigable without funding equal to the task. It is a tribute to those professional men that they accomplished what they did and that, when constructing similar modern works built with the aid of sophisticated devices for identifying the forces at work in the vicinity of the entrances, engineers today follow basically the same lines as their nineteen century counterparts.*

The different stages of construction over the 109 year history of the Port of Clarence demonstrate the emergence of engineering construction techniques. Early construction works (Moriarty's scheme) used locally quarried material transported short distance by tramways. Coode's scheme involved transporting quarried material from a quarry 25km distant by punt. The *Clarence Harbour Works Act* scheme included cast concrete blocks as well as quarried material being transported 25km to the worksite by barge, as well as increasing mechanisation of construction works.

The Port of Clarence also required two opening bridges to permit passage of shipping to Grafton. The MacFarlane Bridge at Maclean was previously recognised in 2006 with a Heritage Engineering Marker, while the Clarence River Bridge at Grafton was recognised as part of the Grafton to Brisbane Railway Line with an Engineering Heritage National Landmark in 2009.

Given its role in developing coastal engineering design and practice in NSW and in fact Australia, and in particular its role as a prototype for NSW river entrance works, the Port of Clarence is considered to have "National" engineering heritage significance under the "Creative or Technical Achievement" criteria.

### 4.2.4 Research Potential

The extant Port of Clarence, and remnants of associated construction infrastructure, provides teaching and understanding opportunities. The entrance training walls are still in place and are regularly maintained. Remnants of associated construction infrastructure include:

- the quarries at Angourie, which subsequently filled with water and are known today as "Blue Pool" and "Green Pool",
- physical remnants of the Angourie to Yamba tramway constructed to transport rock from the quarries to the southern breakwater, including a shallow cutting at Angourie known as "Spooky Valley",

- Remains of large timber piles adjacent to Rabbit Island were originally part of the viaduct for transport of construction material to Middle Wall,
- The "Gantry Wall" at Yamba, named after a large gantry crane which lifted rocks and concrete blocks from barges onto a train for construction of the south breakwater, which forms part of the southern limit of Yamba Bay,
- The Pilot Hill quarry at Yamba, which has been converted into a picnic area. The quarry face is clearly visible below the Yamba lighthouse, and
- The remnants of the tramway at Iluka Bluff in Bundjalung National Park used to transport quarried material to the northern breakwater.

The dry dock which was constructed at Ashby to maintain dredges used for maintenance dredging is still used for its original purpose of vessel maintenance (vehicular ferries).

As remnants exist for other river ports, the Port of Clarence is considered to have "Other than National or State" engineering heritage significance under the "research potential" criteria.

### 4.2.5 Social

Construction of the Port of Clarence had a high social significance as it permitted the establishment of reliable transportation between the Clarence Valley (and Northern Tablelands) and Sydney. Commercial interests also extended beyond links to Sydney, with Kass (2009) indicating that in 1890 there was an attempt to forge a direct sea link between the Clarence and England, which "failed due to inability to obtain a suitable vessel." Following the development of coastal shipping, towns and villages along the river such as Yamba, Maclean, Grafton, Iluka, Palmers Island, Lawrence and Ulmarra developed, and road links between the Tablelands and Grafton were established (Glencross-Grant, 2009). The history and development of these towns and villages is intimately tied with their use as part of the Port of Clarence.

Political influence on development of the Port of Clarence, and particularly the desire for a "deepsea port", was linked with the pressure of the "New State Movement". In 1915 Sir Earle Page, who was elected as Federal Member for Cowper in 1919, launched what became the Northern NSW Separation League, arguing that "metropolitan interests had stunted northern growth, for example by…refusing to bridge the Clarence or clear its mouth for navigation" (Bridge, 1988). The Federal Government commissioned a report by English Civil Engineer Sir George Buchanan entitled "Report on Transport in Australia with Special Reference to Port and Harbour Facilities" (1926), which listed the Clarence as one of five NSW ports capable of being made into first class harbours for overseas trade, and he recommended completion of Sir John Coode's scheme with the main deep water channel running along the concave side of the training wall, though deepened to 30 feet to allow modern vessels (compared with 18 feet in the original scheme). Buchanan indicated (cited in Coltheart, 1997):

> *I am distinctly of (the) opinion that the physical conditions at the Clarence River and estuary, if assisted by a wise and constant policy of deepening flood regulation and esturial reclamation, will lend themselves admirably to the creation of a first-class waterway and port for deep sea shipping at Grafton. I should, therefore, place the Clarence River first on the list of all the ports north of Newcastle for scientific port development for deep sea shipping.*

Buchanan suggested that "the Clarence River should rank next in importance to Melbourne in plans for future Australian port development" (Gallagher, 1979). Evidence given to the State Boundaries Commission in 1933 indicated that NSW Public Works did not endorse Buchanan's recommendations (Coltheart 1997). However, community lobby groups, particularly the Northern Tablelands based United North and North-West Better Communication League, continued to exert influential pressures to ensure a deep-sea port stayed on the agenda (Gallagher, 1979). The NSW government established a Development Committee in December 1939, which recommended in May 1941 that consideration of a deepwater port be set aside until conditions warrant serious consideration of such a course (Gallagher, 1979).

However, in July 1943 the then United Kingdom Deputy Prime Minister and Dominion Secretary, Clement Attlee, gave a speech in London to Building Congress on "how war-time construction and industry are preparing the Empire for future development" (SMH, 1943). Of three specific Australian projects mentioned in his speech, one was that "a deepsea port on the Clarence River (New South Wales) was planned as part of harbour and river works."

In June 1944, Public Works Principal Engineer for Harbour and Rivers, Henry Searl, recommended to Chief Engineer JM Main "the Department might indicate at this stage its preference for the Clarence River for the establishment of a deep sea port on the north coast of New South Wales." An inter-departmental committee recommended in principle in 1946 the establishment of a deep sea port at Iluka with a railway to Inverell. The passing of the *Clarence Harbour Works Act* in 1949 authorising a northern breakwater, extension of the southern breakwater, removal of the reef and Moriarty's Wall, dredging of the entrance channels and incidental works "seemed the culmination of all the dreams and of all the intense lobbying for the port" (Coltheart, 1997). While site works commenced in 1950 and the first stone was tipped in 1952, loan funding shortages soon curtailed work after only 350 feet of breakwater had been constructed and it was not until 1954 that construction recommenced (Gallagher, 1979).

In 1965 the Government allocated $100,000 for construction of a wharf at Goodwood Island, a few kilometres upstream of the entrance, to enable timber from the Richmond and the Clarence to be exported (Gallagher, 1979), and also announced the Government planned to spend $1.5 million to excavate the reef and provide a 500 feet wide channel with a minimum depth of 32 feet. The Goodwood Island wharf, which was completed in 1969, can service ocean going vessels over 100 metres in length, but the reef was not excavated.

An important element in the arguments for a "deepsea port" had been the proposed export of wheat from the Northern Tablelands but in 1968 the grain producer's organisation decided to press for construction of grain loading facilities in Newcastle (Coltheart, 1997). The future development of the Port of Clarence was referred to the State Development Corporation. In 1970, a year after the northern breakwater had been completed, the Corporation reported "there was no economic basis for the dream which had seemed so close to becoming a reality" (Coltheart, 1997). In 1973 the State Government announced that Cabinet had decided to carry out no further works on the Clarence entrance. The rocky reef, which provided a major constraint to

operation of a "deepsea port" because as well as restricting depth it "causes considerable turbulence at flood and ebb tides" (Floyd & Druery, 1976), had not been removed.

While the aspirations for a "deepsea port" have only been partially fulfilled, the Port of Clarence continues today as a working port (known as the Port of Yamba), although with a much diminished level of shipping. However, the aspiration for a "deepsea port" to serve the Northern Tablelands continues, with a call as recently as March 2012 for a railway line to be constructed from Moree to Goodwood Island to permit coal export from a Port of Clarence (*Daily Examiner*, 5 March 2012).

While coastal and international shipping today plays a much smaller role in the Port of Clarence when compared with the previous 150 years, the extant port works also continue to have social significance in facilitating safer passage of commercial fishing and recreational vessels from the river to the sea. The main industries in Yamba and Iluka are tourism and commercial fishing, with commercial fishing facilities having been developed in both towns.

Given its links to the aspirations of the "New State" movement, that in the middle of the Second World War the UK Government considered a deepsea port on the Clarence as one of three projects preparing Australia for future development and the partially fulfilled ambition for a "deepsea port" (an ambition which continues today), the Port of Clarence is considered to have "National" engineering heritage significance under the "Social" criteria.

### 4.2.6 Rarity

Many NSW coastal rivers had port works constructed during the 19th century to facilitate use by coastal shipping. On the NSW North Coast alone, the NCSNC served seven river ports (Richards, 1996 and brochure reproduced on p7 of this nomination). With upgraded land transport links replacing coastal shipping, most of the infrastructure associated with NSW river ports has been removed. The Port of Clarence (today known as the Port of Yamba) is one of two remaining NSW regional ports and is the only NSW regional river port (Transport for NSW, 2012). The other NSW regional port, Eden on the South Coast, is located in a bay rather than being a river port. The Port of Clarence is thus unique as it is the only remaining example of a NSW regional river port still fulfilling its original role serving ocean going vessels.

Three dry docks were constructed in northern NSW ports to service river dredges, but the Ashby dry dock is the only one still being used for vessel maintenance. RTA (2004) indicates that Ashby Dock is an endangered example of a late 19th century non-military working dry dock excavated from bedrock.

Given it is the sole remaining working example of a once relatively common NSW engineering feature, the Port of Clarence is considered to have "National" engineering heritage significance in terms of the "rarity" criteria.

### 4.2.7 Representativeness.

The Port of Clarence is the only remaining NSW example of a working river port, and is representative of a once common feature of coastal NSW. While river improvement works were undertaken on numerous NSW coastal rivers to enable

coastal shipping services, the Port of Clarence is still operated and maintained as a port for ocean-going vessels. For example, major repairs to the entrance walls which were undertaken in the mid to late 1990s were the most extensive works since construction was completed (Rangger, pers comm., 19 June 2012). Maintenance dredging is still being undertaken to maintain a shipping channel to Goodwood Island Wharf (Ecological Australia, 2007).

The entrance works were constructed over a period of 109 years, and are considered to be representative of the various construction techniques used in NSW river port works. The early construction works used mainly manual labour, with locally quarried material transported short distance by tramways. Later works used increased mechanisation, and transported quarried material from a distant quarry by punt. The final stage of the entrance works included cast concrete blocks in addition to the quarried material. The three stages demonstrate the evolution of river entrance construction techniques over a lengthy period.

The Ashby Dry dock is also representative of changes in construction technologies. The original construction was hand hewn, while the extensions were constructed using explosives and more sophisticated plant and equipment. RTA (2004) indicate that Ashby Dock is considered a representative example of a late 19th century stone dry dock in NSW, and is an endangered example of a late 19th century non-military working dry dock excavated from bedrock.

Given that extant Port of Clarence works demonstrate the evolution of coastal entrance and dry dock design and construction techniques over a 109 year period, and its continued operation and maintenance as an ocean going port for over 150 years, the Port of Clarence is considered to have "National" engineering heritage significance in terms of the "Representativeness" criteria.

### 4.2.8 Integrity/Intactness

The most significant components of the Port of Clarence, the entrance training works at Yamba and Iluka, are intact and are still being used for their original design purpose. The Ashby Dry Dock is also intact and is also still being used for its original design purposes, although as outlined in Section 3.3.2.2 it has been expanded several times which has resulted in some modification to the fabric of the dock. The Ilarwill quarry is extant, although currently unused, but could be reactivated in the future.

Remnants of construction works associated with the entrance training work exist. Two quarries at Angourie subsequently filled with water and are known today as "Blue Pool" and "Green Pool", while a physical remnant of the Angourie to Yamba tramway is a shallow cutting at Angourie known as "Spooky Valley". Remains of large timber piles adjacent to Rabbit Island were originally part of the viaduct for transport of construction material to Middle Wall (National Parks & Wildlife Service 2007). The "Gantry Wall" at Yamba, named after a large gantry crane which lifted rocks and concrete blocks from barges onto a train for construction of the south breakwater, forms part of the southern limit of Yamba Bay. The Pilot Hill quarry has been converted into a picnic area with the quarry face clearly visible below the Yamba lighthouse. There are remnants of the tramway at Iluka Bluff in Bundjalung National Park.

# 5. Statement of Significance

The Port of Clarence extended nearly 50km from the river entrance at Yamba and Iluka to Grafton. The major components are the breakwaters and training walls of the entrance works which were constructed in four stages between 1862 and 1971. Other components included a dry dock at Ashby and twenty wharves. The entrance works, Ashby dry dock and a wharf at Goodwood Island are extant, with remnants of associated ancillary works.

The work is of national engineering heritage significance because:

- of its links to the movement to create a "New State" in northern NSW, an association unique in Australia. Originally constructed for coastal shipping, political pressure from this movement resulted in a "Deepsea Port" being identified as one of three key Australian post World War II development projects. Construction commenced even as regular coastal shipping was ceasing;
- design and construction of the Port is associated with eminent colonial engineers EO Moriarty and CW Darley, eminent British engineers Sir John Coode and Sir John Buchanan, and important politicians including Sir Henry Parkes and Sir Earle Page;
- its development demonstrates the evolution of coastal engineering design and construction techniques over 109 years between the mid 19th and mid 20th century;
- the works played a key role in developing Australian coastal engineering design and practice and served as a prototype for NSW river entrance works, and
- it is uniquely representative of once-common regional NSW river ports and is the only remaining working example of a NSW regional river port.

The Port of Clarence was also instrumental in developing European settlement on both the NSW North Coast and Tablelands, and fostered the timber export trade.

Based on this assessment, the works are nominated for recognition as an Engineering Heritage National Landmark.

# 6. Interpretation Panel for Port of Clarence

## 6.1 Interpretation Strategy

Strategy for interpretation of the Engineering Heritage Works is laid out in EHA's "Guide to the Engineering Heritage Recognition Program" (November 2008).

In an overall sense, interpretation will be by: marking the works with an appropriate level of Heritage Marker; a public ceremony to unveil that Marker; and an interpretation panel which summarises the heritage and significant features of the works for the public.

It is proposed to locate an interpretation panel at Yamba, near the southern breakwater and facing Middle and Moriarty's Walls.

This Plan provides a summary of the proposal for design, content, location, manufacture and funding of the proposed panel.

## 6.2 Structure of Interpretation Panel for Yamba

In accordance with the latest international designs, the panel will be a self-standing sign mounted at waist height, inclined at a 30 - 40 degree angle from the horizontal to facilitate viewing by a person standing facing the panel.

The size of the panel itself will be approx. w: 1200 mm x d: 500 mm. The panel material could appropriately be one of a number of suitable materials that meets high standards of corrosion and vandal resistance. The panel surface coating containing the image could also be provided by a number of modern interpretive products now marketed for this purpose; including vitreous enamel (on steel surface), or plasticised Surface-coatings. It must meet high standards of image definition, colour-fastness and scratch resistance.

The panel will be mounted on a solid and strong stand that deters/resists attack from vandals, but on the other hand provides a pleasing and clean appearance. The panel will be similar to that installed in Grafton for the Grafton-Brisbane Railway Link Engineering Heritage National Landmark.

## 6.3 Design Process for the Panel Content

The basic panel content will be proposed and an initial design laid out by EHA(N). The sponsor of the heritage recognition award, NSW Department of Primary Industries Crown Lands Division, will be consulted in preparing the content.

When a satisfactory design content has been achieved, it will be submitted for the approval of the EHA HR Committee and Crown Lands. Following approval of the draft design and content, it will be submitted to the EA's Marketing Manager in the Canberra office, who will finalise the graphical content and prepare an .eps (vector graphics) file required by the surface-coating manufacturer.

## 6.4 Content of the Interpretation

In accordance with good interpretation practice the content of the panel will be divided into three themes for ease of understanding by the public. A summary of the proposed content is provided below.

**Title**

The title of the interpretation is proposed to be "The Port of Clarence". While today the port is known as the Port of Yamba, this title reflects that historically, the Port extend along the river upstream to Grafton. It also tries to avoid technical jargon in attracting the public's attention to the issues being presented.

**Layout**

In accordance with good interpretation practice the content of the panel will be divided into three themes for ease of understanding by the public.

*Primary theme (historical)*

A body of text will be derived from the nomination document to summarise the history of the Port. It will briefly discuss each of: the various components, the purpose of the Port, the major engineering features and its operational success.

*Secondary theme (engineering)*

The entrance works are a major component of the proposed heritage nomination. As this panel will be mounted in view of the entrance works, the secondary theme will be the training walls. Topics to be briefly addressed will be: the role of the entrance works in assisting with a reliable shipping service; significant engineering features (derived from Statement of Significance) and the entrance works as an icon for the Yamba and Iluka communities.

*Tertiary theme (social/personal)*

It is always good to add a personal theme to a story addressed to the public. In the case of the port construction, it is proposed to introduce the principal entrance designer, Sir John Coode, and his achievements. If possible, credits to the other engineers and the PWD Harbours and River Branch may also be added.

*Graphics*

*Map*

It is proposed to include a map (possibly historical) showing the location of the various port works to illustrate the primary theme. This could be artistically added as a background to the panel.

*Images*

Ideally a diagram or photo(s) of significant aspect(s) of the port work construction can be selected to illustrate the secondary theme. The historical research has uncovered many possible images for this theme.

*Portraits*

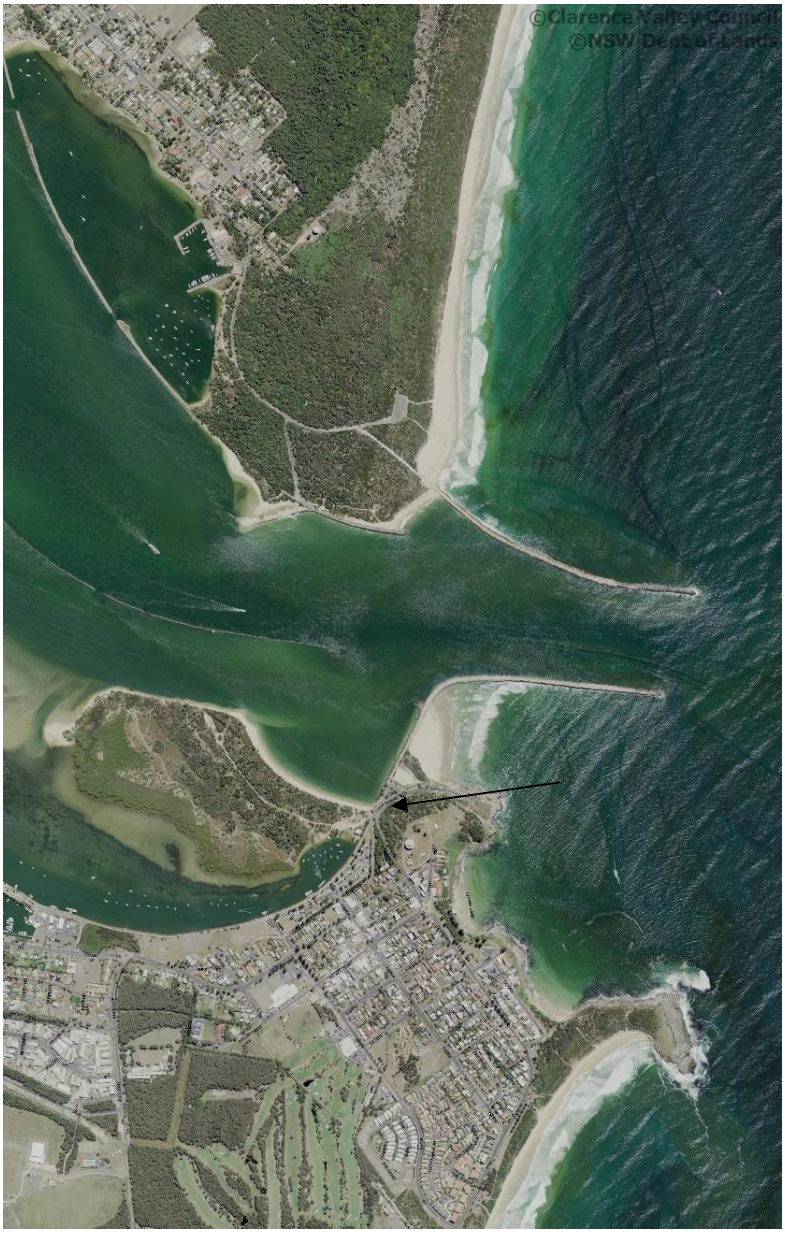
The historical research has uncovered a suitable photo of Sir John Coode to add a personal touch to the tertiary theme.

## *6.5 Location of the Interpretation Panel and Heritage Marker*

The Panel will be located in close proximity to the southern breakwater at Yamba. Good interpretation policy suggests that the sign be placed at a view point for the heritage works; preferably allowing readers of the interpretation to be able to see the item, or the detail being described by looking up.

The HR Guide suggests that the Heritage Marker is, preferably, to be placed on the works, out of reach of damage. It should also be visible and as close as possible to the Panel. If this is not possible, then an image of the Heritage Marker can be added to the interpretation content.

An initial study of the possibilities for placement of the Heritage Marker and Interpretation Panel has been undertaken, and a suggested location is marked with an arrow in the aerial photo below. A photo of the location is on the following page.



*Proposed interpretation panel site on the western side of the Turners Beach carpark for the heritage marker and interpretation panel. The pathway leads from the Turners Beach carpark to the southern breakwater, and is facing Middle Wall.*

## 6.6 Manufacture

Quotations for the Panel will be called from three manufacturers whom are known to have produced signs of the appropriate quality. A preferred tenderer will be selected from the responses on the basis of price, quality, service and estimate of the cost for replacement of damaged panel surface.

## 6.7 Funding

An estimate for the cost of the Interpretation Panel at is $2,000 – $2,500. EHA(N) will provide volunteer and in-house design resources for the above processes and actions in order to reduce this cost to a minimum (of mainly manufacturing costs). The Northern Rivers Group is contributing its $500 Year of Regional Engineering Team event funding towards the panel, and the balance will be contributed by Engineers Australia Newcastle Division.

In the letter of acceptance of the invitation issued to Crown Lands to support the HR event (see attached), CEO Crown Lands agreed to "…contribute towards the cost of the Interpretation Panels" in accordance with EHA's HR Guide.

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# 8 Acknowledgements

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