



# REGISTER OF HERITAGE PLACES - ASSESSMENT DOCUMENTATION

## 11. ASSESSMENT OF CULTURAL HERITAGE SIGNIFICANCE

The criteria adopted by the Heritage Council in November 1996 have been used to determine the cultural heritage significance of the place.

### PRINCIPAL AUSTRALIAN HISTORIC THEME(S)

- 3.7.4 Building and maintaining railways
- 3.7.3 Moving goods and people on land

### HERITAGE COUNCIL OF WESTERN AUSTRALIA THEME(S)

- 202 Rail and light transport
- 209 Technology and technological changes

### 11.1 AESTHETIC VALUE

*Kwinana Signal Box* is significant as a landmark. It was constructed to enable the signalman to see over the Rockingham Road Overbridge. Thousands of cars pass over the bridge daily and the Signal Box is the main landmark on the southern side and the only easily visible indication of the railway yard below. (Criterion 1.3)

### 11.2. HISTORIC VALUE

*Kwinana Signal Box* has historic value as a consequence of both its current role in Kwinana and its previous role at Koojeda. The building has significance as one of the few still in existence from the old Eastern Railway between Midland and Kalgoorlie (gold rush built and enhanced further with the opening of the Trans Australian Railway), as well as being the oldest building in the Kwinana Railway Marshalling yard. Yet in both locations it has a common link to the operation of standard gauge railways in Western Australia. (Criterion 2.2)

Kwinana, as a locality, changed extensively from the 1960s when it moved from a farming community and developed as a highly industrialised area. The emergence of new industries resulted in a changed transport requirement and so the Kwinana Railway Marshalling Yard was created. As a consequence the Rockingham Road overbridge was constructed and hence a high level signal box was required in order for the signalman to have visibility to the north and south. It is the signal box, with its landmark quality, which is the most obvious rail connection with the development of the Kwinana industrial area. (Criterion 2.2)

The contents, in particular the 40 lever McKenzie and Holland No. 9 interlocking lever frame, are of very high significance with the century old technology still in use. Associated with the contents are the ten signal posts in the yard, seven with signal arms that are still connected to the signal box workings by 'rodding' connected to them from the signal box. (Criterion 2.4)

The technology associated with the *Kwinana Signal Box*, dating from the 1896 McKenzie and Holland No. 9 interlocking lever frame through to modern computer based electronic technology, demonstrates the technical changes in signalling and safe-working over this period. (Criterion 2.4)

### **11. 3. SCIENTIFIC VALUE**

The technology associated with the *Kwinana Signal Box* covers a 100 year period. It has the potential to clearly demonstrate the use of lever frames, such as the McKenzie and Holland No. 9 interlocking lever frame through to modern computer based electronic technology. The 1896 designed lever frame, together with associated signal posts and semaphore signalling served WA for 100 years whilst various improvements were made, and as can be seen, it is the co-existence of electronic technology which demonstrates the technical changes in signalling and safe-working. The presence of ten signal posts, as well as the cabin and relay room, complete the technological span. (Criteria 3.1 & 3.2)

### **11. 4. SOCIAL VALUE**

For over 100 years the Government railway system has trained and employed signalmen. Whilst nearly all employees in the former traffic branch, responsible for train operations, were qualified in safe-working procedures, the job of the signaller was a specialised one. Their successors, as train controllers with computer age technology, still have the same responsibility for safety of people and property. The preservation of all aspects of signalling operations, from the beginnings in WA to the present day are now researched and recorded by a special interest group, the Signalling Interest Group of Western Australia. (Criterion 4.1)

Education value of a signal box has been recognised to date by the preservation of the Claremont Signal Box, the Subiaco Signal Box (relocated to Whiteman Park) and one at the Rail Transport Museum which is a combination of Carlisle and Maddington. However it is *Kwinana Signal Box*, with a larger range of technology and links to the old Eastern Railway, that is held in high esteem by former rail workers and enthusiasts. (Criterion 4.1)

## **12. DEGREE OF SIGNIFICANCE**

### **12. 1. RARITY**

The WAGR had over 100 signal boxes in operation over the extensive rail system of which only six remain. Of further rarity is the presence of ten semaphore signal posts, some complete with arms. (Criterion 5.1)

McKenzie and Holland No. 9 interlocking lever frames are rare today, not only in WA but Australia and indeed throughout the world. This is despite McKenzie and Holland manufacturing in both Britain and Australia. (Criterion 5.1)

*Kwinana Signal Box* is the only remaining operational lever equipped signal box on the WAGR system in Western Australia. It is believed to be the only signal box on the system to ever house such a diverse range of technologies. This range varies from the McKenzie & Holland No. 9 interlocking machine (lever frame design, patented c1886) used for mechanical interlocking of points and signals, itself containing both rotary and tappett interlocking, to the current panel which incorporates relay interlocking and computer based electronics to control the enlarged yard layout. These aspects of railway signalling, spanning a century of design, are still in use in 2000. (Criterion 5.2)

## 12.2 REPRESENTATIVENESS

*Kwinana Signal Box* represents a design of signal box that was built to house the operation of a McKenzie and Holland lever frame. It represents a period when railway traffic included part and full wagon loads, rather than the bulk haulage of the late twentieth century. This type of traffic required shunting at sidings and supported the use of industrial spur lines, consequently requiring the control of train movements in railway yards across the State of Western Australia. (Criterion 6.2)

As the former Koojedda Signal Box, this structure is the only railway building still in existence from the Eastern Railway between Midland and Northam, and one of a few (other than housing) from the whole railway from Midland to Kalgoorlie. At the Koojedda location, there are remains of building footings, and pits, but these are in danger of being obliterated with the construction of the new highway. The signal box is representative of the Eastern Railway and its vital link to the Trans Australian Railway. (Criterion 6.2)

## 12.3 CONDITION

The *Kwinana Signal Box* is in sound condition overall. Steel supports were repainted about eighteen months ago but do have some spots of surface rust showing through. With certain wind conditions there is the smell of sulphur from local industry and such emissions, coupled with the marine environment would be detrimental to the metal surface and cause further corrosion. Strong sea breezes have previously damaged the original awning over the cabin windows to the point that this has been removed.

The asbestos cladding is in good condition with no cracking or fretting noticeable. Westrail have a register of asbestos structures and are obliged to ensure containment is complete. The stairway, including the section previously at Koojedda, is in safe condition.

Interiors of the main cabin, stairway and toilet are sound. Metal strips have been placed in the window ledges to prevent rattling of windows, rain incursion and uncomfortable working conditions inside.

The isolation of the building has, in recent years, led to the need to lock the cabin door at all times in order to protect people and property, even though there is always a Signal Operator on duty. Previously the door lock was not used as the cabin was attended 24 hours a day. Recently, a gate at the lower part of the stairway has also been installed for further protection. Of concern therefore is the damage that would occur if the cabin was closed and unattended.

Being in daily use as a workplace has ensured that adequate maintenance has occurred to provide a safe environment free from hazards.

#### **12. 4 INTEGRITY**

The place has a high level of integrity at present. As an operating signal box it is still performing the function for which it was designed. However, Westrail plans to de-commission the signal box in June 2001.

Its future in this location must be carefully considered when it is no longer required for operational reasons by Westrail. Whilst it has important links to the Kwinana region, its location places it at risk from vandalism.

#### **12. 5 AUTHENTICITY**

At present the building and its contents have high authenticity as items have been added with changes in technology, rather than previous items being removed. For example, whilst some levers on the forty lever frame are no longer in use, they have been painted white to designate 'out of service' rather than removed. Twenty-eight levers are still in regular use. Similarly whilst the ends of some levers were cut off in service at Koojedda, they have been extended back to the original length. Evidence of these alterations is still readily visible.

At Kwinana the signal box only differs from the structure at its previous location, Koojedda, by the addition of a steel structure on which the box has been placed. This also resulted in the extension of the staircase. Structurally the loss of the awning is the only significant change.

Ancillary fittings, such as staff instruments, were removed when the first of the control panels were installed.

### **13. SUPPORTING EVIDENCE**

The documentary evidence has been compiled by Philippa Rogers, Historian, with technical details provided by Chris French, signalling specialist. The physical evidence has been compiled by Philippa Rogers, with engineering comment from T. Draper, DHR Consultants.

#### **13. 1 DOCUMENTARY EVIDENCE**

The *Kwinana Signal Box* comprises an elevated signal cabin with an enclosed stairway and two floors. It is located within the Kwinana Marshalling Yards and adjacent to the Rockingham Road overbridge.

The Kwinana Railway Marshalling Yard was established in response to the development of industry in the area. Construction of earthworks for the yard and siding access commenced in April 1966 to ensure that the railway was prepared for haulage of iron ore from Koolyanobbing to Kwinana that was due to commence in 1967. But iron ore was only the beginning of the railway activity as a new fertiliser works was opened in Kwinana with rail haulage commencing in February 1968. Planning had to be revised as further industry requiring rail haulage / access was mooted.

Train movements were expected to reach a level that would require a road bridge over the railway to replace the ground level Thomas Road, as well as extensive signalling in the yard itself. A small temporary signal box was installed at the Thomas Road end of the yard, but once the roadbridge was planned it was realised that visibility would be obscured. There was a clear

need for a high level signal cabin containing a large lever frame to be in situ before the completion of the Rockingham Road overbridge in 1967.<sup>1</sup>

With the 1966 completion of the standard gauge railway from East Perth to Kalgoorlie that linked the metropolitan area directly to the Eastern States, the old Eastern Railway was made redundant. Koojedda, situated 72 kilometres from Perth along the old line, had, until then, been an important locomotive servicing depot, which included a relatively new signal cabin. The cabin was built there, at a cost of £3,920, in 1959 to replace the original 1936 cabin. The new structure was constructed by Esslemont & Co. to the same design as the new Perth 'A' cabin (which replaced the original Perth 'A' box) adjacent to Melbourne Rd in Perth.<sup>2</sup> Electric lever locks were ordered from the United Kingdom and were attached to the Australian built McKenzie and Holland No. 9 interlocking machine (lever frame design) when it was installed.<sup>3</sup> The lever frame was probably assembled using a mix of new and used components on hand from other signal cabins. No. 9 frames are readily identifiable by measuring the distance between the centres of levers. This measures 4 to 5 inches and is known as the pitch of the levers.<sup>4</sup> The new cabin at Koojedda had been opened on 14 June 1959 when earlier signals were replaced by a modern three-aspect colour-light (searchlight) signalling system.

Iron ore haulage from Koolyanobbing to Kwinana, using the new standard gauge railway, was due to commence in July 1967 and the implementation of mechanical signalling was urgently required prior to this date. A letter, dated 7<sup>th</sup> February 1967, from the Western Australian Government Railways (WAGR) Chief Civil Engineer authorised the District Engineer to dismantle the disused Koojedda Signal Cabin, extend the steel frame and re-erect at Kwinana with the necessary alterations. The alterations were the lengthening of the columns supporting the cabin in order to ensure an unobstructed view over the proposed roadbridge. Completion was required by 18<sup>th</sup> March that year – a period of less than six weeks.<sup>5</sup> This short time period supports the likelihood that the movement was undertaken by an internal WAGR workforce rather than by tender.

A meeting of Civil Engineering Staff on 17<sup>th</sup> February confirmed the installation date for the cabin.<sup>6</sup> Other requirements included the deadline of 15<sup>th</sup> April for the operation of staff instruments and narrow gauge mainline signals. The 'temporary' signalling, using the signal cabin, would be effected by 15<sup>th</sup> May 1967. Any delay in the commissioning would result in a delay of acceptance of regular iron ore traffic – a situation to be avoided. However the works proceeded to schedule and consequently the WAGR Weekly Notice for the week ending 15<sup>th</sup> April 1967 advised that Kwinana was opened as a staff station to control narrow gauge movements and standard gauge iron ore movements. In the same publication, for the week ending 10<sup>th</sup> June, railwaymen were advised that the temporary signal frame was to be taken out of use and the new signal box was to be brought into use that month. In

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1 1968 Annual Report

2 Narrogin (built 1962) and North Fremantle Signal Cabins were constructed to a similar design, with lengths varying according to the size of the lever frames required. (Chris French)

3 State Archives 'Koojedda – Improvements and requirement' Acc 1240 AN 262/4 Item 754 1958

4 A Guide to Mechanical Locking Frames by the Signalling Study Group, U.K., page 65

5 State Archives 'Kwinana' Cons 4883 item 1/286 page 73

6 *ibid*, page 84

addition to the train movements the Signaller also controlled the flashing lights at the Thomas Rd level crossing.

The 'temporary' signal cabin was only expected to be in place until August 1968 as it would become redundant when panel signalling commenced, as would be the associated frame at the south end of the yard.<sup>7</sup> Following the commissioning of the signal cabin signalling requirements changed again and so it was retained.

When installed at Koojedda, it was estimated by the WAGR that the signal cabin, with its steel frames and asbestos cladding, would have a life of 30 years, the mechanical signalling and interlocking (at a cost of £3,488) would have a life of 40 years whilst the electrical signalling would last 25 years.<sup>8</sup> However its work at Koojedda was completed after only seven years, so it was still a valuable asset to the WAGR at that time.

At Koojedda, an awning over the windows was necessary to shield the eyes of the signallers from the rising sun. At Kwinana, the awning protected the signallers from the setting sun, until it disintegrated in the late 1970s and was removed by Westrail<sup>9</sup>. Roller blinds were then installed internally.

At Kwinana, the cabin houses a 40 lever McKenzie & Holland No. 9 interlocking lever frame which was augmented by a small 'black-faced' panel which controlled an area around Weston Street and towards the CSBP (Cuming Smith & Co.) & Australian Iron & Steel (AIS) sidings. This panel, in use in the 1970s, was itself replaced by the current 'NX' (eNtrance-eXit) route-setting panel, located centrally above the 40 lever frame. The NX panel was altered many times since commissioning for example, in 1982 when the narrow gauge link to Co-operative Bulk Handling was added to the panel.<sup>10</sup> A relay room adjacent to the base of the signal cabin houses the relays and modern electronic equipment to support the electrical interlocking.

Officially the *Kwinana Signal Box* was known as Kwinana Box 'B' as the title 'A' frame was given to an enclosed ground frame located at the Wellard end of the yard. Lever No.8, electrically released this frame, which was made redundant in the 1990s when the new locomotive depot was opened. Hence the signal cabin is now simply known as Kwinana.

Currently the signal operators at Kwinana control the network of sidings in the area. The traffic handled by the cabin includes alumina, bauxite, caustic soda, coal, wheat and other grain, liquid sodium cyanide, nickel, sulphuric acid, steel, mineral sands and container traffic. Occasionally, hired special passenger trains are signalled through the main line between Mundijong and Cockburn South. There are three shifts a day covering an average of approximately eighty different train movements, operating 364 days a year.

Westrail have deferred plans to close the *Kwinana Signal Box*. They have now indicated that closure will not occur before November 2000, until then it will continue to operate.

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<sup>7</sup> State Archives 'Standard Gauge - Contract C26 - Kwinana buildings' Acc 1240 AN 262/8 Item 10326 1965

<sup>8</sup> State Archives 'Koojedda - Improvements and requirement' Acc 1240 AN 262/4 Item 754 1958

<sup>9</sup> Oral communication, Chris French, former signaller at Kwinana

<sup>10</sup> SIGWA, Chris French

## 13.2 PHYSICAL EVIDENCE

The *Kwinana Signal Box* is an elevated structure located in the Kwinana Railway Marshalling Yard, adjacent to the Rockingham Road overpass. It is isolated from other buildings on the site, except for the small buildings housing relays and a standby power unit, which are situated at ground level on the eastern side of the box.

The original signal box from Koojedda, was placed at Kwinana onto steel supports, elevating the whole structure to enable a view over the road bridge from the top floor of the box. The original support columns were cut and flanges welded to them, then the new support structure, modular with braced trusses, was constructed with matching flanges and the signal box was then lifted onto the new supports. There is some corrosion evident between the flanges.

Most of the building is clad in asbestos flat sheets. Exceptions to this are the corrugated fibro-cement sheeting on the north-east and south-east corners and the weatherboard around the stairway. Asbestos sheets are all painted cream.

The stairway, on the south-west corner, is semi-enclosed. The top section, representing the full height of the box at its previous location, is enclosed by weatherboard except for the section along the cabin window line that has been left open. The extension of the actual staircase to the current ground level is constructed of grey painted metal, whilst the earlier section is a darker painted metal with a skid resistant bitumastic coating on the steps. Timber decking is used on the landing where the stairway turns in the older section.

At the upper level there are windows on all sides. Windows on the eastern side were louvred but have now been blocked off in the cabin area and cannot be seen from the interior. Louvres are still present in the window at the top of the stairwell and in the toilet.

The building has a reverse skillion roof with all around overhang and is constructed of unknown material, most likely asbestos. The eaves are slatted, providing a ventilated space, necessary as the ceiling is very close to the roof. Gutters, and fascia is painted dark brown. Plumbing waste pipes appear to be cast iron.

At Koojedda the cabin featured slatted timber awnings as it faced east into the rising sun. At Kwinana it is the western sun that causes a visibility problem and, after the awning disintegrated, interior blinds were installed.

The relay room is situated behind the cabin at ground level and in the mid 1990s has been expanded. Although the extension is largely unused at present, it is thought to be in readiness for further expansion when the time comes to use this as a remote control site. In this eventuality, the operations of the Kwinana cabin will be taken over by Train Controllers in the Westrail Centre, East Perth.

The signal cabin comprises two rooms; the lower floor, called the interlocking room, houses the mechanical and electro-mechanical equipment; the top floor is called the operating floor of the signal cabin.

In the interlocking room can be seen numbers placed on both structural parts and equipment in the relocation of the structure. On the eastern side is a row of five small wooden windows that provide the only natural light. The front (western side) of the interlocking room has removable sections to permit the extraction of the long 'T-irons' from the lever frame if alteration to the interlocking components is required. A row of metal poles support two tiers

of rocking shafts necessary to effect the mechanical interlocking. Above these supports can be found an example of WAGR locally designed tappet interlocking, applied to, and worked by the levers of the McKenzie and Holland frame.

On the top floor is the actual cabin where the signaller on duty carries out his work. There is a single doorway into the room, in which a new lock has been placed due to the increased trespassing activity occurring. The front half of the room has cream painted sliding timber windows, which have strips of tin fitted over the sill and vertically inside to stop wind and rain incursion. Across the stairway from the room is the toilet, which is largely in original condition.

Below the windows the interior is lined with brown painted tongue and grooved timber. The floor is covered in green carpet tiles, laid over the previous linoleum. The ceiling is off-white painted fibro sheets fixed with timber battens, with a patch over the hole in the roof where the chimney for a pot-belly stove was located when at Koojedda. It is not known whether the chimney was moved to Kwinana, but it was not there in the 1970s and portable electric heaters are now used for warmth.

Centrally located but closer to the window (western) side is the 40 lever McKenzie and Holland No. 9 interlocking machine lever frame from Patent No. 4355 originally registered in 1886. The manufacturer's name is cast into many of the components with both Melbourne and Worcester, England being given as places of manufacture. An unusual feature of the lever frame at Koojedda was the presence of cut-down lever handles to indicate that such levers activated a switch below the floor, rather than actually being connected to the older style mechanical semaphore signals or heavy points. These handles have been extended back to the 'normal' length. The levers are painted different colours in accordance with standard signalling practice to identify the lever's usage, for example, a white painted lever means that the lever is not connected; a red painted lever indicates signals; black indicates points and blue indicates facing point locks. Painted on the sides of some levers are numbers that direct the signal operator to the other levers which must be pulled before that lever itself can be moved. These numbers are called 'lead numbers'.

The 'NX' control panel appears to be consistent in design but has been altered several times since commissioning. A slim, tall cabinet at the left of the panel houses the computer based electronics needed to control the tracks into the new locomotive depot at the south end of the yard. A variety of magnetic 'memory joggers' used by the Signal Operator in his daily work cannot now be used at the left hand half of the panel. This is due to that half of the panel having a new Aluminium backing plate, whereas the older part (the right hand part) has steel backing plates.

On the eastern wall is attached an old style sloped Train Register desk, commonly used in signal cabins. The Train Register Books are used to record the movements of all trains through the cabin's area of control and are a legal document in the event of a serious mishap. The desk's design suggests that it was moved as a fixture to Kwinana from Koojedda. There is also a wall-mounted air-conditioner above the windows, in the stairwell.

The semaphore signal posts, one with rail supports dated 1893, remain in the yard. Seven still have signal arms attached. These are controlled by levers in the signal cabin that are connected to rodding. The rodding runs across the rail yard to the signal posts.

### 13.3 COMPARATIVE INFORMATION

In 1959, Koojedda Signal Box was constructed to the same building design as Box 'A' Perth. In 1962, Narrogin Signal Box was built to the same design, but longer to accommodate a larger lever frame. Tenders for the demolition of Narrogin Signal Box were called in 1998 and by January 2000 the exterior asbestos sheeting had been removed. It is believed that the Narrogin Signal Box will be moved to Pinjarra by the Peel Development Commission.

Whilst Narrogin is similar in design outside (three panels of three windows rather than three panels of two windows) and also houses a 40 lever McKenzie and Holland No. 9 interlocking lever frame and early-model Westinghouse control panel, it does not encompass the same diverse blend of signalling technologies or computer based electronic technology that is in operation at Kwinana.

Box 'A' in Perth was removed before the construction of the Mitchell Freeway and the Entertainment Centre. North Fremantle Signal Box, from the same period, had similarities in structural design such as the flat roof and awning, indicating this was the new style of signal box, as distinct from the earlier McKenzie and Holland inspired style seen at Claremont and other places.

Other intact signal cabins exist at Merredin, Claremont, Whiteman Park, Rail Transport Museum but are 'lever frame only' technology. Only at Claremont and Whiteman Park do levers actually operate signals. Albany signal cabin, attached to the station building has only a small lever frame, combined with a very small, shelf-mounted Westinghouse early-model panel.

As Koojedda was the former location of the *Kwinana Signal Box*, the building also is important as the only building remaining from the Midland to Northam railway (apart from buildings in Northam). From the rest of the Eastern Railway from Northam to Kalgoorlie, the only non-domestic buildings that remain are at Merredin, Coolgardie and Kalgoorlie. Yet it was this rail link that provided transport for the Goldfields in its boom time, transport for the construction of the Pipeline to Kalgoorlie and the interstate rail link to the Trans Australian Railway following its 1917 opening.

### 13.4 REFERENCES

No key references.

### 13.5 FURTHER RESEARCH

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