The development of water supply systems to service the locomotives of the Victorian Railways begins with the construction of the state's first line to Sandridge in 1854. The identification or creation of suitable sources of water, the raising and conveyance of water to a suitable storage point at the rail line, and its discharge to locomotives in accordance with needs, all form a colourful aspect of the era of steam locomotion, which is largely unrecognised today. Covering a period of around a century, ample opportunity existed for the refinement of supply systems in accordance with prevailing technologies, for the supply of water to non-rail users in townships lacking reticulated supply, and for the carriage of this valued commodity to elsewhere on the rail system to check fires and replenish dwindling supplies in times of drought. Indeed, the Railways Department's role as a supplier of water was something of an institution over this period.

So closely allied with this business was the Department that in 1870 its engineer-in-chief, Thomas Higginbotham, was appointed chief engineer of water supply. This development parallels the organisation of reticulated water in the metropolis. In 1854, a 100,000 gallon water tank was built on the corner of Victoria and Gisborne Streets, in East Melbourne, and in 1857, the Yan Yean Reservoir became operative.

In 1862, the Victorian Government Railways opened their first long distance routes, from Geelong to Ballarat, and from Sunshine to Bendigo. The development of steam-powered water supply installations at critical points along the way was essential, and had been accomplished during the same year. By so doing, the department demonstrated to Victorians its degree of technological advancement. Four years later, in April 1866, the Kyneton Water Supply Committee was considering a scheme for bringing water from Mt Macedon to Kyneton and also a scheme for providing tanks constructed on piles and distributed through the town with pipes leading from the river 'to be filled by the Government pumping engine at the bridge'.

About this time, excavations for the Coliban Reservoir began. It is of interest, also, to look at the department's pumping installations against the development of the stationary steam engine abroad. Great Britain was the innovator, the earliest applications of steam power being associated with the mining industry in the form of pumping engines. As early as 1782, James Watt's rotative single acting beam engines employed the principles of the expansion of steam under pressure and its transformation into mechanical energy at the flywheel shaft. James Pickard applied a crack to pumping engines around the same time, and James Watt, again in 1782, invented the double acting cylinder. In 1788 he developed a governor to regulate an engine's speed to the load in hand. The decline of Cornish mining during the latter half of the 19th century, however, coupled with the rapid population growth in towns and cities, swung the pumping emphasis from mining to water supply. Throughout this period, horizontal engines with single, compound or duplex cylinders were in common use on a wide range of duties, of which water works pumping was just one.

Knowing of the former existence of an engine house to pump the water from the Campaspe River to the iron cistern which remains today over the tank house at Kyneton station (Figure 1), I had looked for it, on and off, without success for a number of years. It wasn't until having tea in the Kyneton Gardens one morning in 1985 that I realised that I was actually looking, through the rising mist, at its ruins on the far embankment of the river. Bearing in mind the meticulous manner in which the department had razed all evidence of its obsolete installations over the years, including entire lines, stations and railway settlements, somebody had obviously been rather careless here.

The ruins of the engine house works,
situated on the west bank of the Campaspe River, just to the north of the Mollison Street bridge, consist of the following principal elements:

- the foundations of the engine house
- the well
- the entry(?) pit
- the roadway embankment at the Mollison Street bridge.

Records show that John L. McDonald and Company signed the contract for the construction of the 'engine pumping house, tank and tank house' on 25 June 1862. (5)

Documents describe the architecture of the engine house itself and the route of the water pipe line to the station along the north side of Mollison Street, but details of the well, pit and engine house plant are missing. Similar installations, however, were erected at Sunbury, Middle Gully (Macedon), and Woodend; and detail drawings exist(8) showing the plant as well as details of the slightly smaller yet similar engine houses. The contracts for these works were let in 1860 and 1861.

At Kyton, the foundations of the engine house remain and confirm that the plinth was of bluestone, and that the building dimensions were 22 feet six and a half inches (21 feet seven and a half inches on drawings) by about 19 feet (18 feet seven and a half inches on drawings). The blocks were 12 inches thick by one foot six inches long, the faces rusticated and the four external corners finished with tooled margins. The two thresholds remain in situ, and door step, and the position of the deep stone block which once carried the boiler(?) is marked by its upper surface partially submerged beneath topsoil.

The contract drawings show a hip-roofed building with segmental arched doorway and flat arched window trimmed with quoina, as are the external corners. A roof vent permits passage of the engine exhaust to the open air, whilst the gutters are five inches cast iron ogee pattern. A fragment survives. The walls were probably of bluestone, since the bluestone tank house drawings are indicated in the same way, and if this is so, each block would have received a rough hammered finish. Adjoining the tankhouse, piles of probably locally burnt red bricks, and bluestone rubble with dressed surfaces suggest that the two feet thick walls were made partly of brick. The floor, which has been removed, was of two and a half inches 'Arbroath' flagging on a sand bed.

The position of the boiler and force pumps is not accurately known, but the plant from the other contemporary installations on the line consisted of a fire box measuring eight feet nine inches by three feet three inches and boiler mounted on castings and powering a one foot seven inches diameter spur wheel, counter balanced by a flywheel about four feet six inches in diameter. The horizontal cylinder (engine) is mounted over the fire box and was probably connected with the flywheel by means of a cross head, connecting rod and crank in the manner of many portable engines and traction engines of the day. The rotary motion thus generated was rendered continuous by the flywheel and transferred through a system of gears (spur and driving wheels) to the crankshaft which activated three force pumps. The incoming water was drawn from the well along a five inch OD suction pipe, reducing to two inch ID at the cylinders, and pumped by means of an arrangement of valves through three two inch ID outlets, combining to form a five and a half inch delivery pipe which passes through the wall.
Figure 1: A Norris and Company's view of Kyneton station, c.1870, offering a glimpse of the former water columns, and the iron cistern (tank). (Source: V-Line H 1475).

Figure 2: The entry pit, looking towards the river and showing the part removed bluestone coping.
of the engine house by way of an air vessel and stop valve on its way to the station tank. The air vessel was a common device used to protect the main from shock due to rushes of water as the pump valves opened and closed. It is important to note, however, that the Kyneton plant, though similar in principle, may not have been similar in detail to this description.

Boilers of this size were usually fired with wood, although the availability of coal may have rendered this option attractive. There was room in the engine house to store the fuel, and it is possible that the boiler was continually fired, with the draught being kept down overnight to ensure that it was warm in the morning. A working pressure could then be achieved within an hour. Management of the engine would have been the responsibility of the attendant, and it is known that a weatherboard house was situated within a short walking distance to the north, where he may have lived.

The well is located 2.6 metres to the north of the engine house, and it is here the water was collected prior to being pumped into the engine house. The well lining is one and a half bricks thick with a cement finish. The delivery pipe is in situ within the shaft, with its access cover in place. Immediately below the cover the delivery pipe runs off from a T junction to the pumps. The 1180mm diameter shaft is accessible by means of iron rungs, set into the shaft walls. The well itself is filled to a depth of 1400mm. Being an almost totally subterranean installation, the well, inlet and delivery pipes are almost certainly intact.

Separating the river water itself from the well is a mysterious pit, situated 10 metres east of the well and about eight metres from the water's edge (Figure 2). On that misty morning morning, it was iced over as far as the centre current. The pit is rectangular, measuring 4280mm x 1650mm, and of uncertain depth. Its sides are of brick, one and a half units thick, while the top course is of finely worked bluestone, with chamfered margins, horizontal surfaces and rusticated vertical faces. The internal
edges of the coping are rebated 100mm (w) x 125mm (h), possibly to take a timber deck, and the stonework is separated from the brickwork by a slate damp proof course. As in the well, iron rungs facilitate access at both ends of the shaft.

At its eastern end, the coping is formed into a massive termination made from four bluestone blocks, the two largest (north and south) measuring 530mm x 900mm on plan.

The four blocks contain a 650mm long slot with a rebated upper edge. At either end of the slot are two grooves, protected by metal studs and into which a 13mm x 75mm iron bar may be thrown. The upper surfaces of the smaller blocks have studs set into them, showing that some of the equipment, here, has been removed. The vertical bar, or lever, appears to be connected and to have served to activate something at the base of the pit; possibly a gate which could have closed off the flow of water into the pit, thence by gravity to the well. In order to prohibit weeds and debris and control water entry to the pit, a grate would have been installed allowing passage only of minor particles. The pit, therefore, may have been a device used to collect debris from the river before entry to the well.

Mention should also be made of the unidentified iron machinery, measuring 900mm x 308mm overall, on the site. It appears to have been associated with the passage of water or steam and to have accommodated moving parts, and therefore, to have formed part of the engine house plant.

Access to the engine house was gained at the southern railway abutment of the Mollison Street bridge. The bridge itself was built to facilitate access from town to the railway. Although the southern deviation around Kyneton was something of a compromise, the roadway from the station received a great deal of attention. At one end, highly visible on the side of the hill, the bluestone station buildings rose. A continuous bluestone kerb and channel lined the edge of Mollison Street. A substantial iron girder bridge with bluestone abutments was built over the Campaspe River, and the adjoining Gardens were a fine ornament. At the other end, shops were being built to close the gap between the town and its railway station. At the river crossing, then as now, an earth embankment dropped sharply from Mollison Street to the river bank. It is the width of a cart and would have been used to carry fuel to the engine house. Access to the house noted earlier would also have been available by means of this ramp; a circumstance which heightens speculation that it was occupied by the engine house attendant.

A drawing in the State Transport Authority's plan room indicates that the engine house was situated sixteen chains and twenty links from the Mollison Street level crossing. Water level was recorded at RL1613.28, the engine house floor RL1630.35 and rail level at the platform RL1686.97, a vertical distance of 73.69 fee through which water was raised. In order to provide sufficient pressure at the water crane, however, the height of the iron base of the cistern above ground level was another 15 feet seven inches.

The bluestone tank house measured 18 feet seven and a half inches x 21 feet seven and a half inches on plan and allowed space for the station lamp room within its walls which were two feet thick. Above was a rivetted iron tank, of 20,000 gallons capacity servicing two cranes, situated where locomotives stood at the heads of their trains; one at the Melbourne end of the south-bound platform, and another at the Bendigo end of the north-bound platform. Today, Kyneton is unusual in that water cranes still exist at these locations, although they are not the original models which featured fluted cast iron columns, with Tuscan order capitals, complementing the classical pediments of the goods shed and known as 'water columns'.

Despite the removal of the engine house and plant, the Kyneton water supply system remains surprisingly intact, the station-based and subterranean riverside components still being in place. One large ashlar block is known to have been fished out of the water not so long ago, and it may well be that other remnants lie beneath its opaque surface.
REFERENCES


2. Information supplied by MMBW Publicity Department.

3. Kyneton Guardian: op cit


5. VR Contract Books.

6. Contract No. 86, drawings Nos. 4, 11 et al.

7. This small mounting block, when compared with the engine footings required under contract no. 86, suggests that the boiler may have been mounted vertically, a practice known to have been employed at subsequent pumping stations on the rail network.

8. Confirmed by Mrs Bonnar, whose farm house overlooks the pumping station site.