

TOUR NOTES VISIT L: LOWER LEA VALLEY

Introduction

The Lower Lea Valley has been an industrial site since Medieval times, when industry was required to be sited to the east of London, or south of the Thames. In addition to the mills, distilleries, sewerage and other industries discussed in more detail below, other industries included the famous Bow Porcelain; perfume; Congreve's rocket factory and early gasworks.

Abbey Mills Pumping Station

Abbey Mills is on the site of the tidal mills of Stratford Langthorne Abbey. London's main drainage system was constructed by the Metropolitan Board of Works, under Sir Joseph Bazalgette, after the Great Stink nudged Parliament into action. As part of that scheme, Abbey Mills pumping station was built to lift sewage from the interceptor sewers into the Northern Outfall Sewer, which took it to the River Thames at Beckton. This great building in the Venetian Gothic style, dubbed a "temple to sewage" and designated Station A, was built 1865-8 to the designs of Bazalgette and Cooper. It is cruciform in plan with decorative ironwork by Rothwell & Co of Bolton. The eight beam engines were replaced by electrically-driven centrifugal pumps in 1931-3. The two monumental chimneys were demolished during World War II, reputedly as undesirable landmarks for the Luftwaffe. Station B, was built 1891-6, followed by Station C in 1910-14, the latter currently housing diesel-driven centrifugal pumps used for pumping stormwater. Station D, by Ove Arup & Partners as engineers, was built 1970-71 to provide for storm overflows. The latest pumping station was built in 1995-7 to replace Stations A to C, with Allies & Morrison as architects..

The Northern Outfall Sewer

After the visit to Abbey Mills Pumping Station, the party will walk along the Greenway, on top of the Northern Outfall Sewer, and along part of the Bow Back Rivers (which are British Waterways' 'remainder waterway') to Three Mills. The coach will be available for anyone who does not wish to walk.

Station A was part of Bazalgette's main drainage scheme for the Metropolitan Board of Works, the Northern Outfall Sewer runs in a 5-mile long embankment from Old Ford to Beckton. Originally constructed 1859-61, with two parallel bores from Old Ford (Wick Lane) and a third east of Abbey Mills. Two more bores were added on the north side in the 1900s, reflecting the growth of the built-up area and greater concern over discharges in storms. Plate-girder bridges carry the sewer in pipes over river channels, roads and railways. The road built on top is now a public footpath, known as 'The Greenway'.

THREE MILLS

A buffet lunch will be provided at the Miller's House Visitor and Education Centre.

Milling

Three Mills stands at the head of Bow Creek, on the tidal Lea. It has been the site of milling since at least the 11th century, when the Domesday Book recorded 8 [water]mills in the manor of West Ham on the Lea in 1086. While the sites were not listed, Three Mills and Abbey Mills (see below) were almost certainly two of them. It is not known whether they were then tide mills. The area had already acquired the name '*Three Mills*' by early medieval times, when they belonged to Stratford Langthorne Abbey - though, as Jennifer Tann has shown, a '*mill*' may only have been a pair of millstones at that time. At the Dissolution of the Monasteries, the mills were sold into private hands. Stowe's *Survey of London*, published in 1598, records that the '*Bakers of Stratford*' (ie modern Bow) were allowed to take their carts into the city of London and sell their bread at three markets – provided they baked the penny loaf two ounces heavier than those baked in the City.

The site was bought in 1727 by a consortium led by Peter Lefevre, whose father was a Huguenot refugee, to set up a distillery (see below); two other members of the consortium were also of Huguenot extraction, including Daniel Bisson, who built the House Mill between two houses, hence its name. He lived in a house to the west of the mill and his son, Daniel, lived in a new house built in 1763, which was to the east of the Mill – hence the name '*House Mill*'. Both died in 1727 and the site was acquired by an MP, Philip Metcalf, who rebuilt the Clock Mill on the site of a previous mill in 1817. Until about 1840, the third mill was a windmill. In the late 19th century mills and distillery passed into the hands of J & W Nicholson, gin distillers of Clerkenwell.

Of the two mills there today, the House Mill was built in 1776 for Daniel Bisson; it was rebuilt after a fire burned it to a shell in 1802. It has a brick façade but behind is a timber structure, the rear being weatherboarded. The House Mill contains the remains of four undershot waterwheels, installed in the 19th century. Those on the east side are, at the back, 18ft 8in diameter by 2ft 11³/₄in wide and, at the front, 19ft 10¹/₂in diameter by 2ft 11in wide. Those on the west side were installed in the 1890s and are, at the back, 19ft 9in diameter by 7ft 10in wide and, at the front, 19ft 10¹/₂in diameter by 3ft 3³/₄in wide. They drove stones fitted with Fairbairn-type silent millstone machinery, of which there are some remains.

The Clock Mill was rebuilt, in stock brick, in 1817, and has a wooden clock turret with a clock of 1753 and a bell cast in 1750. At the west end, next to the turret, there are two conical drying kilns. There is a weatherboarded lucam and a wrought-iron wallcrane above barge beds in the creek. The mill contains the remains of three Poncelet waterwheels, two 20ft diameter by 4ft wide and one, between them, 19ft diameter by 2ft 7in wide.

The mills were driven by the ebb tide, impounded in Three Mills Wall and Three Mills Back Rivers. In 1938, the mills operated 26 pairs of millstones, 12 in the House Mill, 6 in the Clock Mill and 8 operated by a steam engine. Milling ceased after World War II. The mills form part of an important group with the remaining distillery buildings. The House Mill has been renovated by the River Lea Tidal Mill Trust, who also reconstructed the 1763 miller's house, destroyed in World War II, as a visitor and education centre. The Clock Mill sluice gear was set in concrete when the building was converted into offices. It is now used as offices and workshops to support the film industry, which now uses the distillery buildings.

Distilling

The Three Mills Distillery, now on an island formed by Three Mills Wall River, the Prescott Channel, the Channelsea River and Bow Creek, was established by Peter Lefevre and his partners shortly after Lefevre purchased Three Mills in 1727; insurance records show that the first distillery buildings were on site by 1732. The distillery was one of the small number of large distilleries (four Mills near Bow Lock on the Middlesex side of the river was another) which concentrated on the gross distilling of alcohol, selling its product to rectifiers of gin and for industrial use (from 1825, this separation became a statutory requirement). In the 18th century, the distillery also produced brandy, and there was a brewery. Meal was sold to the Navy Victualling Yard, along with pork from pigs which were fed in '*druff*' the waste product from the distillery. The facilities represent an early form of industrial integration, with the distillery; the two tide mills and the windmill (later, the steam engine); the brewery and brandy production; the piggery and their own transport operation.

In 1872 the distillery was taken over by J & W Nicholson & Co, whose gin distillery was in St John Street, Clerkenwell. Nicholson's began some rectification of raw spirit at Three Mills. In the late 1950s, they closed down their Clerkenwell premises, concentrating production on Three Mills. This too ceased ca.1973. Some older buildings remain, on the south side of the roadway. Next to the Clock Mill was the bottling plant, rebuilt 1953 and which continued in operation until the late 1980s, with the Old Still House at its eastern end. Next is the three-storey New Still House, a mid-19th century building with its 19th century stills removed from Clerkenwell in 1967 *in situ*. The two-storey laboratory building is thought to have been built about 1890 as a rectifying house. The last building in the row is the spirit warehouse, a single storey building with basement, of ca. 1830.

West Ham Pumping Station [not included in visit]

Built by West Ham Corporation from 1897. Steam plant consisted of two compound beam engines driving bucket pumps and three inverted-vertical direct-acting compound steam engines driving centrifugal pumps (the latter now removed). There were nine Lancashire boilers, of which four were hand fired and five mechanically stoked. The two Woolf compound rotative beam pumping engines were built by Lilleshall and Co Oakengates 1895-1900; one last ran in January 1972. They are double acting and developed 240 hp with steam at 120 psi. The high pressure cylinders have a bore of 30 inches and a stroke of nearly 4 ft 10 ins while the low pressure cylinders have a bore of 4 ft and a stroke of 7ft 6ins. The double web cast

iron beams of these engines, cast in 1895, each weigh about 17 tons and are 28 feet long.

Hackney Wick and Marshgate Lane

Between Lea Bridge and Bow Locks the River Lea divides into a complex of waterways – some natural but most artificial - known as the Bow Back Rivers. For many centuries these have provided power, transport and location for a wide variety of industries – of which Three Mills has been a good example. These industries spread across a wide hinterland between Bow and Stratford and included many trades which were dirty and polluting. Today much industry remains but the area has been designated for the main focus of London’s Olympic bid and, if this succeeds, will be totally changed. Already works for the CTRL Rail Terminal in Stratford, and an rapidly increasing road network are causing to great changes.

After the roundabout going north on the A12 note the 1861 Fairfield Match Works of Bryant and May – now converted into flats.

Turn off into Old Ford for Hackney Wick – this is a busy industrial area and the route may vary according to traffic conditions. Once in Wick Lane (previously Old Ford Road) – note a series of factory buildings and wharves as well as turnings ‘Dye House Lane’ – ‘Iceland Wharf’. Cross the Northern Outfall Sewer – carrying sewage newly elevated at the Wick Lane Pumping Station to the left – and turn into Dace Road.

Many of the industrial buildings here are now in use as artists’s studios but the Alpha Spectacle Frame factory in Smeed Road is still in its original use. Other buildings now house the various departments of Percy Dalton’s Famous Peanut Co. This includes ‘Brittania Works’ erected as a folding box factory.

If time and traffic conditions permit there will be a stop to see Old Ford Locks (different to Old Ford Lock two miles away on the Regent Canal) which mark the end of the Lee Navigation. Below the Locks is the confluence with the Old River Lea and a riverside path leading to confluences with the Pudding Mill River, City Mill River and Waterworks River. At Old Ford Lock the Lock Keeper’s house has been for many years the studio for ‘Big Breakfast’ TV show. On the eastern side of the river was the original Old Ford Works of the East London Water Company, site of the first Cornish Engine in London. Downstream the Northern Outfall crosses the river – above the river on the sewer is a concrete pill box– and it is possible to walk from here along the sewer bank to Beckton and the Thames.

Returning to Dace Road note Swan Wharf which until recently was used by white shellac processors, A.F.Suttor & Co. – who used it to store Gum Arabic, Tragacanth, Guar, Ghatti, Beeswax, Carnubia, Candelilla, Ozokerite, Ouricoury, Copal, Damar, Sandarac, Benzoin, Elemi and Myrrh. In Dace Road can be seen clues to the wharf’s original use as a stable block for the Great Eastern Railway Co. The nosing factory which stood behind it has now been demolished but new building surrounds remains of the Crown Chemical Company also to the rear.

For many years the area has been an important centre for the chemical industry and this saw a notable period of innovation in the 1850s in the area surrounding what is

now Hackney Wick Station. The site of Brooke, Simpson and Spillar's Atlas Chemical Works has now been redeveloped but it was here in the 1850s that the first coal tar dyes were developed on an industrial scale. The works was later used as a factory for Bronco toilet paper. In Wallis Road are a few remains of Daniel Spill's waterproof cloth works – where the earliest plastics, Parkesine and Xylonite (called Celluloid in the US), were developed by Alexander Parkes.

Also can be seen some derelict remains, and the Workers' Institute building of Eugene Carless's Hope Chemical Works. In 1864 Carless made 'carburised' lamps and in the 1890s produced the first motor spirit and coined the word 'petrol' in conjunction with the Daimler Motor Co. Carless were to continue to make a range of motor and aviation spirits and relocated to Harwich in the 1960s, where they continue.

Many of the buildings in this part of Hackney Wick were used by or built by confectionary manufacturers Clarke, Nicholls and Coombs (Clarinco) and demonstrate the importance of sugar based industries in east London.

Numerous other industries, many chemical, were and are based in this area – they include Achille Serre (drycleaning fluid), Davey's Imperial Tar Works, Leon Clerc's Pharos Chemical Works (benzoline), Edward Beanes (wine finings), Ingram (maker of the seamless enema) etc, etc. The area is still very busy today and includes businesses like recoverers of chip frying oil, dental equipment, showroom dummies, and Fresh Farm Produce.

In Carpenter's Road (called for landowners the Worshipful Company of Carpenters) we again cross the Lee Navigation and go into the Marshgate Lane area – which is scheduled to be the site of the Olympic Stadium if the British bid succeeds

Turn off into Marshgate Lane and cross Waterworks River and City Mill River. Pass under the Northern Outfall – noting the barrel shapes of the sewage pipes on the underside of the bridge. Pass under the rail lines going in to Stratford Station, noting Pudding Mill Station (DLR) on the right following the route of the Great Eastern Railway. In this area, in Wharton Road and Carpenters Road are the remains of many different factories – Arsenic and 'Seameal' next to perfume and cosmetic factories.

In Stratford High Street note the fine building of the Yardley box factory with ceramic 'Lavender Girl' – a sharp contrast to the remains of their factory to the rear in Carpenters Road.

In Carpenters Road note in particular the remains of the Johnson Works (marked as 'Jerome Engineering'). Johnson were suppliers of Chemical Process Equipment. Also it should still be possible to see a plaque from the Boake Roberts and Co. – flavourings and perfume manufacturer.

The route then goes to Waterden Road. This was developed as an industrial area in the 1950s including, on the left, the large site of Hackney Stadium now vacant.

At this point – depending on time – the coach will either return via the A12 extension, or proceed to view some remains of the Lower Lea Valley water industry.

Into Eastway, passing the Corporation of the City of London's new Spitalfields Market. Left into Orient Way. On the left can be seen part of the extensive rail yards of the Great Eastern Railway's Temple Mills complex, now partly under reconstruction for the channel rail link. On the right can be seen some remains of Lea Bridge Gas Works built for the South Essex Gas Light & Coke Co in 1852. A holder of 1899 can be seen from the road.

Left into Lea Bridge Road. Ahead is the site of Lea Bridge Station and the entry to a purpose built trading estate of the 1930s.

Left into Waterworks. After the 1850s Lea Bridge was the lowest point at which water extraction was allowed on the Lea and the East London Water Company's works here dates from the 1830s. A set of filter beds was built on each side of the river – the westerly set, the Middlesex Filter Beds, are now a nature reserve. Visits have to be booked but the site is well worth seeing. The easterly beds 'the Essex Filter Beds' are now a recreation centre and there is a small on-site exhibition. It is intended to stop here for a short break.

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TOUR NOTES, VISIT M: CENTRAL LEA VALLEY

Wednesday 18 August 2004

Leaders: Malcolm Tucker and Tim Smith, with Denis Smith am and Bob Carr pm

08.45	Depart Hatfield Campus
09.15 to 10.00	Walk at Broxbourne (2 groups)
10.15 to 10.40	Turnford: Group 1 views engine, Group 2 walks to aqueduct
10.40 to 11.05	Turnford: Group 2 views engine, Group 1 walks to aqueduct
11.35 to 12.05*	King George V Pumping Station
12.05 to 13.05*	Enfield Lock and Royal Small Arms Factory site: Group 2 on foot whole way (1,750m) Group 1 by coach for shorter walk (1,000m)
13.05 to 14.00	Lunch at 'The Greyhound' Pub, South Ordnance Road, Enfield Lock
14.00 to 14.30	Drive via Brimsdown and Edmonton
14.30 to 15.45	Markfield Road Pumping Station & Sewage Works (2 groups)
16.00 to 16.40	Low Hall Pump House Museum
17.30	Arrive Hatfield Campus

* If circumstances permit entry to the KGV Engine House, the RSAF walks will be shortened so that the Humphrey Pumps can be visited in small groups

NOTE: AT TURNFORD AND KING GEORGE V, PLEASE OBSERVE ALL INSTRUCTIONS GIVEN BY THAMES WATER STAFF AND DO NOT STRAY FROM YOUR PARTY

We need to divide into two equal-sized groups at some sites. Group 1 will be the first to see the engines, while Group 2 will walk further to see more at Enfield Lock and follows a steeper path at Broxbourne. Please stick to your group.

Broxbourne

At Broxbourne we shall look at a terracotta works site, some bridges on the New River and the water mill remains.

The New River clings to the steep side slope of the Lea Valley flood plain north of Broxbourne, but here it passes over the crest of the river bluff onto flatter land. Near the church are three types of cast-iron bridge characteristic of the New River:

- heavy cast-iron girders dated 1868 by Cochrane Grove & Co on the first road bridge
- earlier-19th-century arched ribs on the footbridge (here spanning 18 feet clear)
- cast-iron girders with a fancy trellis-pattern parapet on the second road bridge, dated 1841 by HUNTER [& ENGLISH] of LONDON.

(There is a fourth type, that occurs a mile south of here at Wormley, on the arch-suspension principle, with timber deck beams.)

Broxbourne Mill, of 4 storeys and weatherboarded, burnt down in 1949. Its remains are conserved by the Lee Valley Regional Park Authority. The low-breast-short iron waterwheel, 16 feet in diameter and 10ft 3in wide, on a 3½-foot fall, has new floats of a durable plastics material. In the other wheel pit is a Jonval type, axial-flow reaction turbine with its 6-foot diameter stator exposed to view. Below is the navigable tail stream. The bypass weir (formerly a set of hatches) on the head leat discharges to a nice mill pool.

The **terracotta works** of James Pulham operated from the later 1840s to 1945. A kiln and a horse-driven edge-runner mill were conserved in 1986 by Broxbourne Borough Council. The kiln is 9½ feet square externally, beneath a conical chimney, 21 feet high overall.

Broxbourne Station on the Cambridge line was rebuilt in 1960 by BR Eastern Region as a model of good practice. The brick-clad concrete footbridge has prominent lift shafts. From the road bridge (Nazeing New Road) of circa 1908, three blue-brick viaducts are arranged fan-wise to ramp down to the marsh.

Turnford Pumping Station

The now preserved steam engine was installed here in 1869-70. It had been supplied originally by Boulton, Watt & Co in 1845-7 to the New River Company's Hampstead Road well in central London. It is a rare survivor of the side-lever type. With a cylinder of 28 inch bore and 42 inch stroke and a 15 foot flywheel mounted high up on a frame, it worked at about 27 strokes per minute. It drove lift pumps of 22 inches diameter and 6 feet stroke through gearing and bell cranks, at 8 strokes per minute.

The well shaft into the Chalk is 178 feet deep below floor level and 10 feet in diameter. It has been extended by two 18-inch boreholes to 1,012 feet, into Devonian rock. There are also side headings in the chalk, with boreholes within them to a maximum of 500 feet from the surface.

In 1882, R. Moreland & Son of London installed a second, inverted vertical engine on girders above the well shaft, now removed. The boiler house formerly had a chimney 74 feet high. Pumping was electrified after 1953. A standby diesel engine driving a second down-the-well pump has been removed. The buildings have been converted for the use of Thames Water's New River team.

Turnford Aqueduct is on a straightening of the New River made in 1854-5. It is particularly substantial, with 4 brick arches. By engineer William Chadwell Mylne and contractor Thomas Docwra, who did much work for the New River Company. Its parkland setting has succumbed to roads and, this year, a housing development.

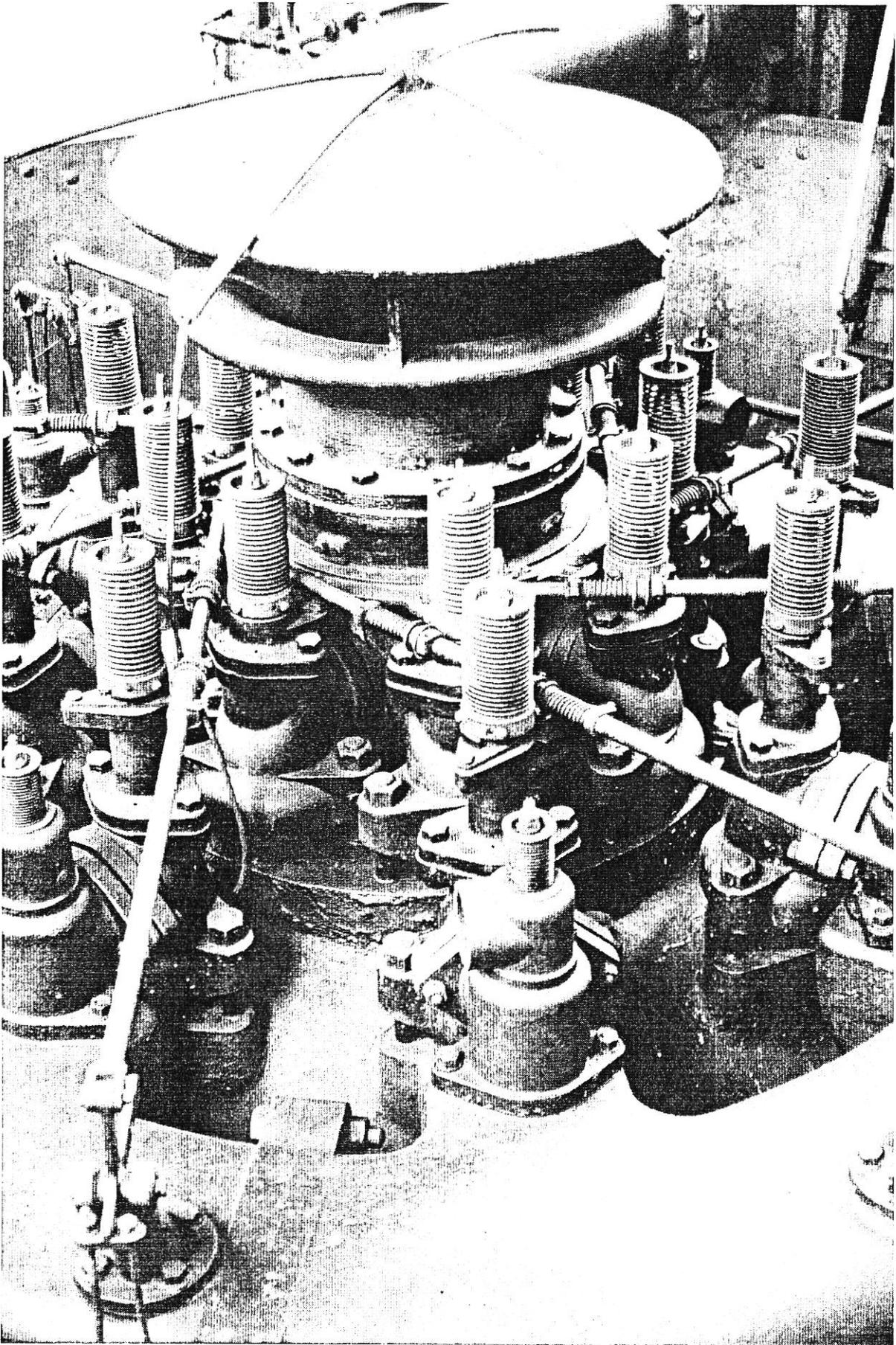
Cheshunt

On our way southwards, we pass near two substantial **reservoirs** of 1837 at Cheshunt, which collected surface water for the New River. South of Cheshunt on the left is **Burleigh School** of 1948, the first of Hertfordshire County Council's prefabricated schools projects.

King George V Pumping Station, Enfield

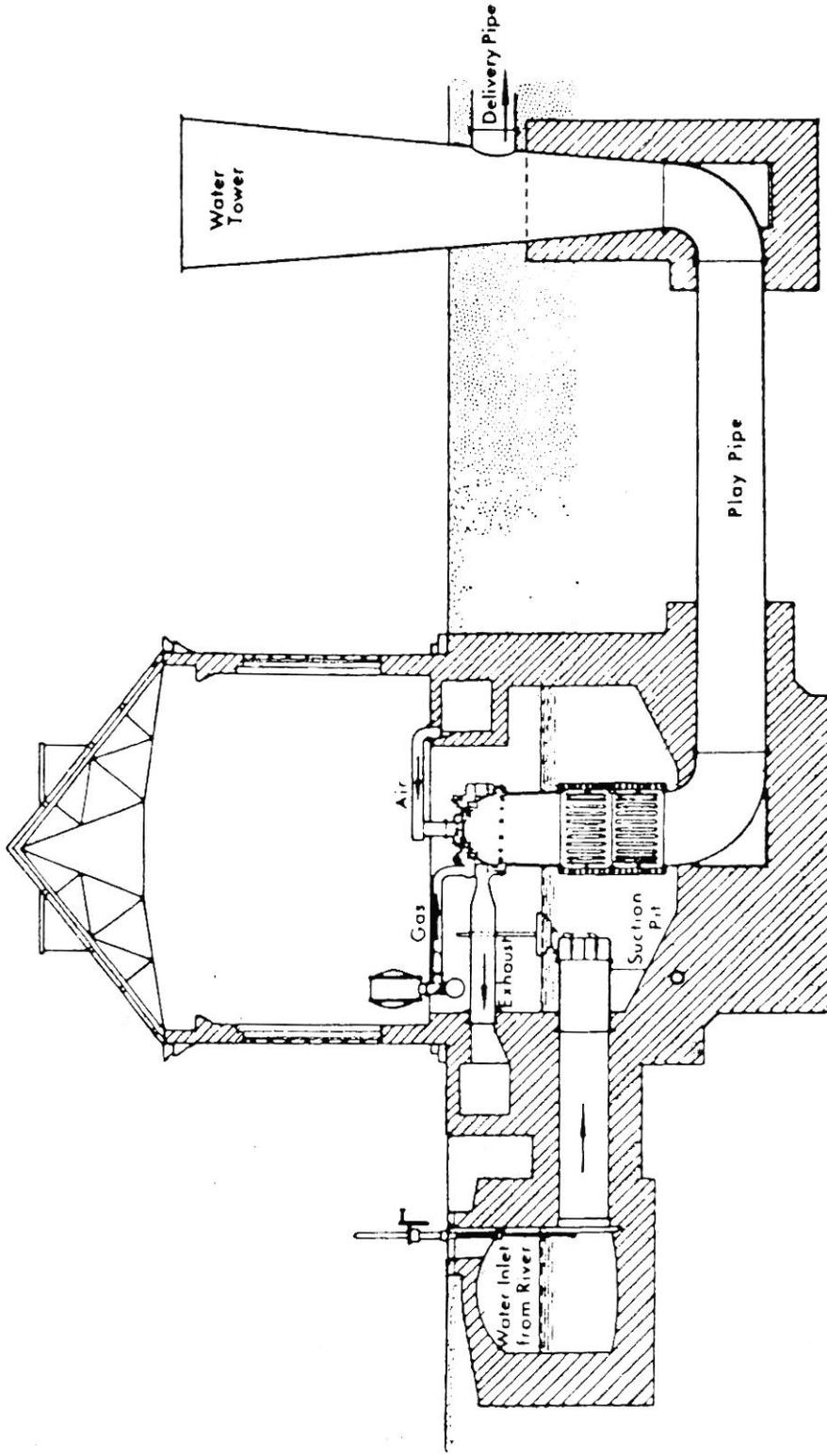
The Metropolitan Water Board, formed in 1903, took over East London Waterworks Company's undertaking in the lower part of the Lea Valley and added to its already extensive suite of reservoirs fed by the Lea. William B Bryan (1848-1914), the East London's engineer, became the first chief engineer of the MWB.

The 420 acre, 2,700 million gallon King George V Reservoir was opened by the King on 15 March 1913. Retained by a massive embankment, its top water level is about 30 feet above the Lea. For pumping from the river on a large scale with excellent fuel economy, Bryan selected a novel gas-powered pump newly developed by Herbert A Humphrey (1868-1951). This has no solid pistons or rotative parts but relied on the tuned oscillation of a mass of water in a 'play pipe', between the combustion chamber and a flare-shaped, open-topped surge tower. Working on a four-stroke principle at 11 cycles per minute, the oscillating water compressed a gas-air mixture in direct contact with it, which was then ignited, forcing the water up the tower and out through the delivery pipe before it surged back to exhaust the



The 8 inlet valves, 8 scavenge valves and 16 exhaust valves of a Humphrey pump

Malcolm Tucker



King George V Pumping Station, Enfield: Cross Section
Enfield Archaeology Society

combustion chamber and then forward to draw in a fresh charge. See Denis Smith, 'The Humphrey Pump and its Inventor', *Transactions of the Newcomer Society*, vol 43 (1970-1) pp 67-92.

There were four **Humphrey pumps** of 40 m.g.d. capacity and one of 20 m.g.d. The combustion chambers are respectively 7 feet and 5 feet in diameter. Four of the five remain as 'listed' features, although they last worked in 1968-9. Producer gas was made by blowing an air-steam mixture through red-hot anthracite in the adjoining building and it was that plant which wore out. However, setting the engines in motion and maintaining the numerous interlocked valves required great skill and it is said that on one occasion when an unexpected flood provided an opportunity to top up the reservoir, the flood had subsided before they could be got to work. The pumping is now done electrically. Works in progress to remove a disused electric pump make it unlikely that we can be allowed into the engine house on our visit. Externally, the buildings are handsome pieces of the English Baroque revival, and a screen wall with coupled Doric columns surrounds the riveted steel surge towers. WB Bryan always ensured that his pumping stations were at the forefront of architectural style.

From the reservoir embankment can be seen the industrial part of **Brimsdown**, with the flare stacks of the Johnson-Matthey chemicals plant and the latest reincarnation of Brimsdown Power Station.

The Lee Navigation – Enfield Lock

The navigation below Enfield Lock is an enlargement made in the late 1760s of the Enfield Mill Stream (of which the entrance sluice remains). It was further improved for 100-ton barges (of 16 feet beam) in the 20th c. Served so well by water as well as rail transport, the industries of Brimsdown flourished in the first part of the 20th century and commercial traffic lasted until the 1980s. The **Enfield Lock** of 1769 (which gave its name to the locality) was rebuilt in 1923, 16 feet wide, 90 feet long and 7 feet deep over the sill, but the traffic upstream remained modest. The present lock keeper's house is dated 1889, with an older one to its north. Below the lock, the Lee Navigation **depot** was established in the 1790s. It has offices of 1907, earlier former workshops and stores and a modernised dry dock.

The Royal Small Arms Factory

Established on this greenfield site, near the Royal Gunpowder Mills at Waltham Abbey, in 1812-16, it superseded the previous Royal Armouries at Lewisham and the Tower of London. Its early water-driven gun-barrel grindery, fed by a canal from Newman's Weir, was designed by John Rennie. Under the management of George Lovell for over 30 years, it set new benchmarks for quality. But its production was on a small scale, most manufacture being by contractors, until the Crimean War, when the Board of Ordnance saw the need for mass production with interchangeable parts, on the American model. A brand new, steam-powered factory was constructed in 1855-7, with American machine tools in a vast Machine Shop under a north-light roof to produce 130,000 muskets annually. Facilities were expanded up to World War I, production of the Lee-Enfield rifle commencing in 1895. Half the site closed in 1963. On privatisation, Royal Ordnance was purchased by British Aerospace in 1987 and the site was rapidly closed down. It was sold to Fairview New Homes for a housing development in 1995 and the RSA Island Centre, of business units in the much-cut-about Machine Shop, was opened in 2001.

Buildings to be seen are:

- **Government Row**, long terraces of workers' houses facing the Navigation, constructed with a single storey in 1815 but rebuilt in 1854-8 more substantially. Much reduced by bombing.

- **Police Office**, by former main gate, very much altered.
- **Offices** of the early 19th century in plain Georgian style along the west side of the site.
- **Basin**, recreated on its original site (the simulated lock gates are a device to accommodate altered site levels).
- **Machine Shop** of 1855-6, single-storeyed with preserved southern office and stores frontage, decorative yellow and red brickwork and clock tower. Behind, the repetitive iron structure on a 20-foot-square module, originally 12 bays by 14 bays, has been reduced to a series of glass-fronted ranges around courtyards. Note the broad arrows and 'BO' initials (Board of Ordnance) on the cast-iron columns and guttering, and provision to fix the line shaft brackets to the column heads.
- Three buildings at south side of site, now flats, include the **Pattern Room** of circa 1900 where 'sealed pattern' reference standards were stored, and the **Grindery** of 1887-8 with diaper-pattern brickwork imitating the main Machine Shop.
- Further north, the Water Tower, late-19th-century functional brickwork supporting a rectangular tank. The rather hideous new road bridge is the work of the borough council, 1998.

(We shall not see **Newman's Weir**, composed of lifting gates in cast-iron frames, rebuilt 1907.)

Brimsdawn, Ponders End & Edmonton

We take the A1055, much of it a new road of the 1980s, past industrial areas that were rural before 1900, and then dug over for gravel extraction. Huge distribution warehouses are replacing diverse 20th-century industrial premises. At Ponders End, **Wright's Flour Mill** continues on an ancient site, with Georgian buildings crowded out by modern plant. Southwards, we pass the 1960s Deephams sewage treatment works.

Edmonton is dominated by the huge concrete chimney of the **Refuse Incinerator**, built by the Greater London Council in 1971-4 and since upgraded to reduce emissions.

The **North Circular Road** had a stylish concrete viaduct across the Lea Marshes, of 1928-30 by Sir Owen Williams, now replaced by a multi-lane highway of the 1990s. On the north side, the Eley industrial estate originated as an explosives factory, and on the south side the **Angel Linoleum works**, with tall, now derelict process block, became another industrial estate around 1940.

The **marshes** are 'green belt', the preserve of installations of the former **East London Waterworks** company. **Chingford Mill** well-pumping station (1893-5) has a romantic Arts & Crafts style, while the **Greaves** pumping station (1902-3), which feeds a reservoir, mimics the style of Sir Christopher Wren. Note also the modern **Flood Relief Channel** which extends from the River Stort confluence to Stratford.

The **Gasholders** belonged to the Tottenham and Edmonton Gas Company. The largest one at Edmonton holds 7 million cubic feet, with box-lattice steel guide columns about 180 feet high (1914-23).

Markfield Road Sewage Pumping Station, Tottenham

Tottenham was one of a chain of villages along the Old North Road (the Roman Ermine Street) that grew ahead of the general expansion of London. As piped water became more available there in the 1850s, so sewage effluents became a problem. Sludge settlement tanks and simple filter beds were built by the Tottenham Board of Health as a model installation, where the local brook discharged to the Lea. But then, in 1883-6, a pumping station was built by the Tottenham & Wood Green Joint Drainage Board, to send the ever-increasing sewage

untreated to the Metropolitan Board of Works' Northern High Level Sewer and thence to the Beckton outfall.

The 100hp Woolf-compound beam engine is by Wood Brothers of Sowerby Bridge. It has a fabricated, wrought-iron box beam, 21 feet long, and the entablature, elaborately bracketed, stands 17 feet above the floor on eight fluted Doric columns. The cylinders are of 20 inches and 35 inches diameter and respectively 51 inches and 72 inches stroke. The steam was at 80psi. The huge flywheel of 28 feet diameter with 10 arms worked at 16rpm. The two single-acting plunger pumps, 26 inches in diameter by 51 inches stroke, could together discharge 4 million gallons per day.

From 1905, three triple-expansion horizontal engines performed most of the pumping, with the beam engine in reserve. The station closed in 1964 (the sewage now gravitates northwards to Deephams treatment works). The building was leased in 1969 by the Lee Valley Regional Park Authority and the surviving beam engine was then restored to steam by volunteers under the leadership of Alan Spackman (who died last year). A charitable trust was established in 1984. Other displays have been gathered, while the rest of the site is incorporated in a public park (but one prone to vandalism).

Tottenham Hale

Tottenham Hale station on the Cambridge line gives interchange to the London Underground Victoria line and was remodelled architecturally in 1992 for the Stansted Airport express service. We pass the duplicated, modernised and mechanised **Tottenham Locks** on the Lee Navigation and cross the Lea Valley on a residual corridor between reservoirs. The railway alongside is the **Tottenham & Forest Gate Junction Railway**, opened in 1894 as an orbital route giving the Midland Railway access to Tilbury Docks.

Low Hall Pump House Museum

This is a sewage pumping station, disused since the 1960s, in a former Walthamstow Council depot, at Markhouse Avenue, London E17. Two horizontal single-cylinder engines of circa 1896, by Marshall Sons & Co Ltd of Gainsborough, share a common flywheel but could be worked singly. The cylinders are of 14 inches diameter and 24 inches stroke. They drove centrifugal pumps via belts. The steam was supplied originally from a refuse destructor. They are demonstrated on compressed air.

The museum has diversified into other aspects of industrial archaeology and road transport history and aspires to become a museum of Lea Valley industry, as explained by Lindsay Collier in his talk on Tuesday.

Malcolm Tucker
August 2004

ROADS – A GENERIC NOTE

The Old North Road, or North Road through Ware.

The original main road northwards to York left the City of London at Bishopsgate along the Roman Ermine Street (the name is Saxon). It proceeded up the Lea Valley, where a string of settlements such as Tottenham, Edmonton, Waltham Cross, Cheshunt, Broxbourne and Hoddesdon prospered, particularly on milling corn for London and the malt traffic from Ware (Visit C). It crossed the Chiltern scarp at Royston.

It was turnpiked in the 17th century. From Tottenham to beyond Ware it is bypassed by the modern A10 - the Great Cambridge Road of the 1920s was dualled in the 1960s and continued north from Turnford around the 1970s.

The Great North Road, or North Road through Hatfield

An alternative, more twisty route, upgraded by turnpiking in the 18th century, left the City at Aldersgate and proceeded via Islington, Chipping Barnet, (Old) Hatfield, (Old) Stevenage and Baldock, rejoining the old road north of Huntingdon. This became the A1. However, the Barnet Bypass of 1927 (see Visit K, am), the first 7 miles of the A1(M) Stevenage Bypass of the early 1960s and the rest of the A1/A1(M) dual carriageway, mainly more recent, have now removed the long-distance traffic from this coaching route.

The Holyhead Road and the North Road through St Alban's

This left the Great North Road at Chipping Barnet (now Barnet) for St Alban's, from where one route winds north via Luton and Bedford (the A6). The more important route follows the Roman Watling Street north-westwards (the A5), and was the route upgraded by Thomas Telford for the Holyhead Road.

Akeman Street

The A41, north-westwards, followed the Roman alignment of Akeman Street beyond Tring. South of there, it lacked those characteristics, but is in any case replaced by a new dual carriageway of the 1990s.

The M1

The London-Birmingham Motorway, completed in 1959, was almost Britain's first motorway (after the Preston Bypass on the M6). It actually stopped near Watford, until extended south in 1966-7. Its original distinctive over bridges in heavy reinforced concrete, by Sir Owen Williams and Partners, have succumbed to widening but the under bridges remain.

The M25

For the London Orbital Motorway, completed in the late 1980s, see the notes for Visit K, pm.

Malcolm Tucker
August 2004

TOUR NOTES, VISIT N: GARDEN CITIES

Thursday 19 August 2004

Coach Leaders: Malcolm Tucker and John McGuinness

Approximate timetable:

- 08.45 Depart Hatfield Campus
- 09.15 Arrive First Garden City Heritage Museum, Letchworth; welcome by Robert Lancaster, curator, followed by tour of parts of Letchworth by coach and foot
- 12.45 Lunch at 'The Three Magnets' public house, 18 Leys Avenue
- 13.40 Depart Letchworth for Stevenage
- 14.00 Drop off at Stevenage Railway Station; short tour of Stevenage New Town
- 14.40 Visit Digswell railway viaduct
- 15.15 Walk through industrial area of Welwyn Garden City
- 16.10 Coach departs
- 16.20 Drop off at Welwyn Garden City Railway Station
- 16.30 Arrive Hatfield Campus

Letchworth Garden City

The **First Garden City** was created to implement the concepts of (Sir) Ebenezer Howard (1850-1928). He saw that people were attracted to towns by employment opportunities and services, while the country offered much healthier living conditions. Planned garden cities, self-sustaining but set in clusters within the countryside, would combine the virtues of both. His concept of 'The Three Magnets' is the theme of the pub where we shall eat.

First Garden City Ltd was formed in 1903, its dividends to be limited to 5%. It was able to purchase four thousand acres at depressed agricultural prices. The architects (Sir) Raymond Unwin and Barry Parker prepared the master plan for 1,500 acres. Roads and parks, water supply, sewerage, cheap gas and (from 1907) electricity were provided by the company, but buildings were to be developed by leaseholders, including cottage housing societies. Competitive designs for £150 construction cost were encouraged in a Cheap Cottage Exhibition of 1905, and another in 1907. Industry was segregated in zones near the railway. By 1930 the population had reached 15,000. Around 1961 a property company acquired a controlling interest in the company. However, Letchworth Urban District Council secured a private Act of Parliament, to vest the assets in a non-profit-making corporation.

Features of note:

- The thatch roofed Heritage Museum was the offices of the architects Parker & Unwin. Nearby are estates designed by them and others for the Howard Cottage Society.
- In Bird's Hill and Pixmore Avenue, some factory buildings remain from before World War I – formerly a bronze foundry, Lloyd's Lawnmowers, WH Smith's printing works of 1905, the Phoenix motor works, the Garden City Laundry and a tapestry works of 1908. Another former printing works has a 1950s barrel shell roof.
- In Works Road, the modern electric power station is the successor of the original, but the gasworks has gone, as has the large steel foundry of Kryn & Lahy from 1915.
- There, and in Ickniel Way, are some 1920s unit factories.
- Glebe Road and Common View have workers' cottages to various designs of the 1907-10 period, which were models for later council housing.
- The Cheap Cottages Exhibition of 1905 has left variegated small houses of diverse construction between Ickniel Way and Nevells Road.
- The Skittles Inn, a temperance pub of 1907, closed by 1925 (despite there being no other pubs in the town).

- No 158 Wilbury Road is a large-panel prefabricated concrete house of 1905 by JA Brodie, the City Engineer of Liverpool.
- The 3-storey Spirella Factory was built by an American corset firm. It is a notable piece of architecture by Cecil Hignett. The south wing of 1912 was extended almost symmetrically around a courtyard by 1920. Tall-roofed pavilions in the Arts and Craft stylistic tradition are blended with large industrial windows under reinforced concrete arches. Refurbished as offices in 1999 at a cost of £11 million.
- The railway station was built in 1912, with prominent lift towers and a provision for enlargement to 4 platform faces.

Old Stevenage

Careful integration into the New Town, with removal of through traffic, has protected the long High Street of this former market town and its Great North Road coaching inns particularly well.

Stevenage New Town

This was the first of the new towns that were designated under the New Towns Act of 1946, to take overspill from London beyond the London Green Belt, as recommended by Sir Patrick Abercrombie in his Greater London Plan of 1944 – on the model of the garden cities but larger. A 60,000 target population was increased to 80,000. The town centre, constructed 1957-9, was the second in Britain, after Coventry, to be designed as a pedestrian precinct. The road system is suited to the motor car, while there is a separate, but now underused, cycleway-cum-footpath system.

The industrial area, along a spine road between the railway and the motorway, has changed considerably since the 1950s, with many of the earlier factories cleared for redevelopment, but some buildings do remain to show the spirit of the period. (The John Lewis warehouse of 1962-3, with cantilever shell roofs, cannot be viewed from the coach.)

On the southern outskirts are the very large, 1990s pharmaceutical laboratories of Glaxo Smith Kline.

Welwyn or Digswell Viaduct

This carries the two tracks of the Great Northern Railway of 1850 across the valley of the River Mimran, about 90 feet above the valley floor. The 40 brick arches span between tapering, hollow piers at 36-foot centres. The original London stock brickwork has been refaced using blue engineering bricks. Joseph Cubitt was the engineer and Thomas Brassey the contractor.

Welwyn Garden City

The Second Garden City was commenced by Welwyn Garden City Ltd in 1920, with (Sir) Ebenezer Howard prominently involved again. It was laid out more formally than Letchworth, under the controlling architectural hand of Louis de Soissons. Its population had reached 18,000 in 1948, when it was designated a new town alongside Hatfield and expanded for a target population of 50,000.

We shall approach from the north along a 'parkway', screened by trees from surrounding estates and with a formal bridge across the abandoned Dunstable branch railway. The name Parkway is borne by the axial continuation past the town centre, which is intersected by Howardsgate leading to the station.

The **Railway Station** was rebuilt in 1926, with 4 platform faces and extensive sidings, crossed by a long footbridge.

The **Industrial Zone** is on the east side of the railway, where the following features will be noted along Broadwater Road:

- The **Roche Products** pharmaceutical factory in 1938 with distinguished International Modern style buildings by the Swiss architect Otto Salvisberg. Larger buildings have been added to the south.
- The derelict Polycell factory has a polite front by Louis de Soissons, 1956. Nearby is the large arched roof of the former British Instructional Films studio.
- A derelict 1920s factory made electric heaters.
- On the east side are two corrugated-clad sectional factories (softened by weather-boarded gable ends) of the 1920s, followed by a 2-storey factory in Art Deco style, possibly Murphy's radio works of 1932.
- The **Shredded Wheat** factory with its landmark silos, was constructed in 1925 and later, to the architectural design of Louis de Soissons.

In further roads such as Hydeway will be seen 1930s factory units with neat brick office frontages by Louis de Soissons. (Spot the Crittall steel window frames, where not replaced, and distinctive concrete mullions.)

Along Tewin Road will be seen:

- The former Norton Grinding Wheel factory of 1930, 4-storeyed and brick-clad but undistinguished architecturally.
- Two fairly large gasholders of three spiral-guided lifts in above-ground tanks, of the mid-20th century. The later tank is welded, the earlier one riveted.
- Tewin Court, an estate of small, very neat factory units in Welwyn Garden City Ltd's characteristic manner.

Malcolm Tucker
August 2004