

Dogdyke Technical Brochure

This is the text of the “Dogdyke Technical Brochure” written around 1982 by Ray Hooley, but never published.

This version of the draft has annotations in red made by John Porter. On an attached slip he notes: “Dear Ray, some suggestions I hope you may find helpful”

This draft has been updated to include John Porter’s suggestions and additional text is shown in red as per the original draft. This copy shall be known as V1.0 – Jan 2026

HISTORY (General)

Drainage of the Lincolnshire Fens was begun by the Romans. However, it was the Dutch drainage engineers of the 17th century who began the drainage system that we know today.

They commenced by straightening the dykes, rivers and **watercourses**, and raising the river banks so that a larger volume of water could be carried down to the sea. The improved drainage caused the land to dry out, shrink and become lower than the water in the rivers. To prevent water flowing back from the rivers onto the land, banks had to be built even higher, and water from the dykes had to be raised over them. Thus the land drainage pumps came into being.

The earliest pumps consisted of scoopwheels driven by windmills. The invention of the steam engine brought a more reliable source of power, and the scoopwheels were driven by beam engines. Some of the beam engines were replaced by more efficient horizontal steam engines towards the end of the 19th century. Others soldiered on until they were replaced by internal combustion engines in the 1920’s and 1930’s. Progress is constantly on the march and at present the internal combustion engines have been rapidly replaced by electric motors. The electric pumping stations are unmanned, and are operated **automatically or** by remote control.

As the engines have progressed, so have the pumps. The scoopwheels worked fine with the slow-speed steam engines, but the powerful oil engines were coupled to centrifugal pumps which **had bigger lift** and could handle far larger quantities of water. The electric motor **with modern pump** in turn moves the water at far greater speed, enabling the same volume to be pumped with a much smaller unit, **e.g. vertical spindle axial (or mixed) flow.**

HISTORY (Dogdyke Pump)

Dogdyke has a unique story to tell. Following the Inclosure Act, land drainage started here when a scoopwheel driven by a windmill was erected in 1796. The wind engine was of the ‘post’ type, and carried a sail 36 feet long by 5 foot 3 inches wide. It drove a scoopwheel of 16 feet diameter. Dozens of similar pumps were installed on the banks of the Witham between Lincoln and Boston, **and in intermediate drains and tributaries.**

The 'wind engine' was replaced by the steam beam engine in 1856. Unfortunately the former was demolished, and no trace of it remains. The beam engine drove a scoopwheel of 24 feet diameter, and worked until 1940, when it was replaced by a Ruston & Hornsby oil engine driving a Foster Gwynnes centrifugal pump. This in turn as recently become redundant, and has been replaced by an electrically driven pump a little further down the river.

This, Dogdyke has experienced four different types of engine (wind, steam, oil & electric). The Preservation Trust is responsible for the steam and oil pumps, which operate side by side on the same plot of land.

The Dogdyke pump is now the only known example of a land drainage beam engine driving a scoop wheel in its original setting still for the same purpose, to be worked in steam.

THE PRESERVATION TRUST

Dogyke Pumping Station Preservation Trust is a voluntary organisation, which was formed in 1973 to ensure the restoration and preservation of the Dogdyke steam pumping station. When the beam engine was replaced by the diesel pump in 1940, the steam equipment was abandoned. By 1969 the engine, boiler and scoopwheel had deteriorated through neglect and were in danger of being demolished by the Ministry of Defence because of their close proximity to the Coningsby Airfield, **directly in the flight path.**

As often happens when something of importance is threatened, there was a sudden surge of interest. Guy Burton and John Porter joined forces to make the building secure against vandals and weather. Dr. Michael Lewis, Hull University Lecturer in Industrial Archaeology organised one of his Lincoln classes to prepare a detailed drawing of the engine. Ronald Clark, author of many well known books on steam, wrote a letter to the "Lincolnshire Life" magazine, urging that the pumping station should be preserved. Following this, members of the Lincolnshire Steam Engine Preservation Society visited the site to assess what might be done. Finally, a meeting of all interested persons was convened at Guy Burton's home. A steering committee was elected, and they arranged a public meeting at the Fortescue Arms, Tattershall. At this crowded meeting, in November 1973, the Dogdyke Pumping Station Preservation Trust was formed, with Guy Burton as Chairman and John Porter as Hon Secretary. Membership of the Trust is about 100, but its activities are organised by the 16 members of the Executive Committee, **plus volunteers, tea ladies, Harry, Paul, Steve, Rowland etc.**

For the purpose of the restoration, members of the Committee were designated to form working parties for (a) the beam engine, (b) the boiler, (c) the scoopwheel, (d) the fabric of the building, (e) the museum and historical collection and display; etc., etc.

BEAM ENGINE

The engine is entirely as manufactured in 1856 by Messrs Bradley & Craven of Wakefield. It was very strongly constructed of cast iron, wrought iron, and brass, and is a low pressure, double active, separate condenser beam engine. The piston is 24" diameter and the engine stroke is 48". The flywheel is 14' diameter, the beam has 12'-3" centres, and the crank throw is 1'-10". **Discovered by Professor Darby who measured the "blueprint" drawing!**

The engine generates 16 h.p. at 28 rpm, sufficient to lift 25 tons of water per minute. Restoration of the engine entailed a complete strip down of all the working parts. The general condition was fair, but some worn parts had to be re-made, all the glands had to be repacked, some lost parts had to be found, and everything had to be painted. Due to some movement in the foundations, the engine had to be trued up with the scoopwheel next door.

SCOOPWHEEL

The 28 rpm of the engine flywheel is reduced through cast iron gearing to 7 rpm at the scoopwheel. This wheel is 24' in diameter, and has 36 wooden floats (or paddles), each 5'-5" long x 1'-3½" wide, set at a raked angle. The scoopwheel works like a water wheel in reverse. The water wheel is driven by the weight of the water falling onto its paddles. The scoopwheel is driven by the engine, and its paddles force water from the drain into a narrow channel, to build up a head sufficient to push open a pair of mitred gates, thus allowing the water to flow through into the river Witham. The gates are designed to be self closing against rising flood waters in the river.

Many rotted timbers had to be replaced or repaired **by Vice Chmn late Rowland H Hill**. A viewing platform, with guard rails had to be constructed to enable visitors to have a lose view of the exciting wheel, with safety.

BOILER

Very little is known about the first boiler, which was supplied in 1856, other than it was a twin-tube Cornish type, costing £96-18s., without fittings. A new boiler was installed in 1909. This as a Lancashire type (No. 12373), built by William Foster & Co. Ltd, Lincoln, and supplied at a cost of £187-16s-9d. It measured 16'6" long x 6' diameter, and worked at a pressure of 15 p.s.i. Delivery was accomplished by floating the boiler down the Witham from Lincoln. It was then installed at a cost of £17-11s. When it was inspected in 1975, this boiler was found to be beyond economic repair. To overcome the problem a second hand boiler was purchased from J. Van Smirren of Boston. This is a Clayton coal-fired vertical cross-tube type measuring 7'-6" high x 4'-2" diameter. Its normal working pressure of 60 p.s.i. is reduced to approx 10 p.s.i. at the engine by means of a William Auld pressure reducer. The boiler is fed by a steam driven Weir water feed pump.

BUILDINGS

The main building comprises three compartments in a line parallel to the river. The first compartment is the boiler house. It was found possible to retain the old Foster horizontal boiler, with the newer vertical boiler set up at the back of it. The chimney from the operating boiler goes straight up through the roof. However, the plinth of the original brick chimney can still be seen at the rear of the building. This chimney stood on a base which was square up to a height of 15', then tapered upward in the round to a total height of 100'. This height was reduced somewhat in 1922, after the chimney was struck by lightning. In 1941 it was completely demolished because of its danger as a landmark for enemy aircraft.

The middle compartment houses the beam engine. A flight of wooden steps and a platform gives access to the beam for maintenance purposes.

The third compartment affords a roof to cover the water inlet from the drain, the scoopwheel, and the outlet to the river. A viewing platform, with safety fence, has been provided to enable visitors to view the scoopwheel whilst it is actually pumping water. In fact, the river banks have been raised considerably since the pump was shut down in 1940, and it is now no longer possible to pump into the river. Channels have been provided which enable the raised water to flow back into the drain. Thus we are able to demonstrate pumping, even during dry periods, since we are redirecting the same water continuously.

Adjacent to the steam engine building, **a new brick and slate building was constructed** in 1940 to house the Ruston oil engine and Gwynnes centrifugal pump. This installation is now redundant and has been handed over to the Dogdyke Trust for preservation. It is being maintained in full working order, and is usually run for demonstration purposes on steaming days. Since this pump still transfers water into the river, it can only be operated when there is sufficient water in the drains.

A few yards from the engine buildings stands the engine man's cottage. Floods often occur suddenly, and because of the large time element required to start the steam pump, it was necessary for the engine man to live close by. The cottage is now used to display the small historical collections of publications, photographs, drawings and artefacts.

The art of land drainage is anticipation, the ideal being to have an empty drain before the flood waters arrive.

With the River Witham bringing water from below Grantham and nearly from Gainsborough, plus the "tide lock" effect of the Grand Sluice at Boston for up to four hours on each tide, all experienced land drainage folk will tell you that one hour's pumping before the Witham rises is worth three after it has come up.

OIL ENGINE & PUMP

The oil engine, a single cylinder horizontal type, is No.194833, Class 7XHR, built in Lincoln by Ruston & Hornsby Ltd. It has a 10" bore x 18½' stroke, and generates 40 h.p. at 300 r.p.m. It was delivered to William Foster & Co., Lincoln on 12th June 1939.

The centrifugal pump, a syphon/rotary/vacuum type, was also built in Lincoln by Foster Gwynnes Ltd. It has a 22" bore outlet, and can deliver 40 tons/min. against a 10 ft head.

Although the oil engine and pump are in the care of the Dogdyke Pumping Stations Preservation Trust, they are always available for emergency use by the Drainage Board, **and in the actual event, performed sterling service in the April 1981 floods.**