Burgh of Langholm

SEWAGE PURIFICATION WORKS

Official Opening
by
Major Francis Moffat M.C.
Convener of Dumfries County Council
28th September 1972

BROCHURE COMMEMORATIVE

of the

OFFICIAL OPENING

of the

LANGHOLM SEWAGE PURIFICATION WORKS AT LAND'S END

by

MAJOR FRANCIS MOFFAT M.C.

on

THURSDAY 28th SEPTEMBER 1972

Langholm Town Council

Provost	James Grieve
Magistrates	Bailie James Harkness
	Bailie Robert R. Rae
Honorary Treasurer	Miss Jean M. White
Dean of Guild	Alex Pool
Councillors	Thomas C. Beattie
	Alex. S. Morrison
	Allan Porteous
	William Tait
Officials	Edward C. Armstrong, *Town Clerk and Burgh Chamberlain*
	Albert Brebner, *Burgh Surveyor*
Consulting Engineers	**Babtie Shaw and Morton, Glasgow**
Principal Contractor	**Border Engineering Contractors Ltd., Whitehaven**

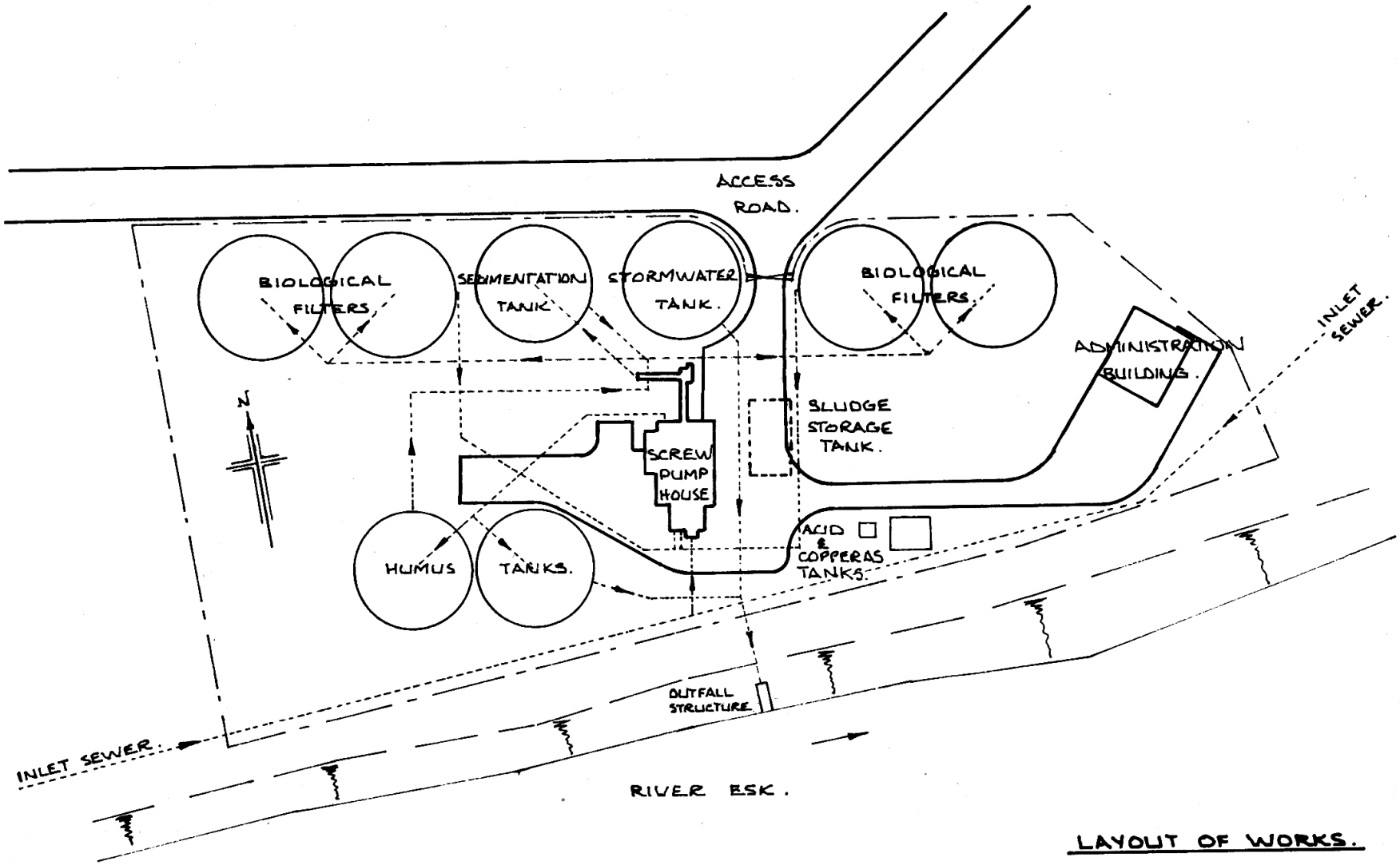
Foreword by the Provost

It would be true to say the people of Langholm were hardly overjoyed when they realised a new sewage purification works for the town would cost some £100 per head of population, but, at the same time, all had to admit the old works had outlived their usefulness and would have to be replaced.

Although the Esk has never been classified as "dirty", the effluents pouring into the river from Sewage Works and Mills alike were far below acceptable standards, and negotiations extending over many years finally resulted in the formulation of a scheme to treat domestic sewage and trade wastes centrally. In other words, the Town Council and Industry joined forces to combat man's modern enemy, pollution, and give added sparkle to the waters of the ebullient Esk.

As my fellow councillors and our industrialists know, the task has not been an easy one, but it would be a poor world if opinions did not differ on occasion, and I am confident everyone involved will now agree that the countless hours spent in discussion and friendly argument have, in the end, produced first class results.

I know a great deal of thought was given to the ultimate design of the new works: they are up-to-date, sophisticated even, and it is my earnest hope they will serve the community efficiently for many years to come.



LAYOUT OF WORKS.

Sewage Purification Works

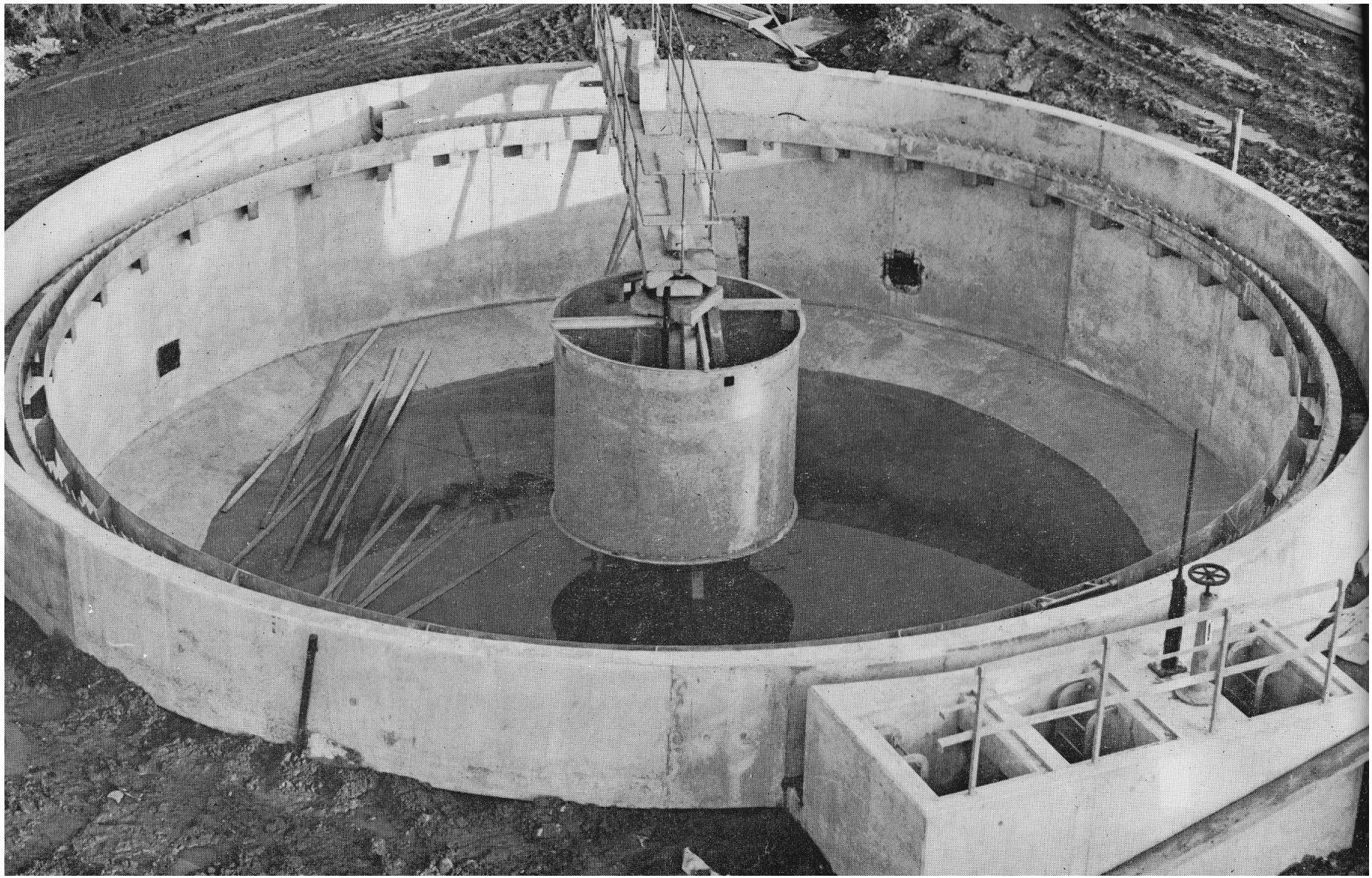
The original treatment afforded to the sewage from the town, prior to the construction of the works, took the form of a septic tank with screens and a detritus tank constructed about 45 years ago. Although these works required to be demolished to make way for new units, they were kept in operation until at least the equivalent treatment was available in the new works.

Orders for mechanical plant were placed in February, 1969 and construction on site by Border Engineering Contractors Ltd. commenced at the start of 1971. Full treatment of the sewage commenced in August, 1972 and this will, in addition to the present flow in the sewers, deal with the additional flow from the various local industries which is at present discharged to the river.

The Purification Process

The flow entering the works is first of all lifted by pump to a higher level after which it passes through presedimentation, sedimentation, biological filtration and humus sludge separation processes before flow measurement and discharge to the river. In wet weather, part of the additional flow is afforded a degree of settlement in the storm water tank, while flows higher than this predetermined figure are passed through a screen only before discharge to the river.

The purpose of these various processes is described below and the appropriate technical data are listed at the end of the brochure.



Presedimentation

After being lifted by the main pump which is of the archimedian screw type, designed and manufactured in Holland, the flow passes through a screen which arrests stones, cans, bottles and rags. These are raked off and disposed of separately.

Inert grit is next removed by settlement in a vortex chamber from which it is removed by conveyor for local disposal, and the main flow then passes through a measurement flume before gravitating to the sedimentation tank.

Sedimentation and Stormwater Settlement

Solid matter is separated from the liquid by gravity in the quiescent conditions of the sedimentation tank where in dry weather each unit of volume is retained for about six hours. Grease and floating debris rise to the surface and are skimmed off by a baffle on the travelling bridge, the main function of which is to trail blades around the floor of the tank, scraping the sludge into a central hopper for removal by hydrostatic pressure.

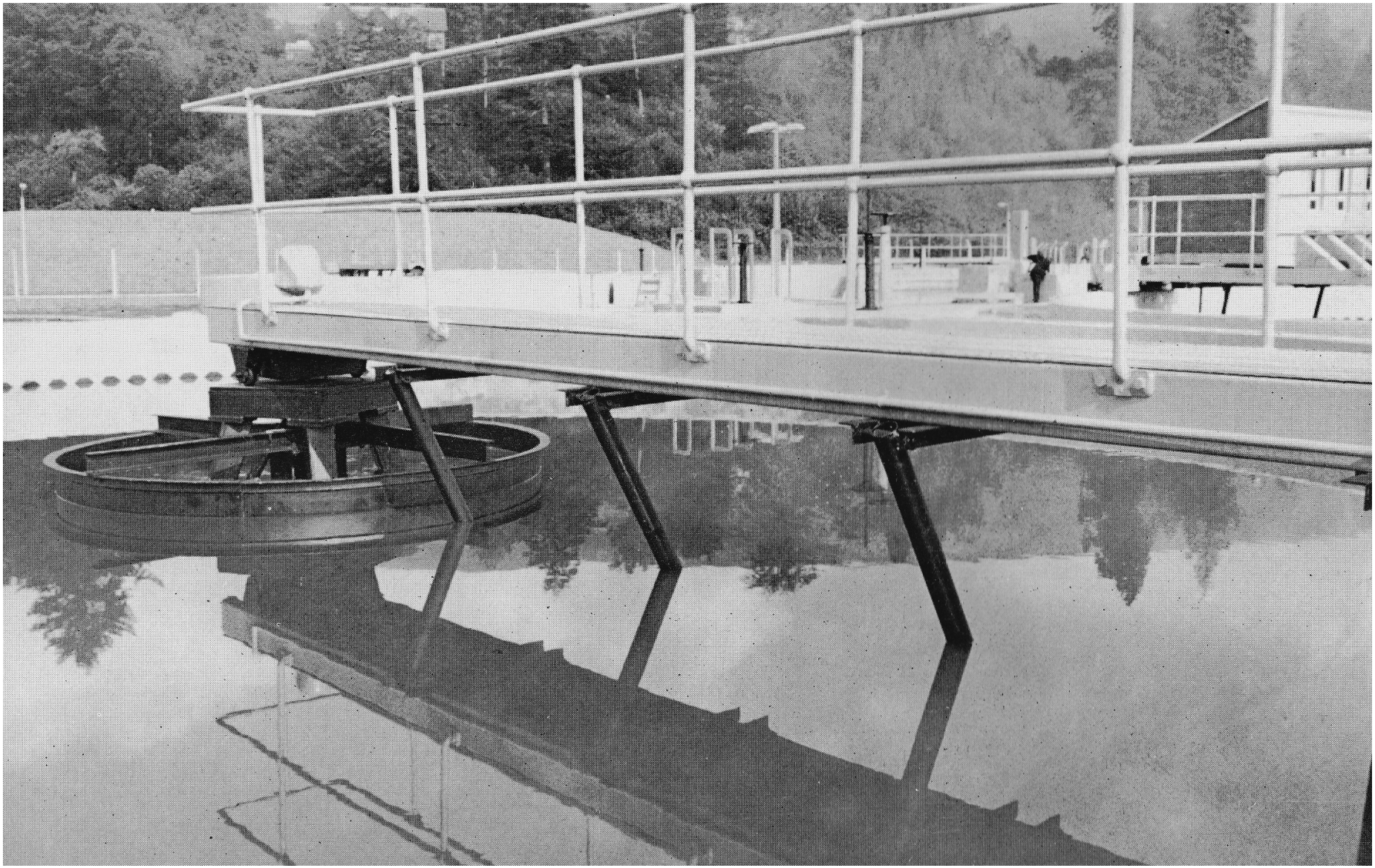
The process removes about one third of the "strength" of the sewage in terms of its polluting qualities.

A similar tank is provided to receive stormwater in wet weather. This extra flow is lifted from the inlet sewer by a separate archimedian screw pump, having first passed through a mechanically raked screen where the debris is returned to the main sewage flow. Facilities are provided to enable this tank to operate as the sedimentation tank if the latter is out of use for maintenance.

Biological Filtration

The essence of a biological filter is the mass of bacterial and other forms of primitive life which adhere to the stones with which the filter is filled. The bacteria adsorb to themselves, and use in their metabolism the dissolved impurities in the sewage. Provided a congenial environment and an adequate supply of suitable nutriment are maintained, the bacteria are self-regenerative.

Sewage is sprinkled over the surface of the filter by electrically propelled rotating distributors. These machines would in fact rotate by the reaction of the flow jets but this is inconsistent and would in any case mostly lead to rotation at a rate higher than the probable optimum. The motors, in effect, therefore act to restrain the speed of rotation.



Humus Sludge Separation

The exhausted bacterial slime from the biological filters is continuously being sloughed off the stones in the form of a thin sludge which is separated from the remainder of the flow in much the same way as the sludge in the sedimentation tank. Each unit of volume, in dry weather, will take about four hours to pass through the tank to which it is lifted by a third archimedian screw pump.

The sludge is scraped to a central hopper for discharge by hydrostatic pressure to the collecting chamber from which it gravitates back to join the crude sewage inflow at the screw pumphouse inlet.

A second tank, fed by the fourth archimedian screw pump, is provided so that the sewage leaving the sedimentation tank can be passed to one pair of filters followed by settlement and a complete repeat of the process using the second pair of filters and the second tank. This double filtration affords a greater degree of treatment to a given strength of sewage.

Settlement is followed by flow measurement and discharge to the river.

Administration & Operation

The works is staffed by one full-time operator with part-time supervision by a senior member of the Burgh Surveyor's staff and assistance as required.

The administration building houses an office, workshop, laboratory and control room which contains the electrical switchgear and instrumentation.

Facilities in the form of suitably-sized tanks, are provided to permit the manual and automatic addition of copperas (ferrous sulphate) and sulphuric acid to the flow to counteract the effects of certain constituent parts of the industrial wastes contained in the sewage.

Sludge Disposal

Sludge from the humus tanks which is very light and contains up to 99% water is returned to the main flow and is removed as part of the thicker primary sludge from the sedimentation tank. This gravitates to ram pump units located in a basement beneath the motor room of the screw pumphouse. These pumps can discharge the sludge to either of two underground storage tanks located immediately adjacent to the pumphouse or to a standpipe at road level for discharge to the County Council road tanker. They can also discharge sludge back to the inlet sewer although this duty is normally reserved for washwater from tank or pipework cleaning which these pumps also deal with. The ram pumps can also withdraw sludge from the storage tanks for discharge through the standpipe to the tanker.

Surplus water which will gather on the surface of the sludge during storage, can be bled off and fed back to the inlet sewer reducing the volume of sludge to be removed by the tanker.

Technical Data

Design Flow

0.273 million gallons per day (m.g.d.) of which about 55% is the domestic sewage flow from an ultimate population of 3 000 persons, the balance being attributable to industry.

Sedimentation and Storm Tanks

Two tanks 42 feet in diameter each having a capacity of 77 000 gallons.

Biological Filtration

Four filters each 52 feet in diameter containing a total of 1 850 cubic yards of filter medium.

Pumphouse

Three archimedian screw pumps each rated at 0.825 m.g.d., one screw pump (stormwater) rated at 1.650 m.g.d., and two ram pumps each capable of dealing with 50 gallons per minute.

Sludge Storage Tanks

Two rectangular underground tanks with a total capacity of over 12 000 gallons, sufficient for more than 4 days' operation.

Costs

The final cost has not been ascertained, but is expected to be around £220 000.

Other Contractors

Longwood Engineering	Screens
Ames Crosta	Screw Pumps and Grit Removal
Simon Hartley	Distributors
Vokes	Tank Scrapers
Lee Howl	Ram Pumps
GEC-Elliot	Flow Measurement
Edwards and Jones	Copperas Stirrer
Ottermill Engineering	M.V. Switchgear
Electronic Instruments	pH control gear
Edmiston Brown	Electrical Installation (sub-contract)
Vanroy	Portable and washwater pumps
Kent Instruments	Level recorders
A. P. V. Mitchell Craig	Acid Pump