

Repton Rural District Council

THE BUNKERS

SEWAGE TREATMENT WORKS

MICKLEOVER

Extensions & Reconstruction

FORMAL OPENING
AND VISIT OF INSPECTION

Tuesday 1st November 1960

Explanatory Handbook

REPTON RURAL DISTRICT COUNCIL

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Vice Chairman

MR. E. H. WRIGHT

PUBLIC HEALTH COMMITTEE

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Chief Public Health Inspector	F. Lomas,	M.R.S.H., M.A.P.H.L I.

CONSULTING ENGINEER

PICK, EVERARD, KEAY AND GRIMSON
6 Millstone Lane Leicester

GENERAL STATISTICS OF DISTRICT

Area: 65,653 acres.

Population: Estimated 37,460.

Number of Parishes : 42

Rateable Value (April 1960) £508,002

Product of 1d. Rate Estimated £2,126

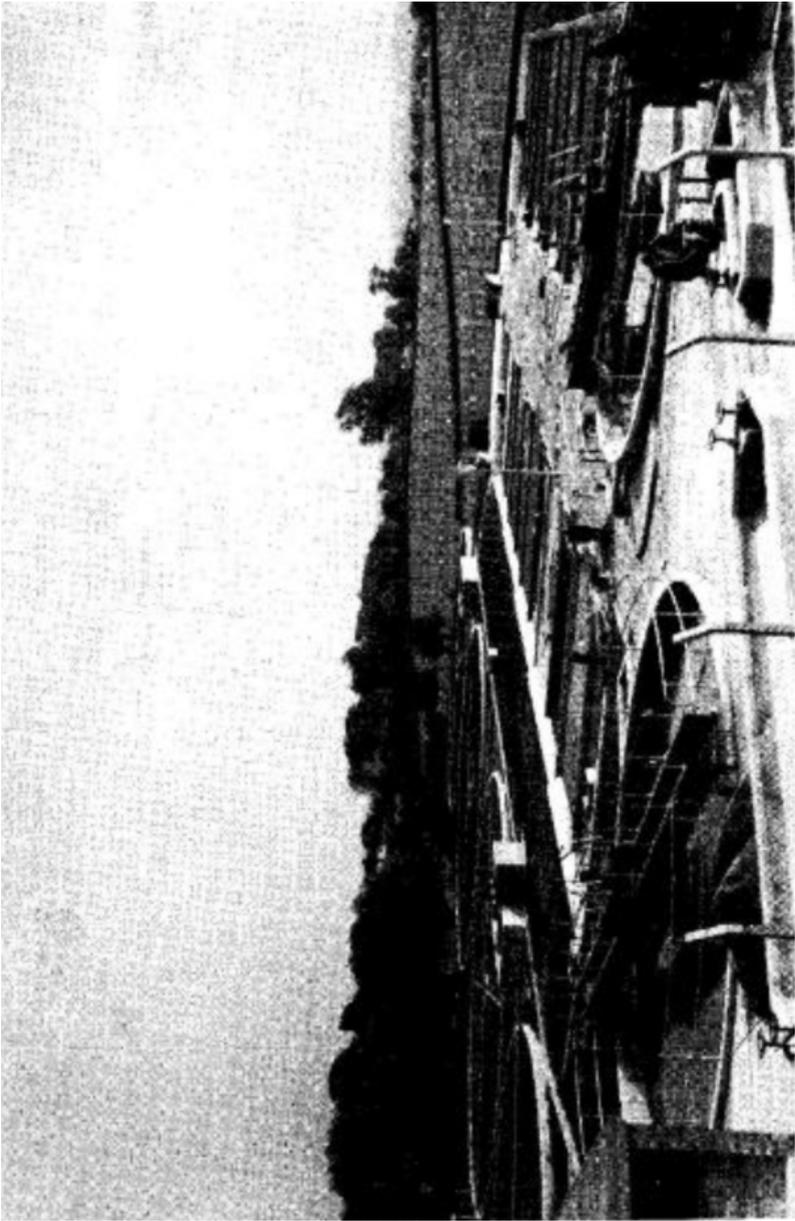
THE BUNKERS SEWAGE TREATMENT WORKS

HISTORICAL

SEWAGE WORKS for Mickleover were first built on the site known as The Bunkers in 1925, when the development to be dealt with consisted of little more than the old village, astride the Derby-Uttoxeter main road. These sewage works were large enough to treat the sewage from a population of roughly 1,500 and they sufficed until some years after the war, when, with the relaxation of controls, extensive new housing estates, constructed by a number of private developers, began to spring up over a wide area to the north and east of the old village. The rapid rise in population which resulted threw an ever growing strain on the old village sewers and sewage works and, on the Council's instructions, the Consulting Engineers prepared a comprehensive scheme for augmenting the sewer capacities and extending the sewage works so that the problems created by the increasing flow of sewage could be fully overcome. Detailed proposals were submitted to the Ministry of Housing and Local Government in 1956 and 1957, and permission to proceed with the necessary work was soon forthcoming.

During 1957 new 12" and 15" diameter relief sewers were laid between the centre of the village and the sewage works and in September 1958, work began on the reconstruction of the sewage works at The Bunkers.

These extensions, comprising, in effect, a completely new sewage treatment works have now been completed and their principal features are described in the following pages.



GENERAL VIEW OF THE NEW TREATMENT WORKS

DESCRIPTION OF THE NEW WORKS

INTRODUCTORY NOTE

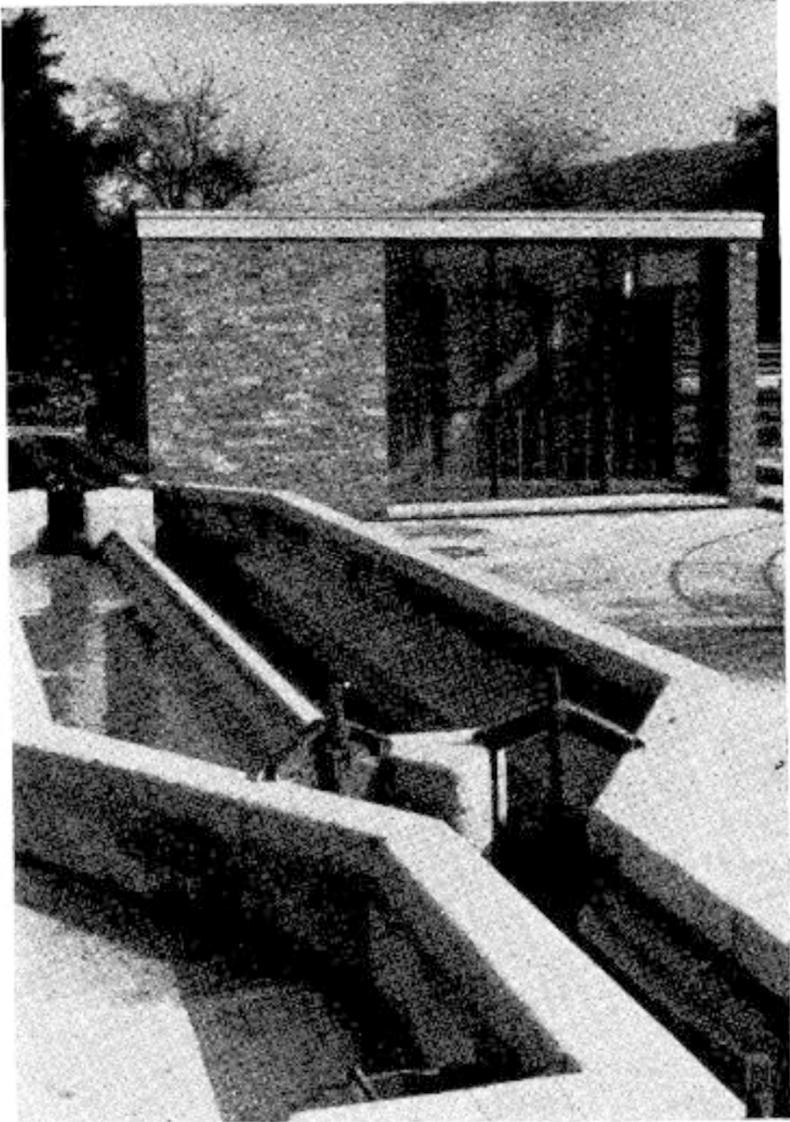
The completed sewage treatment works are designed to serve a future population of 9,000 and to treat a dry weather flow of sewage of 330,000 gallons per day. The sewage is of average strength and is mainly domestic in character.

The older development in the main village area drains to the sewage works by gravity, but much of the sewage from the new estates has to be pumped into the head of the outfall sewer. Although in the new estates storm water is excluded from the foul sewers, many of the older sewers operate on a combined system and in times of storm the flow reaching the works is greatly increased by the run-off from roofs, roads and paved areas.

PRELIMINARY TREATMENT PROCESSES

On entering the treatment works, the sewage first passes through the storm overflow chamber where storm flows in excess of 1 million gallons per day (3 times the dry weather flow) are discharged over a weir to the storm-water tanks. The storm overflow is controlled by a flume which also serves to operate an automatic flow recorder and integrator situated in the adjacent control House. This instrumentation measures and records on a chart the flow passing forward for full treatment.

Immediately below the recorder flume, the sewage enters the detritus channels where separation and removal of grit and other relatively heavy solids takes place. There are two channels, used alternately each of which is 25 feet long with a precast concrete invert of paraboloidal cross-section, designed to maintain a forward velocity of the sewage of approximately 1 ft. per second at rates of flow up to 1 million gallons per day.

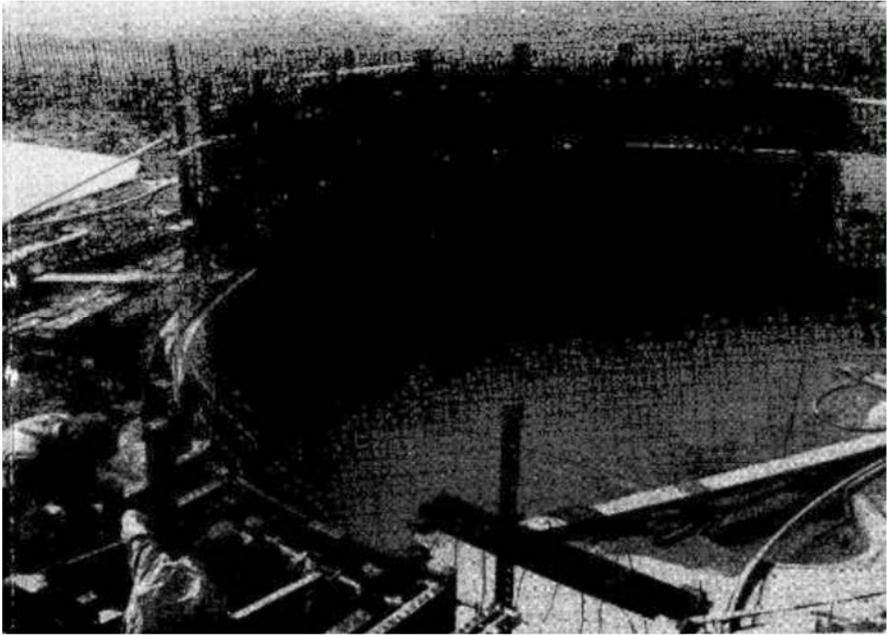


DETRITUS CHANNELS AND MAIN CONTROL HOUSE

The larger solids contained in the sewage are then cut up into small fragments as the sewage passes through the comminutor thus dispensing with the difficulties and unpleasantness associated with the frequent raking of a bar screen and the satisfactory disposal of the screenings. A by-pass channel, fitted with a small screen, is, however, provided for emergency use during servicing of the comminutor

SETTLING TANKS

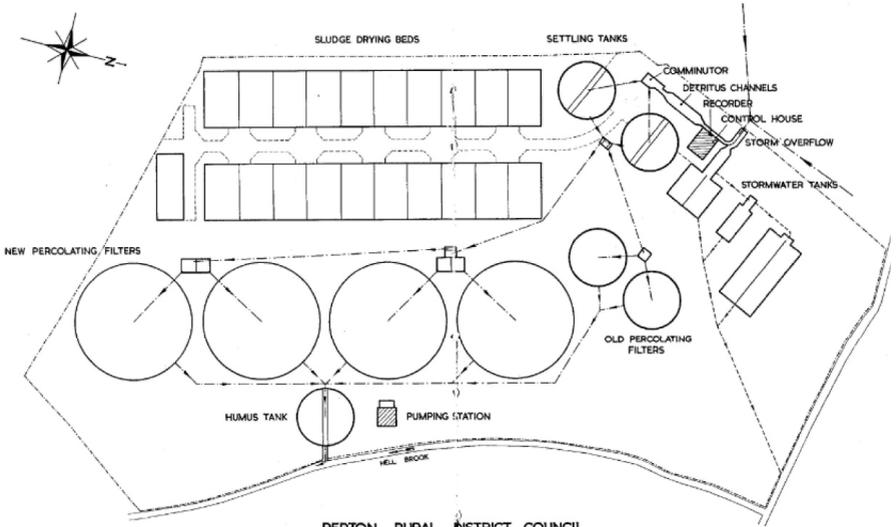
From the comminutor chamber, the sewage passes direct to the two circular radial flow settling tanks. These are constructed of reinforced concrete and each tank is 36 ft. diameter with a depth varying from 6' 6" at the sides to 8' 6" at the centre where a sludge collecting hopper, 4' deep, is situated in the tank floor, The total capacity of the two tanks is 92,600 gallons, giving 6.73 hrs, retention at dry weather flow. Fixed bridge, torque driven, rotary sludge scrapers provided with automatic scum removers, are fitted to each tank to direct the sludge to the central hopper from which it is removed by hydrostatic head to the sludge drying beds.



SETTLING TANK UNDER CONSTRUCTION

BIOLOGICAL PERCOLATING FILTERS

After leaving the settling tanks, the sewage is given further treatment by biological filtration, the flow first passing through a distribution chamber where it is divided between the old and the new percolating filters. Four new filters have been constructed, each 85 ft. diameter and 6 ft. deep. They are of reinforced concrete construction and contain in all 5,000 cubic yards of filtering material consisting of graded slag. The two old filters, built of blue brickwork, have been retained and in their slightly modified form, contain some 500 cubic yards of filtering material. Settled sewage is fed to the filters by 4-arm rotary distributors controlled by automatic dosing syphons, the average daily dosing rate, at designed dry weather flow, being 60 gallons per cubic yard.



REPTON RURAL DISTRICT COUNCIL
 THE BUNKERS SEWAGE TREATMENT WORKS, MICKLEOVER

KEY PLAN SHOWING FLOW OF SEWAGE THROUGH PRINCIPAL UNITS

Scale 1" = 40 feet or 1 inch

PEK 80

HUMUS TANK

Final settlement is given to the biochemically oxidised effluent from the filters in the humus tank. This is a reinforced concrete radial flow tank and is of generally similar design to the main settling tanks. Like them, it is 36 ft, diameter, but of rather greater depth, and the total capacity is 55,000 gallons, equivalent to 4 hours dry weather flow. A rotary sludge scraper is fitted to facilitate sludge removal. The fully treated effluent from the humus tank is discharged through a short effluent channel to the Hell Brook which flows along the eastern boundary of the site, ultimately to join the Trent at Twtford 4 miles to the south.

STORMWATER TREATMENT

Excess storm water discharged over the storm overflow weir passes first through the old screening chamber and then into the stormwater tanks, There are five of these, three consisting of the original stormwater tank and two settling tanks, suitably modified, and two being entirely new reinforced concrete tanks. All are rectangular horizontal flow tanks and their total capacity amounts to 82,500 gallons--equivalent to 6 hours dry weather flow--of which the new tanks provide 42,000 gallons. When full the stormwater tanks overflow to the brook, but after the flow of stormwater has ceased, the contents of the tanks are pumped back through the works for full treatment. In the event of the humus tank being temporarily out of action the new stormwater tanks can serve as emergency humus tanks.

SLUDGE DRYING AND DISPOSAL

Sludge produced in the various settlement processes is discharged by gravity, or in some cases by pumping, to the sludge drying beds for de-watering. The beds, of which there are 20 with a total area of 2,000 square yards, are underdrained and contain a layer of graded slag of average thickness 15", covered partly with gravel and partly with concrete slabs. Decanting chambers are also provided for the withdrawal of surplus liquid separating out from the sludge and accumulating on the surface of the beds. A concrete access ramp to each bed permits the removal of dried sludge by small dumpers and a loading bay has been provided at the end of the drying bed area for temporary storage of the dried sludge so that emptying of the beds can be carried out independently of the arrangements for final removal of sludge from the site.

PUMPING STATION

The pumping station, located alongside the humus tank, comprises a reinforced concrete collecting tank and pump chamber, the floors of which are approximately 11 ft. below ground level, and a control room, housing the starters and other equipment, constructed at ground level immediately over the pump chamber. Duplicate centrifugal pumps, drawing from the collecting tanks, are installed in the pump chamber, each capable of delivering 300 gallons per minute when pumping to the inlet to the works. The pumps are driven by 7 ½ H.P. electric motors mounted vertically over the pumps and can be started by hand or can be operated automatically by electrode control from the liquid level in the collecting tank. Their principal duties include the pumping back for full treatment of the contents of the stormwater tanks and the drainage liquor from the sludge drying beds, and also

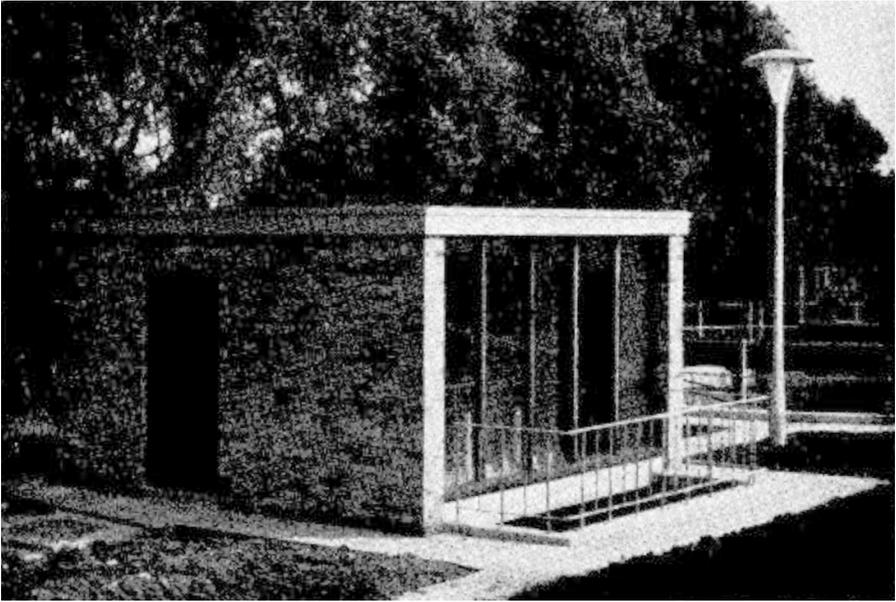
the desludging or emptying of the humus tank. A limited amount of effluent recirculation can also be arranged if required. Access to the pumps is provided by a steel stairway leading from the control room to the pump well.

MAIN CONTROL HOUSE

The main control house and manager's office is situated near the sewage works entrance and commands a wide view of the site. Like the control room of the pumping station, the building is principally of brick construction and is designed in contemporary style. Inside are located the flow recorder and the main switchgear controlling the power supply to the pumping station, sludge scrapers, commutator and other electrical equipment. Opening from the main area area washroom, fitted with W.C., wash basin and water heater, and a small storeroom.

GENERAL

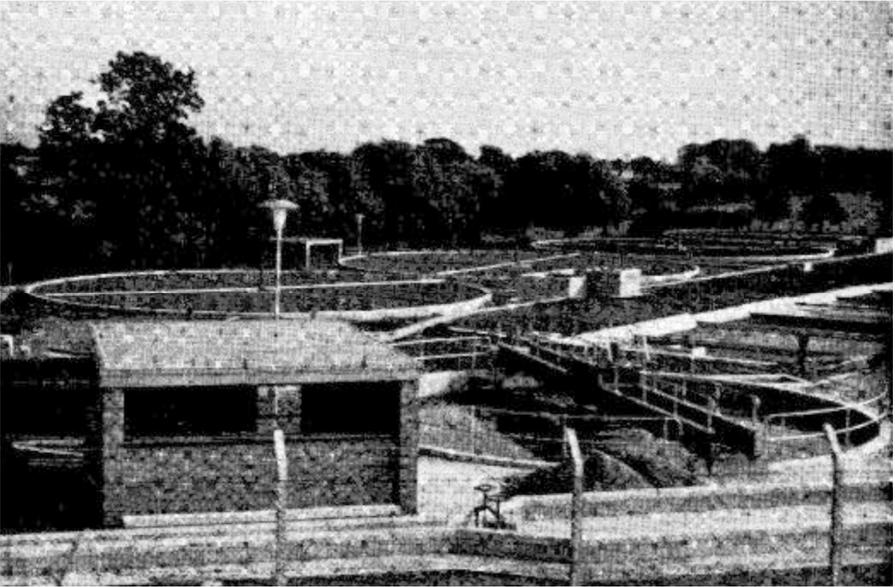
The various treatment units are compactly arranged within the confines of the original site and unclimbable fencing has been erected around the exposed boundaries to prevent unauthorised entry, A system of site roads and paths provides easy access to all units and four lighting columns have been erected to permit maintenance or repair work to be carried out after dark. Mains water is provided by a connection brought from the Derby Corporation's mains in Rykneld Street and supply points have been installed at various points on the site to facilitate hosing of tanks and other cleaning work.



PUMPING STATION

Despite restricted working room and the need for interfering as little as possible with the operation of the old units the constructional work was completed within the contract period and several of the new units were brought into use at an early stage of the scheme. The total cost of the scheme is estimated at £60,000 and the principal contractors and sub-contractors engaged were as follows :-

Main Contract :	Bowmer and Kirkland, Heage, Nr. Belper
Rotary Sludge Scrapers and Filter Distributors ; Pumping Machinery Cast Iron Pipes and Specials :	Hartlevs (Stoke-on-Trent) Ltd., Stoke-on Trent. Wallwin (Pumps) Ltd., Warwick. Stanton Ironworks Co. Ltd., Nr. Nottingham.
Valves and Penstocks :	W.E. Farrer Ltd., Hall Green, Birmingham
Comminutor :	Jones and Attwood Ltd., Stourbridge.
Flow Recording Equipment:	The Lea Recorder Co. Ltd, Manchester.
Electrical Wiring :	Electrical Contractors (Coalville) Ltd., Coalville.



SETTLING TANK, CONTROL HOUSE AND NEW FILTERS