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The Lower Liffey Valley Regional Sewerage Scheme

by

Brian Downes of P J Tobin & Co. Consulting Engineers (Ireland)

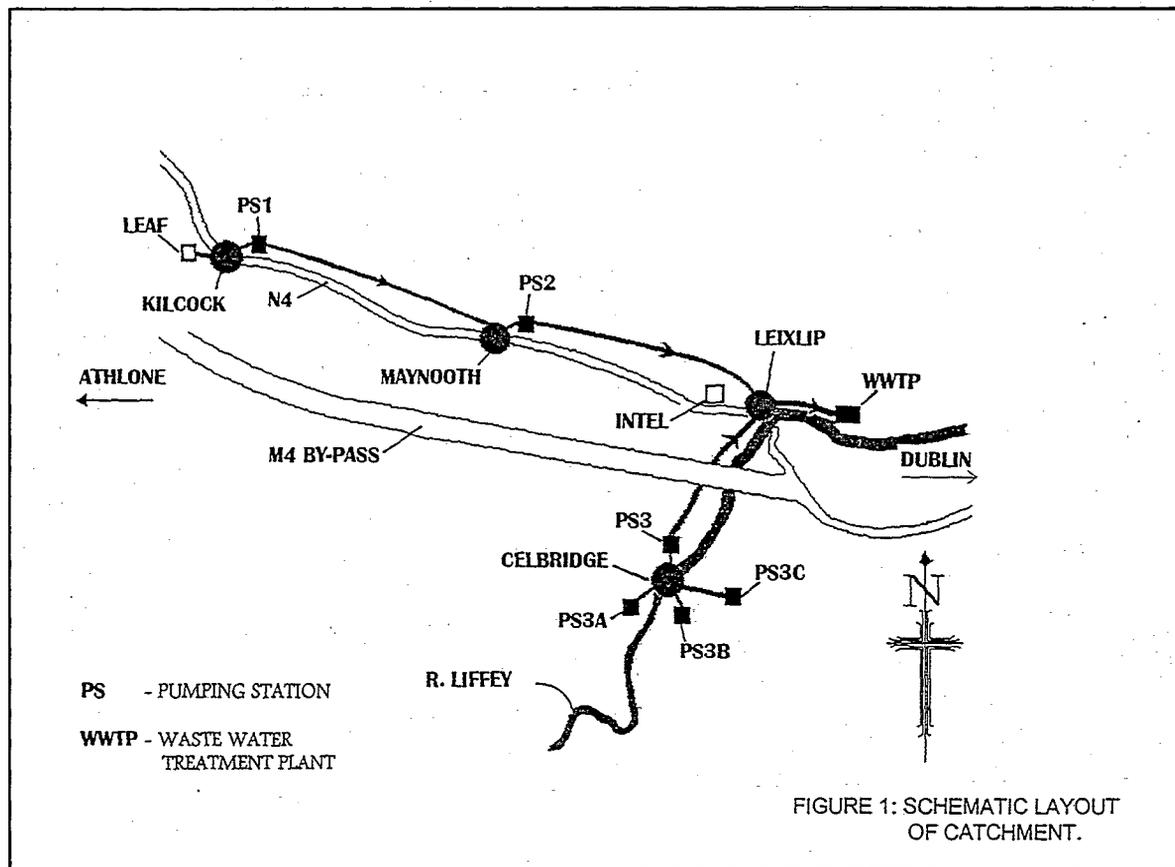
THE LOWER LIFFEY VALLEY REGIONAL SEWERAGE SCHEME

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BACKGROUND

The Lower Liffey Valley Regional Sewerage System lies immediately west of Dublin and serves the towns of Leixlip, Celbridge, Maynooth and Kilcock. The sewerage systems of these four towns were integrated in the early 1980's and all sewage from the region is now treated at a Waste Water Treatment Plant at Leixlip. The existing population of the catchment is estimated at 30,400 with projections indicating an increase to approximately 49,600 by 2020 AD.

The Leixlip sewerage system discharges gravitationally to the Treatment Plant. Sewage generated in Kilcock flows to a Main Pumping Station to the east of the town and is pumped on to the Maynooth sewerage system. Effluent from Maynooth and Kilcock is then pumped via a further main Pumping Station to the Leixlip System. Three minor pumping stations deliver flows from areas surrounding Celbridge. All sewage from Celbridge is then pumped forward to the Leixlip system. The general layout of the Catchment is shown on Figure 1.



Sewage arising in the catchment is largely domestic but with two main industrial contributors namely Intel Ireland Ltd. at Leixlip and the Leaf Chewing Gum factory at Kilcock. Intel contributes a large hydraulic but relatively low polluttional loading while the Leaf Chewing Gum Factory discharges small volumes of sewage with a high polluttional load.

The Existing Treatment Works is designed as a conventional Activated Sludge Plant to cater for a population equivalent of 45,000 persons at a dry weather flow rate of 10,125 m³/day.

The aspects of the existing system which needed to be investigated were :

1. Infiltration

There is a high level of infiltration into the system in all four sub-catchments. Flow records show that Dry Weather Flow for the whole catchment averages 8,500m³/day in the summer months while in winter DWF averages 12-13,000 m³/day.

2. Combined Sewer Overflows

The systems at Celbridge and Maynooth include combined sewer overflows (CSO) which in the case of Celbridge divert flow into the River Liffey which is designated as a sensitive water in that area.

3. Stormwater

Some flooding occurs in Kilcock during heavy rainfall. This problem apart the combined sewer systems work reasonably well. However it is desirable to separate out as much stormwater as possible from the system.

4. New Development

The construction of the new M4 motorway has created prime development land, both residential and commercial, around the four sub-catchments. In order for any such development to take place the ability of the existing sewerage system and treatment works to deal with a range of possible scenarios needed to be assessed. The rapid expansion of the Intel Plant at Leixlip will also have a large impact on the sewerage system and at the Treatment Plant.

5. Odour

There is a serious odour nuisance at the existing treatment works site. Computer modelling of the odour emissions and proposals for their reduction in any upgraded treatment plant formed part of the design brief.

DATA COLLECTION AND HANDLING

Initial model input data on sewers, manholes and Pumping Stations were collected from Kildare County Council's 'as-constructed' and record drawings. Impervious areas contributing to the storm water run-off were measured directly from 1:2500 scale Ordnance Survey maps. When complete, the model included a total of 809 manholes, 50.2km of pipes, seven Pumping Stations and four combined sewer overflows. Because such a large proportion of the existing sewers were 150mm diameter it was decided to include every pipe in the model.

A manhole survey was undertaken to check sewer records. A unique grid reference was allocated to each manhole in the system while details of a 15% sample of key manholes were surveyed as a check against record drawings. The survey showed, as one might expect, that while records for the more recently developed areas were reasonably accurate there were some discrepancies between records and the survey data from the older parts of the towns. Consequently further checks on the manhole records will shortly be undertaken.

A CCTV Survey of all sewers in the system with the exception of certain lengths of smaller diameter sewer in new housing estates. The EXAMINER database was used to process the CCTV information. Finally a flow survey was carried out over a six week period beginning in December 1995.

MODEL CONSTRUCTION AND CONFIRMATION

The model was constructed using the HydroWorks software. Initially there were four separate models representing each of the four towns in the catchment but these are now being combined into a single model. In all four catchments comparisons between the recorded and predicted response of the system showed close correlation from early in the confirmation process. Each sub-catchment was confirmed separately beginning with Kilcock. The resultant hydrograph from the Kilcock model was then used as an input hydrograph into the Maynooth model. In turn then when the Maynooth sub-catchment had been confirmed the flows from here were used as an input hydrograph to the Leixlip sub-catchment.

WASTE WATER TREATMENT PLANT

Intel Ireland Ltd has commenced construction of a new facility and expect to be in production by mid 1997 employing 4,200 people. The licences already granted to Intel, will permit them to discharge 13,000m³/day of industrial effluent with a BOD loading of 100mg/l to the existing Wastewater Treatment Works at Leixlip. The existing Leixlip Wastewater Treatment Works does not have the hydraulic capacity to deal with the increased industrial waste flows. Plans to upgrade the main Treatment Works are not yet far enough advanced to be able to cater for the greater hydraulic load by mid 1997. However the sludge treatment and handling facilities at Leixlip are in urgent need of upgrading to address a serious odour problem at the site.

Having considered:

- the significant increase in the near future in the loadings from the Intel Ireland Ltd. plant;
- the nature of the Intel effluent, with a high hydraulic load and low biological load;
- the currently expected medium term growth in domestic, industrial and commercial development in the catchment;
- the limited capacity of the existing works;
- the need to have treatment capacity available by mid 1997

it is proposed to separate the Intel Ireland Ltd. waste stream from the general catchment flows and to treat the Intel waste stream together with its associated domestic fraction in a dedicated Treatment Plant to be constructed on available space at the northern side of the Leixlip Wastewater Treatment Works site.

Having regard to the Urban Waste Water Directive, the Water Quality Management Plan for the Liffey Catchment and Memorandum No. 1 of the Technical Committee on Effluent and Water Quality Standards and based on a managed low flow of 2.0m cumecs. downstream of Leixlip Dam as operated by the Electricity Supply Board (ESB), it is proposed to adopt the following standards for effluent to be discharged from the Leixlip Wastewater Treatment Works to the River Liffey:

Parameter	BOD	S.S.	Total Phosphorous	Total Nitrogen
Effluent Standard mg/l	8	15	1	9

The proposals then for the first phase of the Treatment Works upgrade are

- the separation of the Intel waste stream
- the construction of a new treatment works to serve Intel, comprising pumping station, selector tank, aeration tanks, clarifiers and tertiary treatment (see Figure 2)
- the provision of anaerobic sludge digestion facilities and odour control facilities and disposal of treated sludge in accordance with the National Sludge Strategy.

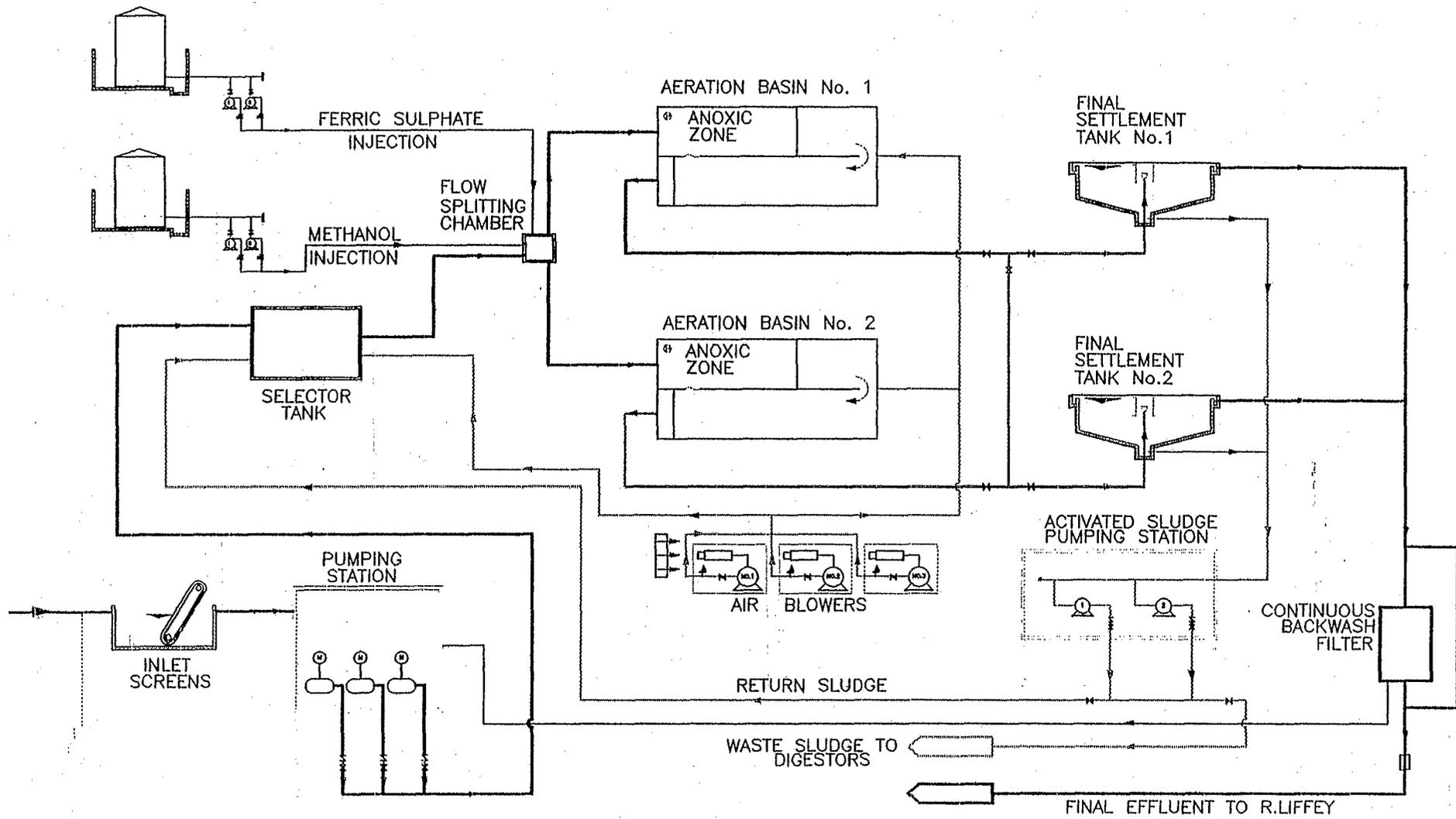


FIGURE 2: PROCESS DIAGRAM OF PROPOSED INTEL TREATMENT WORKS