



ENVIRONMENT AGENCY



# Gold Corner Pumping Station

## Gold Corner Pumping Station

Gold Corner pumping station, constructed in 1942, is the largest and most complicated land drainage pumping station in South West England.

The pumping station was built at the junction of the South Drain, Cripps River and the Huntspill River and is a prominent feature of the Somerset Levels and Moors - an area recognised as an internationally important wetland.

The station is used to prevent flooding in the Brue Valley, maintain acceptable water levels in the South Drain and to keep the Huntspill River - which acts as a local reservoir - topped up during the summer. Water is lifted some 3 metres (8.5 feet) from the South Drain to the Huntspill River.

Gold Corner - owned and operated by the Environment Agency - is a fine example of the engineering of its period and every year attracts hundreds of engineers, students and schoolchildren from all over the world.



## Geography

South Drain is situated between the River Brue and the Polden Hills, where some of the lowest lying ground in the country is found. It has a length of 15 kilometres (9 miles) and a catchment area of 117 km<sup>2</sup> (45 square miles), three-quarters of which lies up to 7 metres below high tide level.



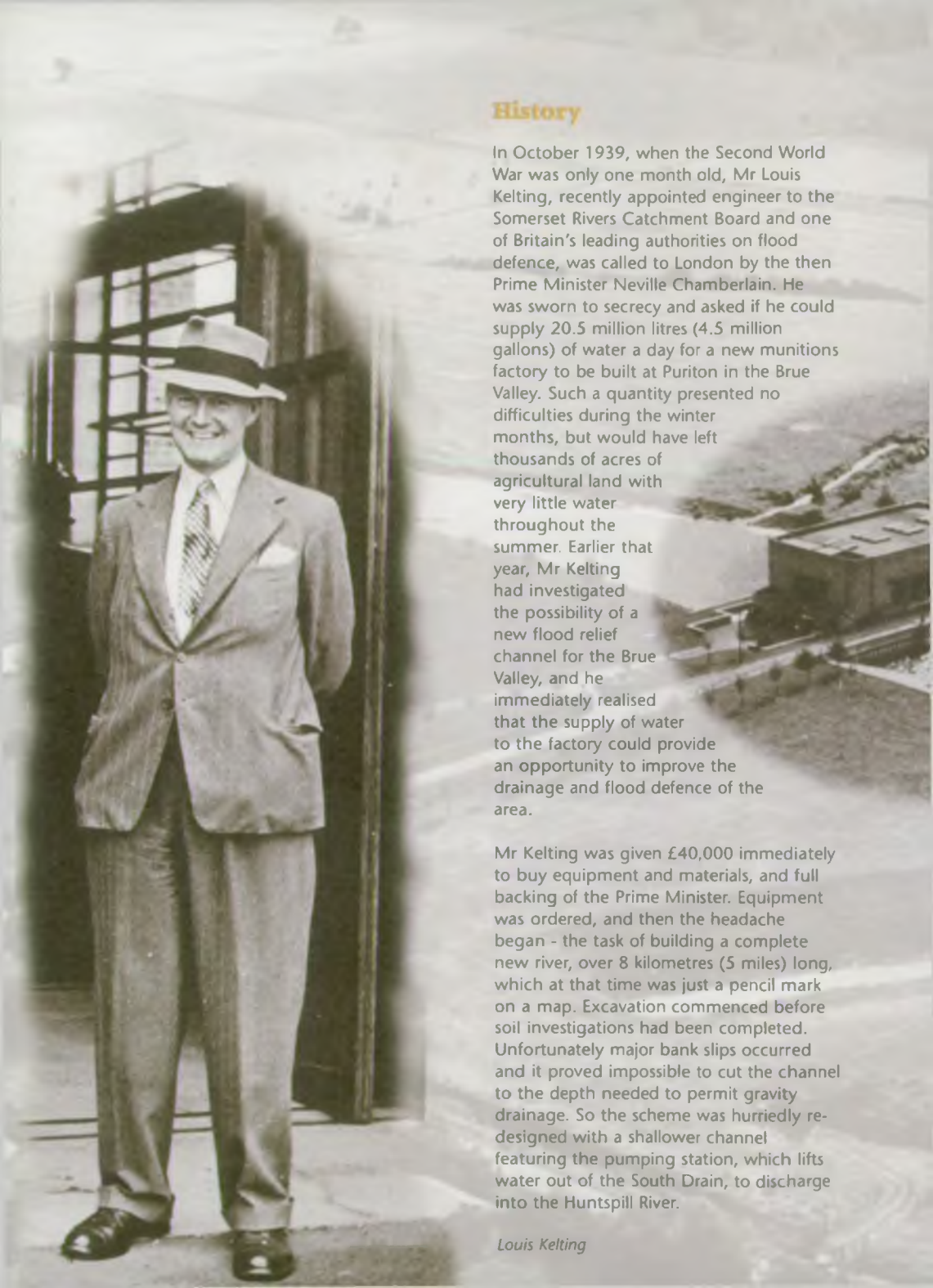
Until Gold Corner became operational the Drain flowed by gravity into the River Brue at Bason Bridge, and extensive persistent flooding of farmland, roads and dwellings was expected every winter.

The Cripps River allows Drain to be discharged into the River Brue without the need for pumping and this forms the normal mode of drainage. However, if the South Drain and River Brue are both high then Gold Corner pumping station is used to lift water into the Huntspill and the River Parrett Estuary which discharges into the sea.



*The South Drain*

## History



In October 1939, when the Second World War was only one month old, Mr Louis Kelting, recently appointed engineer to the Somerset Rivers Catchment Board and one of Britain's leading authorities on flood defence, was called to London by the then Prime Minister Neville Chamberlain. He was sworn to secrecy and asked if he could supply 20.5 million litres (4.5 million gallons) of water a day for a new munitions factory to be built at Puriton in the Brue Valley. Such a quantity presented no difficulties during the winter months, but would have left thousands of acres of agricultural land with very little water throughout the summer. Earlier that year, Mr Kelting had investigated the possibility of a new flood relief channel for the Brue Valley, and he immediately realised that the supply of water to the factory could provide an opportunity to improve the drainage and flood defence of the area.

Mr Kelting was given £40,000 immediately to buy equipment and materials, and full backing of the Prime Minister. Equipment was ordered, and then the headache began - the task of building a complete new river, over 8 kilometres (5 miles) long, which at that time was just a pencil mark on a map. Excavation commenced before soil investigations had been completed. Unfortunately major bank slips occurred and it proved impossible to cut the channel to the depth needed to permit gravity drainage. So the scheme was hurriedly re-designed with a shallower channel featuring the pumping station, which lifts water out of the South Drain, to discharge into the Huntspill River.

*Louis Kelting*

The new river channel was cut through an area of Roman salt works, the remains of which can still be seen in several locations along the banks.

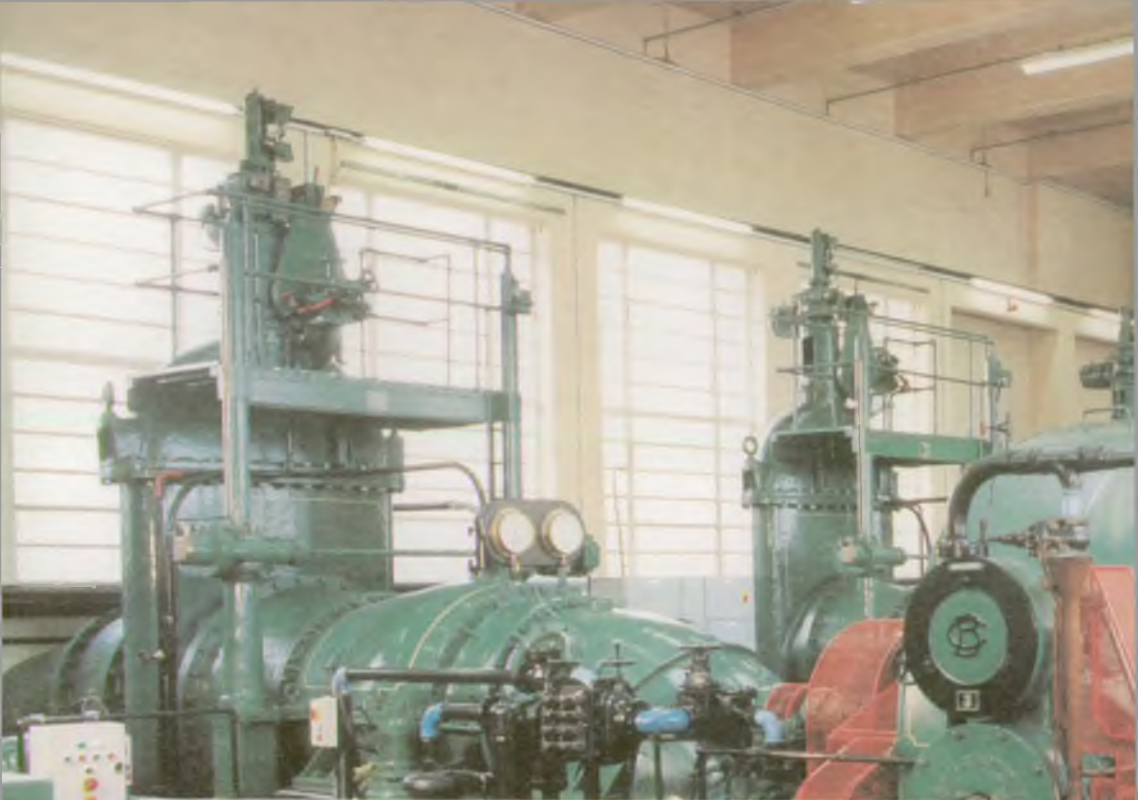
For the bridges it was necessary to drive piles 18 metres (60 feet) deep - one over 24 metres (80 feet) deep - in order to reach firm rock below.

The contract for Gold Corner pumping station began in November 1940. The first of the four pump units was ready for work by July 1942, and the station was completed by the end of that year. Great care was taken to blend the large building with the surrounding countryside and the county architect gave valuable help in producing an attractive and modern design. The entire project took three years to complete.

Total cost of the Huntspill River Scheme was £411,594; £61,000 of that covering the pumping station (£26,000 on machinery and £35,000 on building costs).

Compared to today's prices these costs seem almost incredibly low, but the bulk of the work was done during the early part of the war, and almost all the plant and machinery were bought before prices started to rise. The cost of the entire scheme if it were built today would be over £7.5 million.





*The pumping station interior*



Since the scheme was commissioned no significant overland flooding of either buildings or farmland has been experienced. Many improvements to the scheme have since been carried out, resulting in better control of flood discharge in the winter, better supply of irrigation water to lowlands during the summer, and simplified operation.

In 1990/91 an appraisal of the Gold Corner site was carried out and it was found that much of the equipment and machinery still being used was that installed in 1942. Some equipment within the station had become unreliable or obsolete and some failed to meet current legislative standards. Work was put in hand to update and improve operations and it was also decided that at least one automatic pump was required.

Progressively from 1992 works have been put in hand to update and improve the operation of the site.

The original fuel tanks were buried underground, adjacent to South Drain, with no way of inspecting their condition. Therefore a new double-skinned above ground storage tank with leakage alarms was installed and pipe work modified. The original tanks were

emptied, cleaned and filled with concrete.

The site has been completely electrically rewired to current standards with equipment selected to give energy efficiency and maintenance savings. A fire detection system has also been installed with linkage to telemetry for remote monitoring of the site.

A fully automatic weedscreen was installed and a store erected to house the decomposing weed and collect the liquor before disposing of it safely.

The No.1 pump set was modified for electric drive in 1968 and full automation is now planned. A new control panel, drive motor and discharge gate actuator have been installed and other items such as the standby emergency generator replaced.

Maintenance of the diesel engines is a highly skilled job with spare parts difficult to obtain. Most of the pumping is done by an operator living on the site, willing and able to work extended hours according to the extent and timing of the flows coming to the station. Only at times of exceptional rainfall does the station go on 24 hour pumping with two operators sharing 12-hour shifts.

## WHY DO WE NEED TO PUMP?

1. To control water levels and prevent flooding in the Brue Valley.
2. To allow use of the Huntspill River as a reservoir throughout the summer. Although no longer used as a routine water source for the Puriton munitions factory, the Huntspill still serves as a strategic reserve and its management is the subject of an agreement between the Environment Agency and the Royal Ordnance Pic.

Certain levels have to be maintained at specified dates in the year, and pumping from the South Drain or River Brue is undertaken to meet these commitments.



*Sloway Lane pumping station  
Centre: Withy Drove pumping station*



3. To provide agricultural water supply. The Withy Drove and Sloway Lane sub-pumping stations abstract water from the Huntspill for supply to agricultural land.

4. To maintain low water levels in the South Drain. Without the use of Gold Corner it would be essential to use dams to isolate sections of the river whilst essential maintenance work is carried out.



*Gold Corner sluice*



*The Huntspill sluice*



## ENVIRONMENTAL CONSIDERATIONS

The Gold Corner catchment is one of extreme environmental sensitivity. It contains five Sites of Special Scientific Interest (SSSIs) notified under the 1981 Wildlife and Countryside Act. Three of these - Street Heath, Shapwick Heath and Westhay Heath - are partly subject to the drainage influence of the South Drain. However, the water tables of the Catcott, Edington and Chilton Moors SSSI are currently directly controlled by the pumping station at Gold Corner. This SSSI is of national importance for its wet flower-rich grassland, the wildlife of its ditches and the breeding wader population, e.g. snipe, lapwing and redshank.

It is essential that a safe and reliable system of pumping is maintained at Gold Corner to overcome a decline in local environmental conditions. On Catcott Heath, long-term measurements have shown a decline in groundwater levels and the use of the moors by breeding waders (which require wet spring ground conditions) has decreased as a result.

A long-term vegetation study has also shown the loss of some wetland plant species and a relative increase in those tolerant of drier conditions. A peat soil study has shown the presence of breakdown products which have been associated with drying conditions and a reduction in grassland productivity. This drying process is also harmful to the unique wetland archaeology of the area, unparalleled anywhere in Britain. The wet peat preserves fragile organic remains such as prehistoric trackways, artefacts, and pollen records.





## TECHNICAL DATA

Gold Corner pumping station houses four Sultz horizontal pumps. Three of the pumps are powered by the original 1940 vintage two-cylinder horizontal Crossley oil engine of 240 horsepower, running at 220 revolutions per minute. The fourth is driven by a 315 horsepower electric motor and variable speed drive installed in 1968.

Fuel consumption of the oil engines is approximately 45 litres (10 gallons) per hour and the electric motor, 120 units per hour. The policy is to use the electric pump set whenever possible, due to marginal fuel savings and the fact that use of a diesel pump requires an additional operator. Cheap rate electricity is available on restricted tariff at times other than peak demand, and a back up supply in the form of a diesel generator.

When conditions are appropriate gravity flow is allowed. Sluice valves are installed in the pumps to prevent backflow.

The pumphouse measures 26 x 15 x 7.5 metres (85 x 49 x 25 feet) high. The travelling crane is capable of lifting the heaviest single mechanical component in the station - the engine fly wheels, which each weigh eight tonnes.

## OUTPUT STATISTICS

Pump capacity: 4.4 cubic metres per second (cumecs) [per pump at 2.6m (8.5 feet) head]

Station output: 18.0 cumecs

This output would, for example:

- (a) Fill the pumphouse in approximately 2.5 minutes;

#### Huntspill River Technical Data:

	At Gold Corner PS	At Huntspill Sluice
Top width, metres (feet)	58 (190)	39 (128)
	[average top width 61 metres (200 feet)]	
Bed width, metres (feet)	20 (65)	12 (40)
Depth, metres (feet)	5 (16)	3 (10)
Level above Newlyn	-2	4
Length	8 kilometres (5.25 miles)	
Area of surface water	44.5 hectares (110 acres)	
Volume of water (capacity)	1 million m <sup>3</sup> (233 million gallons)	
Volume of spoil excavated	1,529,110 cubic metres (2,000,000 cubic yards)	
Area of spoil banks	101 hectares (250 acres)	
Maximum pumping head	3.3 metres (11 feet)	
Structures	5 roadbridges 1 railway bridge an outfall sluice and pumping station	
Outfall	Twin 5 x 2 metres (16 x 6 feet) culverts into Parrett Estuary	
Tidelock period	Up to 4 hours per tide	
Retention Level - Summer	11 feet 6 inches	
- Winter	9 feet 3 inches	

- (b) Pump a year's total supply requirements for the Taunton and Yeovil district in 23 days;
- (c) Fill Clatworthy Reservoir in 3.5 days.

60 pump hours are required to fill the Huntspill River from 1.8 metres (6.00 feet) OD to 4.3 metres (14.00 feet) OD.

## HUNTSPILL RIVER

At its seaward end the Huntspill River has a large outfall sluice to keep out the tide, and at the landward end Gold Corner pumping station.

The river is used as both a flood relief channel to store water against a tide in the winter, and as a reservoir to provide farmland irrigation water in the summer and supply water to the Royal Ordnance Factory.

The Huntspill was created as a reservoir and was not designed with wildlife in mind. However, it supports a fine coarse fishery, as does the South Drain; and has immense recreational potential, for canoeing and rowing activities. The banks were left steep when the channel was dug, and are constantly slumping due to wave erosion. The Environment Agency as landowner is carrying out a phased programme of environmental enhancement works, establishing reed and sedges along the regraded banks to stabilise them and provide important habitat for small fish and for dragonflies, such as the nationally scarce hairy dragonfly.



*The Huntspill  
River with Gold  
Corner in the  
background*

## THE ENVIRONMENT AGENCY

The Environment Agency, which began operations on 1 April 1996, brought together the National Rivers Authority, Her Majesty's Inspectorate of Pollution, the Waste Regulation Authorities and several smaller units from the Department of the Environment.

The new Agency provides an integrated approach to the protection and management of the land, air and water environment. Its main functions include pollution prevention and control, waste regulation, flood defence, water resources, fisheries, recreation and conservation.

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ENVIRONMENT AGENCY  
GENERAL ENQUIRY LINE

**0645 333 1111**

The 24-hour emergency hotline number for reporting all environmental incidents relating to air, land and water.

ENVIRONMENT AGENCY  
EMERGENCY HOTLINE

**0800 80 70 60**

Environment Agency  
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