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SOUTHERN WATER AUTHORITY GENERAL REPORT ON RESERVOIR INVESTIGATIONS HAMPSHIRE 1975-78

Draft Copy

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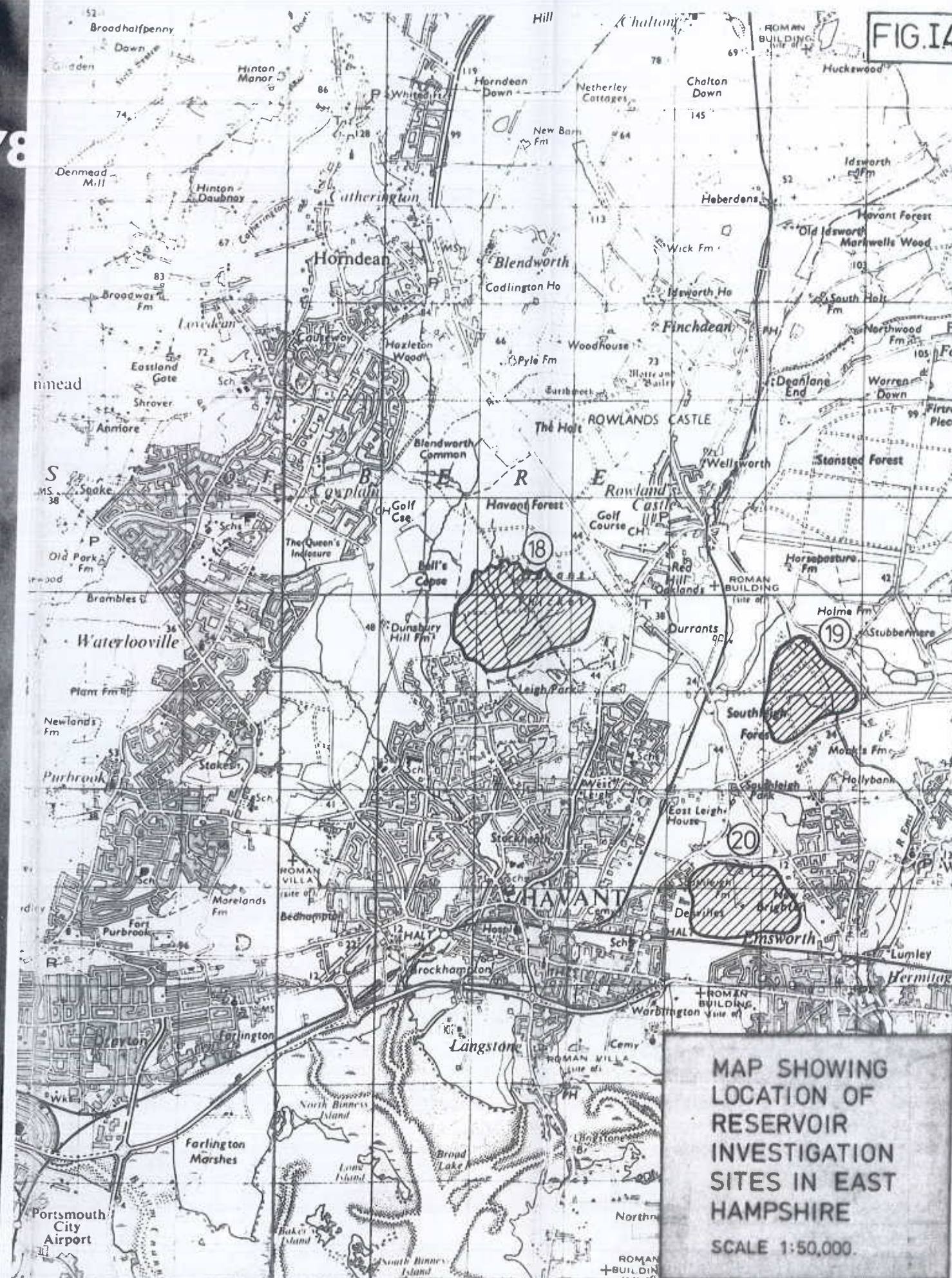
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Hampshire Reservoir Study - Matrix of comparative factors

Factors of importance

Reservoir Sites

	5 (very good)	4 (good)	3 (medium)	2 (poor)	1 (very poor)	1/2	3	4	5	6	B/C	D	8	9/10	12	11/13	15	17	18	19	20
A Strategic location 5(very good) - 1 (very poor)						3	3	4	4	4	5	5	4	3	4	5	2	2	4	4	3
B Cost per cubic metre stored. 5(B/C & 18), 4(+20%) - 1(+ 80%)						4	3	(4)	2	2	5	(1)	3	2	5	3	3	1	5	1	4
C Effective use of site - inverse of area flooded 5(>13m) . . 1(<=7m)						5	2	(3)	3	(3)	5	(3)	5	4	3	2	2	4	2	1	5
D Water quality 5(very good) - 1 (very poor)						4	4	4	3	2	4	4	2	4	4	4	2	2	3	3	3
E Technical problems - design of works, cut offs, constructions 5 (very good) 1 (very poor)						2	2	(4)	4	3	2	1	4	2	2	2	2	2	2	2	4
F Technical problems - external access, birdstrike, services						3	3	(3)	4	4	3	3	3	2	2	2	4	4	4	4	4
G Annual costs 17 B/C & 18 (3) 7 5						3	3	3	3	3	3	3	1	3	3	3	2	2	3	3	2
H Gravel released 5 2 1.2 Mm ³ , 4(1.2-0.9), 3(0.9-0.6), 2(0.6-0.3)1 0 .3						5	5	?	0	0	5	2	0	3	4	1	0	0	0	0	0
I Planning impact 1(very poor) - 5 (very good)						3	3	2	3	3	4	3	4	3	2	2	2	2	4	3	3
J Relative Ecological evaluation. 1(areas of greatest ecological interest) -5 (little)						2	4	4	4	4	1	1	3	4	4	3	2	3	2	2	4
K Recreational & amenity value 1(poor) - 5 (good)						1	2	1	2	3	4	3	4	2	4	4	3	2	4	2	4
L Landscape & environment value 1(poor) - 5(good)						2	2	2	2	2	2	2	3	3	2	2	2	2	3	3	3
M Agriculture 1(Class 1) - 5 (Class 5) (forest - 3)						3	1	2	2	5	3	3	3	4	4	4	3	3	4	3	2

Notes: General - No attempt has been made to weight factors A - M according to their relative importance

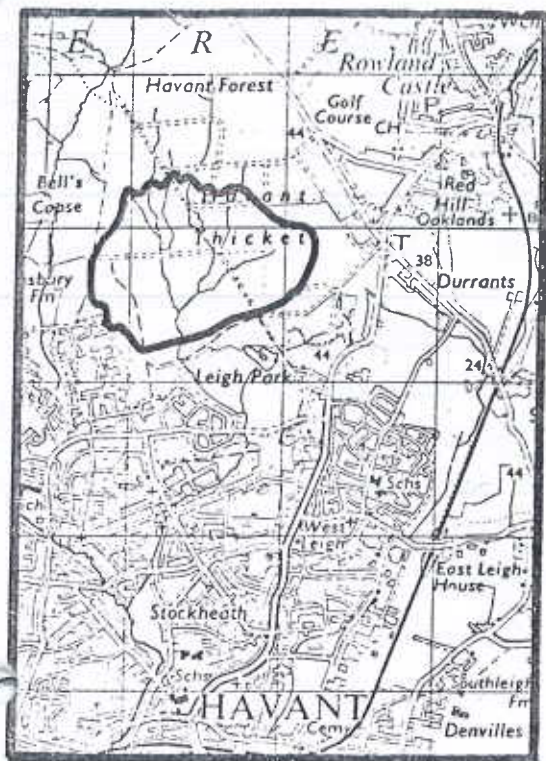
A Discussed in text.

D Stored water quality is taken as good where reservoir is excavated into gravels and input water has low nutrient values;

as medium where one of these factors is absent; and as poor when both are absent.

J South Hampshire structure plan

K South Hampshire structure plan and communications.



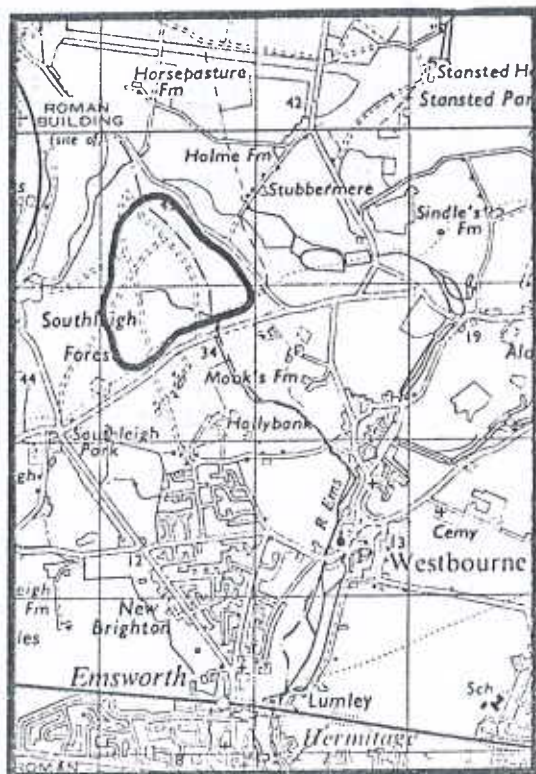
Reservoir on Site 18 - SU715098 *HAVANT THICKET*

Location - 3kms north of Havant
 Total area of reservoir - 118 ha.
 Type of reservoir - single embankment with subsidiary bunds
 Top water level - 38.5m O.D.
 Maximum water depth - 16.5m
 Storage - 6.3 - 9 million cubic metres
 Input-pumped from Bedhampton Springs
 Function - direct supply for treatment at Farlington Works
 Cost - base rate
 Matrix value - 40

Recommendations

This site is equally attractive on the basis of the matrix with site 20. It is however 50% more economic to construct, and the land is already owned by the Authority and put to marginal use. We recommend that this site be retained for use as a reservoir site inspite of having

some considerable and unresolved problems relating to ground conditions:



Reservoir on Site 19 - SU744090

Location - Southleigh Forest, 3.5kms to north east of Havant
 Total reservoir area - 55 ha.
 Type of reservoir - multiple embankments
 Top water level - 44.5m
 Maximum water depth - 11.5m
 Storage - 2.8 million cubic metres
 Input - pumped from Bedhampton Springs
 Function - direct supply for treatment at Farlington Works
 Cost - 2 x base case (site 18(1)) per m³ stored.
 Matrix value - 31

Recommendations

This site has a comparatively small overall capacity. It is likely to have some cutoff problems since its matrix value is low it is probably not worth retaining for reservoir use.

I.3.2 Summary of Description of Sites

Most sites lie on the alluvial or terrace levels of the Test or Itchen Valleys. The exceptions are Site 8 which lies in the wooded valley of Tanner's Brook due north of Southampton, and the five East Hampshire sites, four of which are situated in gently rolling countryside which is forested or arable land, whilst the fifth and last site to the east of Havant lies on the level agricultural land bordering Langstone Harbour.

Although the sites have fairly similar characteristics for reservoir potential, the study has concluded that a the probable strategy would be to promote Site B/C in the Southampton area and Site 18 in the Portsmouth area. Standby Sites 8 and 20 should be reserved until such time as it is certain that the first sites can be developed in which case Sites 8 and 20 should be abandoned. Sites 1/2 and 12 may be reserved against possible eventual use for future need simply because present and foreseen use within their respective local plans would not prejudice an eventual reservoir development.

(18)

(20)

HT, SL farm

The site investigations did not locate any one site which had markedly better soil conditions than any other, though certain problems at site 18 are discussed later.

At an early stage in the overall investigation it became clear that the quantity of gravel of commercial quality on any site might prove to be of great significance as the exploitation of gravel and the development of the reservoir could then go hand in hand, reducing the pressure on the limited amount of available land in south Hampshire. In addition, the carefully controlled extraction of gravel could materially contribute towards reducing the cost of the reservoir works. Thus, it became important that the site investigations were done in sufficient detail to be able to draw up an inventory of the gravels available. This was done from the borehole records, from electrical resistivity surveys of the more important areas, and by including the findings of any known previous survey in the area.

A separate contract was let in 1976 to investigate the permeability of these river gravels by means of large scale pumping tests adjacent to the Rivers Test and Itchen. It had been thought that it might have been possible to store water in these shallow gravels and so in the Itchen Valley at any rate, reduce the area of open reservoir to an extent that would be compatible with Eastleigh Airport and its attendant birdstrike problems. This work showed that the river banks themselves were so permeable that any extensive abstraction scheme would simply draw upon the river itself and so defeat its purpose.

Taken overall, the site investigations have provided two valuable contributions towards the development of reservoir capacity in south east Hampshire. They have

out and the results were given separately in a study report submitted in November 1977. This study also included two possible routes linking Havant and Bedhampton Springs to Site 18, since it had by then become clear that such a link was a fundamental part of the cost of the reservoir construction itself. This study identified and costed feasible routes, giving the Authority the opportunity to reserve these routes in much the same way as it has reserved reservoir sites in the past.

Gravels

The Southampton area is short of local aggregates. Large quantities are imported by sea or hauled in by rail. Local reserves with planning permission have dwindled to barely sufficient for three years of extraction at the present rate. Consequently, there is pressure to develop new resources and this pressure might be channelled to in such a manner as to contribute indirectly towards the cost of development of a new reservoir.

Discussions with gravel operators showed that the typical conditions on any such site, whilst not perfect in that the overburden/gravel ratio is high, are sufficiently promising to justify the premise used in the costings in this Report, namely that the removal of the overburden to previously agreed spoil areas and the extraction of the gravels leaving a clean pit could be done at no cost to the Water Authority.

Peat

Enquiries were made and samples taken to determine whether or not there was a commercial value in the overburden of peat. It appears that the peat is of too poor a quality to be marketable except at a very local level.

TABLE I

Table Comparing the Ratio of the Water Storage
to Embankment Fill for Sites 15, 17, 18, 19, & 20

<u>Name of Site</u>	<u>Number of Site</u>	<u>Ratio</u>
West Walk	15	7.5
Boarhunt	17(1)	2.9
Boarhunt	17(2)	8.0
Boarhunt	17(3)	5.3
Havant Thicket	18(1)	12.2
Havant Thicket	18(2)	8.0
Southleigh Forest	19	6.2
Southleigh Farm	20	4.2

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II.3.8

Programme and Cost

Provided that supplies from Gaiter's Mill are readily available, the need for the development of Site 18 will not arise until late in the 1990's. Within this context there should be adequate time to meet any likely programme. Clearly, the Authority will draw up a detailed programme in due course which will identify the critical points in the overall resource development programme.

The estimate of cost is based upon the table of quantities and rates shown in Fig.II.3.2. This estimate excludes any treatment costs common to all sites, land costs (already owned by the Company).

The total estimated cost at February 1978 prices is estimated to be:-

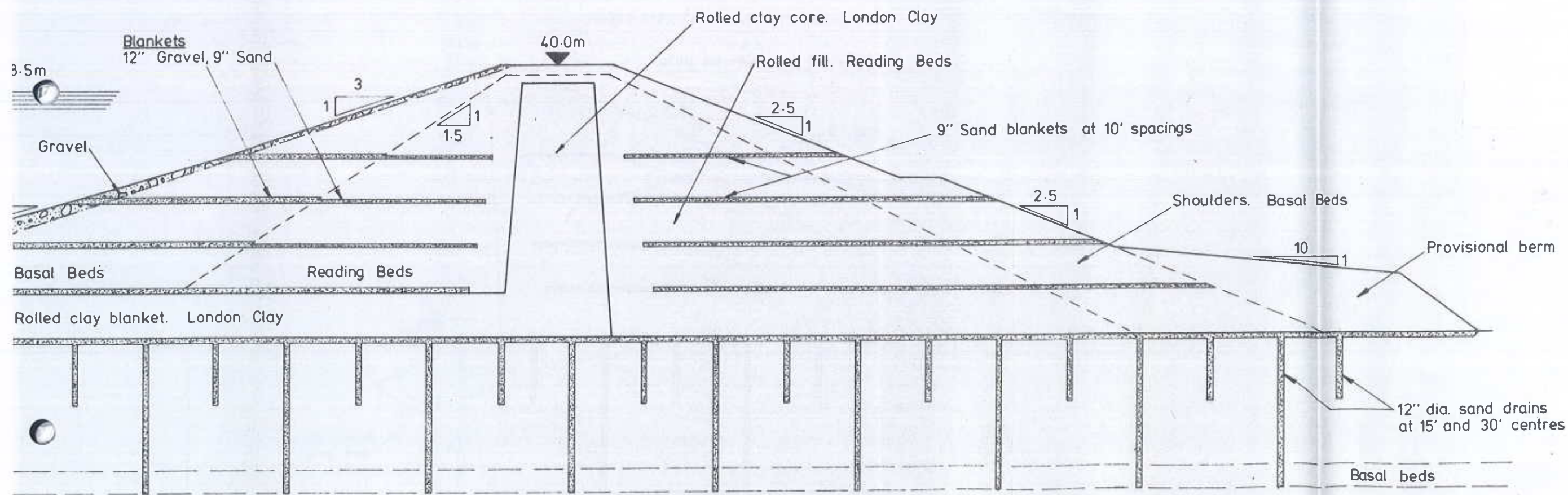
	<u>Solution I</u>	<u>Solution II</u>
Total Cost	£ 4,094,000	£ Approx. equal
Cost/m ³ stored	£ 0.47m	£ 0.67m

TABLE OF QUANTITIES, RATES & ESTIMATES FOR SITE 18 (SOLUTION 1)

<u>ITEM</u>	<u>QUANTITY</u>	<u>RATE</u>	<u>ESTIMATE</u>
<u>Reservoir</u>			
Mobilisation		sum	£ 100,000
Site clearance of remaining forest	10 ha	1,000	£ 10,000
Stripping under embankments and on borrow area and reusing	200,000m ³	1.50	£ 300,000
Clay embankment material - all costs	900,000m ³	2.00	£1,800,000
Gravel drainage materials	110,000m ³	4.00	£ 440,000
Landscaping and topsoiling		sum	£ 100,000
Wave protection	50,000m ³	2.00	£ 100,000
Cut-off and blanket sealing		sum	£ 300,000
Draw off & diversion works		sum	£ 300,000
<u>Total Cost of Reservoir</u>			<u>£3,450,000</u>
<u>Pipeline</u>			
Total length (700Ø)	3.66km	130,000	£ 476,000
Extra for:-			
Woodland	0.40km	4,000	£ 1,600
Under roads	0.41km	30,000	£ 12,300
Urban site	2.15km	56,000	£ 120,400
Thrust bored crossings	20 m	1,000	£ 20,000
Cut and cover road crossings	105m	100	£ 10,500
Other items			£ 3,200
<u>Total Cost of Pipeline</u>			<u>£ 644,000</u>
<u>Total Cost of Scheme</u>			<u>£4,094,000</u>

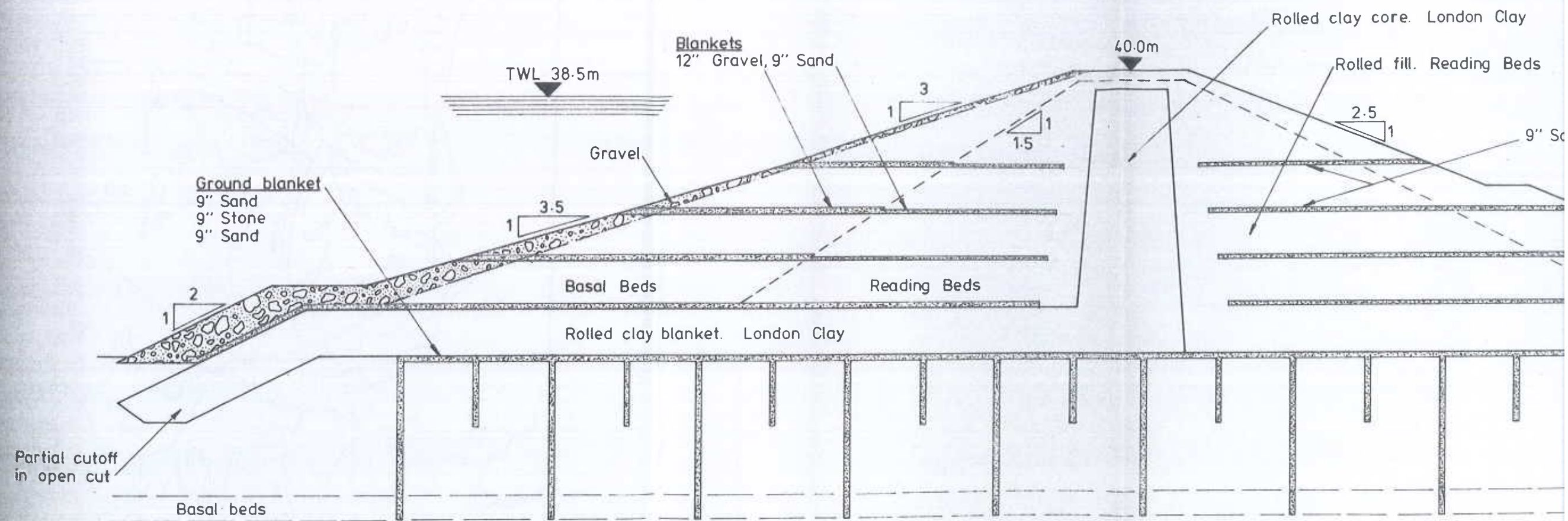
Note:- Additional expenditure will be necessary at some later stage to uprate the capacity of the Bedhampton pumps and existing pipelines at Farlington Treatment Works.

FIG. II.3.1



Approximate scale 1:250

TYPICAL SECTION OF
EMBANKMENT ON SITE 18
AS PUT FORWARD BY
PROFESSOR ROWE



Approximate scale 1:250