Appendix 2

Supply of water from the Nene, Nene Counterdrain and Middle Level System

Introduction

Page 6 & 7 of the Anglian Water Fens phase 3 associated water infrastructure proposals brochure ("the brochure") refer to 4 sources of water to fill the reservoir:-
a) The Ouse Washes (River Delph) when it's available;
b) the River Great Ouse; via a pipeline;
c) the River Nene when it has available flows and its Counterdrain with a new bypass culvert at the existing Stanground lock.
d) Water from the Middle Level System when it's available.

The use of phrases in the brochure such as "when it's available" and "we are exploring whether" demonstrates that this is all rather tentative and that none of this is guaranteed particularly when page 4 of the brochure states that "the new reservoir could provide enough water for up to a quarter of a millions homes every year". It makes no mention of the requirement for additional water supplies needed to meet the forecasted expansion of hospitals, business, research and other facilities in the Cambridge area.

In addition, the brochure makes no mention of the volumes of water to be transferred. However, the pipelines are indicated to have a diameter of 1.0-1.5m which, at an economic velocity of, say, 2.25m/s, implies a transfer capacity of 150-340 Ml/day.

Proposals c) and d) in more detail

c) the River Nene when it has available flows and its Counterdrain with a new bypass culvert at the existing Stanground lock. See Pages 16 - 19 of the brochure.

These constitute 2 sources of water supply, both being fed into Kings Dyke via a new culvert at the Middle Level Commissioners (MLC) Stanground lock.

i) The Nene Counterdrain via a new river intake from the Counterdrain, pumping station, treatment buildings, surface water pond and pump and outfall (pipeline) into the river Nene just ABOVE the Environment Agency's (EA's) Dog in a Doublet lock and associated sluices. The aim of this is to take water from the Counterdrain, treat it and then pump it into the main Nene which common sense and experience suggest will normally be less clean than the water being pumped into it from the counterdrain.

This lock is the last one of 38 locks on the Nene and below this the river is tidal for a further 45 km (gov.uk) https://www.gov.uk/guidance/river-nene-bridge-heights-locks-and-facilities The lock allows access for boats to and from the non tidal Nene and the tidal Nene and the Wash and, crucially, together with the associated sluices, form an essential element for flood control.

Pages 63 and 64, paragraphs 6.3.32 to 6.3.35 the Anglian Water / Cambridge Water Design Refinement Report (DRR) provides a little more information and refers to the possibility of transferring water "without requiring replenishment to the Nene" but "several issues still need further investigation" so this proposal might change.

It appears to be the intention that the volume of water pumped from the counterdrain into the river at Dog in a Doublet should be abstracted from the river further upstream at Stanground Lock. No hydraulic calculations are reported of provided to demonstrate that this can be achieved without adverse effects on water levels, spill weirs, the environment or navigation. However, it seems unlikely that any water will actually flow upstream which suggests that the expensively treated water will discharge directly to the sea via Dog in a Doublet lock and sluice.
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In addition, please provide details of how the proposed new pumping station ABOVE the lock is intended to operate in conjunction with the existing and separate Dog in a Doublet pumping station built in 1983 and managed by the North Level District Internal Drainage Board (IDB) and sited immediately BELOW the Dog in a Doublet lock and sluices. https://www.northlevelidb.org/resources/engineering/catchment-pumping-station-map/dog-in-a-doublet-old-and-new-pumping-stations/

The precise position of the outfall pipe is not mentioned. This may be of little concern from a narrow pumping perspective but it is obviously important for boaters that this pipe is sited carefully so that boats can safely moor, enter or leave the lock, with no transverse flow within 1.5 boat lengths of any restriction and limited transverse flow elsewhere.

Recommendation 1
Please provide details of the location and arrangement of the outfall pipe from the proposed Counterdrain pumping station above Dog in a Doublet lock to ensure that this does not impede the safe passage of boats using or mooring at the lock.

Supply of water for reservoir directly from the river Nene.

MLC's Stanground lock has two main functions which are interlinked:-
a) Raw water is fed by gravity from the Nene at Stanground under historical statutes to provide irrigation and arterial drainage and flood protection to 700 sq km of highly productive farmland and a large number of commercial and domestic properties.

b) The lock also provides an entrance to the network of Fenland waterways (the Middle Level Navigation) between the rivers Nene and Great Ouse. This network is 190km long of which 160km are designated as navigable. License fees for navigating these waterways were introduced in 2020 under the Middle Level Act 2018.
(middlelevel.gov.uk).

A third and significant function is proposed, supplying water to the reservoir along existing waterways via a new culvert at Stanground lock. The concept is simple and the use of open water transfer (rather than pipelines) is welcome but the phase 3 consultation documents are short on detail and the implications.

There are no reports of any hydraulic or leakage modelling to demonstrate

a) Impact on water levels due to the increased flows through the network, and whether this requires any bank raising, weir crest raising (or moveable weir crests), bridge raising, adjustment to any discharge arrangements into the waterways, and whether affects surrounding groundwater levels and drainage.
b) Increased losses resulting from raised water levels, and where these losses flow to. Also, given that losses will increase, the abstractions from the Middle Level System at the reservoir must be less that the volume of additional water supplied at Stanground Lock (which additional volume cannot be directly measured), which in turn must be less than the volume of additional water supplied at Dog in a Doublet Lock.
c) Resulting velocities (both average and localised), whether these result in any potential scour, and how such scour and subsequent silt deposition is to be managed.

Further, there are no reports of studies of system management and control to demonstrate how various pump facilities and sluices are to be managed and controlled to maintain acceptable water levels at all times, including failing safe in all circumstances, and accounting for the losses discussed above (which are likely to vary from any estimates made in advance).

Page 16 and 17 of the brochure (Peterborough, Stanground and Whittlesey) contains this single and important paragraph

“Using existing waterways.
We would transfer water from the Nene to the reservoir via the existing Middle Level System. This helps us reduce the amount of new infrastructure needed in other places too. We don’t plan to do any work to the Middle Level waterways themselves but we would need to create a culvert at Stanground lock."

Secondly paragraph 6.3.32 page 63 of the FRP states

"To enable the transfer of water from the River Nene to the Middle Level System, we propose a new by pass culvert at the existing Stanground lock . This would require modifications to the channel banks near the lock structure".

The separation of the 2 functions of allowing the passage of boats and supplying water may have merit but the inlets and outlets to the culvert must be designed to be suitable for navigation, as above. For reference, the 300 Ml/day lock bypass structures designed for Thames Water on the Severn-Thames Transfer were 140m long, or longer if there was a nearby bridge or other restriction.

Paragraph 6.3.2 states that modifications would be required to the channel banks near the lock structure. What are these modifications and why are they necessary and what are the implications for boats mooring or using Stanground lock or manoeuvring near by ?

Recommendation/ comment 2
Please provide details of the position of the proposed culvert at Stanground lock and the amount and flow of water passing through them and set out any additional measures that may be needed to allow safe passage of boats using and mooring at Stanground lock. What is the estimated initial capital cost of providing the culvert and strengthening the bank at Stanground, what are the estimated annual running costs including labour and who will pay for these?

Supplying the reservoir using the existing waterways of the Middle Level System

This paragraph from pages 16 and 16 of the brochure is crucial so it is repeated here

"Using existing waterways
We would transfer water from the Nene to the reservoir via the existing Middle Level System. This helps us reduce the amount of new infrastructure needed in other places too. We don’t plan to do any work to the Middle Level waterways themselves."

What does this deceptively simple paragraph mean? On one level it is good news.. No extra locks are required, no extra pumping stations are to be built right across a Middle Level navigation such as the Bevill's Leam pumping station completed in 1983 which severs and blocks through navigation and no repeat of the single guillotine impeding navigation on the Environment Agency's (EA) Old Bedford river at Welney close to the reservoir site.

On the other hand the reservoir site is bordered on 2 sides by existing navigable waterways and therefore the site will require bridges over these navigable waterways and pipework over and / or under the waterways during the construction phase and later. It is almost inconceivable that these and the associated pumping stations can be built "without affecting the waterways themselves".

Another matter that arises from this same paragraph from the brochure is that there is no reference to funding for the use of the existing waterways of the Middle Level System for supplying water to the reservoir. Is it possible to add the function of suppling water to the reservoir to the existing functions of irrigation, flood protection and navigation at zero cost? The answer must be no so how is this to be funded?

Recommendation/comment 3
The Inland Waterways Association's position is that

a) There must be no reduction in the volumes of water available for navigation and, given that losses are unknown, there should, in normal circumstances and particularly in drought conditions, be an increase in water available for navigation as a scheme benefit to boaters.
b) The scheme should carry all additional operation and maintenance costs resulting from the scheme. Since it appears impractical to assign some actual operation and maintenance costs to individual users, an arrangement to assign such costs between responsible parties in pre-agreed proportions may be preferable.

Stanground to Whittlesey and beyond : Impact on navigation

MLC is the fourth largest navigation authority in the UK (middlelevel.gov.uk) and supplying extra water for the reservoir along the existing 160km navigable waterways is likely to impact boats and boaters far beyond the landing stages at Stanground lock. For example let us consider Kings Dyke which connects Stanground and Whittlesey and includes Ashline lock and its by pass sluice. The plan on page 63 of the DRP (above paragraph 6.3.32) shows that any water supplied from the Nene and Nene Counterdrain would flow along Kings Dyke and Whittlesey Dyke including Briggate (the tightest bend on the Middle Level Navigation and one of the tightest bends on any navigation in the UK), the narrow channel either side of Briggate lined by houses and Ashline lock and its adjacent water by pass. Navigation through Whittlesey now (upstream or downstream) is not straightforward particularly for longer boats and increased water flows/ speed are bound to make this more difficult. Below Briggate the navigation flows past natural banks which face erosion.

The increased waterflow will also put extra pressure on Ashline lock, either increased water through the lock or the bywash which being enclosed has a finite capacity. Boaters have reported that the bywash when approaching the lock from downstream can be fierce and difficult to navigate already without factoring in extra water passing through.

The Middle Level Commissioners (MLC) are on record as saying that Ashline lock and in particular the top gates need urgent renovation but there are funding difficulties in doing this and are unable to give a start date. This lock and associated by pass sluice are bound to

be affected by extra water required for the reservoir whether or not the gates are replaced, although the exact impact will depend on the quantity and flow speed of water destined for the reservoir."
The river below Ashline lock is also narrow for some distance particularly as it passes the outfall of the adjacent water treatment (sewage) works.

Other parts of the navigable waterways and the water levels on them are already affected by the irrigation of the land and flood protection and the activity of the numerous pumps operated by MLC and the Internal Drainage Boards. Water intended for the reservoir will flow not just along the intended route to the 16 Foot river but will flow along each waterway , putting greater pressure on all bank infrastructures. The river bank at Nene Parade in March has slipped and partially collapsed. Similar damage can also be seen at Benwick where there are houses close to the waters edge.

MLC have invested heavily to manage the water levels and to deal with extreme weather which appears to becoming more frequent but for example owners of boats on the Old River Nene in March have reported increased river flows and fluctuating levels. Adding the extra function of supplying water for the reservoir from the Middle Level System and through Stanground is not going to improve matters unless extra investment (spending) is provided. But where is the funding for this and who will pay for it?

Mention has already been made of the possibility that water intended for the reservoir from the Nene Counterdrain water could be pumped into the Nene above the Dog in a Doublet lock and then be allowed to drain into the tidal river below. A similar situation is possible with the Middle Level Commissioners mighty pumps at Wiggenhall St German, the largest land drainage pumping station in the UK.

Recommendation 4
Hydraulic modelling and system management and control modelling is required across the entire 160km extent of navigable waters, extending into upstream and downstream waterways to the extent necessary. Details of the findings should be released to the public domain.
Please provide details and list any mitigation and improvements required to protect the existing waterways, structures and river banks, particularly in the vicinity of Briggate and Whittlesey and Ashline lock, March and Benwick and set out how these will be funded.