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3.3.9 WEARSIDE RESILIENCE

Summary case for our preferred option for Springwell service reservoir

Ofwat's challenge and our summary response
A challenge was made by Ofwat in the draft determination around the justification for a 62Ml capacity reservoir at Springwell village, on the basis that the initial storage requirement is presented in our business case as being 42.75Ml. As the further ~20Ml capacity was not clearly justified Ofwat applied a 20% cost efficiency to this scheme.

We acknowledge the need for the additional ~20Ml capacity of the reservoir was not well justified in our previous PR19 submissions. This documents seeks to correct this. We maintain our proposal to build a 62Ml service reservoir at Springwell as a resilience enhancement.

Need for this investment
In the first instance, it is worth revisiting the need this investment is intended to address.

A large number of our customers in Wearside and South Tyneside have a very poor level of protection against the risk of lengthy supply interruptions due to a lack of strategic storage. Strategic storage is partly intended to enable companies to deal with unplanned events and minimise the impact on customers. The risks and potential solutions for Wearside were explored by Entec in the 'Wearside Strategic Storage Study' in 2010. The main recommendation from the study was the construction of Springwell SR.

In NWG, a resilience steering group met in 2011 to identify critical assets where failure would result in a large scale interruption event affecting over 10,000 properties. As part of this work, the Springwell SR scheme was identified as the basis for dealing with a number of top resilience risks including losing a number of the critical Central and Tyneside assets such as Mosswood WTWs, The Derwent North Main, and multiple strategic crossings, WPSs and downstream reservoirs.

We then reviewed the total storage available across the system and identified a storage deficit across the whole of Wearside and South Tyneside. We also looked specifically at the demand of the 52,146 properties which currently have no access to storage. This showed a storage deficit of between 63.7Ml and 72.75Ml.

Peak demand in Wearside	193.75 Ml/d
Storage capacity in Wearside	121 Ml
Storage deficit across Wearside	72.75 Ml/d
Peak demand for 52,146 props	63.7 Ml/d
Current storage requirement	**63.7 – 72.75 Ml**

A number of further factors have then been considered.

The Carr Hill link main can supply around 30Ml/d on day 1 of an unplanned event, this support then reduces on days 2 and 3. The alternate supply is taken from the neighbouring Tyneside system and the actual volume available depends upon the operation of that network on the day an unplanned event should strike. While it is possible that would offset the need for some of the storage in an emergency – and potentially reducing the storage requirement to 42.75Ml. It is important to note that there is a significant risk of a low likelihood high consequence event having further adverse impact on available storage in Wearside and the ability of Tyneside to lend support.

There is a unique resilience threat is posed by hazardous ground conditions in parts of the Wearside area which is linked to both historic mine workings and differential ground movement caused by geological faults.

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Part of the vulnerability of the Wearside area is that some of our existing strategic storage is located on sites where these risks are present. The Wearside storage deficit could grow in future due to the sudden loss of existing reservoir storage in a way that is beyond management control and not linked to asset condition. Two reservoir collapses have occurred in the past 40 years because of ground movement. A collapse occurred in one of Stoneygate SR's compartments in 2006 in response to fault reactivation and we lost two compartments of Mill Hill SR in the late 1970s. Differential ground movement from mine workings has also been a recurring problem in the region and have led to the collapse of other infrastructure, such as the collapse of a section of the A1 in Gateshead 20161 and issues with the A690 in Sunderland2 in 2001.

Investigations have shown that at least 27 Ml of storage across two compartments of Downhill SR is vulnerable to this risk. The remaining compartment of Stoneygate SR (22 Ml) could also be affected. A small portion of the compartments of Mill Hill SR that collapsed in the late 1970s remains in service but it could also be affected by further ground movement.

Current storage requirement (after allowing for the Carr Hill link)	42.75 Ml
Potential loss of storage due to ground movement	Up to ~ 54 Ml
Total capacity of reservoirs with no more than 25 years life remaining	50.61 Ml
Future storage requirement	**92.75 Ml**

We do not know if or when the requirement for further storage to replace storage lost due to ground movement may materialise. However, it is clear that this is a low likelihood high consequence risk. If both compartments at Downhill or the remaining storage at Stoneygate were affected this would significantly increase the storage deficit. It would also lead to immediate supply issues relating to pressure and possibly intermittent supply interruptions. We need to be better prepared to deal with any future issues than we are currently.

Options considered
In terms of the service reservoir component of the package of schemes included in the Wearside resilience business case, we considered three main options around the sizing of the reservoir. The choice of reservoir location is for elevation reasons.

Minimum option - Build a 42.75 Ml SR at Springwell
With this option, the 52,147 properties in Wearside fed directly by the Derwent North main from Mosswood WTW would have 24 hours of storage, reducing the probability of loss of supply significantly. However, this option leaves a significant residual future risk across Wearside as no allowance would be made for Springwell SR's strategic importance to securing resilience across Wearside in future.

Most resilient option – Build a 92.75 Ml SR at Springwell
The full storage requirement for Wearside is at least 92.75 Ml. This would ideally be constructed in one location with redundancy in the number of compartments (and at least two outlet mains). Building this full capacity now would be more efficient than building in two phases. The need to replace existing reservoir capacity is sufficiently pressing, bearing in mind that *Entec's* study of 2010 recommended decommissioning some storage sites by 2025. Furthermore, this investment would only constitute phase 1 of the work required to replace existing storage capacity. Additional investment in network connectivity would be required

[1] https://www.bbc.co.uk/news/uk-england-tyne-36633416
[2] http://nora.nerc.ac.uk/id/eprint/3968/1/Residual_fault_reactivation_vfinal_post_refs.pdf

following the construction of the reservoir before existing storage sites could be decommissioned. However, it is not cost efficient or practicable to deliver within the footprint of the site we have purchased.

Optimal option - Build a 62 Ml SR at Springwell
Having purchased land in Springwell village for the construction of a new reservoir, it was identified that to make best use of the site elevation and manage pressures downstream without any further network investment, the optimum maximum capacity of the reservoir would be 62 Ml. This would balance the current storage deficit in Wearside and make some allowance for future risks by delivering enough additional storage in Wearside to accommodate the delivery of further network links in future to better prepare for any further unplanned loss of strategic storage.

(Note: We did also consider the construction of a connecting main from Springwell SR into the Stoneygate system as part of our resilience package for Wearside but concluded that the first stage of preparing for the future would be to construct Springwell SR. We have deferred further investment in connecting mains beyond AMP7 to keep our plan affordable.)

The optimal option maximises what can reasonably be delivered on site and is a conservative response reflecting a degree of uncertainty in future Wearside risks.

Cost review
As the project planning has progressed for this scheme we have improved our understanding of the costs that will be involved in delivery. Recent cost estimates are provided in the table below, presented in 2017/18 prices for consistency with all PR19 costing. We have also revisited the cost of delivering 42.75Ml in the period 2020-25 and then delivering a further 20Ml reservoir compartment at the same site as a separate project. This has enabled us identify the extent of the efficiencies which we will make by delivering the full 62Ml reservoir at one time.

	Capex	Net present value
20 Ml reservoir	£5,702,521.67	£5,942,898.22
42.75 Ml reservoir	£13,477,111.02	£13,722,093.16
62 Ml reservoir	£17,252,940.41	£17,500,331.79
Cost of delivering 62 Ml in two stages	£19,179,632.69	£19,664,991.38
Additional cost of delivering in two stages	**£1,926,692.28**	**£2,164,659.59**

At the time of our previous PR19 submissions we requested £16.20 million for the delivery of a new 62Ml reservoir at Springwell. We do not propose to amend our request on the basis of this new information. Rather, we share this information because it shows that delivering the minimum storage requirement in the short term, while there is a clear need for further storage, would incur additional costs in the region of £2 million in 2017/18 prices by comparison with delivering 62Ml at one time. This efficiency lost by delivering this investment in two stages would amount to the majority of the difference in cost (£2.7 million) between building a 42.75Ml reservoir (£13.47 million) and the full allowance requested of £16.20million.

We can also provide further new evidence that our cost estimates will drive efficiency. In June 2019 we commissioned a shadow pricing exercise by our contractor partners and commercial consultants on the preferred option costs for each of the enhancement projects. The purpose of this exercise was to benchmark the costs produced by NWG's iMOD system against the market.

The result of this exercise showed that NWG's cost estimates were on average 15% lower than the cost estimates returned by our contractor partners and 7% higher than the cost estimates returned by our commercial consultants Turner & Townsend. This gives confidence that the cost estimates produce by the iMOD system for the enhancement projects are efficient.