

April 2021

Linden Homes vs. Southern Water – Final determination

About this document

This document sets out our final determination in relation to a sewer requisition dispute referred to us under sections 99 and 30A of the Water Industry Act 1991. The parties to the dispute are Linden Homes and Southern Water Services Limited.

Our final determination was made on 30 March 2021.

Executive summary

This document sets out our final determination in relation to a dispute referred to us under section 99 of the Water Industry Act 1991. The dispute was referred to us by Linden Homes on 23 June 2015 and relates to the requisition charge Southern Water is seeking to recover for works provided to drain a development in Horsham, West Sussex. Southern Water required a security payment of £534,500 from Linden Homes for the requisition, with Southern Water incurring final costs of £1,168,637.80 for the works it undertook.

We have previously issued two draft determinations and a revised position paper to the parties to this dispute for comment. This is now our final determination made under section 99 read with section 30A of the Water Industry Act 1991. Under section 30A (5), this decision is final and enforceable as if it were a court judgment.

Our role is to determine whether the costs Southern Water charged Linden Homes were reasonable. Our final determination is that these costs were not reasonable, in particular, because we consider that the extent of the reinforcement works Southern Water provided was not required to serve the development. We have concluded that some reinforcement works would have been required to serve the development. With this in mind, we have developed an alternative (more cost-effective) solution as a benchmark for calculating what would be reasonable costs for Southern Water to use for calculating its charge to Linden Homes.

The alternative solution provides some improvements in service for existing customers and, therefore, we have determined that the costs of this solution should be apportioned between Linden Homes (£77,851) and existing customers (£292,869). Factoring the estimated revenue from customers on the development into the method for calculating requisition charges at this time, this results in there being no payment due from Linden Homes. Southern Water, therefore, needs to refund Linden Homes £534,500 (the security payment Linden Homes paid ahead of the calculation of the final requisition charge), plus interest for the period this amount has been held. The refund needs to be paid within 20 working days of this determination being published.

Contents

1.	Introduction	4
2.	The first two draft determinations	7
3.	The Consultant’s report	11
4.	Representations on the Consultant’s report	16
5.	Benchmark for reasonable costs	22
6.	Our revised position	28
A1	Proposed solutions	37
A2	Occupancy profile	39
A3	Average bill assumptions	40
A4	Discounted Aggregate Deficit calculation	42

1. Introduction

A. The Complaint

- 1.1 This determination concerns a dispute referred to the Water Services Regulation Authority (**Ofwat**) by Linden Homes on 23 June 2015 under section 99 of the Water Industry Act 1991 (**the Act**). The dispute relates to the requisition charge Southern Water Services Limited (**Southern Water**) is seeking to recover for works provided to drain a development on the former Novartis Sports Ground (**the Site**) in Horsham, West Sussex.
- 1.2 Linden Homes made a requisition request, under section 98 of the Act, requiring Southern Water to provide a public sewer to drain the Site's foul water discharge. The works Southern Water undertook to fulfil the requisition included the provision of a length of new sewer (on Parsonage Road) and works to reinforce sections of the existing sewerage network (on Pondtail Road). All of the works were provided off-site rather than on the Site itself. Southern Water required a security payment of £534,500¹ from Linden Homes for the requisition, based on Southern Water's estimate of what the final requisition charge would be. The works have since been completed with a final cost of £1,168,637.80 being incurred by Southern Water.
- 1.3 Linden Homes disputes the final costs that Southern Water has provided for the works, primarily on the grounds that it considers that not all of the requisitioned works were necessary to serve the Site, and therefore that not all of the costs of the works undertaken should be used for calculating the requisition charge borne by Linden Homes.
- 1.4 When referring the dispute to us, Linden Homes stated that it disputes the reasonableness of the works and the resulting estimated requisition charge because:
 - Incorrect assumptions and inputs were used for the network modelling undertaken by Southern Water to determine capacity within the existing system; the capacity needed to serve the Site; and what off-site reinforcement works were needed, if any. This resulted in a more costly solution being implemented than would have been the case if better assumptions and inputs had been used.
 - There were three models and off-site reinforcement solutions produced by Southern Water, which places doubt on the robustness of the final solution provided.
 - Southern Water acted outside its powers in requiring Linden Homes to requisition a new sewer rather than allowing Linden Homes to connect directly into the existing

¹ As per the methodology for calculating requisition charges at this time, this estimated requisition charge reflected Southern Water's estimated costs of the works and estimated revenue from the Site.

public sewer. This was contrary to Ofwat's [Information Notice IN 14/16](#) 'Improving Service for customers on new connections'.

- The only reason Linden Homes entered into the agreement with Southern Water, under section 98 of the Act, was to discharge a planning condition that had been imposed by Horsham District Council at the request of Southern Water.
- Another development was planned in the vicinity of the Site, which was not asked to contribute to network reinforcement works.

- 1.5 On 3 August 2015, following our preliminary assessment of Linden Homes' referral, we formally opened a case to determine the reasonableness of the requisition charge required by Southern Water.
- 1.6 On 6 February 2017, we issued a draft determination on this dispute. Following receipt of representations from both parties on the draft determination, we requested further information from the parties. On the basis of the information received we were minded to make substantive changes to some of the conclusions set out in the draft determination. As such, on 30 July 2018, we issued a revised draft determination to provide both parties with the opportunity to provide comments on our revised conclusions and any further evidence in support of their arguments.
- 1.7 On 14 September 2018, Southern Water provided its representations on the revised draft determination, with Linden Homes providing its representations on 21 December 2018. These representations raised a number of new issues that had not previously been raised. Many of these issues were concerned with technical questions about the approach that Southern Water had taken to modelling the available capacity in its sewer network and the potential impacts of connecting new premises to this network. Linden Homes also raised some concerns, for the first time, regarding the Novartis Factory (**the Factory**) which was located opposite the Site. Consequently, we decided to commission an independent expert to review the network modelling Southern Water used to establish the scheme required to connect the Site to its network.
- 1.8 On 3 September 2019, we commissioned an independent technical consultancy (**the Consultant**) to review the approach Southern Water took to model the available capacity in the sewer network around the Site and the impact of the additional flows from the Site on this network. On the basis of the Consultant's review, and the parties' representations on this review, we were minded to make substantive changes to some of the conclusions set out in our revised draft determination.
- 1.9 On 30 September 2020, we issued a revised position paper which provided both parties with the opportunity to make representations on our revised conclusions. Both parties subsequently provided representations and, having considered those submissions, we have now reached our final decision.

B. Overview of our decision

1.10 In light of the legal framework of the Act, the Consultant's report and all the evidence we have gathered from the parties to the dispute, we determine that:

- The costs Southern Water charged Linden Homes for the Site were not reasonable. This is because the works Southern Water provided went beyond what was required to serve the Site in a way that did not cause detriment to existing customers.
- Southern Water did, however, need to provide some reinforcement to its network in order to serve the Site. In order to determine the requisition charge, as a benchmark for establishing reasonable costs for the requisition, we have developed an alternative (more cost-effective) solution that Southern Water could have reasonably been expected to provide to serve the Site.
- On the basis of the predicted flood risk data, albeit indicative, we determine that only 21% of the total costs of the alternative solution can be attributable to serving the Site (£77,851). This is because the alternative solution, as well as mitigating flood risk posed by the Site, significantly reduces the pre-existing flood risk in the area of the Site. The remaining costs (£292,869) should, therefore, be borne by existing customers.
- At the time the requisition charge was calculated, the Act required future revenues from the Site to be offset against the requisition costs. Given the estimated revenue that will be received from customers on the Site, there is no payment due from Linden Homes for the Site. Therefore, a refund of £534,500 (the security payment Linden Homes paid for the Site), plus interest, is due to be paid to Linden Homes within 20 working days of this determination being published.

1.11 Southern Water should apply interest rate(s) in accordance with Ofwat's [Information Notice on interest rates](#).

1.12 Under section 30A (5) of the Act, this decision is final and enforceable, as if it were a court judgment.

2. The first two draft determinations

2.1 We briefly summarise our first and second draft determinations below.

A. First draft determination

2.2 On 6 February 2017, we published our first draft determination. We provisionally determined that:

- Based on the information provided to us in relation to flood risk, the works provided by Southern Water were required in order to serve the Site without causing detriment to existing customers.
- Of the Site's 160 properties, 18 of these were connected to Southern Water's network, which had available capacity to accommodate them. As such, only flows for the remaining 142 properties (approximately 89% of the Site's flows) should have been included when providing a solution in response to the requisition request and when calculating the security payment and final requisition charge.
- On the basis of the predicted flood risk data, only 30% of the total costs of the reinforcement costs were attributable to serving the qualifying 142 properties on the Site (£347,984.40). The remaining costs (£811,963.60) should be borne by existing customers.
- Given only 142 properties should have been modelled to provide a solution to the requisition request, when calculating the security payment only 89% of the charges expected to be generated by the Site should have been included in the estimated revenue used to calculate the security payment.
- Given the estimated revenue, the final requisition charge that Linden Homes needed to pay for the Site was £36,776.47. Therefore, a refund of £497,723.53, plus interest, was due to be paid to Linden Homes.

2.3 Both parties responded to the draft determination and provided additional information to inform our decision. As a result of this additional information, we were minded to make substantive changes to our conclusions and we issued a second draft determination.

B. Second draft determination

2.4 On 30 July 2018, we issued our second draft determination which provided both parties with the opportunity to make representations on our revised conclusions.

2.5 In our second draft determination we maintained the position we set out in the first draft determination except for one significant change. This related to the way in which

we apportioned the costs between the Site and existing customers. We did this because we accepted Southern Water’s argument that all of the works on Parsonage Road (the road adjacent to the Site) were purely to connect the Site to the network, thus solely benefiting the Site. Only the works on Pondtail Road (which was further downstream of the Site) were benefiting both the Site and existing customers.

- 2.6 With the above in mind, we determined that the costs of the new sewer connecting the Site to the existing network (£785,903.17) should be wholly borne by Linden Homes. We also determined that only 18.2% of the Pondtail Road costs were attributable to the Site. This compared to us setting out in the first draft determination that 30% of the total reinforcement costs were attributable to the Site.
- 2.7 Consequently, we provisionally determined a significantly greater requisition charge – £472,024.57 compared to £36,776.47 (the sum set out in the first draft determination). This in turn resulted in us determining a significantly reduced refund to Linden Homes of £62,475.43 compared to £497,723.53 (the figure we set out in the first draft determination).

C. Southern Water’s comments on second draft determination

- 2.8 On 14 September 2018, Southern Water provided its representations on our second draft determination. It welcomed our finding that all the costs for connecting the Site to the public sewer network (the works on Parsonage Road) should be attributed to Linden Homes. It also welcomed the view that the off-site sewer and reinforcement works (the works on Pondtail Road) were required in order to serve the Site and did not only create headroom to alleviate existing issues in the network.
- 2.9 Southern Water did, however, calculate a different apportionment of the off-site reinforcement costs on Pondtail Road suggesting 82.2% of those costs should be attributable to the Site. This was in contrast to the figure we set out in our second draft determination of 18%. Southern Water’s reasoning was that the only element of the off-site reinforcement works that provided betterment to existing customers was a 400mm diameter cross connection. In contrast, it considered that all costs associated with the upsizing of 198m of the sewer network to 225mm diameter pipe should be attributable to the Site, as there was no betterment to existing customers.

D. Linden Homes’ comments on second draft determination

- 2.10 On 21 December 2018, Linden Homes provided its representations on our second draft determination. This included a number of challenges to our conclusions such as:

- Opposite the Site was the Factory that connected into the sewer system next to the Site. This was closed during Southern Water’s planning of the new sewer to serve the Site and Linden Homes considered that Southern Water, incorrectly, did not take into account the freed up capacity (**headroom**) resulting from the Factory when determining the available sewer capacity.
- A number of concerns were raised over Southern Water’s approach to modelling the capacity of the existing sewer system available to serve the Site. These included questions on the appropriateness of the parameters Southern Water used in the modelling and whether the modelling results were supported by evidence from actual flooding events. Linden Homes considered that the evidence of sewer flooding incidents in the area did not support Southern Water’s view that there was insufficient capacity in the existing sewer and that there were significant existing sewer flooding risks.
- Concerns were raised about many of the modelling parameters used in modelling the flows that the Site would produce. In our second draft determination, we had disagreed with Southern Water’s approach to setting these modelling parameters and estimated that the expected flows from the Site would be significantly lower than Southern Water had calculated. Our estimate of the peak flow from the Site was 5.63 litres per second (**l/s**) compared with Southern Water’s figure of 7.41 l/s. In Linden Homes’ representation, however, it argued that the parameters should be even lower than those we had used to calculate the peak flow.

E. Additional information

- 2.11 On 24 November 2018, prior to submitting its formal representations on our second draft determination, Linden Homes raised with us, for the first time, its argument in relation to the Factory. It asked whether Southern Water had taken into account the closure of the Factory and the additional sewer capacity that would have been made available by its closure. The Factory was situated on Parsonage Road but on the other side to the Site.
- 2.12 On 17 December 2018, we wrote to Southern Water to request further information about the closure of the Factory. Southern Water confirmed the Factory had closed in June 2014, when it was planning the drainage solution for the Site. We asked Southern Water how it had taken into account the additional available sewer capacity, resulting from the Factory’s closure, in the design of the drainage solution for the Site.
- 2.13 On 12 March 2019, Southern Water confirmed that it did not take into account the impact of the Factory’s closure in its consideration of the available capacity in its sewer network. Its reasoning was that the Site was not located on the site of the Factory but, rather, the Site was a greenfield site (that is, a previously undeveloped site) that was on the recreation ground opposite the Factory. As such, any flow would be additional to existing flows.

- 2.14 The representations we received on our second draft determination raised a number of issues that had not been previously raised or considered. Many of these issues were concerned with technical questions about the approach that Southern Water had taken to modelling the available capacity in its sewer network and the potential impacts of connecting new premises to this network.
- 2.15 To move the determination forward we considered we needed to commission an independent expert to undertake a review of Southern Water's approach to the modelling for the Site.

3. The Consultant's report

- 3.1 On 3 September 2019, we commissioned the Consultant to review Southern Water's approach to modelling the available capacity in its sewer network in the vicinity of the Site. We asked the Consultant to look at whether the hydraulic modelling Southern Water had undertaken was adequate and whether the sewer capacity assessment² it had carried out was satisfactory.
- 3.2 As part of its review we asked the Consultant to look at whether there was sufficient capacity in the existing network to accommodate the additional flows from the Site and whether Southern Water's approach to modelling the available capacity in the sewer system was in line with both its own internal guidance and industry practice at the time the work was carried out. We also asked the Consultant to provide a view on the impact of the closure of the Factory on the available capacity of the sewer.
- 3.3 We set out that if the Consultant had concerns about Southern Water's approach to modelling the available capacity of the sewer, that it should provide its view on what a reasonable alternative approach would have been and use Southern Water's sewer model for the area to assess the available capacity in the sewer network downstream of the point at which the Site could be connected.
- 3.4 Southern Water provided the Consultant with the information it needed to undertake its review. The information was shared on a commercially confidential basis.

A. Summary of the report

- 3.5 The Consultant's review evaluated the model Southern Water used to assess flood risk local to the Site, investigate the impact of the Site on its wider network, and design the solution. It found that, in respect of the network modelled, the structure of the model Southern Water used was generally satisfactory. The model was built as a Type II model³ which the Consultant considered entirely appropriate for this type of assessment,

² A sewer capacity assessment is undertaken to determine the impact of additional flows from new development on network performance for a range of storms of differing return periods and to identify whether capacity improvements are required. The return period of a storm is the inverse of the annual probability of exceedance of the rainfall total associated with the storm, i.e. the average number of years it takes to get an exceedance of the rainfall total. For example, a storm with a 100 year return period refers to a rainfall total that has a 1% probability of occurring at a specific location in a specific year.

³ A Type II model is considered as "general multi-purpose", providing an overview of a specific drainage area. The purpose of this type of model is primarily as a planning or assessment tool to, for example, assess the impact of proposed developments, climate change and urban creep. A Type III model is more detailed and is appropriate for scheme appraisals and the detailed design of schemes. Type III model detail will typically be within a model of Type II detail but with all known assets included.

though it considered it may have been necessary to locally upgrade part of the model to a Type III model when the work progressed to detailed design.

3.6 The Consultant's report also concluded, however, that there were fundamental shortcomings in the way the model was built. The main flaws were these:

- Southern Water modelled its foul sewer system using permeable surfaces which the Consultant considered to be unrealistic. This is because when simulating design storms, there was a relatively rapid storm response in the foul sewer system which indicated the storm response was most likely from misconnected impermeable areas⁴. The Consultant considered that when the 'New UK runoff method'⁵ is used, the use of permeable surfaces risks a substantial over-prediction of flows when simulating design storms.
- The way in which the discharges from the Factory were modelled was incorrect and, when design storms are simulated, the permeable surfaces that are wrongly included for the Factory generate a significant and unrealistic inflow into the foul sewer system.
- The quality of the verification of the model was poor, in relation to both dry weather and storm conditions.

3.7 In summary, the Consultant's report concluded that the work undertaken by Southern Water to build and verify the model was not in accordance with normal industry standards and was fundamentally flawed. Accordingly, the model was not suitable for undertaking a sewer capacity assessment in relation to the Site. Following on from that, the model was also not suitable for designing any upgrading works that might be required for the Site.

3.8 Despite the above flaws, the Consultant opined that if the Factory had continued to operate, the Site would have created an increased flow in the sewer system and, on the balance of probabilities, would have increased the surcharge and flooding risk. The Consultant did, however, consider this increase would be significantly reduced, compared with Southern Water's estimate, in terms of existing flooding volumes and predicted increase in flooding.

3.9 The Consultant also considered it would have been unreasonable for Linden Homes to assume it was entitled to the headroom in the drainage network resulting from the Factory's closure, particularly as there were plans to redevelop the Factory site as a new business park.

⁴ These are hard surfaces (that is, roofs and paved areas) that are incorrectly connected to, and therefore drain surface water into, the foul sewer network.

⁵ Since its introduction in 1993, the 'New UK runoff method' has been the mainstay of UK drainage analysis. It was designed by HR Wallingford to overcome the limitations of the Wallingford Procedure Percentage Runoff model and calculates the runoff from paved and permeable surfaces separately. Further information may be found at WaPUG User Note No. 28.

B. Consideration of alternative options

- 3.10 Our initial view was that the Consultant’s report was thorough and well-reasoned. As such, we provisionally accepted its conclusion that the model Southern Water used to conduct its assessment regarding the Site was flawed. We also agreed that there would have been some detriment to existing customers if the whole Site had connected to the nearest manhole with no reinforcement to the network. Having said this, we did not consider that the scheme Southern Water implemented represented a reasonable cost-effective solution. We considered that a much less costly solution could, and should reasonably, have been pursued and implemented instead, without causing detriment to existing customers. We therefore considered the feasibility and cost of various, reasonable alternative solutions.
- 3.11 Our starting point for developing an alternative solution was to consider a range of options including some previously investigated by Southern Water⁶. These options encompassed different connection points with the existing sewer network; different routes for new sewers to the connection points; and differing extents of reinforcement of the existing sewers.
- 3.12 This review identified the SL1 Outline Design solution, and a variant of the SL2 Outline Design solution (involving a shorter, more direct, route for a new sewer to the connection point with the existing network), as the most promising possibilities but recognised that each had its own constructability constraints. We focused on SL1 – potentially the cheaper of the two – and wanted to test whether the constructability issues could be resolved through a reduction in the scope of the improvements required. In particular, we wanted to understand which of the network reinforcements forming this solution would still be required to serve the Site, given the reduced flooding risk assumed by the revised network modelling.

C. Additional information requested from the Consultant

- 3.13 We asked the Consultant to assess whether the SL1 Outline Design solution would have been a viable alternative taking account of its assessment that the Site’s flows would result in a smaller predicted increase in flood volume. We also asked the Consultant to clarify the modelling parameters it had used to model flows from the Site.
- 3.14 We asked the Consultant which of the network reinforcements forming the ‘SL1 Outline Design’ solution would still be required to serve the Site. This was the first solution that Southern Water identified for the Site⁷ but was subsequently dismissed owing to a

⁶ There were four solutions put forward to serve the Site – the foul water impact study, SL1 outline design study, SL2 additional optioneering study and detailed design report. See [Appendix 1](#).

⁷ There was a prior solution but this related to plans for a larger development when the Site occupied two parcels of land either side of Parsonage Road.

number of constructability constraints associated with this option. We wanted to test whether these constraints could be resolved through a reduction in the scope of the improvements required. This necessitated some additional modelling work to investigate flood risk and test the degree of betterment for existing customers (if any) this alternative solution would provide.

- 3.15 The additional modelling work carried out by the Consultant first investigated the change in flood volumes that would result from implementing all elements of the ‘SL1 Outline Design’ solution. For the 1 in 30 year storm of 480 minutes duration (which Southern Water had identified as the critical duration) this showed a reduced amount of betterment for existing customers against existing flood volumes compared to Southern Water’s assessment.
- 3.16 The Consultant then investigated the extent to which the network reinforcements forming the ‘SL1 Outline Design’ solution could be scaled back to reduce the amount of betterment for existing customers while still accommodating the flows from the Site. The table below outlines the changes the Consultant made.

Table 1: The Consultant’s ‘SL1 Outline Design’ solution amendments

Retained	Removed	Reduced in scope
19 Fay Road to Pondtail Road – upsizing 102m length of 225mm diameter sewer to 375mm diameter using pipe bursting techniques.	Parsonage Road – removed the upsizing of 92.7m of existing 225mm diameter sewer to 300mm diameter.	Blenheim Road – shortened the length of upsized existing 225mm diameter sewer to 300mm diameter sewer from 139m to 108m.
Pondtail Road – blocking of connecting 225mm diameter sewer from the south at manhole TQ17323101.	Pondtail Road – removed the upsizing of 152m of existing 225mm diameter sewer to 300mm diameter.	
Rear of 27 Kingfisher Way⁸ – connection of manholes TQ17323501 and TQ17323502 by 4.1m length of new 375mm diameter pipe.		

- 3.17 The results of the above modelling showed that the reduced scope of network reinforcement works could still accommodate the flows from the Site and result in a degree of betterment for existing customers (**-197.4m³**). Significantly, it showed that no reinforcement work was needed on Pondtail Road, a section of which was in close

⁸ In our revised position paper we said this was 14 Kingfisher Way (as advised by Southern Water) but have since corrected the address.

proximity to a railway line (which gave rise to some of the constructability concerns that led to Southern Water not pursuing the 'SL1 Outline Design' solution).

- 3.18 In addition to the above, we also asked the Consultant whether the network reinforcements Southern Water actually installed (198m of upsized sewer in Pondtail Road) were necessary. Further modelling work enabled the Consultant to conclude that the length of sewer in Pondtail Road that had been upsized from 150mm diameter to 225mm diameter need only have been 102m rather than the 198m actually upsized. This would still result in some betterment against existing flood volumes although flooding increased at one manhole⁹.
- 3.19 The Consultant also stated that it was not possible to say by how much the flood volumes set out in the Detailed Design Report were overstated without undertaking a full review and remodelling of contributing impermeable and permeable surfaces (which was beyond the scope of this investigation).

⁹ This was manhole TQ17325408.

4. Representations on the Consultant's report

- 4.1 We provided both parties with the Consultant's report to allow them to comment on its conclusions. We also provided both parties with the additional information the Consultant provided in response to our follow-up questions.
- 4.2 On 2 April 2020, Linden Homes provided its representations on the Consultant's report which set out that it largely agreed with its conclusions. Linden Homes considered that the model Southern Water used was flawed, the modelling parameters used were wrong and that there was sufficient spare capacity within the network for the Site to be connected to the nearest manhole with no (or possibly little) reinforcement required.
- 4.3 On 20 April 2020, Southern Water provided its representations on the Consultant's report with its high-level conclusion being that irrespective of the adequacy of the model and the detail of the modelling parameters, connection of the Site would have caused detriment to existing customers without adequate network reinforcement. As such, it considers it had to do something and it implemented the most cost-effective, practical solution it could have done at the time.
- 4.4 On 29 April 2020, we shared Southern Water's representations on the Consultant's report with Linden Homes and, on 6 May 2020, Linden Homes provided its comments on those representations. On 6 May 2020, we shared Linden Homes' representations on the Consultant's report with Southern Water and, on 19 May 2020, Southern Water provided its comments on those representations.
- 4.5 We set out below the main comments received on the Consultant's report and our conclusions regarding those comments. These conclusions formed part of a revised position paper which we issued to the parties for comment on 30 September 2020. The revised position paper is dealt with in more detail in [section 6](#).

A. Adequacy of the model

- 4.6 Linden Homes' view was that Southern Water should have used a Type III model for detailed design rather than a Type II model and it interpreted the Consultant's report as supporting this position.
- 4.7 Linden Homes agreed with the conclusion in the Consultant's report that Southern Water's model was flawed and was not suitable for a sewer capacity assessment. Southern Water, however, considered it was the best tool it had to assess the minimum reinforcement required to serve the Site without increasing the flooding risk for existing customers. It also said that there is no one set way to model a drainage system and no model is a perfect representation of the system the performance of which it is intended

to simulate. It also noted “there are many techniques and variables that can be used and adjusted in order that the model replicates observed flows”.

Our position

- 4.8 The Consultant’s report considers the use of a Type II model to be entirely appropriate for this type of assessment, though it adds it may have been necessary to upgrade part of the model to a Type III model when the work progressed to detailed design.
- 4.9 We agreed with the conclusion in the Consultant’s report that the model Southern Water used, and its verification, was poor. We said that we did not consider that Southern Water had convincingly rebutted the conclusion in the Consultant’s report that the model was flawed – in particular, in relation to it overstating flooding risk. We agreed, therefore, with the Consultant that the model was not adequate for assessing the impact of the Site on the wider network, nor for designing an appropriate solution to the capacity issues resulting from the Site’s impact.

B. Modelling

- 4.10 The Consultant’s report considered Southern Water’s estimation of the Site’s flows to be satisfactory. Linden Homes, however, maintained that the assumptions on the flows from the Site were far greater than they should have been. In particular, it noted its concerns regarding the model input parameters, such as the provision for misconnections associated with urban creep. Linden Homes also considered the results from the Consultant’s modelling work to be purely indicative and not suitable for use in this determination.

Our position

- 4.11 In our revised position paper, we recognised Linden Homes’ concerns regarding the modelling but said that we still considered that whichever of the potential range of parameters were used, the modelling still forecast detriment to existing customers.
- 4.12 The Consultant’s report concluded that the Site’s flows would have caused an increase in surcharge levels and flooding. It set out, however, that the impact of the Site on the existing network would have been significantly lower than Southern Water’s modelling which was over-predicting flood risk. The Consultant could not state by how much the model over-predicted flooding without conducting a full review.

- 4.13 As for Linden Homes' comments on what it sees as the indicative nature of the Consultant's modelling work, whilst we accepted that the Consultant's modelling is indicative, we considered it provided a reasonable basis for our final determination.

C. Evidence of flooding

- 4.14 Linden Homes considered that whilst the flooding predictions made by the Consultant were better than Southern Water's predictions, they were still relatively high due to a constant input of 3 x dry weather flows (**DWF**) for foul flow plus a storm contribution based on 4m² per property.
- 4.15 Linden Homes also considered that Southern Water had not properly investigated the reasons for certain properties being on the DG5 register¹⁰. It considered that properties could be listed on that register due to blockages and this should have been investigated especially given the low flows at flow monitor 24¹¹ (**FM24**).

Our position

- 4.16 We set out in our second draft determination that we considered Southern Water's judgement that making allowance for misconnections following urban creep is in line with industry practice. Although Linden Homes has shown that companies have differing policies regarding storm contributions to foul sewers, we have not seen any evidence to suggest that Southern Water is an outlier in terms of its design assumptions. Having considered Linden Homes' further representations, we saw no reason to depart from this view.
- 4.17 We considered that, in itself, low flow is not necessarily indicative of a blockage. We have not seen anything in the hydrographs provided by Southern Water that would suggest that a blockage was affecting the flow passing this monitor. A flow restriction downstream of FM24 might have been expected to lead to backed-up flows and greater depths recorded at the monitor. A restriction upstream might have been expected to result in a long tail of increased flow after the storm peak. Neither feature is evident.
- 4.18 In any case, the issue of whether a blockage was, at least partly, responsible for the low flows recorded at FM24 is not central to the question of the degree of headroom within the sewer in Blenheim Road (where FM24 was installed). Indeed, if the recorded flow would have been higher but for a blockage, this would have pointed to there being less spare capacity.

¹⁰ The DG5 register refers to a register of properties that have flooded, and are likely to flood again, as a result of hydraulic inadequacy of the public sewer network.

¹¹ This was identified by the Consultant's report as the only relevant flow monitor for this case.

4.19 In addition, we have also not seen any clear evidence to suggest that there are certain properties incorrectly on the DG5 register.

D. The Factory

4.20 As set out above, there was a Factory opposite the Site which closed during Southern Water's planning of the new sewer to serve the Site. Linden Homes also noted that the associated trade effluent consents were terminated before the Site had gained planning consent and before work started on the Site.

4.21 With this in mind, Linden Homes considered Southern Water should have factored in the subsequent headroom created by its closure. To this end, Linden Homes considered it would have been entirely reasonable to remove the flows representing the trade effluent consents and then assess the impact of the Site on the wider network.

4.22 Southern Water confirmed that it did not take into account the impact of the closure of the Factory in its consideration of the available capacity in its sewer network. Its reasoning was that it assumed there to be no existing foul discharge at the Site and any flow would, therefore, be additional to existing flows.

4.23 In terms of removing the flows representing the trade effluent consents from the Factory, and then assessing the impact of the Site on the network, whilst Southern Water did not do this when it was designing a solution for the Site, it did carry out some sensitivity analysis to test this. The results of this analysis demonstrated that even if Southern Water had removed the trade effluent flows from the Factory there would still have been detriment to existing customers from connecting the Site and reinforcement of the network would still have been required. We note, however, that this analysis was carried out assuming a peak flow of 7.4 l/s. This was the rate Southern Water told us it derived using Sewers for Adoption 6 but since switching to Sewers for Adoption 7 it revised the peak flow downwards to 5.43 l/s.

4.24 The Consultant's report set out that with the Factory closing down, the flow from the Site would have been roughly comparable with the previous discharges from the Factory and that if the Site was connected into the nearest manhole there would have been no (significant) net increase in flows with either no or very limited effect on surcharge and flooding risk.

4.25 Notwithstanding the above sensitivity analysis, Southern Water considered it would have been more reasonable to assume the Factory would be redeveloped and that flows from the redeveloped site would be compared with the trade effluent consents to determine the net impact of a redevelopment of that site.

Our position

- 4.26 We considered whether it was reasonable for Southern Water not to take into account the closure of the Factory and, in summary, we agreed with the rationale set out in the Consultant's report that Southern Water did not act unreasonably in not taking the closure into account.
- 4.27 We understood from newspaper articles at the time that the site of the Factory was bought by West Sussex County Council with a view to drawing in new business and redeveloping it as a business park. Given this, and the importance that the UK Government attributed to facilitating development in recent years, we considered that it was reasonable for Southern Water to assume a continuation of flows from the Factory site.
- 4.28 We consequently agreed with the Consultant's report that it was unreasonable for Linden Homes to assume it was entitled to the 'headroom' in the drainage network resulting from the Factory's closure, particularly as there were plans to redevelop the site as a new business park.

E. The solution provided

- 4.29 Southern Water considered that a scheme was required to address the detriment caused by the Site and that it implemented the most cost-effective, practical, solution it could have done at the time. Southern Water also considered it did not have to find the perfect solution - it just had to find a reasonable solution at that time.
- 4.30 Linden Homes considered that the existing sewer in Parsonage Road (the road adjacent to the Site) was capable of taking the flows from the Site with little or no reinforcement being required to the existing sewer.

Our position

- 4.31 As set out above, the Consultant's report concluded that the impact of the Site on the network would have been significantly lower than that predicted by Southern Water's modelling. Whilst the Consultant's report could not state by how much Southern Water's model over-predicted the impact, at our request, the Consultant conducted further analysis into whether an alternative solution would have been viable.
- 4.32 The results of this analysis showed that there were likely to be alternative, less costly options that could have served the Site without causing detriment to existing customers. These included a reduced version of what Southern Water implemented

(from the Detailed Design Report) and also a reduced version of one of the alternative solutions (the SL1 Outline Design Study).

- 4.33 With the above in mind, we considered the Consultant's report provided sufficient evidence to suggest that the works that Southern Water carried out were not reasonably necessary to serve the Site. The Consultant's report also concluded that some reinforcement would have been required and we accepted this conclusion.

F. Summary

- 4.34 Having given due consideration to the parties' representations on the Consultant's report and the supplementary information, we did not consider they affected our provisional conclusions. That is, that the scheme Southern Water implemented did not represent a cost-effective solution and a less costly solution could, and should, reasonably have been pursued and implemented instead.

5. Benchmark for reasonable costs

- 5.1 Having considered the parties' representations on the Consultant's report and the supplementary information, we provisionally concluded that a connection to the nearest manhole in Parsonage Road with some downstream network reinforcement, would in all likelihood have been the most cost-effective of a number of workable solutions for the Site. This is essentially the solution set out in the SL1 outline design report but with some revisions. As indicated above, this option was investigated by the Consultant, which considered it capable of accommodating flows from the Site without providing excessive betterment of existing flood risks.
- 5.2 We considered this option took account of the Consultant's finding that Southern Water's model significantly over-predicts flooding. Southern Water's rejection of the SL1 Outline Design study was largely due to constructability issues. However, the proposed reduced version of the SL1 Outline Design study largely avoids these constructability issues by dispensing with the need for working near a railway line.
- 5.3 The table below sets out the full details of this alternative solution.

Table 2: Alternative solution details

Work	Existing pipe / Manhole	Details	Manhole reference
New sewer	N/A	4.1m of new 375mm diameter pipe in Kingfisher Way	TQ17323501 to TQ17323502
Reinforcement works: Pipe upsizing	225m diameter pipe	108m to 300mm diameter pipe	TQ17326005 to TQ17325101 in Blenheim Road
Reinforcement works: Re-benching manholes	N/A	Re-benching manholes in Blenheim Road to accommodate the larger sewer	TQ17326005, TQ17325001 and TQ17325101
Reinforcement works: Upsizing pipe	225mm diameter pipe	102m to 375mm diameter pipe utilising pipe bursting techniques	TQ17324101 to TQ17323101 between 19 Fay Road and Pondtail Road
Reinforcement works: Manhole upsizing	1200mm diameter manholes	Upsizing manholes to 1350mm diameter to accommodate the larger sewer	TQ17324101 to TQ17323101 between 19 Fay Road and Pondtail Road

Work	Existing pipe / Manhole	Details	Manhole reference
Reinforcement works	N/A	Blocking of connection - 225mm diameter pipe	TQ17323101 (Link TQ17323101.1) Running south along Pondtail Road
Reinforcement works: Re-benching manholes	N/A	Re-benching manholes to accommodate the new pipe	TQ17323501 to TQ17323502 in Kingfisher Way

- 5.4 When the Consultant modelled the above solution, it used the same values for the modelling parameters that Southern Water had used. These are set out in Table 3 (see Alternative solution column) alongside those parameters we assumed in our second draft determination. The Consultant considered that the population allowances in the model and the assumptions relating to sewerage flows assigned to the population (for example, 155 l/h/d consumption with 100% of water used returned to the sewer) were reasonable and in line with industry standards at the time. We note that the values for the relevant parameters are also in line with Southern Water's then current in-house technical guidance document, 'CED4015', Issue No. 5, June 2013.
- 5.5 In view of these points, while the parameters assumed in our second draft determination have merit in that they took better account of the type of development, we considered that the values used by Southern Water (and the Consultant) in their modelling runs were not unreasonable and were, therefore, acceptable for this purpose.
- 5.6 While we acknowledged Linden Homes' point that the default values for a number of the parameters have been revised downwards in more recent Southern Water guidance (Developer Services – Foul Sewage Modelling Criteria – January 2018) this was not available at the time of the original modelling and, as such, we considered it would be unreasonable to adopt these values and apply them retrospectively.

Table 3: Parameters for alternative solution

Assumption	Second draft determination	Alternative solution
No. of dwellings	160	160
Average occupancy (persons per dwelling)	2.53	2.8
Per capita consumption (litres per head per day)	133.7	155
Proportion of water used returned to the sewer	100%	100%
Infiltration (as a % of domestic flow component)	27%	40%
Peaking factor (applied to the domestic flow component)	3	3

Assumption	Second draft determination	Alternative solution
Allowance for future surface water misconnections (m ² impermeable area)	440	640
Peak “foul” flow ¹² (l/s)	2.05	2.73

A. Costs of the alternative solution

- 5.7 Under this option, the costs attributable to the Site are for connection to an existing manhole in Parsonage Road and (excepting costs of betterment to be borne by Southern Water, see section below for apportionment of the costs of the works) reinforcement work as identified in Table 2.
- 5.8 Based on cost information provided by Southern Water for the solution actually built, and other sources held in-house, we estimated the cost of this option to be £370,720. A breakdown of that cost is set out in Table 4. The costs shown include:
- Construction costs – excavation, shoring, supply and installation of pipes, beds, surrounds, backfill, reinstatement, soil disposal, traffic management, general items and ‘normal’ risk;
 - Contractor’s on-costs – site management, supervision, programme management, site accommodation and site security patrols; and
 - Southern Water’s costs – design, early contractor involvement, project management, administration and supervision.

Table 4: Alternative solution costs

Work	Cost
Blenheim Road	£158,700
Fay Road to Pondtail Road	£145,170
Upsize manholes TQ17323101 and TQ17324101 to 1350mm diameter	£38,510
Cross-connection in Kingfisher Way and rebenching manholes	£21,800
Minor items (Connection in Parsonage Way and blocking sewer in Pondtail Road)	£6,540
Total	£370,720

¹² Peak “foul” flow is calculated as 3 x dry weather flow (= 3 x no. of dwellings x average occupancy x average per capita consumption + infiltration allowance)

B. Apportionment of the costs of the alternative solution

- 5.9 In previous requisition determinations we have concluded that where additional capacity, beyond the requirements of the site being connected, is provided as a result of using standard pipe sizes, the costs of the works should not be apportioned between the developer and existing customers. In most cases where this applies, the additional capacity is small relative to the size of the capacity being provided for the new site and becomes spare capacity on the network that may or may not be used in the future.
- 5.10 In our second draft determination, we said that in this case the additional capacity provided beyond the Site's requirements, as a result of Southern Water using standard pipe sizes, was substantial and directly benefited existing customers by partially resolving an existing sewer flooding issue. As a result, we departed from the precedent of previous determinations and provisionally concluded that it was reasonable for the costs associated with this betterment to be apportioned between the two groups of customers that directly benefited from the works.
- 5.11 On the basis of the predicted flood risk data, we provisionally determined in our second draft determination that only 18.2% of the total costs of the off-site reinforcement costs were attributable to serving the Site. This was because only this proportion of the flood risk reduction was associated with the additional flooding risk posed by the connection of the Site to the public sewer network. The remaining 81.8% of the off-site reinforcement costs should therefore be attributed to existing customers.
- 5.12 In seeking to benchmark reasonable costs of the requisition, we sought to cost a solution which was fundamentally different from the solution actually implemented by Southern Water. It was clear, however, from the re-modelled flood risk data presented by the Consultant, though indicative, that as well as providing sufficient additional capacity to accommodate flows from the Site, this alternative approach would also produce a significant reduction in the existing flood risk. Accordingly, we remained of the view that an apportionment of the costs of the reinforcement works between the two parties was appropriate.
- 5.13 In our second draft determination, we apportioned 100% of the costs of connecting the Site to Southern Water's network to Linden Homes, and 18% of the off-site reinforcement costs to Linden Homes. We then used the resulting figure in the Discounted Aggregate Deficit (**DAD**) calculation¹³ to determine the refund.
- 5.14 As our alternative solution involved the Site connecting to the nearest manhole in Parsonage Road, which is a largely negligible cost, with some extent of downstream network reinforcement, we did not split the costs into off-site and on-site. Rather, we

¹³ A single lump sum payment made following provision of the sewer and calculated in accordance with section 100A of the Act.

apportioned the total costs of the solution between Linden Homes and existing customers.

- 5.15 Our revised assessment of the appropriate apportionment did, however, differ from our second draft determination in that it was not based on a different set of modelling parameters to that used by Southern Water for estimating the peak flow from the Site. This acknowledges the Consultant’s finding that:

“The derivation of the anticipated flows from the new development are satisfactory, are in accordance with Southern Water’s own internal methodology and in line with standard industry practice at that time”.

- 5.16 As set out in Table 5 below, the Consultant’s model suggests that the scheme, as well as mitigating 53.1m³ of new flood risk posed by the Site, reduces pre-existing flood risk by 197.4m³. We concluded, therefore, that only 21% ($53.1 / (53.1 + 197.4) = 21\%$) of the total costs of the solution should be attributed to Linden Homes with the remaining 79% of these costs being borne by existing customers.

Table 5: Predicted flood risk with the Consultant’s modelled solution

Manhole	A: Existing flood volume	B: Flood volume with the Site	C: Change against existing flood risk (B-A)	D: Flood volume with Site and solution	E: Change against existing flood risk after solution (D-A)
TQ17318801	0	0	0	0	0
TQ17319801	0	0	0	0	0
TQ17325001	34.8	43.3	8.5	0	34.8
TQ17325101	177.1	189.2	12.1	119.3	57.8
TQ17325109	25.0	26.0	1.0	8.2	16.8
TQ17325110	52.9	54.0	1.1	6.2	46.7
TQ17327001	0.2	0.7	0.5	0	0.2
TQ18310701	184.1	210.1	26.0	148.4	35.7
TQ18311701	78.3	82.2	3.9	72.9	5.4
Total	552.4	605.5	53.1	355.0	197.4

C. Assumed revenues for the requisition calculation

- 5.17 In the second draft determination, we determined that of the 160 properties on the Site, 18 of these connected to Southern Water’s network through a new connection made under section 106 of the Act. As such, only flows for the remaining 142 properties (approximately 89% of the Site’s flows) should have been included when providing a solution in response to the requisition request and when calculating the final costs.
- 5.18 To do the above DAD calculation, we deducted the estimated revenue for 18 premises from the 81 premises that were finalised in year 1 of the Site (this equalled 22.8% of the estimated revenue for year 1). From year 2 onwards, we assumed 89% of estimated revenue would be recoverable. We did this in the DAD calculation itself by manually multiplying the reckonable revenue in year 1 by 77.5% and from year 2 onwards by 89%.
- 5.19 As our alternative solution was based on all 160 properties connecting into the public sewer in Parsonage Road, and not just the 18 properties that Southern Water has confirmed were connected under section 106 of the Act, we considered the above complexity could be dispensed with. As such, the estimated revenue for all 160 properties was included in the DAD calculation in line with the profile of the Site’s occupancy.

6. Our revised position

A. Summary

- 6.1 Based on the conclusions from the Consultant's report ([section 3](#)) and the work we did on an alternative solution (see [section 5](#)), on 30 September 2020, we issued a revised position paper to the parties for their comment. In this paper we provisionally determined that the costs Southern Water charged Linden Homes were not reasonable as the works provided by Southern Water were not required in order to serve the Site without causing detriment to existing customers. Having said this, we also considered Southern Water did need to provide some reinforcement to its network in order to serve the Site. With this in mind, as set out above, we developed an alternative (more cost-effective) solution as a benchmark for what Southern Water could, and should reasonably, have provided.
- 6.2 On the basis of the predicted flood risk data, albeit indicative, we determined that only 21% of the total costs of the alternative solution could be attributable to serving the Site (£77,581). This is because the alternative solution, as well as mitigating flood risk posed by the Site, significantly reduces the pre-existing flood risk borne by existing customers. The remaining costs (£292,869) should be attributed to existing customers.
- 6.3 Given the estimated revenue from customers on the Site, we provisionally determined there to be no payment due from Linden Homes for the Site. This resulted in a refund of £534,500 (the security payment Linden Homes paid for the Site), plus interest, due to be paid to Linden Homes.
- 6.4 In October 2020, following a request from Southern Water, we provided both parties with the additional assessment that the Consultant conducted into the viability of the SL1 outline design solution (see [section 3](#)). Southern Water factored this into its representations on our revised position whereas Linden Homes submitted updated representations in response to this information.

B. Linden Homes comments on our revised position

- 6.5 On 21 October 2020, Linden Homes submitted its representations on our revised position. In summary, it supported the outcome we reached in our revised position, whilst providing some comments on the detail. Linden Homes made a number of comments regarding the alternative solution such as:
- It did not consider it possible to solely requisition off-site reinforcement. It references [Information Notice 14/16](#) in support of this.

- It did not consider it appropriate for any solution to be derived from Southern Water’s modelling given the conclusions from the Consultant’s report.
- It considered our approach of developing an alternative solution to be an unsuitable way forward.

- 6.6 Linden Homes commented that it considered the revised position should not have gone any further than determining that the sewer requisition actually implemented at the Site was not necessary. It considered it would have been more appropriate for the Site to connect to Southern Water’s network via section 106 of the Act¹⁴ with any subsequent reinforcement to Southern Water’s network being funded by infrastructure charges¹⁵.
- 6.7 Linden Homes made a number of comments regarding Southern Water’s modelling and questioned the standard industry practices being applied by Southern Water at the Site for determining the foul sewage discharge. It referred to the comments it made on the second draft determination regarding average occupancy, per capita consumption, allowance for infiltration, peaking factor and surface water misconnections. In particular, Linden Homes set out that it wanted Ofwat to provide a definitive position on the specific issue of surface water misconnections in its final determination.
- 6.8 Linden Homes commented that nobody has a right to reserve foul sewage capacity and that any decision to determine if network reinforcement is required should be based on what flows exist in foul sewers when the first connection from a development takes place to when the last property is connected. It commented that there was little to no foul sewage being discharged from the Factory over the period between the first to last connections at the Site.
- 6.9 On 4 November 2020, Linden Homes provided updated representations on the revised position after we provided it with information about the additional assessment the Consultant had conducted. In its response, it commented on Horsham having separate sewer systems – one for surface water and another for foul sewage – and said that if there is surface water in the foul sewer network it was probably due to misconnections which it did not consider a developer issue. It set out that it would be helpful if Ofwat could set out in its final determination why separate foul water sewers need to be modelled for surface water.
- 6.10 Linden Homes also reiterated in its response that it did not consider the alternative solution could be funded by a requisition and it referenced a Supreme Court decision from December 2009¹⁶ in support of its position.

¹⁴ Section 106 of the Act provides for an entitlement for drains or sewers to communicate with public sewers.

¹⁵ Infrastructure charges are payable when a property is connected to the water and/or wastewater network for the first time.

¹⁶ [Barratt Homes vs. Welsh Water, December 2009](#)

C. Our response

- 6.11 In terms of our alternative solution, we accept that the Act does not provide for requisitions to solely include off-site reinforcement. However, this matter was referred to us under section 99 of the Act as a requisition dispute. We, therefore, consider it appropriate to determine it as such and determine whether the actual costs were reasonable. As set out above, the alternative solution we have developed is as a means of providing a benchmark as to what we consider would, and should, have been reasonable costs.
- 6.12 In terms of our alternative solution going too far, and a connection under section 106 of the Act being preferable, we would note that the outcome for Linden Homes would most likely be the same. That is, under such an approach, Linden Homes would have made a connection to Southern Water’s network and have been charged at Southern Water’s published charging rate with no additional reinforcement.
- 6.13 In terms of Southern Water’s modelling, we set out in [section 4](#) of this determination that when the Consultant modelled the alternative solution it used the same values for the modelling parameters that Southern Water had used and it considered those values to be reasonable. With this in mind, we consider the values used by Southern Water (and the Consultant) in their modelling runs to be reasonable and, therefore, acceptable.
- 6.14 In terms of the specific comments on misconnections, we set out in our second draft determination, and above, that we consider Southern Water’s judgement that making allowance for misconnections following urban creep was in line with industry practice and, though Linden Homes has shown that companies had (and still have) differing policies regarding storm contributions to foul sewers, we have not seen any evidence to suggest that Southern Water was an outlier in terms of its design assumptions.
- 6.15 In terms of the comments regarding reserving capacity, whilst we understand the point being made, we set out in [section 3](#) of this determination that we agree with the rationale in the Consultant’s report that Southern Water did not act unreasonably in not taking the closure of the Factory into account.

D. Southern Water comments on our revised position

- 6.16 On 18 November 2020, Southern Water provided its representations on the revised position, raising some concerns with our conclusion.

The Consultant's model

6.17 Southern Water raised a number of concerns with our use of the Consultant's modelling. These included:

- It did not consider the Consultant's modelling to be the best available evidence. It considered there to be no "best available evidence" as in the absence of verification there can be no more confidence that the Consultant's model is any more accurate than its own model. It noted that the Consultant's modelling has no data to demonstrate that the changes it made were evidence-based. As such, it considered the Consultant's revised assumptions have no greater factual basis than the Southern Water model. In particular, it considered the Consultant's removal of the permeable area has the biggest impact on reducing the predicted flood volumes (by about 35%) but, without supporting evidence, it considered there can be no more confidence that this is more accurate than Southern Water's model.
- It considered the Consultant's indicative results may be under-predicting flows in its system. This is because of the Consultant's statement that 'it was not possible to say by how much flood volumes were overstated in the Detailed Design Report without further work which was beyond the scope of the current investigation'.
- It did not consider the information and assumptions used in the Consultant's model to be appropriate and challenged some of the parameters in the Consultant's model. In particular, it challenged the Consultant's model reducing infiltration back to that recorded in the verification of its model and instead considered infiltration should be set to its design standard at the time which was 40% of PG¹⁷.
- It argued the Consultant's model applies standards which differ from actual design standards it uses and those used at the material time. As such, it considered the Consultant's model to be less appropriate than its model which applies the design standards used in practice.
- It considered the changes the Consultant made to the model locally to the Novartis site will have a significant impact downstream of FM24 and the degree of verification achieved in the model as a whole. It did not consider this impact had been assessed by the Consultant and, as such, the Consultant's model could no longer be considered to be calibrated and, therefore, could not be relied upon for design purposes.
- Unlike its own model, the Consultant's model has not undergone third party review and assessment.

6.18 Building on the above concerns, Southern Water said that it had not seen any clear evidence that its assumptions were so unreasonable and the baseline model so unsuitable for undertaking the sewer capacity assessment that they should be set aside. In the circumstances, Southern Water proposed it would be more reasonable to assess the scale of the solution required based on assumed parameters that produced

¹⁷ P stands for catchment population (number) and G stands for per capita domestic flow (l/hd/d).

flood volumes mid-way between the 53.1m³ and 213m³ detriment of its modelling and the Consultant's proposed approach.

- 6.19 Notwithstanding the above, Southern Water considered that even if the Consultant's report is right, or partially right, it was still entirely reasonable for Southern Water to select the scheme it did at the time.

Alternative solution

- 6.20 Southern Water raised a concern regarding the constructability of our alternative solution (see Table 2). Specifically, it highlighted a key environmental risk at Kingfisher Way and that a geotechnical investigation had been recommended to check the feasibility of using pipe bursting to upsize a section of sewer from 225 to 375mm. Southern Water also noted that our alternative solution entails work across land with multiple owners, work extremely close to existing buildings and work in heavily overgrown areas.

Process

- 6.21 Southern Water raised concerns about how the factors and judgements that led to Linden Homes' initial request are now being set aside five years later and a different solution is being retrospectively applied. Southern Water raised concerns for this case and future applications under section 99 (6) of the Act. Southern Water also raised concerns that a determination along the lines being suggested would potentially increase the likelihood of other developments raising similar concerns to Linden Homes.
- 6.22 Southern Water also raised concerns that our process has led to three draft determinations each with different conclusions. It considered there has been no transparency as to the criteria used to select the point at which a determination is final and binding.

E. Our response

The Consultant's model

- 6.23 As set out above, the Consultant's model was based on Southern Water's model and, in being so, it relied on the same evidence as Southern Water when building the original model. What the Consultant did was to amend certain assumptions and parameters. It did not collect any additional data. We did not ask the Consultant to undertake any

additional survey work (see paragraph 3.19) as this would have involved a disproportionate expense.

- 6.24 Whilst the Consultant's model did not collect any additional data, we consider the revised assumptions that the Consultant used to be well reasoned and preferable to some of Southern Water's assumptions. Taking the example of the removal of the permeable area, we consider the surface water sewer running across the Novartis site would collect surface water running off this area, rather than the foul sewers. In addition, whilst Southern Water referenced its concerns regarding infiltration, it did not provide any further evidence that any other assumptions about parameters or design standards are of concern.
- 6.25 In addition, as set out above, we consider the Consultant's report to be thorough, and well-reasoned, and we accept its conclusions. We do not consider there to be any merit in seeking further independent verification regarding the Consultant's model.
- 6.26 We do not agree with Southern Water's comments that its modelling results for the Site are just as reliable as the results from the Consultant's model. We consider we have set out very clearly in [section 3](#) why we consider the Consultant's model to provide sufficient evidence. We do not see any merit in adopting an approach that assesses the scale of an alternative solution based on a mid-way between the 53.1m³ and 213m³ detriment of the two approaches. We do not consider Southern Water has provided any clear reasoning for why we should adopt that approach. Whilst the Consultant's analysis is presented as indicative, we consider there to be no reason to suppose the likelihood of the real detriment being greater than 53.1m³ is any greater than it being less than this figure.
- 6.27 Following Southern Water's comment on infiltration, the Consultant updated its model to reflect Southern Water's 40% PG design standard for infiltration and, while we note that the flood volumes increased, the increase is not sufficiently large enough to result in a requirement to upsize the length of sewer running parallel with, and adjacent to, the railway line.

Alternative solution

- 6.28 Our alternative solution is a benchmark from which to establish reasonable costs. We have considered Southern Water's concerns about the constructability of our alternative solution. We consider the stretch of pipework running parallel with, and in close proximity to, the railway line to be the main concern, particularly as it appears to be routed through an area of dense undergrowth including mature trees. The Consultant confirmed, however, that our alternative solution does not involve any reinforcement to this length of pipework. The remaining constructability issues

identified by Southern Water, such as working in multiple back gardens and close to the boundary of a local nature reserve, are, in our view, not insurmountable.

Process

- 6.29 In terms of our process, and our determinations, we consider we have been clear in our documents how we have arrived at our positions, why and what the next steps were. They have all been based on the evidence we had at the time and we have set out clearly why, for example, we commissioned an independent expert to review Southern Water's model.
- 6.30 In addition, we do not agree with Southern Water's concerns that the conclusions from this case will increase the likelihood of similar cases being referred to us. The flaws in Southern Water's model that the Consultant has identified were largely due to site-specific factors as opposed to its standard design parameters which, as set out above, the Consultant considers to be reasonable.

F. Our decision

- 6.31 Our role has been to determine whether the costs Southern Water charged Linden Homes were reasonable and our final determination is that they were not. As set out above, to enable us to reach this decision we commissioned the Consultant to review Southern Water's modelling of the relevant sewer network. The conclusion from that report was that the reinforcement works Southern Water actually provided were not reasonably necessary and the works could have been scaled down whilst still allowing the Site to connect to its network and providing some improvements for existing customers. The report also concluded that the work undertaken by Southern Water to build and verify its model was not in accordance with industry standards at the time and was flawed.
- 6.32 Both parties have had multiple opportunities to comment on the above conclusions, and provide challenge, and we have provided our position on the challenge we received above. In summary, our final position is that:
- We consider the Consultant's report to be thorough, and well-reasoned, and we accept its conclusions.
 - We consider the values used by Southern Water (and the Consultant) in their modelling runs to be reasonable and, therefore, acceptable.
 - We do not consider Southern Water has provided adequate evidence rebutting the Consultant's conclusion that the model was flawed – in particular, in relation to overstating flooding risk.

- We consider it was reasonable for Southern Water not to take into account the closure of the Factory and it was unreasonable for Linden Homes to assume it was entitled to the headroom resulting from the Factory's closure.

6.33 With the above in mind, we also conclude that some reinforcement works would have been required to serve the Site. As set out above, this is because of the Consultant's assessment that, despite the flaws in the model, the Site would still have created an increased flow in the public foul sewer system but this increase would be significantly less than Southern Water's estimate.

6.34 To enable us to benchmark what Southern Water could, and should reasonably, have been expected to provide, in order to establish reasonable requisition costs, we have investigated an alternative (more cost-effective) solution and this forms the basis of our determination of the reasonable costs used to calculate the final requisition charge. As set out above, the Consultant's report demonstrated that the alternative solution we have used, which is a revised version of a solution previously considered by Southern Water, would be capable of accommodating flows from the Site without providing excessive betterment of existing flood risks.

6.35 We set out above the full details of our alternative solution, including the cost of the solution and the apportionment of those costs between Linden Homes and existing customers. Both parties have had the opportunity to comment on our alternative solution and, having reflected on those comments, we confirm our view that the alternative solution provides a reasonable benchmark for what Southern Water could, and should reasonably, have provided.

6.36 Taking the above into account, in light of the legal framework of the Act, the Consultant's report and all the evidence we have gathered from the parties to the dispute, our final determination is that:

- The costs Southern Water used to calculate the requisition charge it charged Linden Homes for the Site were not reasonable. This is because the works Southern Water provided were not required to serve the Site without causing detriment to existing customers.
- Southern Water did, however, need to provide some reinforcement to its network in order to serve the Site and, for the purpose of establishing reasonable costs, we have developed an alternative (more cost-effective) solution as a benchmark for what Southern Water could, and should reasonably, have been expected to provide.
- On the basis of the predicted flood risk data, albeit indicative, we determine that only 21% of the total costs of the alternative solution can be attributable to serving the Site (£77,851). This is because the alternative solution, as well as mitigating flood risk posed by the Site, significantly reduces the pre-existing flood risk borne by existing customers. The remaining costs (£292,869) should be attributed to existing customers.

- Given the estimated revenue from customers on the Site, and the methodology for calculating requisition charges in place at the time of the requisition, there is no requisition charge due from Linden Homes for the Site. Therefore, a refund of £534,500 (the security payment Linden Homes paid for the Site), plus interest, is due to be paid to Linden Homes within 20 working days of this determination being published.

6.37 Southern Water should apply interest rate(s) in accordance with Ofwat's Information Notice on interest rates.

A1 Proposed solutions

Solution 1 – The Foul Water Impact Study (June 2013)

- A1.1 This study was commissioned by Linden Homes for both the Site and an additional parcel of land located opposite the Site. It concluded that there was inadequate capacity within the existing network to accommodate both parcels of land and that the increased flows to the network may put existing premises and land at greater risk of flooding.
- A1.2 It concluded that if connecting into a manhole on Parsonage Road, off-site reinforcement works would be required to provide sufficient capacity to serve both parcels of land. Alternatively, it stated that the nearest connection point that did have capacity was located 2,300 metres away from the Site with a discharge into a manhole in Pondtail Road.

Solution 2 – SL1 Outline Design Study (February 2014)

- A1.3 By January 2014, the original plans for the Site had changed with the additional parcel of land no longer scheduled for development. As a result, Linden Homes proposed developing 150 residential premises on the Site.
- A1.4 This solution was based on the Site discharging into a manhole located in the carriageway of Parsonage Road. The study concluded that a large-scale solution would be required to deal with the detriment within the network caused by the additional flows from the Site but there were a number of constructability concerns with this solution. This included:
- undertaking work near a railway;
 - working across land with multiple owners;
 - working extremely close to existing buildings; and
 - working in heavily overgrown areas.

Solution 3 – SL2 Additional Optioneering Study (November 2014)

- A1.5 This solution explored whether it could solve the detriment caused by the Site's additional flows and reduce the constructability issues arising from Solution 2. At this time, Linden Homes also notified Southern Water that it had increased the number of premises it planned to build on the Site from 150 to 160.

- A1.6 The solution consisted of an alternative connection from the northern edge of the Site and included reinforcement works in Pondtail Road to upsize an existing sewer from 150mm to 225mm diameter. The study found that this revised solution could only serve Phase 1 of the Site (18 residential premises) if a 12.5m cross-connection were provided.
- A1.7 Southern Water also undertook a site visit where it identified that the proposed connection point from the northern edge of the Site would be unfeasible due to the presence of an area of dense woodland.

Solution 4 – The Detailed Design Report (February 2015)

- A1.8 The preferred solution connects into the existing network at a manhole in Fern Way and it connects via the construction of a new sewer from outside the Site on Parsonage Road. This runs parallel to the existing foul water sewer in Parsonage Road which then connects into the sewer in Blenheim Road. The revised solution includes reinforcement works in Pondtail Road. The works are on the periphery of the network for the catchment area.
- A1.9 Southern Water considered that providing a new sewer parallel to the existing sewer in Parsonage Road, was preferable to upsizing the existing sewer in Parsonage Road because:
- upsizing would have required works beneath an active railway leading to major works and additional consents;
 - the existing sewer is quite deep, increasing construction complexity within a fairly constrained site; and
 - the existing sewer also carries wastewater from a neighbouring chemical factory, so minimal interaction with the existing main would be preferred due to the difficulties relating to disposal of the chemicals whilst the works were undertaken.

A2 Occupancy profile

Table 6: Occupancy profile used to estimate charges expected to be payable

Year	1 Bed Flat	2 Bed Flat	2 Bed House	3 Bed House	4 Bed House	Cumulative occupancy used in Southern Water's formal offer calculation
1	16	27	-	15	23	81
2	15	23	2	17	22	160
3	-	-	-	-	-	160
4	-	-	-	-	-	160
5	-	-	-	-	-	160
6	-	-	-	-	-	160
7	-	-	-	-	-	160
8	-	-	-	-	-	160
9	-	-	-	-	-	160
10	-	-	-	-	-	160
11	-	-	-	-	-	160
12	-	-	-	-	-	160

A3 Average bill assumptions

Table 7: Average bill assumptions

Year	1 Bed (£)	2 Bed (£)	3 Bed (£)	4 Bed (£)	Total estimated income (£)
1	1,581	3,355	2,237	3,481	10,653
2	4,742	9,585	6,710	9,862	30,899
3	6,125	12,460	8,946	13,053	40,584
4	6,125	12,460	8,946	13,053	40,584
5	6,125	12,460	8,946	13,053	40,584
6	6,125	12,460	8,946	13,053	40,584
7	6,125	12,460	8,946	13,053	40,584
8	6,125	12,460	8,946	13,053	40,584
9	6,125	12,460	8,946	13,053	40,584
10	6,125	12,460	8,946	13,053	40,584
11	6,125	12,460	8,946	13,053	40,584
12	6,125	12,460	8,946	13,053	40,584
				Total	447,392

The figures below are the total figures in Table 7 plus inflation, the different household sizes and Southern Water's assumptions on when income is received (half year). For the purposes of the DAD calculation we have used Southern Water's reckonable revenue and, unlike our revised draft determination, we have not deducted the proportion attributed to the 18 premises that connected to the existing network through the new connection under section 106 of the Act.

Table 8: Southern Water's reckonable revenue

Year	Reckonable revenue (£)
1	£10,652.64
2	£32,103.57
3	£44,739.27
4	£46,797.27
5	£47,920.41
6	£49,722.22
7	£51,591.77
8	£53,531.62

Linden Homes vs. Southern Water – Final determination

Year	Reckonable revenue (£)
9	£55,544.41
10	£57,632.88
11	£59,799.88
12	£62,048.35
Total	£572,084.29

A4 Discounted Aggregate Deficit calculation

Charges and payments (new)

Notes:

A developer can choose to pay for a main either on an annual basis (relevant deficit) or as a lump sum (statutory commuted sum).
When mains are self laid the water company will have to pay the developer an asset payment upon adoption of the main.

Inputs

Total scheme cost (£): Combined costs of all applicable works

Basic average income per property (£): Average metered charge per property (£) in year 1 (before inflation and K are taken into account)

Borrowing interest rate (%): This should be provided by the company. It is the rate as of year 1 and is linked to the ten-year gilt yield plus a premium.

Long term annual inflation (%): Estimate for long term inflation

Cumulative occupancy - The rate of occupation for each year

Company K factor (%) - Applicable K factors through time

		Source
Total scheme cost (£)	£77,851.20	We have determined that SRN can recover 21% of the total final costs (0.21*£370,720) through the requisition charge
Basic average income per property (£)		NA - we use SRN's revenue estimates
Borrowing interest rate (%)	4.00%	Novarits response to Ofwat, p3 (Southern Water calculation sheet)
Long term annual inflation (%)		NA - we use SRN's revenue estimates

Year	Cumulative occupancy	Company K factor (%)	Source
Year 1			Cumulative occupancy: Not applied in this case as SRN distinguish between different property types, instead have used data on revenues provided by SRN (see below)
Year 2			
Year 3			Company K factor: Not applied, we use SRN's revenue estimates
Year 4			
Year 5			
Year 6			
Year 7			
Year 8			
Year 9			
Year 10			
Year 11			
Year 12			

Intermediate calculations

Annuity factor: Sum of annual annuity factor calculations

Annual repayment (£): Total scheme cost (£) / Annuity factor

Discount rate (%): Equal to the borrowing interest rate (so that the calculations of the relevant deficit, statutory commuted sum and asset payment are made consistently)

K factor plus long term inflation: K factor in year t (%) + Long term inflation (%)

Annuity factor calculation: $1 / (1 + \text{Borrowing interest rate (\%)})^n$ * (Number of year)

Calculation of the annual discount factor: $1 / (1 + \text{Discount rate (\%)})^n$ * (Number of year)

Annuity factor	9.39
Annual repayment (£)	£8,295.21
Discount rate (%)	4.00%

Year	K factor plus long term inflation (%)	Annuity factor calculation	Annual discount factor calculation
Year 1	0.00%	0.96	0.96
Year 2	0.00%	0.92	0.92
Year 3	0.00%	0.89	0.89
Year 4	0.00%	0.85	0.85
Year 5	0.00%	0.82	0.82
Year 6	0.00%	0.79	0.79
Year 7	0.00%	0.76	0.76
Year 8	0.00%	0.73	0.73
Year 9	0.00%	0.70	0.70
Year 10	0.00%	0.68	0.68
Year 11	0.00%	0.65	0.65
Year 12	0.00%	0.62	0.62

Linden Homes vs. Southern Water – Final determination

Main calculations

Cumulative occupancy: NA

Basic revenue (£): NA

K factor plus long term inflation index (%): NA

Reckonable revenue (£): Novarits response to Ofwat, p3 (Southern Water calculation sheet), note these incorporate inflation, the different household sizes and SRN's assumptions on when income is received (half year)

Discount factor: Linked from the intermediate calculations

Discounted value of reckonable revenue (£): Reckonable revenue (£) * Discount factor

Annual repayments of the loan (£): Linked from intermediate calculations

Capital payable per year (£): Annual repayments of the loan (£) - Interest on the loan payable per year (£)

Interest on the loan payable per year (£): Year 1: Borrowing interest rate (%) * Total scheme cost (£), Year 2 onwards = Borrowing interest rate (%) * Year end principal outstanding (t-1) (£)

Year end principal outstanding (£): Year 1 = Total scheme cost (£) - Capital payable per year (£), Year 2 onwards = Year end principal outstanding (t-1) (£) - Capital payable per year (£)

Projected relevant deficit (£): Annual repayments of the loan (£) - Reckonable income (£) (will be zero if reckonable income > annual repayments of the loan)

Statutory Commuted sum (£): Project relevant deficit (£) * Discount factor

Income allowance (£): Lesser of reckonable income (£) or annual repayment of loan (£)

Asset payment (£): Income allowance (£) * Discount factor

Year	Cumulative occupancy	Basic revenue (£)	K factor plus long term inflation index (%)	Reckonable revenue (£)	Discount factor	Discounted value of reckonable revenue (£)	Annual repayments of the loan (£)	Capital payable per year (£)	Interest on the loan payable per year (£)	Year end principal outstanding (£)	Projected relevant deficit (£)	Statutory Commuted sum (£)	Income allowance (£)	Asset payment (£)
Year 1				£10,652.64	0.96	£10,242.92	£8,295.21	£5,181.17	£3,114.05	£72,670.03	-	-	£8,295.21	£7,976.17
Year 2				£32,103.57	0.92	£29,681.56	£8,295.21	£5,388.41	£2,906.80	£67,281.62	-	-	£8,295.21	£7,669.39
Year 3				£44,739.27	0.89	£39,773.05	£8,295.21	£5,603.95	£2,691.26	£61,677.67	-	-	£8,295.21	£7,374.42
Year 4				£46,797.27	0.85	£40,002.50	£8,295.21	£5,828.11	£2,467.11	£55,849.56	-	-	£8,295.21	£7,090.78
Year 5				£47,920.41	0.82	£39,387.08	£8,295.21	£6,061.23	£2,233.98	£49,788.33	-	-	£8,295.21	£6,818.06
Year 6				£49,722.22	0.79	£39,296.19	£8,295.21	£6,303.68	£1,991.53	£43,484.65	-	-	£8,295.21	£6,555.83
Year 7				£51,591.77	0.76	£39,205.51	£8,295.21	£6,555.83	£1,739.39	£36,928.82	-	-	£8,295.21	£6,303.68
Year 8				£53,531.62	0.73	£39,115.03	£8,295.21	£6,818.06	£1,477.15	£30,110.76	-	-	£8,295.21	£6,061.23
Year 9				£55,544.41	0.70	£39,024.77	£8,295.21	£7,090.78	£1,204.43	£23,019.98	-	-	£8,295.21	£5,828.11
Year 10				£57,632.88	0.68	£38,934.71	£8,295.21	£7,374.42	£920.80	£15,645.56	-	-	£8,295.21	£5,603.95
Year 11				£59,799.88	0.65	£38,844.86	£8,295.21	£7,669.39	£625.82	£7,976.17	-	-	£8,295.21	£5,388.41
Year 12				£62,048.35	0.62	£38,755.22	£8,295.21	£7,976.17	£319.05	-	-	-	£8,295.21	£5,181.17
Total				£572,084.29		£432,263.39	£99,542.57	£77,851.20	£21,691.37	£464,433.15	-	-	£99,542.57	£77,851.20

Key outputs

Relevant deficit (£): The projected relevant deficit is the difference between the annual repayments of the loan and the revenue. The relevant deficit is capped at 0 when the annual revenue equals or exceeds the annual repayment of the loan.
Statutory Commuted sum (£): An amount equal to the sum of the estimated relevant deficits for each of the 12 years following the provision of the main, in each case discounted to a net present value.
Asset payment (£): The asset payment is calculated as the sum of the estimated offsets (income allowance) for each of the 12 years following the adoption of the main, in each case discounted to a net present value.

Projected relevant deficit (£): Year 1	-
Projected relevant deficit (£): Year 2	-
Projected relevant deficit (£): Year 3	-
Projected relevant deficit (£): Year 4	-
Projected relevant deficit (£): Year 5	-
Projected relevant deficit (£): Year 6	-
Projected relevant deficit (£): Year 7	-
Projected relevant deficit (£): Year 8	-
Projected relevant deficit (£): Year 9	-
Projected relevant deficit (£): Year 10	-
Projected relevant deficit (£): Year 11	-
Projected relevant deficit (£): Year 12	-
Statutory Commuted sum (£)	-
Asset payment (£)	£77,851.20

**Ofwat (The Water Services Regulation Authority)
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