

Neutral Citation Number: [2008] EWHC 3024 (TCC)

Case No: HT-05-264

IN THE HIGH COURT OF JUSTICE
QUEENS BENCH DIVISION
TECHNOLOGY AND CONSTRUCTION COURT

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 10th December 2008

Before :

MR JUSTICE COULSON

Between :

J MURPHY & SONS LIMITED

- and -

JOHNSTON PRECAST LIMITED

(formerly Johnston Pipes Limited)

Mr Christopher Lewis and Ms Jennifer Jones(instructed by **Fenwick Elliott LLP**) for the
Claimant

Ms Nerys Jefford QC (instructed by **Mills and Reeve LLP**) for the Defendant

Hearing dates: 27, 28, 29, 30 October, 3 , 4, 5, 10 and 11 November 2008

Judgment

The Honourable Mr Justice Coulson:

A. INTRODUCTION

1.

Pursuant to a main contract made on or around 21st September 1998, Thames Water Utilities Limited (“Thames Water”) engaged the claimant, J Murphy and Sons Limited (“Murphy”) to design and carry out major water main refurbishment works, including the replacement of seven subterranean mains water pipes, in the vicinity of Holland Park Avenue in West London. This came to be called the Holland Park Project. One element of those works involved the design and construction of a tunnel between Shaft 3 (at the Shepherd’s Bush roundabout) and Shaft 1 (located about 80 metres south of that, off Holland Road). Within that new tunnel was one length of 600mm glass reinforced plastic pipe (GRP), laid at the bottom of the tunnel, and another length of 900mm GRP pipe above it. Both of these GRP pipes were supplied to Murphy by the defendant, Johnston Precast Limited (“JP”). The tunnel was subsequently backfilled by Murphy with foam concrete supplied by Pro-Pump Limited (“Pro-Pump”).

2.

On the morning of 13th November 2004, the 900mm GRP pipe in the tunnel between Shaft 3 and Shaft 1 burst open part way along its length, at a location beneath or immediately adjacent to the roundabout. There was considerable flooding as a result. When the burst was investigated, a 21 metre void in the foam concrete was discovered, affecting the top third of the pipe. The location of the burst was almost exactly halfway along this void. Subsequently, it was decided to take up the entirety of the 900mm GRP pipe between Shaft 1 and Shaft 3. Some parts of the 900mm pipe in the location of the burst were tested the following year at the University of Surrey.

3.

On 16th August 2005, Thames Water commenced arbitration proceedings against Murphy claiming damages arising out of the burst water main. A large number of pleadings were produced in that arbitration, and the experts produced a joint statement. On 28th September 2007, the arbitration proceedings were settled when Murphy agreed to pay Thames Water the sum of £3.9m in settlement of their claim. In addition, Murphy incurred costs of £270,000 in connection with that arbitration.

4.

Murphy sought to recover these sums in separate TCC actions issued against both Pro-Pump and JP. I am told that the Pro-Pump proceedings were discontinued by consent earlier this year, although I have no documents (such as a Tomlin Order) in which any such settlement has been recorded. Reference was made at the trial to the pleadings in the Pro-Pump action. This Judgment, therefore, deals solely with Murphy's outstanding claim against JP.

5.

There are a number of particular disputes between Murphy and JP arising out of and in connection with the burst water main. The principal issues include:

- a) Whether or not there was a contract between Murphy and JP;
- b) If there was a contract, the terms of that contract, and whether (on one analysis of the formation of the contract) certain terms should be excluded by operation of the [Unfair Contract Terms Act 1977](#) (“UCTA”);
- c) Whether JP owed any duty of care to Murphy (either in the absence of a contract or operating alongside any contract) and, if so, the nature, scope and extent of such a duty;
- d) Whether JP was in breach of contract and/or in breach of any duty of care;
- e) Whether any such breach by JP was the cause or alternatively an effective cause of the burst water main.

6.

There is no dispute about quantum. JP accept that if (which they deny) they were in breach of contract and/or duty, and if (which they also deny) any such breach was the cause or an effective cause of the burst water main, then the sums noted in paragraph 3 above, which total £4.17million, represent a reasonable quantification of their liability in accordance with the principle set out in **Biggin v Permanite Limited** [1951] 2 KB 314, CA.

7.

I propose to structure this Judgment in the following way. At **Section B**, I set out some of the background to the Holland Park Project. At **Section C**, I deal with the contract/no-contract issue by setting out the relevant facts, the applicable principles and my analysis of the evidence. At **Sections**

D and E, I deal with the relevant terms of the contract (including my analysis of the disputes arising under [UCTA](#)) and the issues relating to the existence, nature and scope of any duty of care owed by JP to Murphy. Thereafter, at **Section F**, I set out briefly the post-contract chronology, including the manufacture and delivery of the GRP pipe, the installation of the pipe, the backfilling of the tunnel, and the subsequent events following the burst in November 2004.

8.

I then address, at **Section G**, the four possible causes of the burst water main and set out my conclusions as to the effective cause(s) of the burst in both factual and legal terms. Whilst it is conventional to deal with breach first, followed by causation, it seems to me that the dispute as to the effective cause(s) of the burst is the critical issue between the parties, and it would be counter-productive not to address it at this stage of the Judgment. I then go on in **Section H** to consider the allegations of breach of contract and/or duty against JP. It will be seen that the alleged breaches can be properly analysed by reference to the four possible causes of the burst. In **Section I**, I set out my views in relation to the contribution issue. There is a short summary of my conclusions at **Section J**.

9.

I should say at the outset that this has been an old-fashioned TCC trial in the very best sense of the word: clearly-defined issues; courteous but effective cross examination; succinct oral and written submissions in both opening and closing; and, perhaps best of all, no dispute on quantum. This case is a good example of the sort of typically efficient TCC litigation to which Jackson J (as he then was) referred recently in **Multiplex Constructions v Cleveland Bridge [2008] EWHC 2220 (TCC)**.⁴ I am very grateful, not only to counsel, but to all those involved in the preparation and presentation of this case.

B. BACKGROUND

B1. JP's GRP Pipe

10.

Although they are now no longer in existence, in the late 1990's JP had become well-known manufacturers and suppliers of GRP pipe. A spreadsheet running to 37 pages was prepared showing the large volume of GRP pipe manufactured and supplied by JP to various utility companies, principally in the UK. Evidence about this history of JP's manufacture and supply of GRP pipe was given by Mr Clarke, who was JP's engineering manager, and Mr Preece, JP's production manager.

11.

From the spreadsheet and the oral evidence, the following points about JP's GRP pipe should be noted:

- a) The GRP pipe was used for two distinct purposes: for potable water, and for sewage.
- b) The GRP pipe was made with a standard resin. It was only if the pipe was going to be used in what the spreadsheet described as an "aggressive environment" that JP utilised a different kind of resin, called vinyl ester ("VE") resin.
- c) The GRP pipe was commonly used in conjunction with concrete and other cementitious material. This could take many forms and included, in particular, the use of concrete thrust blocks and cementitious grout.

d) The evidence was that no problems had been reported with any of these long pipe runs supplied to the utility companies noted in the spreadsheet.

12.

Mr Clarke identified three contracts within his knowledge where the GRP Pipe supplied by JP was completely surrounded in concrete: Sewardstone; the Lea Valley improvement scheme for Thames Water; and a project in Headingley in Leeds, for Yorkshire Water.

B2. Murphy

13.

Murphy are and were well-known civil engineering contractors. Murphy had both a tunnelling and a pipeline division within their organisation, which made them an ideal choice as the main contractor on this project. Mr Don Robertson was the Project Manager on the Holland Park Project, and answerable to both divisions. Murphy also engaged Maunsell as their design consultants.

14.

The principal point of contact between Murphy and JP was Mr Robertson. He gave extensive oral evidence and I regarded him as an entirely fair and honest witness, doing his best to recollect events – many of which would have seemed entirely mundane at the time - that happened almost 10 years ago. He said that he had “very little” experience of GRP pipes, and that had occurred many years prior to this contract. On the one contract when he had come across GRP pipes before, he had noted a tendency on their part to squash under their own weight, so he had a particular concern about how any GRP pipe would be handled.

B3. The Main Contract and Murphy's Tender

15.

In 1998, Thames Water sought tenders for the design and construction of major water main works in the Shepherds Bush/Holland Park area. This work, which came to be called the Holland Park Project, involved the design and construction of three shafts and a number of tunnels connecting the shafts. Shaft 1 was situated south of the Shepherds Bush roundabout, just off Holland Road. A lengthy tunnel was to be constructed between Shaft 1 and Shaft 2, which was over a mile to the east, close to Campden Hill Reservoir. Originally, it was intended that, in addition to that long tunnel, two shorter lengths of tunnel would be constructed between Shaft 1 and Shaft 3, which was located at the Shepherds Bush roundabout.

16.

On the 15th May 1998, Murphy were invited to tender for the Holland Park Project. Amongst the tender information supplied by Thames Water were general arrangement drawings of Shafts 1 and 3. Those general drawings indicated that the annulus of the two tunnels leading off the shafts were “to be filled with foamed concrete following pressure testing”. The drawings also showed the use of GRP pipe. There was nothing to indicate why Thames Water wanted these two tunnels to be filled with foam concrete.

17.

Murphy produced a method statement indicating how they would carry out the work. This reflected the requirements shown in the general arrangement drawings. At paragraph 4.2.4 the method statement said that “once the pipe lines have been tested and found to be satisfactory, the tunnel drives will be filled with foamed concrete”.

18.

Murphy's tender was compiled without any involvement by JP. The Murphy tender was dated the 17th July 1998. This was the tender which was ultimately accepted by Thames Water.

19.

Although Murphy had no dealings with JP in relation to their tender, one of the other tenderers did seek assistance from JP in putting together their prices. That tenderer was McNicholas. There were a number of documents in the bundle which demonstrated that, in response to a request from McNicholas, JP had put together a price of £138 per metre for the 900 mm GRP pipe. These same documents indicated that JP were told by McNicholas that the annulus of the tunnel was "to be grouted".

B4. Tender Queries And Design Development

20.

Following receipt of the Murphy tender, on 27th July 1998 Thames Water sent Murphy a list of questions. Questions 32-34 were concerned with the method of installation of the GRP pipes and specifically asked whether the design of the pipe support allowed for restraint against flotation of the pipes in circumstances where the pipes were empty and the tunnel was full to the crown with water. This question indicated that, at least at this stage, Thames Water had not decided that the tunnels were to be filled with foam concrete. Murphy responded by referring to their method statement and reassuring Thames Water that the pipe support design allowed for restraining worst case forces arising from buoyancy when the pipes were empty and submerged in water.

21.

In early August 1998 Murphy attended a post-tender interview. A further list of questions was provided after that interview. At this stage it appears, for the first time, that Thames Water indicated that one single tunnel between Shafts 1 and 3, containing both the 600mm diameter and the 900mm diameter pipe, might be preferable. Question 1(d) asked Murphy whether they would be able to use a single larger diameter pipe jack ("with the two new water mains grouted up inside") in lieu of the two 1500mm diameter pipe jacks identified in the tender documents. Murphy's response to this was prepared by Mr Jacques, (who was the divisional manager of Murphy's tunnelling division). Mr Robertson said in his evidence that he was not involved in the drafting of the answer. Mr Jacques said that the costs savings of one tunnel rather than two were "very marginal" and that a detailed redesign would be necessary if Thames Water wished to pursue that option.

22.

In fact, this was the option which Thames Water wished to pursue and eventually, they decided that there would be a single tunnel between Shafts 1 and 3, in which both pipes would be installed. Mr Robertson was not involved in any detailed discussions concerning that change. As for the reference in the Thames Water question to "grouting up the two pipes inside" he thought that "a perfectly ordinary thing" to do, and he confirmed that it did not ring any alarm bells for him.

B5. The Main Contract

23.

On 21st September 1998, Thames Water awarded the Main Contract for the Holland Park Project to Murphy. The contract sum was £7,655,978.

24.

Main Contract Meeting number 1 was held on 6th October 1998. By reference to the minutes of that meeting, Mr Robertson explained how the contract was set up. He was the Project Manager answerable to Mr Jacques. For Thames Water, the project construction manager was Mr Keith Mansell, whilst Mr Sefton was the senior project construction engineer. Mr Howells was Mr Sefton's deputy. Once the project was underway, the staff at Murphy and Thames Water who were responsible for the day-to-day running of the contract were based in the same building at the Campden Hill reservoir. In this way, they had easy access to each other's offices, and often carried documents by hand to the intended recipient.

25.

Two particular aspects of the Main Contract are relevant to the claim now pursued against JP:

a) It was a provision of the Main Contract, which was expressly referred to at paragraph 1.31 of the minutes of the first contract meeting, that Murphy had to obtain the approval of Thames Water for the procurement of any sub-contract package in excess of £5,000. In order for such approval to be given, Murphy had to obtain a minimum of three quotations which accorded with the contract conditions.

b) There was also a provision (of what was called "the particular general specification") of the Main Contract, at item PG 60.0 that, in respect of materials in contact with potable water, Murphy had to complete Thames Water's standard 'materials approval' form and ensure that all materials and fittings were approved. That was also referred to at paragraph 1.34 of the minutes of the first Main Contract meeting.

26.

On the 9th November 1998 there was the first Main Contract design review meeting. This took place at the shared offices at the Campden Hill pumping station. The minutes indicated that the design of the single tunnel between Shafts 3 and 1 was in the process of being finalised.

B6. JP's Early Involvement

27.

The minutes of the Main Contract design review meeting on 9th November 1998 also reveal that JP had been involved for many months in direct discussions with Thames Water concerning the Holland Park Project. Indeed, the evidence demonstrated that this contact dated back to February 1998: there was a fax of 4th February 1998 from JP to Thames Water related to the Holland Park Project, dealing with the spanning applications of their GRP pipes. Mr Clarke told me that such direct contact was not unusual. Between 1973 and 1998, it appears that Thames Water made up about 20% of JP's UK water contracting business.

28.

By the date of the meeting on 9th November 1998, as paragraph 3.8 of the minutes makes clear, Thames Water were issuing to JP details of the tunnel alignment, to allow them to check the pipe bending radius. Mr Robertson confirmed that, even by this stage, subject to the procurement procedure, he understood that Thames Water hoped that JP would be supplying the pipe for the Holland Park Project.

29.

The direct contact between Thames Water and JP continued after the meeting on 9th November. At the next design review meeting, on 19th November, it was recorded that Thames Water's discussion with JP was "ongoing" and at contract design meeting number 3, on 1st December 1998, there was a note

that Thames Water had had a meeting with JP. There is no evidence as to what was discussed at that meeting.

B7. Further Design Development

30.

Contract design review meeting number 4 took place on 5th January 1999. It appears from the minutes that Thames Water were looking at alternative materials for the pipes. Mr Robertson explained that this was as a result of the decision to construct just one tunnel between Shaft 3 and Shaft 1 in order to house both the 600mm and 900mm pipes. He explained that there was a difficulty with the geometry, particularly in Shaft 1, which necessitated this review. However, by the time of contract review meeting number 5, on 19th January 1999, the minutes recorded that it had been decided that Murphy was to use GRP pipes in the tunnel and that "action [was] closed". As Mr Robertson put it "I think we gravitated back to GRP pipes because that was what Thames Water wanted..."

31.

On the 18th December 1998, Murphy had sent Thames Water preliminary drawings from their designer, Maunsell. Enclosed with this was a short, hand-written document, entitled 'Sequence to installing the 600 and 900 diameter GRP mains in 2050 tunnel'. I shall call this "Sequence Document 1". The document indicated that the 600mm pipe would be installed first in the bottom of the tunnel. Once the straps, ducts and drains had been installed and the pipe had been tested, the lower part of the tunnel would be filled with "foam concrete to 50mm above the top of the 600mm pipe". That would then give a base from which Murphy could work. They could then install the 900mm pipe above it. Sequence Document 1 did not envisage filling the remainder of the tunnel with foam concrete. Thus, on the basis of Sequence Document 1, the 900mm GRP pipe would not be surrounded with foam concrete.

32.

Mr Robertson was cross-examined about this document. He described it as "a very preliminary statement". He agreed that there was no reference to backfilling the tunnel with foam concrete after installation of the 900mm pipe. He explained that the design was still ongoing. He said:

"I don't think there has been a massive amount of thought given to it at this stage. What we are trying to establish at this stage is: is there a feasibility of putting the pipes in a single tunnel? It is a very, very preliminary method statement, preliminary sketch, and it has gone to Thames Water to see if they think it is a good idea to develop this. The other drawings that follow on are also quite preliminary layouts, yes. So how much thought was given to that at that stage, I don't know."

Sequence Document 1 was never sent to JP.

B8. The Position in December 1988/January 1989

33.

At around the same time, that is to say December 1998/January 1999, Murphy became aware of another possible feature of the pipeline supply for the Main Contract. It seems that, in their direct discussions with JP, Thames Water had discovered that there was some JP 600mm GRP pipe that had been used on a temporary basis for a project at Ladysmith Road in Enfield, which could be reutilised on the Holland Park Project. Clearly, this potential reutilisation of pipe from the Enfield project would lead to a saving to Thames Water because, although the pipe would have to be cleaned and tested, its

re-use was likely to be cheaper than the purchase of new pipe. Again this was an indication that Thames Water were anxious, if at all possible, to use JP to supply the GRP pipes for the Holland Park Project: after all, as Mr Robertson confirmed in cross-examination, there would not be two different suppliers for the pipeline on the Project.

34.

I find therefore, that, all other things being equal, Thames Water were anxious for JP to supply the GRP pipes on this project. As Mr Robertson put it, "I am sure that they [Thames Water] expected Johnston pipe to be used". He agreed that, because Thames Water were considering reusing pipe from another project supplied by JP, was a clear indicator that Thames Water were intending to use JP on this project.

C. CONTRACT/NO CONTRACT

C1. The Relevant Factual Matrix

C1. 1. Murphy's Sub-Contract Enquiry

35.

As noted in **Section B8** above, by early 1999 Thames Water expected JP to be used to supply the pipes to this project. Mr Robertson confirmed that as far as he was aware, Thames Water were familiar with JP's GRP pipes, and with the company itself, and were happy to deal with them. Therefore, all that remained was the procurement process which, as noted in paragraph 25 above, required Murphy to obtain three quotations from possible suppliers with the successful tenderer requiring the subsequent approval of Thames Water.

36.

In February 1999, Murphy invited JP (and two other suppliers) to quote for the supply of the 900mm and 600mm GRP pipe. The mechanism by which the tender was sought was the Murphy 'Materials Requisition' form. These forms were prepared by Mr Robertson. There was one for each diameter pipe. The form made clear that the length of 900mm pipe sought was 1260 metres, whilst the length of 600mm pipe sought was 860 metres which, as the form said, "may be increased to 1260 metres". This was a reference to the possible reutilisation of 400 metres of 600mm pipe from Enfield. The quantities were for both tunnels (ie the shorter tunnel between Shaft 3 and Shaft 1, and the longer tunnel from Shaft 2 to Shaft 1).

37.

The description of the 900mm pipe in the Materials Requisition form was in the following terms:

"900mm nominal bore GRP pipe. Socket and spigot pipe c/w sealing rings and jointing lubricant. Pipes in 6 metre lengths. Rated to 12 bar internal pressure."

The form went on to say that the GRP pipes and fittings "shall comply with the relevant provisions of BS 5480". Mr Robertson accepted that he had obtained the reference to British Standard 5480 from the Civil Engineering Specification for the Water Industry. He said that it was not a British Standard with which he was familiar and he did not look at its provisions before (or after) he filled out the Material Requisition forms.

38. Although Mr Coll, the buyer, who would have sent out these forms, believed that there would have been a covering letter, no such letter has been found. In any event, any further technical information would, in all probability, not have been provided in a covering letter, because there was a part of the

Materials Requisition form itself dealing expressly with “attachments... specifications [or] drawings”. It is therefore worth noting what the Materials Requisition forms sent to JP did not include:

a) There was no reference to the pipe being required for potable water. Mr Robertson accepted that this was “a fairly major omission”.

b) There was no reference to or attachment of any drawings or specification of the tunnels in which the pipes were to be laid. In particular, therefore, there was no reference to the possibility that, in the tunnel between Shaft 3 and Shaft 1, either of the pipes might be surrounded with foam concrete. The general arrangement drawings that had originally been sent to Murphy had, by this time been superseded because (amongst other things) there was only going to be one tunnel between those two Shafts.

c) Sequence Document 1, which envisaged some foam concrete (albeit round the 600mm pipe, not the 900mm pipe) was not enclosed.

39. Shortly after the forms were sent out, Mr Robertson had a conversation with somebody at JP: he could not recall who. He said that it was clear from that conversation that JP already knew what the working pressures for the pipes was intended to be, and they could have only known that because they had been given the information by Thames Water. As Mr Robertson put it, “it was in all our minds that Johnston would probably be the supplier as long as they got through the procurement [procedure].”

C1.2. The Quotations

40. There were three quotations for the supply of GRP pipe, the minimum required by the main contract. The Pipex quotation was in the sum of £524,881.74. It made no reference to potable water. It was said to be subject to Pipex’s terms and conditions. Mr Coll, the buyer who would have received the quotation, said that he would not have looked at those terms and conditions. The next lowest quotation was from Fibaflo Limited in the sum of £358,872. That quotation too omitted any reference to potable water, and was also said to be subject to Fibaflo’s terms and conditions. Again, Mr Coll said he would not have looked those terms and conditions.

41. The lowest quotation was from JP, in the sum of £247,840. The quotation was dated 25th February 1999. The quotation said expressly that it was “for potable water”. It referred to the working pressure of 8 bar (it being agreed between the parties that a pipe rated at 8 bar should withstand a test pressure of 12 bar). The rate for the 900mm pipe was £138 per metre. That was the rate which JP had calculated for the purposes of their assistance to McNicholas, one of the unsuccessful tenderers for the Main Contract works (see paragraph 19 above).

42. The JP tender was sent under cover of a letter dated 25th February 1999. The fourth paragraph of that letter was in these terms:

“The specification for GRP pipes (i.e. Structural and Chemical) is based on information available at this date. Pipes must be laid in accordance with our standard installation procedures. We should like to take this opportunity to advise you that we also provide an after-sales Technical Advisory Service. Our Site Services Engineers are available by mutual arrangement, to give advice and practical demonstration on the installation of our pipes.”

43. Mr Robertson explained that he was comforted by the offer of after-sales assistance. He said that there were two reasons for that: one was because of his original concerns about the handling of GRP

Pipe; the other was because the design had developed, so that the 900mm pipe was likely now to be supported on brackets in the tunnel, and he considered that the question of brackets and fixing would be another area on which JP would be able to provide assistance.

44. It does not appear that Mr Robertson scrutinised the detail of the Murphy quotation, or indeed any of the other quotations, in any detail.² For example, there was a list of standard abbreviations at the bottom of JP's one page quotation. One of those was 'VE', which was the abbreviation for vinyl ester resin. There was no abbreviation for any other type of resin because the quotation assumed the standard resin unless the annotation 'VE' was used. Mr Robertson said that he did not consider this abbreviation, although there was no particular reason why he would have done.

45. On 25th March 1999, Murphy sent Thames Water a Material Sub-contract procurement sheet, which identified the three tenderers and the three figures. That part of the form was filled in by Mr Coll. Mr Robertson filled in the second part of the form, which proposed acceptance of the JP quotation. The covering letter of the 25th March 1999 recorded that JP had submitted the lowest price "and are DWI approved for potable water". The letter also referred to the possible reuse of the JP GRP 600mm pipe from Enfield. On 29th March 1999, Thames Water approved Murphy's recommendation that the GRP pipe should be manufactured and supplied by JP. The approval was signed by Mr Howells, Mr Sefton's deputy. It was seen and stamped by Mr Robertson on the same day, 29th March 1999.

C1.3. Matters To Be Resolved

46. By this time, the design of the brackets for the GRP pipe had become critical. This urgency can be seen in the minutes of the internal contract review meeting number 6, dated 30th March 1999, a Murphy document. Although the design of the brackets was the responsibility of Murphy (in conjunction with their designers, Maunsell), paragraph 1.2(g) of the minutes indicated that input would be sought from JP in relation to the use of galvanised steel for the brackets. Mr Jacques' handwritten notes of that same meeting stressed that "finalisation of bracket design is critical". Mr Robertson accepted in cross-examination that this was now an urgent matter, and was his responsibility.

47. On 12th April 1999, Mr Robertson informed Mr Coll that the order could be placed with JP. However, that was said to be subject to the need to check on the final quantities, because a decision had not yet been made on the use of the 400 metres of 600mm pipe from Enfield. The memo also said that JP "may assist with design of fixing and handling equipment once they know that they are getting the order".

48. In cross-examination Mr Robertson accepted that by the middle of April there were three matters that needed to be followed up with JP: the actual quantities of material to be ordered; assistance with the design of the fixing/brackets; and advice as to handling/installation. Mr Robertson accepted that, as to those latter two matters, he did not know whether JP would be prepared to assist but he thought that, once they had the order for the GRP pipes, they might.

49. The outstanding issue as to quantities was resolved over the next few days. Mr Coll asked JP what they would charge for transporting the pipes from Enfield to Holland Park, power-washing them, and then inspecting them to make sure they were usable. This information was supplied by JP in a fax of 16th April 1999. Mr Robertson immediately considered the figures in JP's quotation and worked out that the reused pipe would cost considerably less than ordering 400metres of new pipe. He therefore calculated that it was "a good deal" for Murphy/Thames Water and he recommended it.

50. The quotation of the 16th April, seen by Mr Robertson on 19th April, also said that JP “would be pleased to provide indicative drawings detailing the holding down straps and mechanism of support for the pipes after further discussions”. Mr Robertson confirmed that this related to his hope that, after JP had got the order, they would assist with the design of the fixings. The detailed design had thereafter to be submitted to Thames Water for approval.

51. On the 19th April 1999, Murphy wrote to Maunsell enclosing some drawings. Two points made in that letter are important. They are points 17 and 18 on the second page, in these terms:

“17. You cannot detail the pipes nor show supports and restraints until we provide you with more information on the pipes.

18. Show backfill to tunnels to be foam concrete to 2N/mm. We have not decided what type of granular fill to use in the shaft, so leave that note as it is.”

52. In cross-examination, Mr Robertson said that note 17 arose because, until the order had been placed with JP, the design of the fixings could not be taken further. As to note 18, he was unclear as to when or how anyone had decided that the upper part of the tunnel between Shaft 3 and Shaft 1 (which, according to Sequence Document 1, was not going to be filled with anything), might now be backfilled with foam concrete. He agreed that the design was still developing, because it had not yet been decided whether granular fill would be used in the shaft. The longer tunnel, between Shafts 1 and 2, was not going to be filled with foam concrete. Again, neither the drawings nor a copy of this letter were sent by Murphy to JP.

C1.4. The Meeting of 20th April 1999.

53. On 20th April 1999, there was a meeting attended by Mr O’Shea and Mr Robertson of Murphy, Mr Sefton of Thames Water, and Mr Mullard and Mr Smith of JP. Of those five attendees, I only heard oral evidence from Mr Robertson and, entirely understandably, he said that he did not have a clear recollection of that meeting or what was discussed.

54. In many ways, therefore, the best evidence of what was said at the meeting was the half page manuscript note, prepared by Mr Sefton in his day book. That is the only contemporaneous note of the meeting. From that, we know that it lasted from 3.10pm to 4.30pm. The note is almost exclusively devoted to a consideration of the supports (brackets) and the sealing gaskets. There is also a short reference to the reutilisation of the pipe work from Enfield. There is no reference to any decision having been taken to backfill the entirety of the tunnel between Shaft 3 and Shaft 1 with foam concrete.

55. I find as a fact that the vast majority of the discussion at the meeting on 20th April was devoted to the question of the fixing/brackets. The importance and urgency of this item had been highlighted at Murphy’s weekly staff meeting the day before. The minutes of that meeting show (by way of asterisks), what Mr Robertson fairly described as a ‘high embarrassment factor’ for himself personally.

56. The fact that the vast majority of the discussion of the meeting concerned the fixings/ brackets is confirmed by the fact that, during the meeting, JP faxed to the Murphy offices a drawing entitled “Pipe cradle support details... issued for information only”. That fax was received during the meeting (it was timed as having arrived at 3.59pm) and I have no reason to believe that it was not discussed at the meeting. Mr Clarke, in his cross-examination, was firmly of the view that it must have been. That

supports my conclusion that the vast majority of the meeting was indeed taken up with a discussion about the fixings/brackets.

57. I also note that Mr Robertson confirmed in cross examination that there were three things that he wanted to discuss with JP at that meeting: the fixings/brackets (referred to above), the handling of the material; and the quantities.

“Q: Those were the three things that you wanted to discuss with them, were they not?”

A: Yes.”

I find that these were the three matters that were discussed. There is no evidence that any other matters needed to be, or were, discussed on 20th April.

58. For reasons which we will look at in detail later, it is now an important element of Murphy’s case against JP that, in addition to these three topics, there was also a discussion at that meeting about the decision to backfill the entirety of the shorter tunnel with foam concrete. On the balance of probabilities, I find that there was no such discussion. This is because:

a) It was not one of the three matters which Mr Robertson identified as being the topics that he wanted to discuss with JP;

b) It was not a matter which was identified in Mr Sefton’s contemporaneous note of the meeting;

c) All the surrounding evidence demonstrated that the vital matter was the question of fixings/brackets which required immediate resolution.

d) Mr Robertson had no recollection of there being any discussion about foam concrete. He said frankly that, after so long, he could not remember what was discussed at the meeting. The highest that he could put it was that he thought that he had had such a discussion “but I could not be sure”.

e) This aspect of the design was still evolving and was not, in Mr Robertson’s words, “a done deal” (see paragraph 73 below). It seems unlikely that Mr Robertson would have raised with JP an aspect of the design of the Main Contract works – the use of foam concrete – which he did not regard as unusual, and which had not yet been finally decided anyway.

f) There were some subsequent communications, such as JP’s letter of 23rd April (paragraph 70 below) which I believe are inconsistent with there having been any discussion on 20th April about foam concrete.

59. Murphy now say that it is likely that there was a discussion about (or at least a reference to) the foam concrete in the tunnel because its use might have affected the fixings/brackets. But it seems to me that that argument works against them. If it was thought that the use of foam concrete might significantly affect the design of the fixings/brackets in the tunnel, so that it was an important matter for discussion on 20th April then, on the balance of probabilities, I consider that there would have been an express reference to this topic, either in the contemporaneous notes prepared by Mr Sefton, or in any of the other documents sent by Murphy to JP either before or immediately after the meeting.

60. In fact, there is no such reference in any contemporaneous document from Murphy to JP. Likewise, there is no reference to it in any document sent by JP at the time (such as the drawing considered at the meeting). There is therefore nothing to say that this topic arose for discussion on 20th April. Given the potential importance of the point, it is not appropriate to make a finding that foam concrete was discussed at the meeting, when the only ‘evidence’ to support such a proposition is what Mr

Robertson thought might have happened, in circumstances where he had no specific recollection of the discussion at the meeting at all, and when there was no contemporaneous evidence of any such discussion having taken place.

C1.5. Murphy's Order

61. The following day, 21st April 1999, Mr Robertson sent Mr Coll a memo which referred to the meeting the previous day. Mr Robertson instructed Mr Coll to go ahead and place an order for 842 metres of 600 mm GRP pipe and 1242 metres of 900mm GRP pipe "as per Johnston Pipes quotation letter". The instruction went on to say that an order cannot yet be placed for the 400 metres of reused pipe "until Thames Water have sorted out how it is to be paid for".

62. That same day, Mr Coll prepared a formal Order to JP for the GRP pipe. It had an order number K48558/0129399. The pipe was described in the same terms as had been used in the Materials Requisition form. There was no reference to any specification, drawing, or British Standard. Neither was there any reference to the use of foam concrete in the shorter tunnel. At the foot of the Order were the printed words:

"YOUR ATTENTION IS DIRECTED TO THE CONDITIONS OVERLEAF".

63. Those terms and conditions were printed on the back of the Order. They ran to eleven in total. Condition 2 was in these terms;

"Any contract whereby the Supplier supplies goods or materials to the Company shall be subject to these terms and conditions. No agent, servant or other representative of the Company has authority to agree any terms or make any representations inconsistent with these terms and conditions or to enter into any contract for the supply of goods or materials except on the basis of these terms and conditions save only where such terms, representations or contracts are made in writing and signed by a Director or Secretary of the Company. These conditions shall, subject to the above, override any terms or conditions stipulated or referred to by the Supplier whether such stipulation or referral is communicated to the Company before or after these terms and conditions are indicated to the Supplier."

64. It was Mr Coll's evidence that, although he could not remember faxing the Order to JP, he believed he would have faxed it on 21st April. There is no fax cover sheet or confirmation that it was sent by fax. But Mr Coll said that, because he had written at the top 'FAO David J Mullard', this was an indication that he had faxed the document. He said that it was his practice to do this, so that the fax would find the correct recipient. He also said that he would have faxed the front page of the Order only, and that he would not have faxed the Murphy terms and conditions on the back. His evidence was that, whilst he always hoped that Murphy's terms and conditions would apply, he regularly made contracts where they did not.

65. Again, Mr Coll was unable to say exactly what had happened to the Order after that. He believed that the Order would have been collected the following day, checked by the chief buyer and possibly not sent out until Friday 23rd April. He said that he believed that the earliest it was posted out was Friday 23rd April. He had no personal knowledge of what actually happened, and no way of checking. It was only when it was posted out that the terms and conditions on the back of the Murphy Order were attached.

C1.6. The Acknowledgement of Order

66. I find that JP received the order not later than the 22nd April 1999. This is because JP prepared an Acknowledgment of Order bearing that date, and that Acknowledgment referred to Murphy's order number. JP could not have known that number unless they had received the Order of the 21st April. That provides significant support for Mr Coll's view that he would have faxed the Order on 21st April. Mr Clarke's evidence in cross-examination was entirely consistent with this. On the balance of probabilities, therefore, I find that the order was faxed on 21st April.

67. The JP Acknowledgment of Order was sent to Murphy under cover of a letter dated the 23rd April 1999. The Acknowledgment of Order said expressly that it was "subject to the terms and conditions of sale printed overleaf". Mr Coll confirmed that it was not uncommon to get such acknowledgments of orders with the seller or subcontractor's terms and conditions on the back. He said that he would not have paid particular attention to those terms and conditions.

68. Although Murphy raised some doubt about it, I conclude that the version of JP's terms and conditions which was printed on the back of the Acknowledgment of 22nd April, and sent on 23rd April, was the version relied on at trial. It contained the following provisions. I have divided them up for reasons which will become apparent below.

"14. WARRANTY

i) The Company warrants that goods shall be of sound workmanship and materials and goods of their respective kind and generally in accordance with British Standard 5750 Part II and, in the case of concrete products British Standard BS5911 and, in the case of GRP products British Standard 5480.

ii) In the event that the goods or any part thereof are found to be defective owing to faulty workmanship or materials and not arising from the Customer's default, neglect, mishandling or misuse, but not limited to any deviation from catalogues or recommended operating instructions applied by the Company for use with the goods, the Company will at its option, refund the price paid for or replace or repair any goods forming the whole or any part of the goods supplied provided always that the Company is notified in writing within 7 days of the discovery of such defects and in the event not later than 28 days from the date of delivery.

15. EXCLUSION OF LIABILITY

i) The Customer must rely on its own skill and judgment and recognise good civil engineering practice in relation to the goods and shall satisfy himself that goods specified are suitable for the Customer's intended purpose.

ii) Save as otherwise expressly provided in Clause 14 the Company shall not in any circumstances be under any liability whatsoever to the Customer whether in contract, tort or otherwise for any defect in, failure of or unsuitability for any purpose of the goods or for any loss (including but not limited to consequential loss, loss of profit, loss of goodwill or similar financial loss), damage, claim or any other liability howsoever or whensoever caused whether or not due to the negligence or default of the Company or its servants or agents or to faulty design, specification, workmanship or materials.

iii) All conditions warranties or other terms whether express or implied, statutory or otherwise, inconsistent with provisions of this condition are hereby expressly excluded provided that nothing in this condition shall exclude or restrict:-

a) Any liability of the Company for death or personal injury resulting from negligence of the Company or its servants or agents,

b) Any liability of the Company for breach of its statutory undertakings as to title; and

c) Where the customer deals as consumer within the meaning of the [Unfair Contract Terms Act 1977](#), any liability of the Company for breach of its statutory undertakings as to conformity of the goods with description or sample or as to their quality or fitness for a particular purpose.

It shall be the responsibility of the Customer to assume and to cover by insurance, if he so wishes, the risks which fall on the Customer through the operation of this clause or any other part of the contract”.

69. As already noted, Mr Coll could not recall seeing the JP terms and conditions but agreed that it was standard for such terms and conditions to be printed on the reverse of such an Acknowledgment. Mr Robertson could also not recall seeing these terms and conditions. My conclusion was that, as so often happens in the commercial world, those dealing with the projects at the sharp end had little or no interest in what might justifiably be described as “the small print”. ³

70. One final point should be made about the Acknowledgment of Order. JP’s covering letter, dated 23rd April 1999, contained a number of separate paragraphs. The final paragraph, item (f), provided:

“All GRP bends and fittings, unless otherwise agreed, to be fully surrounded in concrete and include a rocker pipe on either side.”

At face value, that would appear to suggest that, at the time of writing the letter, JP were unaware that any decision had been taken to fill the entirety of the shorter tunnel with concrete. Hence the specific reference to the fact that bends and fittings (not the pipe as a whole) should be surrounded in concrete and include a rocker pipe on either side. There was no reference to backfilling the entirety of the shorter tunnel with foam concrete.

C1.7. The Letters of 26th /27th April 1999

71. On Monday 26th April 1999, Murphy wrote to JP in the following terms:

“At the very useful meeting which was held with you and Mr Mullard on 20/4/1999 we discussed the installation of the two GRP pipelines in the tunnel between Shafts 1 and 3. You suggested that we send you details of our proposals.

The tunnel between Shaft 1 and Shaft 3 is 2.05metres internal diameter and 80 metres long. We have to install a 900mm ID Pipeline and a 600mm ID pipeline in the tunnel. The pipes will be installed between Shaft 1 which is 7.0metres internal diameter at the tunnel level. The attached sheets explain our proposals for installing the pipelines.

We would be grateful for any comments that you may have on these proposals.”

72. Attached to this letter was an amended version of Sequence Document 1. I shall call it “Sequence Document 2”. JP would not have known that it was an amended version because they had never been sent Sequence Document 1. Now, the sequence envisaged Murphy filling the tunnel around the 600mm pipe with concrete. The word “foam”, which had been utilised before, was deliberately crossed out, which appeared to suggest the use of structural concrete. Then, following the installation of the 900mm pipe, the next stage was said to be “fill tunnel to crown with foam concrete”.

73. Mr Robertson said in cross-examination that the letter, with its reference back to the meeting on 20th April, indicated that one of the things that they had talked about, in connection with the brackets, was the layout of the pipes inside the tunnel, with one being above the other. He said that Sequence

Document 2 showed that, at this time, Murphy were proposing that what was going to hold the 600mm pipe in place was ordinary (or structural) concrete, hence the deletion of the word 'foam'. He did not know when that proposal had been formulated and he stressed that, even at this time, the design was continuing to develop. Indeed, Mr Robertson was keen to stress that, at this point in the story, all questions of concrete, and what might surround the pipes in the shorter tunnel, were part of the ongoing design development: it was not, as he put it, "a done deal".

"Q: I think that is the point, is it not, Mr Robertson? It was not a done deal. It was, as you said to me a moment ago, an evolving design.

A: That is correct.

Q: It might involve structural concrete?

A: Yes

Q: It might involve foam concrete?

A: Yes

Q: Or it might involve neither?

A: Yes."

74. In addition, Mr Robertson said that Murphy intended that, if this procedure was followed, the upper part of the shorter tunnel would be filled completely with foam concrete, because that is what "filled to the crown" meant. He also agreed that if he had mentioned foam concrete at all to Mr Mullard and Mr Smith on 20th April, he would have said that the intention was to fill the tunnel to the crown.

75. It appears that the letter of 26th April was received by JP the following day, 27th April. At 3.02pm they sent a fax to Mr Robertson indicating that they were about to commence manufacture of the pipes. The letter went on to refer to Sequence Document 2:

"We have briefly reviewed the proposal for the installation of the pipes between shafts 1 and 3. Generally, the method is satisfactory, though a couple of points need further consideration. Our Site Service Manager Mr David Hodgson would be pleased to attend site to discuss the details of this part of the installation, as well as the non-concreted section".

76. Mr Robertson said that, if Mr Hodgson was going to get in touch to talk about anything, he would have expected such discussions to have been concerned with how the pipes were going to be handled and how they were going to be installed. He did not expect Mr Hodgson to contact him to talk about the design of the installation.

C1.8. Later Events

77. The pipes were manufactured between May and July 1999. There is a full summary of the evidence in relation to the manufacture in **Section H2** below. The first pipes were delivered in September 1999. The pipes were installed in late 1999/January 2000. The pipes were tested following their installation.

78. At some stage, a final decision was taken to backfill the whole tunnel (not just the upper part) with foam concrete. It is not clear precisely when that was. As the cross-examination of Mr Robertson

showed, the design was still evolving in September 1999. In October, when Murphy sent JP some further drawings, they did not make any reference to the backfilling of the whole tunnel with concrete. There was also a continuing issue, if the tunnel was backfilled with concrete, as to what the strength of that concrete would be. Even as late as November 1999, it does not appear that a final decision had been taken as to precisely how the pipes were going to be installed and what was to be done in relation to backfilling the entirety of the shorter tunnel.

79. It appears that contact was made with foam concrete suppliers in September 1999. A supplier called Pro-Pump was contracted to supply the foam concrete. In early February 2000, they supplied the foam concrete by way of special hoses to the top of the shaft, but the actual backfilling work was carried out by Murphy themselves. The works were completed by the middle of February 2000.

C2. The Relevant Principles

C2.1. Introduction

80. Broadly speaking, disputes as to whether or not there was a concluded contract will arise in one of two ways. The first is where there has been a lengthy period of negotiation between the parties, and although some or all of the contract has been performed, it may be difficult to identify a complete coincidence of offer and acceptance. The second common situation is where there has been a 'battle of the forms', with offers and counter-offers based on different terms and conditions, and it is difficult to ascertain which party fired the last shot, or whether each side's final shot was simultaneous.

C2.2. Where There Is An Executed Contract

81. Where a contract has been fully performed, the court is overwhelmingly likely to conclude that there was a concluded contract, even though it may be difficult to identify the precise coincidence of offer and acceptance. This approach is perhaps best illustrated in two decisions of the Court of Appeal: **Pagnan v Feed Products** [1987] 2 Lloyds Rep 601 and **G Percy Trentham v Archital Luxfer** [1993] 1 Lloyds Rep 25. In his judgment in the latter case, Steyn LJ (as he then was) said at page 27:

"The fact that the transaction was performed on both sides will often make it unrealistic to argue that there was no intention to enter into legal relations. It will often be difficult to submit that the contract is void for vagueness or uncertainty. Specifically, the fact that the transaction is executed makes it easier to imply a term resolving any uncertainty, or alternatively, it may make it possible to treat a matter not finalised as inessential."

82. In cases where it may be difficult, if not impossible, to identify agreement on every proposed term, the court will often find a contract to exist if there is at least agreement as to parties, price, time and workscope (see **Keating on Construction Contracts**, Eighth Edition, 2006, at paragraph 2-018). But even then, such basic agreement will not always result in a binding contract; that will turn on the facts of each case. Two recent decisions in the TCC illustrate this point. In **Cubitt Building and Interiors v Richardson Roofing Industrial Limited** [2008] EWHC 1020 (TCC), Akenhead J concluded on the facts that there was an agreement on all essential matters and that there was therefore a contract between the parties. A similar exercise performed by Ramsey J in **Haden Young Limited v Laing O'Rourke Midlands Limited** [2008] EWHC 1016 (TCC) led to the opposite conclusion. There certain specific matters concerned with limits of liability, warranties and the like, which had not been agreed between the parties were, on the evidence, matters which both parties

regarded as essential, and the failure to agree upon them had been deliberate rather than accidental. The absence of agreement on those matters meant that there was no contract.

C2.3. Battle of the Forms

83. Where there are exchanges of offers, counter-offers, acknowledgments of order, invoices and the like, each bearing reference to different standard terms and conditions, the court has to try and construe which, if any, is the operative set of conditions. In **Butler Machine Tool Co Limited v Ex-Cell-O Corporation (England) Limited** [1979] 1 ALL ER 965, the Court of Appeal analysed the facts and concluded that the contract was on the buyer's terms and conditions, because the seller had completed and returned the acknowledgment of order which was stated to be on the buyer's terms and conditions. The seller's later letter, which referred to its own terms and conditions, was found to be irrelevant because it simply referred to the price and identity of the machine in question, and did not operate, as a matter of construction, to incorporate the seller's terms back into the contract.

84. **Butler** is often cited as authority for the proposition that it is the "last shot" of the battle which will trump the preceding flurry of communications. It is not quite as simple as that of course, because the court has to construe all of the relevant communications. For example in **Butler** the last shot in time was the later letter from the seller, but because that was irrelevant to the issue about the operative terms, it was the buyer's counter-offer which was held to have set out the relevant terms of the contract.

85. **Butler** is also relevant for another reason. At pages 968-969, Lord Denning MR commented (obiter), that:

"There are yet other cases where the battle depends on the shots fired on both sides. There is a concluded contract but the forms vary. The terms and conditions of both parties are to be construed together. If they can be reconciled so as to give a harmonious result, all well and good. If differences are irreconcilable, so that they are mutually contradictory, then the conflicting terms may have to be scrapped and replaced by a reasonable implication."

The approach indicated in the final sentence is not very different to that outlined by Steyn LJ in **Archital Luxfer**

86. The other 'battle of the forms' case to which my attention was expressly drawn was the decision of HHJ Havelock-Allan QC in **Sterling Hydraulics Limited v Dichtomatik Limited** (6.7.06, Bristol District Registry, unreported). In that case, Sterling sent a purchase order to Dichtomatik dated the 14th April, in their standard printed form, subject to the terms and conditions printed on the back. On the 16th April, Dichtomatik sent an acknowledgment of order by fax which, at the foot of the page, said that delivery would be 'based on our general terms of sale'. Those terms were not included in the relevant fax.

87. The learned judge concluded that, for a variety of reasons, the acknowledgment of order was not an effective counter-offer. First, he held that the Dichtomatik payment terms were not very different to those proposed by Sterling. Secondly, he pointed out that the Dichtomatik general terms of sale had not been included with the acknowledgment of order, so that adequate notice of the terms had not been given and the acknowledgment could not result in a binding contract on those terms. He held that the words of incorporation, without a copy of the terms themselves, did not provide adequate notice that the acknowledgment of order was not an acceptance of the proposed order but was instead an attempted counter-offer.

C2.4. Summary

88. From the authorities noted above, I derive the following principles applicable to the present case:

a) Where a contract has been performed, the court is likely to endeavour to conclude that there was a binding contract (**Pagnan; Archital Luxfer**).

b) The court will consider whether or not there was agreement as to the parties, price, time and workscope and, if there was such an agreement, the court may decide that any other terms were inessential and that the lack of agreement of such terms did not prevent a contract from coming into existence (**Pagnan; Archital Luxfer; Cubitt**). But, depending on the facts, that will not always be possible (**Haden Young**).

c) If there has been an exchange of documents which referred to different sets of terms and conditions, the last shot in the battle may well lead to the incorporation of the terms set out in that last shot (**Butler**) but:

(i) It will be necessary to look at all of the relevant documents to see whether or not the so-called last shot is even relevant to the issue as to the terms and conditions to be incorporated (**Butler; Sterling**);

(ii) If the court has to deal with mutually contradictory terms (because for example they were sent out at the same time) then the court may have to adopt the pragmatic approach set out in **Butler and Archital Luxfer**.

89. With those principles in mind, I now turn to the question of whether or not there was a binding contract in this case.

C3. Analysis

C3.1 The Starting Point

90. The starting point, of course, is that this was a contract of manufacture and supply which was fully performed by both parties. What is more, this is not a case where the parties negotiated for a lengthy period and where it is difficult to identify attempts at either offer or acceptance. The parties themselves would have had no doubt - indeed they had no doubt at all - that there was a binding contract between them. In those circumstances, as Ms Jefford QC properly acknowledged on behalf of JP, the court will be anxious, if at all possible, to find the existence of a binding contract.

C3.2. The Parties' Respective Cases

91. At the outset of the trial, Murphy's principal case on contract formation, added by way of amendment in the summer of this year, and set out in detail in their written opening, was to the effect that a contract was made at the meeting on 20th April 1999. However, in his oral opening on behalf of Murphy, Mr Lewis made plain that he no longer relied on that submission. I think that he was right to abandon that case. There was no evidence of a contractual discussion of any kind on 20th April. In addition, it would be most unusual, given the presence of a representative for Thames Water, that a three-way meeting between employer, main contractor and sub-contractor would have the effect of agreeing, without more, a binding sub-contract. Furthermore, on the following day, Mr Robertson instructed Mr Coll to place an order, which is the best possible evidence that Murphy were not prepared to agree a binding contract until they had at least sent out a formal order.

92. What became Murphy's primary case therefore was that a contract was made, either on 21st or 22nd April, when the Order of 21st April was faxed to JP. This case has much to be said for it, because it is clear that the faxed Order was acted on by JP in two ways. First, JP prepared their own Acknowledgment of Order on 22nd April reflecting Murphy's Order of the previous day (including the order number). And secondly, the evidence was that they took the Order and/or the Acknowledgment as a green light to start production of the pipe. In such circumstances, Murphy's primary case at trial seemed to fit well with the known facts.

93. The difficulty with Murphy's primary case was that the Order drew the reader's attention to a set of "conditions overleaf". True it is that those conditions were not sent out with the Order, but Murphy's primary case means that the court may have to ignore the words printed at the bottom of the Order, which in turn means ignoring the terms and conditions themselves. As set out at paragraph 63 above, those terms endeavour to suggest that Murphy could only conclude a contract on other terms in certain circumstances.

94. Murphy's secondary case is that the offer of 21st April was accepted by JP on 23rd April and that such a contract did not incorporate JP's standard conditions. Murphy's tertiary case acknowledged that the contract might incorporate JP's standard terms and conditions but not clauses 14 and 15 because, say Murphy, they do not pass the test of reasonableness laid down by [UCTA](#). Murphy's fourth case is that their re-sending of their Order in the post on 23rd April amounted to a last shot in the battle of the forms, so that it was the Murphy terms and conditions that applied.

95. JP say that, in view of the muddled communications (neatly encapsulated by Murphy's various cases outlined above), there was in law no concluded contract. They say that this is principally because it was unclear when, if ever, there was a coincidence of offer and acceptance. JP's alternative case was that, if there was a contract, it was based on their Acknowledgment of Order and therefore the JP terms and conditions.

C3.3. My Primary Conclusion

96. My primary view is that there was a contract evidenced by the faxed Order of 21st April 1999. This contract was a simple contract, and did not incorporate Murphy's terms and conditions. While I have some slight misgivings about this conclusion, for the reason noted in paragraph 93 above, I consider that it accords with both the evidence and common sense.

97. There can be no doubt that, if you had asked the parties late on 21st April or on the morning of 22nd April, they would have both agreed that they had agreed to a contract, pursuant to which JP would manufacture and supply GRP pipes for the Holland Park Project. Indeed from that moment on, each side treated the other as a contracting party. Crucially, JP commenced production based on that Order and/or their own Acknowledgement of the following day.

98. Applying the principles summarised in paragraph 88 above, at that point - but not before - there was agreement as to parties, price, and work scope. There was also agreement as to the British Standard to which the pipes were to be manufactured and the working pressure of the pipes, both matters being identified either in the Order itself or the Materials Requisition forms and/or tender to which the Order expressly referred. All the important matters were therefore agreed. I therefore conclude that there was a binding contract at that stage.

99. I acknowledge at once that this means that I am effectively putting to one side the words at the bottom of the Murphy Order (paragraphs 62 and 63 above). However, I have concluded that it is

appropriate to do so. There are a number of reasons for this. First, there is no evidence that anybody on either side paid any attention to whether or not the terms were actually attached to the Order when it was faxed on 21st April. Secondly, of course, no terms were in fact faxed, so the words were meaningless. Thirdly, I do not believe that these words amount to an effective incorporation of the Murphy terms in any event. They merely draw the reader's attention to the conditions; they do not say expressly that those conditions wholesale will be incorporated into any proposed contract. They do not say that the Order is 'subject to' those conditions, or even that the Order 'incorporates the conditions overleaf'. Fourthly, I am confirmed that this is the right approach by the decision in **Sterling** in which a similar (in fact, rather stronger) attempt to incorporate non-existent terms and conditions was rejected by the learned judge.

100. Accordingly, I have concluded that the contract was made between Murphy and JP late on 21st April or early on 22nd April 1999. The only relevant documents were therefore the Order of 21st April 1999, and the Materials Requisition forms and the JP tender, to which the Order referred. These documents referred to BS 5480, the 12 bar pressure rating and the 8 bar working pressure. On this basis, no other documents formed part of the sub-contract between the parties.

C3.4. An Alternative Conclusion

101. Now let us assume that I am wrong to ignore the words printed at the bottom of the Order and that (also contrary to my view) those words proposed the wholesale incorporation of Murphy's terms and conditions into the contract. In those circumstances, this Order was an offer on which JP would have to come back, either signalling their assent to Murphy's terms and conditions wholesale, or identifying particular terms with which they did not agree. Alternatively, they could ignore Murphy's terms and conditions altogether, and propose their own terms and conditions. On the facts as I have found them, JP took this latter course. They did not need to see the Murphy terms; it was their practice, which is not uncommon, to send out an Acknowledgement which purported to contract on their own terms and conditions.

102. On that analysis, JP's Acknowledgment of Order, which expressly incorporated their own terms and conditions, (and which terms and conditions were printed on the back of the Acknowledgment) became a counter-offer. In those circumstances, I would conclude that Murphy accepted that counter-offer on about 26th April, by treating JP as the contractual supplier of the pipe, both on that day and thereafter. Of particular relevance in this regard was Murphy's request, on 26th April, for JP to approve Sequence Document 2, a request which Mr Robertson said that he thought JP would assist with, once JP knew that they had the contract to supply the pipe (see paragraphs 47 and 48 above). On this alternative analysis, therefore, there was a binding contract, made a few days later, and incorporating JP's terms and conditions.

103. Murphy's secondary case (paragraph 94 above) cannot be right because it seeks to ignore the clear and obvious words of incorporation on the face of the JP Acknowledgment of Order. There is no basis for ignoring such clear words. My alternative conclusion is therefore in accordance with Murphy's tertiary case and JP's only case if, contrary to their primary submission, I conclude (as I do) that there was a contract.

104. The only argument raised against this alternative view is Murphy's final submission, to the effect that the JP's Acknowledgment of Order, with its terms and conditions, was effectively cancelled out by the sending out on the same day (23rd April 1999) of the hard copy of the Murphy Order, this time with the terms and conditions on the reverse. This case suggests that the two documents cancelled each other out, which on one view would seem to support an argument that there was no contract at

all. Alternatively, it is said that the hard copy of the Murphy Order was sent out after the 23rd April and therefore should be deemed to be the last shot in the battle.

105. It seems to me that neither of these approaches is supported by the evidence nor based upon a commonsense interpretation of the facts. First, there is no evidence as to when the hard copy of the Order was actually sent out. The suggestion that it was not sent out until 23rd April or after, when it had been faxed on 21st April, seems to me to be unlikely. Even if the Order had to be checked, it could have been checked late on the 21st or on the morning of the 22nd and sent out that day. On the basis of the evidence before me, I would be reluctant to find that it was sent out two whole days after the same document had been faxed (and acted upon by JP), at the same time as the Acknowledgment of Order. There is no basis upon which I could find that it was sent out after 23rd April in any event.

106. Secondly, I have already said that, in my judgment, the words used on the bottom of the Murphy Order were not sufficient, on their own, to incorporate their terms and conditions into the contract at all. I have contrasted them with the clear words of incorporation used by JP in their Acknowledgment of Order. On that basis, it could be said that the posting out of the Murphy Order was not a shot in 'the battle of the forms' in any event.

107. Thirdly, there is a degree of unreality in Murphy's submission that the sending out of a document that had already been faxed one or two days earlier amounted to a second shot in that battle at all. It was purely an administrative exercise. True it is that the terms and conditions were not faxed first time round, but on these facts, JP had already decided that they would offer to contract on their own terms and conditions. The hard copy of the Order made no difference to that approach.

108. For these reasons, if I am wrong to accept Murphy's primary case as to the formation of the contract, I accept JP's alternative argument, namely that, if there was a contract, it incorporated their own terms and conditions. The Acknowledgement of Order was the last relevant shot in the battle. I therefore deal with the terms of the contract in **Section D** below on the basis of these two alternative conclusions. However, as noted in that Section of this Judgment, it fortunately makes no difference to the final result which of these two alternative analyses as to contract formation is correct.

D. THE TERMS OF THE CONTRACT

D1. On the Basis Of My Primary Conclusion

a) General

109. As I have already indicated, by 21st/22nd April 1999, there was agreement between Murphy and JP as to parties, price and work scope. As we shall see, there was also agreement as to two other express terms relied on by Murphy in connection with the quality of the GRP pipe, and a further term (as to satisfactory quality) to be implied by operation of the [Sale of Goods Act 1979](#). The real issue concerns the implication of another term pursuant to [the 1979 Act](#), concerned with fitness for purpose.

b) 8 Bar Working Pressure

110. The Materials Requisition forms identified that the 900mm GRP pipe should be rated to 12 bar internal pressure. The parties are agreed that this meant that the GRP pipe would have a normal working pressure of 8 bar, but be capable of withstanding a test pressure of 1.5 times that (namely 12 bar). In addition, the parties agree that clause 4.1 of BS 5480 required, for a nominal pressure rating, that the pipe should be capable of withstanding that pressure throughout its design life and with a

factor of safety of 1.6. Thus, in this case, the working pressure of the GRP pipe was 8 bar but, in order to comply with the contract, it had to satisfy a test pressure of 12 bar (8 x 1.5). Moreover, it had to achieve this for the entirety of its working life of 50 years; hence the factor of safety identified above. That increased the relevant figure to 12.8 bar.

c) British Standard 5480

111. There was an express term of the contract that the 900mm pipe manufactured and supplied by JP would comply with BS 5480. That was an express requirement identified on the face of the Materials Requisition forms; indeed, it is the only specified standard or other document identified by Murphy, with which it was said this pipe had to comply. As noted in paragraph 68 above, it was also part of JP's standard terms and conditions that they warranted that the GRP pipe complied with BS 5480.

d) Satisfactory Quality

112. [Section 14\(1\)](#) and (2) of the [Sale of Goods Act 1979](#), as amended, provide as follows:

"1) Except as provided by this section and section 15 below and subject to any other enactment there is no implied term about the quality or fitness for any particular purpose of goods supplied under a contract of sale.

2) Where the seller sells goods in the course of a business, there is an implied term that the goods supplied under the contract are of satisfactory quality.

2A) For the purposes of this Act, goods are of satisfactory quality if they meet the standard that a reasonable person would regard as satisfactory, taking account of any description of the goods, the price (if relevant) and all the other relevant circumstances.

2B) For the purposes of this Act, the quality of goods includes their state and condition and the following (amongst others) are in appropriate cases aspects of the quality of the goods-

a) fitness for all the purposes for which goods of the kind in question are commonly supplied.

b) appearance and finish,

c) freedom from minor defects,

d) safety, and

e) durability...."

113. There was therefore an implied term of the contract that I have identified above that the 900mm GRP pipe would be of satisfactory quality. I did not understand Ms Jefford QC to argue that, if there was such a contract, this term would not be implied into it. It is plain to me that this term would be implied by operation of [the 1979 Act](#).

e) Fitness for Purpose

114. [Section 14\(3\) of the Sale of Goods Act 1979](#), as amended, provides as follows:

"3) Where the seller sells goods in the course of a business and the buyer, expressly or by implication makes known-

a) to the seller....

any particular purpose for which the goods are being bought, there is an implied term that the goods supplied under the contract are reasonably fit for that purpose, whether or not that is a purpose for which such goods are commonly supplied, except where the circumstances show that the buyer does not rely, or that it is unreasonable for him to rely on the skill or judgment of the seller....”

115. The parties are, I think, agreed that there was an express term of this contract that the GRP pipe would be fit for the purpose for carrying potable water; indeed, it was JP, alone of the three tenderers, who expressly qualified their tender with the promise that the GRP pipe was fit to carry potable water. There was therefore an express term that the GRP pipe would be fit for the purpose of carrying potable water. But that is not the thrust of the issue as to fitness for purpose. For reasons which will become apparent when we consider the disputes concerning causation and breach, Murphy contend that there was a term of this contract, implied by reference to [section 14\(3\) of the Sale of Goods Act 1979](#), that the GRP pipe would be fit for its purpose in connection with the use of foam concrete in the tunnel. This obligation is expressly denied by JP. Given the significance of the issue, it needs to be carefully considered.

116. Murphy have had a number of attempts at defining the precise fitness for purpose term for which they contend. That is not a straightforward exercise, not only because of the absence of any helpful contemporaneous material on which they could rely, but also because Murphy need to imply a term which, on the one hand, encompasses the probability of contact between the pipe and the foam concrete but, on the other, because of the 21 metre void in the area of the burst, also embraces the possibility that, in places, the GRP pipe would not be in contact with the foam concrete. The pleaded term is that the GRP pipe ought to have been fit for “an environment in which it was in contact with foam concrete”. In the written opening the suggested term was that the GRP pipe was fit for “a foam concrete environment” or “an environment of foam concrete”. In the oral opening, Mr Lewis put the term in this way:

“We were simply saying that this is a pipe that was going to be installed in an environment where foam concrete would be present and where the foam concrete and the chemical conditions which it created would be in contact with the pipe over at least some of its length and some of its circumference.”

117. I have concluded that, for the reasons set out below, the sub-contract made on 21st or 22nd April 1999 did not incorporate an implied term as to fitness for purpose in conjunction with ‘the foam concrete environment’ in any of the formulations alleged by Murphy.

118. First, I am slightly dubious about the whole concept of the surrounding physical conditions of the pipe being said to equate to its purpose. Its purpose was to carry potable water.

119. Secondly, assuming that the operation of the GRP pipe within a foam concrete environment was capable of amounting to a “particular purpose” for the Sale of Goods Act, then the first question is whether that particular purpose was made known by Murphy to JP. The answer to that question must be No. It is common ground that at no time before 20th April 1999 did Murphy ever make any reference to foam concrete to JP, nor did they ever provide JP with any drawing, specification or method statement which indicated that foam concrete might be used around the 900mm pipe. Mr Lewis’ attempt to avoid this obvious difficulty, by pointing to the information JP may have gleaned from McNicholas (paragraph 19 above) not only demonstrated a fundamental weakness in Murphy’s case (akin to saying ‘We never mentioned to you the particular purpose we now rely on but, although we did not know about it at the time, it seems that one of our competitors might have done’), but it was also wrong on the facts. The McNicholas documents referred to grout, not foam concrete, and

there was no evidence that, if grout had been used here, there would have been any subsequent difficulty or any arguable case against JP. Indeed, the evidence identified in **Section H4** below suggests the opposite.

120. As to the meeting on 20th April 1999, I have set out at paragraphs 53-60 above the reasons why I have concluded that foam concrete was not discussed at that meeting. Moreover, the evidence was that it had not yet been finally decided that foam concrete would in fact be used at all; it was not in Mr Robertson's phrase "a done deal" (see paragraph 73 above).

121. Thus, on the basis of my findings of fact, Murphy simply never made known to JP this alleged 'particular purpose' of the GRP pipe, and the term could not be implied in accordance with the Act.

121. Thirdly, and linked to the second point, there is the difficulty created by the rather convoluted term on which Murphy were driven to rely. It is very important, if the buyer intends to use the goods for a particular purpose, that the particular purpose is clearly identified by the buyer to the seller. Not only was there no reference to foam concrete before or at the meeting, as I have found, but it is impossible to believe that there could ever have been any discussion along the lines of the term for which Murphy now contend. People simply do not talk about "a foam concrete environment". Put bluntly, the term which Murphy now seek to imply is in a particular form, because, if it is not, JP will not be in breach of it. And yet there is no evidence that such a particular purpose was ever discussed with or made known to JP. That is a further reason why I reject the implied term.

123. Fourthly, I reject the term because in all the circumstances, there is no evidence that on or before 21st or 22nd April, Murphy relied on the skill or judgment of JP in relation to any decision connected with foam concrete. Again, [section 14\(3\)](#) provides that a fitness for purpose provision will not be implied where the circumstances show that the buyer does not rely, or that it is unreasonable for him to rely, on the skill or judgment of the seller. In my judgment, that is the case here.

124. There is no evidence to suggest that Murphy placed the Order with JP on 21st April because they had relied on anything that JP had said or done about the use of its GRP pipe with foam concrete: indeed, there was no evidence that Murphy themselves had ever said anything to JP at all about foam concrete prior to the Order being placed. Furthermore, whether or not the shorter tunnel was going to be backfilled with foam concrete was a matter for Thames Water. As I understand it, they decided that the tunnel should be backfilled with foam concrete as a safety measure, to prevent somebody being trapped within the tunnel. That was a matter for them to decide because they were the ultimate employer. If they required foam concrete in the tunnel then Murphy would be obliged to provide it. There was no question of either Murphy (or indeed Thames Water) taking an informed decision as to foam concrete on the basis of anything said by JP prior to 21st April 1999.

125. I should add that, in my judgment, what JP knew about foam concrete, and the extent (if at all) to which it was different to ordinary (structural) concrete or grout, is an important issue in this case. Indeed, as I pointed out to the parties during the final submissions, I consider that the issue as to whether there is any significant difference between foam concrete on the one hand, and other types of concrete on the other, (and, if so, whether JP should reasonably have known about those differences) is determinative of a number of the issues in this case. It is an issue on which the evidence is extremely sketchy. It is a matter to which I return in **Section H4** below, where I conclude that there was nothing which JP knew or ought reasonably to have known about foam concrete which would have led to any alarm bells ringing. That is another reason why no such fitness for purpose term is appropriate.

126. I draw some comfort from my rejection of the fitness for purpose/foam concrete term from the speech of Lord Reid in **Henry Kendall and Sons v William Lillico and Sons** [1969] 2 AC 31. Although that case was dealing with an earlier version of the Sale of Goods Act, it contains a number of important considerations about the need for a clear statement of the purpose, reliance and the like. At pages 79-80 Lord Reid said:

“If the object of the disclosure of the particular purpose is, as I think it must be, to give to the seller an opportunity to exercise his skill or judgment in making or selecting appropriate goods, then it is difficult to see how a stated purpose can be a “particular” purpose if it is stated so widely that it would cover different qualities of goods, because carrying out the purpose in one way would only require a lower quality of goods whereas carrying it out in another way would require a higher quality. Different qualities normally sell at different prices. If a customer sought from a manufacturer or dealer cloth for the purpose of making overcoats the dealer would not know what quality was required... It was argued that whenever any purpose is stated so as to bring this sub-section into operation, the seller must supply goods reasonably fit to enable the buyer to carry out his purpose in any normal way. But that can only be right if the purpose is stated with sufficient particularity to enable the seller to exercise his skill or judgment in making or selecting appropriate goods. The seller may know or be told that the merchant who is buying from him is buying for the purpose of reselling the goods in the course of his business. That may be sufficient to enable the seller to select appropriate goods or it may not...”

127. For all these reasons, therefore, on my primary view of the contract (namely that Murphy are right and that the contract was made late on 21st or early on 22nd of April 1999), there was no term which could be implied that linked the fitness for purpose of the GRP pipe to foam concrete. On the evidence, it has not been shown that, at that stage, foam concrete was going to be used in conjunction with the 900mm pipe, or that the possibility of its use had ever been mentioned to JP.

f) Duty to Warn

128. However, the debate as to potential terms of this contract concerned with foam concrete does not end there. I have concluded that, for the reasons I have given, the contract made on 21st or 22nd April 1999 did not include a term that the pipe would be ‘fit for an environment of foam concrete’. That conclusion is based on a variety of reasons, but it is at least in part due to my finding on the facts that no such purpose was made known by Murphy to JP before or at the time that the contract was made. But, on the facts of this case, it is plain that, after the contract was made but before the pipes were installed, JP became aware that the tunnel was going to be backfilled with foam concrete. What, if anything, is the effect of that knowledge?

129. There have been a number of authorities in which a contractor has been found to owe a duty to warn the employer of design defects which they believe exist, or whose existence they ought as ordinarily competent contractors to suspect: see, for example, **Equitable Debenture v William Moss** (1984) 1 Const LJ 131 at 134; **Victoria University of Manchester v Hugh Wilson** (1984) 1 Const LJ 162; **University of Glasgow v William Whitfield** (1988) 42 BLR 66; **Oxford University Press v John Stedman Group** (1990) 34 Con LR 1 and **Lindenburg v Canning** (1992) 62 BLR 147. In my judgment, there is no reason why, as a matter of law, and as a matter of common sense, a supplier in the position of JP would not owe a similar duty to the contractor who was buying his GRP pipe. It would be absurd if, say, JP knew or ought reasonably to have known that foam concrete was an inappropriate environment for their GRP pipe, but had no obligation to pass such information on to

Murphy, simply because the contract had been made before JP found out about the use of foam concrete.

130. Accordingly, I find that there was an implied term of the contract between Murphy and JP that, if JP knew or ought reasonably to have known that the use of foam concrete would or might create problems for their GRP pipe, they were obliged to warn Murphy of their concerns. This duty arose, as in the reported cases cited above, as an implied term of the contract of supply. It is important to stress that it arose as a consequence of JP's role as a specialist supplier of GRP pipe, and not because of any role that JP had as designers of any aspect of the Holland Park Project.

131. For the avoidance of doubt, it follows from these conclusions that, to the extent that it matters at all, the [Supply of Goods and Services Act 1982](#) is irrelevant to this case. JP were not supplying services at all. This was a contract to which only the [Sale of Goods Act 1979](#) applied.

D2. On The Basis Of My Alternative Conclusion

a) General

132. As noted in **Section C3.4** above, my alternative conclusion is that there was a contract, but based on JP's terms and conditions. It seems to me that, in such circumstances, this contract would also incorporate the express terms set out in paragraphs 110-111 above as to the working pressure of 8 bar and compliance with BS5480. It would also include the implied terms set out above as to satisfactory quality (paragraphs 112-113) and the duty to warn (paragraphs 128-130). [The 1979 Act](#) would apply; [the 1982 Act](#) would not. That the pipe should be fit for the purpose of carrying potable water was an express term, derived from JP's tender (paragraph 115 above). Thus, the principal dispute between the parties on this alternative approach to contract formation is whether or not clauses 14 and 15 of JP's standard terms and conditions fall foul of the relevant provisions of the [UCTA](#).

b) [Unfair Contract Terms Act 1977](#)

133. [Section 11 of UCTA](#) is concerned with 'reasonableness'. It provides as follows:

"1) In relation to a contract term, the requirement of reasonableness for the purpose of this Part of this Act.... is that the term should have been a fair and reasonable one to be included having regard to the circumstances which were, or ought reasonably to have been, known to or in the contemplation of the parties when the contract was made.

2) In determining for the purposes of section 6 or 7 above whether a contract term satisfies the requirement of reasonableness, regard should be had in particular to the matters specified in schedule 2 to this Act; but this sub-section does not prevent the court or Arbitrator holding, in accordance with any rule of law, that a term which purports to exclude or restrict any relevant liability is not a term of the contract.

3) In relation to a notice (not being a notice having contractual effect), the requirement of reasonableness under this Act is that it should be fair and reasonable to allow reliance on it, having regard to all the circumstances obtaining when the liability arose or (but for the notice) would have arisen.

4) Where by reference to a contract term or notice a person seeks to restrict liability to a specified sum of money, and the question arises (under this or any other Act) whether the term or notice

satisfies a requirement of reasonableness, regard shall be had in particular (but without prejudice to sub-section (2) above in the case of contract terms) to-

a) the resources which he could expect to be available to him for the purpose of meeting the liability should it arise; and

b) how far it was open to him to cover himself by insurance.

5) It is for those claiming that a contract term or notice satisfies the requirement of reasonableness to show that it does."

134. Schedule 2 sets out the guidelines for the application of the 'reasonableness' test. The relevant factors identified there include the relative strengths of the bargaining positions of the parties; whether inducements were offered to agree a specific term; whether the customer knew or ought reasonably to have known of the existence or extent of the terms; whether it was reasonable at the time of the contract to expect that compliance with a particular condition would be practicable; and whether the goods were manufactured processed or adapted to the special order of the customer.

c) Relevant Authorities

135. My attention was drawn to a number of recent authorities concerned with the proper operation of [UCTA](#). They included two Court of Appeal cases on the severability of clauses (**Watford Electronics Limited v Sanderson CFL Ltd** [2001] EWCA Civ 317 and **Regus (UK) Ltd v Epcot Solutions Ltd** [2008] EWCA Civ 361) and a decision dealing with an attempted exclusion of a fitness for purpose term by Christopher Clarke J in **Balmoral Group Limited v Borealis [UK] Ltd** [2005] EWHC 1900 (Comm); [2006] 2 Lloyd's Rep 629.

136. In **Watford v Sanderson** the Court of Appeal analysed a limitation of liability clause which the judge at first instance had ruled was unfair and contrary to [UCTA](#). Chadwick LJ said that, on a proper analysis, the term comprised two distinct terms, one which excluded a liability for indirect loss and one which limited the liability for direct loss. He concluded, for different reasons, that each term was reasonable, but he considered each separately. In **Regus v Epcot** the Court of Appeal divided up one lengthy clause into four separate parts. They concluded that the third part did meet the requirement of reasonableness and the fourth part was capable of being severed from the rest of the clause and was, on any view, unobjectionable. In dealing with the question of severability, the Court of Appeal concluded that the fourth part of the clause was independent of the preceding sections because it served a different purpose and could therefore be severed for the purposes of [UCTA](#). Reliance for that proposition was also placed on the decision in **Ailsa Craig Fishing Co Ltd v Mulvern Fishing Co Limited** [1983] 1WLR 964.

137. Mr Lewis suggested that, a matter of principle, clauses 14 and 15 were not severable. In support of that proposition he relied on the earlier Court of Appeal decision in **Stewart Gill Limited v Horatio Myer and Co Ltd** [1992] 1QB 600. However, I do not believe that **Gill** is a case that is really concerned with severance at all; the point at issue in that case was whether the court should look only at part of the clause in question, rather than the entirety of the clause. Moreover, the dispute there came down to the consideration of a few words within a clause, which made severance, for all practical purposes, impossible. For that reason, I do believe that the decision in **Gill** is inconsistent with those in **Watford v Sanderson** and **Regus v Epcot**, set out above.

138. Mr Lewis referred to a number of other cases arising under [UCTA](#). I do not consider that these authorities contain any significant statements of law; they are, so it seems to me, cases showing the application of the general principles of [UCTA](#) to their own facts. Thus:

a) In **Britvic Soft Drinks v Messer UK Limited** [2002] EWCA Civ 548; [2002] 2 All ER Comm 321; the Court of Appeal refused to allow the seller of carbon dioxide to rely on an exclusion clause which purported to limit its liability for breach of a warranty that the purity of the gas was less than that laid down in the relevant British Standard. On the facts of that case, particular emphasis was placed on the fact that there had been no discussion or negotiation about that particular clause. For what it is worth, it seems to me that different considerations may apply to an attempt to exclude a fundamental quality standard, such as occurred in **Britvic**, and the attempt here to ensure that the fitness for purpose obligation remains with the buyer, a notion which, depending on the facts, is entirely in accordance with [s14\(3\) of the Sale of Goods Act 1979](#).

b) In **Balmoral v Borealis**, Borealis were seeking to rely on a term excluding their liability for fitness for purpose. As a matter of fact, the judge concluded that, given Borealis' knowledge of the intrinsic properties of their particular product, borecene, which had failed in that case, and their knowledge of the purpose for which Balmoral intended to use that product, it was unreasonable for them to exclude the fitness for purpose term.

139. From those authorities I derive the following propositions:

a) For the purposes of [UCTA](#), a lengthy contractual term is capable of being broken down and considered in its constituent parts if, on analysis, those different parts are performing different functions (**Watford v Sanderson, Regus v Epcot**);

b) Whether or not it is reasonable to exclude or limit liability will depend on the facts. Sometimes it will be reasonable (**Watford, Regus**), but it may not be if the clause in question seeks to exclude a fundamental warranty (**Britvic**).

c) Whether or not it is reasonable to exclude a fitness for purpose obligation will again depend on the facts (see **Borealis**). Since [section 14\(3\) of the Sale of Goods Act 1979](#) requires the buyer to take various steps before such an obligation can be implied in any event (notification of purpose etc), it may be possible, depending on the facts, for a seller to demonstrate that a clause which keeps that liability with the buyer is reasonable in all the circumstances.

With those principles in mind, I turn to consider clauses 14 and 15 of the JP terms and conditions.

d) Clause 14

140. I have set out clause 14 at paragraph 68 above. I have divided it into two parts, indicated with the prefix (i) and (ii). I am in no doubt that, in line with the authorities cited above, the two parts of clause 14 are severable, because they were performing two entirely different functions. Clause 14 (i) was a warranty of sound workmanship, materials and compliance with BS5480. It is, on any view, unobjectionable.

141. Clause 14 (ii) was a very different clause. It provided for a limitation of liability. It is draconian in its effect. The proviso at the end means that, 29 days after the date that the GRP pipe was delivered to Holland Park, no claim could be made by Murphy against JP, no matter how defective the pipe. Thus if, 29 days after the delivery of the GRP pipe, the pipe collapsed because it had been incorrectly manufactured then, even if the collapse occurred before it had been installed, on the basis of clause 14

(ii), JP would have no liability. In my judgment, that is plainly and obviously unfair and unreasonable and falls foul of [UCTA](#).

142. Ms Jefford QC mounted a brave defence of clause 14 (ii) on the basis that it was reasonable because, once the pipe was installed (which was not an operation in which JP were involved), anything could happen to it, which would be outside JP's control. Therefore, she said, it was reasonable for JP to limit their liability to a short period after delivery. I reject that submission. First, it assumes the pipe would be installed within the first 28 days after delivery. There is no basis for such an assumption. Secondly, if the pipe was damaged during installation then that would not be a matter for JP anyway. But if there was a defect in the manufacture of the pipe that was only discovered, say, following the post-installation testing, then, prima facie, that would be JP's responsibility, and it would be wholly unreasonable for such liability to be excluded, merely because 29 days had passed since delivery. It has the effect of reducing the statutory limitation period from 6 years to 28 days. In my judgment, that is unreasonable.

143. Accordingly, for these reasons, I accept Murphy's submission that clause 14 (ii) has not been demonstrated to be reasonable. That provision should therefore be excised. For the reasons that I have given, that has no effect on the clear warranty set out in clause 14 (i).

e) Clause 15

144. I have also set out clause 15 in paragraph 68 above. For the reasons which I have given, I have divided up this provision into three parts (i), (ii) and (iii). Clause 15 (i) is a provision which has the effect of keeping the fitness for purpose obligation with the customer (in this case Murphy), by obliging them to rely upon their own skill and judgment in relation to the goods and to satisfy themselves that the goods were suitable for their intended purpose. Clause 15 (ii) is a wide ranging exclusion clause. Clause 15 (iii) endeavours to maintain JP's liability for those matters which [UCTA](#) provides cannot be excluded in any event. Again, I consider that these three provisions were performing three different functions, and are capable of being severed in accordance with the approach adopted by the Court of Appeal in **Watford** and **Regus**.

145. In my judgment, clause 15 (ii) is too wide an exclusion clause and again falls foul of [UCTA](#). It is unreasonable in its extent for similar reasons noted above in connection with clause 14(ii). Clause 15 (iii) does no more than identify and preserve those liabilities on the part of JP which, pursuant to [UCTA](#), cannot be excluded in any event. For that reason alone it cannot be regarded as unreasonable.

146. That leaves clause 15 (i). Is it reasonable, in all the circumstances of this case, to make Murphy rely on their own skill and judgment in relation to the intended purpose of the GRP pipe? As I have said, this is nothing to do with potable water, because the parties are agreed that it was an express term of this contract that GRP pipes supplied by JP would be fit for potable water. So again we come back to the question of foam concrete.

147. For the reasons that I have explained at length at paragraphs 115-127 above, on my preliminary view of the contract, I do not consider that there was a fitness for purpose term in relation to foam concrete. If it is the alternative view of contract formation which is correct, the disputed term at clause 15 (i) would be entirely consistent with that reasoning. It would be reasonable on the facts of this case to conclude that JP were not warranting the fitness for purpose of the GRP pipe in connection with foam concrete, when (even allowing for the fact that the contract, on the alternative basis, was made a few days later) the use of foam concrete in the shorter tunnel was still not 'a done deal'. Furthermore, I take comfort from the fact that, if the contract, on this alternative basis,

incorporated clause 15 (i), it would also include the implied term as to the duty to warn in relation to foam concrete as set out in paragraphs 128-130 above. In other words, clause 15(i) did not relieve JP of its obligation to warn Murphy if it knew or ought reasonably to have known that the foam concrete would or might cause problems for its GRP pipe.

148. Accordingly, on the important dispute as to the alleged fitness for purpose of this GRP pipe used in connection with foam concrete, the result is the same, whichever conclusion on the formation of the contract is correct. On Murphy's primary case as to contract formation, which remains my primary conclusion, there was no fitness for purpose term in connection with foam concrete, for the reasons set out in paragraphs 115-127 above. If, on the other hand, the contract was based on JP's terms and conditions, then there was no fitness for purpose term both for those same reasons, and by operation of clause 15 (i) of JP's terms and conditions. For the reasons that I have given, therefore, that term was reasonable in all the circumstances.

E. DUTIES OF CARE

E1. Duty In The Absence of A Sub-Contract

149. Understandably, given that JP's principal contention was that there was no contract between the parties, Murphy endeavoured to argue that even if that was right, JP owed to them a duty of care in respect of the supply of the pipe, so as to allow Murphy to claim economic loss in these circumstances. Whilst I have sympathy with the submissions of Ms Jefford QC that such duty would be most unusual, it is unnecessary for me to decide the point. I have found that there was a sub-contract between the parties. It is unnecessary to consider further interesting questions of law that might arise had there been no sub-contract.

E2. Duty To Warn

150. At paragraphs 128-130 above, I have explained how and why I consider that JP owed to Murphy an ongoing duty to warn if they knew or ought reasonably to have known that the GRP pipe was or might not be suitable for use in conjunction with foam concrete. That is principally to protect Murphy against what I believe would otherwise be an absurd result, whereby, when JP became aware of the use of foam concrete, even if they knew or ought reasonably to have known that the foam concrete would pose a problem, they had no duty to say so. There was a duty to warn therefore, which operated as an implied term of the contract between Murphy and JP.

E3. Alleged Mis-Statement

151. Murphy contended that JP owed to them a duty of care in relation to the exchange of letters in respect of the installation methodology, namely Sequence Document 2 and the response to it, referred to at paragraphs 71-76 above. The duty is said to be akin to that found in **Hedley Byrne v Heller** [1964] AC 465. In support of that contention, Murphy rely on the reasoning of Akenhead J in **Galliford Try Infrastructure Ltd v Mott McDonald Ltd** [2008] EWHC 1570 (TCC) where at paragraph 190 (e), he said, in considering a **Hedley Byrne** type duty of care;

"... It is relevant to determine if the statement giver is being asked to give and is giving advice to the recipient. It is then necessary to establish that the statement giver is full aware of the nature of the particular transaction which the recipient has in contemplation and its statement would be relied upon by the recipient and, finally, that the recipient has to rely upon the statement in entering it into the transaction in question."

152. The significance of such a duty, say Murphy, is that Sequence Document 2, which JP briefly reviewed, expressly refers to the possibility of filling the tunnel to the crown with foam concrete. In addition, Mr Clarke indicated that, if he had known or had reasonable grounds for suspecting that the GRP pipe would be adversely affected by the foam concrete, he would have said so at this point.

153. In reality, therefore, I do not see any difference between this alleged **Hedley Byrne** type duty, and the contractual duty to warn, to which I have previously referred. They both focus on the same thing: whether, in all the circumstances, JP knew or ought reasonably to have known that the foam concrete would have had an adverse effect on the GRP pipe. If they had such knowledge, or ought reasonably to have had such knowledge, either on 26th April (for the purposes of the limited duty alleged by Murphy) or throughout their involvement on the project (on the wider basis of the duty to warn which I have found) then it seems to me they were obliged to pass on that knowledge. The critical question may well be not whether they had such knowledge (it was, I think, clear that JP did not have any such actual knowledge) but whether they ought reasonably to have had such knowledge. That important issue is dealt with in **Section H4** below.

154. This was a standard supply sub-contract. I would be reluctant to find a separate free-standing duty of care in such circumstances.⁴ I think it is unrealistic to impose such a duty arising out of one hurried fax, which refers to a 'brief review', and does not in any event approve the document without qualification. Moreover, as Ms Jefford QC rightly notes, neither the Murphy letter, nor the JP response, makes any reference to foam concrete as a matter on which Murphy are seeking advice; that is limited to the installation process. It would not be fair, just or reasonable to impose an extra-contractual duty in such circumstances. Most important of all, it is unnecessary for me to find such a duty, because I have already found there to be an implied term of the contract that JP had a duty to warn Murphy if it knew or ought to have known that the use of foam concrete might create a problem for the GRP pipe. Moreover, in my judgment, that contractual duty to warn continued throughout the relevant period, from the time that the contract was made up to the post-installation testing of the pipe, almost a year later.

F. POST-CONTRACT CHRONOLOGY

F1. Manufacture And Delivery Of The Pipe

155. JP commenced the manufacture of the 900mm GRP pipe for the Holland Park Project at the end of April 1999. The length of pipe that eventually failed was manufactured on the morning of Monday 17th May 1999, the second length of pipe made that day. A visual inspection showed that it was 'smooth'.

156. In accordance with JP's Quality Assurance procedure, the pipe was then subjected to a hydrostatic pressure test. The hydrostatic test pressure was about 12 bar. It appears that, following the pressure test, one end of the pipe showed signs of 'crazing'.

157. JP adopted a procedure whereby random lengths of pipe (one in roughly every 50 made), were subjected to short-term burst pressure tests. This involved testing the length of pipe in question until it burst. The crazed section of this pipe was cut off from the rest of the pipe and subjected to such a burst pressure test.

158. JP had an internal safety guide value which was designed to ensure that their pipes complied with BS 5480. For the 900mm pipe on the Holland Park Project, the guide value was 4.2. The crazed length of pipe was tested, and burst at 33.5 bar, which was the equivalent of a safety margin of 4.2

(4.19 rounded up to 4.2). Accordingly, having removed the crazed section of piping and having tested that section to satisfy themselves that it met their guide value, JP delivered the remaining section of pipe to the Holland Park Project in the early autumn of 1999.

159. Further details concerned with the events at JP's production facility are set out in **Sections H2 and H3** below, where I deal with the allegation that the pipe was inherently defective and/or that the crazing was indicative of hidden defects in the pipe.

F2. Installation

160. The first delivery of pipe on the Holland Park Project was in September 1999. It appears that the remainder of the pipes was delivered over the next few weeks. The pipes were installed by Murphy in late 1999/January 2000. A representative of JP, Mr Chris Perry, made a number of visits to the Holland Park Project during the installation. Following the installation of the 900mm and 600mm pipeline, they were tested. No difficulties were identified as a result of that testing.

F3. Foam Concrete Backfilling

161. By a contract made in late September 1999, Murphy engaged Pro-Pump to supply the foam concrete. It is worthy of note that, in their Particulars of Claim against Pro-Pump, Murphy sought to rely on their faxed order to Pro-Pump as incorporating Murphy's terms and conditions, the complete opposite of the approach that they pursued in this litigation against JP. Moreover they also sought to turn what was obviously a materials supply contract into a contract pursuant to which Pro-Pump were obliged to give all manner of design and specification advice. Pro-Pump denied such a case, and Mr Aldridge explained why in his oral evidence. Murphy's approach to such free-standing duties of care, of course, was very similar to the position they have adopted in this claim against JP, and which, for the reasons set out above, I have rejected.

162. Evidence as to what Pro-Pump did came from Mr Aldridge. He confirmed the accuracy of Pro-Pump's defence to the claim brought against it by Murphy. From that document, and in particular paragraph 32 thereof, I find that Pro-Pump's work was limited to the following:

- a) Mixing together the base mix of sand, cement and water with foam in its mixer at site;
- b) Connecting its pumping pipe onto the hose and fitting installed by Murphy at the top of Shaft 3. It was Murphy's responsibility to ensure that the head walls were sound and that there were no leaks;
- c) Pumping the foam concrete into the hose and fitting installed by Murphy at the top of Shaft 3, and controlling the rate at which concrete was pumped through the pipe into that fitting.

163. Thereafter the installation of the foam concrete was the responsibility of Murphy. In particular, they were responsible for indicating when the section being filled was full, by checking the vent at the crown of the pipe; Pro-Pump's work was strictly limited to the supply of the concrete. Murphy retained full and sole responsibility for the backfilling works. It was the Murphy operatives who designed and controlled them and undertook them.

164. The tunnel was backfilled with foam concrete on the 8th February 2000. Thereafter, between 9th and 15th February 2000, concrete was pumped into Shaft 3 and Murphy carried out the backfilling works in Shaft 3.

165. There was an issue as to whether the hose had been at the top or the bottom of the tunnel when the backfilling was carried out. Although the drawings are muddled, I find on the balance of

probabilities that the backfilling works were carried out from the top of the tunnel rather than, as shown in one drawing, from the bottom. The laws of gravity would have made proper backfilling from the bottom of the tunnel impossible.

166. Once the backfilling work in the tunnel had been completed, the 600mm and 900mm GRP pipe were again tested to see if they operated at the correct working pressure. Again, they satisfied these tests and there was no record of any difficulties.

167. One slightly ironic footnote; by the end of the project, Mr Robertson, who had originally had doubts about the GRP pipe, was now much more positive. Indeed, the evidence showed that he was prepared to provide a testimonial in relation to JP's GRP pipe and his words were used in one of JP's promotional brochures. In particular, Mr Robertson picked out the "excellent" after-sales service, principally provided by Mr Perry.

168. The main contract works were completed later in 2000. Following commissioning, the water mains were fully operational later that year.

F4. The Burst

169. At about 8am in the morning on Saturday 13th November 2004, at a location close to the Shepherds Bush roundabout, the 900mm mains water pipe burst open. There was extensive flooding.

170. The area of the burst pipe was excavated. A number of important things were found. In particular, it was discovered that, in the location where the pipe burst, there was a considerable void in the foam concrete around the top third of the circumference of the pipe. This void, when excavated, was discovered to be about 21 metres in length. The point of failure was almost exactly in the middle of that void. The failure took the form of a section of the top part of the pipe cracking open and being forced upwards, rather like a lid. Of course, it was able to do this because of the void around the top third of the pipe.

171. Further investigation revealed an obstruction in the crown of the tunnel in the vicinity of the void. This can be seen in the photographs. Although a small area immediately behind the obstruction was filled with foam concrete, it seems more likely than not that the obstruction was responsible for the 21metre void. Mr Robertson hazarded a guess that the obstruction might be a bit of spragging, a wooden support used during the installation of the pipe that was inadvertently left behind.

172. A decision was taken to replace the entirety of the 900mm pipe. Accordingly, the whole length of that pipe was dug out and replaced. Unfortunately, there are no records of what was discovered on those excavations. Save for specimen E, referred to below, the location of which is unknown, there was nothing to say what the state of the pipe was in the areas away from the void and nothing to indicate the state of the foam concrete in those areas. The evidence is almost exclusively limited to the condition of the 900mm pipe in the area of the void. This creates certain difficulties when considering both causation and breach, identified below. The absence of other comparative evidence relating to this pipe and the foam concrete was rightly described by Dr Leek, one of Murphy's experts, as "unfortunate".

173. The areas of pipe in the vicinity of the burst were the subject of detailed testing by the University of Surrey. Copies of their reports have been provided and all the experts have utilised their results, although the authors of those reports were not called to give evidence at the trial.

174. The lengths of pipe in the area of the burst which were tested by the University of Surrey were specimens B and D. Leaving aside the results from samples which were described as “pre-cracked”, the tests showed two things. First, they demonstrated that in the area of the pipe burst/void, the pipe had suffered from alkaline attack. This meant that, on testing, the average initial failure pressure for those specimens of the failed pipe which were the subject of the alkaline attack was 11 bar, as against the figure of 14.5 bar which the experts agreed was the pressure it should have been able to withstand, just 5 years into its 50 year life. However, where the specimens had been protected from the foam concrete (by rubber strips in the area of the brackets), the average initial failure pressure was 16.5 bar. The 16.5 bar was safely above the design criteria.

175. The results in relation to the specimen of pipe in the area of failure were compared with specimen E. This was described simply as “adjacent pipe” and was apparently taken from a location further removed from the failure area. The average initial failure pressure for that specimen, where there was some degree of alkaline attack, was 15.6 bar. Where the pipe had been unaffected by alkaline, the average was even higher, at 18.5 bar. In other words, away from the area of the pipe burst/void, the tests showed that the pipe more than met the necessary design criteria, whether the section of pipe in question had suffered from alkaline attack, or not.

F5. Subsequent Claims

176. By notice of arbitration dated 16th August 2005, Thames Water commenced arbitration proceedings against Murphy. The arbitrator was Mr John Marrin QC. The arbitration went through a range of detailed pleadings but, in September 2007, the arbitration proceedings were settled. Murphy agreed to pay £3.9million to Thames Water in full and final settlement of the claims. Murphy also incurred costs of £270,000 in that arbitration, which JP now accept were reasonable costs. It is those figures, namely £3.9million and £270,000, making a total of £4.17million, which forms the quantum of the present claim.

177. In order to recover these sums, Murphy issued claims against Pro-Pump and against JP. I am told, but I have not seen the documents, that Murphy discontinued their claim against Pro-Pump. Given that Pro-Pump were simply supplying foam concrete, and were not responsible for the backfilling operations, this discontinuance was perhaps unsurprising.

178. That means, of course, that Murphy’s remaining attempt to recover the £4.1million lies in these proceedings against JP. Whether or not that claim can succeed depends on whether or not it can be shown that JP were in breach of contract and that any such breach of contract was an effective cause of the pipe burst. In those circumstances, since causation is so important in this case, I turn to deal with that topic first.

G. THE CAUSE OF THE WATER MAINS BURST

G1. The Applicable Principles

179. There are, of course, two aspects to causation in a case like this. The first is a consideration of what caused the burst as a matter of fact. If the cause of the burst was the result of more than one factor, such that one cause was the responsibility of the defendant but another cause was not, then the law requires a consideration of the efficacy of each causative factor. It is in respect of this second aspect of causation that difficulties can arise. Although the authorities repeatedly say that causation is a matter of common sense, some of the learning on this topic might fairly be said to demonstrate anything but.

180. The starting position I take to be this. If a breach of contract can be shown to be one of two causes of a loss, and both such causes co-operated together and were of at least approximately equal efficacy, then the party in breach of contract will be liable for the loss. This is so, even if the cause for which that party is responsible might be thought, in the round, to be of less significance than another cause for which that party is not responsible, always provided that the cause for which it is responsible is of approximately equal efficacy.

181. Authority for this proposition is the approach adopted by Devlin J (as he then was) in the case of **Heskell v Continental Express Limited and Anr** [1950] 1 ALL ER 1033. That was a case where there were two sequential failures, for which the defendant was responsible for the first, but not the last. Devlin J (as he then was) gave judgment against the defendant. He said:

“It is not enough that loss or damage should be a foreseeable consequence; it must also be actually caused by the breach. There are many cases where a loss is foreseeable but does not in fact occur because some act intervenes, as a piece of good fortune for the wrong doer, to prevent the natural and probable consequences of his wrong from operating. Likewise, the intervening act, while not destroying the wrong as a causative event, may contribute to the damage that occurs; the damage is then caused both by the wrong and by the intervening act. That is, I think, what happened here. The issue of the bill of lading could not extinguish the first defendant’s breach of duty as a causative event; the breach being continuing is a continuous source of damage. But the two were equally operative causes in that if either had ceased the damage would have ceased.... I do not think that I have to deal here with a breach of contract which by the operation of some other cause is reduced to a cause of lower efficacy. It may be that the term “a cause” is, whether in tort or in contract, not rightly used as a term of legal significance unless it denotes a cause of equal efficacy with one or more other causes. Whatever the true rule of causation may be I am satisfied that if a breach of contract is one of two causes, both co-operating and both of equal efficacy, as I find in this case, it is sufficient to carry judgment for damages....”

182. The Court of Appeal decision in **County Limited and Anr v Girozentrale Securities** [1996] 3 ALL ER 34 was also cited to me and it was suggested that this put something of a gloss on what has been called the Devlin approach. However, on analysis, I do not believe that it does; in my judgment, it demonstrates the Devlin approach in operation. In that case, again, there were two sequential breaches, the first by the claimant, County, and the second by the brokers Gilbert Elliott. At first instance the judge had ruled that the second breach by the brokers was not an effective cause of the bank’s loss.

183. In the Court of Appeal, Beldam LJ concluded that the judge had been wrong to discount the broker’s breach merely because he regarded it as less effective in causing the result than the first cause which was the responsibility of County. He said:

“.... the judge was distracted from the simple question whether Gilbert Elliott’s breach of contract was the cause of County’s loss by posing the question: ‘Whether Gilbert Elliott’s breach of contract was of equal efficacy with the conduct of County which I have found to be negligent?’ Having answered that question no, he selected County’s conduct as the effective cause of the loss. As I have previously indicated, the mere fact that County’s failure to take reasonable precautions in its own interest could be regarded as an effective and concurrent cause of the need to refresh places did not justify the conclusion that Gilbert Elliott’s breach of contract was not an effective cause. For my part I would not agree that the conduct of the County could be regarded as of greater efficacy, but even if it could, it certainly did not displace the efficacy of Gilbert Elliott’s breach. Accordingly I would hold that Gilbert

Eliot was in breach of the terms of its engagement as brokers and that its breach caused County the loss claimed.”

184. I consider that the approach in **County** illustrates the principle outlined in **Heskell**. It simply serves to demonstrate that there is, quite rightly, a certain amount of elasticity in the concept of one cause being of approximately equal efficacy with another cause. The real problems come when the cause that is or might be a breach of contract is plainly of less efficacy and significance than the cause which is not the responsibility of the defendant. However, I do not need to explore that area of difficulty because, for the reasons set out below, that is not a problem which arises in this case.

G2. The Four Possibilities

185. There are four possible causes of the burst water main. They divide neatly into two pairs of two; the first pair concerned with the GRP pipe itself, the second pair concerned with the conditions in which that pipe was operating at the time of the burst.

186. The first two possibilities, concerned with the pipe itself, are these. First, it is said that the GRP 900mm pipe was inherently weak or defective (“possible cause 1”). Secondly it is said that, even if the pipe was not inherently defective, this particular section of pipe was defective because of the crazing that had been identified during the original test at the factory (“possible cause 2”).

187. The remaining pair of possible causes arises from the conditions in which this particular pipe was operating when it failed. The third possible cause is the 21 metre long void around the upper third of the pipe in the area of the burst, and the stresses that would have been created on the pipe by the existence of the void (“possible cause 3”). Fourthly, it is said that a cause of the burst was the alkaline attack on the pipe in the area of the burst (“possible cause 4”).

188. It was Murphy’s original case that, to a greater or lesser extent, all four of these possible causes led to the failure and that, since, on Murphy’s case, possible causes 1, 2 and 4 were all the responsibility of JP, they had done more than enough to satisfy the necessary test on causation. It was JP’s case that regardless of any questions of breach, the effective cause of the failure was the existence of the void - possible cause 3 - for which they were not responsible.

189. I deal briefly in the next four sections of this Judgment with those four possible causes.

G3. Possible Cause 1: Inherent Weakness In The GRP Pipe

190. I deal in detail in **Section H2** below with the question as to whether or not it has been demonstrated that the pipe was inherently weak. However, on causation I can take this issue shortly. At paragraph 60 of their final submissions, on behalf of Murphy, Mr Lewis and Ms Jones expressly concede that, whatever the result of that investigation, the inherent strength point “does not give rise to any difficulties of causation”. This links back to paragraph 6 of their final submissions where they say that the difference between the University of Surrey test figures on the specimens of pipe that failed, and the pressure the pipe should have been able to withstand, was explained by reference to the void (possible cause 3) and - in particular - the alkaline attack (possible cause 4). The alleged inherent weakness in the pipe was not demonstrated to be an effective cause of the failure at all.

191. In my judgment, this concession on causation is properly made. As will become apparent from my analysis of the evidence below, the evidence points unequivocally to possible causes 3 and 4 as being the only efficacious causes of the burst water main. There is no evidence to suggest that, even if the pipe was inherently weak, it had had anything to do with the pipe burst.

192. I examine below the comparison between the test figures, and in particular the comparison between 6.77 bar, the pressure at which the pipe failed, and 14.5 bar, the highest pressure that the experts have agreed that this pipe should have been able to withstand at this early stage of its design life. In trying to explain this difference, Murphy's experts (Mr Greateorex and Dr Leek) concentrated on possible causes 3 and 4; there was no part of the missing 7.7 bar that was said to be due to the alleged inherent weakness in the pipe. Consistent with that, during his skilful cross-examination of Dr Eckold, JP's sole expert, Mr Lewis concentrated on showing that it was indeed possible causes 3 and 4 which mattered on causation, rather than possible cause 1.

193. In fact, for the reasons set out in detail in **Section H2** below, I reject the contention that the JP GRP pipe was in any way inherently defective or weak. But for present purposes it is sufficient to say that, even if I am wrong about that, it is plain that the inherent strength of the pipe played no part in the failure in November 2004.

G4. Possible Cause 2; The Crazing

194. I deal in detail with the evidence surrounding the crazing in **Section H3** below. I there reject the suggestion that the crazing noted at one end of the pipe was improperly dealt with by JP or that the crazing somehow denoted 'hidden inadequacies' in that part of the pipe that was supplied. The crazed section of the pipe was cut off and not supplied to Murphy. Moreover, that crazed section met the JP guide value of 4.2 when it was subjected to a short-term burst test.

195. But again, even if I was wrong about that, it is clear on the evidence that the crazing had no causative link to anything that happened subsequently. Again, at paragraph 6 of the final submissions prepared by Mr Lewis and Ms Jones, they make that plain when they argue that, other than the void, the remainder of the discrepancy in the figures needed to explain the failure of the pipe was attributable to the alkaline attack.

196. It is true that in those final submissions, at paragraph 66, Mr Lewis and Ms Jones seek to argue that the crazing was somehow linked to or exacerbated by the alkaline attack. However, in my judgment, there was simply no evidence of any such thing. It was not a point advanced by Mr Greateorex or Dr Leek, either in their reports or in their oral evidence. I find that they were entirely separate matters, and that, of itself, the fact that one end of the pipe showed some crazing and was cut off, tested and destroyed, revealed nothing at all about the strength or other qualities of the remaining length of pipe that was supplied. It was therefore irrelevant to the question of causation.

G5. Possible Cause 3: The Void

197. As noted above, there was a void of some 21 metres in length across the top third of this tunnel in the area of the burst. Whilst Mr Lewis is right to say that there is no evidence of the extent of the void prior to the burst and the subsequent excavation, it seems to me more likely than not that the void was always roughly of the size that was discovered when the burst occurred and the pipe was excavated. Dr Leek said that "it would be unwise for me to assume that there was absolutely no change in the size of void pre-and post-failure" and there was a suggestion that there may have been some fines that were washed away when the water main burst. Whilst I am sure that is right, it is simply impossible to accept that large amounts of foam concrete were washed away by the burst; indeed, the photographs show that on excavation, the concrete adjacent to the area of the void was solid and in good condition. Accordingly I find that the void in the tunnel following the backfilling exercise in 2000 was of approximately the size that was discovered when the tunnel was dug out more than 4 years later.

198. It should not be thought that the void was somehow 'just one of those things': an inescapable hazard arising from the use of foam concrete. Mr Aldridge expressly agreed that the purpose of the foam concrete was 'to completely encase the pipes, with no voids.' That chimed with Mr Robertson's evidence that in conversations with Mr Aldridge, "the discussion was we wanted to fill the tunnel completely with concrete, so that there were no voids". Moreover, as Dr Leek accepted, there was no evidence of any other discontinuity in the foam concrete. Accordingly I find, on the balance of probabilities, that the void was the only significant area where the foam concrete was not in intimate contact with the pipe, and represented a major error in the performance of the Main Contract works which was not noticed at the time.

199. What was the effect of the void into which, at the time of the burst, the top part of the pipe lifted like a lid? There was a certain amount of agreement on this topic. Dr Leek and Dr Eckold have agreed that there was an increase in the hoop stress at the point where the pipe emerged from the foam concrete into the void. This is because the pipe derived significant support from the concrete, and the stress increased when that support was removed, in the vicinity of the void. The experts have quantified that hoop stress at approximately 20 MPa, and the increase from 16 MPa to 20 MPa is the rough equivalent of 1.7 bar when rated by way of pressure. This obviously accounts for a significant part of the difference between the actual and the intended failure pressure.

200. In addition, Dr. Eckold and Dr. Leek were agreed that there would also have been a shear stress in that vicinity. They were not agreed as to the extent of any shear stress or how such shear stress might be measured, although they did agree that it was "a more complex stress distribution that is difficult to quantify". Dr. Leek considered that the shear stress would be marginal. Dr. Eckold thought that the shear stress would be significant, but he also accepted that he had not done any of the calculations that would be necessary to arrive at any sort of meaningful figure attributable to shear stress.

201. I consider that, in the light of that expert evidence, there was an additional stress (and therefore pressure) caused by the shear stress. Whilst it is impossible to quantify it, I conclude that (as per Dr.Eckold) it was not insignificant but (as per Dr. Leek) it was not as significant as the hoop stress.

202. There can be no doubt therefore that the existence of the void was an effective cause of the water burst. The [CPR Part 35](#) agreement between Dr. Leek and Dr Eckold is enough on its own to make that good. In cross-examination, Dr. Leek agreed with this analysis:

"Q: Where the pipe was supported by foam concrete, you have agreed the stress was small?

A: Yes

Q: Where it was unsupported by foam concrete [ie in the vicinity of the void], the stress was greater?

A: Yes

Q: Had it been supported by foam concrete at the point where it was in fact unsupported, the stress would also have been small?

A: Yes

Q: And therefore, had the pipe been surrounded by foam concrete, it would not have failed?

A: It depends on the influence of the chemical attack."

Later on the same day, there was a similar exchange as follows:

“Q: In terms of your paragraph 20 of your joint statement, at an internal pressure of 6.77 bar or 7 bar or 8 bar, the stress in the pipe wall was small, was it not, if it was surrounded by foam concrete?”

A: If it is surrounded by foam concrete, yes.

Q: right. What follows from that is that had the pipe been surrounded by foam concrete and had there been no void, the pipe would not have failed?

A: Depending on the effect of the chemical attack and how persistent or otherwise that is.

Q: And you don't know anything about that because you don't have a particular expertise in foam concrete?

A: That's correct.”

203. A point made throughout the closing submissions of Ms Jefford QC, on behalf of JP (see, for example, paragraph 47 (i), paragraph 77 (iv) and paragraphs 98-99), was to point out that, where the pipe was surrounded by foam concrete, it was effectively acting as a liner, because the foam concrete was performing much of the structural support function. The experts have indeed agreed that, where the pipe was surrounded by foam concrete, it was subject to minimal loads: 0.5 MPa, as against 16 MPa or higher where there was no concrete. This led to a certain amount of debate as to whether JP were unfairly relying on the foam concrete to explain away any deficiencies in the strength of the pipe whilst, at the same time, pointing out the absence of foam concrete in the area of the void, so as to explain how and why the burst had happened.

204. In truth, I consider that the position is relatively straightforward. If JP's GRP pipe was inherently weak, so that it did not comply with the stipulated 8 bar working pressure, then they could not seek to avoid the consequences of their breach of contract by saying that, in reality, the load on the pipe itself was much less than 8 bar because of the foam concrete. As Mr Lewis correctly argued, the foam concrete was not there to act as a support (see paragraph 18 of his closing submissions), a point with which Mr Currie agreed. On the other hand, it seems to me that, in order to explain how and why the pipe burst when and where it did, JP are entitled to point to the vast difference in the loading condition on pipe that was surrounded by foam concrete, and pipe that was not. I certainly accept the submission made by JP that, on the basis of the figures agreed by the experts, the vastly increased loading in the area of the void demonstrates plainly that the void was an effective cause of the burst.

205. A judge should always be wary of answering a causation question with a mathematical answer. But the figures in the present case have been well presented and are clear. It seems to me that they constitute important evidence about causation. The pipe had to be capable of withstanding a pressure of 1.6 its designed pressure of 8 bar throughout its design life. That gives a figure of 12.8 bar. However, because it is accepted that GRP pipes lose strength over the course of their design life, a pipe in the relatively early stages of its design life, such as this one, would have to be capable of surviving at an even higher pressure. As noted above, the agreed figure is 14.5 bar. The evidence indicates that the pressure in the pipe when it burst was 6.77 bar. There was therefore a discrepancy of about 7.7 bar. I consider that Mr Lewis is right to say that explaining that discrepancy is a good way of identifying what caused the failure of the pipe.

206. On that analysis, the void can be demonstrated to be an effective cause of the failure. The hoop stresses make up something like 1.7 odd of the missing bar. So, when it is added to the 6.77 bar at which the pipe failed, it gets the figure up to about 8.5 bar. There is then a further unknown amount to be added for the shear stress. However, in the light of the evidence that I have heard, I consider

that such an amount, whilst not insignificant, could not possibly make up the difference between the 8.5 bar and the 14.5 bar. To the extent that JP's case on causation depended on the shear stress to make up the entirety of that difference, I reject it. There was simply no evidence from Dr. Eckold, either in his report or orally, that the shear stress could have had that sort of effect. Indeed, I accept Mr Lewis' submission that, by the end of his cross-examination, Dr Eckold seemed to have very little remaining confidence in such an explanation.

207. Accordingly, contrary to JP's case, I find that Dr Leek was right to say that there must have been something else: another causative factor, in addition to the hoop and shear stresses caused by the void, which caused the failure of the water main in November 2004. Dr Leek set out some possibilities at paragraph 6.5 of his report but (aside from alkaline attack) each was either not pursued by Dr Leek or demonstrated in cross examination to be insignificant or irrelevant. By the end of his evidence, I had formed the clear conclusion that Dr Leek's view was that the 'something else' was indeed the alkaline attack.

G6. Possible Cause 4: The Alkaline Attack

208. I am in no doubt that, just as Dr. Leek explained, the other effective cause of the failure was the alkaline attack on the pipe in the area of the void, what I have called possible cause 4. It seems to me that all the evidence points to that conclusion.

209. First, the experts have agreed that the pipe in the vicinity of the void has indeed been the subject of an alkaline attack. Secondly, in those passages of Dr Leek's cross-examination set out at paragraph 202 above, it can be seen that, whilst the large void caused by the absence of the foam concrete, and the additional stresses hereby caused, was an important cause of the failure, something else was needed to explain the failure. That something else was expressly identified by Dr. Leek as being the alkaline attack on the pipe in the area of the burst.

210. Furthermore, the figures from the University of Surrey tests also make good that conclusion. As I have already indicated at paragraphs 174-175 above, in the area of the failure, the parts of the pipe that had been protected from the foam concrete had an average initial failure pressure of 16.5 bar. However, those areas which had been the subject of alkaline attack had an average initial failure pressure of 11 bar. That is a difference of 5.5 bar. That would explain the difference between the 8.5 bar plus referred to above, (greater than 8.5, to make an allowance for shear stress), and the 14.5 bar that the pipe should have achieved.

211. Accordingly, I accept Dr. Leek's evidence that possible causes 3 and 4 worked together hand in hand. What caused the failure was the effect on this pipe of the conditions outside the pipe itself, namely the void, and the stresses that it imposed, and the alkaline attack in the area of the void. For the avoidance of doubt, I conclude that these two possible causes were of approximately equal efficacy: both were required for the failure to occur.

212. As a matter of law, of course, the void and its adverse consequences were not a matter for JP.⁵ So that leaves the alkaline attack on the GRP pipe in the area of the burst. If that was not something for which JP were liable, either in contract or in tort, then neither of the two efficacious causes of this water main burst was their responsibility, and their defence succeeds. On the other hand, if I conclude that the alkaline attack was JP's responsibility, either in contract or in tort, then JP were responsible for one of the two efficacious causes of the water main burst. In those circumstances, on the basis of the Devlin approach to causation, set out above, I would conclude that they are liable to Murphy for the entirety of the claim.

213. Accordingly, as was I think apparent to everyone from the outset of this trial, the critical issue boils down to whether or not the alkaline attack in the area of the failure/void was due or attributable to a breach of contract on the part of JP. But, before coming to that issue in **Section H4** below, I must first address the other allegations of breach advanced by Murphy against JP.

H. BREACH OF CONTRACT/BREACH OF DUTY

H1. Methodology

214. I have of course approached the question of breach of contract and/or breach of duty with one eye upon the four possible causes of the failure of the water main. But, although I have concluded that only possible causes 3 and 4 (the void, and the alkaline attack in the area of the failure/void) were effective causes of the failure, I set out in this Section my conclusions as to each of the alleged breaches which are said to give rise to each of those four possible causes, regardless of whether or not they were efficacious in terms of causation.

215. Accordingly, at **Section H2** below, I deal with the allegation that the GRP pipe was inherently weak. This covers the allegation that the pipe was not in accordance with the British Standard 5484 and/or was of unsatisfactory quality. I then go on at **Section H3** to address the allegation that this particular pipe failed to comply with the contract because of the crazing. In that way, I deal with the allegations of breach of contract and/or duty relating to the pipe itself.

216. I then turn to consider the allegations in respect of the alkaline attack. This is the analysis set out in **Sections H4 and H5** above. This part of the judgment considers general questions as to whether the GRP pipe was or would have been fit for its purpose if it had been surrounded by ordinary concrete or grout; whether there was any evidence that foam concrete led to different performance characteristics or effects on GRP pipe and, if so, whether JP knew or ought reasonably to have known about that; and whether JP are liable, either in contract or in tort, for the consequences of the alkaline attack in the area of the void. This analysis focuses particularly on the duty to warn and the issue of fitness of purpose.

217. Before embarking upon this detailed analysis, I should deal with one underlying feature of Murphy's case, which I have elsewhere described as their 'default mode'. That was the stance that, because the pipe failed at a pressure that was less than 8 bar, JP must automatically have been in breach of contract. This was a point made by Mr Lewis and Ms Jones on a number of occasions in their final submissions (see, for example, paragraph 156 of that document). I reject that approach as unsound in principle. What is important is why the pipe failed, and whether that cause was the result of a breach of contract on the part of JP. This is emphatically not a case of 'res ipsa loquitur'. That is a point to which I return in paragraphs 267-269, and paragraph 300, below.

H2. Was The Pipe Inherently Weak?

H2.1 JP Experience and QA Procedures

218. As previously noted, JP were experienced pipe manufacturers and suppliers. The spreadsheet referred to at paragraph 10 above demonstrates the large quantities of GRP pipe that they supplied to all the major water utility companies in the UK. They also supplied pipes for major contracts abroad.

219. The evidence was that JP regularly carried out tests on the GRP pipe that they were manufacturing. These tests were designed, amongst other things, to give them a guide value (a safety margin) for the short-term pressure test, so as to ensure that other pipes being manufactured met

that guide value and were therefore in accordance with BS 5480. Although BS 5480 does not expressly require a manufacturer to identify a guide value, it was plainly a sensible methodology to adopt, and none of the experts suggested otherwise.

220. Evidence as to JP's QA procedures were given by Mr Currie. It was clear from his evidence that there were occasions when those procedures seemed rather more ad hoc than was envisaged in the British Standard, but at least one explanation for this was the detailed involvement of the senior management in the day-to-day manufacturing process. Indeed, the managing director Dr Kanona, was apparently a hands-on manager who was regularly involved in the minutiae of GRP pipe manufacture. In the round therefore, I consider that the evidence demonstrated that JP had a robust and reactive QA process.

H2.2. The JP 1992 Tests

221. Some tests were carried out by JP in 1992. The results of those tests are summarised in a report written by JP employee, Mr Darren Bailey, in 1997. In the report itself, Mr Bailey indicated that the 1992 tests led to a safety factor of 4.8. Murphy's suggestion was that the later reduction in this safety factor to 4.2 was, in some way, unjustified.

222. There are a number of difficulties with that argument. The first is that, other than the reference in Mr Bailey's report itself, there was nothing in the other (relatively limited) data available about the 1992 tests which indicated that the safety factor was 4.8. Secondly, the test results themselves were discussed with Mr Greatorex, Murphy's GRP expert, during his cross-examination. He had not considered those tests in his report. The calculations put to him indicated that, on the basis of the actual results, a safety limit of about 3.8 or 3.9 was justified. Mr Greatorex agreed that, on that basis, the 4.2 actually used was 'conservative'. The relevant calculation is set out at paragraph 68 of Ms Jefford QC's closing submissions. The difference was largely concerned with the way in which the lower confidence limit was addressed. Although it was subsequently said by Mr Lewis that the basis of those calculations was flawed, I consider that, making every allowance for the points that he made, the calculations did show that a figure of less than 4.8 was appropriate as a guide/safety margin. A safety factor as high as 4.8 was difficult to discern from the actual test data or the subsequent back-calculations.

223. Perhaps the critical evidence on this topic came from Mr Preece, JP's production manager. He was very surprised to see the figure of 4.8. His evidence was that, whilst he was the production manager, the safety figure was round about 4: "We felt comfortable down to 4. Anything below 4, we would refer to Dr.Kanona. Anything below 4.2 we made him aware of, but particularly if it was less than 4." From all of the evidence I heard about the testing in 1992/1993, a safety factor of less than 4.8 and round about 4.2 seemed to be appropriate and justified.

H2.3. The JP 1997 Tests

224. Although there was more information available concerning the 1997 tests, it was accepted that there was not sufficient data to be able properly to calculate a safety factor. It was Murphy's case that, making due allowance for the missing data, the results showed that the safety factor should have been around 4.5.

225. I consider that the difficulty with this argument is that it was purely speculative, because of the absence of the critical data. Moreover, Mr Greatorex had simply made an allowance in arriving at the 4.5 figure, and had not carried out any calculations in support of it. The basis of his allowance was not

explained. Again, during his cross-examination, calculations were put to him, derived from the existing data, which arrived at a figure for the guide value of 4.1, not 4.5. These figures were again based on a particular approach to estimating the 95% lower confidence limit where there was not enough data to do it by use of a standard deviation. On the evidence, it seems to me that I cannot reject outright these calculations; moreover, they are consistent with the evidence of Mr Preece, referred to above.

226. That said, I must, of course, be wary about accepting at face value the figures produced by this sort of exercise. Mr Lewis' criticisms of the calculation that produced the 4.1 safety factor may have some force. On the other hand, Mr Greatorex's figure of 4.5 was not produced by any calculation at all. In all the circumstances, it seems to me that the evidence does not bear out the suggestion that the 1997 tests indicate that JP should have used a higher safety value than 4.2.

H2.4. Other Tests

227. There was an unparticularised allegation that JP had not carried out tests in accordance with British Standard 5480. On an analysis of Mr Greatorex's evidence, it appeared that he criticised JP for not carrying out testing with test pieces wholly submerged in water and not carrying out testing on the glass when a switch was made to a new supplier, Vetrotex. There is no dispute that JP did not carry out either type of test.

228. I do not consider that the absence of such testing meant that JP were in breach of BS 5480. I accept the submissions made by Ms Jefford QC on behalf of JP that the British Standard did not provide for mandatory testing and that the type tests identified in Appendix E of the British Standard were not mandatory. It appeared that Mr Greatorex's only response to this was to argue that the British Standard, which he had drafted, contained an error, and meant to say that such tests were mandatory. I consider that this unusual approach, which I do not accept, coloured Mr Greatorex's entire attitude to the testing evidence.

229. Further in any event, there was no evidence that, even if these tests had been carried out, they would or could have made any difference, either to the guide value of 4.2, or at all. They were therefore, even on Mr Greatorex's evidence, no more than technical failures to comply with BS 5480 which led nowhere. The absence of such tests had nothing whatsoever to do with the burst water main at Holland Park.

H2.5 The 4.2 Safety Guide

230. I have already referred to the two rounds of testing at JP which ultimately produced this figure, as well as the evidence of Mr Preece about the general approach adopted. Mr Currie explained that the 4.2 was a guide value, taken from the report produced by Mr Bailey in 1997 which said:

"The results analysed from the graph, appendix B, indicates that the value of 4.8 as a safety factor is 14.4% too high as discussed in the results. Therefore a value of 4.2 should be adequate as a safety factor".

231. Mr Currie agreed that this report was indicating that the 4.8 figure could be reduced by 14.4%, because the pipes burst at 50 years at a figure 14.4% above the British Standard minimum. A reduction of 14.4% reduced the 4.8 to 4.2. It was suggested to Mr Currie that this was all very well for previous types of pipe, but the results did not necessarily tell you anything about the pipes which were being produced then and in the future. He strongly disagreed with that: he said that he would expect similar results on future tests, and would not expect them to be wildly different. He did,

however, accept that, on one reading of the British Standard, the 14.4% should have been 6%, which might have only reduced the guide value to 4.5, but this interpretation depended on using strength figures in megapascals, rather than the pressure figures, in bar.

232. It seemed to me that the adequacy of the 4.2 guide value was demonstrable by reference to the test records, a view which, I cannot but note, was also expressed at paragraph 83 of Mr Greatorex's report. According to both Mr Currie and Mr Preece, it was the guide value that JP had utilised without difficulty in the past. I do not consider that any criticism can be made of JP's use of that guide value at the time that these pipes were manufactured in 1999. And the mere fact that a result might come in just below 4.2 may well not have mattered: as Mr Preece explained, if a result between 4.2 and 4 was recorded, JP would check to see that there had been no mishaps in manufacturing, no breakdowns or stoppages. He said: "If there was no good reason for the burst to be slightly lower than 4.2 or between 4 and 4.2, as I say, no manufacturing breakdowns, errors, anything like that, then we would have said, 'yes it's probably alright' ".

H2.6 The Manufacture Of This Pipe

233. Mr Preece confirmed that, once the acknowledgment of order had been completed (as it was on 22nd April) that was effectively the green light to the production department to go ahead with the manufacture of the pipe. On 23rd April, Mr Ward of JP filled out the production advice and pipe specification sheets, which identified the technical details of the pipe to be produced. In the section marked 'special resins' he identified the particular epoxy resin suitable for potable water. The pipe specification sheet concluded by saying 'Standard pipes defined as Pipe Design in accordance with BS 5480 with FWC joints and JP Standard Resin.' Mr Preece explained that Mr Ward would have considered what information was available about the ground conditions before filling in the sheets. The orthophthalic resin he identified was the standard resin used by GRP, which came from two different suppliers.

234. These technical details were entered into a computer, which then identified the precise quantities of sand, resin, glass etc required for the manufacture of the particular pipe for the Holland Park Project. The paper trail includes the production diary for Monday 17th May 1999 when the length of pipe in question was manufactured, the second out of ten lengths produced that day.

235. As Mr Preece explained in his evidence, any pipe manufactured by JP went through a three stage testing process. The first stage was a visual inspection. The second stage was a hydraulic test. Thereafter, about one in every 50 pipes, manufactured by JP, was the subject of a short term burst pressure test. This was, agreed Mr Preece, to ensure compliance with the requirement in clause 4.1 of BS 5480 to the effect that the pipe had to retain a certain strength over a period of 50 years. He said that the 1 in 50 was per class of pipe manufactured by JP. The length of pipe at the heart of this case, or at least parts of it, went through that three stage process.

236. The pipe length in question was the second length of pipe manufactured by the day shift on Monday 17th May 1999. When it was subjected to a visual inspection, the length of pipe was said to be 'smooth'. It was explained to me that, on occasion, if there were glass knots and the like, the exterior of the pipe might then require some remedial work. If the report said that the surface was 'rough', then Mr Preece said that it meant that something had gone wrong in the manufacture.

237. The pipe was then the subject of a hydraulic test. The result of this test indicated 'crazing'. Mr Preece explained that the crazing had been caused by the expansion of the pipe under pressure during the hydrostatic test. It seems clear from the records that the crazing was at one end of the

pipe length, and that end was then cut off. The cut-off section was then utilised for the one in 50 burst pressure test. Mr Preece explained that this was common practice: "We would say: well, we have to cut that pipe short anyway because there is something wrong with it. Why don't we use it as a burst and stiffness sample within the batch of 50?" It obviously made sense for JP to test to destruction a length of pipe that they had already decided not to send to the customer.

238. Mr Preece said crazing sometimes happened during manufacture; that it was not limited to this pipe on this day. The precise cause of the crazing here was not identified in the contemporary documents. However, Mr Preece had a view about it. In cross-examination he said it was probably due to "a malfunction in the feeding". In re-examination, he expanded on this:

"It [the crazing] indicated the malfunction of some form had occurred when the materials on the outside of the pipe were being fed into the mould. Generally speaking, crazing occurred only at the end of pipes. It was rare, very rare, that the whole pipe was ever crazed. It was usually an area about half a metre long, three quarters of a metre possibly, at the end of a pipe... We generally thought the reason for it was that there was too much sand on the outside of the pipe. You will see from the feeding programme that the outer layer of the pipe is resin. Feeder passes in with resin and comes back out with sand. It was felt that because of the irregularity or the occasional irregularity of that sand feed when it first picked up, that it put in a disproportionate amount of sand at one end of the pipe until the belt had got itself sorted out. So you would have an area towards the end of the pipe where there was probably more sand than there should be. That when it comes to the expansion of the pipe, because there was that overloading of sand, that's what we pinned down as the cause of the crazing."

239. There was other evidence which suggested that Mr Preece's theory might be right. In particular, Mr Greateorex agreed that "it seemed a possibility" and went on to say:

"I understand it was located at the end of the pipe and if it is located near to the end of the pipe, it may be a feature of the test pressure regime. You get what is known as 'end effects'.... it is permissible in most strength tests to be allowed to discount those at the end because you can get these unusual stresses."

240. The crazed section of the pipe, having been removed, was then the subject of the burst pressure test. The pipe burst at 33.5 bar, which demonstrated a safety value of 4.19, rounded up to 4.2. As Mr Preece confirmed, this indicated that, even with the crazing, that section of pipe met the JP safety guide value. He said that there was no reason to suspect that the remainder of that section of pipe (about 4.3 metres long), which was not crazed, was not entirely in accordance with the British Standard. Murphy were not told about the crazing on that part of the pipe that was not supplied to them; Mr Currie said "I would not have expected Murphy to be informed of the detail of an individual pipe supplied to their contract.... this would be something that the manufacturer would be responsible for and you wouldn't normally expect the contractor to be notified of it".

H2.7 The Manufacture Of Other Lengths Of Pipe For The Holland Park Project.

241. There was some evidence about the test results for other lengths of pipe supplied subsequently to the Holland Park Project, some of which apparently achieved a lower safety value than 4.2. Both Mr Currie and Mr Preece gave evidence about that. Whenever that happened, specific approval had to be obtained from JP's QA and senior management for the pipe to be sent out to Murphy. There plainly was an 'in-process concern', as Mr Preece accepted. However, those lengths of pipe passed the pre- and post-installation tests; they did not subsequently fail; they have not been identified as having a

design life of less than 50 years; and they are not said to be incapable of operating at the required working pressure. Accordingly, I do not, (save for the point of paragraph 242 below), deal further with that aspect of the evidence.

242. The fact that some of the lengths of pipe which did not fail achieved a lower margin of safety than the length of pipe which failed serves, in my judgment, to highlight the overall reasonableness of the 4.2 guide value, and the particular circumstances surrounding the length of pipe that burst in November 2004. In my judgment, for the reasons set out previously, those circumstances lie not in the length of the pipe itself, but in the particular conditions surrounding that pipe, in particular the void, and the alkaline attack in the area of the void. I address those matters in detail below.

H2.8 The Subsequent Tests On This Pipe.

243. As I have already indicated, the length of pipe in question was tested at site following its installation, and again following the backfilling of the shorter tunnel. There was nothing to suggest that there was any deficiency in the pipe.

244. As already noted, after the failure, sections of the pipe were tested as part of the investigations carried out by the University of Surrey. There were three types of pipe within the specimens which were tested: parts exposed to the foam concrete; parts protected from the foam concrete; and parts that were already cracked. The causes of the 'pre-cracking' are not explained in the University of Surrey reports. Having listened to Dr Leek's evidence about those pre-cracked samples, I am wary of attaching very much significance to the results that they generated. Because they were already cracked, the test results that they generated do not provide much assistance in working out generally how the pipe was operating and how it should have operated in November 2004.

245. Specimen E was taken from an "adjacent" piece of pipe. Although it is not clear precisely where it was taken from, it was apparently utilised to act as a comparator to those specimens of pipe which were taken from the failed pipe. In the areas where the specimen E pipe was protected from the foam concrete, the initial failure pressure range was between 16.2 and 20.9 bar, with an average initial failure pressure of 18.5 bar. That was well above the required failure pressure and demonstrated conformance with British Standard 5480 and the other terms of the contract.

246. In the areas of specimen E which were apparently the subject of some alkaline attack, the initial failure pressure range was between 14.2 and 16.8 bar, with an average initial failure pressure of 15.6 bar. That again was in excess of the required pressure (given the early stage of the design life) of about 14.5 bar. In other words, even where there was some evidence of alkaline attack, the pipe was operating generally as envisaged by the contract.

247. Secondly, the tests on those parts of the pipe in the area of the failure (specimens B and D) showed that, where there was no question of alkaline attack, the pipe achieved an initial failure pressure range of 15 to 18 bar with an average initial failure pressure of 16.5 bar. Again that was well over the required failure pressure. Again, therefore, those results demonstrate that there was nothing inherently defective about the GRP pipe that was provided on the Holland Park Project.

248. In his cross-examination, Dr Leek agreed that, in both the case of the failed pipe and specimen E, his conclusion was that "they were satisfactory on manufacture in terms of pressure rating". Indeed, paragraphs 5.9 and 6.3 of his Report explained that, in his view, the strength of these samples was greater than he would have expected from an 8 bar pressure rated pipe after more than 4 years. And even when the cracked samples were taken into account (which I am wary about doing, for the

reasons noted above), Dr Leek agreed that the initial failure pressure achieved on testing was greater than the figure that he had agreed with Dr. Eckold as being the pressure at the time of failure.

249. Similarly, in his cross-examination, Mr Greateorex was asked to compare various test results on sections D and E and agreed that there was not a statistically significant difference between them. In my judgment, the evidence from each of Murphy's experts supports the conclusion that, absent the conditions, there was nothing inherently wrong with this pipe.

H2.9 Conclusions As To Alleged Inherent Weakness Of The Pipe

250. I consider that there is nothing in the criticism of JP's QA procedures. In this regard I note that Mr Greateorex had, at paragraph 107 of his report, originally suggested that the short comings in JP's quality control "may well be another reason why the pipe supplied was of inadequate strength at the time of supply". At the outset of his oral evidence, he deleted that sentence from his report. I consider that concession was properly made. On the evidence, even if some criticisms could be made of the quality control procedure, they were of an administrative nature, and I find that they had no effect on the quality of the GRP pipe at all.

251. I find that the use of the guide value (or safety margin) of 4.2 was a sensible methodology to adopt, and the particular figure of 4.2 that JP utilised was generally justified on the basis of their earlier tests. The length of pipe (or at least part of it) that was supplied for the Holland Park Project had been tested three times before it was sent out (visual; hydrostatic; burst pressure). The end which had been cut off satisfied the 4.2 guide value. That is the best evidence that the pipe supplied was not of inadequate strength or otherwise inherently defective.

252. I reject the suggestion that JP should have carried out other tests in accordance with British Standard 5480. No such tests were required by the British Standard. It was unfortunate that Mr. Greateorex, one of the authors of that British Standard, was obliged to argue that, although the British Standard did not require particular tests to be carried out, that was in some way an omission in the text of the British Standard which he himself had drafted.

253. There was no evidence that the pipe in question was inherently weak. Indeed this pipe was subjected to numerous tests both before and after the failure, and those tests demonstrated that, absent the void and the alkaline attack in the area of the void, the pipe was more than adequate to meet the design test pressure and the stipulated 8 bar working pressure.

254. Accordingly, in my judgment, when the GRP pipe was supplied and installed, it met the criteria set out in British Standard 5480, and it met the 8 bar working pressure requirement. It was therefore of satisfactory quality in accordance with the implied term pursuant to s14(2) the [Sale of Goods Act 1979](#). For all these reasons, therefore, I conclude that there was no breach of contract in relation to the inherent quality of the pipe supplied by JP.

H3. Was This Particular Pipe Defective?

H3.1. Introduction

255. For the reasons set out above, I have concluded that the pipe was not inherently defective. The related allegation, however, maintained by Murphy, is that this particular length of pipe was defective because it was crazed. I have set out in **Section H2** above the factual evidence related to the crazing and Mr Preece's evidence as to at least one possible cause of that crazing (see in particular paragraphs 238 and 239 above).

256. For the reasons set out below, I consider that, on analysis, the crazing issue is a red herring. I quite understand how and why Murphy raised the point in the first place: the disclosure revealed that part of the pipe that eventually failed had been cut off because it was crazed. Superficially, therefore, that would have indicated that there might well have been a potential problem from the outset with that length of pipe. However, I am satisfied that the rest of the evidence makes plain that there was no such problem.

H3.2. The Factual Evidence

257. The relevant factual evidence is set out at **Section H2** above. Mr Preece confirmed that crazing was something that happened from time to time, usually, as in this case, at the end of the pipe. It was JP's normal practice to cut off the crazed part of the pipe and test it to destruction. I find that this was in accordance with JP's own Operating Procedures Manual. As we know, in this case, the crazed part of the pipe satisfied JP's (reasonable) safety guide value. Mr Preece said that, had he been asked, he would have passed the 4.19 result. He also explained that, if the pipe had not passed the test, "We would immediately have taken another burst from another pipe in the batch". He also said that, if crazing had been found in the middle of the pipe, the entire length in question would have been rejected.

258. There was nothing to say that the remaining part of the pipe which was sent to the Holland Park Project had suffered from any crazing at all; indeed, the inference must be the other way, since the evidence was that, following the test, it was only the crazed part that was cut off. In addition, there was no factual evidence that the crazing of the pipe at one end was linked to a known deficiency in the remaining section of the pipe.

H3.3. The Expert Evidence

259. By reference to ISO 14692, Mr Greateorex accepted that crazing was properly described as "fine hairline cracking at or under surface or laminate". He accepted that there was no reference in BS5480 to crazing, or indeed to visual defects at all. Paragraph 41 of Mr Preece's witness statement was to the same effect: that crazing meant "very fine cracks visible on the surface of the pipe".

260. The highest that Mr Greateorex could put it was that, because there was crazing at one end of this length of pipe, this meant that, in some way, there were "hidden inadequacies" in the rest of the pipe. As I have indicated there was no factual evidence of those hidden inadequacies and neither Mr Greateorex's report, nor his oral evidence, began to explain what those inadequacies might be or how they could be linked to the crazing.

261. By reference to BS 4994, Mr Greateorex was cross-examined about what a manufacturer should do when confronted with crazing. That British Standard was concerned with design and construction of vessels and tanks in reinforced plastics, so it was not of direct applicability, but it was plainly relevant because it was concerned with crazing in receptacles that would contain liquid. Given that BS 5480 contained no reference to crazing at all, I derived assistance from Ms Jefford QC's analysis - by reference to BS 4994 - of a manufacturer's rights and duties, when faced with crazing.

262. In essence, BS 4994 suggested that, if the crazing was on the outer surface (as it was here) 'slight' crazing was permissible without the manufacturer undertaking any repair works at all. If the defects were outside these limits, the BS suggested that the method of repair should be agreed, and the repair carried out. Here there was no evidence as to the extent of the crazing, and whether or not it could be described as greater than 'slight'. More importantly, BS 4994 plainly envisaged that, if the

surface was crazed, it was capable of repair. Crazing did not mean that the whole product had to be scrapped: there was no evidence of any kind to the contrary.

263. Murphy criticised JP because they were not told about the crazing and were not involved in any decision to repair the pipe. But it seems to me that this contention misses the essential point that this pipe was not in fact repaired at all. The part that was crazed was removed altogether and that section of the pipe which was not crazed was delivered in accordance with the contract⁶. It seems to me that, on that basis, JP did as much (if not more) than that which was recommended in BS 4994.

264. Put another way, I regard it as untenable to suggest that the crazing (which may or may not have been 'slight') was dealt with improperly by JP. They cut off the affected part, tested it to a satisfactory pressure, and sent the remainder of the length of pipe to Murphy. In such circumstances, I am confident that there was nothing more that they could or should reasonably have done. I am afraid that I regarded Mr Greatorex's vague evidence about the mysterious (and unparticularised) 'hidden inadequacies', and his refusal to accept some of the rather more obvious points on this topic put to him in cross-examination, as an indication that he was not quite as thoughtful or clear as I would have expected, although this may have stemmed from the fact that, as the cross-examination as to his experience made plain, he had little practical (as opposed to theoretical) experience in the manufacture of GRP pipes. These vague criticisms were also inconsistent with his view that the crazing was caused by 'end effects' and could be discounted for testing purposes in any event.

H3.4. Conclusion As To Crazing

265. For the reasons set out above, I consider that the crazing on the discarded part of the pipe was irrelevant. Whilst I understand why the issue was raised, it seems to me that it was precisely the sort of point which, having been considered by an independent expert, should have been dropped. Without any evidence at all of the "hidden inadequacies", and given the way in which the crazing was actually dealt with by JP, there was nothing in this allegation.

266. Accordingly, my conclusion at paragraph 254 above, that the pipe that was delivered to the Holland Park Project was in accordance with the terms of the contract, remains unaffected by the evidence of crazing. The crazing did not evidence any breach of contract or breach of duty on the part of JP.

H3.5. Conclusion As To GRP Pipe Generally

267. For the reasons set out in the preceding two sections, I have concluded that the GRP pipe that was delivered on the Holland Park Project complied with the terms of the contract when it was delivered and installed. In any event, even if I am wrong about that, for the reasons set out in **Section G** above, it was not any defect in the inherent strength or quality of the pipe that was responsible for the failure; the pipe failed because of the external conditions in which it was operating, namely the void and the alkaline attack. Accordingly, since the existence of the void cannot be said to be JP's responsibility on any view of the contract between the parties, the critical issue is whether the alkaline attack, which ultimately meant the GRP pipe could not maintain the working pressure of 8 bar, was JP's responsibility under the contract.

268. There was, during the trial, a good deal of debate as to whether the design life of 50 years must have encompassed a particular 'design condition'. This was a point which Dr. Eckold made on a number of occasions in his evidence. I did not find that a particularly helpful way of looking at the problems of causation and breach, particularly as BS 5480 makes no mention of 'design condition'. Of

greater assistance was the point made in Ms Jefford QC's closing submissions, at paragraph 77(ii) when, in dealing with the difference between the pipe and the conditions surrounding the pipe, she took the example of an 8 bar pipe which was subsequently 'immersed in a vat of acid' and thereby weakened so it could no longer withstand the internal pressure of 8 bar. Her contention was that, in such circumstances, the pipe supplier would not be liable because something unforeseen had happened during the design life of the pipe which had rendered it incapable of performing in the way that it should have done.

269. It seems to me that this is similar to the approach that I have adopted to causation and breach. On Ms Jefford QC's example, the supplier would not in ordinary circumstances be liable for the pipe's failure to withstand the acid. But, extending her example, the supplier would be liable if he had indicated to the buyer that the pipe was quite capable of resisting the acid attack, or the seller knew that the buyer intended to utilise the pipe in a vat of acid, knew or ought to have known that the acid would destroy the pipe, but kept quiet about it. Coming back to this case, therefore, the critical question becomes: was the alkaline attack something for which JP were liable under the terms of this contract?

H4. Foam Concrete: Breach of Duty To Warn?

H4.1. Introduction

270. For the reasons set out in paragraphs 128-130 above, I have concluded that, pursuant to an implied term of the contract, JP owed to Murphy a duty to warn if, once they became aware that foam concrete was definitely going to be used to backfill the shorter tunnel, they knew or ought reasonably to have known that the foam concrete would have an adverse effect on the GRP pipe. I must therefore consider whether or not JP were in breach of that obligation. I approach that issue by considering the nature and extent of JP's knowledge of the effect of ordinary concrete or grout on the GRP pipe; whether they believed that there was any significant difference between other kinds of concrete and foam concrete; and whether they ought reasonably to have known that there might be any such significant differences.

H4.2. JP's Knowledge Of Concrete Generally

271. The spreadsheet indicating the numerous projects for which JP had supplied GRP pipe included a number which involved the GRP pipe being in contact with or surrounded by concrete. It appears that some, if not most, of these were projects where the pipe rested on concrete anchors or thrust blocks, but there were others where cementitious grout had been used to backfill the tunnel in question. JP did not believe that the close contact between the concrete or grout and their GRP pipe was any cause for concern. As Mr Currie said, JP had used concrete around GRP pipes for 25 years without any perception of a problem. He said that he saw the concrete around the pipe as a "bonus, an improvement on the situation on a pipe which was designed for the working pressure".

272. As noted in paragraph 12 above, Mr Clarke's evidence was that the GRP pipe had been surrounded by concrete "in a number of instances" in the past, and he specifically recalled contracts at Seawardstone, Lea Valley and Headingley in Leeds where the JP GRP pipe was surrounded by grout. He went on to say that "there are several others that I cannot quite recall". In cross-examination he explained that the grout would have gone into the annulus, "in other words, the gap between the pressure pipe and the pipe-jack pipe".

273. There was no evidence of fact that JP had ever been given any reason to worry about or question the inter-action between their GRP pipe and any concrete with which it might be in contact. Indeed the contrary was not suggested to any of JP's witnesses of fact or their expert, Dr Eckold. If there is any doubt about this, Mr Greateorex's report, at paragraph 55.5, reiterates that, in practice, GRP pipes have been used in contact with concrete for many years in the UK with no reported failures that were attributed to an alkaline attack created by the presence of the concrete. He also agreed in cross-examination that he would not have worried about the chemical consequences of the 600mm pipe (in the same tunnel) being surrounded by concrete.

H4.3. JP's Actual Knowledge Of Foam Concrete

274. Save for one possible exception, dealt with below, it was plain that JP had no knowledge in 1999 (or thereafter) of any particular or different characteristics of foam concrete which could have created problems for the GRP pipe. Their position was summarised by Mr Currie, when he said that these terms were used inter-changeably:

"The industry tends to use the terms 'foam concrete', 'concrete', 'grout', if you like basically cementitious-based products, containing cement, which are mixed up in various materials to make a concrete, a grout, a foam grout, a foam concrete."

In other words, JP did not regard foam concrete as being any different to any other kind of concrete or grout which had surrounded their pipe for years. Their evidence was that they had no reason to do so. In this, they were supported by Mr Aldridge, who referred to the use of concrete as a 'standard operation'.

275. The one exception was in relation to the possibility of different curing rates. Mr Clarke said that he was well aware that ordinary concrete contained alkaline until it cured, that it was a product of the wet concrete. He thought that, during curing, the leaching of the alkali might be higher than 11 pH, the figure referred to in the relevant BS. He also agreed that, because foam concrete was wetter than ordinary concrete to start with, it may well take longer to cure, so that the alkaline might be in existence for longer. However, he made plain that he did not think there was any significance in either the 11 pH figure or that potentially different curing rate. He said: "All cementitious materials are alkaline to a high degree when they are first put round the pipe, but that alkalinity reduces once the concrete has cooled and gone hard. It was not an unusual thing for us to do...." He repeatedly stressed that his training and experience had taught him that any alkaline produced by curing concrete was "a temporary condition and that long-term it was not a hazard to the pipe". There was nothing in the other evidence to suggest to the contrary. It also seemed that, in this respect at least, there was no difference between foam concrete and grout.

276. In my judgment, all the evidence on this topic pointed one way: that whilst some at JP involved in the manufacture of these pipes (like Mr Currie) never knew that foam concrete was going to be used at Holland Park, they would not have done anything differently even if they had known. JP did not have any actual knowledge or belief that foam concrete was any different to any other kind of concrete that had been used successfully in conjunction with JP's GRP pipe in the past. Mr Clarke said that he would have advised Murphy if he had thought that foam concrete posed a potential problem, but he had no such knowledge.

H4.4. Should JP Have Known Better?

277. Although it is clear that, as a matter of fact, JP did not know that foam concrete had different properties to ordinary concrete, which might then have had a different effect on their GRP pipe, that would not be enough to provide them with a defence to an allegation of breach of the obligation to warn if, on the balance of probabilities, I conclude that they ought reasonably to have known that the properties of foam concrete were indeed different, and created (or might create) a problem for their GRP pipe. Was foam concrete different and, if so, should JP have reasonably known that it was, and might therefore create the conditions for an alkaline attack on their GRP pipe?

278. I have no doubt that, on the evidence before me, the answer to those questions must be in the negative. First, there was no evidence of any kind to suggest that foam concrete had radically different properties and/or would create the conditions for an alkaline attack on the pipe which would not have existed with structural concrete or grout. Secondly, there was no evidence that, even if foam concrete did have a different effect, this knowledge ought reasonably to have been in JP's possession at the time of the manufacture of this pipe in 1999.

279. Murphy's two experts, Mr Greateorex and Dr. Leek, were both quick to say at the outset of their evidence that they were not experts in foam concrete and had not come across it in any detail themselves. Neither man made any reference to any technical journals or literature, of the kind that one often sees in this kind of defects case, in connection with foam concrete. Nor was there any material in which the Building Research Establishment, or some other construction-based laboratory, warned of the particular properties of foam concrete. Neither Mr Greateorex nor Dr Leek had done their own research into whether or not foam concrete created a greater risk of alkaline attack than structural concrete or grout. There was simply no evidence from the experts on these matters at all.

280. Further, the anecdotal evidence was that no-one, other than the specialist suppliers Pro-Pump, would have known about the particular properties of foam concrete in 1999. Mr Aldridge said that even large civil engineering contractors, like Murphy would not have had such knowledge. Mr Greateorex said that he was unsurprised that Murphy did not know about foam concrete and accepted that he, too, as a pipe expert, had minimal knowledge and experience of it. It is a fair inference that, if Murphy (who are civil engineering contractors and who agreed to use foam concrete) could not reasonably have been expected to have known about the particular properties of foam concrete in 1999, then neither could a pipe manufacturer like JP.

281. Mr Aldridge's evidence did not support a contention that foam concrete would or could create the conditions for an alkaline attack in circumstances where, for example, the use of grout would not. On the contrary, he explained that grout was "more fluid" than foam concrete which, to use his words, was "quite claggy". Taken at face value, this suggested less alkali and/or a shorter curing time when compared with grout. There was other evidence to show that foam concrete was "an alternative to grout with compatible strengths", and Mr Greateorex accepted that he knew that "it can fulfil a similar function".

282. So what was the evidence that JP ought to have done more than they did once they discovered that foam concrete was going to be used at Holland Park? There are two parts of Mr Greateorex's evidence which really constituted the totality of Murphy's case on this point.

283. First, he listed at paragraph 65 of his report a number of matters which, according to him, a reasonably competent pipe manufacturer should have known about the installation of foam concrete in the tunnel. I am not sure that, on the evidence, I can accept all of these points (Mr Greateorex said he would have considered them, but was unclear why), but it does not matter for present purposes because none of these points are concerned with the possibility of the foam concrete acting as an

agent for the alkaline attack, which is all that matters for this part of the case. The matters listed in paragraph 65 of Mr Greateorex's report are all limited to matters of mechanics. He accepted in cross-examination that they were nothing to do with installing foam concrete in a tunnel.

284. The other part of Mr Greateorex's report which is relevant to this point is paragraph 58, in which he sets out his view that, because the foam concrete contained a surfactant (an agent to make it foam) JP should have known that this surfactant would or might contribute to any alkaline attack on the GRP pipe or should at the very least, have taken advice from their resin manufacturer about this point. This view was linked to Mr Greateorex's view that there was considerable significance to be attached to an allegedly longer curing time for foam concrete. There are a number of points that need to be made about this evidence.

285. First, Mr Greateorex accepted in cross-examination that his view (to the effect that the characteristics of foam concrete might mean that the initial high pH would continue for a greatly extended time) was speculation. There was no evidence of any kind to support it. In the absence of any other evidence about the relative curing times, and their effect on pH levels, I can have no further regard to that speculation. Dr Leek indicated that this was not a topic on which he could assist. As to Mr Greateorex's suggestion that a resin manufacturer would or might have been troubled about using a standard resin in conjunction with foam concrete (and therefore a surfactant), he was taken in cross-examination to the single document which he had identified in his report as supporting this opinion, which was a catalogue from a supplier of resins called Scott Bader. When Mr Greateorex was then taken through this document in cross examination, I consider that it was demonstrated beyond any doubt that, depending on the type of surfactant used, a resin manufacturer may well have advised the pipe manufacturer to use the standard orthophthalic resin which JP used here. The resin manufacturer would not necessarily have advised the use of a VE resin at all.

286. Ultimately, Mr Greateorex's evidence on this topic came down to this exchange in cross-examination:

"Q: And after the concrete has cured, it is no longer alkali is it?"

A: As I understand it, it stills leaches out for some time afterwards.

Q: How long?

A: I do not know, but I know it does...

Q: So let us, for a moment take concrete that is not in contact with water or a fluid. Once it is cured, it ceases to be alkali?

A: I do not know, I am not a chemist, but that seems a reasonable supposition.

Q: So again what you know about the alkalinity of concrete is said from the perspective of someone who is an engineer and knows about pipes?

A: Yes."

287. Mr Greateorex effectively accepted that somebody experienced in the composition of pipes would know that, once the concrete in contact with the pipe had cured, there ought to be no problem with alkali; beyond that, he was unable to give any cogent evidence as to the difference (if any) between the levels and rate of alkali produced by normal concrete, and alkali produced by foam concrete. That view accorded with what I have found to be JP's actual knowledge. There is therefore nothing in any

of this to suggest that JP should have done any more when they discovered that foam concrete was going to be used in the shorter tunnel.

288. Dr Leek's evidence was, in one sense, even starker on this issue, because his report did not suggest that JP would have had any reason to believe that foam concrete was any different to any other forms of concrete. He accepted that in cross-examination:

"Q: And no reason, as we saw in your report, to think that its chemical properties are any different from any other concrete?"

A: That's correct. I think there is an agreement that there was an alkaline attack of the GRP.

Q: Yes

A: So I don't know how long that would persist for and what effects it would have."

Again, there was nothing in Dr. Leek's evidence to support the proposition that JP should reasonably have known anything relevant or remotely alarming about foam concrete at all.

H4.5. Should JP Have Used Another Resin?

289. Although I have already touched on this point above, some significance was attached to it in Murphy's closing, so I deal with it separately. It is Murphy's case that JP should have gone to their resin manufacturer with a query once they knew that foam concrete was going to be used, because that resin manufacturer would probably have told them that a vinyl ester resin, not a standard resin, was appropriate.

290. There is no evidence to support such a case. I have already referred to the Scott Bader document, which demonstrates that a resin manufacturer would not necessarily have suggested anything other than its standard resin for use in contact with foam concrete. The Scott Bader document also demonstrated, as Mr Greatorex accepted in cross-examination, that neither the manufacturer nor the resin supplier would necessarily have concluded that the use of a vinyl ester pipe or a vinyl ester resin was required in conjunction with foam concrete.

291. For completeness, I should add that, in my judgment, there was something rather artificial about Mr Greatorex's view that JP should have contacted the resin manufacturer on learning that foam concrete might be used. He agreed that, during his relatively limited experience of working for a GRP pipe manufacturer, he never made any enquiries of any foam concrete suppliers about the chemical properties of the product, and he never consulted any resin supplier about the effect on their resin of foam concrete. In this regard, I accept the points at paragraph 88(iv) of JP's closing submissions: in my judgment, there was simply nothing to trigger the need for JP to seek any such advice.

292. Mr Clarke made plain that, because this was a pipe to be used for potable water, he would not use vinyl ester resin in any event. He repeated that position on two separate occasions and was not challenged about it. It does not seem to me that, on the evidence before me, it could possibly be said that a special or non-standard resin should have been used or that JP should even have sought the advice of their resin manufacturer on the issue.

H4.6 Paragraphs 176-178 of Murphy's Closing Submissions

293. In order to ensure that I have dealt with every aspect of Murphy's case on the duty to warn, I set out below a summary of my conclusions on the points in paragraphs 176 and 178 of their closing submissions. As to the individual matters in paragraph 176:

(1) Mr Clarke thought that a pH in excess of 11 would be produced by foam concrete, but there was no evidence that this was any different to the pH produced by structural concrete or grout. Mr Clarke rather thought not. But the most important thing about this evidence was his view that this was only a limited and temporary condition, on which there was no evidence to the contrary.

(2) JP had not carried out any alkali-related tests on their GRP pipe in the 6 or 7 years prior to 1999. Neither Mr Greatorex nor Dr Leek suggested that they should have done, or that their failure to do so was a breach of the BS. In my judgment, it could not have been. In addition, there was nothing to say what such tests would have demonstrated.

(3) The HOBAS material was of limited relevance, because it was not concerned with foam concrete, or indeed conditions outside the pipe at all. The information was restricted to what liquids could be carried inside the HOBAS pipes, which is a completely different question. Even then, Mr Currie did not accept that a manufacturer would not use orthophthalic resin if there was alkalinity inside the pipe: he said “you might, depending on the level of that alkalinity, depending on the temperature, depending on the exposure.”

(4) Neither Mr Clarke nor Mr Currie had any reason to believe that long-term alkalinity was a hazard to the GRP pipe and, although Mr Lewis made the most of the points he had in his cross examination of both men, he was seriously hampered by the absence of any positive evidence to the contrary from his two experts.

294. Paragraph 178 of Murphy’s closing submissions made a number of points by reference to the evidence of Mr Greatorex, which I have already addressed. I note that Murphy seek to distance themselves from the Scott Bader document, which is understandable in view of Mr Greatorex’s evidence about it, but since Mr Greatorex introduced this material in the first place, and it was the only source of his view that checks should have been made with the resin manufacturer, I do not believe that it can be so lightly dismissed.

H4.7 Conclusion As To JP’s Actual Or Reasonable Knowledge Of Foam Concrete

295. There was no evidence that, beyond the speculation about a possibly longer curing time, foam concrete had any different properties to ordinary concrete. There was no evidence of any difference between foam concrete and grout; indeed the evidence was that they were similar. More importantly, if there were any differences between these different kinds of cementitious grout, there was no evidence that JP either knew or should have known about such differences. In particular, there was nothing to say that JP should have known that, in contrast to ordinary concrete or grout, foam concrete represented a threat of alkaline attack to their GRP pipe. Indeed, as explained above, there was a significant lack of evidence generally about the particular properties of foam concrete in this case.

296. At the conclusion of Ms Jefford QC’s cross-examination of Mr Greatorex on this topic, there was a telling exchange in which Mr Greatorex accepted that a pipe manufacturer would not necessarily have known that there was a significant difference between foam concrete and ordinary concrete, but maintained that the pipe manufacturer should have suspected that there might be. But Mr Greatorex was able to offer no basis for that ‘suspicion’, and he accepted that there was “no body of learning or evidence that pipe has failed in contact with concrete”.

297. In those circumstances, I am quite unable to say that, once JP became aware of the fact that foam concrete was going to be used on the Holland Park Project, there was anything further that they

should have said or done. Their evidence was that they treated foam concrete no differently from any other kind of cementitious material, and its proposed use rang no alarm bells with them. On the evidence before me, I conclude that that was an entirely reasonable attitude for them to adopt. They were not therefore in breach of their duty to warn. Moreover if they did owe a separate **Hedley Byrne** type duty in relation to the exchanges on 26th April 1999, when the proposal to use foam concrete was first identified to them as a possibility in the handwritten Sequence Document 2, they had no reason to give any advice about it, or to pause to re-consider their “recipe” for the GRP pipe.

298. For what it is worth, that constitutes a significant factual difference between this case and **Balmoral v Borealis**, where Christopher Clarke J set out the reasons why, on the facts, Borealis were aware of the purpose in question and aware of the relevant properties of their chemical product. This case is, for the reasons I have explained, entirely different.

299. Accordingly, Murphy’s case as to JP’s failure to act reasonably in warning them about foam concrete must fail, whether that alleged failure is limited to the 26th April exchange or covers the whole of the period of manufacture, supply and installation. For the reasons which I have explained, I consider that JP acted reasonably and were not in breach of their duty to warn. There is no cogent evidence that could have led me to any other conclusion.

300. As I indicated at the outset of this part of my analysis (paragraph 217 above), throughout Murphy’s closing submissions, there was the repeated suggestion that the alkaline attack meant that the GRP pipe did not meet the various quality obligations in the contract (the 8 bar working pressure, satisfactory quality etc). This was really another way of putting Murphy’s default mode: that, because the pipe failed at less than 8 bar, JP must automatically be in breach of contract. I have rejected that approach entirely, because it misses out the key questions: Why did the pipe fail? And was that something for which JP were liable under the contract? To repeat Ms Jefford QC’s analogy, this approach ignores the ‘vat of acid’ problem. The alkaline attack did not give rise to a breach of JP’s duty to warn. Was there any other contractual term of which the alkaline attack rendered JP in breach?

H5. Fitness for Purpose

H5.1 Introduction

301. On the basis of the preceding analysis, the case comes down to this. The GRP pipe in the vicinity of the void was the subject of an alkaline attack. That was the only effective cause of the failure for which JP might be liable in law. But JP were not liable for that attack by reference to any allegation of breach of their duty to warn because they did not know and had no reason to know that there was any difference between foam concrete and any other kind of cementitious material with which their pipes would be surrounded.

302. Thus, Murphy’s last remaining argument must be to the effect that, regardless of all questions of reasonableness, there was an obligation on the part of JP to provide a pipe that was fit for the purpose of being surrounded (at least in part), by foam concrete and that, in the circumstances of the failure as it occurred, JP were in breach of that obligation. This argument would therefore depend on a strict liability on the part of JP, through the operation of the fitness for purpose term.

H5.2. No Fitness For Purpose Term

303. Of course, the first insuperable hurdle faced by this argument is my conclusion that, on either version of the contract that I have found, there was no operable fitness for purpose obligation. I have

set out my reasons in detail at **Sections D1e) and D2e)** above and do not repeat them here. Accordingly, in the absence of a fitness for purpose obligation, the last remaining part of Murphy's case against JP must fail.

304. It is appropriate, however, to stress one aspect of this conclusion. As discussed in **Section D1e)** above, one of the reasons why a fitness for purpose can be an appropriate obligation to imply into a contract of this sort is the situation where the purpose has been made known to the supplier and the buyer is relying on the supplier's judgement and skill in effectively recommending his product for the buyer's particular purpose. Of course, on the evidence before me, and particularly the evidence relating to foam concrete identified in the preceding Section, there could be no question of Murphy relying on JP's reasonable skill and judgment in relation to the chemical inter-action between the GRP pipe and the foam concrete. JP did not know (and had no reason to know) whether the foam concrete had any different properties to ordinary concrete or to cementitious grout, so they did not know (and could not reasonably have known) whether or not there was any risk of alkaline attack to the GRP pipe created by the foam concrete. As I have found on the evidence, there was absolutely no reason why they should have known or even suspected that foam concrete might have a deleterious effect on their GRP pipe. There was therefore no question of JP's judgment or skill on this issue being triggered or relied upon at all.

305. For that reason, therefore, for what it is worth, I am satisfied, on the overall merits of this case, that Murphy have failed to make out a strict liability case against JP in relation to the alkaline attack.

H5.3. A Last Finding

306. There is, however, one last finding which, so it seems to me, I should set out in a little detail in this Judgment. Although it arises only if, contrary to my view, there was a term that the GRP pipe would be fit for the purpose of operating in circumstances where it was surrounded by foam concrete 'to the crown of the tunnel', it does constitute a further tie up between the issues of breach and causation, and provides a further reason why, in my judgement, JP are not liable for the burst water main in fact or in law.

307. Assuming, contrary to all of my previous findings, that there was such a fitness for purpose term, I would conclude that, on the evidence before me, either JP were not in breach of such a term or, if they were, such a breach was not causative of the alkaline attack. My reasons for that final conclusion are set out below.

308. The principal reason for this conclusion comes back to the presence of the void. Dr Leek's evidence was that the void would always have been filled with ground water, because the tunnel lining itself was not water-proof. Dr Leek explained, by reference to the photographs, where a water-mark could be seen on the failed pipe. It seems from this that the water probably sat on top of the pipe and filled the void. In that condition, of course, the concrete around the void would have been permanently wet. The evidence was that it was the wetness in concrete that produced the alkali, which would leach into the water. In a normal situation, following the curing (drying out) of the concrete, the leaching of the alkali would stop. It must follow that the leaching of the alkali would not stop if the concrete was permanently wet, as it would have been in the area of the void.

309. Accordingly, I consider that Ms Jefford QC was right to suggest in her closing submissions that - on the balance of probabilities - the alkaline attack on the pipe in the vicinity of the void was caused by the void itself. That is, of course, another reason why the void lies at the heart of this case. It is the final reason why I have concluded that JP were not liable for the failure.

310. I consider that the other evidence strongly supports this conclusion. I have already referred to the test results from the University of Surrey which indicate that, although there is some evidence of chemical attack to parts of Specimen E (that part of the pipe not taken from the failed area), the average initial failure pressure for the samples tested was in excess of the contractual standard of 14.5 bar, whether or not those samples had suffered from alkaline attack. That is to be contrasted with the specimens taken from the failed pipe, where the chemical attack was much greater, and had the effect of reducing the average initial failure pressure to 11 bar. In my judgment, that demonstrates beyond reasonable doubt that the chemical attack was of much greater significance in the area where the pipe failed than in the adjacent areas, where it did not. On the evidence before me, the only explanation for that difference is the effect of the void and the alkaline production that I consider would inevitably have followed the permanent saturation of the foam concrete around the void. No other explanation was proffered in the evidence for the much more significant nature of the alkaline attack in the area of the void.

311. I acknowledge that the test results show that the pipe in the area of the void had been the subject of some chemical attack even in those areas which were below the void itself (i.e. the bottom half of the pipe). But the ground water will have leaked through the tunnel lining and then sat in the void for years before the failure. If, as Mr Greatorex indicated, the foam concrete contained air bubbles, it is not difficult to imagine the concrete below the void also becoming wet. Of course, there is no evidence to say what the condition of the foam concrete was at that depth in the area of the failure but, for the reasons I have given, the evidence of alkaline attack towards the bottom of the pipe, where there was foam concrete, does not of itself mean that the void was irrelevant to that attack.

312. There is obviously an element of inference about this conclusion, due to the absence of evidence about the foam concrete around the pipe in the area of the failure, and the absence of evidence about the state of the GRP pipe and the foam concrete in other areas away from the failure ⁷. But it is hardly uninformed speculation. Based solely on the University of Surrey test results, there can be no doubt that the pipe in the area of the void was subjected to a much greater alkaline attack than anywhere else. There can also be no doubt that wet concrete produces alkaline when dry concrete does not, and both the concrete and the GRP pipe in the vicinity of the void would have been wet, because of the existence of the void itself. Mr Greatorex expressly accepted that, in those circumstances, the concrete in the vicinity of the void would leach alkali into the water even after the concrete had cured.

313. On the basis of the evidence noted above, I conclude that it is more likely than not that the water in the void caused the particular alkaline attack in that location, which was significantly greater than anywhere else, and was the other effective cause of the failure of the water main.

314. If that is right, of course, then it means that, even if there was a relevant fitness for purpose term, the pipe burst does not show that JP were in breach of such a term or, if they were, that such breach caused the loss. In the areas where the shorter tunnel was filled to the crown with foam concrete, there was no significant alkali attack on the pipe. In my judgment, it was because the foam concrete was not filled to the crown in this particular area that created both of the problems which led to the failure. On my analysis, neither of those effective causes of the burst were nor could be JP's responsibility in law.

I. CONTRIBUTION

315. In the light of my conclusions set out above, there is no need for me to address the issues of contribution.

J. CONCLUSIONS

316. For the reasons that I have given, I am in no doubt that Murphy's claim against JP must be dismissed. The effective causes of the failure were not the result of any deficiency in the GRP pipe itself, but the conditions in which it was operating, namely the void around the burst and the (related) alkaline attack. On any view, JP were not liable for the void and, on my analysis, not liable in law for the alkaline attack either.

317. When stripped to its essentials, this was a claim that depended on a finding that JP were strictly liable for the failure because of the alleged breach of an implied term as to fitness for purpose aimed at the chemical inter-action between the GRP pipe and the foam concrete. There was no factual basis to imply the alleged fitness for purpose provision, and, given the clear absence of any negligence or want of skill or care on the part of JP, no injustice in such a result. JP owed a clear duty to warn but, for the reasons that I have explained, the evidence demonstrated beyond doubt that they were not in breach of that obligation. Moreover, even if there had been a fitness for purpose obligation, there would have been no effective breach because I consider that, on the balance of probabilities, the alkaline attack in the vicinity of the failure was due to the void in the concrete, which provided a permanent source of water and therefore kept the concrete wet and the alkaline production continuing.

318. I would ask the parties to agree the terms of the order following from this Judgment. I will deal separately with all ancillary matters, such as costs, if they cannot be agreed.

¹ In making a number of trenchant remarks about the conduct of that particular case, the judge has said at paragraph 1673: "I wish to place firmly on record that what has happened in this case is in no way typical of litigation in the Technology and Construction Court".

² For example, Mr Robertson did not go back to check whether the other two suppliers were offering pipe which was suitable for potable water. As he accepted, this was because JP's quotation was the lowest and that Thames Water were expecting JP to supply the pipe anyway.

³ The JP terms and conditions were in small type, but not perhaps unusually so.

⁴ That was the same point made by Pro-Pump in their defence to the claim brought against them by Murphy: see paragraph 161 below.

⁵ Indeed, they were not a matter for Pro-Pump either. The failure to backfill the tunnel in the area of the subsequent burst was entirely a matter for Murphy, who were responsible for that backfilling operation.

⁶ It should be noted that Murphy had at one time sought to amend their claim to allege that the pipe that was delivered was also crazed. Such an amendment was hopeless because there was no evidence of any such crazing: in fact, the likely inference was the other way, as set out in paragraph 258 above.

⁷ An absence which Dr Leek, in answer to a question from me, described as "unfortunate", but which was not his responsibility. The materials had been dug out and disposed of prior to his involvement.