

## **In the matter of the Grenfell Tower Inquiry**

### **Witness statement of David Paul Bradbury**

1. My name is David Paul Bradbury.
2. I am currently employed by J S Wright & Co. Limited, Atlas Building, 16 Portland Street, Birmingham B6 5RX and I shall refer to them as "JSW" or "the Company".
3. I have worked with JSW since April 2014.
4. JSW is a building services engineering company and I am authorised by the Company to make this witness statement.
5. This is my first witness statement prepared to assist the Chairman of the Grenfell Tower Inquiry.
6. I have not made any witness statement to the Metropolitan Police Service.
7. In this witness statement I will provide some background information about the work undertaken by JSW and details of my involvement in the Grenfell Tower refurbishment.
8. I have worked in the building and construction since about 1999 and have an HNC, ONC and BSc (Hons) in building services.
9. At the time of my involvement in the Grenfell Tower refurbishment, I was a senior design engineer. I was involved in developing designs for residential and commercial buildings. This was very much a client facing role and I would regularly attend meetings with clients, consultants, architects and other professionals involved in a project.
10. My current job title is design manager and although I am still involved in design work, I am also involved in managing the design team.
11. Soon after I started work with JSW I was aware of Grenfell Tower as a potential project. I did not become formally involved in the Grenfell Tower refurbishment until JSW had been awarded the M&E sub-contract.

12. During the early stages of my involvement, I saw various documents such as tender and contract drawings and equipment specifications. These had been prepared by others including Max Fordham (the TMO's consultants) and StudioE (the architects).
13. JSW has offices in Birmingham and London and the Grenfell Tower refurbishment was a project run from London. However, Birmingham was and is the Head Office where a lot of JSW's core services, such as estimating, design, quality control, accounts and the Aftercare department are located. I worked, and still work in the Birmingham office.
14. My immediate supervisor in Birmingham was Terence McLaughlin, although he was only really involved in the very early stages of the project. His direct supervisor was Paul Featherston, a director in the London office.
15. Working alongside me in the design team in Birmingham were CAD (Computer Aided Design) engineers. They prepared drawings based on information and designs which had been signed off by Max Fordham. The CAD team did not have any design function and I checked that they had prepared the drawings in accordance with the approved specification.
16. It may be helpful to briefly explain the roles of some of the organisations involved in the refurbishment as this applied to the design element of the project.
17. Rydon Maintenance Limited (Rydon) was JSW's client and the ultimate project client was the Kensington and Chelsea Tenancy Management Organisation (TMO). They instructed Max Fordham as their consultants for the project. Max Fordham prepared a schedule of mechanical equipment which provided the specifications for the various pieces of equipment to be installed as part of the M&E work.
18. That schedule and the initial drawings were sent to JSW by Rydon and formed the basis of JSW's tender.
19. All changes to the specifications or equipment, design or method of working needed to be approved by Max Fordham.
20. In addition, some elements of the M&E work required approval from the Royal Borough of Kensington and Chelsea Building Control department (Building Control).

On this project this applied particularly to the dry rising main (“dry riser”) and to the smoke control system (sometimes referred to as the ‘AOV’ system).

21. JSW carried out the M&E work in two main ways; using its own direct labour and, for the more specialist work, by engaging experienced and specialist sub-sub-contractors (SSCs).
22. The direct labour force carried out works such as installing pipework for the flow and return water system and the boosted cold water system. This pipework ran vertically up the central core of Grenfell Tower and branched out horizontally at each floor where the pipes were taken into the individual flats. Where holes were cut to take the pipework into the flats, they were cut by and fire stopped by contractors appointed by Rydons.
23. Perhaps of greater relevance to the Inquiry's investigation is the work undertaken to the dry riser and the smoke control system. In each case, I was predominantly involved in the early stages of the project and then as required.
24. I attended design team meetings on site at which various elements of the work, progress and any issues were discussed.

## Dry Riser

25. The extent of the work to the dry riser was prescribed by Max Fordham in a schedule of Employer's Requirements (ERs) dated 16<sup>th</sup> October 2013. On the JSW system this is also referred to as Employer's Requirements for MEP Services dated 19<sup>th</sup> November 2013. This was one of the documents sent by Rydon to JSW for use by JSW in providing its initial tender.
26. The description of the work was DPB/1: \_\_\_\_\_):

“The existing dry-riser system shall essentially remain unaltered with modifications to suit the new areas at podium level. The inlet valve shall be relocated to a point on an external wall. New landing valves shall be provided where indicated on the drawings.”

27. There were three elements to the dry riser works carried out at Grenfell Tower: minor modification of the existing dry riser as required; extending the existing dry riser from level four to ground floor level (as part of the reconfiguration of the lower levels of Grenfell Tower including new flats and communal spaces) and moving the inlet breeching valve from the original location on the fourth floor to ground floor level (the new inlet valve was installed on the south elevation of Grenfell Tower to the left hand side of the main entrance door).
28. The work to the dry riser was quite a small, albeit important, element of the M&E parcel of work. The work was undertaken by one of JSW's specialist SSCs, Argus Fire Protection Co. Limited (Argus Fire).
29. As with all projects, JSW receives its instructions from the client or the client's representatives and then it provides instructions to its SSCs by means of a works order which is then subject to variation as required. In the Grenfell Tower refurbishment, Max Fordham and Rydon told JSW what work was required and JSW provided a works order to Argus Fire which was then subject to a variation. I was not involved in the preparation of the works order or variation for the dry riser.
30. It is inevitable that issues arise on any building project. This may relate to a piece of equipment, a design element, a method of installation or to the need to obtain consent or approval for an item of work. Where this occurs, JSW raises a Request for Information (RFI) which is then answered by the appropriate person.
31. In this project I was the JSW liaison person for collating and submitting RFIs relating to the M&E work to Rydon.
32. One of these RFIs at Grenfell Tower related to the dry riser.
33. My involvement with the dry riser was very much at the start of the project and primarily related to whether the existing dry riser should be replaced with a new wet riser. I will provide some detail around this but in the end Building Control advised that a wet riser did not need to be installed.
34. The reason for JSW's concern was that building regulations stipulated that buildings above a certain height must have a wet riser.

35. On 6<sup>th</sup> August 2014 I sent an e-mail to Simon Lawrence (Rydon) attaching an RFI (listed as number 6 on the Register of Requests for Information) in which I wrote DPB/2:                   ):

“Hi Simon,

Further to our telephone conversation regarding concerns over the dry riser at Grenfell Tower, please see attached RFI 006.”

36. The attachment was a standard JSW form used for submitting RFIs which stated:

“Can we request confirmation that building control and the fire officer have been consulted regarding the modifications to the existing dry riser?

It is a building regulations requirement to have wet risers in buildings above 50m (approximately 20 floors), we will therefore need to ensure we have building control and fire officers agreement that the existing dry riser is acceptable as Grenfell Tower is 24 storeys high.

The installation of a wet riser will involve the installation of tanks and additional pumps”.

37. I asked for a response by 14<sup>th</sup> August 2014.
38. This issued was also raised at the first design team meeting held at Grenfell Tower on 13<sup>th</sup> August 2014. The meeting was attended by representatives of the main organisations involved in the refurbishment including Rydon, Studio E, RJ Electrics (JSW’s SSC undertaking the electrical element of the M&E parcel of works), Curtins (the project engineers), Harley Façades as well as myself and colleagues from JSW.
39. The issue is recorded at clause 4.31 of the minutes of the meeting DPB/3:                   );

“DB highlighted concerns around the Dry Riser alterations and whether building Control would enforce the system to be upgraded to a Wet Riser. Communication with the building Control Officer required asap.”

40. I am the 'DB' referred to in that note.
41. The dry riser issue was also discussed at a JSW internal meeting which took place on the following day, 14<sup>th</sup> August 2014 DPB/4: ).
42. The second design team meeting on site took place on 2<sup>nd</sup> September 2014 and clause 4.51 of the minutes records DPB/5: );

"An email conversation has happened between DB and building control Officers John Hoban and Paul Hanson with the response confirming that the system can stay as a Dry Riser as no additional floors (in height) are being added to the system".

43. Again, I am the 'DB' referred to. I believe that note was added to the minutes after the meeting as I had an e-mail discussion with building control on 2<sup>nd</sup> and 3<sup>rd</sup> September 2014. The minutes of that meeting were issued by Simon Lawrence on 3<sup>rd</sup> September 2014.
44. In the usual course of events communication with organisations such as building control would be made by the main contractor; Rydon in this case. However, on 1<sup>st</sup> September 2014, Simon Lawrence (Rydon) had said that I could contact building control directly and that he would discuss the dry riser issue on my behalf at the meeting which took place on 2<sup>nd</sup> September 2014 DPB/6: ).
45. The upshot of my e-mail communication with building control was an e-mail from Paul Hanson (Senior Building Control Surveyor (Fire Regulations)) to me dated 3<sup>rd</sup> September 2014 in which he said DPB/7: );

"This sounds like a matter of control rather than a technical question. I have spoken with John Hoban the area surveyor, who would normally deal with matters on control, and he agreed in this instance with my sending you this response.

Essentially the building regulations cannot require you to improve the system to serve the existing floors over 50m.

The regulations only apply to the work being carried out and additionally you must not adversely affect the existing building.”

46. JSW took this to mean that a wet riser was not necessary and the works to the dry riser must not make the system any worse than it had been prior to the refurbishment. This information was relayed to the relevant people involved in the project.
47. In effect this gave JSW, and therefore Argus Fire, the official ‘green light’ to proceed with the dry riser works.
48. As mentioned above, the dry riser inlet valve was installed on the south elevation at ground floor level. The original design from Max Fordham was for the dry riser inlet valve to be at ground level on the east elevation of Grenfell Tower.
49. Discussions took place in 2015 about moving the dry riser inlet valve from the east elevation to the south elevation. This could not happen without it being approved by Max Fordham.
50. I cannot recall who was involved in the discussions about relocating the dry riser inlet but Matt Smith of Max Fordham, sent me an e-mail dated 12<sup>th</sup> August 2015 in which he said DPB/8:                   );

“Afternoon Dave

Further to our telephone conversation regarding the dry riser inlet valve; as long as the proposed position is within 18m of the fire appliance and clearly visible from this position then we are happy with a location on the South façade rather than the East as we had indicated previously.”

51. On the same day I informed Rydon (Simon O’Connor and Jason North) by e-mail and stated that I would update the drawings to suit. This was done by JSW’s CAD team.
52. I sent an e-mail to Max Fordham, Studio E, Curtins and Rydon dated 26<sup>th</sup> November 2015 attaching the updated drawings showing the finalised dry riser positions and pipe routes DPB/9:                   ). I asked to be provided with any comments by 27<sup>th</sup> November 2015 and if I did not hear from them JSW would assume that there were no

adverse comments and the work would proceed. No comment were received and works proceeded accordingly.

53. In early 2016 during the latter stages of the project the dry riser was out of action for a short while and I understand that the London Fire Brigade (LFB) attended site to discuss contingency arrangements in the event of a fire or other emergency occurring during that time.
54. Although I was not directly involved in any testing of the dry riser system, I understand that it was tested by Argus Fire and was passed as being fit for purpose.

#### **AOV/Smoke control system**

55. The refurbishment of the existing smoke control system at Grenfell Tower was part of the M&E parcel of work.
56. Prior to JSW being appointed as the M&E sub-contractor on the Grenfell Tower refurbishment, PSB had been involved with Max Fordham in connection with the design of a suitable system for Grenfell Tower.
57. The smoke control system was a life safety element of the M&E work and as such required approval by building control.
58. The detail of the system is very technical and outside the scope of JSW's, and my personal, experience and expertise hence the need to appoint a specialist SSC.
59. However, I can say that on 22<sup>nd</sup> October 2014 I spoke with Paul Hanson at Building Control and he indicated to me that the new system must be "no worse" than the existing system. I passed this information to Matt Smith at Max Fordham.
60. Other JSW witnesses will provide information about the smoke control system, particularly in relation to witnessing, demonstration, commissioning and certification. I will set out my involvement with this work.
61. PSB prepared a document entitled, "Smoke Ventilation Technical submission for Lobby Smoke Control Systems and Grenfell Tower Apartments, London."

62. The original submission was dated 12<sup>th</sup> November 2014 and it went through several revisions and the final revision was Revision 6 dated 15<sup>th</sup> March 2016.
63. On 25<sup>th</sup> June 2015 Revision 3 of the Technical Submission (dated 12<sup>th</sup> June 2015) was signed off as approved by Building Control. This gave JSW, and others involved in the project, comfort that the system had been scrutinised by Building Control and the design had been passed as being fit for purpose at Grenfell Tower.
64. As this was a very technical element of the work, JSW did not become involved in the detail of the workings of the system. In the early stages, I was involved in meetings with PSB and others and I generally acted as the JSW liaison person between PSB and Rydon, Max Fordham and others. From a design perspective I needed to be involved to ensure that the system fitted in with the overall M&E parcel of work.
65. I had a lot of dealings with Hugh Mahoney of PSB and it was very clear to me, even from my earliest involvement, that he was extremely knowledgeable about smoke control systems.
66. The essential purpose of the system was to keep smoke out of the stairwell by controlling smoke in the affected lobby. Any smoke in the affected lobby would be extracted from the affected lobby into shafts on the north and south sides of the building and out of the Tower at roof level (via the north shafts) and at level 2 above the main entrance door (via the south shafts).
67. This provided a safe means of egress for residents on the floor affected by fire or smoke to make their way to the stairwell. It also allowed a safe means of ingress for fire fighters.
68. Prior to the refurbishment, Grenfell Tower had a natural ventilation system. In the event of a fire, the fire brigade could manually override the system.
69. One important feature of the PSB designed system as approved and installed at Grenfell Tower is that it activated automatically upon detection of smoke by one of the smoke detector heads located in each lobby area.
70. Once activated on that floor, this set in motion a series of events: all dampers on the affected floor opened; all dampers on other floors closed; the smoke extract fans were

engaged (at roof level and at level 2); the environmental function was overridden; an automated emergency message was sent to the appointed remote monitoring company (Tunstall in the case of Grenfell Tower who would then alert the emergency services); a signal was also sent to the Building Maintenance System (BMS) panel which dropped power to the gas solenoid in the basement effectively cutting off the gas supply to the existing boilers (not worked on by JSW) and the new boilers (installed by JMC Mechanical Services Limited as part of the M&E work).

71. The actual mechanics of how the system operated is set out in the PSB Technical Submission, as approved by Building Control, but the above is a brief explanation of how I understand the system was intended to function.
72. The smoke control system incorporated a manual override system to enable someone, for example a caretaker or fire fighter, to change from automatic to manual mode and change the floor on which the system operated.
73. The two main visual representations of the smoke control system were a red AOV or smoke panel located in the main entrance lobby and a small yellow key switch located in the lobby area on each floor.
74. The red AOV/smoke panel is referred to as an HMI panel (Human Machine Interface) or a 'mimic panel'. It contained various pieces of information that allowed someone to interrogate the system to identify where it had been activated (e.g. on which floor). It also contained instructions for how the system could be switched to manual override as well as how to re-set the system to revert to automatic mode once there was no longer a need for the system to be operating in smoke mode or following a test.
75. I should perhaps point out that I would not call that red panel a 'fire panel' or 'fire alarm panel'. This might suggest that there was a fire alarm but there was no communal audible fire alarm system at Grenfell Tower.
76. The PSB smoke control system was specifically designed to open the dampers on one floor only.
77. This was based on the general assumption that a fire would only occur in one location or on one floor and that the smoke control system was needed to allow residents

78. I will now set out some of the events that related to my involvement with the AOV/smoke control system.

79. The initial specification for smoke control was set out in the Max Fordham equipment specification/Employer's Requirements dated 16<sup>th</sup> October 2013/19<sup>th</sup> November 2013 (pages 34-36).

80. The following is taken from that document DPB/10:                                 );

It is not viable to adapt the existing system to comply with current standards. Given the physical constraints of the existing building, the design approach has therefore been to retain the existing system and replace all of the existing components with new, equivalent or better components.”

- JSWC JSW00001932/11

85. The document provides a flow rate analysis of the Existing Natural Ventilation, the Existing Mechanical Ventilation (manual override) and Proposed Mechanical Ventilation (automated) and states that the results show that flow rate of 5 m<sup>3</sup>/s for the proposed automated system will considerably improve the system (see page 6 of 6).
86. The PSB Technical Submission document, Revision 0 dated 12<sup>th</sup> November 2014 was issued.
87. On 24<sup>th</sup> November 2014, I attended a meeting to discuss the smoke control system at Building Control's offices. This was one of several meetings that took place to discuss the AOV system at Grenfell Tower.
88. The PSB Technical Submission document, Revision 1 dated 1<sup>st</sup> December 2014 was issued. This was due to the incorporation of Phase 2 details (creation of an automated mechanical system).
89. On 5<sup>th</sup> January 2015 I submitted the PSB Technical Submission, Revision 1, along with the technical data sheets for the relevant equipment, to Max Fordham (Matt Smith) DPB/12: ).
90. On 19<sup>th</sup> January 2015, I sent an e-mail to Paul Hanson and John Hoban (Building Control) saying:
- "Further to our meeting and ongoing discussions regarding the AOV system at Grenfell Tower, we have the pleasure of submitting the technical submission from our specialists PSB.
- On review of the attached, if you have any comment or questions please do not hesitate to contact me."
91. PSB wrote to me on 23<sup>rd</sup> January 2015 attaching their quotation for the supply, delivery and commissioning of the controls package for the refurbished smoke control system at Grenfell Tower DPB/13: ). PSB's quotation included checking the operation of the system in accordance with the cause and effect chart, taking airflow

velocity readings across open lobby doors, production of test records/certificates for the system, production of a certificate of conformity and one day for client training.

92. PSB wrote to me on 2<sup>nd</sup> February 2015 attaching details for the additional work required to convert the natural ventilation scheme (Phase 1) to a full mechanical system (Phase 2) DPB/14: ).
93. On 4<sup>th</sup> February 2015, I provided an update to JSW colleagues in relation to the PSB AOV costs. Two items are relevant:
1. There was a large cost increase occasioned by the client's (TMO) decision to change the offices to apartments requiring the AOV shaft to be extended by 3 floors and the consultants design was not passed by building control. The consultant issued a revised smoke vent report after the tender period which involved changing smoke vent flow rates from 0.43 to 5m<sup>3</sup>/s (the report was written by the consultant using the technical advice from PSB); and
  2. JSW had approached other specialist contractors to provide a quotation for the AOV/smoke control system but JSW received insufficient responses. As such JSW agreed with Rydon and the consultant (Max Fordham) to "push forward using PSB DPB/15: ).
94. On 23<sup>rd</sup> February 2015 I wrote to Zak Maynard (Rydon) providing him with a full breakdown of the AOV works and the additional costs resulting from the design changes (the information having been provided to me by PSB DPB/16: ):
- Fan increase from 0.42 m<sup>3</sup>/s to 5 m<sup>3</sup>/s
  - All smoke fans will now be smoke extract, duty standby
  - As the smoke fans are noisier (Due to tip plate clearance to allow the propeller to expand during smoke extract) the environmental fans will need to be separate
  - Pressure switches on every floor
  - Addition controls and commissioning (Commissioning will require all pressure switches to be tested, air flow across every door, flow rate checks on both smoke and environment fan systems)



2. The paragraph stated; "I should be noted that as the system is designed to extract air from the lobby, via the open stairwell door, the system is not designed to comply with the aforementioned Code of Practice".
102. The Code of Practice refers to BS EN 12101 Part 6; Specification for pressure differential systems.
103. I finished the e-mail by saying to Hugh Mahoney that if we could respond quickly we can avoid him rejecting the TS. I was not getting involved in the technicalities of the system but simply relaying information from Building Control to PSB.  
DPB/19:                    )
104. That paragraph was deleted from the PSB Technical Submission which became Revision 3 dated 12<sup>th</sup> June 2015.
105. On 24<sup>th</sup> June 2015 Paul Hanson (Building Control) sent me an e-mail, copied to Hugh Mahoney (PSB), John Hoban (Building Control) and Neil Crawford (Studio E). In the e-mail, Paul said;

"Hi Dave,

Please find attached my comments regarding the smoke control system for the stairway lobbies; the proposals for which are satisfactory."

106. The comments were included in a memorandum from Paul Hanson to John Hoban dated 24<sup>th</sup> June 2015 relating to the PSB Technical Submission Revision 3 dated 12<sup>th</sup> June 2015. The memorandum stated DPB/20:                    ):

"I make the following comments using Approved Document B and, where appropriate, BS 9991.

The proposals outlined in the Smoke Ventilation Technical submission PSBUK1143-12 rev 3 are satisfactory.

1. I note that there is the intention to bring the ventilation system down to also serves the existing ground level lobby adjacent to the lifts and switch room.

2. Final details of the key switch arrangements should be submitted when finalised.
  3. Generally the components of the system should conform to the Guidance on Smoke Control to Common Escape Routes in Apartment Buildings (Flats and Maisonettes) Revision 1: June 2012 listed in section 11.3.”
107. From a JSW perspective this told us that the smoke control system as presented in the PSB Revision 3 Technical Submission had been approved by Building Control.
108. On 24<sup>th</sup> June 2015, I sent an e-mail to Rydon, Max Fordham, and PSB stating:
- “All, Please note we have now received written confirmation off Building Control with approval for the proposed AOV system at Grenfell Tower.
- There are 3 minor comments/notes as listed on the attached.”
109. On 24<sup>th</sup> June 2015, Simon O’Connor (Rydon) sent me an e-mail in which he provided formal instructions to proceed with the AOV works DPB/21: ).
110. This was clarified in an e-mail dated 25<sup>th</sup> June 2015 received from Zak Maynard (Rydon) in which he confirmed Rydon’s instructions to proceed with the works including the required design change for Building Control Approval (based on 5m3/s) and that Rydon were waiting for instruction from their client with regard to the cost of the work to the additional floors.
111. As matters progressed, on 15<sup>th</sup> July 2015, I received the revised drawings from PSB which I forwarded to Matt Smith of Max Fordham. He responded by raising some questions which I asked PSB to respond to. Hugh Mahoney of PSB provided the necessary answers which I then forwarded to Matt Smith. This is an example of how I, and JSW, were involved in facilitating the works by providing a link between PSB and Max Fordham.
112. Hugh Mahoney’s e-mail may be helpful in explaining some aspects of the smoke control system. Matt Smith had asked about the low-level discharge of smoke (walkway + 1) as he assumed that all smoke discharge was to be at roof level. Hugh replied by saying that smoke discharge from a smoke control system can be at any level



117. However, in order to provide an element of continuity with issues concerning the smoke control system, I can say that following various communications involving PSB, Max Fordham, Rydon, JSW, Silcock Dawson, John Rowan and Partners in early 2016, the PSB Technical Submission was subject to minor revisions 4 (12<sup>th</sup> February 2016), 5 (24<sup>th</sup> February 2016) and 6 (15<sup>th</sup> March 2016).
118. None of the revisions 4, 5 or 6 significantly changed the design, installation and intended operation of the smoke control system. Revision 6 is the final revision to the PSB Technical Submission for the Smoke Control System at Grenfell Tower.
119. Once the smoke control system had been installed, it was subject to testing, witnessing, demonstration, commissioning and certification. I was not involved in those processes and I understand that some information about that will be provided by my colleague, Alan Whyte.
120. Finally, I would like to mention two other matters.
121. The specification for the extract fans fitted to the kitchen windows of the flats at Grenfell Tower had been provided by Max Fordham. I received an e-mail dated 8<sup>th</sup> May 2015 from the fan supplier, Fans Direct Limited (Nuairé) confirming that the fans were suitable for installation into high rise apartments. This issue was the subject of a Request for Information and is listed as item 16 on the Request for Information Register.
122. Some of the items of the M&E work required the production of a technical submission relating to the work or to equipment to be used. These were sent to Max Fordham for comment and approval. As with the Requests for Information, I was responsible for collating these, submitting them to Max Fordham and listing them in the Technical Submission Register.
123. The Register was updated as required. By way of example, in relation to the AOV system, the Technical Submission was issued by PSB and was sent to Max Fordham. The Register records, "Building Control Approval? Schematic?". The Register was updated to read; "Building Control gained on the 24/6/15. Drawings issued from PSB".

124. I am willing for this witness statement to form part of the evidence before the Inquiry and published on the Inquiry's website.

I believe that the facts stated in this witness statement are true.

Signed:

D. Bradbury

Dated:

26<sup>th</sup> OCTOBER 2018