

## **AIR RAID SHELTERS**

Air raid shelters are structures for the protection of non-combatants as well as combatants against enemy attacks from the air. They are like bunkers in many regards, although they are not designed to defend against ground attack (but many have been used as defensive structures in such situations).

### **Pre-Second World War.**

Prior to World War II, in 1924, an Air Raid Precautions Committee was set up in the United Kingdom. For years, little progress was made with shelters because of the irreconcilable conflict between the need to send the public underground for shelter and the need to keep them above ground for protection against gas attacks. In 1935, every city in the country was given a document to prepare air raid shelters. In February 1936, the Home Secretary appointed a technical Committee on Structural Precautions against Air Attack.

By November 1937, there had only been slow progress, because of a serious lack of data on which to base any design recommendations and the Committee proposed that the Home Office should have its own department for research into structural precautions, rather than relying on research work done by the Bombing Test Committee to support the development of bomb design and strategy. This proposal was eventually implemented in January 1939.

During the Munich crisis, local authorities dug trenches to provide shelter. After the crisis, the British Government decided to make these a permanent feature, with a standard design of precast concrete trench lining. Unfortunately, these turned out to perform very poorly. They also decided to issue free to poorer households the Anderson shelter, and to provide steel props to create shelters in suitable basements.

### **The Second World War.**

During World War II, many types of structures were used as air raid shelters, such as cellars, Hoch bunkers (in Germany), basements, and underpasses. Bombing raids during World War I led the UK to build eighty specially adapted London Underground stations as shelters. However, during World War II, the government initially ruled out using these as shelters. After Londoners flooded into underground stations during The Blitz, the government reversed its policy. The UK began building street communal shelters as air raid shelters in 1940. Anderson shelters, designed in 1938 and built to hold up to six people, were in common use in the UK. Indoor shelters known as Morrison shelters were introduced as well.

Cellars have always been much more important in Continental Europe than in the United Kingdom and especially in Germany almost all houses and apartment blocks have been and still are built with cellars. Air-raid precautions during World War II in Germany could be much more readily implemented by the authorities than was possible in the UK. All that was necessary was to ascertain that cellars were being prepared to accommodate all the residents of a building; that all the cellar hatch and window protections were in place; that access to the cellars was safe in the event of an air raid; that once inside, the occupants were secure for any incidents other than direct hits during the air raid and that means of escape was available.

### **United Kingdom and Cellars and Basements.**

The inadequacies of cellars and basements became apparent in the firestorms during the incendiary attacks on the larger German inner cities, especially Hamburg and Dresden. When burning buildings and apartment blocks above them collapsed in the raging winds (which could reach well over 800 °C), the occupants often became trapped in these basement shelters, which had also become overcrowded after the arrival of inhabitants from other buildings rendered unsafe in earlier attacks. Some occupants perished from heat stroke or carbon monoxide poisoning.

Cellars in the UK were mainly included only in larger houses, and in houses built up to the period of the First World War, after which detached and semi-detached properties were

constructed without cellars, usually to avoid the higher building costs entailed. Since house building had increased vastly between the wars, the lack of cellars in more recent housing became a major problem in the Air Raid Precautions (ARP) programmes in the UK during World War II.

Alternatives had to be found speedily once it became clear that Germany was contemplating air raids as a means of demoralising the population and disrupting supply lines in the UK. Initial recommendations were that householders should shelter under the stairs. Later, authorities supplied materials to households to construct communal street shelters and Morrison and Anderson shelters.

### **Basements.**

Basements also became available for the use of air raid shelters. Basements under factory premises, schools, hospitals, department stores and other businesses were utilised. However, these ad hoc shelters could bring additional dangers, as heavy machinery and materials or water storage facilities above the shelter, and insufficient support structures threatened to cause the collapse of basements.



There was a huge shelter under Wilkinson's lemonade factory in North Shields. It could hold over two hundred. The shelter had three rooms, one was a smoking room, and each was equipped with bunk beds. Critically the ceiling was not reinforced and so at 11.12pm on Saturday May 3<sup>rd</sup>, 1941, when a single bomb directly hit the shelter, one hundred and seven people were killed, forty-one of whom were children when heavy machinery fell through the ceiling of the basement in which they were sheltering. However, Ellen Lee, the ARP warden for the shelter bravely rescued thirty-two people from the explosion, despite having been badly burnt

herself. It was the worst bombing incident in this part of the country during World War Two.

Air raid shelters were built to serve as protection against enemy air raids. Existing edifices designed for other functions, such as underground stations (tube or subway stations), tunnels, cellars in houses or basements in larger establishments and railway arches, above ground, were suitable for safeguarding people during air raids. A commonly used home shelter known as the Anderson shelter would be built in a garden and equipped with beds as a refuge from air raids.

### **Railway arches and subways (underpasses).**

British cities, prepared for use of railway arches and underpasses in 1935. And railway arches and subways were operationalized for air raid protection during World War II. Railway arches were deep, curved structures of brick or concrete, set into the vertical sidewalls of railway lines, which had been intended originally for commercial depots, etc. The arches were covered usually with wooden or brick screen- or curtain walls, thus giving a considerable amount of protection against air raids – provided, of course, that railway lines were not the prime target of the attack at the time and so being more likely to suffer from direct hits.

Each arch could accommodate anything from around sixty to one hundred and fifty people. However, fewer people could find shelter at night as sleeping areas for the occupants took up

more of the space available – a limitation applying to any other type of shelter as well. Subways were actual thoroughfares also in the shape of arches, normally allowing passage underneath railway lines.



People smile for the camera on and around the bunks that are lined up under the clearly visible roof of a Southeast London railway arch, in November 1940.

In the background, the ladies' lavatory can be seen. It is not possible to identify which of the many railway arches used as air raid shelters during the Second World War is featured in this sequence of photographs, although it is probable that it is at Dockley Road in Bermondsey. Stainer Street Arch and Druid Street Arch.



### **London Underground stations**

Prior to the beginning of the war, shelter policy had been determined by Sir John Anderson, then Lord Privy Seal and, on the declaration of war, Home Secretary and Minister of Home Security. Anderson announced the policy to Parliament on 20<sup>th</sup> April 1939, based on a report from a committee chaired by Lord Hailey. This reaffirmed a policy of dispersal and eschewed the use of deep shelters, including the use of tube stations and underground tunnels as public shelters.



Reasons given were the spread of disease due to the lack of toilet facilities at many stations, the inherent danger of people falling onto the lines, and that people sheltering in the stations and tunnels might be tempted to stay in them day and night because they would feel safer there than outside the stations.

**Underground – 13<sup>th</sup>**



**September 1940.**



Official policy had been to prevent Londoners sheltering in Tube stations, one of the reasons being that people and goods needed to be kept moving during the Blitz.

But on the first night of bombing East Enders bought tickets for short journeys and defiantly refused to come up again. Thousands camped in cold, crowded, and fetid conditions.

By mid-September it was obvious to the authorities that to enforce a ban on sheltering in the Tube would risk ugly confrontations and a collapse in morale.

**14<sup>th</sup> October 1940 -  
Balham**

A bomb falls on Balham High Road above the intersection of Tube tunnels, killing sixty-eight people sheltering in the station, including the stationmaster.

A number 88 bus lies in a crater in Balham High Road.

Many of the Balham victims were drowned by sludge and sewage from fractured pipes. It was now clear that nowhere was safe from a direct hit. Most people sheltered in corrugated iron Anderson shelters in their back gardens, brick-built



public shelters, or designated air raid shelters – usually the basement of an office block or public building. Bridges, railway arches and cellars were also sought out, and an estimated 15,000 Londoners colonised Chislehurst caves in Kent each night.

None of these concerns had been borne out by experience during the bombing raids of the First World War, when eighty specially adapted tube stations had been pressed into use, but in a highly controversial decision in January 1924, Anderson, then chairman of the Air Raid Precautions Committee of Imperial Defence, had ruled out the tube station shelter option in any future conflict.

**An Air raid shelter in a London Underground station in London during The Blitz.**



Following the intensive bombing of London on 7<sup>th</sup> September 1940 and the overnight raids of 7/8<sup>th</sup> September, there was considerable pressure to change the policy but, even following a review on 17<sup>th</sup> September, the government stood firm. On 19<sup>th</sup> September, William Mabane, parliamentary secretary to the Ministry of Home Security, urged the public not to leave their Anderson shelters for public shelters, saying it deprived others of shelter. "We're going to improve the amenities in existing shelters", he promised. "We're setting about providing better lighting and better accommodation for sleeping and better sanitary arrangements." The Ministries of Home Security and Transport jointly issued an "urgent appeal", telling the public "to refrain from using Tube stations as air-raid shelters except in the case of urgent necessity".

However, the government was then confronted with an episode of mass disobedience. Over the night of 19/20<sup>th</sup> September, thousands of Londoners

were taking matters in their own hands. They had flocked to the Tubes for shelter. At some stations, they began to arrive as early as 4pm, with bedding and bags of food to sustain them for the night. By the time the evening rush hour was in progress, they had already staked their "pitches" on the platforms. Police did not intervene. Some station managers, on their own initiatives, provided additional toilet facilities. Transport Minister John Reith, and the chairman of London Transport, Lord Ashfield, inspected Holborn tube station to see conditions for themselves.

The government then realised that it could not contain this popular revolt. On 21<sup>st</sup> September, it abruptly changed policy, removing its objections to the use of tube stations. In what it called part of its "deep shelter extension policy", it decided to close the short section of Piccadilly line from Holborn to Aldwych, and convert different sections for specific wartime use, including a public air raid shelter at Aldwych. Floodgates were installed at various points to protect the network should bombs breach the tunnels under the Thames, or large water mains in the vicinity of stations. Seventy-nine stations were fitted with bunks for 22,000 people, supplied with first aid facilities and equipped with chemical toilets. 124 canteens opened in all parts of the tube system. Shelter marshals were appointed, whose function it was to keep order, give first aid and assist in case of the flooding of the tunnels.

### **Anderson Shelter**

As mentioned, these were designed in 1938 and named after Sir John Anderson, Home Secretary during the Battle of Britain, and this type of air-raid shelter was designed for use in the garden. When covered with earth the shelter would give some protection from shell fragments and bomber splinters although dampness was an ever-present problem.

Designed to accommodate up to six people the government supplied them free to low-income families and later sold to others to wealthier people. 1.5 million





**Anderson shelter, Dunton Plotlands.**

Anderson shelters were distributed in the months immediately leading up to the outbreak of war. When production ended 3.6 million had been produced.

As said, the first German air attack took place in London on the evening of 7<sup>th</sup> September 1940. Within months, Liverpool, Birmingham, Coventry, and other cities were hit too.

### **What were Anderson Shelters?**

These shelters were half buried in the ground with earth heaped on top to protect them from bomb blasts.



Picture courtesy of Mandy Barrow.

The government gave out Anderson Shelters free to people who earned below £5 per week. By September 1939, one and a half million Anderson shelters had been put up in gardens.

### **What were Anderson Shelters like?**

The Anderson Shelters were dark, and damp and people were reluctant to use them at night.



### **Inside a shelter.**

In low-lying areas, the shelters tended to flood, and sleeping was difficult as they did not keep out the sound of the bombings.



### **Morrison Shelters**

European houses often had cellars, British houses much less often. This led to the design of a cage-like construction that could be used as a refuge inside a house. Morrison shelters came in self-assembly form and the householder bolted it together. Each pack had 359 parts and three tools supplied.

The Morrison Shelter was introduced in March 1941, for people without gardens. The shelter, made from heavy steel, could also be used as a table. People sheltered underneath it during a raid. The Morrison shelter was named after the Minister for Home Security, Mr. Herbert Morrison. Half a million had been distributed by the end of 1941. A further 100,000 were added in 1943.

### **When was the Morrison Shelter first introduced?**



The Morrison shelter was approximately six foot six inches (2m) long, four foot (1.2m) wide and two foot six inches (0.75m) high.

### **Air Raid Precautions**



## personnel.

They were responsible for the issuing of gas masks, prefabricated air raid shelters and the looking after public shelters. ARP Wardens. They were also responsible for maintaining the blackout. They assisted in fighting incendiaries during air raids and rescue work afterwards.

There were around 1.4 million ARP wardens in Britain during the war, almost all unpaid part-time volunteers who also held day-time jobs.

## Gas mask

Respirator with canister: black leather mask with round glass eyepieces in metal surrounds; rubber exhale valve flap protrudes from front of nose; front of mask is open, with cylindrical canister inserted into opening and sealed with metal clip ring; cylinder is painted black with thin green and red stripes around it, towards the front; black elastic harness.



From 1938, in response to fears that air attacks on Britain might include the use of poison gas, the entire British population was issued with gas masks. Most people received the standard civilian pattern respirator. Air raid wardens, by contrast, received a higher grade of respirator.

This is a civilian duty respirator. Unlike the standard civilian model, it features separate glass eye pieces, an exhalation valve and could be adapted to accept a microphone. Although poison gas was never used against Britain during the Second World War, masks like this became another common symbol of wartime life. Though masks were potentially lifesaving pieces of equipment, they tended to make their wearers appear terrifyingly alien and dehumanised.

## Gas rattle.

Wooden ratchet rattle, consisting of turned wooden handle and spindle, on to which are threaded two 6 point wooden star ratchets and two supporting bars. The bars are held apart by a spacer block at the end away from the spindle, together with a shaped piece of plywood which is panel pinned to the supporting bars. Two strips of wood are attached, at one end, to the spacer block, by two rounded headed wood screws through each strip. The other end of the strip engages with the ratchet.

This is a gas rattle. It is a hand-held noisemaking device used to give warning of a gas attack or during gas mask drill. By holding the handle and spinning the rattle around it, the rattle makes a distinctive clicking noise.

The 'all clear' signal would be given by ringing a hand bell. This particular example was used by staff of the Imperial War Museum, which was closed to the public during the Second World War and its buildings used for war purposes. Rattles like this used to be a common sight in the hands of supporters at football matches.





## Report forms.

**WARDEN'S REPORT FORM.** A.R.P./M.I.  
Form of Report to Report Centres.

(Commence with the words) "AIR RAID DAMAGE"

Designation of REPORTING AGENT  
(e.g., Warden's Sector Number)

POSITION of occurrence

TYPE of bombs :—H.E. Incendary Poison Gas

Approx. No. of CASUALTIES :—  
(If any trapped under wreckage, say so)

If FIRE say so :—

Damage to MAINS :—Water Coal Gas Overhead electric cables Sewers

Names of ROADS BLOCKED

Position of any UNEXPLODED BOMBS

Time of occurrence (approx.)

Services already ON THE SPOT or COMING :—

Remarks :—

(Finish with the words) "MESSAGE ENDS"

ORIGINAL } These words are for use with a report sent by messenger.  
DUPLICATE } Delete whichever does not apply.

Form for reporting the final situation following an air raid (blank).

Air raid wardens were the first link in the chain of Britain's civil defence system. Wardens worked from a network of wardens' posts, which were connected to higher command by telephone or messenger.

When bombing raids occurred, wardens on duty had to monitor and report bomb damage.

This form sets out how these reports were to be made – accurate information like this could be vital for saving lives and protecting important buildings from damage.

### Messengers

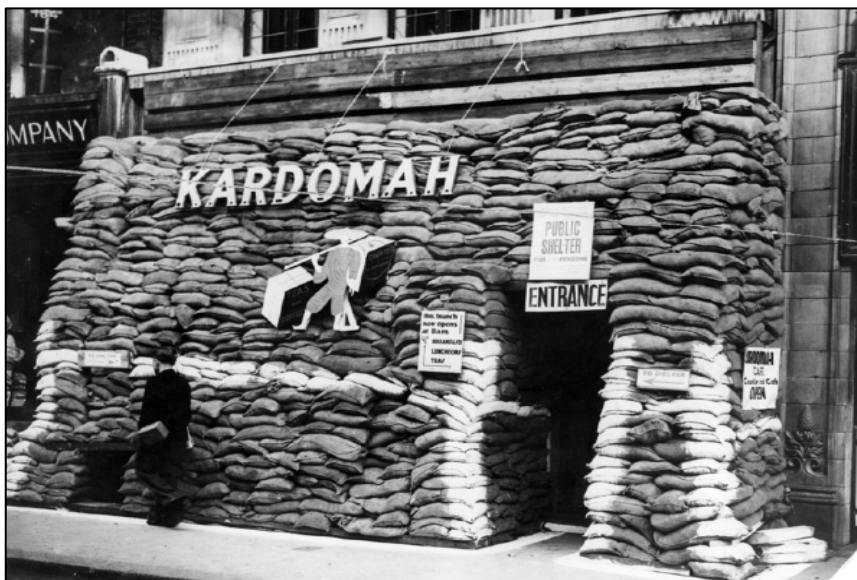
Often Boy Scouts or Boys' Brigade members aged between 14 and 18 as messengers or runners would take verbal or written messages from air raid wardens and deliver them to either the sector post or the control centre.

Bombing would sometimes cut telephone lines and messengers performed an important role in giving the ARP services a fuller picture of events.

### Street communal shelter

It was quickly recognized that there was a need to protect members of the public who might be on the streets or in public spaces. A big programme of street communal shelters was begun in March 1940. These surface shelters were intended to accommodate fifty people.

Problems with quality control, in their hurried construction, meant that some failed to provide the protection expected. Rumours began to circulate and although improved designs were introduced they became very unpopular and remained so throughout the war.



### Other tunnels

Many other types of tunnels were adapted for shelters to protect the civil population, and the military and administrative establishment in the UK during the war. Some had been built many years before, some had been part of an ancient defence system, and some had belonged to commercial enterprises, such as coal mining.

The Victoria tunnels at Newcastle upon Tyne, for example, completed as long ago as 1842, and used for transporting coal from the collieries to the river Tyne, had been closed in 1860 and remained so until 1939. 12m deep in places, the tunnels, stretching in parts beneath the city of Newcastle, were converted to air raid shelters with a capacity for 9,000 people. Furthermore, tunnels linked to landing stages built on the River Irwell in Manchester at the end of the nineteenth century were also used as air-raid shelters.



The large medieval labyrinth of tunnels beneath Dover Castle had been built originally as part of the defensive system of the approaches to England, extended over the centuries and further excavated and reinforced during World Wars I and II, until it could accommodate large parts of the secret defence systems protecting the British Isles. On 26<sup>th</sup> May 1940, it became the headquarters under Vice Admiral Bertram Ramsay of "Operation Dynamo", from which the rescue and evacuation of up to 338,000 troops from France was directed.

The network of tunnels within the white cliffs beneath Dover Castle served as a barracks for soldiers during the Napoleonic Wars, became a headquarters and hospital during the Second World War, and were equipped to serve as a Regional Seat of Government in the 1960s in the event of nuclear war.



The Telephone exchange and Plotting Room in WW2 under Dover Castle.

In Stockport, six miles south of Manchester, four sets of underground air raid shelter tunnels for civilian use were dug into the red sandstone on which the town centre stands. Preparation started in September 1938 and the first set of shelters was opened on 28 October 1939. (Stockport was not bombed until 11<sup>th</sup> October 1940.)

The smallest of the tunnel shelters could accommodate 2,000 people and the largest 3,850 (subsequently expanded to take up to 6,500 people.) The largest of the Stockport

Air Raid Shelters are open to the public as part of the town's museum service.

In southeast London, residents made use of the Chislehurst Caves beneath Chislehurst, a 22-mile-long (35 km) network of caves which have existed since the Middle Ages for the mining of chalk and flint.



## Chislehurst Caves Kent.



The caves have been carved out over hundreds of years. The caves were dug for chalk used in lime burning and brick making for the Building of London, as well as for flints to fire the tinderboxes and flintlock guns of years ago.

First open to the public in 1900 as a showplace, the guides told the Victorians history of Romans, Druids and Saxons, Smuggling and Murder. The last one hundred years has added munitions storage for the Woolwich Arsenal in the

1914-18 war, Mushroom growing in the 1920 and 1930's and becoming an underground town as the largest deep air-raid shelter outside London, protecting over 15000 people every night during the Blitz.

## Scallywag bunkers.



Reconstruction of a Scallywag bunker at Parham Airfield Museum, Suffolk

Scallywag bunkers or Operational Base/OB were underground bunkers used by Auxiliary Units of the British Resistance against axis invasion of the United Kingdom.

They were provided with elaborately concealed underground Operational Bases (OB), usually built by the Royal Engineers in a local woodland, with a camouflaged entrance and emergency escape tunnel.

## Stanton shelters.

An abandoned Stanton shelter at the disused airfield RAF Beaulieu (2007)



A segment shelter manufactured by the Stanton Ironworks, Ilkeston, Derbyshire.

The shop producing spun-concrete lighting columns ceased production and turned over to concrete air-raid shelters, of which 100,000 tons were manufactured, principally for the air ministry. Reinforced concrete proved an ideal material for air-raid shelters, being strong and resistant to shock with no deterioration with the passing of time.

This type of segment shelter was of simple design and of low cost—any length of shelter could be built up from the pre-cast steel reinforced concrete segments.

The segments were twenty inches wide; a pair of them formed an arch seven feet high and transverse struts were provided to ensure rigidity. These fitted into longitudinal bearers which were grooved to receive the foot of each segment. Each pair of segments was bolted together at the apex of the arch and each segment was also bolted to its neighbour; the joints being sealed with a bituminous compound. The convenient handling of these segments enabled them to be transported onto sites where close access by motor lorry was not possible. Partly buried in the ground, with a suitably screened entrance, this bolted shelter afforded safe protection against blast and splinter.

### **Other Brick built surface Air Raid Shelters**



World War Two Air Raid Shelters were structures built for the protection of Military and Non-Military Personnel against Enemy Air Attacks.

In the United Kingdom, it was recognised early on that Public Air Raid Shelters in open spaces, especially near streets, were urgently needed for pedestrians, drivers, and passengers in passing vehicles, etc. The programme of building Public Air Raid Shelters commenced in March 1940, the government supplying the materials, and being the moving force behind the scheme, with private builders executing the work under the supervision of surveyors. These Shelters consisted of 14in brick walls and 12in reinforced concrete roofs, similarly to, but much larger than, the Private Air Raid Shelters in backyards and gardens being introduced slightly later. The Public Air Raid Shelters were usually intended to accommodate about fifty persons and were divided into various sections by interior walls with openings connecting the different sections, which were normally furnished with six bunk beds.

The construction works then went on rapidly, until the resources of concrete and bricks began to be depleted due to the excessive demand placed on them so suddenly. Also, the performance of the early Public Air Raid Shelters had a serious blow to public confidence. Their walls were shaken down either by earth shock or blast, and the concrete roofs then fell onto the helpless occupants, and this was there for all to see. At around the same time rumours of accidents started to circulate, such as on one occasion people being drowned due to a burst main filling up the Shelter with water. Although much improved designs were being introduced whose performance had been demonstrated in explosion trials, Public Air Raid Shelters became highly



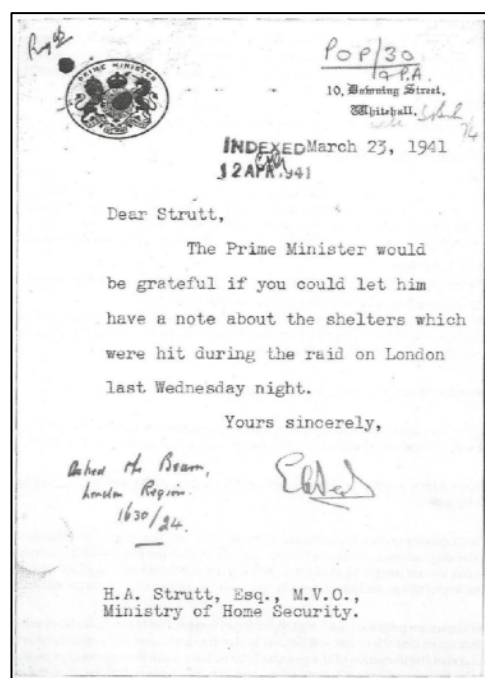
unpopular, and shortly afterwards householders were being encouraged to build or have built Private Air Raid Shelters on their properties, or within their houses, with materials being supplied by the government.

### Bullivant's Wharf Isle of Dogs.

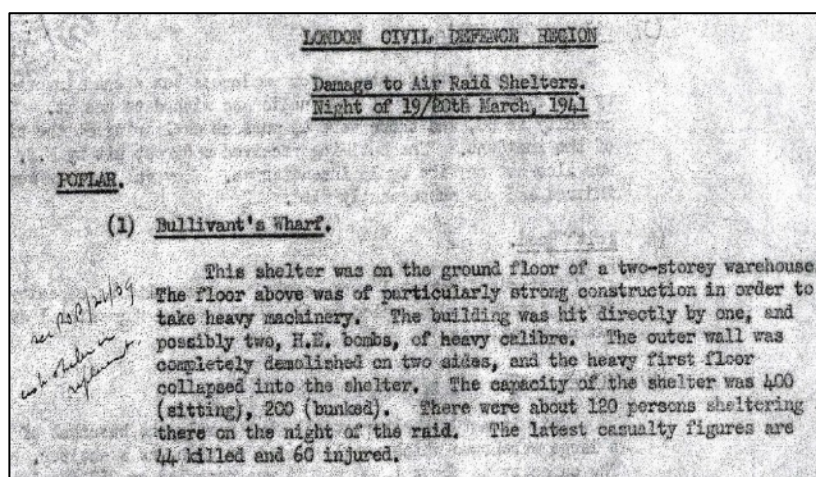
On Wednesday 19th March 1941, between 8 pm and 2 am, in a massive assault made by 479 Luftwaffe bombers, 470 tonnes of high explosive and more than 120,000 incendiary bombs were dropped on London. The targets, illuminated by parachute flares, were the dock installations along the Thames, from London Bridge to Beckton. Fire watchers assessed afterwards that there were close to 1900 separate fires.

The Stronghold Works at Bullivant's Wharf received a direct hit, as mentioned by rescue worker Bill Regan in his diary entry for 20th March 1941, when he was stationed at the emergency services depot in Millwall Central School, Janet Street (quote from Heavy Rescue Squad Work on the Isle of Dogs – Bill Regan's Diary from the Second World War, by Ann Regan-Atherton):

Sadly, similar incidents were reported from other parts of East London that night. It is estimated that 631 Londoners were killed in what was the largest bombing raid since December 1940, with West Ham, Stepney, and Poplar suffering particularly badly. On 23rd March, Downing Street asked for details of the events.



There were approximately 120 people in the shelter, and at least forty were killed, and a further sixty injured. This was to be the worst bombing incident on the Isle of Dogs during WW2. The names of those known to have died are registered in the Commonwealth War Graves Commission (Civilian Victims) list. It names forty-one victims, and not forty-four as mentioned in the WWII report; either the report was incorrect, or the names of all victims were not established.



**Compiled by Norman Bambridge  
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