This schematic map of the areas in which the Dynamite Factory operated, the location areas, if not the actual buildings of which can be seen during a walking tour that Ken Porter conducts during which time he is able to take you back into its history of the early twentieth century.

Picture – Alfred Nobel.

Yes, the same Alfred Nobel of Peace Prize fame.

In 1863 Alfred Nobel patented an invention called Dynamite. He had developed a safe way to handle the dangerous explosive Nitro-Glycerine and wanted to sell to the huge markets of the British Empire but regulations kept him out of manufacturing in Britain. Through a 'loophole' in the law he built a factory in Scotland.

In 1891 the British Explosives Syndicate built a Factory in Pitsea in which he was a secret or silent partner to begin with, but eventually was able to trade under his own name. Around this time The Pitsea Explosives Factory mostly made explosives for mining.

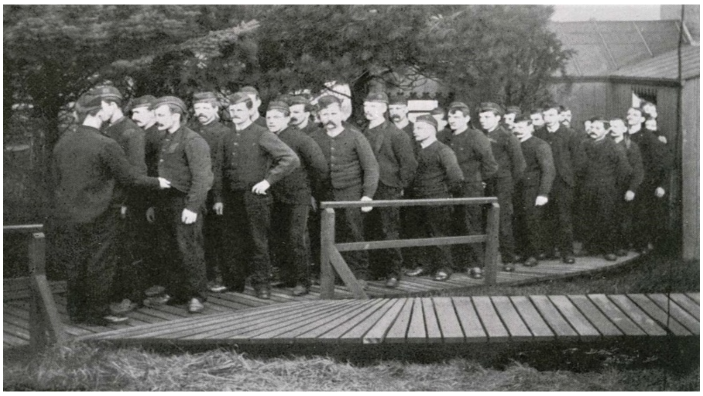
1. The Factory entrance.

Picture - The Guard house - Men and women queuing up at the Guard House to be searched

The building shown here was originally the Pitsea explosives factory search hut. Workers were searched for metal objects that could cause a spark – matches, coins, watches, jewellery. It was feared a spark could ignite volatile fumes and blow up the factory, as had happened in a number of factories around Europe. Wooden walkways around the factory stopped your shoes picking up stones which might have caused a spark.

The buildings located opposite to the search were the guard house and supervisor's house.

Staff were kept on site to guard against accidents or sabotage by enemy agents during wartime. Explosives were a very profitable business, and the company had to keep its guard up against foul play by ruthless competitors.



Preparing for war?

In 1902, with tensions building between the British and the Dutch over South Africa, the Pitsea factory added buildings for the manufacture of Cordite.

Cordite buildings featured distinctive bays with dividing walls extending upwards between rooms above the roof to control the possible spread of fire.

Cordite had been used since 1889, when it replaced black gunpowder. It consisted of the high-explosives nitro-glycerine and nitro-cellulose (gun-cotton), with acetone playing the key role of solvent.

Prior to WWI, acetone used in British munitions was made almost entirely from the dry distillation (pyrolysis) of wood. It required a hundred tonnes to produce a tonne of acetone.

Britain was forced to import the vast majority of its acetone from the United States.

An attempt to produce our own acetone was made in 1913 when a factory was built in the Forest of Dean. By the outbreak of war in 1914, military stocks were just 3,200 tonnes; it was obvious that an alternative domestic supply would be needed.

The First World War ...

This became even more pressing during the spring of 1915 when an acute shortage of shells – the so-called 'shell crisis' – reduced some British guns to firing just four times a day. The British government's response was to create a dedicated Ministry of Munitions, run by David Lloyd George.

One of Lloyd George's first initiatives was to ask the brilliant chemist Chaim Weizmann of Manchester University if there was an alternative way of making acetone in large quantities.

Weizmann had perfected an anaerobic fermentation process that used a highly vigorous bacterium known as Clostridium acetobutylicum to produce large quantities of acetone from a variety of starchy foodstuffs such as grain, maize and rice.

Conkers for Cordite ...

In May 1915, Weizmann demonstrated that he could convert 100 tonnes of grain to 12 tonnes of acetone, the government commandeered brewing and distillery equipment.

They produced 90,000 gallons of acetone a year, to feed the war's insatiable demand for cordite. The British army and Royal Navy, alone, fired 248 million shells from 1914 to 1918.

In the autumn of 1917, a notice appeared on the walls of classrooms and scout huts across Britain: "Groups of scholars and boy scouts are being organised to collect conkers… This collection is invaluable war work and is very urgent. Please encourage it."

It was never explained to schoolchildren exactly how conkers could help the war effort. Nor did they care. They were more interested in the War Office's bounty of 7s 6d (37.5p) for every hundred weight they handed in, and for weeks they scoured woods and lanes for the shiny brown objects they usually destroyed in the playground game. Their efforts collected more conkers than there were trains to transport them. A total of 3,000 tonnes of conkers did reach the Synthetic Products Company at King's Lynn – where they were used to make acetone.

By 1917, grain and potatoes were needed to feed the British population, and German U-boat activity was threatening to cut off the import of maize from the United States, he was tasked to find another supply of starch for his process.

2. The Site Stores.

Non-explosive items like sheets of brass for manufacturing cartridges, or glass vials for storing and dispensing acids would have been kept here along with uniforms, machinery and spare parts.

3. Laboratory.

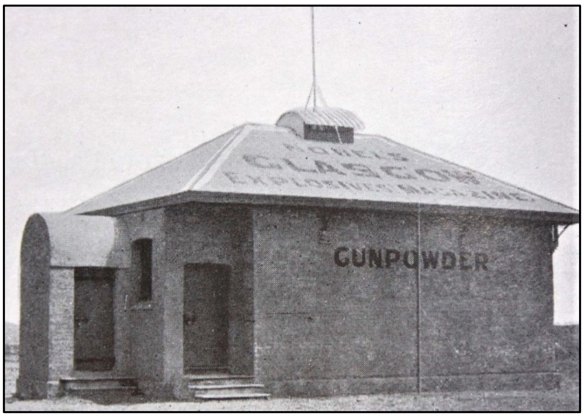
This building became the explosives factory's laboratory after the original laboratory (standing on the site of the house next door) was destroyed in an accident in 1916. Laboratory staff tested the strength of incoming chemicals to guarantee uniformity and safety, as consistent blends and strengths were vital for making reliable explosives that were safe to handle and use.

The accident occurred in May 1916 when a Chemist and his assistant were killed when he dropped a small bottle of nitro-glycerine.

The Laboratory – destroyed by an explosion in 1916 –Two Killed

Chemicals that fell below standard could lead to fatal accidents. In 1913 an explosion thought to be caused by sub-standard guncotton led to three deaths, extensive damage and a report to Parliament. Finished explosives were also tested here by igniting a small amount of the explosive on a bench top.

4. Expense magazine.

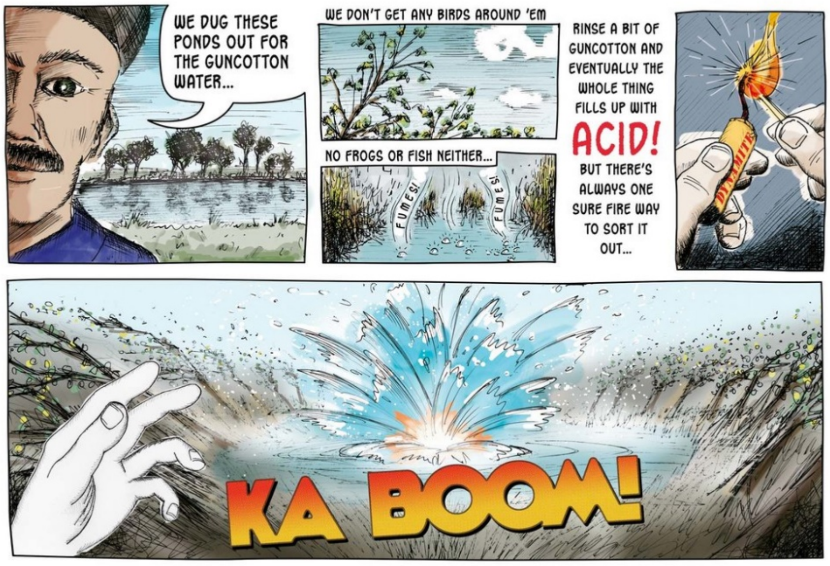


Electricity and gas were not used in the explosives factory site in dangerous areas, as they might ignite the highly flammable fumes created in explosives manufacture. This meant work in the factory was limited to the hours of daylight.

Fumes in the factory buildings could be so overpowering that workers would frequently pass out. Fellow workers would then pull their unconscious workmate out of the building and leave them in the fresh air until they recovered. As soon as they came round, they went straight back to work.

5. Water collection and laboratory magazine

The natural-looking ponds here were actually man made. They were designed to capture waste water from washing guncotton, an explosive made by mixing cotton waste from the Lancashire mills with nitro-glycerine – the most frighteningly unstable and powerful explosive.



Guncotton was washed in water to remove excess nitro-glycerine and to make it stable enough to be handled safely and easily. The building to the side of the pond was the laboratory magazine. It stored chemicals used for testing explosives ingredients and explosives in the laboratory.

6. Cartridge huts

A series of small wooden 'cartridge huts' followed the perimeter track here, where workers assembled ammunition for guns.

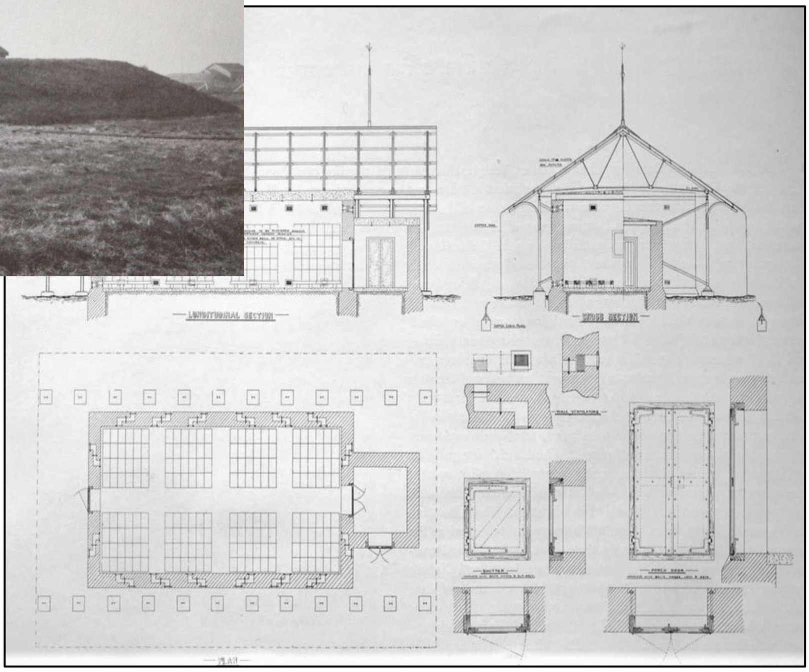
Women workers took pre-cut explosive 'charges' and used machinery to press them into brass cylinders (cartridges) that held the explosive and allowed it to be easily loaded into a gun. The 'charge' would explode inside the cartridge case, forcing a lead bullet out at great speed through the barrel of a rifle or pistol.

7. Liquids recycling & acid egg house

The angular earthworks you see all around the park are called blast mounds. They were built around and between the buildings of the factory to contain accidental explosions and stop them spreading from building to building. Blast mounds were designed to deflect explosions in case of an accident.

The recycling house stood within the blast mound here. It was used to recover as much of the precious acids used in the chemical processes as possible, as these represented a high proportion of the cost of manufacture. The challenges of acid production and distribution meant many larger factories would have their own acid manufacturing and distillation facilities on site.

Further along this path are the remains of the acid egg house, where compressed air was used to gently and safely remove sulphuric and nitric acid from the large cast iron 'eggs' they were delivered in.



8. The magazines

Around this perimeter track there were five magazines, each holding about 1.5 tons of nitroglycerin based explosives.

Magazines had brick walls and wooden roofs. In case of an explosion the blast would meet least resistance going upwards and out through the roof. Blast mounds around each magazine would also help direct the blast upwards instead of sideways, preventing damage to neighbouring factory buildings. Wooden floors were secured with copper nails to avoid causing sparks and possibly igniting the explosives.

9. Nitrating house & flushing tanks

Producing nitro-glycerine the most volatile and dangerous of all explosives – was actually a very boring job. It happened here in the nitrating house, where nitric acid was carefully mixed with glycerine in a large vat with a factory worker keeping a constant eye on the temperature of the mix.

If the mixture in the vat got too hot then the worker would have to quickly flush the system with water to douse the chemical reaction, then release the mixture for recycling and start again with a new mixture.

The nitro-glycerine produced here at the highest point of the factory site was piped by gravity to other buildings at lower positions around the site.

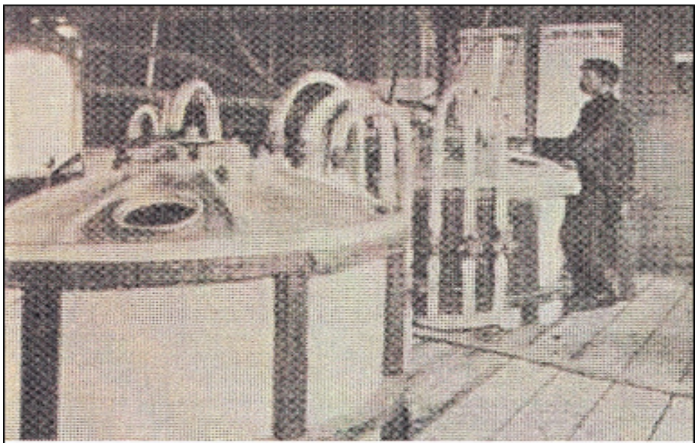
The dull business of mixing the world's most dangerous explosive.

Dynamite was made by mixing nitroglycerin with kieselguhr.

10. Nitroglycerin mixing house

Workers in the mixing houses mixed nitroglycerin with an inert paste to stabilise the explosive and make it easier to handle. Alfred Nobel pioneered this technique and called the explosive it produced dynamite.

Different mixtures were used to give different strengths and blasting qualities, depending on the intended use. Explosives for ammunition were blended to propel missiles at speed, whereas explosives for quarrying were blended to fracture even the hardest rock.


Showing the double set of Nitrators at BES in 1911

Others were mixed to explode with very little flame to minimise the risk of igniting flammable gases in mines.

11. Gelatine mixing houses

The buildings that stood here at one time made gelignite, a newer type of nitroglycerin explosive that followed on from dynamite. It contained a higher concentration of nitroglycerin and was used extensively for blasting rock in mining and laying railways.

By 1913 four of the buildings were being used as "stoves" to dry gun cotton. In that year the northernmost stove exploded, tragically killing two people.

Gelatine mixing houses

12. Dangerous energy

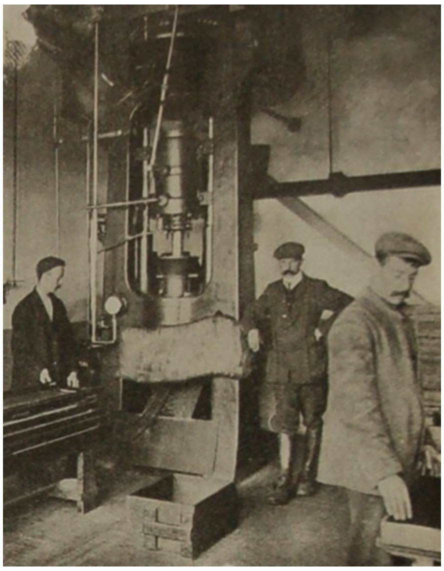
Whatever chemical process went on in the huts that would have stood inside these blast mounds we can't know for sure – but the earthworks here give us a clue.

These are two of the largest blast mounds on the site and are surrounded by double bonded blast mounds, suggesting that a very dangerous chemical process must have gone on here.

Concrete channels in the bases of these huts suggest they were used for handling acids, and were probably built to manufacture a new type of explosive using new techniques.

13. Cordite range

The buildings that stood here housed large machinery including presses that forced newly-mixed dynamite through circular dies to make tubes of dynamite in different diameters. These were then cut to length to



make dynamite ‘sticks’ for mining, or ‘charges’ that went into military shells and ammunition for rifles and pistols.

Dynamite sticks would then be wrapped in greaseproof paper and packed into crates at the packing house, ready for use in mining. Charges went to the cartridge huts where they were pressed into cartridges for military use.

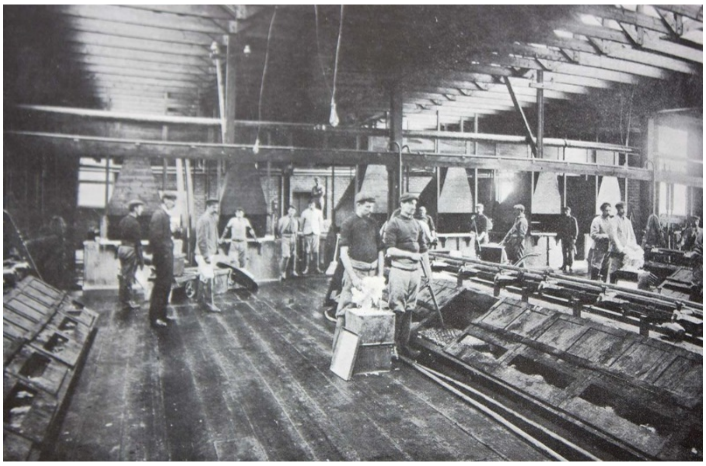
14. Company offices

The building would have housed the site offices, where the customers’ orders for different explosive blends would have been received and relayed to the foremen and workers on the ground.

The Pitsea Explosives Factory was part of Nobel Explosives.

15. Guncotton washing house

The Wat Tyler Centre building could also have been where guncotton was ‘washed’ in nitroglycerin in huge open tanks to stabilise the explosive. The floors of all buildings on the site which dealt directly with explosives were covered in sheets of lead to avoid causing sparks and igniting the explosives.



While the guncotton was wet it was safe to handle. The next stage, where the guncotton was heated and dried on the drying stoves, was one of the most dangerous processes on the site, and one that led to fatal accidents.

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Guncotton drying

Different explosives were manufactured for different needs

16. Wet process storage

Five corrugated iron sheds stood here. They were probably used to store the materials needed in the nitroglycerin washing house ‘wet’ process.

Factory buildings were carefully separated between hazardous and non-hazardous processes, and staff were made to wear either red or green uniforms, depending on the kind of process their job involved.

Every explosive manufactured on this site was based on nitroglycerin. Different product names like Dynamite,

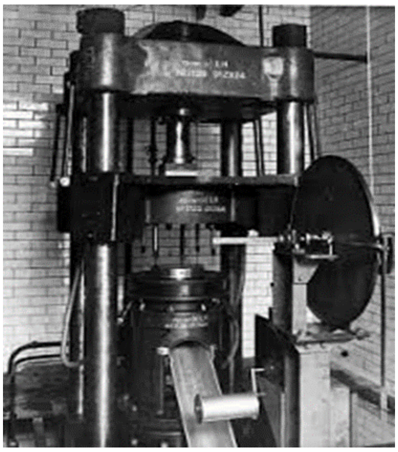
Cordite and Blasting Gelatine were given to explosives with different characteristics developed using different manufacturing techniques, materials, and strengths.

17. Cordite room and non-hazardous store

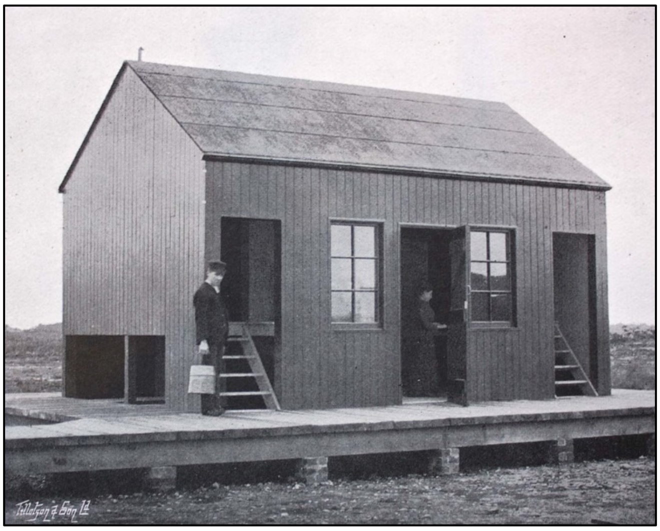
Cordite was the British Government's answer to the Swedish Alfred Nobel's inventions of nitroglycerin and dynamite.

Nobel tried to take the government to court for patent breach, but the different wording on the British patent made it impossible for Nobel to sue, even though the chemical process was nearly identical.

A cordite factory



18. Packing house



The packing house was supplied by the tramline (which the miniature railway now retraces in part), making it easier and safer for explosives to be off-loaded into the building. The building itself was used for packing explosives into boxes so they could be transported safely and securely to the client.

Explosives were loaded onto barges from the wharfs and shipped to a special explosives mooring at Hole Haven (where the creek meets the Thames) and then onto larger ships.

Packing shed, supplied by rail.

Rail provided the smoothest way to transport sensitive explosives.

19. Tramway

The current miniature railway stands in the place of part of the old tramline which supplied many of the buildings on site. Trams of several carriages were drawn by a horse walking to one side of the track. Wooden rails were used some distance before each building to prevent sparks.

The tramline still leads to the third of three wharfs (the other two were on the landfill site). This wharf, positioned close to a number of buildings, would have been used as a goods inwards wharf, for off-loading safe incoming materials.

Around the site.

Wooden trolleys and walkways around the factory prevented sparks and possible explosions!

Finished explosives were dispatched from
an isolated wharf that can still be seen next to the landfill site down the creek.

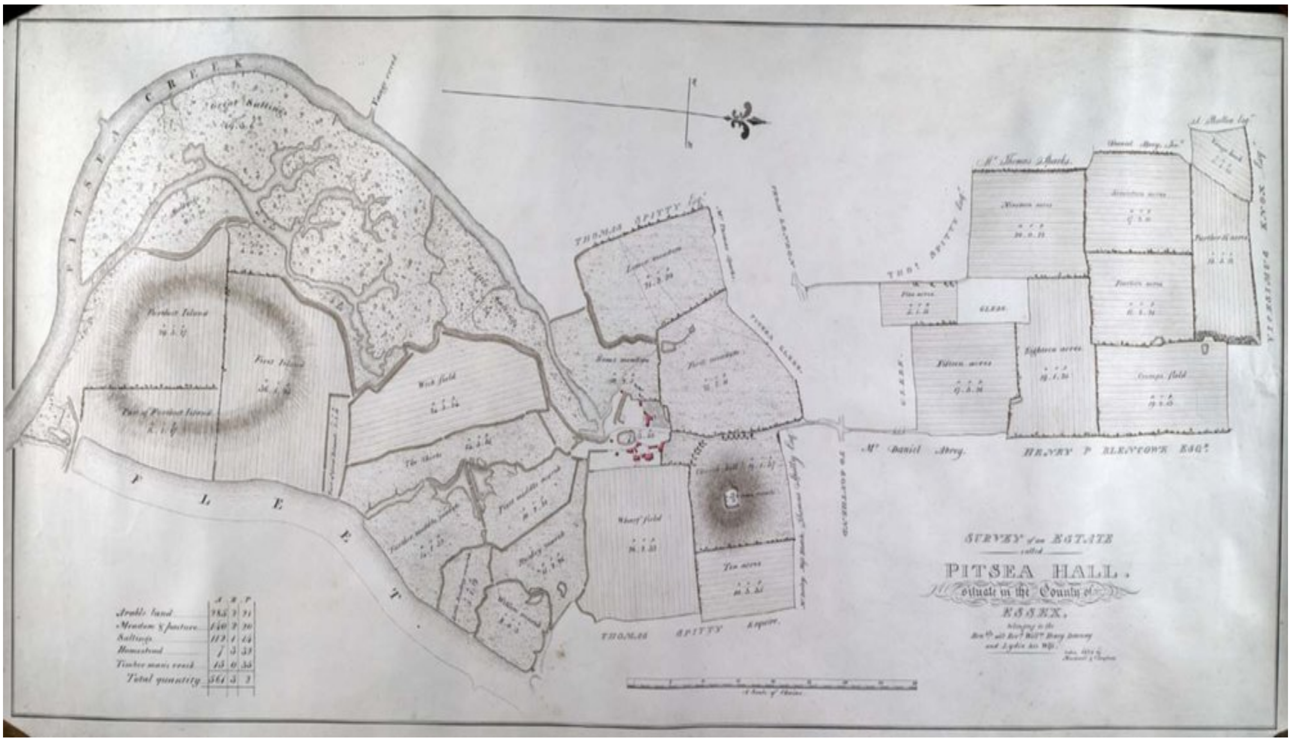
20. Washing bowl

The unusual concrete bowl that sits behind the fence towards the creek was probably used to wash or drain guncotton. You can see where it would have been lined with bronze, chosen to prevent sparks and reactions with any of the chemicals being used.

21. A bump in the landscape

This magnificent view from this spot looking out over the marshes towards the Thames shows the big drop in height from the middle of the park to its perimeter – one of the main reasons this site was chosen for an explosives factory.

The drop in height made the process of moving chemicals around from one building to another easier, safer and cheaper. A sprawling network of pipelines criss-crossed the factory site supplying acids and water to all the chemical processes involved in explosives manufacture.



Portrait picture

Norman Bambridge
Basildon Borough Heritage Society
August 2024.