Designation Consultation

This designation consultation is open for comment until 03/11/2022

Give us your comments

Historic Environment Scotland consult with those who are directly affected by designation proposals – including owners, occupiers and tenants – and with the planning authority.

We also welcome comments from interested persons or groups.

When we consult about a designation case we will have carried out research and set this out in a **report of handling**. This report is an assessment produced for consultation and it sets out our view, including a proposed decision. The assessment is not intended to be a definitive account or description of the site or place. We consider the comments received before we take a final decision.

We consider comments and representations which are material to our decision-making, such as:

- Your understanding of the cultural significance of the site or place.
- Whether sites or places meet the criteria for designation.
- The purpose and implications of designating the site or place. We consider whether these are relevant to the case.
- Development proposals related to the site or place. Where there are development proposals, we consider whether to proceed with designation in line with our designation policy.
- The accuracy of our information.

You can find more guidance on providing comments and how we handle your information on our website.

Information on how we treat your personal data is available on our Privacy Notice.

How to make a comment

Please send your comments to designationconsultations@hes.scot and provide us with the case reference. You can also make comments through our portal by clicking on the link ‘email your comments about this case’.

If you are the owner, occupier or tenant or the planning authority please email us at: designations@hes.scot.

If you are unable to email your comments please phone us on 0131 668 8914.

Case information

Case ID	300053581 and 300059741
Name of Site	Eastriggs, former munitions works

Local Authority	Dumfries & Galloway Council
National Grid Reference	Gatehouse NY 24855, 65425 & NY 24872, 65420. Acids section & glycerine distillery centred on NY 24590, 65027. Gun-cotton section centred on NY 25240, 65213. Nitro-Glycerine hill centred on NY 26620, 64722.
Designation Type	Scheduled Monument Listed Building
Designation No.	SM13761 LB52612
Case Type	Designation

Received/Start Date	16 Aug 2021
Decision Date	Pending

1. Proposed decision

Scheduled monument name (including designation number)	Proposed action
Eastriggs former munitions factory, glycerine distillery and acids production area, gun-cotton section and nitro-glycerine hill, 600m SSW, 700m SE and 2050m ESE of Rosslea. (SM13761)	Designate as a scheduled monument

Statutory Listing Address	New category of listing
East and west guardhouses and gatepiers at the main entrance to former munitions factory, Eastriggs (LB52612)	Designate as a listed building at category B

2. Designation Background and Development Proposals

2.1 Designation Background

There are currently no national heritage designations associated with this site.

2.2 Development Proposals

We are unaware of any development proposals affecting this site or that any development plans directly affecting the proposed designated areas, as verified with

the online Dumfries and Galloway development planning portal (August 2022). There are, however, two live planning applications affecting the northwest area of the wider Eastriggs site – the area of railtrack and adjacent ground at the northwest corner – application references 21/1643/FUL (conditionally granted), 21/1644/FUL (conditionally granted). Both applications relate to reuse of disused railway infrastructure for the storage and maintenance of train rolling stock. These areas have not been included in the designation assessment.

3. Assessment

3.1 Assessment information

We received an application to consider the heritage significance and designation for the overall site at Eastriggs from Dumfries and Galloway Council on 16/08/2021.

We carried out an assessment of built and buried remains covering four phases of prehistoric and historic development at the site. This fieldwork was complemented by archival research at The National Archives (London), Carlisle Archives Centre, The Devil's Porridge Museum (Eastriggs) and The National Archives of Scotland (Edinburgh).

The four phases of activity assessed at Eastriggs are:

- Remains of prehistoric, medieval and post-medieval activity.
- The First World War use of the site as a cordite production facility, part of the wider complex known as His Majesty's Explosives Factory (HMEF) Gretna.
- The reuse and adaptation of the site for munitions storage in the Second World War.
- Post-1945 reuse and adaptation of the site for munitions storage.

We inspected the field remains during three site visits. Over 400 items of potential interest were observed on the ground across an approximate area of 5km east to west by 2km north to south. Given the scale of the site and the extensive and numerous remains, our assessment included an initial sift to determine which structures and areas were likely to meet the designation criteria. Following that, we carried out a more detailed assessment of the selected structures and sites.

Our initial phase of assessment showed that the most culturally significant period of the site's activity was the construction and operation of the First World War cordite factory. The detailed assessment process therefore focuses on structures and sites relating to this period. In addition, we also considered 12 structures (of a type known as Nissen huts) located within the nitro-glycerine production area and thought to date to the Second World War, because of their reuse of First World fabric (protective bunding and floor plates).

3.2 Assessment of 'national importance' (scheduling) and 'special architectural or historic interest' (listing)

We have carried out an assessment using the selection guidance for scheduling and for listing (see Annexes A and B respectively). Elements of the site have been found to meet the criterion of national importance for scheduling and other elements meet the criteria of special architectural and historic interest for listing. Our proposal is to designate four parts of the site as a scheduled monument (covering the glycerine distillery, acids section, part of the gun-cotton section and part of the nitro-glycerine section) and two buildings as a listed building (the two First World War gatehouses and gate piers).

Our scheduling assessment in Annex A considers areas that illustrate the main industrial processes to produce cordite - glycerine distillation, acid mixing, nitro-glycerine production and gun cotton mixing. 12 Nissen huts have also been included.

Our listing assessment in Annex B considers the First World War buildings that demonstrated special architectural and historic interest. The extent to which the buildings or structures survived is also a factor. The buildings assessed in detail form the gatehouse complex. A single-storey building (known as Building 216), located in the eastern half of the site is not included in Annex B. It is thought to date to around 1917 and may relate to the nitro-glycerine production area. However, its purpose is unclear and on the basis of the information we have, this building is not of special interest.

Our initial sift concluded that Second World War munitions storage buildings (other than 12 Nissen huts) did not demonstrate special interest or national importance. They consist of standard building forms and do not relate to the First World War use of the site as a munitions factory or reuse any First World War Fabric.

The designation selection guidance for scheduling and listing are published in the Historic Environment Scotland Designations Policy and Selection Guidance 2019, Annex 1, pp 9-10 and Annex 2, pp 11-13 https://www.historicenvironment.scot/designation-policy.

3.3 Policy considerations

Historic Environment Scotland Designations Policy and Selection Guidance 2019 supports the Historic Environment Policy for Scotland (HEPS). This means that in addition to the designations assessments, where historic environment assets meet the criteria for designation, we consider these proposals in the context of wider historic environment policies.

Our view is that designation is the best mechanism with which to recognise and protect the remaining elements of the Eastriggs complex which convey their cultural significance at a national level.

It is our practice to avoid the dual designation of these types of heritage assets (as both listed buildings and scheduled monuments) as this can lead to confusion over which regulatory controls are used to manage change. In this case, we are

proposing a complementary approach whereby listed building status is proposed for those assets (standing buildings) with a predominantly architectural character and scheduled monument status is proposed for those assets (such as buried remains, footings and ruined structures) with a predominantly, but not exclusively, archaeological character. 12 Nissen huts, a building associated with an alcohol offloading point and an observation structure are included in the proposed scheduled monument to recognise both their architectural and archaeological significance, and because the contribute to the significance of the monument as a whole.

The following policy considerations and actions are relevant to this case:

HEP 1 – *Decisions affecting the historic environment should be informed by an inclusive understanding of its breadth and cultural significance.*

Our actions - We have complemented our own research and investigation of the field remains with the results of relevant, existing thematic research. A considerable amount of archival material was reviewed in order to provide additional evidence. We are consulting widely on this proposal before making our decision to ensure we are taking into account wider views about the heritage significance of the site and the values ascribed to it.

HEP 2 – *Decisions affecting the historic environment should ensure that its understanding and enjoyment as well as its benefits are secured for present and future generations.*

Our actions – Designation of the selected elements of this site (the buildings and areas proposed here) is deemed the most appropriate mechanism with which to ensure this understanding and enjoyment. This is achieved through the regulatory controls established by designation.

HEP 5 – *Decisions affecting the historic environment should contribute to the sustainable development of communities and places.*

Our actions – Our designation proposal is for five parts of the site which illustrate the main industrial processes to produce cordite - glycerine distillation, acid mixing, nitro-glycerine production, gun cotton mixing and the gate complex, the entry to the whole site and the most complete First World War buildings. Heritage designation of these elements of the site will recognise what is cultural significant at the national level. In doing so it will help inform future decisions about the site.

HEP 6 – *Decisions affecting the HE should be informed by an inclusive understanding of the potential consequences for people and communities. Decision-making should be collaborative, open, transparent and easy to understand.*

Our actions – Our approach to designation has been informed by consideration of the purposes and implications of designation, and therefore have taken a focused approach to the site. We have also considered the most appropriate type of

designation with which to recognise and protect these historic environment assets. To engage with communities and stakeholders in order to understand and consider their views, we are consulting widely on this proposal. Our intention is to be as clear as possible in this report, but we are happy to engage further if any aspects of the proposal are not clear.

3.4 Assessment Sources

At the time of our assessment, there was limited information available about the site from traditional record sources such as historic environment records at a national and at a local level. There is, however, an extensive, overall archive of written and photographic material which has been a helpful additional source of evidence.

Concurrent with this designations assessment, there has also been a heritage assessment conducted by the landowner's heritage consultants (not seen as part of this designations assessment). Historic Environment Scotland has also undertaken selective survey and recording work at the site to improve publicly available information.

The position and extent of the three polygons comprising the scheduled monument are defined using a number of cartographic sources, combined with an inspection of the field remains. The key cartographic sources used are the current Ordnance Survey (OS) Mastermap and an undated block plan showing HMF Gretna: Site No.3 thought to date to circa 1917. This earlier map is used to set out the proposed scheduled monument polygons and where appropriate, the positions of the polygon edges have been modified by moving them to adjacent features depicted on the OS Mastermap - to simplify identification of the scheduled monument on the ground.

4. Consultation

4.1 Consultation information

Consultation period: 22/09/2022 to 03/11/2022.

We consult directly with the owner, occupier and/or tenant and the planning authority.

The consultation report of handling is published on our portal for comment from interested parties.

4.2 Designation Consultations

What you can comment on

We will consider comments and representations which are material to our decision-making, such as:

- Your understanding of the cultural significance of the site or place and whether it meets the criteria for designation.
- The purpose and implications of designating the site or place.
- Development proposals related to the site or place. Where there are development proposals, we consider whether to proceed with designation in line with our designation policy.
- The accuracy of our information.

Comments we don't consider

We do not consider comments and representations on non-relevant/non-material issues, such as:

- Economic considerations
- Abusive or offensive remarks
- Whether you personally like, or do not like, a proposal

Our video about consultations explains how you can comment on our designations decisions, and what we can and can't take into account when considering your views https://www.youtube.com/designations.

4.3 Consultation summary

N/A

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ANNEX A – Assessment of national importance

Eastriggs former munitions factory, glycerine distillery and acids production area, gun-cotton section and nitro-glycerine hill, 600m SSW, 700m SE and 2050m ESE of Rosslea.

1) Description

The monument comprises the remains of part of the Eastriggs First World War cordite production factory which was built and in use between 1915 and 1920. It includes the acids production area, a glycerine distillery, a gun-cotton processing area and a nitro-glycerine production area. The nitro-glycerine production area includes 12 Second World War Nissen huts and their associated remains. The monument survives as a complex of structural remains, buildings and archaeological deposits in low lying scrub land on the north shore of the Solway Firth, 1km south of the village of Eastriggs at approximately 10m above sea level.

Surviving elements of the four production areas listed above are contained within the three discrete spaces comprising this scheduled monument. These three areas are as follows:

Westernmost scheduled monument area - glycerine distillery and acids production section

Towards the west side of the Eastriggs facility and near to the goods-in railway sidings, there is the glycerine distillation area comprising the remains of approximately 14 different structures that received, stored, distilled, treated, tested and further processed large quantities of crude glycerine. The largest structure, the distillation plant, housed 18 separate stills within a building measuring approximately 90m by 40m and roughly rectangular on plan. The remaining space within this polygon is taken up by infrastructure connections supporting the distillation process – narrow- and standard-gauge goods-in railway sidings, connections for power, heat and the transfer of liquids. The remains generally survive as concrete floor pads and low walls as well as buried archaeological materials. There is a substantial brick structure surviving at the east side of stills building, thought to be part of the distillery boilerhouse.

Also towards the west side of the Eastriggs facility is the acids section, where the production of nitric and sulphuric acids took place, both of which were essential in cordite production. Raw materials such as sulphur and pyrites as well as waste products from elsewhere in the factory were processed in four areas in approximately 75 buildings and structures. These four areas were the oleum section for sulphuric acid production (using the Grillo and Mannheim plants); the nitric section; the mixed acids section and the Gaillard towers for concentrating sulphuric acid. The building structures, fixtures and fittings have since been removed and what survives is the archaeological footprint. The ground plan can be identified and consists of low lying and underground concrete, brick and stone structures as well as

some of the connecting infrastructure and the associated archaeological deposits. The underground structures of 16 furnaces in the Mannheim Oleum plant survive although several have been backfilled with building rubble. The concrete plinths used to support metalwork columns and the roof structures also survive.

Within this area are three Second World War structures (storage buildings with associated earth and masonry bunds). The upstanding elements are not included in the designation (see exclusions below), but they overlie and mask earlier First World War remains and may also help to preserve them.

Central scheduled monument area - gun-cotton section

To the north of the site, there is the remains of the gun cotton section comprising the remains of approximately 45 buildings and structures used for processing cotton, into nitro-cotton or guncotton. At the east end of this area, the remains of the first 8 of 42 buildings comprising the large gun cotton drying complex are included (the remaining buildings, outside of the scheduled monument are part of a repetitive layout of the same structures and processes). Within this area of the scheduled monument the plant, buildings and structures generally survive as low-lying concrete floor plates, the concrete and metal supports for overlying building and roof structures. The surviving archaeological remains illustrate the construction, use and abandonment of the factory. There are also the visible remains of a standing building in the alcohol loading area and the earthwork bunding surrounding the adjacent alcohol storage area. The largest building in this area was a nitrating house, measuring approximately 130m by 30m.

Within this area are four Second World War structures (three storage buildings with associated earth and masonry bunds and a single storage building without bunding). The upstanding elements are not included in the designation (see exclusions below) but they overlie and mask earlier First World War remains and may also help to preserve them.

Easternmost scheduled monument area - nitro-glycerine production area

This area is the best preserved of the five similar nitroglycerine production ‘hills’, located at the east side of the site. This production area would have originally consisted of 13 buildings, each surrounded by substantial, protective earthwork traverses or bunds. Some of these bunds retain tunnel entrance structures to access the interior. The southernmost of these earthworks now survives only as buried remains, sealed by later development including a rail track. In each of the remaining 12 earthworks, a Nissen hut has been inserted into the bunded spaces, using the First World War concrete floor plate but replacing the overlying structures, repurposing the area as munitions stores during the Second World War. There are three different sizes of Nissen hut, reflecting the space available within the bunding, the largest covering a rectangular space area of approximately 14m by 20m.

These well-preserved huts retain key structural elements such as curved sections of flat bar ironwork, bolted metal floorplates, strengthening ties, overlying corrugated sheeting, sections of interior paneling, load bearing beams with load trolleys and loading ramps with traces of the narrow-gauge rail head in each. Between the 13 earthworks there are the remains of the connecting narrow gauge rail network. These connections follow a distinct plan form which allowed for the transfer of materials between the various process areas within the Hill complex. The areas between the structures and remains described above are likely to contain evidence of materials and services (such as water and wastepipes and electricity cable) linking the processing, storage and transportation areas of the Hill.

Finally, towards the southeast corner of this area, there survives a square, brick-built structure with a flat concrete roof. The entrance on the north side is protected by a brick outer wall and there are small embrasures / look-out slots on each face. This building is thought to postdate the Second World War function and it may have acted as an observation point during later use of the site.

The scheduled area comprises three irregular areas and includes the remains described above and an area around within which evidence relating to the monument's construction, use and abandonment is expected to survive, as shown in red on the accompanying maps. The scheduling extends up to but does not include the modern fencing associated with a water treatment plant located at the southwest corner of the western-most polygon. Specifically excluded from the scheduled monument are:

- the top 300mm of all metalled roads and tracks.
- the remains of eight brick and steel Second World War munitions storage buildings from the base of their foundations upward and their surrounding earthwork bunds above present ground level upward. These are located within the area of the acids section and gun cotton section (noted at the date of this document as building numbers R6, 9, 10, 11, 15, 16, 24 and 27 using Ministry of Defence numbering system to identify individual buildings).
- all modern boundary features including post and wire fencing, steel railings and signage.

2) Statement of National Importance

The national importance of the monument is demonstrated in the following way(s) (see Designations Policy and Selection Guidance, Annex 1, para 17):

a. The monument is of national importance because it makes a significant contribution to our understanding or appreciation of the past, or has the potential to do so, as a nationally significant munitions factory that produced the propellent cordite during the First World War. An indication of the significance of the scale of production at Eastriggs is given by the name attached to the site at the time of its construction and use - *the largest factory in the empire.* It is an important example in the development of industrial chemistry and is an example (in its construction) of

private / public sector collaboration as part of home front efforts during the global conflicts of the First World War.

b. The monument retains structural, architectural, decorative or other physical attributes which make a significant contribution to our understanding or appreciation of the past. There survives the overall plan-form and spatial arrangement of four key areas representing the overall production site (for glycerine, nitric and sulphuric acids, gun-cotton and nitro-glycerine manufacture). The surviving elements help us understand the functions and processes of a major munitions factory operating during the First World War.

c. The monument is a relatively uncommon example of a military industrial complex, established in response to a specific need – the large-scale supply of components or war materials as part of the overall war effort during the First World War.

d. The monument is a particularly good example of industrial scale chemical manufacturing in the early 20th century and therefore an important representative of this monument type.

e. The monument has research potential which could significantly contribute to our understanding or appreciation of the past. Eastriggs contributed to the development of factory design and construction in the early part of the twentieth century, exploiting emerging industrial chemical processes and manufacturing / production techniques. To enhance this research potential, there is a substantial range of archive materials which complement the physical remains. This evidence includes extensive plans and accompanying design and construction notes, process descriptions, historic imagery and contemporary accounts of life at Eastriggs.

g. Eastriggs has significant associations with historical events, with the development of social issues and to a range of key individuals. Of particular interest is the contribution on a national scale that the materials produced at Eastriggs played, in the global conflicts of the First World War. The site has very strong connections to wider social issues such as workplace welfare, industrial health and safety (addressing the risks from industrial processes and exposure to harmful chemicals), as well as the wider development of women's place in society, affecting the tens of thousands of people who worked here (a significant proportion of the workforce was young women) and who lived in the neighbouring purpose-built settlements of Eastriggs and Gretna. Finally, there are significant individuals directly linked to the site, for example King George V, Kenneth B Quinan and Sir Arthur Conan Doyle, and among others.

3) Assessment of Cultural Significance

This statement of national importance has been informed by the following assessment of cultural significance:

- **Intrinsic characteristics** (how the remains of a site or place contribute to our knowledge of the past)

The monument includes the remains of four key parts of a large, purpose-built, early twentieth century chemical plant located in a rural, coastal setting, adjacent to the north shore of the Solway Firth.

The Eastriggs site (commonly known as Eastriggs, Dornock or Site III) was a part of a larger industrial production complex, known as His Majesty's Explosives Factory (HMEF) Gretna - spread along 12km and set out to exploit innovations in industrial chemistry and large-scale manufacturing and production. At its western end, Eastriggs (covering an area of approximately 1000 hectares, 5km by 2km) was the start of the production process - raw and constituent materials were deposited by rail; these materials were processed into chemicals (such as acids), explosive constituents (nitro-glycerine and nitro-cellulose or 'gun cotton') and into the finished explosive (cordite) and these constituents were stored onsite before being transported by rail, continuing a broadly eastwards production flow, for finishing and storage at Gretna and Longtown (England).

An official account of the site gives an insight into cordite production and the scale of effort undertaken at Eastriggs (Ministry of Munitions, 1919). The co-ordination and scale of production at Eastriggs was impressive. Records indicate an estimated 600 rail wagons arrived every day, transporting construction and raw material to the site. Construction was started in July 1915 by the main contractor Pearson and Son Limited. The site was erected by an estimated workforce of more than 10,000 and production started only 11 months later (The Devil's Porridge Museum). In one area alone, at the glycerine distillery, some 2000 tons of crude glycerine could be stored at any one time and an estimated 250 tons were processed each week. In the case of the nitro-glycerine area (the Enclave), two of the five hills (the outer most hills on the west and east sides) were built to provide redundancy and spare production capacity in the overall system. Overall, the annual output of cordite materials was projected at 40,000 tons and by 1917, the plant was producing 1000 tons per week.

Nitre, or sodium nitrate is a naturally occurring soft, white soluble mineral. This was imported from South America to the factory where it was dried and heated with sulphuric acid made on site in the Oleum and Mannheim plants, using producer gas also created on site in the north and south retort houses. The resultant nitric acid was then distilled in the still house, condensed and collected. Both nitric acid and sulphuric acid were needed in huge quantities to enable the nitration of refined glycerine to make nitro-glycerine**.**

Sulphuric acid (also known as oil of vitriol and fuming sulphuric acid) was produced in the Grillo Oleum plant formed by combining sulphur, hydrogen and oxygen. Sulphur was heated in burners to produce sulphur dioxide and further processed to produce the required levels of sulphur trioxide using platinum as a catalyst. The resultant highly concentred acid was colourless, odourless, dense, corrosive and oily - hence 'oleum'. To the east of the Grillo Oleum plant was the Mannheim Oleum

plant. Sulphuric acid was also produced here. Sulphur trioxide was absorbed in sulphuric acid by the catalytic action of iron oxide (mixed with sulphur) in the form of pyrites and with platinum. The plant required a nearby store for the pyrites and a screening / crusher plant. At the glycerine distillery, crude glycerine (a byproduct of soap making and the oil industry) was refined by steam distillation. It was then mixed with sulphuric and nitric acid in lead cylinders to make nitro glycerine at the Enclave.

The scale to this section indicates the volume of material being produced. The largest of the buildings was the Mannheim Oleum plant which measured 90m by 60m. The adjacent Grillo Oleum section had approximately 27 separate structures, many of which were between 25m and 80m long by between 10m and 15m in width. The stores for raw materials adjacent to these buildings were also necessarily large – approximately 60m by 65m on plan.

In addition to the production of acids and the refining of glycerine, the processing and transformation of compressed waste cotton was a key process here. Raw waste cotton bales were picked, teased and willowed to dry and open up the cotton fibres. The cotton was then mixed with sulphuric acid in over 600 large basins or pans to produce nitro-cotton or guncotton. It was then transported to a boiling house where it was boiled five times in over 120 stabilising vats. The nitrated cotton was then beaten, potched (bleached) and screened, breaking the cotton fibre into a fine white pulp. Water and calcium carbonate were added to reduce acidity. The nitro-cotton was then agitated and rung to reduce the moisture content. It was then transported to be screened into a loose consistency before being dried. The bagged nitro-cotton was split between wet magazines and the 41 drying houses or stoves after which it was then transported to the dry nitro-cotton magazines.

The Enclave at the east side of the complex comprised five ‘hills’, each with various process buildings protected by large enclosing earthwork bunds. The final nitrocotton product known as ‘paste’ was manufactured at the hills. The nitroglycerine ‘hills’ made use of the local natural topography, for a south to north gravity feed, using the natural slope of the ground to aid the flow of liquid material. The configuration of these ‘hills’ illustrates batch production for nitro glycerine. A single ‘hill’ consisted of a soda dump, glycerine dump, acid storage tanks, brine storage tank, air storage tanks, charge houses (acid and soda), nitrator separator house, washing houses, wash water settling houses, mixing houses, nitro-cotton magazine, paste magazines and a loading platform. The dried nitro-cotton was transported by narrow gauge rail to the nitro glycerine washing and mixing houses. Refined glycerine was nitrated with concentrated sulphuric acid and nitric acid. Dry nitro-cotton was taken from the dry nitro-cotton magazines and mixed in the mixing houses by hand to produce the paste. It was then transported to the magazines and loading platforms. The outermost hills shared mixing houses, nitro-cotton magazines and paste magazines.

The paste was stored in magazines before rail transportation eastwards to the other Gretna sites. At these other sites, the paste was mixed with ether, alcohol and mineral jelly to make cordite dough. It was then pressed, cut, dried and packed. The inherently dangerous (explosive) nature of materials being produced and handled at

Eastriggs necessitated careful design and layout, construction and site management – from earthwork containment around key process buildings to the ways in which power, heat, materials and transport were used, to minimise risk (for example from sparking / ignition). Because of this, the security oversight of work, staffing and materials handling at the Enclave was an important element in its operation.

The four key areas described above functioned as elements of the larger, industrial production flow – producing and refining chemical ingredients and combining these into processed materials all of which were essential components in the manufacture of a relatively new type of propellent known as Cordite RDB (Research Department formula B). These areas provide evidence of large-scale industrial chemistry during its developing phase in the second decade of the twentieth century. They demonstrate how the chemical processes were scaled up to meet the demands of munitions supply during the First World War and they help us understand how emerging production techniques were employed to ensure efficiency, optimisation and safety in manufacturing – for example the breaking down of complex processes into smaller tasks, which enabled an unskilled workforce to undertake technical tasks relatively easily. The surviving elements in these key areas represent the materials, design, and construction methods and the functional nature of the site. They reflect a complex and ambitious factory design plan of more than 300 buildings and structures.

The period of munitions production represents a short, single phase of use, responding to a national need between 1915 and 1920, after which the site was partly sold under auction in 1924. 600 separate land parcels were auctioned at Carlisle County Hall and this included land, buildings, the adjacent housing stock at Eastriggs and bundles of dismantled materials. The industrial infrastructure and apparatus was largely dismantled and removed. By 1936, the factory ground at Eastriggs was described as “a mass of dismantled and broken-down buildings” (Dundee Evening Telegraph).

Attempts to dispose of the whole factory largely failed, and the site lay dormant until the whole site was then taken back into government ownership for the Second World War and transformed into a munitions storage facility, involving a reworking of the overall layout to facilitate storage and movement of finished munitions. The Second World War building stock surviving in the acids and guncotton section is not of sufficient significance here. However, within the area of Hill 3 in the Enclave, there is considerable interest in the surviving group of later buildings (Nissen huts) which replaced the early, purpose-built nitro-glycerine houses.

Combined photographic and field evidence shows that the First World War building stock was removed from The Enclave at some point, probably in the inter-War period. Subsequently Nissen Huts (of at least three different variations using the standard five foot component sections) were carefully inserted over the existing concrete footplate, making use of the surrounding earthwork bunding at each house. The survival and good preservation of a group of varied Nissen Huts is relatively uncommon. The group is a good example of the range of uses to which this simple,

effective type of prefabricated building was put to. The presence of a group of these buildings (from a surviving overall group of 34 examples at Eastriggs) demonstrates the scale of munitions storage undertaken during the Second World War and later (including the First Gulf War in 1991) up until relatively recently when the site was closed as a munitions storage facility. The huts are therefore evidence an interesting development sequence from the First World War until the early 2000s.

In addition to the standing and ruined remains of buildings and structures from the production and storage phases at Eastriggs, there is likely to be good overall potential for the survival of archaeological evidence relating to the site's construction, use and reuse. This can include evidence of the materials and apparatus built from 1915 onwards, the residual features of infrastructure connections such as power water, heat, waste, railway lines and importantly, surviving chemical signatures from the various processes taking place here.

- **Contextual characteristics** (how a site or place relates to its surroundings and/or to our existing knowledge of the past)

The choice of a munitions production site along the inner Solway Firth (straddling both Scotland and England) was based on what was described at the time as 'war factors'. The site was relatively inaccessible by land, sea, and air by German military forces, it was an undeveloped site with sufficient space for the very large factory complex with access to existing main rail lines and critically, with access to sufficiently large quantities of fresh water.

Eastriggs and the wider complex, HMEF Gretna, were developed in direct response to a single issue - an insufficient supply of small and large calibre munitions during the First World War (commonly known as the '1915 shell crisis'). The site at Eastriggs was part of a national response to the crisis, aiding in the supply of munitions to various land campaigns. A newly created government department, the Ministry of Munitions, tackled this shortfall within a very short timescale, implementing a co-ordinated munitions and war materials production programme. This programme combined existing munitions production and contracted commercial companies with the development of new sites such as HMEF Gretna.

The Eastriggs / Gretna site was one of the newly formed National Factories providing munitions materials on a vast scale. Chemical constituents such as acetone and components such as shells, projectiles and explosives were all produced at key sites. Explosives such as the high explosive, TNT, were manufactured at Craigleith, Edinburgh and at Alfred Nobel's commercial plant at Irvine, Ayrshire while component materials were made elsewhere, for example at Dundee (acetate of lime) and at Mile End and Mossend, Glasgow and Renfrew (high explosive shells). The combining of these into finished munitions was also undertaken at newly built facilities with filling factories established at Georgetown, Renfrewshire and Cardonald, Glasgow.

In 1914, across Great Britain, the production of cordite took place at seven private factories, including the large private works at Cliffe, Medway (Historic England scheduled monument designation reference – 493683), and Hayle, Cornwall (Historic England scheduled monument designation reference – 533338) and the government factory at Waltham Abbey in Essex (Historic England scheduled monument designation reference - 1016618), joined shortly after the outbreak of war by Holton Heath in Dorset which produced cordite specifically for the Royal Navy (Historic England scheduled monument designation reference – 1019151). The Gretna site was unique as the sole purpose-built cordite factory in Scotland and the single largest producer of cordite the United Kingdom. It plays an important role in our understanding and recognition of the home front, industrial scale response to the demands of the First World War. It was one of 24 munitions factories in Scotland, collectively producing essential war materials and contributing to the outcome of the First World War.

The landscape at Eastriggs, a previously quiet and relatively remote coastal area, changed radically as a result of the emerging factory complex (and over an area of approximately 5km east to west by 2km north to south) and subsequently, when much of the industrial fixtures and fittings were removed and a new munitions storage function was developed. The essential character of the factory survives in its overall footprint and the low and buried remains of the buildings, structures and physical connections here - the four key production areas within the monument are an important illustration of this character and the overall factory layout. It is one of the key sites that make up the overall Gretna complex, from Longtown (Cumbria) in the east to Eastriggs in the west and combined with the planned villages of Gretna and Eastriggs, both purpose-built to house the workforce. The survival of other elements of this dispersed complex adds to the significance of Eastriggs,

- **Associative characteristics** (how a site or place relates to people, events, and/or historic and social movements)

In 1915, Britain faced a persistent and significant shortfall in munitions production. In part this was caused by a lack of materials and also a lack of workforce, the result of a significant proportion of the male population enlisting for military duty. This led to women being employed in the munitions industry and was an important pre-cursor for the significant role those female workers would play in the overall home front effort. A newspaper article on the 'Shell scandal' in May 1915 highlighted the lack of an unlimited supply of high explosives as "*…a fatal bar to our success*" (The Times Newspaper, 14 May 1915). As a result of the so-called 'shell crisis', the 1915 Munitions of War Act was passed by Parliament and the Ministry of Munitions created. Notable ministers of this department included David Lloyd George as the founding minister and Winston Churchill. The act gave the Government extensive powers in controlling the UK-wide production of munitions across the private sector and in the creation of national factories.

The complex at Eastriggs / Gretna was a major producer of the explosive cordite to the war effort. The scale of production here earned it the label, '*the largest factory in*

the Empire' and so on production scale alone, it played a significant part in the outcome of the war. It also played an important role in the development of explosives. Because of the shortage of raw materials, for example acetone, alternative chemicals and production processes had to be found to meet the demand for propellants. The site produced a newly developed type of cordite, Cordite RDB (Research Department formula B), which instead of acetone used ether-alcohol to gelatinise the cordite paste. The factory exploited emerging ideas in manufacturing, such as the breaking down of production into smaller, key stages along a logical sequence or flow.

Cordite RDB was almost exclusively used for land service munitions and was supplied in enormous quantities to support the huge artillery barrages on the Western Front. Munitions such as these were a chief cause of mass casualties on both sides and a grave reminder of the human impacts of industrialised war.

On a social level, Eastriggs and the wider Gretna facility contributed to shifting attitudes towards women and the role of women in society. By the Armistice of 1918, over 1.5 million women were employed on government contracts in industrial supply and in administering the war effort. Of a 30,000-person workforce at HM Factory Gretna, around 12,000 of the workers were women. Women, many young, single and working-class, were employed across the factory in a variety of roles, including manual labour as part of the production of cordite, hospitality, domestic service, medicine, chemistry, firefighting and policing.

Kenneth Bingham Quinan (1878-1948) is one of several key figures associated with Eastriggs. Quinan was an American-born chemical engineer who later settled in South Africa. He had a background in explosives and mining, and upon the outbreak of war was put in charge of the Factories Branch of the Ministry of Munitions. This included designing and overseeing the construction of HMEF Gretna and the Eastriggs factory. Quinan recruited chemists and technical experts and used his expertise to develop a highly complex cordite production system at Eastriggs, made simple by the breaking down of processes into constituent parts (The Devil's Porridge, Quinan). David Lloyd George publicly thanked Quinan in the House of Commons and commented: *'It would be hard to point to anyone who did more to win the war than Kenneth Bingham Quinan.'*

King George V and Queen Mary conducted an official visit to the site in May 1917. The writer, Sir Arthur Conan-Doyle is attributed with the phrase 'Devil's Porridge', a popular term used to describe the appearance of the gun-cotton and nitro-glycerine mix used in producing cordite material. Conan-Doyle also wrote about the factory in popular print media, in his capacity at the War Propaganda Bureau.

4) References

HES Canmore links 121308, 146621, accessed on 26 July 2022.

Local Authority HER link - MDG 13390, 11954 accessed on 26 July 2022.

Cocroft, W D, 2000, *Dangerous Energy. The archaeology of gunpowder and military explosives manufacture.* English Heritage. Swindon.

Dolan J and Oglethorpe M, 1996, *Explosives in the service of man. Ardeer and the Nobel heritage.* Royal Commission on the Ancient and Historical Monuments of Scotland. Edinburgh

NA, ND, *Eastriggs: From WW1 HMF Gretna Cordite RDB production to disposal* (circulated typescript report).

Guy, J A, 1998a, *Dumfries and Galloway. A survey of the 20th Century defences. 1997-1998. Part I.* Historic Scotland, Edinburgh.

Guy, J A, 1998b, *Dumfries and Galloway. A survey of the 20th Century defences. 1997-1998. Part II.* Historic Scotland, Edinburgh.

Kenyon, D, 2015, *First World War National Factories: An Archaeological, Architectural and Historical Review.* Research Report Series no. 76. Historic England.

Ministry of Munitions, 1921, *The Official History of the Ministry of Munitions. Volume X - The Supply of Munitions. Part IV - Gun Ammunition: Explosives.* HMSO. London

Ministry of Munitions of War, 1919, *H.M. Factory, Gretna: Description of plant and process*. Dumfries: J. Maxwell & Son, for His Majesty's Stationery Office.

Rayner-Canham, Marelene and Rayner-Canhan, Geoffrey, (1996). *The Gretna garrison*. Chemistry in Britain, Pages 37 – 41.

Routledge, G L, 2003, *Miracles and Munitions: A concise History of Munitions Manufacture from the time of Alfred Nobel to the building of H.M. Factory Gretna during World War I*. Longtown: Arthuret Publishers.

Routledge, G L, 1999, *Gretna's secret war. The great munitions factory at Dornock, Eastriggs, Gretna and Longtown and an account of the Quintinshill railway disaster.* Bookcase. Carlisle.

Royal Commission on the Ancient and Historical Monuments of Scotland, 1997, *Eastern Dumfriesshire: An Archaeological Landscape*. Royal Commission on the Ancient and Historical Monuments of Scotland. Edinburgh. HMSO

Archive materials:

Construction plans and elevations. Supp 10/15; 20-22; 24-7; 29-31; 34; 36 (numbers are inclusive). Held at The National Archives, London.

Descriptions of construction plans and elevations. Supp 10/16-19; 23; 32 (numbers are inclusive). Held at The National Archives, London.

Glass plate negatives of plant and staff at HM Munitions Factory, Longtown, Gretna 1916-19. GD1/1011. Held at National Records of Scotland, Edinburgh.

HM Factory Gretna. Sale particulars with plans and photos of the estate. DX 170/38. Held at Cumbria Archive Centre (Carlisle). Cumbria County Council.

Land acquisition, construction & operation papers – Supp 5/987; 5/1163; 5/1306; 10/35-36; 10/254; 10/255. Mun 7/254; 7/256; 7/258. Held at The National Archives, London.

Maps and plans. MR 1/1825. Held at The National Archives, London.

Photographs of the site. Mun 5/159/1122/7/195; 5/239; 5/297. Held at The National Archives, London.

Sale particulars for properties in Eastriggs and Gretna. DMIL/Mounsey/153/494. Held at Cumbria Archive Centre (Carlisle). Cumbria County Council.

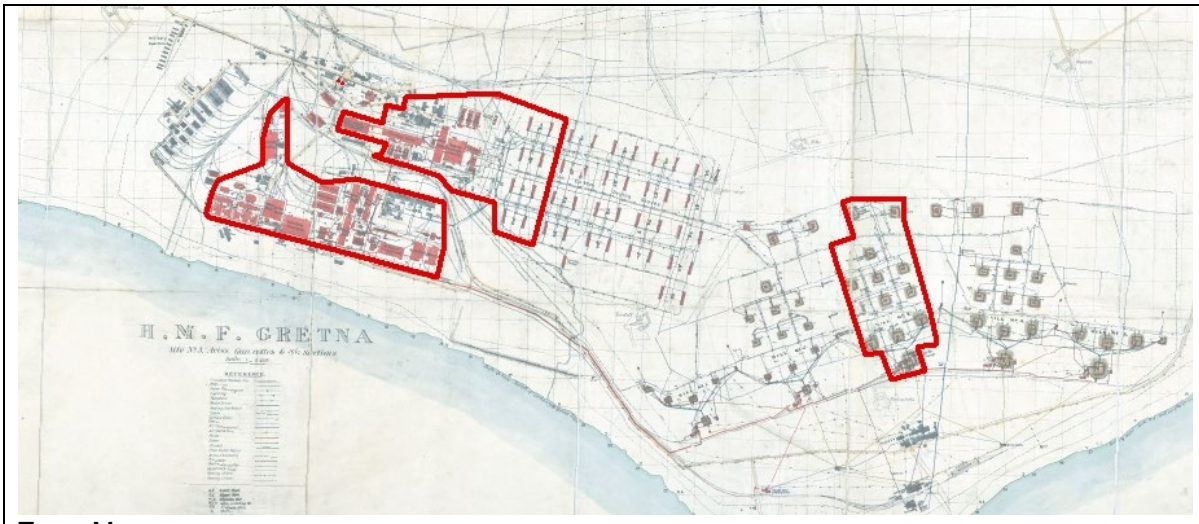
Site disposal papers (1920s). 5/1307. Held at The National Archives, London.

5) Images

Images proposed for inclusion in online Scheduled Monument Record if site becomes scheduled or if an existing scheduled monument record is amended.

Type: Aerial
Title: oblique aerial view of the glycerine distillery and acids production areas looking south southeast.
Alternative Text: An aerial view of the Eastriggs site showing the location of the glycerine distillery and acids production areas looking south southeast on a sunny day.
Date taken: 21/06/2022
Photographer: HES
Copyright:© Historic Environment Scotland.

Type: Aerial
Title: oblique aerial view of the Eastrigggs nitroglycerine production area, Hill 3, looking north northwest.
Alternative Text: An aerial view of the Eastriggs site showing the location of the nitroglycerine production area, Hill 3 looking north northwest on a sunny day.
Date taken: 21/06/2022
Photographer: HES
Copyright:© Historic Environment Scotland.



Type: Map
Title: Historic Map likely to be contemporary with the construction and use of the site, showing the layout of plant, buildings and infrastructure with the three scheduled monument areas superimposed.
Alternative Text: An undated historic map likely to date to the construction and use of the site, showing the layout and configuration of buildings, plant and rail track / track with the three areas of the scheduled monument superimposed.
Copyright:© The National Archives.

ANNEX B
Assessment of special architectural or historic interest

1. Building or site name

East and west guardhouses and gatepiers at the main entrance to former munitions factory, Eastriggs

2. Description and historical development

2.1 Description

Built in 1916 by the Ministry of Munitions and with mid to late-20th century additions and alterations, the former main entrance to the Eastriggs site of His Majesty's Explosives Factory (HMEF) Gretna comprises two guardhouses and two associated gatepiers. These structures are located at the end of a minor (and latterly private road), approximately 560 metres southeast from the junction of Melbourne Avenue, The Crescent and The Ridge in the village of Eastriggs.

The two guardhouses are detached, multi-phase, single-storey buildings, roughly L-shaped on plan and constructed in red brick with raised brickwork quoins and cills.

The principal (north) elevation of the east guardhouse is roughly five bays wide with a small, flat-roofed, rectangular-plan entrance extension attached to its west elevation. There is a timber veranda running along its west elevation forming a covered walkway. The west guardhouse is four bays wide and has a similar timber veranda along its east elevation. The veranda columns sit on low, squared concrete plinths.

The window and door openings are predominantly boarded up. Some of the window openings have 12-pane glazing in timber sash and case frames (visible from inside). The roofs of each guardhouse are piended and swept and are covered in slates. The east guardhouse has a central chimneystack along the roof ridge and there are a mixture of metal and plastic rainwater goods throughout. The flat-roofed verandas are covered in felt.

The interior of the guardhouses largely dates from the mid to late-20th century. The internal walls are of painted and exposed brick. There are no historic fixtures or fittings, such as original doors or lights. The fireplaces have been blocked up and a number of rooms have been reconfigured and some window and doors openings changed. There is a later toilet block extension on the west elevation of the west guardhouse.

The tall, square-plan gatepiers are chamfered and constructed in brick with a decorative concrete band a little above the centre point of each. The tops of the

gatepiers are corniced and are surmounted by squared concrete slabs. The remains of 20th century electric lamp fittings are set into each concrete top. Each gatepier is connected to a guardhouse by a squared brickwork entranceway with concrete band decoration, forming a pedestrian walkway on each side.

2.2 Historical development

The Eastriggs site (commonly known as Eastriggs, Dornock or Site III) was part of the industrial munitions production complex known as His Majesty's Explosives Factory (HMEF) Gretna. The factory was developed in direct response to a single issue - an insufficient supply of small and large calibre munitions during the First World War (commonly known as the '1915 shell crisis'), which was widely publicised in the press. Trench warfare was an essentially static form of warfare and used large numbers of shells and explosives to control the lines held. As a result, stocks of shells were soon depleted. This created a need for large-scale supplies of key constituents, such as the propellant, Cordite RDB (Research Department formula B), which was a key constituent of shell production. The Ministry of Munitions was formed in 1915 to oversee and coordinate the production and distribution of munitions for the war effort.

The purpose-built complex at HMEF Gretna spanned an area of around 12km from Mossband near Longtown in the east to Dornock/Eastriggs in the west. Its function was to exploit innovations in industrial chemistry and large-scale manufacturing to produce cordite propellent during the First World War. The construction of the Eastriggs site began in 1915 and formed the westernmost part of HMEF Gretna, covering approximately 1000 hectares, 5km by 2km. Constructed by around 10,000 mostly Irish workers, the first factory workers arrived at HM Factory Gretna in March 1916 (The Devil's Porridge Museum). The Eastriggs site was the start of the production process. It was here that raw and constituent materials were deposited by rail and processed into chemicals (such as acids), explosive constituents (nitro-glycerine and nitro-cellulose or 'gun cotton'), before being turned into the finished explosive, cordite RDB. These constituents were stored onsite before being transported by rail, eastwards, for finishing and storage at Gretna and Longtown.

Building plans, dated April 1916, show the guardhouses at the Eastriggs entrance were constructed as police offices (The National Archives, Supp 10/28, drawing no. 3921). The east guardhouse housed 7 rooms, including a search room, waiting room, Commandant's room, clerk and assistant rooms, detention room and matron's room. The west guardhouse was smaller and housed five similar rooms, including a cell, with the provision for later extension westwards if required. The east and west guardhouses had a veranda on their west and east elevations respectively, forming two covered pedestrian walkways. The east guardhouse entrance was designated for women, the west one was for men.

A historic photograph (taken around 1916-1918) shows the guardhouses flanking the main road into the factory site with two brick and timber-constructed, rectangular-plan buildings (the parcels and checks offices) to the southwest (The National

Archives, Mun 5/297/pt.3). These contemporary buildings were demolished sometime between 1924 and 1940 (they are not shown on a 1940 aerial photograph but are shown on a 1924 sales map). This photograph shows dirt tracks connecting the entrance buildings and large metal gates between the gatepiers and guardhouses.

After the First World War ended, the high level of output was no longer required and the number of workers employed at Eastriggs was significantly reduced (The Scotsman, 1919). In 1921 the Ministry of Munitions proposed the closure of the Eastriggs factory (Dundee Evening Telegraph, 1921). The entire HM Factory Gretna, including the townships at Gretna and Eastriggs and the Longtown (Mossband) and Eastriggs (Dornock) factory areas, was put up for sale by auction at the County Hall in Carlisle in July 1924. The auction catalogue outlines around 600 lots, including stone, brick and steel-constructed factory buildings as well as public buildings and around 300 houses (Cumbria Archive Centre (Carlisle), DX/170/38). Smaller auctions of dismantled steelwork, iron and timber are recorded in the same year in Hamilton (The Scotsman; Motherwell Times). Attempts to sell or re-purpose the factory largely failed, and the site lay dormant for a number of years.

By 1936, the factory ground at Eastriggs was described as “a mass of dismantled and broken-down buildings” (Dundee Evening Telegraph). By the late 1930s, part of the Eastriggs site was acquisitioned and utilised under the national defence programme (The Scotsman, 1938). The site was reused and adapted for large-scale munitions storage during the Second World War and into the 21st century as ESD Eastriggs (Explosive Storage Depot Eastriggs). The Longtown site also became a storage depot in 1938 and continues in use as such today (2022).

Aerial and oblique photographs (taken in 1940, 1963 and 1975) clearly show the L-shaped footprint of both guardhouses with the addition of some extensions over time, particularly to the western elevation of the west guardhouse. The buildings have continued to be used for their intended purpose as a security point and guardhouse complex. A photograph taken in 1996 shows the guardhouses and gatepiers in much the same configuration except for the addition of a flat-roofed, MoD police station extension to the north elevation of the east guardhouse (Canmore).

ESD Eastriggs closed as an ammunition depot in about 2010.

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3. Assessment of special architectural or historic interest

To be listed a building must be of ‘special architectural or historic interest’ as set out in the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997. To decide if a building is of special interest for listing we assess its cultural significance using selection guidance which has two main headings – architectural interest and historic interest (see Designation Policy and Selection Guidance, 2019, Annex 2, pp. 11-13).

The selection guidance provides a framework within which judgement is exercised in reaching individual decisions. The special architectural or historic interest of a building can be demonstrated in one or more of the following ways.

3.1 Architectural interest

The architectural interest of a building may include its design, designer, interior, plan form, materials, regional traditions, and setting and the extent to which these characteristics survive. These factors are grouped under two headings:

3.1.1 Design

Built as the main entrance to the Eastriggs/Dornock site at His Majesty's Explosives Factory (HMEF) Gretna, the two guardhouses and associated gatepiers are a unique survival at a nationally significant First World War former munitions site.

The guardhouses are of a simple design, prioritising function over form, however both have some limited external decorative detailing, including raised brickwork quoins and cills, and verandas over the side elevations which form the former pedestrian walkways. Some contemporary houses that were built for workers along The Rand in Eastriggs village have similar raised brick quoins, further highlighting the stylistic connections between the former factory and the township. The original L-plan footprints of the guardhouses are largely retained and are of a similar size to one another. They are shown with roughly mirrored footprints on a sales map of 1924 and these largely survive today (2022).

Comparisons between the building plans of 1916, a map of the factory dating from around 1916 and the sales map of 1924 show that the west guardhouse was enlarged from a rectangular-plan building to an L-shaped one to mirror the east guardhouse relatively soon after its construction. A future extension to the west elevation of the west guardhouse was provided for in the 1916 building plans, that these works proceeded indicates the requirements of the west guardhouse evolved once the site was fully operational (Supp 10/28, Supp 10/39 and DX 170/38). The level of alteration and reconfiguration of the west guardhouse, particularly to its west elevation, is unclear, however its roof plan indicates that changes to the building in the later 20th century were largely sympathetic to the overall plan form of the two guardhouses.

Buildings of this type were constructed according to a relatively standard design, although minor variations were common, based upon the specific location of the building and availability of materials. The brick and slate construction of the guardhouses and gatepiers is typical for the building type. The inclusion of a veranda is also a standard design feature, regularly used by the military in its buildings throughout the United Kingdom. These guardhouses were designed to be of a temporary nature and the use of concrete and brick is indicative of that, however the good quality brick and long-term usage and repair have aided their survival. While the exterior form of the two guardhouses have been augmented since that shown on

the 1916 plans and historic photographs, the lack of significant later external alteration, such as by the addition of render or drastic alteration of plan form, further adds to their interest for listing.

The internal plan form and layout of the guardhouses roughly corresponds to that shown on plans dating from 1916. The plan form is typical of the building type with a series of rooms branching off from a main corridor with associated toilet facilities and communal areas. There has been some reconfiguration of rooms by the addition (and in some cases removal) of partition walls and original door openings, however overall, the layout of the principal rooms has been largely retained. Both guardhouses were designed to be entered from the pedestrian entrance underneath their respective verandas and a series of entrance doors were positioned along the side (veranda) elevations of the guardhouses, a number of which have been since blocked up and new window openings formed as the use of these guardhouses changed over time.

As the use of the overall Eastriggs site changed throughout the 20th century, so too did the guardhouses and, as such, the buildings were upgraded to suit changing requirements. Mid to late-20th century alterations include the reconfiguration of window and door openings, particularly along the veranda, south and north elevations of the guardhouses and the addition of a later MoD police sentry box (the current openings are different to those shown on a historic photograph taken around 1916-18). Importantly, much of the original footprint, layout and function of the buildings is retained, and while they no longer form a main entrance route into the site, they remain readable in the landscape and their architectural integrity is retained.

The positioning of the two guardhouses and entrance gatepiers represents the whole functioning of the site and its evolution during the 20th century. At the time of their construction in 1916, the guardhouses were built to act as both a gatehouse and entry point into the site but also as a place of security and congregation for those in the role of supervision, namely police. The two pedestrian entrances formed between each guardhouse and gatepier were designed to cope with a large numbers of workers as they entered and exited the factory site, and these were designed specifically to separate men and women according to strict social codes of the time. The west (men's) entrance continues to be readable as a pedestrian walkway into the site, however the east (women's) entrance has been altered by the addition of a late-20th century MoD sentry box which has blocked the pedestrian gate and reconfigured the interior. The southern sections of both guardhouses were originally used as search rooms with two doors, one for entry and one for exit. While openings have been blocked up and the rooms reconfigured, the original entry and exit points can be seen and inform the building's original function.

While there has been some later alteration to the guardhouses, this has not adversely affected the overall historic interest of the buildings. They retain much of their historic character and authenticity as largely symmetrical, double guardhouses with associated gatepiers. Furthermore, the L-shaped footprint of the buildings and

their respective male and female entrances are evident. In their current form, the guardhouses and gatepiers continue to inform their original and intended function.

3.1.2 Setting

The guardhouses and gatepiers are situated at the end of what is now a minor road that leads southeast from the village of Eastriggs at the junction of Melbourne Avenue, The Crescent and The Ridge. These structures are located at the former entrance to the Eastriggs site, the westernmost extent of the former HMEF Gretna, and largely occupy the same boundary as they did when they were constructed in 1916. The Eastriggs site is deliberately located in a rural, coastal setting, next to the north shore of the Solway Firth.

The location of the guardhouses and gatepiers, within easy walking and vehicular distance of the village of Eastriggs, further adds to the interest of these buildings because it continues to inform their function. The outline of the train platform (known as Wylie's platform) is still visible on aerial photographs of the entrance to the site which further connects and informs the function of the guardhouse buildings.

The guardhouses have retained much of their historic setting. Their positioning and form clearly identify them as a main entrance into a site of outstanding historic importance. When the Eastriggs site was adapted to become an explosives storage depot after 1938 much of the surrounding infrastructure was removed and the site repurposed, however the guardhouses continued to be used for their intended purpose and, as such, survive as one of the few remaining and upstanding First World War structures at Eastriggs, albeit in a modified form.

While there have been significant alterations to the wider site since its use as a munitions factory between 1915 and 1921 and its use as munitions storage depot from the late 1930s onwards, the guardhouses and gatepiers are clearly readable in the landscape as military gatehouse buildings. The historic and functional relationship of the guardhouses and gatepiers, as well as the standing and archaeological remains of the wider site, can still be seen and they aid our understanding of the operation and size of Eastriggs as the starting point of the wider cordite production process at HMEF Gretna.

The immediate setting of the guardhouses and gatepiers has changed since the time of their construction, particularly by the removal of two buildings to the south, the brick and timber-built parcels and check offices, removed sometime between 1924 and 1940 (MUN 5/297, pt3; NCAP, 1940; sales plan, DX 170/38). Furthermore, the addition of a single-storey range attached to the west elevation of the west guardhouse and the addition of other detached buildings to the north and west of the guardhouse complex in the mid-20th century has altered the setting, but these changes have not adversely affected the overall grouping and historic setting of the guardhouses and gatepiers because their original footprint, design and plan form are largely intact.

The structures are prominent features in the landscape which broadly retain their historic character and setting. Overall, these are key First World War buildings in a wider complex of archaeological remains of former factory structures and later, military buildings and, as such, are a unique survivor at the site.

Eastriggs has a wider setting as one of the key sites that made up the overall Gretna factory complex, from Longtown (Cumbria) in the east to Eastriggs in the west and combined with the planned villages of Gretna and Eastriggs, both purpose-built to house the workforce. The survival of other elements of this dispersed complex adds to the significance of Eastriggs.

3.2 Historic interest

Historic interest is in such things as a building's age, rarity, social historical interest and associations with people or events that have had a significant impact on Scotland's cultural heritage. Historic interest is assessed under three headings:

3.2.1 Age and rarity

The survival of the guardhouses and gatepiers, particularly on a site that has been adapted for different uses since its closure as a munitions factory, is unique. The structures are of interest because they are a group of buildings that were built in 1916 and which largely survive in their original form in terms of overall footprint, plan form and function.

Guardhouses not only act as gatelodges to a site, they are also important for the security of the complex and house all the personnel on guard duty for a specific period of time. Guardhouses are normally positioned at the entrances to military or highly secure sites. Those at Eastriggs were constructed for the accommodation of police officials who were there primarily to inspect workers upon entry to and exit from the site (The National Archives, Supp 10/21 and Supp 10/28). The two guardhouses included search rooms as well as a guard room and cells in the west guardhouse for the secure holding of prisoners.

Over 150 women were employed at HM Factory Gretna in the Women's Police Service (WPS), to supervise the female workforce. One of their main roles was to inspect female workers as they entered and exited the factory. One woman, for example, is recorded as trying to smuggle in her cigarettes and another tried to steal some cordite (The Devil's Porridge Museum, Women's Police Service at HM Factory Gretna). The east and west guardhouses would have been used as part of this screening process. Women would have used the east guardhouse and pedestrian entrance and the men would have used the west guardhouse entrance and been supervised by male police.

Much of the Eastriggs site was composed of temporary, industrial structures, many of which were dismantled or sold off after the First World War and those that remained were adapted and repurposed when Eastriggs became an explosives

storage depot from the late 1930s onwards. The guardhouses and their associated gatepiers are a major example of their building type which are largely unaltered in terms of their footprint, plan form and historic function as a critical link between civilian and restricted areas. While the guardhouses and gatepiers are architecturally plain, they are also typical of their building type as functional and utilitarian structures. Their special interest comes from their date of construction (in 1916) and their rarity as a largely intact group of two gatehouses and associated gatepiers marking the entrance to a site of outstanding historic interest.

3.2.2 Social historical interest

Social historical interest is the way a building contributes to our understanding of how people lived in the past, and how our social and economic history is shown in a building and/or in its setting.

HMEF Gretna site was the sole, purpose-built cordite factory in Scotland and was the single largest producer of cordite in the United Kingdom. It plays an important role in our understanding of the industrial scale response to the demands of the First World War and how the home front responded. Gretna was one of 24 munitions factories in Scotland, collectively producing essential war materials and contributing to the outcome of the First World War.

The guardhouses were built as the main entrance in and out of the factory at the Eastriggs site. Their survival informs and represents the functioning of the whole First World War munitions site, particularly so since the site's significant adaptation and change of use from the mid-20th century onwards. Furthermore, the visual and logistical relationship between the site entrance to the purpose-built township at Eastriggs remains evident in the landscape and directly illustrates the historic function of these buildings and the wider HMEF Gretna site, as well as the social history of Eastriggs village and the surrounding areas.

The social historical significance of women and their role in the workplace in relation to Eastriggs is of further interest. Of a 30,000-person workforce at HM Factory Gretna, around 12,000 of the workers were women (The Devil's Porridge Museum). Women, many young, single and working-class, were employed across the factory in a variety of roles, including manual labour as part of the production of cordite, hospitality, domestic service, medicine, chemistry, firefighting and policing.

Over 150 women were employed at HM Factory Gretna in the Women's Police Service (WPS), to supervise the female workforce. As well as inspecting female workers as they entered and exited the factory, another role, indicative of the time, was to police the morals of the female (and male) workers by, for example, breaking up public kissing within the factory site and maintaining the 10pm curfew in the townships. By December 1919 the factory police force no longer employed women (Hansard).

3.2.3 Association with people or events of national importance

Eastriggs is a relatively uncommon example of a section of a military industrial complex built as part of the overall war effort during the First World War. At the time of its construction and use, HMEF Gretna was known as the largest factory in the empire.

The wider Eastriggs site is of national importance because it provides an important and tangible historical link to the global conflicts of the First World War by highlighting the scale of the conflict and how it essentially became a war of production. Eastriggs was purpose-built to produce materials necessary for the national war effort, namely cordite for shell production. Cordite RDB was almost exclusively used for land service munitions and was supplied in huge quantities to support the artillery barrages on the Western Front. These munitions were one of the chief causes of mass casualties on both sides and this site is an important reminder of the requirements and impacts of industrialised war.

Kenneth Bingham Quinan (1878-1948) is one of several key figures associated with Eastriggs. Quinan was an American-born chemical engineer who later settled in South Africa. He had a background in explosives and mining, and upon the outbreak of war was put in charge of the Factories Branch of the Ministry of Munitions. This included designing and overseeing the construction of HMEF Gretna and the Eastriggs factory. Quinan recruited chemists and technical experts and used his expertise to develop a highly complex cordite production system at Eastriggs, made simple by the breaking down of processes into constituent parts (The Devil's Porridge, Quinan).

The work at HM Factory Gretna came under the Official Secrets Act and was a crucial component of the home response to the war. The guardhouses and gatepiers are an important group of multiphase historic buildings that have stood at the entrance to an area of outstanding historical significance since 1916.

4. Summary of assessment

The east and west guardhouses and associated gatepiers meet the criteria of special architectural or historic interest for the following reasons:

- They mark the former main entrance to the former Eastriggs munitions complex which was the westernmost extent of His Majesty's Explosives Factory, Gretna, and are a tangible reminder of one of the largest factories of its type ever built.
- The guardhouses and gatepiers, built in 1916, are contemporary with the First World War use of the site and were likely constructed shortly after the first workers arrived at the munitions factory in March 1916.
- The L-shaped footprints of the guardhouses and the layout of the gatepiers and their respective pedestrian entrances are largely retained as they existed when HM Factory Gretna closed following the First World War.
- The survival of these entrance structures represents the functioning of the whole site throughout the last century, particularly the highly classified and restricted

nature of operations during two world wars and late 20th and early-21st century explosives storage.
- There is a strong social historical association with the former workers at this site and its relationship to wartime industry which is of national importance.

5. Category of listing

Once a building is found to be of special architectural or historic interest, it is then classified under one of three categories (A, B or C) according to its relative importance. While the listing itself has legal weight and gives statutory protection, the categories have no legal status and are advisory. They affect how a building is managed in the planning system.

Category definitions are found at Annex 2 of Designation Policy and Selection Guidance (2019) https://www.historicenvironment.scot/designation-policy.

5.1 Level of importance

The east and west guardhouses with associated gatepiers' level of importance is category B.

Buildings listed at category B are defined as 'buildings of special architectural or historic interest which are representative examples of a period, style or type.

Taking into account, the level of later change alteration to the exterior and interior of the guardhouses, category B is considered to be the most appropriate level of listing.

6. Other Information

Sir Arthur Conan-Doyle wrote a widely published article in November 1916 in which he described the gun-cotton and nitro-glycerine mixture used in producing cordite as a 'sort of devil's porridge' (see for example, Dundee Courier). Interestingly, in this article, after a glowing report of the factory he mentions two difficulties: drink and labour.

All work at HM Factory Gretna came under the Official Secrets Act. Security was paramount and state control of operations was an effective way to ensure this. As well as the control of people's day-to-day working lives, the state also intervened in their limited free leisure time. Not only were night-time curfews in place in the townships of Gretna and Eastriggs, the men and women were segregated (as at work) and excessive drinking was curbed. Many munitions workers lived over the Scotland-England border in Carlisle and travelled to Eastriggs by train (and also to Mossband and Longtown).

The State Management Scheme known as the 'Carlisle Experiment' began in Carlisle in 1916 and was extended to Gretna, Silloth and areas close to the border (where HM Factory Gretna was). The state nationalised all the breweries and over 300 pubs and licensed premises in these areas, introducing changes to moderate

alcohol consumption and behaviour, because excessive drinking and drunken disorder was causing absenteeism and poor productivity at the factory. The Scheme continued in Carlisle and the surrounding districts long after HM Factory Gretna closed, finally coming to an end in 1971 (Historic England).

7. References

Canmore: http://canmore.org.uk/ CANMORE IDs 121308 and 255707

Maps

No author (no date) Block plan showing H.M.F. Gretna: Site No.3, Acids, Gun cotton & N/G [Nitro-Glycerine] Sections. Scale 1:2400. Quinan Papers, Supp 10/39. The National Archives, Kew.

Tiffen, W. L & Sons (1924) Plan of Factories & Land Eastriggs Dumfriesshire. Insert map in DX 170/38, Cumbria Archive Centre (Carlisle).

Archives

H.M. Factory, Gretna: sales particulars with plans and photographs of the estate (July 1924), DX 170/38. Cumbria Archive Centre (Carlisle).

Hansard. Gretna Factory (Police Force), volume 122, Commons: 8 December 1919.

Photographs of HM Explosives Factory, Gretna, Dumfries. MUN 5/297, pt3. The National Archives, Kew.

Plan of Factory Gates and Police Station, Wylies Lane (April 1916). Quinan Papers, Supp 10/28, drawing no.3921. The National Archives, Kew.

Descriptions of plans, nos. 3892-4135 [book 20] (1916). Quinan Papers, Supp 10/21. The National Archives, Kew.

Printed Sources

Dundee Courier (28 November 1916) Britain's Miracle Town, p.4.

Dundee Evening Telegraph (20 June 1921) Protest Against Closing of Gretna Factory, p.7.

Dundee Evening Telegraph (21 July 1936) Famous Gretna Factory May Be Re-Erected, p.1.

Motherwell Times (29 August 1924) Sale by Auction, p.1.

The Scotsman (29 August 1919) Gretna Munitions Factory, p.3.

The Scotsman (19 January 1924) Forthcoming Sales, p.16.

The Scotsman (23 June 1938) Gretna Arms Store, p.11.

Online Sources

British Police History. HM Factory Gretna, at https://british-police-history.uk/f/gretna [accessed 21/07/2022].

Historic England. The 'Carlisle Experiment' – Government Takes Control of Public Houses, at https://historicengland.org.uk/research/current/discover-and-understand/military/the-first-world-war/first-world-war-home-front/what-we-already-know/land/state-control-of-pubs/ [accessed 21/07/2022].

National Collection of Aerial Photography (NCAP) (1940). Royal Air Force Second World War Aerial Reconnaissance, Sortie: M/124/13, at https://ncap.org.uk/frame/8-1-7-1-116-32?pos=20 [accessed 19/07/2022].

National Collection of Aerial Photography (NCAP) (1963). United States Navy Aerial Reconnaissance, Sortie: USN/219/206, at https://ncap.org.uk/frame/8-1-11-1-14-16?pos=1 [accessed 19/07/2022].

National Collection of Aerial Photography (NCAP) (1975). Joint Air Reconnaissance Intelligence Centre (JARIC), Sortie: 39/4701, at https://ncap.org.uk/frame/8-1-12-13-13-99?pos=5 [accessed 19/07/2022].

The Devil's Porridge Museum. Explore the Museum: virtual reality tour, at https://www.devilsporridge.org.uk/whats-inside [accessed 20/07/2022].

The Devil's Porridge Museum. About us, at https://www.devilsporridge.org.uk/your-visit [accessed 20/07/2022].

The Devil's Porridge Museum. Members of the Women's Police Service at HM Factory Gretna, at https://www.devilsporridge.org.uk/members-of-the-womens-police-service-at-hm-factory-gretna [accessed 21/07/2022].

The Devil's Porridge Museum. Women's Police Service at HM Factory Gretna, at https://www.devilsporridge.org.uk/womens-police-service-at-hm-factory-gretna [accessed 21/07/2022].

The Devil's Porridge Museum. Kenneth Bingham Quinan Part 2, at https://www.devilsporridge.org.uk/kenneth-bingham-quinan-part-2 [accessed 29/07/2022].

8. Images

Images proposed for inclusion in online Listed Building Record if building becomes listed or if an existing listed building record is amended or removed.

	
Type: Standard **Title**: East guardhouse at the former entrance to Eastriggs factory, showing pair of gatepiers and the west guardhouse in the distance, principal elevation, looking west. **Alternative Text**: East guardhouse at the former entrance to Eastriggs factory, showing pair of gatepiers and the west guardhouse in the distance, principal elevation, looking west, with signage in front of the guardhouse, during daytime, on clear day with blue sky. **Date taken:** 23/03/2022 **Photographer**: HES **Copyright**: © Historic Environment Scotland.	**Type**: Standard **Title**: East guardhouse and pair of gatepiers at the former entrance to Eastriggs factory, rear elevation, looking northeast. **Alternative Text**: East guardhouse and pair of gatepiers at the former entrance to Eastriggs factory, rear elevation, looking northeast, with trees and vegetation growth in foreground, during daytime, on clear day with blue sky. **Date taken:** 23/03/2022 **Photographer**: HES **Copyright**: © Historic Environment Scotland.

9. Indicative Map

A map of the proposed listed building is attached separately.