

**Bishopton Royal Ordnance Factory, Renfrewshire:
Archaeological Mitigation**

Archaeological Mitigation Strategy

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Introduction

1. This Archaeological Mitigation Strategy has been prepared for BAE Systems Plc in respect of a proposed remediation and enabling development of the Bishopton Royal Ordnance Factory. The archaeological works are designed to mitigate the impact on the archaeological remains within the development area.
2. Renfrewshire Council have required a programme of archaeological works to be undertaken as a requirement of the granted planning consents. The West of Scotland Archaeology Service (WoSAS) who advise Renfrewshire Council on archaeological matters has provided guidance on the structure of archaeological works required on this site during development works.
3. Rathmell Archaeology Limited has been appointed by BAE Systems Plc to undertake the development and implementation of the archaeological mitigation. This Archaeological Mitigation Strategy provides the detail of the works for the mitigation pertaining to all aspects of the remediation and development.
4. The identified structure of appropriate mitigation works are those necessary to ensure that the development can proceed; while dealing appropriately with the identified adverse impact on the archaeological resource. A suggestive consideration of the possible post-excavation and reporting structure for these works is also presented. Inevitably as works proceed the character of the later stages of this Archaeological Mitigation Strategy will be subject to review and enhancement.
5. At each stage of implementing this Archaeological Mitigation Strategy the specific details of each stage of these works must be agreed with the West of Scotland Archaeology Service on behalf of Renfrewshire Council, who will also monitor their implementation.

Planning Context

6. Scottish Government policy is laid out in the *Scottish Historic Environment Policy* which explores the interrelationship between the Historic Environment and the needs of Scotland. One of the critical elements of the policy is that:
The protection of the historic environment is not about preventing change. Ministers believe that change in this dynamic environment should be managed intelligently and with understanding, to achieve the best outcome for the historic environment and for the people of Scotland. Such decisions often have to recognise economic realities.
Source: Scottish Historic Environment Policy, October 2008
7. The Scottish Planning Policy (SPP) and Planning Advice Notes (PAN) provide guidance on the appropriate treatment of the Historic Environment. In addition the adopted Development Plan maintained by the planning authority defines specific local policy which will have bearing on the historic environment.
8. Historic environment sites and monuments without statutory protection are curated within the planning process by the planning authority. The SPP deals with all aspects of the Historic Environment setting policy in relation to the historic environment with a view to its protection, conservation and enhancement. Central to the approach is the need to secure preservation whilst accommodating and remaining responsive to present day needs.
9. For archaeological sites *PAN 42 Archaeology* indicates that the principle that should underlie all planning decision-making is the preservation of cultural resources, *in-situ* where possible, and by record if destruction cannot be avoided. It is recognised in the document that preservation may not always be possible and, where damage is unavoidable, various mitigation measures will be appropriate.
10. All potential historic environment remains identified or postulated within a development area should be dealt with in keeping with the issued planning guidance, and hence through close negotiation with the planning authority and their advisors.

Environmental Statement

11. The Cultural Heritage Appraisal within the submitted Environmental Statement prepared by AOC Archaeology to support the application for outline consent identified that:

Impacts on material assets in this instance could potentially embrace the infrastructure and morphology of the former Royal Ordnance factory as well as aspects of history, archaeology and architecture. The key impacts are likely to be associated with:

- (a) *The potential for impact on buried archaeological remains*
- (b) *The potential for damage, alteration or removal of listed buildings, building of historic interest and features of the pre-industrial landscape*
- (c) *In particular, at the development stage, there could be potential for impact on historic buildings and the landscape.*

12. While the Cultural Heritage Appraisal is non-specific on the character of the necessary response, other than the production of a Site Archaeological Handbook, it does recognise the need to address the two divergent issues of the former Royal Ordnance Factory and the potential presence of earlier and unrelated sites of archaeological significance. This Archaeological Mitigation Strategy is the equivalent of the Site Archaeological Handbook.

Conditions appended

13. Of the six planning applications to date that comprise the scheme of works, five have conditions that require archaeology services to be deployed in support of granted consent:

Table 1: Conditioned consents

Consent	Condition	Element	Standard?
06/1065/PP	12	M8 Junction	Y
06/0602/PP	49	Outline Consent	Y
09/0796/PP	2	Construction of An Access Road (North)	Y
09/0456/PP	4	Construction of a landfill Facility	Y
09/0527/PP	2	Engineering operations comprising remediation and bulk earthworks	N

14. Four of these conditions are common negative suspensive conditions (see Standard ? column), a variant on the condition originally proposed by PAN42 Para 34 (Scottish Office 1994):

No development shall take place within the development site as outlined in red on the approved plan until the developer has secured the implementation of a programme of archaeological works in accordance with a Archaeological Mitigation Strategy which has been submitted by the applicant, agreed by the West of Scotland Archaeology Service, and approved by the Planning Authority. Thereafter the developer shall ensure that the programme of archaeological works is fully implemented and that all recording and recovery of archaeological resources within the development site is undertaken to the satisfaction of the Planning Authority in agreement with the West of Scotland Archaeology Service.

15. This condition prohibits development until such time as an agreed programme of archaeological works is in place and being implemented. The main modification from the original PAN 42 condition is the sentence starting 'Thereafter ...'. This expansion of the condition has sought to clarify that the applicant should complete the commenced programme of archaeology.
16. The fifth condition is non-standard, although remains negative suspensive in character:
- Prior to the commencement of development the developer shall submit for the*

Council's approval an archaeological mitigation strategy. Thereafter the developer shall ensure that the approved strategy is fully implemented and that all recording and recovery of archaeological resources within the development site is undertaken to the satisfaction of the Planning Authority in agreement with the West of Scotland Archaeology Service.

17. The consequences of all five conditions are in common; no development works can proceed until they are supported and integrated with an agreed programme of archaeological works. This Archaeological Mitigation Strategy has been developed to address all five conditions within a single overarching strategy which also includes the details appropriate to Written Schemes of Investigation.
18. One consent within the overall scheme does not require any archaeology in support of the consented development. This was planning consent 06/1284/PP for the Security Fence and Access Gate.

Treatment of Archaeological Resource in the Development Plan

19. The current Development Plan for Renfrewshire consists of the Glasgow and Clyde Valley Joint Structure Plan 2006 and the Renfrewshire Local Plan which was adopted in March 2006; these two documents provide the planning policy framework for Renfrewshire. Both identify Bishopton as a Community Growth Area and include the principle of a new junction on the M8 as well as the Community Forest Park as an aspect of the Green Network Priorities.
20. The Structure Plan promotes the maintenance and enhancement of the quality of the built heritage (Strategic Policy 7), a principle sustained within the Local Plan.

Historical and Archaeological Background

21. The Bishopton Royal Ordnance Factory is a substantive heritage issue; there is, in addition, the potential for archaeologically significant sites predating its establishment within the broader landscape. The red-line boundary of the proposed development covers a large area which extends beyond the limits of the factory, defined by the factory fence. Although a few archaeological sites are known to exist within its extent, the best assessment of its archaeological potential is obtained by expanding the discussion to include sites in the landscape immediately surrounding it.

Prehistoric Landscape

22. The potential for significant prehistoric archaeology in the surrounding landscape may be partially demonstrated by the numerous findspots which are recorded in the National Monuments Record of Scotland (NMRS). A battle-axe of the Woodhenge Group was found at North Brae, Barochan (WoSAS Site ID: 7678) and donated to the National Museums of Scotland in 1920. Similarly, a collection of flint spearheads (NMRS No. NS47SW 25), believed to be of Bronze Age date, was found during landscaping works just south of Formakin House. The spearheads, now in Paisley Museum, were thought to have been recovered from a prehistoric site of which no further evidence exists.
23. Other prehistoric sites are known to exist in the immediately surrounding landscape. To the west of Formakin House the site of Barmore Hill has yielded a hammerstone (WoSAS Site ID: 7903) and evidence of a settlement (WoSAS Site ID:7906) of potentially Iron Age date. To the east of Bishopton Royal Ordnance Factory, situated just beyond the M8 motorway, a possible enclosure has been recorded to the south and east of existing woodland on high ground. The Southbar enclosure (WoSAS Site ID: 7623) is described as a shallow depression 20ft wide, enclosing an area 88ft in diameter.

Roman Sites

24. In the surrounding area there are a number of archaeological monuments of national importance, including the Roman Forts of Barochan and Whitemoss. These sites are indicative of the potential for Roman remains to be recovered within the development

area. The fort on Barochan Hill (Scheduled Monument No. 3188) is currently situated partially in woodland and partially on arable land, with the eastern half of the site lying within the western boundary of the development area. The site has been partially investigated and the information and material recovered includes evidence of defences, internal features and finds (NMRS No. NS46NW 17). Roman coins featuring the heads of Augustus and Agrippa, potentially associated with the fort, were found to the west (NMRS No. NS47NW 23).

25. Whitemoss Fort (Scheduled Monument No. 1652) is situated about half a kilometre to the north of the development area. The fort (WoSAS Site ID: 7891) was identified from cropmarks but progressive excavations carried out in the 1950s recovered evidence of internal features and a road. Given the concentration of Roman activity in the area, the potential for Roman roads is not surprising, and a band of cobbles in gravel, appearing in places as a raised mound, has been identified as a causeway (NMRS No. NS47SW 49) running north from Milton Island. Looking briefly beyond the area immediately surrounding the proposed development area, evidence exists for Roman roads linking the forts at Bishopton and Largs, lying to the west, and Glasgow, to the east (Wilson 1994-95, 17). The location, specific alignment and condition (should they survive) of these roads in the vicinity of Bishopton is unknown.

Agricultural Revolution and Later Archaeology

26. The potential for the survival of more recent significant archaeological remains in and around the development area is reflected in the numerous upstanding and ruined farmsteadings known to exist in the surrounding landscape. Several of these still survive to the east, south and west of the proposed development area. The concentration of these sites is not surprising given that almost the entire area is shown as cultivated land in William Roy's Military Survey (1747-55) and that it continued to be cultivated when the 1st edition Ordnance Survey map was published in 1864. Of potentially direct significance is the bridge associated with Selvieland Farmstead (WoSAS Site ID: 19063), on the south edge of the proposed development area, and the ruined farmstead at Maxwellfield (WoSAS Site ID: 42301), which is within the area of the proposed M8 junction.
27. In addition to the potential for the remains of the agricultural buildings mentioned above, we must consider the possibility that traces of small estate houses may yet survive in the vicinity of the development area. No above ground evidence remains of Wester Rossland House (NMRS No. NS47SW 104), lying just inside the proposed development area to the east of Bishopton. However it is possible that subsurface remains will still survive. Formakin House, to the north of the proposed development area, exists within an Inventory Garden and Designed Landscape. This is a non-statutory designation of national significance indicating areas of notable woodland, parkland and wildlife, with the southernmost portion of this Inventory Garden and Designed Landscape lying adjacent to the proposed development area.

National Filling Factory Georgetown

28. Georgetown was originally conceived as a single factory constructed to produce munitions in September 1915. From March 1916 production demand led to the building of a second factory to the west of the Dargavel Burn focusing on the preparation of Amatol-filled shells. The original factory was known as the No. 1 (Cartridge) Factory with the second the No. 2 (Shell Filling) Factory. The factories were constructed adjacent to existing sidings on the Caledonian Railway's Glasgow to Greenock Line.
29. No. 1 Factory was located on the western edge of the railway, bounded to the south by the Renfrew to Bridge of Weir road, the west by the Dargavel Burn and the north by agricultural land. The factory included offices, canteens, a power station, a laundry and a fire-hose drying tower, as well as the working components of the factory. These included ammunition and component stores, workshops, cordite, TNT and black powder magazines, filling rooms, cutting rooms and assembly rooms.
30. Railway sidings were present on the site prior to the existence of Georgetown but the

construction of the factory meant the expansion of the railway system. This expansion included the creation of Georgetown (or Houston) Station, which was a private station, built in 1915 to serve the factory. The station was designed to accommodate trains carrying up to one thousand passengers and included covered walkways providing access to the factory. Supplies were brought in to the factory by a standard gauge railway linked to the main Caledonian Railway line. A trolley system conveyed the supplies to the various workshops and finished ammunition was handed over to the Army Ordnance Department (AOD) and dispatched by rail.

31. The No. 2 Factory lay immediately to the west of the No. 1 Factory with the extents of both factories separated by the Dargavel Burn. Many buildings once related to the factory, in particular those providing accommodation and barracks, lay to the south of the boundary fence. The No. 2 Factory was constructed in 1916 to fulfil an increased demand for production, with particular regards to the incorporation of Ammonium Nitrate and TNT into 80/20 Amatol and 40/60 Amatol to fill shells. The No. 2 Factory would eventually support the No. 1 Factory in the production of both HE and QF ammunition.
32. The No. 2 Factory was laid out so that the 'dead' material could be transported and stored in the southern portion of the site, 'live' material on the eastern portion, while assembly took place at the centre with the AOD stores were located to the north. Access was provided via a covered walkway from Georgetown Station to various buildings, including general offices, AOD Offices, canteens, shifting houses, a laundry and an ambulance station. As well as stores the working elements of the factory included the Disintegrating House, the Assembling Rooms, magazines, the Incorporating House, the Press House and the Finishing House.
33. On the conclusion of the Great War plans were drawn up to convert the Georgetown area to a permanent Garden City; these schemes were not enacted. The factories closed in November 1918, when they were demobilised and handed over to the military authorities. The schedule of the progressive demolition of the factories is uncertain.

Bishopton Royal Ordnance Factory

34. The Bishopton Royal Ordnance Factory comprised three virtually self contained explosive factories which shared a common Administration Group and Workshop Support Services Group. The Bishopton Royal Ordnance Factory was intended primarily for the manufacture of propellant, mainly Cordite, for supply to the ordnance manufacturing industry of the British Army and the Royal Air Force. The factory was ideally situated, located near sea level but with higher ground present which could be used for nitroglycerine hills. The local area also had a ready workforce and established communications links.
35. Over 2000 acres of land were acquired by compulsory purchase and the overlap, in the southern portion, with what had been National Filling Factory Georgetown. Previously much of the northern portion had remained agricultural land, centred on Dargavel House.
36. The factory site contains a large number of buildings (over 2,000). In essence, the site operated as a chemical works: raw materials were imported in liquid or solid form, and through a procedure of storage and handling, these materials were processed into end products comprising various energetic materials. These final products were handled, packaged and stored within the factory pending off-site transportation to customers. The buildings and infrastructure surviving on-site reflect this transformation process.
37. Bishopton Royal Ordnance Factory was organised through the assignment of numbers to each building; a part of the number code assigned the building to a particular factory 0, 1, 2 or 3. Factory 0 consisted of offices, laboratories, non-explosive workshops, machine shops, stores, laundry and fire-station. In Factories 1 to 3 the buildings were constructed as needed, and in some cases modified as the processes undertaken changed. The buildings are generally set out with large open spaces between them as a consequence of the nature of the work undertaken within.
38. With reference to the processes involved; each of the three factories included three nitroglycerine hills, i.e. a nitration plant. The works involve the manufacture of

nitroglycerine, nitrocellulose, cordite and gun cotton. Although the explosives produced had many uses, the predominant output of the factory was propellants for numerous types of weapon systems. The continued expansion, alteration and improvement of the processes taking place on the site means that it is outwith the scope of this summary to examine it all. The factory buildings were predominantly steel framed and brick built with reinforced concrete roofs. However, the buildings on the nitroglycerine hills were more lightweight, with some built in association with Factory 3 clad in corrugated iron.

39. There is also an artificial landscape associated with the factory; this survives as a palimpsest of bunds, blast structures, and remains associated with the road and rail infrastructure. As with any substantial chemical works the buildings are not solely related to storage and processing; administrative, workshop and residential areas are also present.
40. As well as a road network, Bishopton Royal Ordnance Factory had approximately 20 miles of standard gauge railway line within its perimeter fence as well as its own fleet of wagons and locomotives. This railway linked to the Caledonian Railway line via large transfer sidings located just north of the former Georgetown Station. In addition, approximately 80 miles of narrow gauge track supported the transfer of supplies and explosives within the factories themselves. In places the remains of the tracks still exist around the remains of the factory.
41. Perimeter defences exist around the factory, the most obvious is the still functioning factory fence. This fence bounds the manufacture and storage areas of the factory. A number of pillboxes are present within the factory fence at key locations. Beyond the fence are further defensive structures, including an outer cordon of pillboxes still identifiable to the north and west of the factory.
42. Bishopton Royal Ordnance Factory was privatised in 1984 and sold to British Aerospace in 1987. During the 1990s improvements were made in automating its nitroglycerine, nitrocellulose and nitroguanidine manufacturing facilities in order to increase manufacturing capacity and safety. Over the same period, the workforce on site was reduced from 3000 in the late 1970s, to 2000 in the 1980s and to about 600 in 1993. The intention to cease manufacture on the site was announced in 1999.

Other wartime activity

43. Some temporary uses of the factory ground are also known to have occurred which may have left physical traces. These include the use of the ground for the storage before onward shipment of Armoured Fighting Vehicles during World War II. This activity overlay a portion of the NFF Georgetown.
44. In the landscape surrounding the proposed development area, evidence of the World War II Clyde anti-aircraft defences still exists. The importance of the Firth of Clyde in terms of its industrial output at this time is reflected in the military remains in the surrounding landscape. These include, for example, the searchlight battery on top of Barochan Hill (NMRS No. NS46NW 62) and the radar service units building (WoSAS Site No. 42235) and pillbox (WoSAS Site No. 42713) to the southeast of the proposed development area.

Modern Recording

45. There has been no systematic archaeological work on either the Ordnance Factory or the surrounding ground. The RCAHMS have undertaken a basic photographic record of some elements of the factory, but this only comprises some 150 images in total.
46. Within the development team there is considerable information that has been garnered for other purposes:
 - ❖ BAE Systems Plc holds full and comprehensive mapping of the extant structures on-site and a detailed topographic survey is underway;
 - ❖ A photographic record (internal and external images) is an element of the asbestos survey; and

- ❖ The ecological survey has identified a number of key characteristics about every extant structure.
47. BAE Systems Plc also maintains an archive on-site that holds material relating to the construction and evolution of the factory.

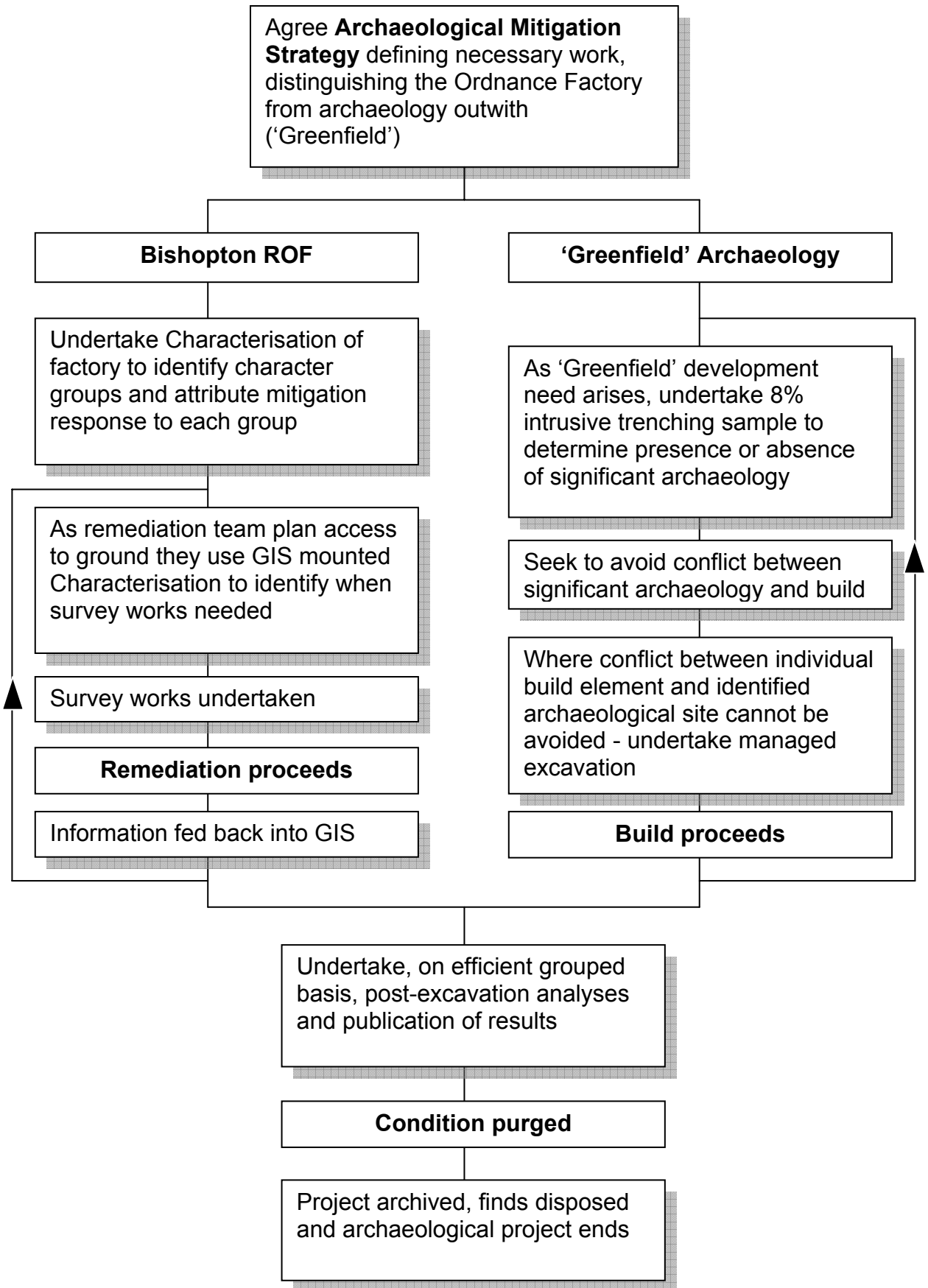
Objectives

48. Within the factory complex (both Georgetown National Filling Factory and the later Bishopton Royal Ordnance Factory) the objectives will be:
- ❖ to elucidate the nature, form and extent of the factories in their original conception and as they were altered and amended through their use;
 - ❖ where remediation will impact on the structures or locations identified, to institute a programme of managed recording of the factories to recover a coherent record of their character;
 - ❖ to undertake a programme of analysis of information recovered; and
 - ❖ to disseminate the findings of the works through reports to the local planning authority, an academic publication and public lecture where significant archaeology has been recorded.
49. Within the surrounding landscape outwith the factory it is clear that there is the potential for the survival of prehistoric to post-medieval archaeology, although this potential is untested. Beyond this we cannot safely make further assumptions about the likely date, duration or function of the archaeological resource. Necessarily, therefore, the following objectives must remain quite general:
- ❖ to determine the nature, form and extent of the archaeological resource within those areas adversely impacted upon by the development;
 - ❖ to establish, wherever feasible in the long term, a programme of preservation *in-situ* to protect the archaeological resource;
 - ❖ where preservation is not feasible, to institute a programme of managed excavation of the archaeological resource to recover artefactual, palaeo-environmental and structural evidence;
 - ❖ to undertake a programme of analysis of archaeological materials (artefacts, ecofacts, sediment samples and records) recovered; and
 - ❖ to disseminate the findings of the works through reports to the local planning authority, an academic publication and public lecture where significant archaeology has been excavated.
50. These objectives are to be achieved through the programme of works detailed within this Archaeological Mitigation Strategy.

Strategy

51. Our strategy follows two broad paths in dealing with the archaeological potential of the development area. Within the Ordnance Factory the archaeological potential is dominated by the requirement to elucidate the character (including change through time) of the Ordnance Factory. In contrast where there has been substantive factory development the potential for sub-surface archaeology (not related to the factory) is lessened below the threshold where speculative investigative works should be undertaken.
52. Outwith the Ordnance Factory (i.e. the factory fence) the ground being impacted upon by the development is predominantly arable or improved pasture that has a long history of agricultural use. While there are few known archaeological sites on or within this ground, the dominant archaeological potential is from currently unknown archaeological sites.

Table 2: Flowchart of Strategy



53. From this point the archaeological mitigation is split in two (see Table 2); one strand is the assessment and recording of the Ordnance Factory, the other the investigation of ground with the reasonable potential for sub-surface archaeological sites. The Ordnance Factory is defined for the purpose of this separation as all ground within the factory fence; this fence gives a clear boundary between the ground in BAE Systems Plc land ownership that was intensively used and that which is predominantly agricultural ground.
54. The exceptions to this division are some defensive, social and infrastructure elements that lie outwith the factory fence. These will be treated as parts of the factory for the purpose of recording prior to loss but, given their broadly agricultural context, remain best served as being considered 'greenfield' should specific development impacts be identified.

Evaluate Greenfield ground to resolve uncertain archaeological potential

55. In 'Greenfield' areas – that is agricultural ground or areas without substantive impact from the factory (inc. contaminants) the initial stage, promoted by a development need for the ground, will be to undertake an intrusive evaluation through machined trenching. The findings of this stage would determine whether any significant archaeological sites were present, and if so whether they would be directly impacted by the proposed build.
56. The principle of planning guidance is to avoid loss of archaeological sites where possible. However, should an archaeological site not be avoided, then a programme of formal excavation would be undertaken in advance of the build. The archaeological materials recovered would then need to be analysed and reported. On conclusion of the project the results from these works would be published

Characterisation of Ordnance Factory to inform survey recording

57. Experience has shown that to commence a whole factory set piece historic building recording exercise will be massively inefficient and divorce the archaeological works from receiving information from or supplying it to the remediation team. Instead the first stage will be a Characterisation project which seeks within a GIS environment, with site familiarisation input, to understand in heritage terms the nature and evolution of the factory. This will drive a scheme of building recording that maximises the quality of output while minimising works undertaken through avoiding duplication of effort.
58. Targeted detailed building recording work, to recover exemplars of standard buildings or machinery sets, would be initiated by the remediation team based on the GIS mounted characterisation. Information garnered by survey works would be fed back into the Characterisation to prevent duplication of effort. On conclusion of the project the results from these works would be published.

Mitigation Works

59. All works will comply with West of Scotland Archaeology Service Standard Conditions, the Institute for Archaeologists' Standards and Policy Statements and Code of Conduct and Historic Scotland Policy Statements.

Greenfield development

60. The development does not constitute a uniform impact against the whole red line area of the planning application nor is the potential for subsurface archaeology consistent across the comparable area. Consequently it is appropriate that the archaeological mitigation response for subsurface archaeology unrelated to the Ordnance Factory is targeted at those areas where there is a reasonable anticipation of adverse physical impact that has the potential to damage any archaeological resource that may be present.
61. The at risk ground, termed 'Greenfield', is defined for the purpose of this document as all ground outwith the factory fence but within the development boundary of one of the constituent detailed / full planning applications referred to at the start of this document. The following procedures will be applied to the development of all Greenfield ground.

62. The blue line area of the ground under the control of the applicant also covers additional areas outwith the factory that will not be subject to archaeological mitigation.

Investigative works

63. An intrusive evaluation will be undertaken with the purpose of identifying the scale of the archaeological resource within the Greenfield portion of the development area and resolving mitigation (either through preservation or excavation) where significant archaeology is identified. The appropriateness of the mitigation response will be discussed and agreed with the West of Scotland Archaeology Service.
64. The evaluation would comprise an 8% sample, obtained by means of a series of linear trenches, of each specific conditioned build element within a Greenfield portion of the planning application. The positioning of these trenches will be agreed in writing with the West of Scotland Archaeology Service prior to their excavation; this may be subject to variation depending on ground conditions, safe standoffs from existing structures, ecological constraints and live services.
65. A 13 ton 360° excavator using a 2m smooth ditching bucket or equivalent machine would be used to remove topsoil or modern overburden under direct archaeological control down to the level of the uppermost archaeological horizon or the subsoil. The resulting surfaces will be hand cleaned if necessary and investigated for archaeological features or deposits.
66. A representative sample of potential archaeological features will be then be excavated to allow characterisation. Discrete features (pits, post-holes etc) would be investigated through half-sections while linear features would have stretches excavated totalling 10% to 25% of their exposed length. Features not suited to excavation in narrow trenches will only be investigated in plan.
67. A Data Structure Report would be prepared to clarify the archaeology identified (in terms of nature, form and extent) and to propose the appropriate mitigation, e.g. no further works necessary; preservation *in-situ*; excavation; and/or monitoring topsoil strip as part of a staged mitigation. Any proposed mitigation will be subject to the approval and agreement of the West of Scotland Archaeology Service

Exclusion and preservation in-situ

68. In keeping with planning guidance the preferred option for any significant archaeology that is identified will be preservation *in-situ*. Any consideration of preservation *in-situ* will cover the entire development and likely management regime to ensure that preservation is credible.
69. Specific preservation mitigation will be prepared for each site and incorporated into the Archaeological Mitigation Strategy initially as an agreed addendum.
70. The default character of the preservation process where topsoil and overburden has been removed will be:
- a. covering the exposed archaeologically significant horizon with a geotextile (e.g. terram);
 - b. the reintroduction of overburden (e.g. topsoil) of sufficient depth that any future works (e.g. drainage or rotovation) does not reach the geotextile.
71. The default character of the preservation process where archaeology has been identified prior to reduction will be for the main contractor to erect temporary fencing enclosing the area. Enclosing the area will exclude plant and equipment movement across potentially fragile archaeology and prevent other inadvertent damage. The fencing will only be removed once the general area is free of development activity and is ready for final preparation for its end use.
72. The main contractor will be responsible, under archaeological guidance, for undertaking preservation *in-situ* tasks.

Excavation

73. Where excavation is agreed as the appropriate response the extent of the site will be stripped, and the area cleaned using hand tools to define any surviving archaeology. The exposed archaeology will then be excavated and recorded.
74. The site grid will be established at the cleaning stage. The grid will be based on 20m spacing and related to the National Grid. A temporary bench mark related to Ordnance Datum will be established.
75. After the cleaning and planning of the excavation area the sampling strategy will be finalised. This will take into account the project aims (which may need modifying at this stage) and the type, quality and quantity of remains revealed. The excavation sampling strategy will seek to maintain the following levels, but the West of Scotland Archaeology Service on behalf of Renfrewshire Council will take the final decision on the appropriate levels of sampling to be applied in any single case:
- a. all structures and all zones of specialised activity (e.g. funerary, ceremonial, industrial, agricultural processing) will be fully excavated and all relationships recorded;
 - b. ditches and gullies will have all relationships defined, investigated and recorded. All terminals will be excavated. Sufficient lengths of the feature will be excavated to determine the character of the feature over its entire course; the possibility of re-cuts of parts of the feature, and not the whole, will be considered. This will be achieved by a minimum 10% sample of each feature (usually a 1m section every 10m);
 - c. sufficient artefact assemblages will be recovered (where possible) to assist in dating the stratigraphic sequence and for obtaining ample ceramic groups for comparison with other sites;
 - d. all pits, as a minimum, will be half-sectioned. Usually at least 50% (by number) of the pits will be fully excavated. Decisions as to which pits will be fully excavated will be taken in the light of information gained in the half-sectioning taking into consideration, amongst other things; pit function, artefact content and location
 - e. for post and stake holes where they are clearly not forming part of a structure (see above) 50% (by number) will be half-sectioned ensuring that all relationships are investigated. Where deemed necessary, by artefact content, a number may demand full excavation;
 - f. for other types of feature such as working hollows, quarry pits, etc the basic requirement will be that all relationships are ascertained. Further investigation will be a matter of on-site judgement, but will seek to establish as a minimum their extent, date and function; and
 - g. for layers, an on-site decision will be made as to the limits of their excavation. The factors governing the judgement will include the possibility that they mask earlier remains, the need to understand function and depositional processes, and the necessity to recover sufficient artefacts to date the deposit and to meet the project aims.
76. All recording will be by Rathmell Archaeology Ltd standard method. In summary: all contexts, small finds and environmental samples will be given unique numbers; bulk finds will be collected by context; colour transparency and colour print photographs will be taken; and all recording will be undertaken on *pro forma* record cards. An overall site plan will be recorded at 1:500 with 1:20 plans of all the individual features and sections drawn at 1:10.
77. Any artefacts retrieved will be catalogued and subject to standard Treasure Trove procedures. Archaeological deposits will be sampled systematically in accordance with Rathmell Archaeology Ltd standard environmental sampling practice. All investigated

features believed to be significant archaeological features will be sampled along with a selection of natural features and topsoil to provide control samples. Bulk samples, of a minimum of 10 litres but up to 30 litres if possible, will be taken for wet sieving and flotation.

78. On conclusion of the excavation the West of Scotland Archaeology Service on behalf of Renfrewshire Council will sign off each excavated area for release to the developer for any further development works that are necessary.

Preliminary site reporting

79. The preliminary reporting of the on-site works will be as follows:
- a. Data Structure Report presenting the results of the excavation and incorporating a detailed listing of the materials (artefacts, sediments; written record) recovered; in addition a narrative would explain the character of the archaeology investigated and compare this to comparable archaeology within Renfrewshire;
 - b. Post-Excavation Research Design, which will be prepared to identify the potential analyses necessary and the structure for the publication and dissemination of results;
 - c. Summary report for inclusion in *Discovery & Excavation in Scotland* and *OASIS* entry;
 - d. Project archive, to be deposited in National Monuments Record of Scotland;
 - e. Lists of finds (if any) to be submitted to the Treasure Trove Unit.
80. To ensure the coherent recovery of information over a potentially long duration project some reporting works will be undertaken throughout the period of the on-site works. In addition some finds and ecofact management tasks (cleaning, stabilising, repackaging etc) will also be undertaken intermittently throughout the period of on-site works.
81. A full draft of the Data Structure Report will be circulated to both the client and the West of Scotland Archaeology Service for comment. An appropriate number of copies of each finalised report will be supplied to the Renfrewshire Council and West of Scotland Archaeology Service.

Agreement of Post-Excavation strategy

82. Individual Post-Excavation Research Designs will be prepared in conjunction with the Data Structure Reports. These will have identified the recommended analyses for the recovered material and the structure for the publication and dissemination of results. These designs will be subsequently agreed with the West of Scotland Archaeology Service on behalf of Renfrewshire Council.
83. The agreed designs must incorporate a finalised timetable of all remaining works and be integrated into the current version of this Archaeological Mitigation Strategy. Where multiple excavations are being undertaken in a programmed sequence then efficiencies from merging programmes of post-excavation works may be realised even where this may result in a delay in initiating work on the material from the first excavations.

Post-excavation Analyses

84. Should archaeologically significant material be recovered during the on-site works then a programme of post-excavation analysis of this material will be required by Renfrewshire Council and will be undertaken. Until the on-site works are complete the exact nature and size of any post excavation works will be unknown. Should archaeologically significant material be recovered then this will be a significant stage of works.
85. To some degree the examination will be led by the nature of the materials recovered. However any work is likely to focus on artefact analysis, palaeo-environmental analysis, radiometric dating and stratigraphic interpretation.

86. The works will also incorporate conservation work on any artefacts recovered to ensure their suitability for disposal. Full declaration of all finds will be made to the Queen's and Lord Treasurer's Remembrancer.

Reporting and Dissemination

87. The results of the project will be published in an appropriate archaeological journal or monograph should the fieldwork results warrant this. The West of Scotland Archaeology Service on behalf of Renfrewshire Council will take the final decision on the requirement for publication. The suitable level of publication will be dependent on the significance of the project results. Meeting the journal publication costs will be a costed element of the project to be met by the client.
88. Should the material recovered from the site be suitable then a public lecture would also be undertaken to disseminate the findings of the work. Where possible this would be undertaken in conjunction with a local archaeological society.
89. A final Discovery and Excavation in Scotland report will be submitted should the post-excavation programme be completed in a separate year to the excavation programme.
90. The project archive originally prepared during the initial site reporting (see Preliminary site reporting) will be expanded during reporting to cover all new materials generated by the post-excavation and reporting works. The finalised archive would be submitted to the National Monuments Record of Scotland at the conclusion of the project.
91. The lists of finds submitted to the Treasure Trove Unit will be renewed at the conclusion of the project (see Preliminary site reporting) will. The finds will be retained at Rathmell Archaeology Limited premises until they can be collected by the institution awarded the collection by the Treasure Trove Unit.

Bishopton ROF – Industrial Structures and Landforms

92. Experience has shown that to undertake the set piece historic building recording exercise of an entire factory would be massively inefficient and would divorce the archaeological works from receiving information from other disciplines involved in the remediation process.
93. Instead, the first stage will be a characterisation project which seeks, within a GIS environment, to embark upon an initial phase of site familiarisation, in order to better understand in heritage terms the nature and evolution of the factory. This will drive a scheme of building recording that maximises the quality of output while minimising works undertaken through avoiding the duplication of effort.
94. Characterisation is a means of understanding the way in which both the historic and recent developments of a place contribute to its current distinctive character. It is a process which can be applied broadly at landscape level, or at a finer grain for urban areas or sites which fall between those categories, such as large industrial sites. The technique provides a comprehensive information base as a point from which proposals for spatial planning and development can be considered.
95. Targeted detailed building recording work, to recover exemplars of standard buildings or machinery sets, would then be initiated by the remediation team using information derived from the GIS mounted characterisation. Additional data garnered by the survey works would subsequently be fed back into the Characterisation. On conclusion of the project the results from these works would be published.

Characterisation

96. The characterisation of the factory complex will elucidate the known process of development and alteration in its function and use. This in turn will generate a prioritisation of subsequent survey tasks that are necessary as the remediation and redevelopment of the factory proceeds.
97. The methodology for the Characterisation would follow existing Historic Scotland

guidance, as well as the English Heritage '*Characterising Heritage Places*' guidelines. We would draw on:

- ❖ existing archaeological desk-based assessments;
- ❖ WoSAS Sites and Monuments Record;
- ❖ National Monuments Record of Scotland;
- ❖ the National Library of Scotland;
- ❖ National Archives;
- ❖ Bishopton Royal Ordnance Factory Archives / safety boxes; and
- ❖ any other detailed research concerning the site.

98. Characterisation would add the following to these existing sources:

- ❖ a distinction between different areas of the site, based on date, function and current character;
- ❖ the identification of Type structures;
- ❖ an encapsulation of the key values which underpin the importance of the site;
- ❖ definition of the character of each area, together with identification of particular values represented in each; and
- ❖ identification of management opportunities, to be considered in the development.

99. The study area would comprise the fenced area of the site, as well as the housing at Holme Park and Rossland Crescent and Dargarvel House.

100. The following is a list (not exhaustive) of the likely external data sets that would be used to develop the Bishopton Royal Ordnance Factory GIS:

- ❖ Ordnance Survey Master Map;
- ❖ Historic Ordnance Survey 10,000;
- ❖ Modern BAE Systems Plc topographic survey; and
- ❖ Aerial photographs - client / RCAHMS / RAF etc from the early 1900s, 1939, 1946, 1980s, 1990s, 2000s.

101. Thematic and secondary layers would be created from the information gathered on site by digitising from hand drawn maps / on-site DGPS data collection. In addition the work undertaken as part of the Environment Statement contamination studies at the ordnance factory would be a rich source of GIS data for integration.

102. Within the characterisation process Character Areas would be defined according to their origin and functions, and to the extent to which these attributes contribute to their present day appearance and layout. The areas would be initially defined using desk-based information, and would be further refined following site visits. Information on condition and survival would also be collected during site visits. This additional information on each Character Area would be available through a linked database.

103. A draft of the Character Area plans would initially be produced, which would be sent out to consultation to other parties involved in the study of the site. Plans would then be amended and finalised.

104. A sequence of Phase Plans would also be developed to illustrate the broad historical physical development of the complex, in terms of extent and development of major areas of key features.

105. Changes in the site extents and areas of development for each period (and details of structures built at this time, where known) would be presented as separate GIS layers, resulting in a multi-layered plan of the development of the site.
106. The Character Area and Phase Plans generated by the characterisation work will determine the known patterning of the factory and hence the necessary survey response to ensure that the range of Type structures and processes present within the site can be recorded without duplication or omission.

Survey prior to Remediation Works

107. The GIS model produced by the Characterisation will hold the prompts for where the survey recording of historic fabric is necessary and hence can be consulted by the regeneration team to act as a prompt for requesting survey works. The survey works in turn will be orientated to recording 'Type' structures or complexes; this is essential given the 2,000 structures on-site. The process to be followed is summarised in Table 3 (below).
108. One of the primary outputs from the Characterisation Works will be the identification of examples of each structure which best represents the Type, i.e. where the surviving elements best represent the structure type as originally conceived. The mitigation will ensure that a competent record exists of each Type structure either through validation archival records or from new survey to record the structure in detail. The resulting records will be used as a yardstick by which the remainder of the structures can be assessed.
109. It is recognised that there is the potential for there to be variations in form and use between the individual members of a particular building Type. Such variation may reflect changing use over time, adaptation of a pre-existing plan in order to address specific issues relating to a particular building or factory element, or differential survival of internal/external features.
110. Where variation from Type is identified and this reflects change of use or significant variation from the established norm, as opposed to the loss of internal elements due to their demolition or removal, then this will be subject to more detailed recording, in that it represents a new Variant or subset of the Type in question.
111. No cleaning, clearing or other disturbance will be undertaken as an element of the recording process. Likewise no stabilisation of structures will be undertaken to facilitate access for recording. Where elements of structures remain unrecorded prior to remediation (due to a constraint in access) then relevant portions of the remediation process will be monitored to enable relevant information to be garnered.

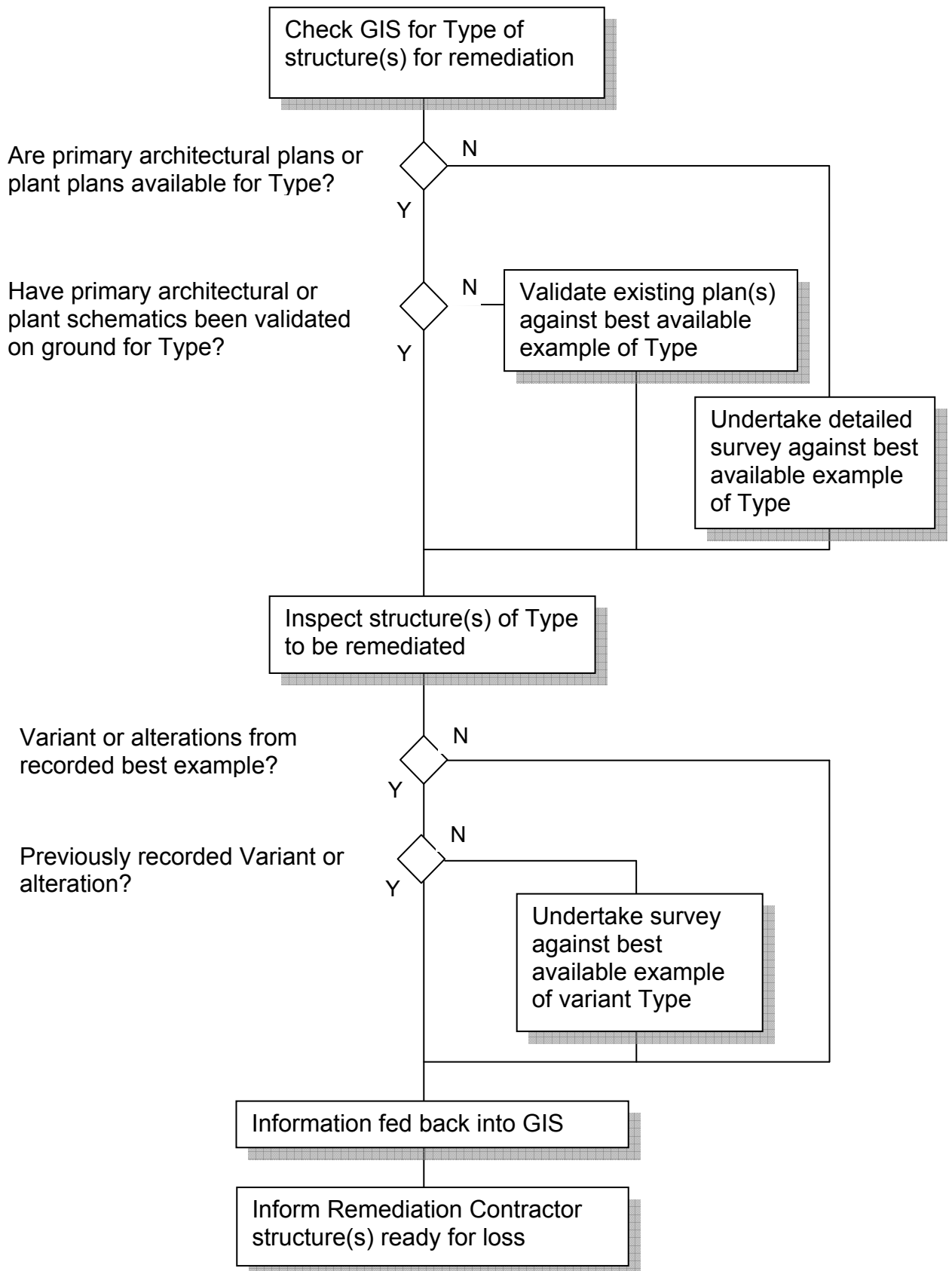
Validation of existing plans and elevations of Type structures

112. Where plans and elevation of a Type structure are already available these will be validated against the most appropriate example. Note that for some banded structures a part demolished structure may inform on the validity of the existing plans more than a fully intact structure.
113. Validation will be through a process of survey to confirm accuracy of the archival information and ensure scope and remit meet the scale of information that would be garnered from a Detailed Survey (see below).

Detailed survey of Type structure

114. Detailed survey will be undertaken to record a Type structure where pre-existing validated archival information is not available. For each Type structure where such detailed survey is required the most appropriate surviving example will be identified and recorded. The purpose of this detailed survey will be to recover accurate floor plans and exterior elevations of the structure supported by imagery and text descriptions.

Table 3: Flowchart of Building Recording prompts



115. The primary survey for exterior elevations and a base plan would be recorded by radiation survey using a reflectorless EDM (REDM) Leica TCR 307. This method of survey allows the accurate capture of data for elevations. A traverse will be created around each building or group of buildings. Extra stations may be set up in places where there is limited access. Where appropriate, records generated by instrument survey will be supplemented by detail measured by hand.
116. Measured interior ground plans of each room of the interior will be carried out using tapes and a Leica Disto™ electronic distance measurer.
117. The following categories of detailed information would be recorded for elevations and interiors:
- ❖ All architectural features with associated decorative detail including windows, doors, quoins, string courses, roof lines and other elements of structural stonework and jointing.
 - ❖ Fixtures and fittings such as chemical plant, drainpipes and guttering, signs, brackets and vents.
 - ❖ Later modifications and/or damage to the building such as structural cracks, areas of erosion, patches of rendering, blocked doorways, windows and other openings.
 - ❖ For large or small repetitive features such as windows, capitals, mouldings, etc., sampling will be undertaken as appropriate.
118. A selection of digital images will be taken to show the landscape within which the building is situated and how the structure in question relates to any surrounding buildings. Additionally every external and internal elevation will be photographed together with a general plan shot of each room. Any architectural features or fixtures of interest will be subject to more detailed photography. All interior photography will be undertaken with appropriate lighting conditions and the use of a tripod. Where light access is still quite minimal, an automatic flash will be used.
119. A written record will be compiled using pro forma building recording sheets including comments on the condition, construction techniques, materials, fixtures and fittings and interpretation of function. A competent analysis will be made of all building phases and any relationship between buildings.

Inspection of structures to be remediated

120. A visual inspection will be made of both the interior and exterior of all structures that are to be remediated. This inspection (which may be made by remote means where appropriate) will be undertaken with a view to confirming the Type of the structure and whether there are any notable Variations.
121. Where the inspection identifies a Type that has not been subject to either the validation of existing plans or detailed survey, then the relevant primary record will be generated. Where the inspection identified a Variant that has not been recorded, this Variant recording will be undertaken prior to remediation.
122. A brief written record and digital imagery of the structure will be collated for addition to the GIS characterisation record to support the attribution of Type and/or Variation.

Survey of Variant from Type

123. Where a Variant of Type is identified and it reflects change of use or significant variation from the established norm, as opposed to the loss of internal elements due to their demolition or removal, then this will be subject to more detailed recording.
124. This recording will be proportionate to the scale of the variation. For major variation then a detailed survey will be undertaken of that element of the structure that has been varied to a common level as would be carried out by a Detailed Survey (see above). Minor

variation will be recorded by photographic survey, written record and measured sketch plan.

125. No general recording of the structure will be undertaken except insofar as is necessary to ensure the location of the variation is understood relative to the core structure.

Outstanding issues to be addressed during loss

126. There are a number of scenarios where a competent record of a Type or Variant cannot be completed prior to remediation. This may be because:
- ❖ the stability of the structure, or contamination within it, is such that it cannot be safely accessed in whole or part prior to loss; or
 - ❖ at the known location of the structure there are no visible remains.
127. In these instances the remediation of the structure will be monitored at appropriate points to recover as much information (relative to the aims of the survey) as are reasonably possible. This monitoring will be severely constrained by the necessary Health & Safety protocols surrounding the remediation process.

Analysis and reporting

128. The preliminary reporting of the on-site works will be undertaken at the end of each substantive block of works with a summary report presenting the results of the survey and incorporating detailed listing of the records created.
129. Information garnered from each block of survey work would also be entered into the Character Area database supporting the GIS characterisation model. This will ensure information is available to other members of the regeneration team and that prompts for initiating additional survey work are amended to reflect the work already undertaken.
130. On conclusion of the remediation programme and hence any building recording, an analysis will be required to summarise the origin, development and decline of the ordnance factory. The results of the survey work are anticipated to be of a significance to warrant publication in an appropriate archaeological journal or monograph.

Project details

Timetable

131. Rathmell Archaeology, subject to the agreement of the Archaeological Mitigation Strategy by West of Scotland Archaeology Service, will commence works at the instruction of BAE Systems Plc. Preliminary reports will be prepared within 4 weeks of the completion of on-site works.
132. This timetable may be subject to change depending on circumstances, but in any event post-excavation analysis through to a report fit for publication will be completed within 12 months of the termination of all on site fieldwork pertaining to each identified archaeological site. Any variation in this timetable for the post-excavation analysis phase will require the prior approval of the West of Scotland Archaeology Service on behalf of Renfrewshire Council.

Copyright

133. Rathmell Archaeology will assign copyright of any commissioned reports, tender documents or other project documents under the Copyright, Designs and Patents Act 1988 to BAE Systems Plc but retains the right to be identified as the author of all project documentation and reports.

Health & Safety

134. Rathmell Archaeology maintains high Health & Safety standards on-site and a copy of our Health & Safety policy is available. The lead archaeologist will liaise with the Main Contractor before coming on-site to ensure that works are conducted in a safe manner.

Project team

135. The lead consultant will be Mr Thomas Rees, an experienced consultant, curator and field archaeologist. All contact to Rathmell Archaeology should be directed through Mr Rees. Mr Rees will be assisted by a freelance specialist in military and ordnance matters, Mr Gareth Talbot who will supply his experience of similar complexes to the ordnance factory.
136. Dr Louise Turner will lead all desk-based tasks, database development and building recording works. All intrusive archaeological sampling and consequent excavations will be led by Mr Alan Matthews. Both are Senior Archaeologists with Rathmell Archaeology. Archaeologists will be used as required from the company pool of permanent and temporary archaeologists to deliver specific project tasks.

Table 4: Key Personnel

Role	Name	Responsibility	Relevant experience
Consultant	Thomas Rees	Consultancy	Director of Rathmell Archaeology, former archaeologist with Fife Council, experienced field archaeologist and archaeological consultant.
	Gareth Talbot	Specialist advice on Ordnance Factories	Freelance consultant on Military / Industrial Archaeology previously with Atkins Heritage
Senior Archaeologist	Louise Turner	Archive works and building recording	Senior Archaeologist with Rathmell Archaeology; formerly working with RCAHMS, D&GC SMR, WoSAS and Historic Scotland.
	Alan Matthews	Intrusive archaeology and subsequent excavation	Senior Archaeologist with Rathmell Archaeology; experienced field archaeologist.

137. The West of Scotland Archaeology Service will be kept informed of the progress of the project and any monitoring visits by the West of Scotland Archaeology Service during fieldwork will be facilitated. Written updates of progress will be circulated, normally by e-mail, at the end of each phase of on-site works.

Insurance

138. Rathmell Archaeology is fully indemnified and all necessary insurances can be presented on request. A summary of insurances held is presented below:
- ❖ *Public Liability Insurance* - A policy with a limit of indemnity of £5,000,000 is held with Towergate;
 - ❖ *Employer's Liability Insurance* - A policy with a limit of indemnity of £10,000,000 is held with Towergate; and
 - ❖ *Professional Indemnity Insurance* - A policy with a limit of indemnity of £1,000,000 is held with Saturn.

References

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Historic Scotland, 2008, *Scottish Historic Environment Policy*

Renfrewshire Council, 2006, *Renfrewshire Local Plan 2006*

Scottish Office: Environment Department, 1994, *Planning Advice Note 42: Archaeology*

Scottish Government, 2010, *Scottish Planning Policy*

Contact Details

139. Rathmell Archaeology can be contacted at our Registered Office or through the web:

Rathmell Archaeology Ltd	www.rathmell-arch.co.uk
Unit 8 Ashgrove Workshops	
Kilwinning	t.: 01294 542848
Ayrshire	f.: 01294 542849
KA13 6PU	e.: contact@rathmell-arch.co.uk

140. The West of Scotland Archaeology Service can be contacted at their office or through the web:

West of Scotland Archaeology Service	www.wosas.org.uk
Charing Cross Complex	
20 India Street	t.: 0141 287 8332/3
Glasgow	f.: 0141 287 9259
G2 4PF	e.: enquiries@wosas.glasgow.gov.uk

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