BAE SAMLESBURY LOGISTICS FACILITY

FLOOD RISK ASSESSMENT

VOLUME 1

REVISION S1

Prepared for

AEW ARCHITECTS

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VOLUME 1

Document Revision Record

Revision	Details of Revision	Prepared by	Checked by	Date	Position
S1	Report Issue	L Moran	T Royle	23/6/15	Director

DUTY OF CARE

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1.0 Introduction

1.1 Project Background

TRP Consulting was commissioned by AEW Architects on behalf of the client, BAE Systems Limited, to prepare a Flood Risk Assessment (FRA) to support an LDO submission for the development of a Logistics Facility on the Samlesbury Enterprise Zone, part of the former Samlesbury Airfield site in Balderstone, Lancashire.

A screening desktop study has been undertaken to identify flooding issues related to the development site that may warrant further consideration. The study is a holistic risk based assessment of potential flooding from all sources, including tidal and fluvial flooding from adjacent watercourses, groundwater and surface water run-off. The assessment also identifies and examines any residual risk of flooding to the site and neighbouring properties.

The aim of this report is primarily to consider flood risk, flooding consequences (as appropriate) and satisfy legislative requirements under The National Planning Policy Framework (NPPF) which replaced Planning Policy Statement 25 for Development and Flood Risk (PPS 25) in March 2012. Reference has been made to the Technical Guidance to the National Planning Policy Framework document issued in March 2012 by the Department for Communities and Local Government. The assessment has been undertaken in accordance with Ciria C624, 'Development and Flood Risk – Guidance for the Construction Industry (2004) and Flood Risk Assessment Guidance for New Development, Phase 2, R & D Technical Report FD2320/ TR2 (2005).

The Flood Risk Assessment is presented in a format consistent with the FRA Pro-forma contained in PPS 25 Development and Flood Risk - Practice Guide.

This flood risk assessment is based on information provided by BAE Systems, AEW Architects, the Environment Agency and other information available in the public domain.

In the event that new or additional information is received, the assessment may need to be reviewed and modified to incorporate the relevant issues.

1.2 Consultation

Due to programme constraints on the Logistics project it has not been possible to seek pre-application advice has been sought from the Environment Agency. Consultation has however taken place for the development of the new BAE Training facility which is to be constructed on an adjacent part of the Enterprise Zone Site. It is assumed that similar principals should be adopted in design of surface water drainage systems for the development and in minimising potential flood risk

The Environment Agency

The site under review is a predominantly undeveloped green field site. Environment Agency Flood Mapping indicates that the site is located in Flood Zone 1 (low probability of flooding). Flood Zone 1 land has been assessed as having 0.1% (1 in 1000 year) chance of flooding from rivers or the sea in any given year.

General Environment Agency Advice

Environment Agency standing advice indicates that for developments greater than 1 hectare in Flood Zone 1, the FRA should be focused on the management of surface water run-off. Proposals for surface water management should seek to maintain, or where practicable reduce, the rate of run-off from the site taking into account the potential for climate change.

EA guidance on flood risk recommends that surface water runoff should be controlled as near to its source as possible through a sustainable drainage approach to surface water management (SUDS), including the use of soakaways, infiltration trenches, permeable pavements and grassed swales to reduce flood risk by attenuating the rate and quantity of surface water runoff from the site.

The run-off for developments on greenfield sites should be limited to the 1 in 1 year greenfield rate. The drainage system should be designed to ensure that a 1 in 100 year standard with a 30% capacity for climate change can be accommodated.

There is no objection, in principle, to storing surface water surcharge within hard paved areas (not immediately surrounding properties) on the understanding that the levels are not high and will be contained in the areas for only a short period.

2.1 Development Site

2.1.a Site Location and Description

The BAE Systems site at Samlesbury, a former World War 2 airfield, is located in Balderston, Blackburn BB2 7LF and is centred on Ordnance Survey grid co-ordinates 362700, 431180. It is located between Myerscough Smithy Road (A59) to the north and Preston New Road (A677) to the south. The area of Mellor Brook lies just over 1km to the east, Turner Green lies approximately 1.5km to the west and Samlesbury town centre is located almost 4km to the west.

Figure 1: Environment Agency Flood Map covering the site and surrounding area

The BAE Systems facility is occupied by a number of manufacturing, office and storage buildings, site roads, disused runways and grassed areas. The surrounding rural area comprises agricultural land and associated farm buildings.

The Logistics Facility to be constructed on the Enterprise Zone within the BAE Samlesbury site. The proposed training facility is located around 111m north of the former main runway, between the 610 Machine Facility Building and the 3A16 car park. The southern boundary crosses land located between the site and the runway. The western boundary is formed by an access road between the site and the 610 Machine Facility site. The south eastern boundary is formed by land leading to an access road. The north eastern boundary is immediately west of a raised earth bund. The northern boundary is located around 11m south of the edge of a raised earth bund.

The site is currently an open grassed area which is roughly rectangular in shape with a 'dog leg' along the eastern boundary. A section of existing tarmac runway crosses the south west corner. Site level slopes slightly towards the south.

The total development site area is approximately 4.56 hectares. The impermeable area associated with the first phase development is approximately 2.37 hectares.

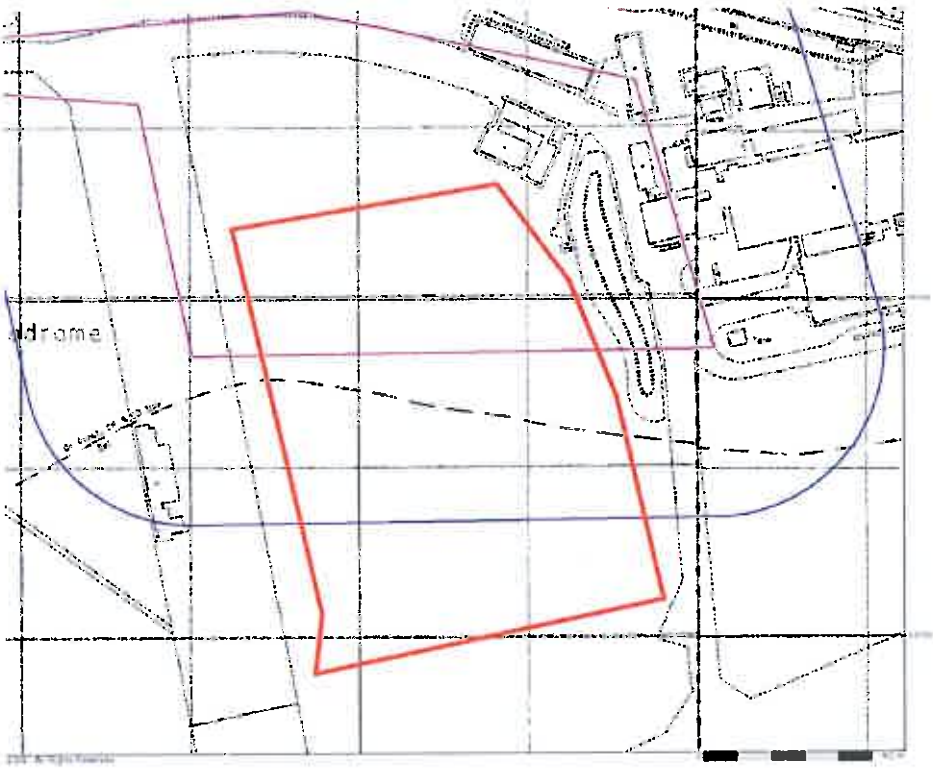


Figure 2: Site layout superimposed on OS Survey plan 1992

Drawings of the proposed development are included in Appendix C.

2.1.b Vulnerability classification

The proposed development comprises a 'less vulnerable' use, as classified in Table 2 in 'Technical Guidance to the National Planning Policy Framework,' published in March 2012.

2.1.c Local Development Documents

The Lancashire Advanced Engineering and Manufacturing Enterprise Zone (Samlesbury) Local Development Order No.1 (2012)' was adopted in March 2012. The document formed part of a phased approach to developing the Samlesbury part of the Lancashire Enterprise Zone.

Ribble Valley Council published a consultation version of '*The Lancashire Advanced Engineering and Manufacturing Enterprise Zone (Samlesbury) Local Development Order No.2 (2013)*' in November 2013.

This relates to other local documents as follows (reproduced from the LDO):

Ribble Valley District wide Local Plan (adopted June 1998)

1.7.1 Policy EMP8 (Extensions and Expansions) permits the expansion of established firms on land outside main settlements provided it is essential to maintain the existing source of employment and is not contrary to other policies in the Local Plan.

Ribble Valley Submission Draft Core Strategy (September 2012)

1.7.2 Key Statement EC1 (Business and Employment Development) identifies the BAE Samlesbury site as a regionally significant employment site with considerable potential to accommodate a variety of advanced knowledge based industries in the future. This has been recognised by the Government's proposal to create an Enterprise Zone at this location. The Council will support the delivery of the Enterprise Zone and has produced a Local Development Order to achieve this.

1.7.3 Policy DMG2 (Strategic Considerations) requires development to be compatible with the Enterprise Zone designation.

South Ribble Local Plan (adopted February 2000)

1.7.4 Policy EMP8 (Land at Samlesbury Aerodrome) permits development of the land within the limits of the British Aerospace complex at Samlesbury Aerodrome in connection with the company's Aerospace Division Activities.

Central Lancashire Local Development Framework Adopted Core Strategy (July 2012)

1.7.5 Policy 9: Economic Growth and Employment identifies Samlesbury as a location for regionally significant employment. South Ribble Borough Council Submission Draft

Site Allocations and Development Management Policies Development Plan Document (as modified) (June 2013)

1.7.6 Within this document Policy C5 – BAE Systems Samlesbury was intentionally left blank as the Council were awaiting information on the Enterprise Zone bid that was submitted for the site. Following the grant of Enterprise Zone status by the government, the Council has consulted on Policy C5 which protects the strategic designation of the site including the BAE Systems site core area and its operations, and supports the delivery of the Enterprise Zone.

Consultation Draft Samlesbury EZ Master Plan (September 2013)

1.7.7 The Consultation Draft Master Plan provides a strategic context for the preparation of this consultation draft LDO and establishes a framework for long-term strategic objectives for the Enterprise Zone. Public consultation on the draft Master Plan commenced on 17th October 2013 and will conclude on 28th November 2013. Following consideration of the representations received, it is anticipated that Ribble Valley Borough Council and South Ribble Borough Council will adopt the Master Plan in December 2013.

Preparation of the final LDO will be take account of the final Master Plan.

1.7.8 The Master Plan addresses the following matters:

- *Provision and coordination of transport infrastructure within and beyond the Enterprise Zone boundary.*
- *Preparation and provision of a Travel Plan.*
- *Access to the Enterprise Zone and its integration to the existing public highway network and proposals for on site/off site works required as a result of the development.*
- *On site parking.*
- *Protection of BAE Systems' core operations.*
- *Provision of utilities supply and integration of new supplies with the existing.*
- *Provision of superfast broadband outside the BAE Systems secure area.*
- *Implementation of a Design Code, building materials etc.*
- *Provision of on-site structural landscaping.*
- *Avoidance of ecological impacts, measures to offset unavoidable ecological impacts, the delivery of biodiversity enhancements, the maintenance and enhancement of habitat connectivity and buffer zones around habitats of ecological importance.5*
- *Provision of drainage.*

The development complies with the local development policy.

2.1.d Evidence that the Sequential Test or Exception Test has been applied in the selection of this site for this development type.

The Sequential and Exception Tests are applied for sites where flood risk is outweighed by wider sustainability considerations and is designed to ensure that the flood risk posed to such sites is controlled and mitigated to an acceptable level taking account of climate change.

The risk-based Sequential Test aims to steer new developments towards areas with the lowest probability of flooding (i.e. Flood Zone 1). Environment Agency mapping indicates that the site lies within Flood Zone 1. This zone is compatible with all development uses.

The Exception Test requires that the development provides wider sustainability benefits to the community which must outweigh the flood risk. The Exception Test is therefore not required in this case.

2.2 Definition of the Flood Hazard

2.2.a What sources of flooding could affect the site? (see Annexe C PPS 25)

Consideration has been given to the possibility of flooding that could affect the site from sources such as rivers, the sea, reservoirs and other artificial sources, groundwater, sewers and surface water runoff.

2.2.b For each identified source, describe how flooding would occur, with reference to any historic records wherever these are available.

Fluvial and Tidal Flooding

Environment Agency Flood Mapping indicates that the site is located within EA Flood Zone 1. EA Flood Zone 1 land has been assessed as having a minimal 0.1% (1 in 1000 year) chance of flooding from rivers or the sea in any given year.

The nearest watercourse, Mellor Brook, is 300m north of the site. Huntley Brook is located 500m south east.

The site is currently an open grassed area. Ground level is around 76m AOD in the north sloping to around 78m AOD in the south.

The hydraulic gradient local to the site is assumed to flow towards the northwest as shown on flow direction indicators on OS mapping.

The risk of flooding from fluvial or tidal flooding is considered to be low.

Flooding from reservoirs, canals and other artificial sources

Examination of public records and maps has not revealed the presence of reservoirs or other artificial sources in the close vicinity of the site or known records of flooding from artificial sources at the site. These are considered to be an unlikely source of flooding.

Flooding from Groundwater

The BGS Geology 1:100,000 Map of Great Britain: Sheet 10, Lancashire, indicates the succession of strata to be as shown in the table below. Additional information has been obtained from a site investigation undertaken on the site.

Geological Mapping Summary	
Strata	**Description**
Anticipated Geology	Drift geology consists of an undefined thickness of low permeability deposits of head, clay-with-flints, brickearth, peat, river terrace deposits and marine and estuarine alluvium. The Envirocheck review of the BGS1:625,000 solid geology map of Great Britain indicates that the underlying solid geology comprises Namurian (Millstone Grit series).
Superficial Geology	A site investigation encountered Made Ground comprising ashy slightly clayey gravel sized fragments of slag overlying clays with low stone cobble content to around 3.2m in a former pond. Investigation of earth bunds along the southern boundary encountered Made Ground comprising slightly gravelly silty clays with localised brick, stone cobble and boulder content to between 3.5 and in excess of 4.5m bgl. In the majority of the site the investigation confirmed that ground conditions on the site generally comprised 200-300mm of topsoil overlying natural clay strata extending to depths of at least 15 metres.
Bedrock	Not encountered. In the locality bedrock has been identified as Carboniferous Millstone Grit at depths in excess of 15 metres.

Environment Agency Groundwater Vulnerability maps have been consulted and the information is presented in the table below.

Vulnerability Mapping Summary	
Strata	**Eastern end of main runway**
Bedrock	Minor Aquifer - Variably permeable
Source Protection Zone	Outside

Soakaway tests undertaken in the natural cohesive strata indicated that the soil is relative impermeable and perched groundwater is present.

The nature of the natural clay soils on the site is such that infiltration drainage systems are unlikely to be effective or practical.

Groundwater flooding is not considered to represent a significant risk to the site.

Flooding from Sewers

There are no reported problems of flooding from sources in the vicinity of the site.

The site area is served by a land drainage system dating back to construction of the wartime airfield. The risk of flooding from foul and surface water drainage systems is currently considered low.

There may be a residual risk of flooding associated with blockages in the site drainage systems or main sewers.

Flooding from Surface water run-off - Overland flow

There is no record of flooding at the site.

2.2.c Existing surface water drainage arrangements for the site

The site is currently undeveloped greenfield land.

2.3 Probability of Flooding

2.3.a Which flood zone is the site located in?

Environment Agency mapping indicates that the site is in Flood Zone 1.

2.3.b If there is a SFRA covering this site, what does it show?

The Central Lancashire SFRA (dated December 2007) indicates that the site is located in Flood Zone 1 – low probability of flooding.

The Environment Agency Standing Advice notes that for developments in Flood Zone 1 FRA Guidance Note 113 should be followed '*In areas where the Local Planning Authority has identified drainage problems through a Strategic Flood Risk Assessment or Surface Water Management Plan and they have indicated that a formal flood risk assessment is required*'.

FRA Guidance Note 1 requires FRAs to provide '*Proposals for surface water management that aims to not increase, and where practicable reduce the rate of runoff from the site as a result of the development (in accordance with sustainable drainage principles, and the Local Planning Authority's published SFRA).*'

2.3.c What is the probability of the site flooding taking account of the contents of the SFRA and any further site-specific assessment?

Preliminary assessment of the site and surrounding area has identified that the main potential source of flooding is associated with surface water run-off.

2.3.d Existing rates and volumes of run-off generated by the site

QBAR has been calculated using the IH124 method based on a site area of 50 hectares giving an equivalent run off of 6.6 litres/second/hectare. Preliminary design of the surface water drainage systems has been based on a permissible discharge of 5.5 litres/second/hectare. A copy of the calculation for QBAR is included in Appendix A.

2.4 Climate Change

2.4.a The EA recommends the following allowances are made in designing drainage systems to take into account future climate change (Table 5 taken from the Technical Guide to the National Planning Policy Framework, March 2012).

Table 5: Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

Notes to table 5:

a. Refer to Department for Environment, Food and Rural Affairs *FCDPAG3 Economic Appraisal Supplementary Note to Operating Authorities – Climate Change Impacts*, October 2006, for details of the derivation of this table.

b. For deriving peak rainfall, for example, between 2025 and 2055 multiply the rainfall measurement (in mm per hour) by 10 per cent and between 2055 and 2085 multiply the rainfall measurement by 20 per cent. So, if there is a 10mm per hour event, for the 2025 to 2055 period this would equate to 11mm per hour, and for the 2055 to 2085 period, this would equate to 12mm per hour. Other parameters in table 5 are treated similarly.

The lifetime for the development has been assumed to be 50 years. A 20% increase in peak rainfall intensities has been incorporated in drainage and surface run-off calculations in line with Environment Agency Standing Advice.

The drainage system has been designed to contain a 1 in 100 year storm event including a 30% increase in peak rainfall intensity to allow for climate change. Flood risk at the site will therefore not be affected by climate change during the life of the proposed development.

2.5 Detailed Development Proposals

2.5.a Details of the development layout, referring to the relevant drawings

The Logistics Facility development comprises the construction of single storey steel framed warehouse with an area of around 13,000 square feet sub divided into various areas. The building will also contain offices, IT server rooms, plant rooms and ancillary facilities. The mezzanine floor will contain additional office areas. Heavy goods vehicle service yards will be provided along one side of the warehouse with around 150 car parking spaces together with associated roads and landscaped mounding.

The total development site area is approximately 4.56 hectares. The impermeable area associated with the first phase development are summarised as follows:

Location	Area		Permissable discharge
Main building roof	1.16		
Service Yard	0.50		
Fire access road	0.16		
Roads	0.15		
Car Parks	0.40		
Total Phase 1 area	**2.37**	**Hectares**	**13.04 l/s**

The nature of the natural clay soils on the site is such that infiltration drainage systems are unlikely to be effective or practical.

It is therefore proposed that surface water drainage from the site should discharge to the existing surface water network with flows limited to the equivalent green field run off.

Drawings are included in Appendix C.

2.5.b Where appropriate, demonstrate how land uses most sensitive to flood damage have been placed in areas within the site that are at least risk of flooding

The site is located within Flood Zone 1. All forms of development are considered appropriate in Flood Zone 1 (see Table D.3 in Appendix D, PPS 25).

2.6 Flood Risk Management Measures

2.6.a How will the site be protected from flooding, including the potential impact of climate change, over the development's lifetime?

The site lies within Flood Zone 1, assessed as having a low probability of flooding.

In order to protect the site and surrounding area from flooding a number of measures have been adopted in design of the surface water drainage to the proposed development.

Where possible, the drainage has been designed to adopt the principles of SUDS as set out in CIRIA Best Practice Manual C523 and Design Manual C522, and as summarised in PPS25.

The Environmental Agency (2004) recommendations for the management of surface water state that:

'Surface water should be controlled as near to its source as possible through a sustainable approach to surface water management. This approach involves using a range of techniques including soakaways, infiltration trenches, permeable pavements, grassed swales, ponds and wetlands to reduce flood risk by attenuating the rate and quantity of surface water from a site. This approach can also offer other benefits in terms of promoting groundwater recharge, water quality improvement and amenity enhancements. Approved Document Part H of the Building Regulations 2000 sets out a corresponding hierarchy for surface water disposal which encourages a SUDS approach.'

The hierarchy of surface water disposal as noted in the Building Regulations H3 is as follows:

i) Sustainable urban drainage systems (SUDS)
ii) Discharge of surface water offsite direct to watercourse
iii) Discharge to adopted sewer

SUDS are made up of one or more structures built to manage surface water run-off. They are used in conjunction with good management of the site, to prevent flooding and pollution. There are five general methods of control:

- Prevention
- Filter strips and swales
- Permeable surfaces and filter drains
- Infiltration devices
- Basins and ponds

These controls should be located as close as possible to where the rainwater falls, providing *attenuation* for the run-off. They also provide varying degrees of treatment for surface water, using the natural processes of sedimentation, filtration, adsorption and biological degradation.

The ground conditions on the site, comprising generally clay soils, are such that infiltration systems are unlikely to be effective or practical. It is therefore proposed that surface water drainage from the site should discharge to the existing surface water network with flows limited to the equivalent green field run off which for the purposes of preliminary design has been taken as 6.6litres/second/hectare.

Run off from external paved areas, car parks and service yard slabs initially discharge to a series of dry swale features, with a total length of approximately 200 metres, to provide a SUDS element to the scheme. The dry swales will provide a degree of retention in the system but it is not anticipated that there will be any significant infiltration. Further storage, in the form of below ground cellular tanks will be incorporated in design of the surface water drainage system and flows attenuated by use of a hydobrake in the final manhole.

All discharge from car park areas should be passed through a class 1 bypass interceptor prior to discharge to surface water sewers.

The following criteria should be adopted for design of the surface water drainage system.

- The drainage network is to be designed as a gravity system to accommodate run off from a 1 in 2 year storm event with no surcharge.
- The network is to be checked for a 1 in 30 year storm event with surcharge permitted but with no surface flooding
- The network is to be checked for a 1 in 100 year storm event with surface flooding permitted providing that there is no risk of flooding to buildings and there is no off site overland flow.
- An allowance to be made for a 20% increase in peak rainfall intensity to account for climate change.
- The discharge from the system will be limited to the peak rural run off rate of 5.5 l/sec/hectare.

Surface water from the proposed development will be collected and discharged to the existing 450mm diameter surface water sewer which crosses the site. Flow from the site will be restricted to 13.04 litres/second by use of a hydrobrake in the final manhole. The design of the surface water drainage system incorporates approximately 200 linear metres of dry swale and 1600-1800m3 of cellular storage located in the car park to the east of the building.

Copies of Micro Drainage simulation output is included in Appendix C for reference

All car park drainage will pass through a Class 1 bypass separator prior to discharge to the site sewers.

The surface water drainage system and attenuation has been designed to accept run off from the first phase of the Logistics Facility development. It has been assumed that the Logistics Centre extension and additional car parking will be provided with its own attenuation in the form of below ground cellular storage located at the southern end of the site.

2.7 Off Site Impacts

2.7.a How will you ensure that your proposed development and the measures to protect your site from flooding will not increase flood risk elsewhere?

The drainage and attenuation system will be designed to accommodate a 1 in 100 year storm event without overland flow. The proposed development will not increase flood risk on or off site. The computer simulations incorporating attenuation indicate that run-off from the 1 in 100 year storm will be contained below ground.

2.7.b How will you prevent run-off from the completed development causing an impact elsewhere?

See measures set out in section 2.7 above.

2.8 Residual Risks

2.8.a What flood related risks will remain after you have implemented the measures to protect the site from flooding?

A residual risk will remain from surface water run-off caused by extreme storm events with annual probabilities of less than 1% (1 in 100 year). There may also be a residual risk of flooding associated with blockages in the site drainage systems or main sewers around the site.

2.8.b How, and by whom, will these risks be managed over the lifetime of the development?

The National Standards for SUDs were issued by DEFRA in December 2011. The National Standards set out what to design and construct in order to obtain approval from the SUDS Approving Body (SAB) and outline the operation and maintenance of SUDS which the SAB adopts.

The Flood and Water Management Act 2010 encourages the use of sustainable drainage in new developments and re-developments by requiring drainage systems to be approved against the National Standards before building can commence and a connection to the sewer can be allowed (if needed). The plans for the drainage system need to be approved pre-construction by the SUDS Approving Body (SAB), which will be the unitary or county council for the area. In addition, the Local Planning Authority may set local requirements for planning permission that have the effect of more stringent requirements than the National Standards.

The Sustainable Drainage (Approval and Adoption) (England) Order 2012 defines the exemptions to the requirement for approval.

The management of the on-site SUDS systems is the responsibility of the owners. The approved drainage plan must include the safe operation and maintenance of SUDS. Where appropriate this must make provision for a warning system and contingency arrangements. The owners should ensure that the systems are properly maintained and kept free of debris which will prevent them operating efficiently.

Reference should also be made to British Standard BS 8582:2013: Code of practice for surface water management for development sites regarding the maintenance requirements and programming for maintenance to surface water drainage systems.

3.0 Conclusions

3.1 The site is located on the BAE Systems Samlesbury complex in Balderstone. The site is roughly rectangular in shape and occupies an area of around 4.56 hectares.

3.2 The proposed development comprises a Logistics Facility which will include a large single storey warehouse, service yard, roads and car parks..

3.3 The site is located in Flood Zone 1. Flood Zone 1 is land assessed as having a minimal risk of flooding from rivers and the sea, less than 1 in 1,000 in any year.

3.4 The principal risk of flooding on the site and adjacent sites is considered to be related to surface water run-off. A surface water management plan and drainage design that takes a holistic approach taking into account all the sources of local flood risk, including from sewers, overland flow, culverted and open watercourses and groundwater will be implemented. This will incorporate the use of SUDs, as appropriate.

3.5 Ground conditions on the site, comprising generally clay soils, are such that infiltration systems are unlikely to be effective or practical. It is therefore proposed that surface water drainage from the site should discharge to the existing surface water network with flows limited to the equivalent green field run off which for the purposes of preliminary design has been taken as 5.5litres/second/hectare.

3.6 The design of the surface water drainage system will incorporate SUDS features in the form of approximately 200 linear metres of dry swale and 1600-1800m3 of cellular storage located in the car park to the east of the building. Flow from the site will be restricted to 13.04 litres/second by use of a hydrobrake in the final manhole

3.7 All discharge from car park areas should be passed through a class 1 bypass interceptor prior to discharge to surface water sewers or alternative SUDS treatment considered.

The following criteria will be adopted for design of the surface water drainage system.

- The drainage network will be designed as a gravity system to accommodate run off from a 1 in 2 year storm event with no surcharge.
- The network is to be checked for a 1 in 30 year storm event with surcharge permitted but with no surface flooding

- The network is to be checked for a 1 in 100 year storm event with surface flooding permitted providing that there is no risk of flooding to buildings and there is no off site overland flow.
- An allowance to be made for a 30% increase in peak rainfall intensity to account for climate change.
- The discharge from the system will be limited to the peak rural run off rate of 5.5 l/sec/hectare.
- The surface water drainage system and attenuation has been designed to accept run off from the first phase of the Logistics Facility development. It has been assumed that the Logistics Centre extension and additional car parking will be provided with its own attenuation in the form of below ground cellular storage located at the southern end of the site.

3.8 The overall risk of flooding to the site has been assessed as low. The principal risk of flooding on the site is considered to be associated with surface water run-off from the proposed development.

3.9 If appropriate drainage design measures are implemented, the will be no adverse flood risk to areas in the vicinity of the site.

3.8 Management of the on-site SUDs is the responsibility of the owners.

3.9 Reference should also be made to British Standard BS 8582:2013: Code of practice for surface water management for development sites regarding the maintenance requirements and programming for maintenance to surface water drainage systems.

3.10 The process of flood risk assessment has been undertaken for the site and the proposed development. It is considered that the proposed development will not increase the likelihood of flooding on-site or in the surrounding area provided that the criteria set out above are applied to the design.

APPENDIX A **Blank**

APPENDIX B

B1 Location maps

B2 Location within the BAE Systems complex

B1 Location Map

B2 Location of site within the BAE Systems Samlesbury complex

APPENDIX C

C1 Proposed site layout

C2 Topographic survey data

C3 Flood map

FIGURE C1 Proposed Site Layout

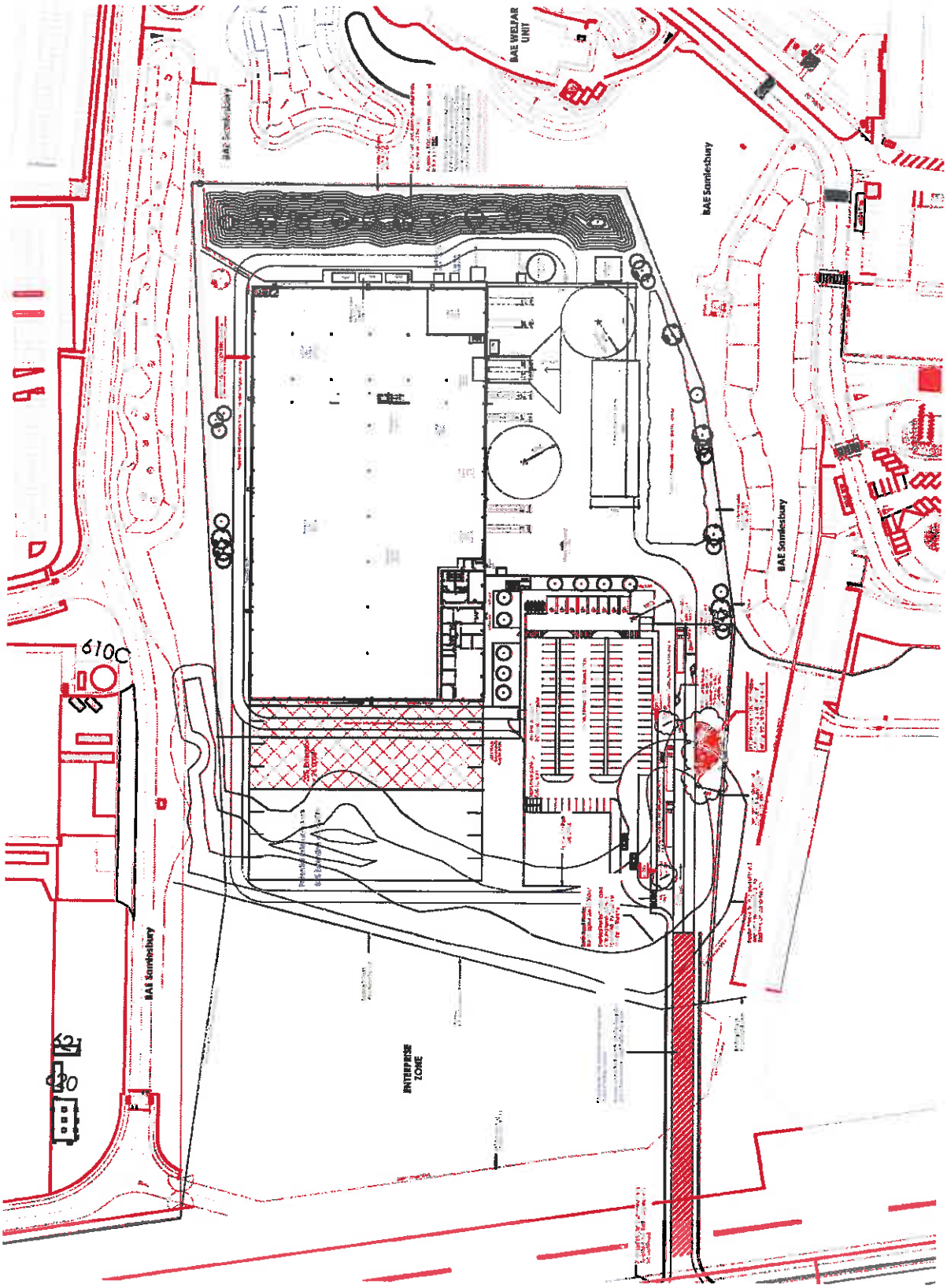
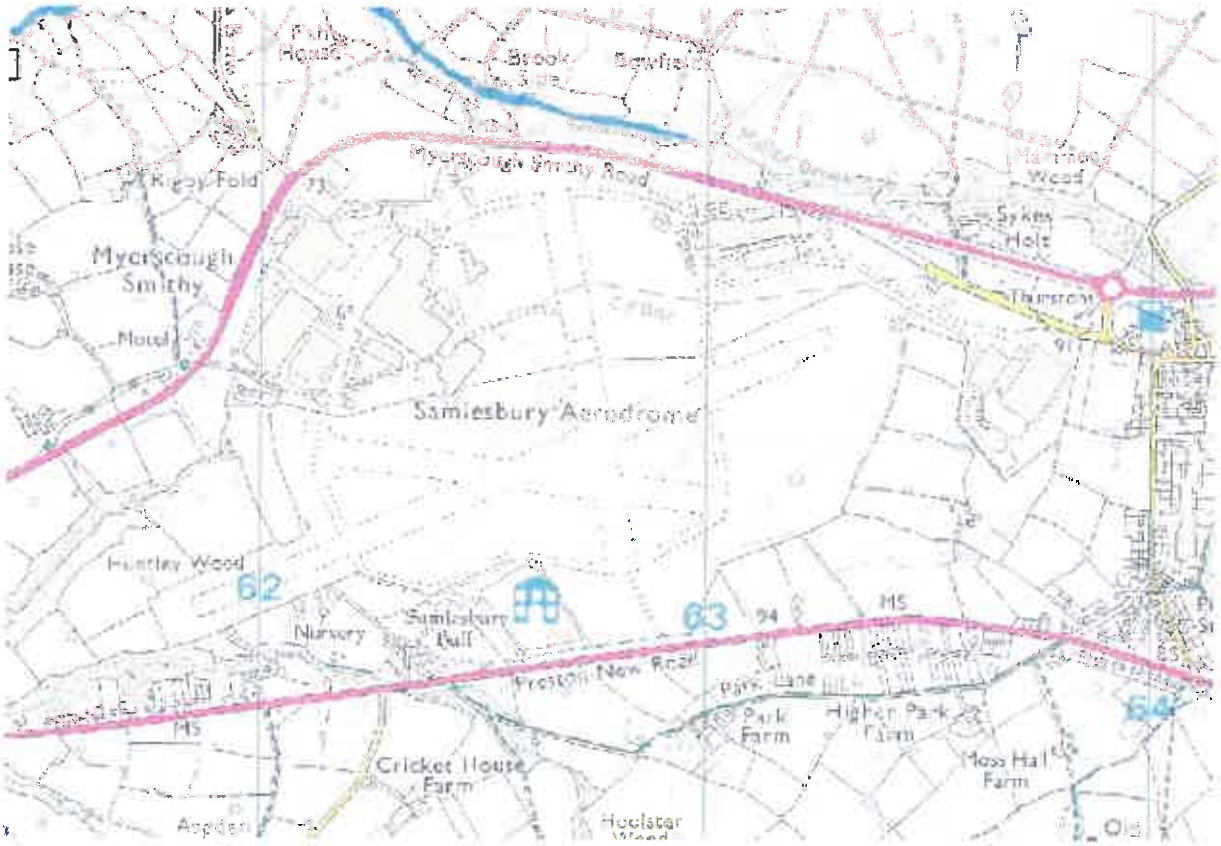


FIGURE C2 Topographic survey data

FIGURE C3 Flood Map



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APPENDIX E

E1 Sources of Information

Data and information has been obtained from the following sources:

a) Environmental Agency Flood Zone maps
b) Topographic survey data prepared by Survey Operations drawing: AO 15B124/001
c) Inspection of site photographs
d) Information provided by BAE Systems Drawing P 5878 L(00)24 revision 2: Building Location
e) Ordnance survey maps
f) Publicly available data regarding local conditions.