

ROYAL ORDNANCE, BISHOPTON



REMEDICATION AND RECLAMATION EARTHWORKS

ENVIRONMENTAL STATEMENT

APPENDIX II.4 VERIFICATION PLAN

October 2006

BAE SYSTEMS Environmental Verification Plan

Remediation & Reclamation Earthworks, Bishopton
Redrow Group & BAE Systems Property Investments Ltd



Verification Plan

Remediation & Reclamation Earthworks, Bishopton

Redrow Group & BAE Systems Property Investments Ltd

DOCUMENT CONTROL

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INVESTORS IN PEOPLE

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FIGURES

FIGURE 1 **SITE LOCATION PLAN**

FIGURE 2 **PROPOSED LAND USE PLAN**

APPENDICES

APPENDIX A **REFERENCES**

1. INTRODUCTION

1.1. Background

An outline planning application (OPA) was submitted to Renfrewshire Council in June 2006 which outlines the proposals of Redrow Group and BAE Systems Property Investments Ltd to redevelop the site of the former Royal Ordnance factory in Bishopton. The proposals include for a mixed used development on around 24% of the 996 hectare site including residential, commercial and employment land. The remainder of the site is to become a managed Community Woodland Park.

Due to the Sites' long industrial history manufacturing explosives and munitions, the OPA was supported by information about land contamination at the site and the proposals to remediate the land such that it would be suitable for its proposed new uses. BAE Systems Environmental, as the environmental consultant appointed in relation to the assessment of land contamination assessment, prepared the various reports in support of the OPA and is responsible overall for the remediation of the Site.

The information submitted in the OPA was based on the findings of numerous exploratory investigations as well as a site-wide Stage 1 Site Investigation (this corresponds to Stage 1 of the Main Investigation in the terms of CLR11). These informed the Outline Remediation Strategy as well as the Stage 1 Detailed Remediation Strategy, which supports the separate detailed application for the Remediation and Earthworks.

However, in order to finalise the Detailed Remediation Strategy, there is a requirement for further intrusive investigations to be undertaken. This phased approach to investigation and development of the Remediation strategy has been agreed with Renfrewshire Council. The finalised remediation strategy will be such that the identified significant pollutant linkages at the site are effectively managed.

This report outlines the principles to be applied to demonstrate the effectiveness of the proposed remediation activities and has been produced in support of the Detailed Planning Application for the proposed Remediation and Earthworks at Bishopton. It should be read in conjunction with the Stage 1 Remediation Strategy and the various reports upon which the strategy is based:

- Preliminary Risk Assessment for Land Contamination, Desk Study, Bishopton (BAE Systems Environmental 2005)
- Stage 1 Site Investigation Outline Strategy, (BAE Systems Environmental, 2005)
- Factual Report, Bishopton, (BAE Systems Environmental, 2006)
- Generic Quantitative Risk Assessment Report (GQRA), Bishopton, (BAE Systems Environmental, 2006)
- Stage 1 Detailed Remediation Strategy, (BAE Systems Environmental, October 2006)
- Stage 2 Site Investigation Outline Strategy, (BAE Systems Environmental, October 2006)

- Monitoring Plan, Bishopton, (BAE Systems Environmental, October 2006)

1.2. Objectives

The objectives of the remediation scheme as a whole can be split between management objectives and technical objectives as follows:

Management objectives

- To produce a remediation strategy that can be agreed with all key stakeholders.
- To meet all regulatory requirements applicable to the development on contaminated land i.e. PAN33 (Scottish Executive 2000) and to consider the views of key stakeholders on how unacceptable risks should be managed.
- To meet all regulatory requirement during the implementation of the remediation options.
- To avoid unacceptable health and safety and environmental impacts during remediation.
- To carry out remediation in accordance with good technical practice.
- To achieve successful phased remediation within the timescales required by the development and at a cost that is commensurate with the level of revenue generated through the development proposed.

Technical Objectives

- The remediation options employed must be effective in reducing or controlling the risk.
- The remediation options must be feasible and practical taking into consideration factors such as the ground conditions, environmental setting, ecological issues and the phasing of the development.
- The remediation options employed must be durable and provide a robust solution over the lifetime of the project (and beyond).
- Sustainability of the strategy in terms of how it fits other environment objectives e.g. habitat enhancement, use of natural resources, and avoids or minimises adverse environmental impacts e.g. transportation, water environment, air, off site landfill.
- To consider the additional benefits of the strategy in terms of enhancement of amenity and ecological value.

This document defines the principles to be adopted in the verification and validation process to meet the requirements of the regulatory authorities in demonstrating the effectiveness of the remediation undertaken on site. It is anticipated that the details required for verification and validation of individual areas of the site may alter subject to further ground investigation, detailed remediation strategy adopted for the individual areas, amendments to the strategy required through findings during the remediation or previous verification and validation processes and the requirements

of the regulators over the course of the remediation process. Detailed verification and validation plans will be agreed for each area with the regulators prior to remediation commencing on that area of the site.

1.3. Verification Overview

Demonstrating that the remediation objectives and criteria have been met will be achieved through the verification process. Verification is the process of demonstrating that any risk associated with the Site has been reduced to meet remediation criteria and objectives based on a quantitative assessment of remediation performance.

The verification plan sets out the requirements for gathering data to demonstrate the effectiveness of the remediation in terms of meeting the remediation objectives. This draft plan will be submitted as part of the Stage 1 Detailed Remediation Strategy that supports the detailed planning application for the works. The plan will then be finalised and agreed with the local authority prior to implementation of each phase of the remediation works.

The finalised plan will include, but not be limited to, the following information:

- Introduction and background
- Remediation Criteria
- Outline of the remediation works to be undertaken
- For each element of remediation, the measures to be employed to validate its successful completion
- Responsibilities for carrying out measurement and tests
- Reporting requirements
- Procedures to deal with the review of the effectiveness of the remediation activities
- Schedule of third party contacts
- Key criteria to be met to discharge any planning conditions

This verification plan sets out the general requirements for gathering data to demonstrate that remediation meets the remediation objectives and criteria. Setting out the requirements effectively establishes '*lines of evidence*' which will ultimately show that remediation has successfully completed.

1.4. Definitions

The term 'Site' refers to land owned by BAE Systems to the south-west of Bishopton village encompassing the former Royal Ordnance factory, as shown in Figures 1 and 2.

1.5. Reporting Conditions

The report refers to the conditions present at the Site at the time of writing.

It should be noted that BAE Systems Environmental has relied on the accuracy of information contained in external documents and provided by third parties, and is in no circumstances responsible for the accuracy of such information or data supplied.

This report has been specifically prepared for the purposes stated in Section 1.1 and, therefore, should not be used for any other purpose without prior consultation with BAE Systems Environmental.

1.6. Interested Parties

This report has been produced primarily in support of the Detailed Planning Application for the proposed Remediation and Reclamation Earthworks at the Bishopton site and as such will be of interest to not only Renfrewshire Council Planning Authority, but also the councils various statutory consultees. These include, in particular, the councils Environmental Services Department, the Scottish Environment Protection Agency, Scottish Natural Heritage and the Health and Safety Executive (explosives). The report will also be of interest to other consultees such as the community council and members of the general public who may have an interest in the redevelopment proposals.

2. BACKGROUND INFORMATION

2.1. Summary of Risks

Previous investigations identified a number of pollutant linkages (PLs) as existing at the Site. The purpose of the Generic Quantitative Risk Assessment (GQRA) was to determine whether the identified PLs were likely to be significant. For the majority of PLs this was determined by applying Generic Assessment Criteria to concentrations of contaminants in soil and water.

The outcome of the risk assessment was that PLs were categorised according to their likelihood of significance, as follows:

- **PLs that are *likely to be significant*** –where there is sufficient data to determine that there is an unacceptable risk and that further more detailed risk assessment is unlikely to negate the requirement for remediation.

This applies, for example, to the occurrence of explosives residues around process/storage buildings, visible asbestos beneath steam mains, PCB contamination near electrical substations and hydrocarbon contamination adjacent to fuel storage tanks.

- **PLs that are *unlikely to be significant*** - where there is sufficient evidence that a PL is unlikely to be significant it requires no further consideration.

This situation is considered to arise where a contaminant was neither expected in part of the Site nor found at significant concentrations. This applies to many contaminants away from identified sources, such as certain metals and PCBs.

This category also includes PLs that are unlikely to be significant but for which validation will be required at a later date, for example by sampling at a tighter grid spacing in areas of housing. Contaminants in this category include explosives, asbestos and a number of naturally occurring metals.

- **PLs that *may be significant*** – i.e. those that do not fall into one of the above categories. These require further assessment based on a more refined land use model (particularly in Recreational Open Space) and/or further data to be collected in the next phase of investigation. A contingency is required in the Outline Remediation Strategy for certain PLs in this category, for example those where the average concentration of a contaminant is close to the assessment criteria.

Our assessments identified that the main risk drivers are generally associated with human health. It is believed that the majority of the risks identified in relation to the water environment will also be dealt with, as these were generally associated with the same sources of contamination

However, correlation between leachability data and water quality suggests continuing entry of contaminants to the water environment from a number of other sources, including the Picrite Lagoons and ash tips, and these require further assessment as part of the Stage 2 Site Investigation.

Further investigation during the Stage 2 Site Investigation will aim to reduce the uncertainties identified in the GQRA by:

- Delineating sources of contamination that are contributing to significant pollutant linkages
- Addressing data gaps and uncertainties highlighted in the GQRA report
- Undertaking more detailed risk assessment, especially for open space end uses. This may also involve additional sampling as required to achieve a greater dataset.

The remediation strategy has been developed to deal with the identified significant pollutant linkages as well as to account for any further significant pollutant linkages that maybe confirmed during the Stage 2 Site Investigation. Further details of the remediation activities to be employed are provided in section 3.

2.2. Contamination Characteristics

The factory manufactured explosives for over 80 years using various processes. Contamination as a result of the previous uses of the site has been identified associated with the various processes, materials storage, waste handling and product processing and storage activities. However, based on the investigations carried out to date, contamination is generally associated with point sources including waste tips, burning grounds and areas around process buildings and storage areas. Soils have been found to be impacted by a number of key contaminants including, explosives residues, explosives fragments, heavy metals (including lead, arsenic, cadmium, nickel), PAHs and other hydrocarbons.

Through the risk assessment process, human health risks have been identified associated with these contaminants. In some cases, the contamination has also been shown to be impacting the water environment. Further details of the contamination profile can be found in the various reports referenced in section 1.1.

3. SCOPE OF REMEDIATION

3.1. Introduction

Remediation in its widest sense includes preventing or minimising, remedying or mitigating the effects of the contamination, or monitoring of the condition of the land. The Stage I Detailed Remediation Strategy for the Site provides details on the proposed remediation. The strategy is based on the findings of the GQRA Report (BAE Systems Environmental, 2006) where risks were identified to human health and the water environment (as a result of land contamination) that require remediation. It has been designed to break significant pollutant linkages identified.

Remediation will be undertaken such that each area of the Site is suitable for its proposed new use.

3.2. Risk Management Options and Scope of Remediation

The following risk management options have been selected in order to break significant pollutant linkages considering the overall remediation objectives outlined in section 1.2. The quantities provided in Table 1 have been estimated based upon the information gathered to date. A key objective of the Stage 2 Site Investigation will be to delineate identified sources to provide more precise estimates of the quantities of materials requiring remediation through treatment or disposal. In some instances a number of treatment options may be suitable for remediation purposes. The most appropriate remediation treatment for an area will require to reflect a combination of suitability, quantity and economics when considered alongside both the individual area being remediated and the phasing of the overall remediation. This will be addressed within the detailed remediation plans for the individual areas.

Source	Risk Management Options	Quantum Estimates
Hydrocarbon hotspots	Bioremediation and reuse (preferred option), Excavate and remove (may also involve pre-treatment by bioremediation)	To be determined in Stage 2 Site Investigation.
Explosives residues contamination around process buildings	Excavate and remove to landfill	500No. process buildings – quantities still to be estimated – further SI required. However, assuming average propellant building size (1500m ²) and taking 10m around mound excavated to depth of 200mm, this equates to 300m ³ per building. Assuming all 500 building require remediation – 150,000m ³ worst case.
Burning grounds	Excavate and remove Soil Washing Soil stabilisation Visual inspection for small devices	Approx. area of burning grounds (excluding RL) = 6.1ha. Assuming all made ground + 0.2m natural material needs to be removed - average depth is approx 1.5m. Total volume estimate is therefore 100,000m ³ .
Boghall Dump	Surface Encapsulation	1.9ha land area. Assuming 500mm cap and 100mm topsoil then

Source	Risk Management Options	Quantum Estimates
		requirement for approximately 10,000m ³ of material.
Sulphur Dump	Possible excavate and removal – Surface Encapsulation	Estimated 0.4 ha land area affected. Assuming 1m of made ground, this equates to approx. 4,000m ³ .
Netherfield tips	Excavate and removal preferred	Estimated 1ha land area affected and assuming 2m of fill = 20,000m ³ this could be v. conservative. Depth appears to vary and so more investigation required to delineate. Conservative estimate made on quantities at this stage.
Visible asbestos (predominantly bonded around buildings that have had asbestos cement cladding etc and directly beneath steam mains (near stanchions).	Hand picking, possible machine surface scrape in some cases around buildings. Feasibility of handpicking beneath steam main to be determined during Stage 2 Site Investigations. Contingency allowance for excavation and removal directly beneath steam mains to provide confidence of bulk asbestos removal. Accompanied with visual inspection either side of trench and further removal as required.	Will be quantified during asbestos survey. Contingency - Best estimate of length is 49 km. Assuming 300 mm scrape in 1m wide trenches equates to approximately 15,000 m ³ of material.
Devices risk in ammunition breakdown, Georgetown and other storage areas	Inspection and further investigation and assessment required but options may involve active management or possible surface encapsulation. Remediation in ammunition breakdown area may be coincidental with works required for proposed landfill, depending upon final design.	Possible excavation of 16,500m ³ to prepare landfill.
Asbestos dispersed in soils beneath steam mains – Contingency only	More information is required to determine if actual risk. Contingency allowance to be made for excavation and removal directly beneath steam mains and to defined width.	To be confirmed after Stage 2 Site Investigation
Picrite Lagoons	Monitored Natural Attenuation likely to be required. Possibly also reed bed system for intercepted groundwater. Perhaps impermeable barrier although further assessment required. Note - contained in BAE Systems retained land, risk management plan required	
Explosives (propellant) fragments	Vacuuming from hard surface areas and destruction by burning; surface excavation either side of hard areas - if not landfilled then destruction by burning or screening / burning.	Length of narrow gauge in CDA = 36 km. This is the single rail total - approx 8 km of this is counted twice because it is double line. Length of remaining narrow gauge = 28km. This is also single rail total -approx 5km of this is double line.
Coal stores area	Further investigation in the Stage 2 SI to ascertain whether removal is required. 50% is contained within the BAE Systems retained land (ETF) and a risk management plan will be required.	Estimated 1.4ha land area affected. Depth of made ground is approx. 1.5m equating to approx. 21,000m ³ of material.

Source	Risk Management Options	Quantum Estimates
Other areas including scrap yards, areas of mineral workings, stores yard	Excavate and refill/reprofile Encapsulation	Not yet delineated - Allowance of up to 1.5m fill over area of 2.5ha.
White Phosphorus open storage areas	Excavate and removal/treatment including visual inspection for explosives devices	Up to 1ha but more likely 0.5ha.
Vegetation tip	Surface Encapsulation	0.5ha capped – 200mm cap with 100mm topsoil – approx 1500m ³
Waste Dump ('Refuse Coup')	Excavate and remove Soil Washing (feasibility to be assessed) Soil stabilisation (feasibility to be assessed)	Estimated 0.5ha land area affected with up to 3m of made ground anticipated. This equates to a volume of 15,000m ³ .
Other small areas of incidental waste tipping outwith CDA	Allowance to be made; lift and sort waste for disposal/treatment streaming	Allowance of 1000m ³
Roads, rail, narrow gauge – other hard standing	Excavate and remove Assess for re-use in other parts of Site	CDA – 11ha road, 7ha narrow gauge, broad gauge and other hardstandings allowance required – 11,000 m ³ with 15% recycled concrete (1500m ³)

Table 1 - Remediation Options

Further details of these activities, as well as the wider earthworks requirements to allow development, are provided in the Stage 1 Detailed Remediation Strategy.

4. VERIFICATION METHODS

4.1. Introduction

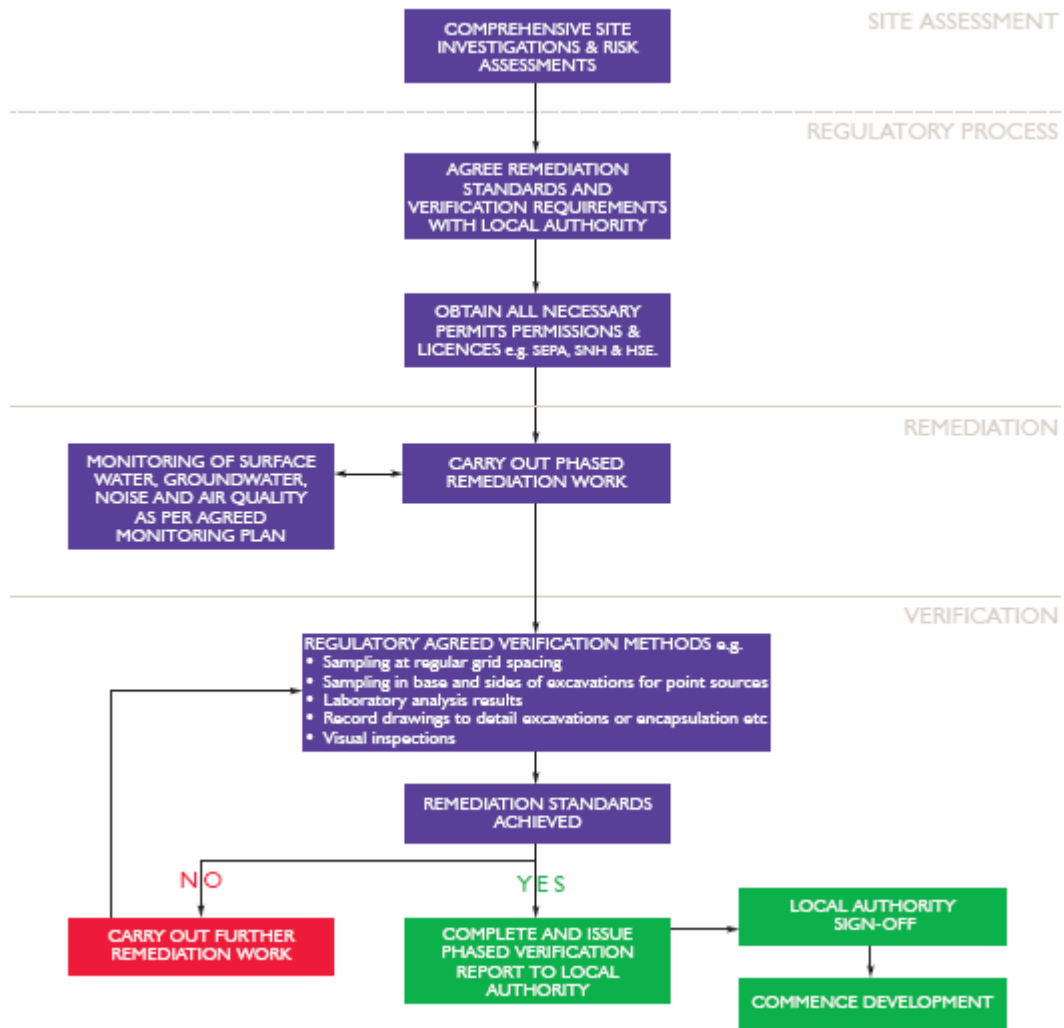
There are a number of different remediation techniques and activities that will be employed to bring the Site back into beneficial use. Each remediation treatment action is designed to deal with a particular significant pollutant linkage or group of such linkages. The verification requirements for each element of remediation will be specific to each activity and will be detailed once the remediation design has been finalised. However, there are some general principles that will be applied to the final design of the verification process and these are provided in the following paragraphs.

In some instances, there will be 2 levels of verification that will be undertaken to demonstrate the effectiveness of the remediation works. Operation criteria will be used in the first instance, being used as a means to direct the earthworks such that sufficient remediation is undertaken whilst minimising waste. It will also be used to avoid risks of delays to programme as a result of non-compliance with remediation end points. Such criteria will include both chemical testing and surveying of excavations / construction works.

The final verification however will be the re-testing of individual plots/areas to demonstrate that no significant pollutant linkages exist. Final validation will be on a grid basis to be agreed with the Local Authority. It is envisaged that a sampling regime corresponding to a 25 – 30m grid will be required in residential areas with wider grid spacings for employment land and open spaces. This intensive sampling exercise assumes a fully remediated area with development platform level formed.

This phase of verification will also be used to show that the other pollutant linkages found not to be significant in the Stage 1 Site Investigation are indeed insignificant.

The finalised sampling protocols will be appropriate for the eventual remediation techniques employed such that the effectiveness of the remediation can be measured with confidence. An outline of the verification process and how it fits into the overall remediation of the site is provided in the following diagram:



4.2. Remediation Standards

The standard of remediation will be such that each area of the site is suitable for its proposed new use. There are no generic UK statutory standards for acceptable concentrations of contaminants in soil. The decisions on whether an area is suitable for its proposed new use will be based on a site-specific risk assessment approach and as agreed with Renfrewshire Council.

There is currently a debate over the use of Soil Guideline Values (SGVs) and assessment criteria derived using the CLEA framework as the basis of regulatory decisions either under Part IIA of the Environmental Protection Act 1990 or under the planning regime. Concern has been raised in particular about the conservativeness of the current criteria when applied to determining what is an unacceptable risk to human health. CLAN 4-06 (DEFRA) states that there is a requirement for a number of practical and policy issues to be debated and whilst no timetable has been produced for the outcome of such a debate, it is acknowledged that the outcome will affect the current way that SGVs are either developed or used in the future.

In view of the above and the timescales involved in the remediation, we do not believe that it is appropriate to define definitive numerical remediation standards at

this time. However, the overall principles to be applied have been outlined in the following sections.

4.3. Confirming That Identified Pollutant Linkages are Not Significant

As outlined in sections 4.2 and 4.3 of the GQRA, there are a number of pollutant linkages that have been determined as not being significant although it is recommended that a larger data set be obtained to confirm this in the CDA. It is therefore proposed to undertake additional sampling in the CDA during the validation as follows:

- 30m grid in residential areas with analysis for Lead, Arsenic, Cadmium, Nickel Pb, As, Cd, Ni, speciated PAHs, asbestos and explosives.
- 50m grid in commercial/employment areas with analysis for Lead, Arsenic, Cadmium, Nickel, Pb, As, Cd, Ni, speciated PAHs, asbestos and explosives

4.4. Demonstrating Effective Removal of Contamination

Significant pollutant linkages have been found to exist at a number of locations across the site associated with point sources such as former waste tips, around process buildings, storage areas and tanks and burning grounds. The stage 2 site investigation will be used to delineate contamination and hot spots by trenching to prove clean material surrounding the areas of concern and samples will be taken and surveyed to allow excavation extents to be established. This will allow the quantities of materials requiring remediation to be identified, which will in turn inform the remediation options appraisal to determine the most appropriate treatment method, having regard to suitability, phasing and economy.

Where delineated, source area will be excavated and either disposed of to landfill or otherwise treated. The effectiveness of the removal will be confirmed by obtaining clean surveyed sample data (mainly for operational usage only) and as-built drawings of the excavations. This method will apply to areas such as waste tips, burning grounds, storage areas, around process buildings and rail track.

Where a source area has not been previously delineated, the verification method to be applied will include for sampling of the base and sides of the excavation to demonstrate sufficient removal of the source. Where a linear source is to be remediated then linear sampling at appropriate frequency along road or track lengths will be undertaken. This data will be used together with as-built drawings in the validation report.

Analysis conducted for the purposes of verification will be for determinands that contributed to the significant pollutant linkages for which remediation is required.

During excavation and removal the resident engineer will also conduct visual inspections of the excavation before being backfilled with clean imported material that meets acceptability criteria.

4.5. Demonstrating Effectiveness of Treatment of Contamination

It is likely that the preferred option for dealing with hydrocarbon contaminated material will be by ex-situ bioremediation. Where hydrocarbon sources have been identified delineation will take place to prove contamination extent vertically and laterally and to establish boundaries of clean material before any bioremediation will

take place. Materials will likely be excavated from various locations across the site and transferred to the treatment area (either within the PPC permitted area or other designated area licensed under the appropriate Waste Management Licensing regime (Mobile Plant)).

Validation of sufficient excavation will be as described in section 4.3. The completion criteria for treatment will depend on the final end use of the material.

- Re-use of the material – in some instances, it may be possible to treat the material to an extent that it can be reused on the site, particularly in areas to be used for less sensitive end uses e.g. open space. The criteria for acceptability will therefore be such that the material can be re-used safely without further treatment.
- Pre-treatment prior to landfill – where the material cannot be treated to a level which would allow it to be reused (without further treatment such as encapsulation) then this may be pre-treated to a level which will allow disposal to the on-site landfill

During the bioremediation process, there will be a requirement to undertake monitoring of the specific remediation parameters and these will be detailed in the specific working plan for this element.

A similar process will apply to other treatment methods such as stabilisation although where the treatment is also intended to deal with risks to the water environment then appropriate leachability criteria will also be derived, again linked to the final use of the material.

4.6. Breaking Pollutant Linkages by Surface Encapsulation

Where wastes have been previously buried on site the best environmental and practicable option is to remediate by encapsulation. This method will be applied mainly to areas outwith the development area to deal solely with human health risks e.g. Boghall Dump and the vegetation tip. Where there is a requirement to also deal with water environment linkages, then this method would only be used where it was demonstrated to be the best environmental, practical and reasonable option for such areas. For example, in ecologically sensitive areas, the benefits of intrusive remediation to deal with slight groundwater contamination may be outweighed by the ecological damage that would occur if such works were to take place.

This method of remediation involves the breaking of pollutant linkages by creating a physical barrier between the source and the receptor. All waste areas where this technique is to be applied will be visually inspected and vertically and laterally delineated with surveyed samples proving clean material boundaries. The encapsulation will be to an agreed specification to provide adequate protection to address any potential pollutant linkages together with sample data proving encapsulation material itself meets acceptability criteria. The capping material will be sourced on site and may include clean geotechnically unsuitable material or lower level contaminated soils which are unsuitable for use in the Core Development Area but could be used in open spaces without any further treatment.

Verification will be measured using surveying methods to produce as-built drawings showing capping thickness and detail (as necessary) as well as chemical testing of the capping materials used, generally on a grid or per volume basis.

4.7. Specific Considerations

Visual inspection is an important verification method for the remediation of particular areas where devices may also be present i.e. the burning grounds and white phosphorus production areas. Whilst the primary delineation of these areas will occur using trenching techniques to determine the lateral and vertical extents of the source areas, the verification by visual examination will be a key success measure.

Systematic visual inspection will also be utilised to verify the following:

- remediation of bulk asbestos (i.e. asbestos pieces) which has been remediated by either hand-picking or excavation
- remediation of narrow gauge track to remove propellant fragments

4.8. Re-use of Materials

Where excavated materials can be re-used onsite either as excavated or following treatment, a suitable sampling and testing regime will be employed to show that the materials are suitable for their new use. Such testing will be as required by both the planning authority and to satisfy SEPA in terms of identifying suitable waste management exemptions etc for the re-use of the material.

4.9. Imported Soils/Materials

It is envisaged that there will be no requirement to import materials to the site. Due to timing issues in the early phases of remediation, there may be a requirement for some aggregate to be imported to construct the haul road and compound and the new entrance off Houston Road. Such materials will be accompanied with a certificate to show that the material complies with the required specification.

4.10. Phasing of Verification

The remediation will be phased to fit the redevelopment proposals. Similarly the verification of the remediation works will be reported on a phased basis although in practice, the verification process outline in the above paragraphs will be ongoing throughout the remediation project.

4.11. Monitoring

Water quality and dust monitoring will be ongoing throughout the remediation works. A water quality monitoring programme (both groundwater and surface water) will be specifically designed to measure the effectiveness of mitigation measures employed and to ensure compliance with any regulatory discharge consents or controls.

A groundwater and surface water monitoring programme is already being implemented to provide baseline data prior to the works commencing (see Monitoring Plan, BAE Systems Environmental, 2006). This plan will be updated prior to the commencement of the remediation works to take into account new information from the Stage 2 Site Investigation, specific regulatory requirements and to fit with the agreed remediation phasing.

The monitoring plan also includes background monitoring for dust. Similarly, the operational monitoring for dust will be finalised prior to commencement of remediation works.

5. VERIFICATION RESPONSIBILITIES

5.1. Responsibilities

The BAE Systems Environmental Project Manager will have overall responsibility for ensuring that the remediation is carried out to the required and agreed specification and that the required level of information is gathered to demonstrate that this is the case. The Project Manager will be responsible for reviewing the remediation plan as the works progress and will agree any adjustments with the regulatory authority as necessary. The Project Manager will be supported by a number of Site Engineers who will direct the various remediation and earthworks elements.

The Project Manager will also be supported by a team of BAE Systems Environmental consultants and surveyors who will carry out the necessary verification works as required. The verification team will report directly to the Project Manager on completion of the verification of each element of the works. The verification team will also be responsible for preparing the various reports for submission to the planning authority.

5.2. Response Actions for Non-conformance

In the event that specified remediation criteria have not been met, then a further iteration of remediation and verification will be undertaken. This will however be preceded by an assessment of the reasons why the criteria were not made. Such responses may include further removal of contamination, further treatment or the use of an alternative remediation strategy. Any departure from the methods detailed in the finalised remediation strategy will be advised to and agreed with the Local Authority.

6. REPORTING

6.1. Verification Report

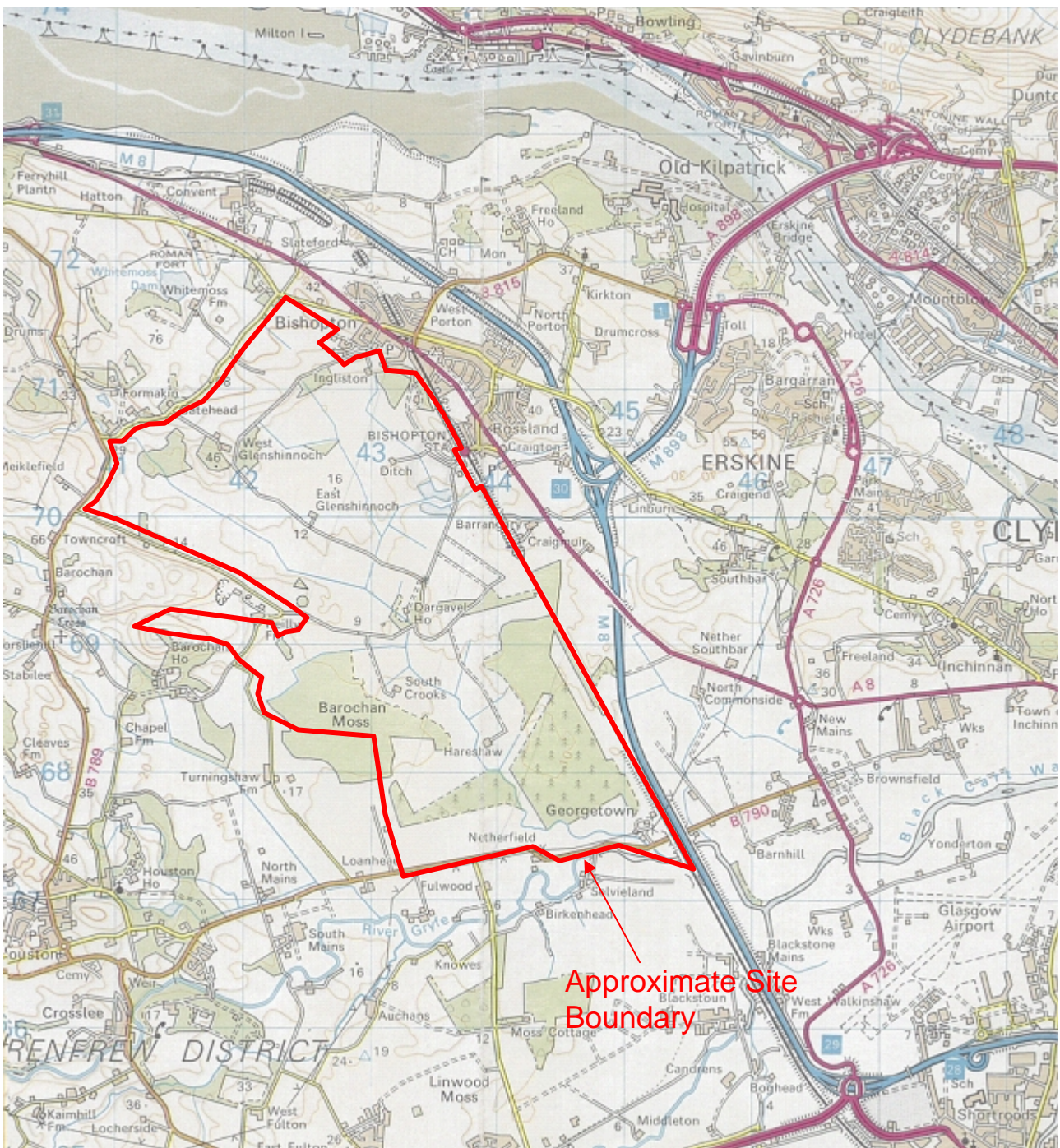
In accordance with CLR11 'Model Procedures For The Management of Land Contamination' the Verification Report will provide a complete record of the remediation activities on the Site and the data collected as part of the verification plan to support compliance with remediation objectives and criteria. It will also include descriptions of the works with associated 'as built' drawings and details of any unforeseen conditions encountered during the works and how they were dealt with. In view of the size of the Bishopton project, verification reports will be submitted to cover individual phases of remediation to allow for the phased release of land for development to progress in accordance with its phasing requirements.

A typical verification report will include, but is not limited to, the following information:

- Background information – Remediation Objectives, Site Details, Project Details.
- Remediation – Methodology and Programme, Verification, Emissions Controls, Chemical and Physical Testing.
- Monitoring – Surface waters, groundwater, soil-gas.
- Final Site Conditions – Status, Remediation Extent, Post-treatment Management Needs.
- Results of surface water, groundwater or soil gas monitoring to assure the effectiveness of the remediation measures after the remediation has been implemented
- Third Party Contacts – Consultees, Site Visits by Regulators, Statutory Requirements, Third Party Agreements.
- Supporting Information – Plans, As-built drawings, photographs, Analytical Results, Health and Safety, Progress Reports, Quality Management.

Figure 1

Site Location Plan



BASED UPON THE ORDNANCE SURVEY MAP WITH THE SANCTION OF THE STATIONERY OFFICE. CROWN COPYRIGHT RESERVED.
THIS MAP IS FOR IDENTIFICATION PURPOSES ONLY AND SHOULD NOT BE RELIED UPON FOR ACCURACY.

FIGURE TITLE :

Figure 1 – Site Location Plan

PROJECT :

Verification Plan, Bishopton

REPORT NUMBER :

B0014-0G-R6-1

BAE SYSTEMS

Figure 2

Proposed Land Use Plan

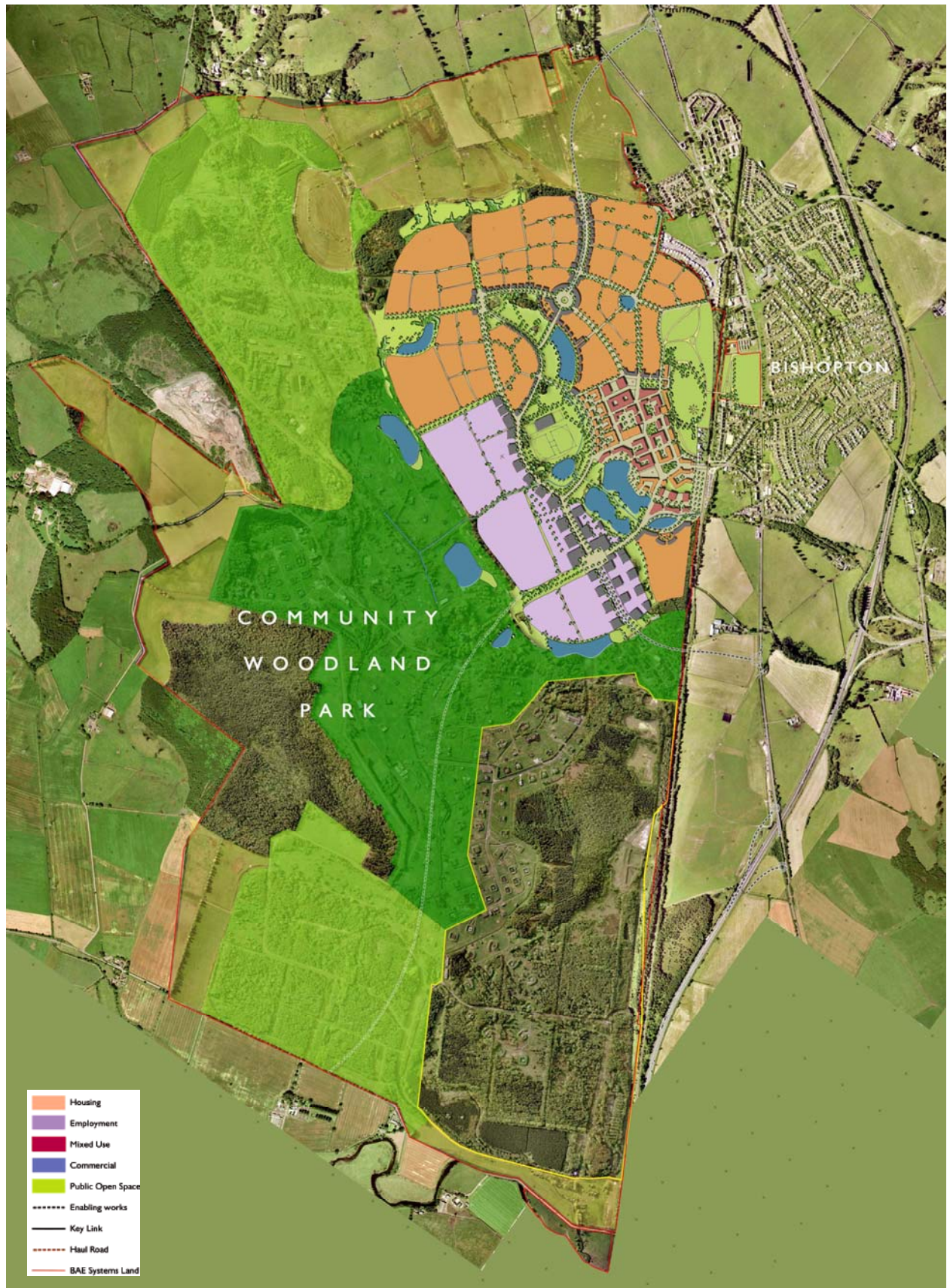


FIGURE TITLE :

Figure 2 - Proposed Land Use Plan

PROJECT :

Verification Plan, Bishopton

REPORT NUMBER :

B0014-0G-R6-1



Appendix 1

References

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