CL:AIRE

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case study bulletin

CL:AIRE case study bulletins provide a source of information on the characterisation and remediation of specific sites in the UK. This case study bulletin describes the application of the Definition of Waste: Development Industry Code of Practice in a Cluster arrangement on a former landfill in Coventry.

Remediation of a Former Landfill in Coventry

A Practical Application of the Definition of Waste: Development Industry Code of Practice in a Cluster Project

1. INTRODUCTION

The remediation industry has utilised exemptions from the Waste Management Licensing Regulations 1994 or Environmental Permitting Regulations 2007 for a number of years to allow the reuse of soils on sites either after treatment or without treatment. From the authors' experience, this proved a problematic arrangement especially when looking to reuse soils that were technically still classified as hazardous waste as the exemptions did not apply. These exemptions were never really intended for treated contaminated soils which sometimes led to inconsistent regulation and left many practitioners looking for a more suitable approach to the management of site materials. However with time, pragmatism by the regulators and industry alike, combined with a risk based approach, has enabled the reuse of such materials on remediation projects.

However inappropriate the Waste Management Licensing or Environmental Permitting Regulations exemptions were, the fact that they were available allowed thousands of hectares of previously used land to be brought back into beneficial use without the obvious significant environmental and financial impact if such soils were exported to licensed landfill. The subsequent withdrawal of the Waste Management Licensing Regulations 1994 and their exemptions, threatened to regress the industry significantly or worst still, stop it in its tracks.

The most recently amended Environmental Permitting Regulations 2010 do contain exemptions but these are often inappropriate and insufficient for the needs of organisations charged with reusing soils as part of redevelopment. The option of applying for an Environmental Permit to allow the reuse of soils is unattractive to many developers due to the cost, time and administration burden together with the obvious potential 'blight' issue associated with even a Standard Rules Permit. Throughout this time period and in recognition of these issues the industry and regulators combined their efforts to establish an appropriate industry code of practice to allow the reuse of soils on remediation and (re)development projects.

This bulletin describes the application of the Definition of Waste: Development Industry Code of Practice (CL:AIRE, 2008) in a Cluster arrangement on a former landfill in Coventry. To provide background and context, the bulletin introduces the key aspects of this Code of Practice to help explain the decisions that were made at the site. The success of this project can be largely attributed to the careful management and organisation of all the stakeholders involved which was aided by an overriding consensus that the principles of the Cluster arrangement were fundamentally right and that it would yield financial and environmental benefits. The stakeholders were Coventry City Council as a client, their consultant, a consortium of three different house builders, the consortium's consultant, the local authority contaminated land officer, and three different sections of the Environment Agency.

2. DEFINITION OF WASTE: DEVELOPMENT INDUSTRY CODE OF PRACTICE

2.1 Background

The Definition of Waste: Development Industry Code of Practice (Code of Practice) was launched in September 2008 to address the issue of whether material to be reused on site was a waste or not. It sets out good practice for the remediation and development industry to use when:

i) Assessing whether materials are classified as waste or not
ii) Determining when a treated waste can cease to be a waste for a particular use.

Further, the Code of Practice introduced appropriate controls which enable the reuse of soils on remediation and development projects. It has improved regulation and increased the sustainability of such projects whilst maintaining the overriding objective of preventing harm to human health and pollution of the environment.

2.2 Materials Management Plan

An integral component of the Code of Practice requires that an adequate Materials Management Plan (MMP) is prepared and adhered to. The MMP must be produced prior to excavation and in summary provides:

i) A description of materials in terms of potential use and relative quantities of each category underpinned by an appropriate risk assessment
ii) Details of where and if, appropriate, how these materials are to be stored
iii) Details of the intended final destination and use of these materials

iv) Details of how these materials are to be tracked
v) Contingency arrangements that must be put in place prior to movement of these materials.

All documents relevant to the assessment and reuse of materials as detailed in the MMP must be reviewed by a Qualified Person. The Qualified Person will then sign a Declaration to confirm the information reviewed meets the requirements of the Code of Practice. The Qualified Person is an individual who must possess certain attributes and be registered as a Qualified Person with CL:AIRE.

2.3 Cluster Arrangement

Whilst the Code of Practice will primarily be used for the reuse of soils on sites from where they were generated, it also includes details on how to facilitate the remediation and development of a number of sites that are in close proximity (i.e. in a Cluster) and which can share a decontamination facility located on a single site. The single site utilised for decontamination is referred to as a Hub site. Other sites can then export soils to the Hub site for treatment under the Environmental Permit held by that facility. These other sites are referred to as Donor sites. Once deemed suitable for use which must include demonstrating a need, the treated soils can then be exported back to any of the Donor sites, reused at the Hub site, or any combination thereof. They are then also referred to as Receiver sites.

3. PRACTICAL APPLICATION: SITE DESCRIPTION

VertaseFLI was employed to undertake remediation and reclamation works on a former landfill in Coventry on behalf of Coventry City Council. The landfill was created by the land filling of demolition and site clearance waste from buildings destroyed by bombing during World War II. On the worst night of bombing, 14th November 1940, over 4,000 homes were destroyed and 75% of the city's factories were either destroyed or badly damaged, by high explosive and incendiary bombs (BBC website). Contaminants present included heavy metals and hydrocarbons which posed a risk to human health and controlled waters respectively.

Following completion in the early 1950s, the site became a public park. More recently, the council wanted to redevelop three quarters of the park for a residential end use, whilst remediating and returning the remaining quarter to a high quality green space/park area.

In addition to the remediation requirements, certain other works were required to render the site suitable for residential redevelopment. The site was susceptible to flooding and the landfill was constructed by loose tipping resulting in up to 4 m of unconsolidated fill. Therefore, in addition to the remediation requirements, VertaseFLI deemed dynamic compaction the most appropriate methodology to address the unconsolidated fill (Figure 1).

Remediation works entailed selective excavation of overlying landfill cap and up to 800 mm of the underlying landfill materials. Materials were subjected to physical processing and *ex situ* bioremediation followed by appropriate validation. Reuse was undertaken after dynamic compaction in a controlled manner so that the site was re-instated with an appropriate pathway break layer thus breaking the source-pathway-receptor linkage between the underlying residual landfill and end site users.

Figure 1. Dynamic compaction

A detailed Remediation Strategy was prepared and approved by the Coventry City Council Contaminated Land Officer and the Environment Agency and encompassed site-specific, risk-based targets produced from risk assessments undertaken by the councils' consultant, Atkins. All remediation works were undertaken under an Environmental Permit (formerly a Mobile Treatment Licence) and site specific Deployment Form prepared by VertaseFLI and approved by the Environment Agency.

The reuse of soils after remediation was undertaken under the Code of Practice in accordance with a MMP prepared for the project. Due to the size of the project, a Site Waste Management Plan (SWMP) was also prepared. Whilst VertaseFLI employs individuals who are registered Qualified Persons, a decision was taken, for reasons of maintaining transparency and to meet the requirements of project independence, to employ an external Qualified Person from Atkins.

It is worth noting that the reinstatement of materials excavated for remediation purposes was undertaken to a strict compaction specification which would result in a slight reduction in overall site levels. Further, the proposed dynamic compaction was likely to lead to significant *in situ* compaction reducing site levels still further. Therefore, in order to maintain the site at appropriate development levels in accordance with planning and flood protection requirements, it was necessary to import materials to re-instate the site to historic site levels which confirmed a definite need for materials.

4. ESTABLISHING A CLUSTER ARRANGEMENT

During early design discussions with Coventry City Council and Atkins, the prospect of using the site as part of a Cluster arrangement was discussed and agreed. Early discussions were also held with the Environment Agency which also agreed and supported the proposed approach. Coventry City Council were particularly supportive of the Cluster proposal not least because they had sold (and still had an interest in) a former school site approximately 12 km away, to a consortium of three different house builders. This former school site was to generate a significant quantity of surplus materials some of which were contaminated. VertaseFLI entered into contractual arrangements with the house building consortium to prepare an appropriate MMP and import approximately 11,500 m^3 of surplus soils from the former school site which would become a Donor site, onto the subject site which would become both the Hub (treatment) and Receiver site.

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Establishing a Cluster arrangement required significant project management input. Necessary activities can be summarised as:

- Agreeing contractual arrangements on costs and liability (should soils fall outside the scope of the agreed Remediation Strategy and MMP) with the clients at the Donor site,
- Undertaking additional site investigations and risk assessments for the Donor site soils for reuse at the Hub / Receiver site,
- Calculating exact requirements and demonstrating real need for the imported soils,
- Preparation of a MMP suitable for use at the Donor and Hub / Receiver site,
- Dealing with a significant number of stakeholders including three different house builders (which made up the consortium), the consortium's incumbent consultant, Coventry City Council as a client, Atkins as their consultant, the local authority contaminated land officer, and three different sections of the Environment Agency; national permitting, groundwater protection and local enforcement.

According to the Code of Practice, details of the Cluster arrangement should ideally be incorporated into the Remediation Strategy and the site-specific Environmental Permit. During the project it became clear that a comprehensive and properly prepared Remediation Strategy provided most of the information and records necessary to prepare and manage a quality MMP and subsequent Verification Report.

One particular challenge encountered was that the various clients (remembering there were four separate ones on this project) were unfamiliar with the Code of Practice. Further, whilst the regulators were aware of the Code of Practice, they had no direct experience of a Cluster arrangement. Therefore, it was necessary to undertake an element of education to explain the detail and the background to the Code of Practice. Despite this low level of knowledge and experience, it should be recorded that during all stages of discussions with the aforementioned stakeholders, there was an overriding consensus that the principles and objectives of the Cluster arrangement were fundamentally right with obvious financial and environmental benefits. Ultimately, the commercial contractual arrangements proved far more difficult to agree than the regulatory approvals.

5. PROJECT SPECIFIC MATERIALS MANAGEMENT PLAN

A schematic of the MMP for this project is provided in Figure 2. Based on experience of producing MMP's on previous projects, it was considered more efficient to combine the MMP with the SWMP to avoid duplicating a lot of the information.

The MMP schematic illustrates the movement of waste and material on the site. It can be seen that material which failed validation and geotechnical testing was either considered not suitable for reuse or subjected to further treatment. Material that passed validation testing was reused on site as a pathway break layer, its thickness dependent on the end use of that particular area of the site.

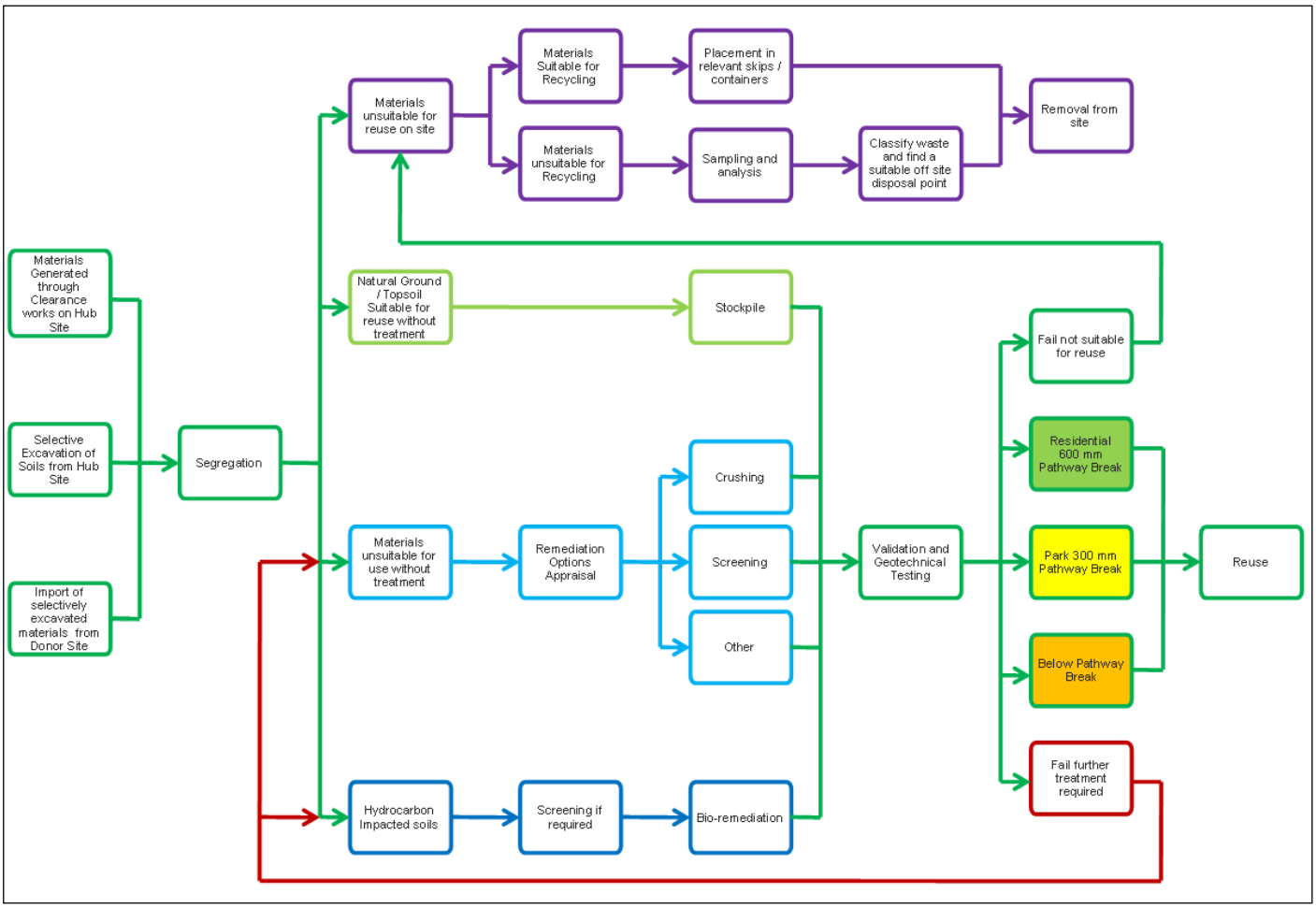

Figure 2: Schematic of the Materials Management Plan showing waste and material movement

Following completion of additional site investigations and risk assessments at the Donor site, the MMP was expanded to accommodate and manage the import of the soils. In reality, the Donor site soils were handled in exactly the same manner as those produced at the Hub / Receiver site. Figure 3 is an extract from the MMP and shows the classification categories for the Donor site.

One further variation was incorporated into the MMP once import was underway when unforeseen contamination was discovered at the Donor site in the form of broken cement bound asbestos product (asbestos containing material - ACM). This was not identified in the site investigations at the Donor site and had not been assessed in the context of suitability for import onto the Hub / Receiver site. Following discussions with the housing consortium and Atkins who were representing the client, VertaseFLI entered into a separate contract with the Donor site to establish a more robust approach to the selective excavation and subsequent hand picking of ACM's to render them suitable for use at the Hub / Receiver site (Figure 4). This also included changes to validation criteria at the Receiver site to confirm the absence of ACM's within the imported soils.

Satisfactory completion of remediation works is normally recorded and confirmed in a validation report prepared at the end of the project. It is also a requirement of the Code of Practice to produce a Verification Report to confirm works were undertaken in accordance with the MMP or to confirm any agreed variations. Considerable duplication was found across these two reports so it was considered acceptable to combine them. In fact for this project, a validation report was prepared for the remediation works and a combined Verification Report for the MMP and SWMP. The latter also included a Verification Report for the Donor site.

Figure 4. Asbestos picking station at the Donor site

6. PROJECT OUTCOMES AND BENEFITS

The Hub / Receiver site required approximately 18,000 m³ of import depending on the actual compaction achieved. However, when preparing the MMP and considering the contractual programme for

Donor Site Group	Classification	Process
Group D1:	Clean Topsoil / Natural Soils not requiring treatment.	Topsoil and Natural Soils from areas known to be free of chemical contamination and free from visual and olfactory evidence of either deleterious or chemical contamination. Excavated and stockpiled for transfer as inert material. Received by Hub Site and stockpiled. This material will then undergo chemical validation and geotechnical testing, prior to reinstatement.
Group D2:	Topsoil requiring treatment / processing	Topsoil from areas known to contain chemical contamination or exhibiting visual or olfactory evidence of contamination and deleterious material i.e. ash, clinker, glass. Excavated and stockpiled for transfer as non hazardous material. Received by Hub Site and stockpiled in the designated treatment area where it will initially undergo physical processing as required and chemical analysis to determine if treatment is necessary. The material will then undergo treatment as necessary and chemical validation and geotechnical testing prior to reinstatement.
Group D3:	Made Ground not requiring treatment.	Made ground from areas known to be free of chemical contamination and free from visual and olfactory evidence of either deleterious or chemical contamination. Excavated and stockpiled for transfer as inert material. Received by Hub Site and stockpiled. This material will then undergo chemical validation and geotechnical testing, prior to reinstatement.
Group D4:	Made Ground requiring treatment / processing	Made ground from areas known to contain chemical contamination or exhibiting visual or olfactory evidence of contamination and deleterious material i.e. ash, clinker, glass. Excavated and stockpiled for transfer as non hazardous or hazardous soils. Received by Hub Site and stockpiled in the designated treatment area where it will initially undergo physical processing as required and chemical analysis to determine if treatment is necessary. The material will then be treated as necessary and undergo chemical validation and geotechnical testing prior to reinstatement.

Figure 3. Extract from the MMP showing classification categories for Donor site

completion of works on the Hub / Receiver site, it was decided that there would only be time to actually allow the import of approximately 11,000 m³. However, the client at the Hub / Receiver site subsequently agreed an extension to programme which allowed the total volume of import to increase. Ultimately, approximately 14,000 m³ of soils were imported from the Donor site. More material was available from the Donor site but there was insufficient time to accommodate any further import, treatment and reuse.

An environmental and financial assessment was carried out on the project to compare the costs and benefits of the Cluster approach to landfill disposal and import of fill. Figure 5 illustrates the results and shows that the Cluster arrangement resulted in a significant reduction in the quantity of CO_2 emitted (79%), in kilometres of haulage distance (82%), in litres of fuel used (79%) and a considerable cost saving of £1,490,000 when compared with landfill disposal and independent import of fill.

The environmental and financial benefits enjoyed by the Donor site and the Hub/Receiver site can be summarised as follows:

Environmental benefits

- Less lorry miles travelled from the Donor site to a more distant landfill facility
- Less lorry miles travelled to the Receiver site to import required fill from further away
- Less consumption of valuable landfill space
- Reduced use of primary aggregates at the Receiver site
- Treated contaminated soils and reused them within a risk based framework whereby they no longer posed a risk to the environment
- Alleviated potential flood issues at the Receiver site
- The strict procedures and controls contained within the MMP for the assessment, and frequency and suite of analysis, provided significantly greater information and confidence on the quality and suitability of soils for reuse at the receiving site.

Financial benefits

- No landfill disposal or landfill tax costs for the soils exported from the Donor site
- Reduced haulage costs for exporting soils from the Donor site
- No cost to the client at the Hub / Receiver site for the import of materials from the Donor site nor for their treatment prior to reuse
- No requirement and therefore cost to the client at the Hub / Receiver site to import fill to raise site levels as a consequence of dynamic compaction works.

7. CONCLUSIONS

This project involved the successful application of the Definition of Waste: Development Industry Code of Practice in a Cluster arrangement at a former landfill in Coventry.

The process of setting up a Cluster project should not be underestimated and in this project it required significant project management input. Not least because it involved a number of stakeholders and their particular needs: a consortium of three different house builders, the consortium's consultant, Coventry City Council as a client, their consultant, the local authority contaminated land officer, and three different sections of the Environment Agency. In addition, the requirements of the Code of Practice were met, including amendments to the MMP and additional site investigations and risk assessments were undertaken when necessary.

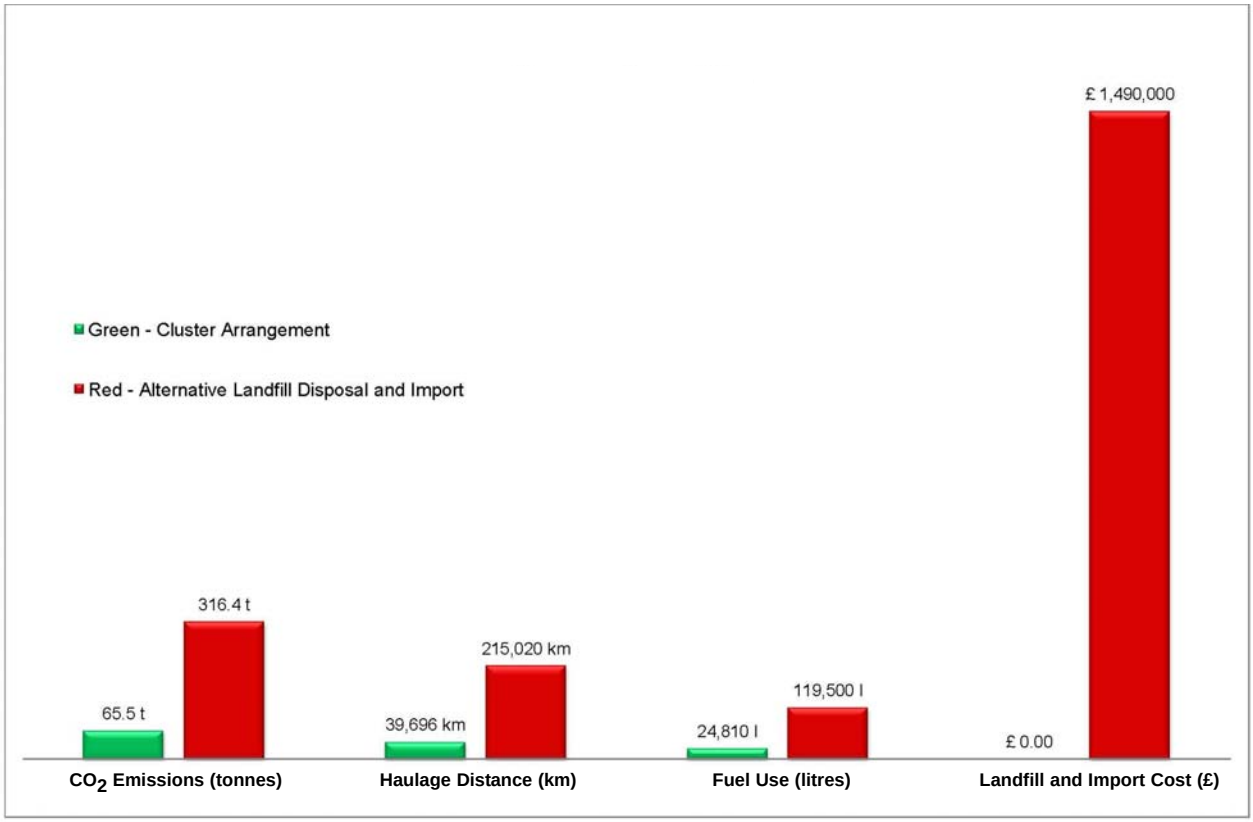

Figure 5. Environmental and financial benefits of the Cluster arrangement

The Cluster arrangement resulted in the import of approximately 14,000 m³ of soils from the Donor site to the Hub / Receiver site.

There were a number of significant environmental and financial benefits realised by the project. These included less traffic congestion on outer roads, less visual and noise pollution via a vastly reduced number of lorry kilometres travelled, reduced use of primary aggregates, and reduced use of valuable landfill void space. Of particular note was the better quality assurance provided on the use of imported soils. Whilst it was always envisaged that the anticipated environmental and financial benefits of operating a Cluster arrangement on the project would be significant, actual reductions of approximately 80% for CO_2 emissions, haulage distance and fuel use, and landfill disposal and import cost savings of £1,490,000, were more than anyone expected.

VertaseFLI has utilised the Code of Practice since its inception and it has proven to be a most appropriate and effective mechanism to allow the safe and sustainable reuse of soils on numerous remediation projects.

8. CHALLENGES FACED AND LESSONS LEARNED

Through experience and successful operation of MMP's on previous sites, establishing and managing an MMP for a Cluster arrangement proved relatively trouble free. The regulators in particular were very supportive and because Coventry City Council had an interest in both sites, there was a general consensus of wanting to make the whole project work for the benefit of the environment in Coventry and for local council tax payers. As mentioned previously, it was necessary to undertake a degree of explanation and education to convince the clients at the Donor site that the operation would be accepted by the regulators.

Following preparation of appropriate method statements and explanation of the requirements of the MMP, it was initially considered that a relatively low level of supervision would be required at the Donor site. However, it soon became apparent that this was not the case and in particular the selective excavation and categorisation of soils did not fully comply with the requirements of the MMP. Whilst this did not compromise the integrity of the Cluster, it did result in additional processing being required at the Hub site. Therefore, it was decided to maintain full-time supervision at the Donor site to ensure full compliance with the MMP.

A specific requirement of the Remediation Strategy was that all excavated soils had to be stockpiled and tested to confirm classification and suitability for reuse. This requirement was also extended to the imported soils from the Donor site resulting in the construction and management of a further 56 stockpiles over and above those being generated by the remediation of the Hub site. Apart from the obvious cost and time lag from taking samples and obtaining results, space soon became a problem and careful logistical management of these stockpiles was vital. Managing space on site also proved difficult when trying to integrate the construction programmes from two different projects. It is unlikely that all sites within any proposed Cluster arrangement will be at a similar stage in their respective construction programmes.

Based on site investigations undertaken at the Donor site, some of the material selectively excavated indicated that the levels of contamination present would result in a hazardous waste classification. This material was consigned to the Hub site using hazardous waste consignment notes. A site receiving hazardous waste must file a hazardous waste return, to confirm the nature of the waste and its method of disposal or recovery. Discussions with the Environment Agency left uncertainty as to the most appropriate way to file the return. Ultimately this was achieved by use of a recovery code as the materials were now technically not a waste i.e. had been fully recovered following treatment and reuse in accordance with the agreed Remediation Strategy. Further clarification may be required on this for future projects of this nature.

It was clear that once all stakeholders were brought together; there was significant support for the Cluster arrangement. However, in future projects the probability of all the necessary requirements coming together at the right time would appear to be low. Landowners / developers with multiple developments being undertaken concurrently represent the most likely scenario for success.

9. LOOKING AHEAD

The industry has demonstrated an ability to identify constraints to the safe and efficient delivery of remediation projects. It has then established a workable solution through a degree of self regulation. The industry should continue to manage the use of the Code of Practice and take serious action against those professionals who might look to abuse it. Failure to maintain the integrity of the Code of Practice would lead to a very immediate loss of confidence and support from the regulators. Maintaining the standards set by the Code of Practice could be achieved through increasing the necessary qualifications and/or responsibility of the Qualified Person.

Once the transition period for the withdrawal of the exemptions available under the Waste Management Regulations and Environmental Permitting Regulations has expired in October 2011, many practitioners will focus on the Code of Practice as an alternative, voluntary solution and its use will increase. In addition, the recently released second version of the Code of Practice (see www.claire.co.uk/cop), which includes the direct transfer of "unpolluted natural soils" from site to site and develops the use of fixed soil treatment facilities, will further increase the use by the remediation industry and wider civil engineering sector.

Further consideration should be taken on the interaction of the MMP and the activities undertaken within the Code of Practice with other waste regulations. The synergy with the SWMP was referred to earlier but another example might be to standardise validation reports produced for remediation works with the verification reports produced for the Code of Practice.

ACKNOWLEDGMENTS

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