Rochdale Metropolitan Borough Council

Former Turner Brothers Asbestos Plant

Non Asbestos Environmental Review of Outline Planning Submission D44701

Non Technical Summary Report

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1. INTRODUCTION

GENERAL

1.1 An outline planning application has been received by Rochdale Metropolitan Borough Council (RMBC) from Countryside Properties (the applicant), who are proposing to redevelop the former Turner Brothers Asbestos (TBA) Plant at Rooley Moor Road, Rochdale (outline planning application number D44701).

1.2 Atkins was appointed by RMBC to carry out a peer review of the outline planning application and to advise on the adequacy of the application and proposals in relation to ground contamination. Other aspects such as traffic impacts were not covered in the review undertaken by Atkins, but the review covered solely the issues relating to the assessment of the environmental condition of the site in accordance with current good practice and regulatory guidance. The Atkins review considered whether the proposed redevelopment plans for the site are acceptable given the known and potential levels of environmental risk associated with ground contamination.

1.3 The review for RMBC was separated by Atkins into on-site non asbestos and asbestos related contamination on site. It was considered by Atkins that asbestos is a unique contaminant which warranted a separate more detailed appraisal of its health effects and toxicity. Two separate peer review reports have therefore been prepared, as follows:

- "Asbestos Environmental Review of Outline Planning Permission D44701" (report reference 077_30506) dated June 2006; and
- "Non Asbestos Environmental Review of Outline planning Permission D44701" (report reference 077_30507), dated June 2006.

These reports will be referred to in this summary as the "asbestos report" and "non asbestos report" respectively.

1.4 It is understood that the site is to be redeveloped predominantly for residential use with some small commercial operations to be situated in the southern part of the site. In addition, the majority of the existing woodland areas in the northern and western portions of the site are to be developed as public open space.

1.5 A separate non technical summary report has been prepared for the "asbestos report". Reference should therefore be made to this summary document (report reference 077_30849 dated July 2006) and associated full "asbestos report" for a review of the asbestos issues at the site.

NON ASBESTOS PEER REVIEW

1.6 The "non-asbestos report" presents a detailed review of non asbestos contamination issues at the site. Information was assessed against current UK regulatory requirements relating to the assessment and redevelopment of contaminated land.

1.7 The UK takes a risk-based approach to dealing with land contamination. This approach follows a tiered framework; starting with simple desk based risk assessments and progressing through to more complex computer based numerical risk assessments. This leads to a progressive and iterative assessment of environmental risk, which enables a contaminated sites "suitability for use" to be assessed. The different stages of risk assessment have not been described in detail in this non-technical summary. The following key risk assessments should be considered to assess the sites' suitability for use in the context of the proposed redevelopment.

- Assessment of the risks to human health posed by existing ground conditions on site. This is generally related to the risk to future site users, whether these be residents, commercial workers, school children or other less frequent users who may come into contact with known and / or suspected contamination on site;

- Risks to controlled waters, which for the purposes of this report, include groundwater beneath the site and nearby surface water bodies (River Spodden), other streams, and the reservoir within the site boundary (referred to as the Lodge);

- Risks to built structures, such as foundations built in aggressive soil conditions; and

- Risks from the presence of ground gases which may have been generated from infilled voids which may contain biodegradable materials.

1.8 It should be noted that the non-asbestos review was limited to the information submitted with the outline planning application which related to the appraisal of the environmental condition of the site. Supplementary anecdotal evidence was obtained by Atkins during a site visit and interviews conducted with ex-TBA employees and residents' groups. Atkins did not undertake any site investigations or laboratory analysis or complete any specific risk assessments which could inform any remediation and redevelopment works.

1.9 Atkins has assessed the completeness of the environmental risk assessment works undertaken in support of the outline planning application and compared these against current UK regulatory requirements for undertaking risk assessments in a progressive manner (as described in 1.7 above).

1.10 Other potential issues that are pertinent to the sites' redevelopment of the site which are related to the environmental condition and redevelopment of the site include:

- The presence of ecologically sensitive receptors;
- Flood risks which may result in the transportation of contaminants on or from the site; and
- Potential waste management issues associated with the reuse of materials on site for construction purposes.

1.11 It should be noted there may be potential geotechnical risks associated with the redevelopment of the site. These have been included in the peer review only where ground works (eg foundations) may influence the environmental risks associated with on site contamination.

1.12 Artesian groundwater conditions have previously been reported in southern parts of the site. The geotechnical risks associated with these and their potential impact on the sites' redevelopment have not been included in the review undertaken by Atkins.

NON TECHNICAL SUMMARY

1.13 The purpose of this non technical summary report is to provide a synopsis of the findings of the non-asbestos review and to provide an overview of the completeness of previous environmental assessment works undertaken in support of the outline planning application. This will enable a review of the assessment of land condition in the context of "suitability for use" to be completed. This is in general accordance with the Planning Policy Statement 23 Annex 2: Development on land Affected by Contamination, usually referred to as PPS23.

1.14 Atkins has provided comment on the appropriateness of environmental assessment works undertaken by the applicant to date, and whether these works are a sufficient assessment of the "suitability for use" in accordance with appropriate contaminated land regulations and guidelines. Reference has been made to appropriate sections of the "non asbestos report" where appropriate.

1.15 For the purposes of this summary, the following definitions apply:

- Environmental risk shall mean the risks posed to human health, controlled waters (groundwater, surface waters) and built structures (buildings, services etc) from the presence of non asbestos contaminants;

- For the purposes of this summary, exposure to contamination shall be in the context of the UK regulatory approach to environmental risk assessment, and does not automatically imply that any exposure to contamination is beyond acceptable levels.

- The definition of "risk" in the context of the UK regulatory approach to the redevelopment of contaminated land has been carried forward into this summary.

1.16 As defined by DEFRA, the definition of risk is as follows:

- The probability, or frequency, of occurrence of a defined hazard (for example, exposure of a property to a substance with the potential to cause harm); and

- The magnitude (including the seriousness) of the consequences.

2. SITE ZONING

2.1 The site and its previous industrial land uses are large and complex, with many different historical and current industrial land uses and hence potential sources of contamination. These have been described in detail in Atkins "non asbestos report" dated June 2006. For convenience the site has been divided into eight discrete zones that are broadly based on historical uses, current activities, proposed end uses and/or topography, as follows:

- Northern Woodland Zone: the former asbestos tipping area to the north of the central factory area, which is to remain as woodland and public open space;
- Lodge Zone: area located to the west of the River Spodden, the southern part of the lodge is proposed for residential end use with the green belt to remain and be integrated into the Northern Woodland Zone;
- Lower Tier Zone: comprising the demolished factory area which is proposed for residential use;
- Middle Tier Zone: most of the existing occupied factory units which is proposed for residential use;
- Upper Tier Zone: the old boiler house and adjacent, which is proposed for residential use;
- Flexitallic Zone: the units and area occupied by Flexitallic Ltd, which is proposed for part residential and part commercial end use;
- Southern Zone: the area to the south of the River Spodden, which is proposed for commercial use with a neighbourhood centre (doctors surgery, nursery etc); and

- Hollows Wood Zone: the western woodland area, containing car parks and existing leisure facilities, part of which is proposed for residential end use (the area currently occupied by the bowling green).

2.2 The above zones are generally consistent with the site divisions provided in the outline planning application submitted by Countryside Properties. For details of the proposed developments within each of these zones, refer to Section 2 of Atkins' "non asbestos report".

3. SITE BACKGROUND

3.1 The site is situated approximately 2 miles to the north of Rochdale town centre, and is approximately 30ha in area. The site is contained within the steep sided valley of the River Spodden and comprises areas of dense woodland, industrial units (former asbestos works) and derelict land (demolished asbestos works). The woodland areas are green belt, and are classified as a site of biological interest.

3.2 The site is dominated by the central factory area, with the Northern Woodland Zone, Lodge Zone and Hollows Wood Zone being retained predominantly for open space / green belt around the periphery of the proposed redevelopment areas.

3.3 The site is surrounded by established residential neighbourhoods to the south and west (Rooley Moor Road), east (Shawclough) and south east (Fallowfield Drive).

3.4 The site has historically been occupied by a variety of industrial land uses, which include cotton mills, woollen and velvet mills, allotments, asbestos plant and solvent (hydrocarbon) recovery plant. However, the asbestos/rubber works used predominantly for the manufacture of asbestos products have dominated the industrial history of the site, particularly in the central factory areas to the east of the River Spodden. It should be noted the central factory has been proposed for redevelopment predominantly for residential use.

3.5 Currently the site is occupied by a variety of businesses that manufacture bullet proof vests, woven glass fibre products, heat resistant laminate pressings and gaskets/seals (this process involves solvent recovery), warehouses, refurbishment of boilers and repackaging of electronic components. Associated with these activities can be a variety of contaminants, such as petroleum hydrocarbons, oils, solvents, metals, sulphate and ammonia.

3.6 Methane and other potentially hazardous ground gases generated from the potential biodegradation of materials which may have been previously

deposited on site. Several depressions and previous mill lodges have been previously identified on site, which are known / suspected as being infilled with materials which may contain biodegradable matter.

3.7 The River Spodden runs through the centre of the site and flows in a north to south direction.

3.8 The site is underlain by both man made materials ("made ground") and natural materials. Substantial thicknesses of made ground have been identified by Encia in the southern and eastern parts of the site, as a result of previous earthworks undertaken to enable the asbestos factory to expand from its origins along the River Spodden, eastwards towards what is now residential areas around Fallowfield Drive. Several platforms of factories resulted in this expansion, which took place between the 1930s and 1950s.

3.9 Natural soils beneath the site comprise granular alluvial deposits which are underlain by glacial clay deposits. The alluvium deposits have been identified within the general floodplain of the River Spodden within the Southern, Lower Tier Zone and parts of the Flexitallic Zone. Lower Coal Measures' mudstones, sandstones and coal measures make up the solid geology beneath the site. The coal seams beneath the site have been mined and there are four mine shafts located on site, one of which has been capped.

3.10 Details of the site geology, hydrogeology and their importance in assessing environmental risks is provided in Section 4 of the "non asbestos report".

4. SITE HISTORY & CONTAMINANT SOURCES RELEVANT TO PLANNING REVIEW

4.1 In order to gain an understanding of the assessment of "suitability for use" for the redevelopment of the site, the main identified and suspected contaminative processes have been summarised below.

4.2 A detailed review of the site history and the known and suspected contaminant sources was summarised in section 5 of the "non asbestos report". This was completed in order to assess the completeness of site investigations completed to date.

4.3 Below is a summary of key findings from the review of historical information which are relevant to the outline planning review in relation to non-asbestos contamination:

- Several hydrocarbons sources have been identified in the Lower Tier Zone, immediately east of the River Spodden and within an area proposed for residential development. These are associated with fuel tanks, oil storage tanks and other factory processes which might have utilized hydrocarbons;

- A major hydrocarbon source is present in the Flexitallic Zone, which is currently the location of a solvent recovery process plant.

- Some other isolated sources of contamination have been identified associated with former oil-fired and coal-fired boiler houses located across the site.

- It is evident from site historical photographs, that major earthworks, associated with the asbestos factory expansion, have resulted in the deposits of natural, and possibly man made, materials in the southern and eastern parts of the site. This might have implications for the current distribution of contamination across the site.

4.4 It is generally considered that, due to the various stages of industrial development across the site, the presence of non asbestos contamination cannot be ruled out across much of the site. The Northern Woodland Zone, although known historically as the location where the majority of asbestos waste tipping took place, may contain other non asbestos contaminants within the asbestos wastes themselves.

4.5 However it is considered likely that the central factory area, which makes up the Lower, Middle, Upper, Flexitallic and Southern Zones, will contain the most likely sources of non-asbestos contamination within them.

4.6 Several historical sources of contamination have been identified across the site which may pose a risk to the future users of the site which have not been assessed to date. These briefly include:

- The presence of non asbestos contamination in the Northern Woodland zone referred to above;
- The historical presence of a gasometer within the Southern Zone;
- Potential backfilled structures and depressions which may contain made ground containing biodegradable materials. These infilled areas might be a potential source of ground gases;
- Ash deposits associated with coal fired boilers and previous allotments on site; and
- Transformers present in current industrial areas (these have been identified by the applicant but are currently live and cannot be assessed at this stage).

5. SITE INVESTIGATIONS

GENERAL

5.1 Several phases of intrusive site investigation have taken place across the site. Generally, investigations commenced in 1994 within the Northern Woodland Zone, and more recently have concentrated on the central factory area where residential and commercial redevelopment is proposed. The intrusive site investigations most relevant to the assessment of non-asbestos contamination have been completed since 2004. Encia Consultants were retained by the applicant to conduct detailed intrusive non-asbestos and asbestos investigations across much of the site, including the central factory areas, and the southern part of the Lodge Zone respectively. Details of the individual site investigation and assessment reports reviewed by Atkins are summarised in Section 3 of the "non asbestos report".

5.2 Limited sampling and analysis for non asbestos contaminants has been undertaken across the Northern Woodland Zone. As discussed above, the presence of non-asbestos contamination here cannot be ruled out.

5.3 To review the site investigation information supplied by the applicant, Atkins identified the potential sources and types of contamination that might be present based on the known historical and current land uses. This information was then used to critically assess the extent and coverage of previous ground investigations and chemical analysis in order to identify any data gaps in the submitted information. The gap analysis enabled Atkins to provide recommendations for future investigations, which should be designed by the applicant to address these data gaps.

5.4 In some cases investigation had not been possible due to access restrictions in areas of the site which were still in use. In a few instances this was due to potential contaminant sources not having been previously identified or there being insufficient data collected based on the potential size of the contaminant source. This was acknowledged in Atkins' "non asbestos report".

5.5 Atkins identified that further more targeted soil sampling and analysis will be required for some known and suspected contaminant sources that were not fully assessed previously.

5.6 Atkins considers the design of future sampling and analysis strategies should take into consideration final site levels, the proposed layout of buildings and the future use of the individual development areas. The sampling/analysis design should also ensure that enough information is collected to allow suitable environmental risk assessments to be carried out to inform the need for remediation.

5.7 Atkins considered the potential risks to human health posed by ground gases should be considered further, since not all potential sources of ground gas were adequately investigated, again mostly due to access restrictions. This will require additional gas monitoring and vapour sampling for hydrocarbons focussed on potential source areas. Encia did acknowledge the need to conduct more detailed gas risk assessments as part of a full planning application.

5.8 Atkins considers additional groundwater focussed site investigations will be required to enable a more detailed groundwater risk assessment to be undertaken for the identified controlled water receptors. It is acknowledged by Encia that more detailed hydrogeological risk assessments are required in inform the need for remediation.

RECOMMENDATIONS

5.9 In summary the following issues need to be addressed:

1 Further intrusive ground investigations and chemical analysis are required to address identified data gaps, which are summarised in Atkins “non asbestos report”. The investigation and sampling strategy should be designed by considering the likely environmental risks both during and post the redevelopment works posed by the known and suspected sources of contamination. This should take account of risks to human health, built structures, controlled waters and hazards from ground gases and vapours.

2 When designing detailed targeted intrusive investigations, reference should be made to the historical summary provided in Atkins “non asbestos report”, Section 5 and the summary of environmental data gaps presented in Section 6 of Atkins “non-asbestos report”.

3 In designing further site investigation and chemical analysis, consideration must be given to the need for several rounds of sampling where contaminant concentrations may vary with time and site conditions (groundwater & ground gas / vapour).

6. CONCEPTUAL SITE MODEL

GENERAL

6.1 A key stage in developing a clear understanding of the environmental risks posed by non-asbestos contamination across the site is to develop a model showing how the contaminant sources might come into contact with future site users (residents, commercial workers etc), controlled waters and permanent built structures. Such a model is commonly referred to as a conceptual site model (CSM), and is essential for identifying potential environmental risks and hence ensuring that the site is "suitable for use" following redevelopment.

6.2 As part of the commission, Atkins has developed a site-wide CSM which comprises detailed listings of contaminant sources, likely pathways and receptors. The Atkins CSM was then used to critically assess the CSMs presented by Encia, and to assist in prioritising the assessment of environmental risks at the site. Atkins CSM, together with a review of the CSM developed by Encia as part of the outline planning application, is given in Sections 7 & 8 of the "non asbestos report".

6.3 In general terms the Encia CSMs highlighted many of the likely contaminant exposure scenarios which are usually considered. However, the CSM developed by Encia was not presented in sufficient detail to ensure that all likely contaminant exposure scenarios were identified. Atkins therefore considered some priority contaminant exposure scenarios may have been omitted by Encia without justification. This is an important omission when assessing the future "suitability for use following redevelopment.

6.4 Atkins considers that a revised detailed CSM for the site must be developed. Some of the issues that require addressing are summarised as follows.

- Encia developed a general "site wide" CSM for the site. Atkins considers this was not appropriate, as it did not consider the various proposed land uses at the site, which might have a varied degree of sensitivity to exposure from on site contamination;

- Atkins considers the development platforms proposed in the final site redevelopment plan have different ground conditions beneath them, including fill materials in the Lower Tier Zone and natural and disturbed cohesive materials in the Middle and Upper Tier Zones. This may influence the level of risk as physical ground conditions can affect the movement of contaminants in the ground;

- Atkins notes that the wooded areas around the mill pond (lodge) and on either side of Woodland Road (Northern Woodland Zone) do not appear to have been within Encia's remit for site investigation and subsequent assessment works. Atkins considers more detailed CSMs will need to be developed by Encia, assuming a continued recreational end use;

- The revised CSMs should include the contaminant sources and pathways which were not identified/specifically targeted previously. All identified receptors should be considered individually (eg each surface water course and groundwater body should be considered separately and not as undifferentiated controlled waters).

- Atkins considers the revised CSMs should consider the final development designs and incorporate the final site levels, layout and end uses for each development area on an individual basis. This will enable the extent of more detailed risk assessments to be identified at an early stage in the risk process.

6.5 The Atkins derived CSMs should be used as a framework for the applicant to develop individual zone-specific CSMs. These have identified and summarised the most likely exposure scenarios with which future users of the site, controlled waters and built structures can be affected by on site non-asbestos contamination.

6.6 It is possible that similar CSMs may apply to several zones of the site, where ground conditions and proposed land use are similar. Atkins anticipates that there may be scope to reduce the total number of CSMs, as separate zone by zone CSMs may not be warranted. Encia will need to justify this approach as part of the preliminary risk assessment process.

RECOMMENDATIONS

6.7 In summary the following issues need to be addressed with regards to CSMs:

1 The results of the further site investigations/chemical analysis works summarised in the "non asbestos report" (Section 6) should be combined with the findings of previous reports and investigations to develop more detailed conceptual site models for individual zones of the site. The conceptual site model(s) should consider all potential contaminant exposure scenarios and should take account of final site levels, proposed design and land-use. The detailed conceptual site models to be developed by Encia should be adequate to identify the priority contaminant exposure scenarios in each zone.

2 The Atkins derived CSM should form the basis of future CSMs developed for the site. It is considered possible that several zones might be grouped into similar exposure scenarios, but confirmation of development platform levels should be confirmed for the site to inform the risk assessment process. The summary of potential contaminant exposure scenarios as detailed in Table 8.1 of Atkins CSM (Section 8 of full non-asbestos report) should be referred to. The individual contaminant source identifications could be referenced on a zone-by-zone basis when developing the zone specific CSMs.

3 The geological cross sections developed by Atkins should be taken forward to the development of individual zone specific CSMs. This will help identify the pathways for which more detailed assessment of environmental risk is required. This is in general accordance with the current UK Regulatory Approach for the redevelopment of contaminated land.

7. ENVIRONMENTAL RISK ASSESSMENT

INTRODUCTION

7.1 Using Atkins' derived conceptual site models, Atkins reviewed the environmental risk assessments submitted in support of the outline planning application. A detailed review of our findings is presented in section 9 of Atkins "non asbestos report".

7.2 The first stage in Atkins review process was to summarise the assessment criteria which were used to quantify the environmental risks posed by non-asbestos contamination. This was generally divided into the following three aspects:

- The risks posed to human health, via a range of exposure scenarios;
- The risks posed to controlled waters, specifically groundwater and surface waters (in particular the River Spodden); and
- The risks posed to built structures.

The risks posed by the presence of ground gases have been included in the risks to human health and built structures, which is in general accordance with PPS23.

7.3 Geotechnical risks were not specifically considered as part of this review, even though these may pose a risk to built structures.

7.4 There are several stages to the assessment and quantification of environmental risks where redevelopment of contaminated land is proposed. Details of these individual stages are presented in detail in Atkins non asbestos technical peer review report and various UK Regulatory guidance documents published by the Environment Agency and DEFRA. The following stages should be noted:

- The initial stage is to compare chemical test data with generic assessment criteria developed by the regulators. This stage is referred to as a "generic risk assessment", and compares site wide data with published generic criteria for a range of contaminants. Where site data is reported at concentrations above published criteria, further more detailed risk assessment is required.

- "Detailed risk assessment", which can apply to both human health and controlled waters, takes into account the characteristics of a particular site and the specific development proposals, to enable site specific criteria to be calculated. This process involves completing more complex numerical analyses to arrive at site specific criteria. These site-specific criteria then provide the basis for assessing whether any potential exposure is acceptable or not, given the conditions of the particular site and the proposals for its land use.

- Where risks are identified above acceptable levels following completion of detailed risk assessments, remediation is required to mitigate risks to acceptable levels.

It can be seen from the above the importance of completing representative CSMs for each zone which are capable of informing each environmental risk assessment stage in a clear and concise manner. Atkins has briefly referred to these terms below.

FINDINGS OF ENVIRONMENTAL RISK ASSESSMENT REVIEW

7.5 Atkins has reviewed the environmental risk assessments undertaken by Encia on behalf of the applicant and is in broad agreement with some of the preliminary risk assessment methods used and the subsequent conclusions made which inform the need for more detailed risk assessment or remediation.

7.6 Atkins generally agrees with Encia that more detailed risk assessments are in some circumstances required to assess the level of remediation works required. Encia has identified the hydrocarbon source(s) in the Flexitallic Zone as requiring more detailed risk assessment and possible remediation. Atkins noted that no detailed human health risk assessments have been submitted in support of the outline planning application.

7.7 Atkins notes the following from our review of Encia's environmental risk assessments to date:

- In assessing risks to human health, Atkins notes the soil test data submitted by Encia were not grouped in accordance with the relevant land use zones for the site. Encia did not undertake statistical analyses of soil chemical data for the individual zones in accordance with best practice. Atkins considers this should be completed to identify anomalies in the data sets for each zone. However, Atkins does acknowledge that this may not be critical for certain contaminants identified across the site, particularly within residential areas of the site where "low" concentrations have been reported for certain inorganic contaminants.

- Atkins considers the development of more UK compliant generic screening criteria is required, for some contaminants of concern identified across the site. This is particularly the case for hydrocarbons, where "professional judgement" was used by Encia to complete a generic screen for hydrocarbon contamination.

- Atkins considers the approach adopted by Encia to assess the risks posed to controlled waters have correctly identified the main receptor to be the River Spodden, with groundwater resources being less vulnerable. When assessing risks to controlled waters (surface waters & groundwaters), Encia has correctly identified exceedences of relevant generic screening criteria. Encia go on to recommend more detailed risk assessment where generic values have been exceeded. This approach is considered to be an appropriate next step.

- For ecological receptors in the green belt which comprises Healy Dell, Encia has adopted inappropriate generic screening criteria for soils. It is noted that no sensitive ecological receptors have been identified by the surveys undertaken in support of the outline planning application. However, badger sets are known to be present on site.

- Encia has adopted appropriate screening criteria to ensure risks to built structures (eg foundations) are adequately assessed. Atkins concurs with the approach adopted when considering material protection requirements for the built environment.

- Encia has acknowledged that more detailed ground gas risk assessments are required as part of the full planning application. Atkins

agrees with this statement, and considers this should extend to the monitoring of hydrocarbon vapours.

RECOMMENDATIONS

7.8 Atkins recommends that before the detailed risk assessments are attempted, the following issues need to be addressed to ensure the assessments are sufficiently robust:

- Atkins recommends that the applicant should collate soil analysis data into appropriate groups in accordance with current UK guidance, based on an appropriately developed set of zone specific CSMs. Statistical analyses in accordance with current UK guidance should be undertaken to identify any anomalies in the data sets.

- When undertaking generic human health risk assessments, Atkins recommends that appropriate generic screening criteria for soils should be derived using UK regulatory compliant methods. It is considered appropriate that some generic soil screening criteria should be developed from first principles, using appropriate numerical risk models, as there are currently no soil screening criteria published in the UK for several contaminants of concern identified on site. UK compliant generic screening criteria should always be considered before internationally derived criteria are adopted.

- Detailed risk assessments for both human health and controlled waters should be completed to inform the need for remediation works. It is possible that some contaminant sources may require remediation to a level which is protective of both human health and controlled waters. Both generic and detailed risk assessments should be conducted in accordance with section 10 of the “non-asbestos report”.

- Detailed risk assessments should be conducted using appropriate numerical models which have either been produced in the UK or have been made UK compliant.

8. REMEDIATION & REDEVELOPMENT

GENERAL

8.1 Atkins has reviewed the remediation and redevelopment strategies proposed by Encia. These proposals have been summarised in Section 11 of Atkins' "non asbestos report". Atkins is in general agreement with some of the proposed remedial measures for the main contaminant sources identified across the site. It is acknowledged by the applicant that remedial strategies need to be refined following the completion of more detailed environmental risk assessments (which is acknowledged by Atkins). However, as discussed in the two previous sections, refinements are first needed for the conceptual site model and environmental risk assessment methodologies.

8.2 This is particularly the case for known hydrocarbon sources associated with the solvent recovery plant currently present in the Flexitallic Zone.

8.3 In reviewing the remediation and redevelopment proposals submitted by the applicant, it should be noted that Atkins has not reviewed other potential geohazards associated with the sites redevelopment. These are understood to include:

- flood risks on the proposed development;
- artesian groundwater conditions which have been noted across southern parts of the site; and
- geotechnical risks associated with redeveloping the site. This may include but not be limited to the presence of previous mine workings, mine shafts and any subsequent foundation requirements.

It is noted, however, that geotechnical foundation requirements for commercial developments should consider the potential environmental risks associated with piling through potentially contaminated land.

8.4 The following remediation and redevelopment recommendations are proposed by Encia on behalf of the applicant that are relevant to the assessment of the environmental suitability of the site:

- The removal / remediation of localised hydrocarbon sources of contamination identified in the Lower, Middle and Upper Tier zones, subject to the outcomes of more detailed environmental risk assessment.

- Suitable remediation, to site-specific clean up targets of a hydrocarbon contaminant source identified in the Flexitallic Zone, associated with the solvent recovery process. Atkins agrees that the Flexitallic zone is the main source of non-asbestos contamination on site. The need to assess risks, and develop remediation strategies, has been well documented as part of the outline planning application. Appropriate remediation technologies have been proposed to treat the hydrocarbon source in the Flexitallic Zone, and it has been acknowledged by the applicant that this will be subject to more detailed risk assessment and preparation of appropriate remediation strategy documentation.

- Provision of a 600mm clean soil cover layers across garden areas to mitigate human exposure to certain contaminants. It is noted that site won materials comprising crushed and screened demolition materials, will be placed above existing ground cover prior to placement of clean soil cover layers in garden areas.

- Appropriately specified and protected utility services where hydrocarbon contamination has previously been identified. The level of protection should be concluded following consultation with the appropriate utility companies.

- The provision of appropriately specified resistant concrete in areas where potentially highly aggressive soils have been encountered.

Atkins is in general agreement with the above remediation and redevelopment proposals in relation to non-asbestos contamination.

8.5 Other factors which need to be considered include:

- The type of foundations proposed for the development. From an environmental perspective, this may include the need to consider the

risks associated with piling through contaminated land and the potential to introduce pathways. This is probably more important for commercial / industrial developments on site.

- Phytotoxicity and vegetation growth; and

- The reuse of materials and any waste regulatory issues.

These issues have been addressed separately in section 11 of Atkins' "non asbestos report", and where relevant have been summarised below.

RECOMMENDATIONS

8.6 Remediation objectives for the Northern Woodland Zone, which is understood to be contaminated with asbestos, have been reviewed in a separate asbestos report. However, the presence of non-asbestos contamination cannot be ruled out in this zone, and any remedial works to mitigate risks posed by the presence of asbestos in this zone should consider the possible presence of non-asbestos contamination.

8.7 Encia has stated that a more detailed ground gas risk assessment is required. Atkins considers that this should extend to the assessment of vapour risks from known hydrocarbon sources on site.

8.8 It is noted by Atkins that raft foundations are the most likely foundation solution proposed at the site. However, should piled foundations be proposed (eg for commercial properties), Atkins recommends the implications this may have on risks to controlled waters, should be considered as part of a piling risk assessment. This will require approval from the Environment Agency.

8.9 The Environment Agency has provided comment on the potential for floods to occur at the site and has identified the need to conduct more detailed flood risk assessments. This has not been considered further in the context of environmental risk, but may warrant further review when the flood risk assessment is completed and whether there are any notable changes to any proposed land uses.

8.10 It should be noted that the reuse of materials on site for the purposes of the redevelopment may require approval from the Environment Agency for waste management purposes. It may be necessary to demonstrate no adverse

environmental risks are associated with the redeposit of materials across the site as part of any waste exemption applications.

8.11 A series of remediation technologies have been proposed for the treatment of known hydrocarbon sources in the Flexitallic Zone. Atkins' agrees with the suitability of the technologies proposed in treating the hydrocarbons identified in this zone, and recommends that a more detailed remediation strategy is finalised based on the outcomes of more detailed risk assessments.

8.12 Atkins considers that detailed proposals should be provided for the commercial redevelopments in the Flexitallic Zone, to ensure the finalisation of remediation technologies considers the assessment of both end use and foundation risks respectively.

8.13 Appropriate validation reports should be submitted to RMBC for approval. In the case of controlled waters, appropriate approvals should be obtained from the Environment Agency when remediating to be protective of controlled waters.