

ArupTransport

Tyne and Wear Passenger Transport Authority

New Tyne Crossing

Proof of Evidence on Spoil and Waste Management

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1. QUALIFICATIONS AND EXPERIENCE

Ian Lofthouse will say:

- 1.1 My name is Ian Lofthouse. I hold the Sheffield City Polytechnic Associateship in Minerals Surveying. I am a Fellow of the Royal Institution of Chartered Surveyors, (Minerals & Waste, Planning & Development and Commercial Property faculties) and a Member of the Institute of Quarrying.
- 1.2 I am an Associate of Ove Arup & Partners Ltd (Arup) and leader of the Environmental Planning section of the Industrial Civil Engineering Groups Environmental team.
- 1.3 Following graduation I spent much of the 1980s as Estates Surveyor/Manager responsible for planning and development of Tarmac's aggregates, waste disposal, concrete and asphalt operations, east of the Pennines, from the Scottish Border down to the Humber. This included activities on Tyneside on both sides of the river
- 1.4 I have worked in the aggregates and construction industry for over 22 years. I have directed and managed environmental impact assessments of major quarry and construction projects, involving the handling and transportation of spoil materials, aggregates and waste in both rural and urban settings.
- 1.5 Since joining Arup in 2000 I have managed environmental impact assessments for projects involving the redevelopment of contaminated land including landfill sites and the handling, containment and disposal of materials excavated therefrom.
- 1.6 In 2001 I was asked by the New Tyne Crossing project team to investigate the options for the storage and re-use of dredged materials and to identify the issues involved in the disposal of surplus materials in general. In 2002 I was subsequently asked to review the generation of surplus material and to examine in greater depth the issues involved in the options for its re-use and disposal.

2. STRUCTURE OF EVIDENCE

- 2.1 My evidence first identifies the regulatory framework within which the operations of handling and disposal of surplus materials would be undertaken. I describe the history of the area and the processes involved in establishing the nature and quantity of the materials to be dealt with.
- 2.2 I will set out the methodology used to establish and assess the options available for the disposal of the materials.
- 2.3 I identify the potential environmental impacts, the mitigation that would be applied and the mechanisms for ensuring delivery.
- 2.4 A summary of the responses to formal objections relevant to this aspect of the development is included in Appendix D

3. REGULATORY FRAMEWORK

- 3.1 The assessment of the significance of ground contamination on the spoil and waste materials and its implications on the handling and disposal of these materials has considered the current UK legislation, including the requirements of the Environmental Protection Act 1990, associated Regulations and technical guidance, health and safety legislation and relevant planning and pollution control guidance.
- 3.2 There are two main statutes that regulate 'Waste':
- Environmental Protection Act 1990 (EPA 1990) – which deals with the management of controlled waste, Duty of care (S.34), definitions of Waste, Waste Management Licensing, Integrated Pollution Prevention and Control (IPPC);
 - Environment Act 1995 – which covers statutory 'producer responsibility' obligations to increase re-use, recovery or recycling of products or materials that have served their original purpose.
- 3.3 Other relevant legislation and regulations associated with or arising from the above includes:
- Landfill Regulations 2002
 - Control of Pollution (Amendment) Act 1989 – registration of carriers of controlled waste, regulatory authority is the Environment Agency;
 - Waste Management Licensing Regulations, 1994 as amended;
 - Environmental Protection (Duty of Care) Regulations, 1991 as amended;
 - Landfill Tax Regulations 1996 as amended;
 - Landfill Tax (Qualifying Material) Order 1996.
- 3.4 EC Directives that address waste are:
- Landfill of Waste, 99/31/EC;
 - IPPC, 1996/61/EC;
- 3.5 Relevant Guidance includes:
- PPG10;
 - PPG23;
 - The Duty of Care – A Code of Practice (0-11-753210-X);
 - IPPC SO.01 General Technical Guidance Note;
- 3.6 The handling, storage and disposal of dredged materials is influenced by:
- Water Resources Act 1991
 - Groundwater Regulations 1998
 - Food and Environmental Protection Act 1985 (FEPA)

4. EXISTING CONDITIONS

- 4.1 The site is underlain by mudstones, sandstones, seatearth and coal of the Middle Coal Measures, which are in turn overlain by glacial till, alluvial deposits and made ground. The glacial deposits comprise the upper clays, laminated clays and silts, glacial sands and gravels and glacial till. Alluvial deposits are present in watercourses and flood valleys of the River Tyne, the River Don and Howdon Burn.
- 4.2 Over the majority of the site, made ground overlies the glacial and alluvial deposits. The composition of the made ground varies greatly, ranging from domestic/industrial wastes to ash, colliery spoils and ships ballast
- 4.3 The industrial history of the north and south banks of the River Tyne dates back to 17th Century. Significant industrial development has occurred and included collieries, iron foundries, clay pits, ship yards, coke works, lead works, aluminium works, staiths and ballast hills
- 4.4 The peak of industrial activity appears to have taken place between the mid 19th Century and 20th Century with development of the quays, land reclamation and dredging of the River Tyne occurring alongside expansions of the industries. By the late 1950's the area had undergone both substantial industrial and residential clearance.
- 4.5 Jarrow Riverside Park was developed during the mid 1980's and included the refurbishment of the River Quay wall. Some infill development, in areas cleared during the 1940's and 1950's, also took place at this time. This included housing, a shopping centre and schools. In the northern area of the site, to the east of the A19, several landfill sites were operated between 1940 and the 1970's. The landfill sites are understood to have accepted both industrial and domestic waste.
- 4.6 The baseline ground conditions were examined using a desk-based study and the results of the Preliminary Ground Investigation. As part of the ground investigation, chemical analysis was carried out on soil, groundwater and riverbed sediments. A standard suite of chemical tests was carried out. Leachate testing was conducted on selected samples with identified elevated levels of contamination.
- 4.7 For assessment of the soils test results, the Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL, 1987) and Dutch Standards (1994) were predominantly used. The assessment values most appropriate for material remaining on site relate to ICRCL parks, playing fields, open space and landscaped areas. For off site disposal of material, the results were compared to Environment Agency Guidance on the Disposal of Contaminated Soils (2001).

- 4.8 For the assessment of leachate analysis, the results were compared to the Leachate Quality Threshold Values contained in the Environment Agency Guidance on the Disposal of Contaminated Soils (2001). The results of these tests were used to assess the possible disposal requirements of site material and to provide additional information for groundwater quality assessment.
- 4.9 The test results showed that a number of determinants in the made ground were elevated above the assessment values and to a lesser extent in the natural ground. The determinants and the degree of elevation varied considerably across the site, as did the results of the leachate testing.
- 4.10 Elevated determinants, in different combinations and locations, included heavy metals (arsenic, cadmium), phytotoxic metals (copper, zinc, nickel, boron), inorganic compounds (sulphate, sulphide) and organic compounds (petroleum hydrocarbons, phenol).
- 4.11 The results of the following surveys were also used to establish the levels of contamination likely to be encountered when working within the river:
- Sediment contamination survey (deep sediment samples) of the New Tyne Crossing site undertaken by Allied Exploration and Geotechnics Ltd (AEG) with analyses by Severn Trent Laboratories and the Centre for Environment, Fisheries and Aquaculture Science (CEFAS);
 - Sediment contamination survey (inter-tidal and sub-tidal surface samples) of the New Tyne Crossing site and its environs including Howdon Basin, Jarrow Slake and the River Tyne entrance by the University of Newcastle and CEFAS;
 - Sediment leaching survey of the New Tyne Crossing site by WRc-NSF (WRc);
 - Sediment toxicity survey of the New Tyne Crossing site by WRc (WRc, 2001)
- 4.12 The level of contamination likely to be encountered in the dredged material is variable due to the previous dredging activity, the natural scouring effect of the tidal action and river flow, the nature of the material itself and the history of industrial and development activity at this point on the river and upstream.

5. ASSESSMENT METHOD

- 5.1 The assessment that was carried out to inform Chapter 19 of the Environmental Statement (CD4) – Waste Arisings and Disposal, was essentially a desktop exercise drawing on the findings of a number of the studies behind the Environmental Statement in particular those associated with Chapter 12 – Water Quality and River Impacts and Chapter 16 – Geology, Soils and Contaminated Land. It examined in qualitative terms the opportunities and options for disposal, the potential environmental impacts associated with the options and the mitigation necessary to minimise the impacts.
- 5.2 Appendix A to this proof contains a report entitled ‘Analysis of Tunnel Construction Spoil Generation and Disposal 2003 (2003 Report). This is a review of the work undertaken to prepare Chapter 19 and involved a more detailed analysis of the volumes of material to be handled and the implications of the options for its use or disposal.
- 5.3 The review was carried out primarily in response to discussions with the Environment Agency and others regarding emerging waste management guidance and its implications for the handling and disposal of the surplus excavated materials from the project.
- 5.4 The significance criteria adopted in the Environmental Statement at Chapter 19 – Waste Arisings and Disposal (CD4 - Environmental Statement Table 19.1 and Appendix B IL fig.3) have been used to describe the significance of the impacts identified in the 2003 Report.
- 5.5 The 2003 Report analysis consisted of a review of the;
- Construction programme and the estimated volumes of material to be generated on-site
 - Nature of the materials and the levels of contamination anticipated
 - Opportunities for re-use within the project
 - Potential avenues for disposal of surplus and waste materials arising
 - Environmental impacts likely to be associated with each avenue
 - Regulatory requirements of each avenue

- 5.6 The following differences between the material quantities referred to in the Environmental Statement and the 2003 Report due to ongoing design refinements should be noted. The total quantity of 'excavated' material identified in the 2003 Report is approximately 11% less than in the Environmental Statement (CD4). The subsequent distribution of this reduction amongst the different materials and their destinations is illustrated in IL fig.1 contained in Appendix B and which is based on Environmental Statement (CD4) Tables 19.2 & 3 (Appendix B - IL fig.2). The 2003 Report figures also include estimates of the demolition and site clearance that was specifically discounted in the Environmental Statement.
- 5.7 I do not consider that these revised quantities significantly alter the rationale for the Environmental Statement conclusions. In order to avoid confusion I have therefore reverted to the quantities identified in the Environmental Statement for this proof unless specifically identified otherwise.
- 5.8 The review examined the findings of the various site investigation studies and analysis carried out for the project, particularly in respect of Soils & Contaminated Land and Water Quality (River sediments).
- 5.9 The opportunities to maximise the quantity of material for on-site use were examined with the view to maximizing the quantities and thereby minimizing the environmental impacts of the off-site disposal options.
- 5.10 A hierarchy of sustainability for the re-use and disposal options was developed (Appendix B IL fig.4) This is to be used to direct the TWPTA (Concessionaire) in the development of the Waste Management Plan as required by the Construction Code of Practice (Appendix 2 to the Proof of Paul Johnson TWPTA 9A).
- 5.11 An overview of the current state of the construction market (with particular reference to fill material and recycled aggregates), the availability of appropriate landfill sites and the likelihood of securing a dedicated disposal site(s) was undertaken.
- 5.12 The potential for disposal at sea has been examined in terms of the regulatory procedures to be followed and the suitability of materials for this form of disposal.

6. FINDINGS

- 6.1 The construction activity associated with the New Tyne Crossing will involve considerable quantities of dredged, excavated, and other potentially surplus or waste materials of different origins and conditions, both natural and manmade. These would include:
- Demolition and site clearance (buildings and redundant infrastructure)
 - Made ground (including domestic/industrial wastes, ash, colliery spoil and ships ballast)
 - Soils
 - Glacial and alluvial deposits (silts, clays, sand & gravels)
 - Bedrock (Middle Coal Measures)
- 6.2 The total quantity of this material over the life of the project is estimated at 693,400 m³. This is generated over a 24 month period within the 3 year project programme.
- 6.3 The on-site material requirement for which the excavated or dredged materials would be suitable is estimated to be 340,500 m³.
- 6.4 There is therefore a potential surplus of materials of the order of 352,900 m³.
- 6.5 It should be noted that the presence of contamination within elements of the material does not necessarily preclude the use of that material. This will be dependant on the nature and level of contamination and the proposed use.
- 6.6 The selection of materials for on-site use must clearly be driven by the engineering suitability of the materials for the purpose. However, the aim will be to optimise the on-site use of contaminated materials in order to maximize the acceptability of the surplus materials for off-site use, there being fewer environmental risks associated with off-site haulage of uncontaminated materials and such material being more readily disposed off to off-site users.
- 6.7 There are a number of options for dealing with the surplus depending on the nature and condition of the materials. Each option has been considered in terms of its environmental sustainability and a hierarchy of options drawn up that reflects this and the particular circumstances associated with the project.
- 6.8 The hierarchy of options is referred to as the 'Hierarchy of Sustainability' (Appendix B IL fig.4 –) and is contained in the Code of Construction Practice.
- 6.9 The Hierarchy of Sustainability is based on the following key principles:
- On-site use (with or without processing) minimizes the use of other natural resources and requires the minimum road haulage
 - Off-site use directly into a project or to an existing recycling facility includes the environmental impact of delivery to the project or facility. The impacts associated with that project or facility will already have been considered and are not therefore considered further here.

- Dedicated Recycling facility or Landfill includes existing sites where significant changes to the operation are required to accommodate the material. (i.e. potentially significant additional impacts)
 - Haulage of uncontaminated materials has less environmental risk than haulage of contaminated materials, however this can only apply where the contaminated material is 'fit for purpose' and can be appropriately 'contained on site'.
- 6.10 A proportion of the surplus material is affected by contamination at levels that could require particular attention in terms of handling and ultimate disposal.
- 6.11 On land, this tends to be associated with the made ground and in the surface layers of the natural ground resulting from existing or previous land uses. The contamination occurs in 'hotspots' rather than extensive areas and depths. Some of the contamination is at a level that could, during construction, pose a potential risk to humans and the environment – for example, groundwaters and vegetation.
- 6.12 The contamination in the riverbed materials is associated with the made ground, the silt and the surface layers of the natural ground. As with the land based contamination the riverbed contamination is found in 'hotspots'. Materials taken from the riverbed have the added disadvantage of being in a saturated state.
- 6.13 Within the area of the riverbed directly affected by the dredging the material with the greatest potential for contamination is the silt within the Howden Yard (also referred to as Howden Basin). Unlike the rest of the effected riverbed the Howden Yard is not subject to regular dredging, or the scouring effects of the tidal and river flows.
- 6.14 Test results from samples taken from the Howden Yard (Appendix B IL fig.8) were described by CEFAS (Centre for Environment, Fisheries and Aquaculture Science advisors to the Department for Environment, Food and Rural Affairs – DEFRA) as 'within sediment Action Levels 1 and 2' and are therefore 'considered to be suitable for disposal to sea'. CEFAS also confirmed the view that Howden Yard is not as highly contaminated as some of the other locations along the River Tyne.
- 6.15 On this basis the majority if not all the dredged materials, not required or suitable for backfilling the trench, would be suitable for sea disposal subject to obtaining an appropriate FEPA licence from DEFRA. This material would not be landed but would be discharged from the dredger to barges for transportation to the disposal site.
- 6.16 In the event that hotspots (i.e. material not acceptable for sea disposal) are identified, consultation with CEFAS indicates that it is accepted practice to deal with them in isolation This would entail the separate removal of the contaminated material using a sealed grab to minimise the escape of sediment. The control of sediment escape including dredging techniques is discussed in more detail in Chapter 4 of Paul Johnson's proof (TWPTA 9). The contaminated material would be taken to the former Mercantile Docks dewatering and storage facility before onward transportation to an appropriate landfill site.

7. SURPLUS MATERIAL AND WASTE MANAGEMENT OPTIONS

7.1 As well as the degree of contamination the nature of the material itself will dictate the potential opportunities for its re-use or recyclability. For example; sand & gravels, ballast, slag, ash or other granular materials may well be suitable for recycled aggregates, but clays and shale may only be suitable for fill materials.

7.2 On-site re-use/Onsite process and use

This is the most sustainable option minimizing impacts associated with haulage to and from the site, and consumption of natural resources. The Concessionaire will have the opportunity to improve on the currently identified requirement for material (340,500 m³) during the detailed design process as well as identifying and securing additional opportunities in close proximity to the site.

7.3 Off-site re-use/existing recycling facility

Off-site re-use is dependant on the opportunities for disposal of surplus materials to construction projects and 'exempt' sites (as defined in Schedule 3 Waste Management Regulations 1994 as amended) in the region. There are a number of proposed commercial development and infrastructure projects identified in the Local Development and Local Transport Plans for the region. There will be the potential to provide fill materials to these developments should they come to fruition at the time of the project and subject to the material requirements of each project.

7.4 There are a number of existing recycling facilities (operators) in the region (Thompsons at Prudhoe; Smiles at Sunderland; Durham County Waste Management at Coxhoe and their transfer station in South Tyneside; Holystone Waste Management). There is the potential to transport suitable material to such facilities for processing directly, or blending with other materials, into recycled aggregates and fill. These facilities are not currently operating at capacity in terms of inputs. Production capacity can be increased relatively easily with mobile crushing and screening equipment. Stockpiling of raw materials or final product is normal practice for dealing with the vagaries of supply and demand.

7.5 The recycled aggregates industry is somewhat variable being dependent on the level of redevelopment activity for its raw materials, and redevelopment and development activity for its market. The opportunity to maximise this option would therefore be dependent on the level of redevelopment activity at the time of the construction of the New Tyne Crossing.

7.6 Offsite Dedicated recycling facility

Recycled aggregates producers have mobile plant specifically for temporary operations. The plant is specifically authorized under IPPC regulations. A dedicated facility in close proximity to the site could offer certain environmental advantages such as reduced haulage distances. There is maximum flexibility in site selection terms, as other than space to operate the plant and stock the materials, the location can be chosen so as to minimize the environmental impacts, opposition and therefore delays in commencing operations. However, there are environmental impacts associated with the operation of these plants (e.g. dust, noise) that would need to be assessed as part of a planning application in respect of the specific site selected. The timescales associated with locating a site, acquiring rights, obtaining planning consent and other relevant authorisations could preclude this as a viable option.

7.7 Landfill

There are a number of existing landfill sites currently available, both north and south of the river. These were identified in the Environmental Statement (fig 19.1 CD5 also included in Appendix B ILfig.5). (14 within the Tyne and Wear Unitary Authorities within 15-20 km of the site). The identified sites are those defined by the Environment Agency as large landfill sites that can receive 75,000+ tonnes per annum. An assessment of the licence conditions of a number of these facilities concluded that, whilst most could accept the material in 'quality' terms, no single site could take the overall quantity or receive it at the peak rates at which it would be generated if no other disposal option was to be adopted. It should be noted that the licence regimes of all landfill sites are being reviewed as a result of the European Waste Catalogue and the Landfill Regulations 2002.

7.8 Operators are likely to be reluctant to give up space designated for more lucrative waste streams (i.e. Special waste) for inert waste (or in their terms low value) unless suitably compensated. However, they do have a requirement for cover and engineering materials. One of the effects of the landfill tax had been to reduce the normal inputs of materials suitable for this purpose. However, the recently successful Court of Appeal case by Viridor Parkwood Limited against HM Customs and Excise has reinforced this opportunity establishing it as a beneficial use of materials and not subject to the burden of Landfill Tax.

7.9 Securing a dedicated facility on a 'greenfield' site for the anticipated quantity and range of materials and at the rates of production generated by the scheme would require a detailed planning application, environmental impact assessment and IPPC permit in its own right. However, in my experience the time needed to locate a site, achieve a planning consent, waste management licence (WML) and engineer a landfill site is likely to be measured in years particularly where there is significant opposition. Therefore on this basis this option is not considered viable.

7.10 There is the possibility of securing an existing facility and seeking appropriate variations to the planning consent and WML. In this instance the principal of waste disposal would have been established and the assessment of environmental impact would be focused on the effects of the potential intensification of the operation, for example, increased traffic flows, reduced operational timescale. Here the uncertainty is identifying a suitable facility with a willing operator.

7.11 Sea Disposal

The Department for the Environment, Food & Rural Affairs (DEFRA) is the licensing authority under Part 11 of the Food and Environment Protection Act 1985 (FEPA) and has a statutory duty to control the deposit of materials in the sea. DEFRA have indicated that a licence will be required for the dredging and disposal of materials.

7.12 When judging a FEPA application DEFRA consider the suitability of the applicant, his contractor, the equipment and methodology to be applied, the quantity, quality and nature of the materials, the environmental impacts of the proposal and whether disposal at sea is the best environmental option.

7.13 A FEPA licence application requires the submission of detailed information about the project. It must identify the person, company or organisation;

- Whose activities produce the material for disposal
- Who will be in possession of the material prior to its deposit

- Who may be engaged to act under contract or other agreement and having responsibility for the material to be deposited
- 7.14 The information must include named individuals from the organisations identified. The minimum likely to be acceptable would be the Concessionaire and the dredging contractor. Details of the proposed programme, dredging equipment and method statements are also required.
- 7.15 There are certain criteria that must be satisfied before a licence for the deposition of dredged material at sea is issued. These relate to the chemical quality of the material, the quantity to be disposed of, its nature and origin. A comparison of the predicted impacts at the disposal site and those associated with any alternative disposal method, in this case landfill.
- 7.16 If elements of the materials to be dredged contain contamination above levels specified by DEFRA at the time of the project then this material would need to be separately removed and disposed of to appropriate landfill sites. The Environmental Statement identified three sites within the Tyne and Wear Unitary Authorities specifically licensed for the disposal of dredgings (Environmental Statement fig 19.1 CD5 also included in Appendix B as ILfig.5).
- 7.17 Under normal circumstances DEFRA would expect to receive a FEPA licence application at the same time (or shortly after) being consulted on a TWA Order application and Environmental Statement. Therefore in determining the licence they effectively respond to the TWA consultation.
- 7.18 In the context of a proposed Public Finance Initiative (PFI) project none of the above information is available at the time of making a TWA Order application. Consequently, the FEPA licence application must await the appointment of the Concessionaire.
- 7.19 DEFRA are not prepared to pre-empt a licence application for the disposal of material at sea, (which must be judged on its merits at the time of the application) when responding to a TWA consultation. Therefore, for the purposes of the project, disposal at sea can only be considered as a potential option.
- 7.20 The likelihood of securing such disposal as an actual option can be assessed however by comparison of the proposed activity with existing dredging and disposal operations in the area and by considering the comparison of impacts I referred to in paragraph 7.15. I discuss this assessment later in my proof.
- 7.21 There are some 100 Marine Disposal Sites in use around the coasts of England and Wales at any one time. There are 7 such sites in the vicinity of the mouth of the Tyne:
- Blyth A (TY041)
 - Blyth B (TY042)
 - Tyne Industrial (TY050)
 - Howden Area (TY060)
 - North Tyne (TY070)
 - Souter Point (Inner) (TY080)
 - Souter Point (Outer) (TY081)

(The locations are shown on ILfig.4 contained in Appendix B of this proof).

- 7.22 The selection of an appropriate disposal site and decision on the volume rests with DEFRA and will be influenced by the quantities and nature of the materials being deposited at the individual sites at the time of granting the licence.

8. ASSESSMENT OF OPTIONS

8.1 Land Disposal

The Environmental Statement (CD4) at para. 19.8.3 identified what is essentially a theoretical worst case scenario for landfill. This envisaged all the surplus materials going to landfill (i.e. no at sea disposal, no off site re-use or recycling) in one year. In order to put this into context this was compared to the annual landfill input for the Tyne & Wear Unitary Development Authorities. The surplus was the equivalent of 55% of the annual void space consumption (Tyne & Wear Unitary Authorities (DETR) Municipal Waste Management Survey 1998-99).

8.2 The 2003 Report sought to identify realistic levels of off-site re-use and recycling, sea disposal and thereby assess the likely level of landfill disposal over the 2 years during which materials would be generated. The potential for disposing of materials to the various land based options was assessed by a review of industry research findings and an informal consultation exercise with members of the industry. This was undertaken to establish the current levels of activity in the construction and waste disposal industries with particular reference to re-use and recycling of construction, demolition and excavated materials. The results of this exercise were reinforced by the recently published findings of the 'Survey of Arisings and Use of Construction and Demolition Waste in England and Wales 2001' (2001 Survey). Appendix B IL fig.7 contains figures for the Northeast and England abstracted from the results of this survey.

8.3 In order to provide a basis for considering the potential environmental impacts associated with the options the volume of surplus materials has been apportioned between the options broadly in line with the 2001 Survey findings, having first adopted pessimistic estimates for the effect of contaminated materials.

8.4 The 2003 Report established that offsite re-use/recycling was at its highest in the first 12 months of the project 70,900 m³. This equates to 2.22% of the 2001 Survey estimate for such uses in the Northeast. The second 12 months had 60,100 m³ (1.88%).

8.5 The average distance travelled from source to recycler was 25km and a further 25km to the end-user. (BRE – Centre for Sustainable Construction: Sustainable Construction – the Data; March 2000) This implies a market area including some of the largest conurbations in the northeast. On this basis the disposal of this quantity of material in this manner is considered achievable.

8.6 Conversely the 2003 Report established that the landfill requirement was at its highest in the second 12 months of the project at 52,800 m³. The first 12 months was somewhat less, 19,700 m³. The landfill requirement for these periods equate to approximately 9% and 3.4% of the annual landfill inputs for the 'Tyne and Wear' Unitary Development Authorities (DETR Municipal Waste Management Survey 1998-99)

8.7 If the 52,800 m³ was apportioned equally between the 14 identified (EA defined) large sites this equates to approximately 3770 m³ per site per annum. This is comfortably within the limitations of the Waste Management Licences for these sites, that typically allow 50-75,000 m³ of construction & demolition and/or 'difficult' wastes.

- 8.8 These volumes and percentages are considered achievable levels in the context of a properly formulated and implemented Waste Management Plan as required by the Code of Construction Practice.
- 8.9 **Sea Disposal**
As I have already pointed out it is not possible to state categorically that a license will or will not be granted as this requires a FEPA licence application which in turn requires detailed knowledge of the proposals that is not available at this stage of a PFI project and the at sea disposal activity at the time of the application. Consequently, as noted above (para. 8.1) the Environmental Statement considered the 'worst case' scenario of no sea disposal (CD4 para. 19.8.3), while the 2003 Report considered the more realistic scenario of some sea disposal.
- 8.10 In order to assess the likelihood of securing sea disposal of dredged materials a comparison of the proposed activity with existing dredging and disposal operations in the area was undertaken as part of the 2003 Report including considering the comparison of impacts I referred to in paragraph 7.15.
- 8.11 The levels of contamination in the samples of the material to be dredged are generally similar or less than those encountered when carrying out navigation dredging along the river. This is confirmed by the comments of CEFAS in respect of the Howden Yard area (referred to at para 6.14). Consequently, the majority of the dredged material should be suitable for at sea disposal in quality terms.
- 8.12 Dredging activity on the River Tyne during the 1990's is understood to have resulted in the at sea disposal of between 80,000 and 280,000m³ each year. The Environmental Statement identified the maximum at sea disposal quantity as 140,900m³ (CD4 – Table 19.2 and Appendix B II fig.2). The 2003 Report assessed the maximum quantity as 139,000m³ and, after adopting a pessimistic view of the likelihood of encountering unacceptably contaminated material, identified 113,700m³ (20,100m³ and 93,600m³ for year 1 and year 2 respectively) for at sea disposal. The potentially contaminated balance of 25,300 (4,500 and 20,800m³) would be landed at the former Mercantile Docks for treatment and transportation to landfill.
- 8.13 The annual at sea disposal requirement is similar to or less than the lower end of the River Tyne dredging disposal range. On this basis I have concluded that the quantities to be disposed of are unlikely to be a reason to refuse a licence.
- 8.14 The comparison of the environmental effects of at sea disposal of dredged material with the alternative landfill disposal considered the effects at the sea disposal site and the effects of landing the dredged material for treatment and transportation to landfill.
- 8.15 The potential impacts associated with the disposal of dredged material at sea relate to the degree of contamination of the material and effects of burial on the seabed at the point of disposal.
- 8.16 Chemical analysis of dredgings or in this case samples of the material to be dredged provide an indication of the relative degree of contamination, but they do not provide a measure of any resultant biological effects.

- 8.17 The role of sediment type, contamination and effect of burial on selected indicator species (Nematode assemblages) has been the subject of recent research by M Schratzberger, H L Rees and S E Boyd (2000). Published extracts from their report are contained in Appendix C.
- 8.18 The research consisted of laboratory experiments designed to simulate the deposition of materials and investigate the effects of the degree of contamination and burial on the indicator species. Uncontaminated, oxic intertidal mud and anoxic sediments from the Mersey and the Tees were used. In both bases the contamination included heavy metals.
- 8.19 Migration and survival rates were highest in the uncontaminated material. However, high migration rates and survival were noted in high frequency experiments with contaminated sediments. The research concluded that the effects were mainly determined by the deposition frequency rather than the type or degree of contamination.
- 8.20 The potential environmental impacts of disposing of the dredged material to landfill are associated with:
- The need to make the material suitable for road haulage, i.e. space and time requirements
 - Increased road haulage impacts i.e. congestion, noise, dust and greenhouse gases.
 - Risks to surface water from discharges during the handling and settlement of the materials.
 - Increased consumption of voidspace.
- 8.21 Unlike the granular sand and gravels, that it is proposed to temporarily store in the former Mercantile Docks site, the unusable silts and clays would require extensive settlement and water management facilities. The space requirement and the time needed to dewater the material would seriously extend the disruption to the RMC operations assuming there is actually sufficient space available.
- 8.22 The time required to render the material capable of transportation could be reduced by the introduction of cement, pfa or similar hydrophilic material. However, this would mean increased transportation impacts, increased volume for disposal and the additional risk of escape of pollutants from the process.
- 8.23 It is my view, that on balance, a detailed assessment and comparison of the potential environmental impacts of at sea and landfill disposal of the clays and silts will conclude that at sea is best environmental option.

9. IMPACTS ASSOCIATED WITH THE OPTIONS

9.1 Land disposal

There are four issues with the handling and offsite disposal of surplus and waste materials that have the potential for significant environmental impacts on land

9.2 Release/Escape of Contaminants

The excavation activity (including dewatering of silts or other saturated materials from dredging) and transportation of contaminated material have the potential to allow the escape of contaminants into the surrounding environment. This could be in the form of spillage, dust and as the result of surface water run off and discharges to surface water particularly from the dewatering of dredged materials.

9.3 Transportation

Transportation of the waste materials offsite (irrespective of whether this is to landfill or beneficial use) has the potential to cause moderate adverse impacts at various times throughout the project (traffic congestion, noise and vibration).

9.4 'Loss' of Void Space

In the Environmental Statement (CD4 para 19.8.3) the theoretical worst-case total quantity of surplus material that could potentially need to be disposed of to landfill if no offsite re-use or recycling was achieved and a sea disposal licence was not forthcoming is 330000 m³ (55% of the annual landfill inputs for the 'Tyne & Wear' Unitary Development Authorities - DETR Municipal Waste Management Survey 1998-99) this was judged to be a moderate adverse impact on the void space availability. The 2003 Report equivalent was 317,200 m³. This is apportioned between the two years as 110700 and 206500 m³. This is the equivalent of approximately 18.9% (year 1) and 35.3% (year 2) of the annual landfill inputs for the 'Tyne & Wear' Unitary Development Authorities (DETR Municipal Waste Management Survey 1998-99)

9.5 Natural Resources

The re-use and recycling of waste materials would have a minor beneficial impact in respect of substitution for primary aggregate production in the region.

9.6 Sea Disposal

The potential impacts of the disposal of dredged material at sea are the effects of contamination and burial at the point of disposal.

As I discussed at para 8.15-8.19 contamination and the effect of burial have been the subject of recent research that concluded that the effects were mainly determined by the deposition frequency rather than the type or degree of contamination.

10. MITIGATION

10.1 The mechanism for the delivery of satisfactory mitigation of the impacts is contained in the Code of Construction Practice. Specifically the following Management Plans

- General Environmental
- Traffic
- Noise and Vibration
- Dust and Air Pollution
- Contaminated Land
- Surface and Ground Water
- Spoil and Waste

10.2 The Spoil and Waste Management Plan includes a requirement to have due regard to the Sustainability Hierarchy, when selecting the methods of disposal of surplus materials. The objective of this being to minimize disposal to landfill.

10.3 The Environmental Statement (CD4 para 19.7.4) identified the following combination of disposal options as the most sustainable:

- At sea for dredged (saturated) materials - which would minimise the risks involved in handling the material on land (dewatering and road haulage);
- Existing landfill for all contaminated and unusable materials for which onsite disposal would be inappropriate;
- Recycle or fill material re-use for all suitable materials would generate a return to offset haulage and landfill tax costs.

- 10.4 The rate at which the surplus material is generated for disposal is not consistent. Consequently, the potential for impact will vary proportionally with the rise and fall of the rate of generation. The various Management Plans, agreed with the relevant statutory authorities as part of the CoCP, would include traffic management measures to minimize these impacts. This would include operating hour's restrictions, rate of despatch from site, use of temporary surge piles to smooth out the production peaks.
- 10.5 Materials identified as being contaminated would be carefully managed in accordance with environmental and health and safety requirements. The Management Plans will ensure that such materials have priority for disposal to minimise the time during which contaminants could escape. They will contain set procedures for the containment and handling of contaminated materials and strict health and safety procedures would be employed to prevent workers coming into contact with such material.
- 10.6 Measures would also be taken to avoid the release of contaminants offsite, for example, through dust emissions. This would include wheel cleaning facilities and road sweeping where appropriate, regular maintenance and damping down of internal haul roads.
- 10.7 Areas identified for the temporary containment of contaminated material would be bunded and any surface water runoff collected for appropriate disposal. This would include the dredged material storage area and particularly any area required for the dewatering of the contaminated dredged material destined for landfill.
- 10.8 Mitigation in respect of the disposal of dredged materials at sea includes the identification and separate disposal of unacceptably contaminated material to landfill. Mitigation for the effects of burial of the seabed at the disposal site would be achieved by the formulation of a disposal regime involving smaller quantities at frequent intervals. This would have to be co-ordinated with existing ongoing disposal activity at the DEFRA nominated site.

11. CONCLUSION

- 11.1 The Environmental Statement and 2003 Report identified potential impacts from the materials to be excavated, associated with the degree of contamination, and the methods of handling, use and disposal of the surplus.
- 11.2 The contamination likely to be encountered is of a nature and at levels that are understood and for which there are well established techniques and procedures available for dealing with it.
- 11.3 The options available for the disposal of the surplus material are such that the quantity requiring disposal can be dealt with in an appropriate and sustainable manner.
- 11.4 The Management Plans envisaged by the Code of Construction Practice provide the mechanisms for safe and appropriate handling and disposal of the surplus material. None of the identified issues are of such significance that they will not be capable of satisfactory mitigation.
- 11.5 I therefore conclude that the residual effects of the potential environmental effects associated with the handling and disposal of the surplus material will be no more than minor adverse.