

ArupTransport

Tyne & Wear Passenger Transport Authority

New Tyne Crossing

Proof of Evidence on Spoil and Waste Management

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APPENDICES

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INTRODUCTION

1.1 Background

The Tyne and Wear Passenger Transport Authority (TWPTA) wish to construct a new crossing of the River Tyne in the vicinity of the existing vehicular tunnel. This would be constructed as an 'immersed tube tunnel' beneath the bed of the River Tyne and as cut and cover tunnels on the land sections.

Ove Arup & Partners Ltd. (Arup) was commissioned by the TWPTA to act as their advisors. One of the principal duties of Arup is to carry out the work necessary to obtain approval for the project under the Transport and Works Act 1992 (TWA). In connection with this Arup has carried out an Environmental Impact Assessment (EIA) and prepared the Environmental Statement (ES) to accompany the application for a TWA Order by the TWPTA.

1.2 This Study

This study has been commissioned in response to representations by the Environment Agency (EA) and others in respect of the ES that accompanied the TWA application.

The representations are seeking further assurance that the nature and quantity of the material generated by the New Tyne Crossing (NTC) proposal is fully understood and the implications of the disposal of contaminated or surplus materials in terms of the emerging guidance on the Landfill Regulations 2002, the European Waste Catalogue and associated regulatory instruments is appreciated.

The Study examines the origins, nature and quantities of material, and considers the potential environmental impacts arising from the generation, handling and disposal of excavated and other materials that would arise from the construction of the New Tyne Crossing.

2. METHODOLOGY

2.1 Introduction

For the purposes of this study the project was divided into three parts:

- North of the River
- South of the River
- The River

The study consisted of the identification of the surplus materials and waste, the options for their disposal and an examination of the potential environmental impacts arising from the handling and disposal of the materials.

The NTC Project programme is approximately 36 Months. The materials are generated over approximately 24 months. For the purpose of the analyses this has been divided into two 12 month periods referred to as Project Year 1 and 2.

For the avoidance of doubt definitions of the terminology used in this study (as listed in Section 2.5) are provided in Appendix A.

2.2 Identification of Potential Surplus Materials and Wastes

This has involved a review and updating of the work carried out prior to the publication of the ES and included:

- The construction program and the estimated volumes of material to be generated
- The nature, including potential contaminants, of the materials to be generated
- An examination of the recycled aggregates market and its likely evolution over the next 10 years.
- Availability of landfill sites in terms of location, inputs (quantity and material types)
- The potential for, and implications of disposal at sea
- An examination of the environmental impacts likely to be associated with handling and disposal of surplus and contaminated materials.

Section 4 of this report examines the origins and nature of the materials that will be encountered in the NTC project.

Section 5 provides an analysis of the quantities of the materials and assess' the potential for their re-use or ultimate disposal. For this purpose the materials have been classified into three types: inert, non-hazardous and hazardous in line with the EA Technical Guidance Document (Public Consultation Document September 2002).

2.3 Options for the Disposal of the Surplus Materials and Waste

A theoretical list of options for disposal was devised and applied to the identified materials. This has been developed into the 'Hierarchy of Sustainability' that is to be included in the Code of Construction Practice (See Section 5.1). Informal consultation with members of the aggregates, construction and waste industries, the EA, CEFAS and DEFRA was used to validate the assumptions used in this exercise and to establish the statutory and regulatory procedures to be addressed in the various disposal options.

In particular, in order to assess the potential for disposing of materials to the various options an informal consultation 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). In order to provide a basis for considering the potential environmental impacts associated with the options the surplus materials have been apportioned between the options broadly in line with the 2001 Survey findings and adopting pessimistic estimates for the effect of contaminated materials. The source data for this is contained in Appendix D.

Section 6 provides a general discussion of the 'Disposal Options' and the Regulatory Framework within which they would be implemented is discussed in Section 6.

2.4 Examination of the Potential Environmental Impacts

The environmental impacts likely to be associated with the handling and disposal of materials from the project can be divided into two categories:

- Those associated with the generation of the material and the use of a proportion of it within the project
- Those associated with the removal of the remainder from the Site and its eventual disposal

This part of the study and in particular Section 8 considers the second category and in particular the potential impacts from the following activities:

- Storage or treatment of materials prior to leaving the Site
- Transportation from the Site
- Any relevant impacts directly associated with the materials at the point of disposal.

In the case of the north and south of the river the materials generated and the disposal solutions available are essentially the same but the volumes and disposal locations are likely to be different. However, the Concessionaire will have the option to move material over the river via the existing tunnel that will be under his control, thus minimising the financial penalty that could be associated with cross river movements of material and maximising programming flexibility.

2.5 Terminology Employed

Definitions of the following terms as used for the purposes of this study are contained in Appendix A:

The Site	Recycle on-site
Disposal	Recycle off-site
Re-use	Dedicated Recycling Operation
Re-use on-site	On-site landfill
Re-use off-site	Dedicated landfill site
Recycle	

3. ORIGIN AND NATURE OF THE MATERIALS

The significant material generating activities envisaged for the project includes demolition and site clearance, the construction of the diaphragm walls, the excavation of the land based cuts and the dredging of the trench in the river.

3.1 Demolition and Site Clearance

3.1.1 Origins and Nature

There are a number of buildings and associated structures to be demolished on both sides of the river.

The quantity of material likely to be generated from this activity has been estimated using a crude volumetric calculation and a basic assessment of materials required to construct a similar building or structure. This is set out in Appendix E.

The construction program envisages early site clearance activity and consequently limited opportunity for immediate re-use other than for temporary site access. As there is a substantial surplus of reusable material it is logical to direct this early material into the recycled aggregates market. As this could be described as standard demolition materials it is likely to be readily accepted. This has the benefits of:

- avoiding the potential for environmental problems associated with stocking this material
- helps to spread the off-site transportation burden (reduces peak traffic volumes)
- spreads the flow of material into the market place.

3.1.2 Contamination

Modern demolition techniques (Selective Demolition) enable a high degree of sorting to be achieved with the removal of the majority of non-aggregate or hazardous materials such as asbestos, metals and wood. It has therefore been assumed that up to 90% of this material is capable of re-use or recycling. The remaining 10% has for the purpose of this study been considered incapable of beneficial use and requires disposal to landfill.

3.2 Diaphragm Wall Material

3.2.1 Origins and Nature

The construction of the diaphragm walls involves the production of granular material consisting of a combination of natural ground, made ground and bentonite residue. The latter being used to flush the material out of the cut/maintain the cut until the concrete is inserted. The engineering properties of this material are such that it is potentially capable of use as a non-structural fill.

3.2.2 Contamination

Bentonite is an inert material and does not constitute a contaminant likely to render the material unsuitable for use. Nevertheless its introduction into the spoil may mean that it is considered an industrial waste. Its use/disposal would then be subject to an appropriate license. Because of the nature and quantity of the bentonite involved it is not considered that its presence would preclude on-site use and it may well be eligible for exemption (Schedule 3 Waste Management Licensing Regulations 1994 – as amended).

There is the potential for existing contamination particularly within the made ground. This was referred to as 'hotspots' in the ES. Not all of the made ground is considered likely to be so contaminated as to be categorised as Hazardous (and therefore unusable). Nevertheless following a review of the site investigation reports levels of 30% and 10% for unusable material were adopted for north and south of the river respectively. These are considered appropriately pessimistic levels to establish the landfill option requirement.

With the exception of the contaminated hotspots through which the diaphragm wall will be driven the majority of the material has been categorised as non-hazardous. The remainder is included as inert in recognition of the potential for an uncontaminated natural ground element. The make up of the made ground and natural ground is described briefly in Section 3.3.

3.3 Cut Material

3.3.1 Origins

The excavation of the cut will produce a combination of natural ground materials (Middle Coal Measures; mudstones, sandstones, seatearths and coals, overlain by Devensian glacial deposits; clays, silts, sands & gravels and boulder clay and Alluvial deposits) and made ground. The latter is composed of material ranging from domestic/industrial wastes to ash, colliery spoil and ships ballast.

3.3.2 Contamination

Given the origin of the made ground and the historic uses of the area through which the cut is to be driven there is clearly the potential for contamination. The results of the site investigation clearly illustrate this and the conclusion drawn is that contamination hotspots will be encountered. The assumptions regarding the quantities of unusable material referred to in Section 3.2 apply.

3.4 Dredged Material

These materials are produced from the dredging of one or more of the following:

- The temporary tunnel section storage area,
- The building dock,
- The cofferdam
- The immersion trench.

Appendix C contains the base data from which the volumes were calculated.

The materials generated consist of:

3.4.1 Made Ground

Made ground will be encountered in the dredging of the building dock, the immersion trench and particularly the cofferdam. The material is a combination of ships ballast, materials placed to stabilise the banks and the detritus of successive on shore uses.

3.4.2 Alluvial Clay and Silt

This material is produced from the dredging of the building dock, the immersion trench and a small quantity from the cofferdam. It is exposed at the surface (i.e. not overlain by the made ground) within the building dock and immersion trench.

3.4.3 Alluvial Sand and Gravel

This material is produced from the dredging of the building dock and the immersion trench. It is partially exposed at the surface (i.e. not overlain by the made ground and alluvial clay & silt) within the building dock and immersion trench.

3.4.4 Glacial Sand and Gravel

This material is produced from the dredging of the building dock and the immersion trench. None is exposed at the surface (i.e. it is overlain by the glacial clay and alluvial sand & gravel).

3.4.5 Glacial and Other Clay

Clay is found in five layers in this area three of which are intersected by the dredging operations. None of this material is exposed at the surface (i.e. it is overlain by the alluvial clay, the alluvial sand & gravel or the made ground).

3.4.6 Bedrock

This material is produced from the dredging of the building dock, the cofferdam and the immersion trench. None is exposed at the surface (i.e. it is completely overlain by the other materials).

3.4.7 Contamination

The presence of TBTs in the silt and other contaminants associated with the shipbuilding industry is of particular concern for the River Tyne. The potential for elevated levels of heavy metals associated with historic sewage disposal was also raised in respect of the Howden Yard.

Samples of the materials referred to in sections 3.4.1-6 have been tested to establish the level of contamination. The levels identified are similar to the levels anticipated from data supplied in respect of the normal navigation dredging activities carried regularly on the river. However, for the purpose of this study where materials are exposed at the surface, it has been assumed that the first one metre within the building dock and cofferdam and the first half metre in the river are potentially sufficiently contaminated to require disposal to landfill. The exception to this is the made ground for which disposal to landfill has been assumed as the only alternative at this stage. The data used to estimate the dredged volumes is contained in Appendix C.

4. ANALYSIS OF QUANTITIES

For the purposes of this section the project has been divided into three parts – north of the river, south of the river and the river. The following sections set out the results of the analysis undertaken for the materials generated within each part and provide a Project Year 1/2 split. The results are summarised in Figures 1 to 7 in Appendix B. In the figures, where a 'Destination/Quantity' has a '0k m³' entry, this signifies that this is a potential option but that it has been discounted for the purposes of the analysis.

It should also be noted that due to the ongoing refinement of the project design and programme the figures used in this analysis are approximately 10% less than those used for the ES.

4.1 North of the River

4.1.1 Demolition and Site Clearance (see Figure 1)

There are a number of buildings and associated structures to be demolished. These include:

- AMEC offices
- Gatehouse/substation
- Workshop

The estimated quantity of potential aggregate materials generated from the demolition and clearance of the above buildings and structures is **1.3k m³**. Applying the 90/10% referred to in para.4.1 this will generate **1.2k m³** for recycling with the remaining **0.1k m³** requiring disposal to landfill.

All of this material is produced in the early weeks of Project Year 1.

4.1.2 Diaphragm Wall Material (see Figure 2)

The construction of the diaphragm wall has been estimated as generating **22.4k m³**

There is the potential for existing contamination particularly within the made ground that accounts for over 30% of the material. Therefore there is **6.8k m³** identified for landfill.

The majority of the material **10.4k m³** has been categorised as non-hazardous. The remainder **5.2k m³** is included as inert in recognition of the potential for an uncontaminated natural ground element.

The production of this material commences in the first quarter of Project Year 2 and is completed within 9 months.

4.1.3 Cut Material (see Figure 3)

The estimated total quantity of material produced from the cut is **54.0k m³**. The assumption adopted in respect of the contamination referred to in Section 5.1.2 were applied. As a consequence **16.4k m³** has been identified for landfill and **37.6k m³** as non-hazardous/inert. Of the latter **23.5k m³** is earmarked for re-use onsite and **14.1k m³** for re-use offsite.

The excavation of the cut is in two sections. The first is programmed for the second quarter of Project Year 2 and the second is in the final quarter of Project Year 2.

4.1.4 North Side Disposal Summary

The total quantity of material to be generated from the North of the River is **77.7k m³**.

23.5k m³ is re-used/recycled on-site

30.9k m³ is exported for re-use recycling off-site

23.3k m³ is to be disposed of to land fill

4.2 South of the River

4.2.1 Demolition and Site Clearance (see Figure 4)

There are a number of buildings and associated structures to be demolished. These include:

- Gaslight Public House
- Used Car Showroom
- 61-71 Commercial Road (6 flats)
- St Peters Junior and Infant School
- Grange Nursing Home
- Electricity substation
- 280-290 High Street (6 flats)
- 207-219 High Street (4 flats, 1 house and a shop)
- 31-37 Salem Street (4 bungalows)

The estimated quantity of aggregate materials generated from the demolition and clearance of the above buildings and structures is **4.7k m³**. Applying the 90/10% referred to in Section 3.1 this will generate **4.2k m³** for recycling with the remaining **0.5k m³** requiring disposal to landfill.

All of this material is produced in the early weeks of Project Year 1

4.2.2 Diaphragm Wall Material (see Figure 5)

The construction of the diaphragm walls has been estimated as generating **49.3k m³**. There is the potential for existing contamination particularly within the made ground that accounts for approximately 10% of the material. Therefore there is **4.9k m³** identified for landfill. The majority **14.8k m³** has been categorised as non-hazardous. The remainder **29.6k m³** is included as inert in recognition of the potential for an uncontaminated natural ground element.

The production of this material commences approximately three months into Project Year 1 and is completed by the fifth month of Project Year 2.

4.2.3 Cut Material (see Figure 6)

The estimated total quantity of material produced from the cut is **185.0k m³**. The assumptions adopted in respect of the contamination referred to in Section 4.2.2 were applied. As a consequence **18.5k m³** has been identified for landfill and **115.0k m³** as non-hazardous/inert for on-site re-use. A further 51.5k m³ for off-site re-use/recycling.

The excavation of the cut is in four sections. The first two occur in Project Year 1 and the second two in Project Year 2.

4.2.4 Disposal Summary

The total quantity of material to be generated from the South of the River is **239.0k m³**.

115.0k m³ is re-used/recycled on-site

100.1k m³ is exported for re-use recycling off-site

23.9k m3 is to be disposed of to land fill

4.3 The River

The potential to re-use the materials generated by the dredging operations for the backfilling of the trench is more closely defined by the origin and nature of the materials. Consequently, the analysis of quantities is more detailed.

4.3.1 Made Ground

The total quantity of this material to be handled is estimated to be **9.4k m3**. This is earmarked for landfill.

4.3.2 Alluvial Clay and Silt

The total quantity of this material is estimated to be **76.1k m3**. Applying the '1m/0.5m rule' referred to in Section 3.4.7 approximately **12.4k m3** could potentially require disposal to landfill. The balance **63.7k m3** is unsuitable for use as backfill for the immersed tunnel and would be considered for disposal at sea.

4.3.3 Alluvial Sand & Gravel

The total quantity of this material is estimated to be **140.9k m3**. Applying the '1m/0.5m rule' referred to in Section 3.4.7 approximately **3.5k m3** could potentially require disposal to landfill. The balance 137.4k m3 is suitable for use as backfill for the immersed tunnel and would be stored at the RMC site (former Mercantile Docks) adjacent to the river.

4.3.4 Glacial Sand & Gravel

The total quantity of this material is estimated to be **18.1k m3**. It is suitable for use as backfill for the immersed tunnel and would be stored at the RMC site (former Mercantile Docks) adjacent to the river.

4.3.5 Glacial and other Clay

The total quantity anticipated is **38.3k m3**. This material is generally not suitable for backfilling the immersion trench. As a relatively uncontaminated material its disposal at sea would be sought.

4.3.6 Bedrock

The total quantity anticipated is **15.2k m3**. Approximately **3.5k m3** of this material is required for backfilling the immersion trench. Disposal at sea would be sought for the remaining **11.7k m3** of this relatively uncontaminated material.

4.3.7 River Disposal Summary

The total quantity of material to be generated from the River is **298.0k m3**.

159.0k m3 is recycled on-site

25.3k m3 is to be disposed of to land fill

113.7k m3 is to be disposed of to sea

4.4 Summary

The following table provides a summary of the quantities

Analysis of Quantities
Summary Table 4.4

	'000 m3 Re-use/Recycle on-site	Re-use/Recycle off-site	Landfill	At sea	Total
North	23.5	30.9	23.3	0	77.7
South	115.0	100.1	23.9	0	239.0
River	159.0	0	25.3	113.7	298.0
Total	297.5	131.0	72.5	113.7	614.7

5. DISPOSAL OPTIONS – GENERAL DISCUSSION

5.1 Sustainability Hierarchy

The primary principle that underlies the approach to be adopted to the disposal of the surplus materials is that wherever possible the materials should be put to a beneficial use, provided that the environmental impacts of achieving that use do not outweigh the benefit. This principle has been developed within the CoCP and a 'hierarchy of sustainability' produced.

Hierarchy of Sustainability

- *On-site use (including opportunities immediately adjacent to the project)*
- *On-site process (recycle) and use*
- *Offsite use/existing recycling facility (including registered exempt sites)*
- *Offsite dedicated recycling facility*
- *Existing landfill*
- *Dedicated landfill*
- *Sea disposal*

(Note: The list as set out above is applicable to all the materials except the dredged material where Sea Disposal is placed before the Landfill).

On-site use is considered to offer the maximum benefit and the minimum potential for environmental impacts. It reduces transportation impacts as it avoids exporting the material and it reduces raw material imports.

5.2 Re-use

There is a significant surplus of materials for disposal. The nature of these materials is such that there is ample opportunity to identify materials that are capable of re-use onsite which are uncontaminated or contamination is below the Soil Guidance threshold levels (ref: EPA 1990 Pt IIa, Environment Act 1995 associated Government./EA Guidance).

The same principal would be applied to re-use offsite. However, the likelihood of identifying opportunities for this will be a function of the level of general construction and development activity in the region at the time. This would include 'exempt' sites as defined in Schedule 3 of the Waste Management Licensing Regulations 1994 (as amended). This is discussed in detail in Section 6.1.3.

It should be noted that the opportunity to re-use contaminated materials on-site in appropriate circumstances should be encouraged. The engineering suitability of materials must inevitably be the overriding, determining factor. However, this would release less contaminated or uncontaminated materials that will be more attractive to the potential 're-users' and recyclers in the market place. It has the added benefit of reducing the potential risks associated with the off-site transportation of contaminated materials.

Much of the material capable of immediate re-use is likely to be suitable for inclusion in recycling activity, therefore in the event that re-use offsite is not available this material could be re-directed to recycling opportunities.

5.3 Recycling

The most significant on-site recycling opportunity is the refilling of the immersion trench with the dewatered sand and gravel from the trench and the other dredged parts of the Site. The

implications of the dewatering process are discussed in Section 7.4. Other opportunities for on-site recycling are limited by the available space within the Site and the proximity of residential property.

There is the potential for establishing off-site dedicated recycling operations at which surplus material could be processed and fed into the market place. There are a number of recycling plant operators in the North-East who have appropriately licensed equipment and specialise in running this type of operation. Such operators offer the maximum possible flexibility in site selection and can therefore seek to minimise the environmental impacts of their activity (noise, dust, traffic) by siting them appropriately. Nevertheless, such operations would require planning consent and even in an environmentally favourable location such consent is likely to take at least 12 weeks to achieve. (The regulatory regime under which such operations are established and run is discussed in Section 6.1)

Recycling offsite, as with re-use offsite, will be a function of the level of general construction and development activity in the region at the time and the availability of associated recycling facilities in the region. Re-cycling equipment is normally mobile making it relatively easy for operators to increase capacity at short notice. It is also common practice to stockpile raw materials for later processing or finished product in anticipation of future contracts.

Recycling activity is actively encouraged by Central, Regional and Local Government as evidenced by such measures as Landfill Tax and minimum recycled material requirements in Local Authority maintenance contracts and Highways Agency infrastructure projects.).

5.4 Landfill

The proposed CoCP requires the Concessionaire to minimise the quantity of material that is disposed of at Landfill sites. Therefore, in the first instance only contaminated materials incapable of satisfactory re-use or recycling on site or offsite would be directed to appropriate landfill sites. In this category, of particular note would be dredged material considered to be contaminated for disposal at sea. (see Section 5.5).

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). The identified sites are those defined by the Environment Agency as large landfill sites that can receive 75k+ 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.

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. It is therefore considered to be within the spirit of the 'Hierarchy of Sustainability' and appropriate for NTC surplus materials.

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. This will need to be kept under review.

The possibility of a dedicated landfill site to be set up by the Concessionaire has been considered. However, this has been discounted as not a viable option due to the time that would be required to secure a site, obtain the necessary planning consent and site licensing and to engineer the site. Similarly, the possibility of the Concessionaire acquiring rights to an

existing landfill has also been discounted as not viable. This being due to the time necessary to identify a site and willing operator and seek a variation to the existing Planning Consent and site license to account for the volumes and types of material envisaged. In both cases a requirement to carry out a full EIA could be expected. It should also be noted that a dedicated landfill could well be considered as not be in the spirit of the 'Hierarchy of Sustainability' as it would not encourage the maximisation of re-use and re-cycle options.

5.5 At Sea

The NTC project involves the removal, replacement and placement of materials within tidal waters. These operations are subject to the Food and Environmental Protection Act 1985 (FEPA) licensing process (See Section 6.2). Two licenses would be required MCU 3 and MCU 5. However, this assessment only considers MCU 3 in respect of the dredging and disposal of materials at sea. (MCU 5 relates to the construction operations including the replacement of materials into the immersion trench).

The particular circumstances of this project in the context of the Transport and Works Act (TWA) and the FEPA licensing process are discussed in Section 6.2.

Obtaining a licence involves establishing the suitability of:

- The organisation and individuals who will be responsible for the operations
- The material for disposal at sea which is a function of the quantity, quality and the amount of material being disposed of at sea by others at the time.
- At sea disposal in comparison with any alternative disposal options

For the purpose of this assessment it has been assumed that the Concessionaire and his contractors will be appropriately qualified and equipped to carry out the dredging and disposal operations.

The quantity of material for which disposal at sea is proposed is substantially less than the average annual quantity dredged from the Tyne for navigation purposes by, or on behalf of the Port of Tyne Authority. Figures provided by the Port of Tyne in confidence show a range of annual quantities disposed of between 80 and 280k m³ during the 1990's. Clearly, it is not possible to know what the level of disposal will be at the time of applying for the licence so meeting this aspect of the process cannot be guaranteed.

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. Consequently, the majority of the dredged material should be suitable for at sea disposal in quality terms.

The Environmental Statement identified the maximum at sea disposal quantity as 140.9k m³ (ES Table 19.2). The analysis in Section 5 assesses the maximum quantity as 139k m³ and, after adopting a pessimistic view of the likelihood of encountering unacceptably contaminated material, identified 113.7k m³ (20.1k m³ and 93.6k m³ for year 1 and year 2 respectively) for at sea disposal. The potentially contaminated balance of 25.3k m³ (4.5 and 20.8k m³) would be landed at the former Mercantile Docks for treatment and transportation to landfill. The impacts associated with this are discussed at Section 7.4.

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.

The potential impacts associated with the disposal of dredged material at sea relate to the degree contamination of the material and effects of burial on the seabed at the point of disposal.

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.

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).

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.

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.

Any alternative disposal option (landfill being the only realistic option given the nature of the surplus material) would involve landing the material. This would require a large area for dewatering lagoons, water treatment facilities and for the worst of the materials potentially treatment involving mixing with cement, pfa or some other hydro-phylic material. The work carried out to identify a suitable site for the temporary storage of the re-usable sand and gravels established that there was little available space for such activities and resulted in the selection of the former Mercantile Docks site. The sand & gravel storage already effects approximately half of the site. It is unlikely that the remainder of the site would be sufficient for the surplus materials. In the event that it was there would be a number of potential additional or increased impacts arising from:

- Increased transport to and from the site (cement/pfa to and exports from the site)
- The increased quantity of silt (space required for treatment, odour, risk of contaminant release)
- The increased space requirement (Disruption to the existing site occupier's operations – RMC)

When compared with the potential impact on the seabed (burial), which is mitigatable by devising an appropriate deposition regime to moderate the frequency it seems more than likely that at sea disposal would be judged the more environmentally appropriate disposal option.

6. REGULATORY FRAMEWORK

The following list contains the most relevant items of the legislation, regulation, and associated government guidance applicable to the operations considered in this report.

(The bullet points are particularly relevant elements (or notes) but the reference is not to exclusively that part).

1. Waste Management Licensing Regulations 1994 (as amended)
 - This introduced the European Waste Framework Directive to the UK (see also EPA 1990 Part II)
2. Water Resources Act 1991
 - Part III – levels of contaminants
3. Groundwater Regulations 1998
4. Environmental Protection Act 1990
 - Integrated Pollution Control Authorisations (IPC)
 - Integrated Pollution Prevention and Control Authorisations (IPPC)
5. Pollution Prevention and Control (PPC) Act 2000
 - PPC Regulations
6. Anti-Pollution Works Notice Regulations 1999
7. Food and Environment Protection Act 1985 (FEPA)
8. Environmental Protection (Duty of Care) Regulations 1991 (as amended)
9. Environment Agency – Landfill Directive Regulatory Guidance Note 14: The Duty of Care and the European Waste Catalogue
10. Landfill (England and Wales) Regulations 2002

The following sections relate the most pertinent to the disposal options.

6.1 Land Based

The following is relevant to the handling and treatment of NTC surplus and waste materials extracted from or brought to land for disposal.

6.1.1 Water

In order to protect the water environment, levels of contaminants in discharges to controlled water are controlled through discharge consents issued under Part III of the Water Resources Act 1991 or the Groundwater Regulations 1998. Where the activities pose an unacceptable risk of pollution to controlled waters, notices may be served to control or prevent the continuation of the operation. This is implicit in the Anti-pollution Works Notice Regulations 1999 and the Groundwater Regulations 1998. This may be particularly relevant to the control of activities associated with lagoons for the de-watering of dredged material for landfill disposal or for re-use when filling the emersion trench. The use of the lagoons may also be associated with bentonite separation and slurry de-watering subsequent to transfer of the spoil material from the diaphragm wall construction activity.

6.1.2 Atmospheric Emissions

Emissions from specified major industrial sites are controlled under Integrated Pollution Control Authorisations and Integrated Pollution Prevention Control Authorisations issued pursuant to Part I of the Environmental Protection Act 1990. This requires certain activities to operate to a particular standard known as 'Best Available Technique' to reduce the emission of pollutants to air, water and land. It is not envisaged that any of the techniques associated with the transfer or storage of spoil will necessitate the issuing of a permit under IPPC. However, in the event that recycling of spoil on-site or at a new dedicated off-site facility this would require the use of equipment that would require an authorisation.

6.1.3 Waste Management

The Waste Framework Directive introduced into UK legislation by Part II of the Environmental Protection Act 1990 and the Waste Management Licensing Regulations (as amended) 1994 implicitly require the control of environmental impact in relation to the keeping and treating of waste. A number of concepts have been introduced under this legislation, including the requirement for operators of licensed activities to be fit and proper persons and the requirement for the licence to remain in force until it has been surrendered demonstrating that the land will not cause pollution.

Part II of the EPA 1990 also introduced the concept of mobile plant licences. This allows the Environment Agency (EA) to licence a plant for the treatment of waste that by design will not be restricted to one piece of land. The Act also allows the regulatory burden to be reduced for activities that promote recycling and re-use of waste where there is not an unacceptable risk to the environment. It is this latter precept of the Act that is particularly relevant to the operations proposed for the transfer and storage of spoil material in association with the New Tyne Crossing.

It should however be noted that the Landfill Regulations 2002 required the application of the European Waste Catalogue (implemented 31st August 2002) to the Environmental Protection (Duty of Care) Regulations 1991. The EA have issued Regulatory and other guidance on the implications of this. However, the full effects in terms of procedural requirements and any repercussions for the recycling and landfill industries have yet to evolve. It is therefore important that this is kept under review.

In order to promote the concept of re-use of construction materials and to encourage the ecological and agricultural improvement of land there are specific legislative exemptions within the context of the Waste Management Licensing Regulations 1994. It is imperative that any exemptions are registered with the EA to ensure that the operations proposed are sanctioned. Specific referral is made to the use of spoil material in the Waste Management Licensing Regulations. In order to determine the most appropriate mechanism for legislative control, the EA have a series of criteria that are applied to proposals for material re-use, storage and recovery. Consideration is given to the degree of risk posed, and the subsequent level of pollution control required by different activities. The appropriate legislative control system is determined through examination of the proposal against a decision flowchart. This aids in the process of determining whether the material to be stored, in this case the construction spoil, should be subject to the Waste Management Licensing Regulations.

The following sections outline the process, however as already noted above the evolution of the response to the EWC may well result in changes to this.

6.1.3.1 Controlled Waste

The first stage in the process is the determination as to whether the spoil material constitutes a controlled waste. In order for this to be verified, there must be reference to the following criteria:

- The material must be in the scope of the Waste Framework Directive
- It must be listed in Part II of Schedule 4 of the Waste Management Regulations
- It must have been discarded or intended to be discarded or has been required to have been discarded which means that it must have been consigned to a waste disposal operation or otherwise abandoned.

In the event that the spoil materials were contaminated and required submission to a recovery or disposal operation, the materials would be regarded as a controlled waste. As a consequence, the material would have to be managed under Section 35 of the EPA 1990 with a waste management licence in place. However, a waste management licence would not be a

requirement if the activities under which the material was to be recovered were excluded or exempt from the Waste Management Licensing Regulations.

6.1.3.2 Exclusions from the Waste Management Licensing Regulations 1994

The second step under the EA framework, is determination as to whether the material can be excluded from the requirements of the Waste Management Licensing Regulations. This is effected under regulation 16 and applies where the prevention of pollution or harm to human health is fully dealt with through other legislation outside the scope of the EPA 1990. The additional controls are as follows:

- The recovery or disposal of waste carried out as part of a Part A, Part I of EPA 1990 i.e. EA regulated authorisation unless it involves the final disposal of waste
- The disposal of waste by incineration carried out as part of a Part B of EPA 1990 under Local Authority Control
- The discharge of liquid waste to surface or ground water, subject to a consent under Chapter II of Part III of the Water Resources Act 1991
- The deposit of waste at sea subject to a licence under the Food and Environment Protection Act 1985

Proposals for management of the material indicate that only the deposit of waste at sea is a potential option for the waste. If this option is effected, a separate waste management licence will not be necessary for the disposal operations.

6.1.3.3 Exemptions from the Waste Management Licensing Regulations 1994

In order for the material recovery/ re-use activity to be exempt from the requirement to be carried out under a waste management licence, it must comply with the precepts outlined in the Waste Framework Directive and Schedule 3 of the Waste Management Licensing Regulations. These are outlined below:

- Any exemption must comply with the relevant objectives at all times. The aim of this is to ensure that the waste is recovered or disposed of without endangering human health or using processes or methods that could harm the environment
- There must be no risk to water, air, soil, plants or animals
- There must be no nuisance through the production of noise or odours
- The exemption must not adversely effect the countryside or places of special interest.

There are currently 45 exemptions, of which six, are relevant to the process of recovery and re-use of materials or remediation activities. The exemptions are as follows:

- Exemption 7-Spreading of waste on land for the benefit of agriculture or for ecological improvement
- Exemption 9-The spreading of waste on land in connection with the reclamation and improvement of that land
- Exemption 13-The manufacture and treatment of waste soils
- Exemption 19-Use of waste for 'relevant works', which includes construction and maintenance of certain facilities
- Exemption 24-Brick, tile or concrete crushing
- Exemption 41-The temporary storage of waste at site of production

It must be noted that exemption 19 is not appropriate for use at sites where remediation is the sole requirement. The use is specifically barred for any site where 'land reclamation' in a wider context is involved.

If the activity is exempt, it must be registered as such with the EA. This is applicable unless the exemption has been conferred through the local enforcing authority responsible for granting the authorisation under Part I EPA 1990.

Remediation/Re-use Exemptions from the Waste Management Licensing Regulations

Exemption Number	Application	Restrictions	Guidance
7	This exemption relates to the spreading of waste in defined places	Does not apply to special waste Has a volumetric limit set at 250t.Ha ⁻¹ (soil) and 5000t.Ha ⁻¹ (dredgings) per annum Exemption only applies where the deposit results in benefit to agriculture and ecological improvement	Agricultural benefit or ecological benefit not described in UK legislation
9	This exemption is formulated specifically for land reclamation and has been formulated to allow the deposit, storage and spreading of wastes to form cover or capping systems	This exemption does not apply to special waste and has a volumetric limit set at 20,000 m ³ .Ha ⁻¹ The exemption is limited in that waste must be 'spread', the operation covered by a planning permission for the reclamation or improvement of the land and result in agricultural or ecological benefit The exemption does not apply to sites 'designed or adapted for the final disposal of waste by landfill', the reclamation activity must be wholly legitimate. The use of the exemption at licensed sites is therefore ruled out	The EA may take the view that where site operations for the purposes of landscaping, regrading or similar operations requiring the movement of material arising within the site, then this will not require a site licence

Exemption Number	Application	Restrictions	Guidance
13	This exemption covers the manufacture of construction materials, and the storage of wastes pending manufacture. It also covers waste treatment prior to disposal via spreading	This exemption cannot be applied to special wastes. There are also limits imposed upon use, namely, 500t.day ⁻¹ for waste recovery and 100t.day ⁻¹ for treatment pending spreading. Limits are also placed on storage	The recovery activity must be taking something which is not suitable for use and via a process that changes that waste into a material that can be used as any other 'raw material' without the need for 'special precautions' Once the material has been produced to the specification, it must be put to a legitimate use or sold as appropriate. The mixing of uncontaminated and contaminated wastes to achieve a lower overall level of contamination is not considered good practice
19	This exemption covers the storage on site of specified wastes for the purposes of specified construction work and the use in that work	The exemption cannot be applied if the 'relevant work' involves land reclamation i.e. where the land involved is incapable of beneficial use in its present state. The exemption may also not be used if special wastes are involved and limits are imposed on associated storage	There may be sites where the level of contamination was such that the risks posed were deemed acceptable i.e. formal land reclamation was not required, but there was a need to use the materials for construction purposes
24	This exemption covers the crushing, grinding or other size reduction of waste bricks, tiles or concrete and associated storage prior to pulverisation	This exemption only applies where the operation is carried out under an authorisation under Part I of EPA 1990 The exemption cannot be used for special wastes and has limits for storage	
41	This exemption can be used to cover the temporary storage of wastes on site of production pending collection This exemption also applies to special waste	Restrictions are placed upon the quantity, time and method of temporary storage for special wastes	This exemption may be useful in consideration of the transitory deposition of spoil/arising from excavation works

N.B Further exemptions exist that are not deemed relevant to the NTC proposal

The re-use of spoil material will not be subject to the Waste Management Licensing Regulations provided that no recovery or processing is carried out prior to the material being re-incorporated as fill. In the event that separation or screening of the material is carried out, it must be demonstrated that exemption 9, 19, or 41 applies in order to affect the storage of the material without having a waste management licence in place.

6.1.3.4 Mobile Plant Licenses

In the event that there is a requirement for a waste management licence to be in place, there will be essentially two methods employed, either a site-specific licence or a mobile licence. The majority of waste management licenses relate to a piece of land at the point of activity. The responsibility is therefore implicit on the holder of the licence for any pollution or harm caused by the activity on that land. However, where waste production is too small to justify a permanent waste management facility on site, or would be likely to produce a detrimental impact on the locality if the waste were removed, the best course of action may be for a mobile plant licence to be gained. As mobile plant licences are not site specific, certain provisions of the waste licensing regime cannot be applied, including the requirement to verify that the land is sufficiently remediated to allow the licence to be surrendered. This

'surrender test' does not apply to mobile plant licences, and as such they may be handed back to the issuing authority at any time.

The EA may reach a determination that the activity under review would necessitate a waste management licence to be in place. For the purposes of the proposal for spoil management, it would be appropriate to gain a mobile plant licence, should the EA deem it necessary, for processing operations at various locations at the storage facility.

6.2 At Sea

The Department for the Environment, Food & Rural affairs (DEFRA) is the licensing authority under the Food and Environment Protection Act 1985 Part 11 (FEPA) and has a statutory duty to control the deposit of materials in the sea. DEFRA have indicated that two licenses will be required for the project, one for the construction itself and one for the 'Dredging and Disposal of Dredged Materials at Sea'. This study considers the requirements of the second license and to this end a review of the application Form MCU3 and the accompanying 'Explanatory Notes' (Appendix F) was undertaken. CEFAS, the organisation responsible for processing the applications on behalf of DEFRA were consulted on the application process and the requirements of Form MCU3.

A FEPA license 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

This would include the Concessionaire and the dredging contractor and the information to be supplied must include named individuals.

Details of the proposed programme, dredging equipment and method statements are also required.

Under normal circumstances DEFRA would expect to receive a FEPA license application at the same time (or shortly after) being consulted on a TWA Order application and ES. Therefore in determining the license they effectively respond to the TWA consultation.

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 license application must await the appointment of the Concessionaire.

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. Clearly, DEFRA are not prepared to pre-empt a license 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.

The likelihood of securing such disposal as an actual option can only be assessed by comparison of the proposed activity with existing dredging and disposal operations in the area. An outline of the comparison that has been undertaken is included in Section 5.5.

6.3 Programme Implications

A number of aspects of the disposal of the surplus materials have significant implications for the NTC project programme. Where activities might involve the identification and acquisition of third party rights outside the scope of the TWA application no set timescale will apply.

Consequently, such possibilities (e.g. Greenfield site for dedicated landfill) have been discounted. The assessment of the options has thereafter assumed that the Concessionaire and his contractors will have reviewed their proposed activities at the earliest opportunity to ensure that they have sufficient time to secure all licences, exemptions or other authorisations necessary to achieve the range of disposal options.

The following is a list of activities related to the generation, handling and disposal of waste and surplus materials, anticipated as being required for the NTC project for which licences exemptions or other authorisations will be required as a result of the legislation referred to in Section 6. This list should not be considered exhaustive.

Dredging and disposal of dredged materials

Transportation of waste

Surface water discharge to controlled waters

Use of contaminated material in landscaping

Temporary storage of materials

Treatment of waste materials

The Concessionaire should enter into early discussions with the Environment Agency, DEFRA, Local Authority Environmental Health and Planning Officers to establish in detail the applications they must make for their operations and the timescales envisaged for their determination.

7. ENVIRONMENTAL IMPACTS

7.1 Introduction

The following sections identify the potential environmental impacts and assess them on the basis that appropriate mitigation will be applied. The mechanism for ensuring that this is the case will be the application of the Code of Construction Practice (CoCP), specifically the various Management Plans that the Concessionaire will be required to devise, agree with the Regulators and implement.

7.2 Contaminated Materials

The site investigation and analysis carried out to date has established the presence of contamination hotspots throughout the site. The contaminants that have been detected or are anticipated from knowledge of the past history of the area are well understood. The potential effects of the escape of these contaminants into the surrounding environment are well known as are the means available to control such escapes.

The potential for environmental impacts arising from the presence of contaminants in elements of the excavation and construction materials must underpin the extraction, handling, storage, use and disposal methods employed.

Appropriate observation and sampling methodologies must be employed and detailed contingency plans must be in place to deal with seriously contaminated materials requiring specialist handling or treatment.

It is anticipated that the 'Contaminated Land Management Plan' and the would deal with this aspect. Appropriate implementation of these would reduce the environmental impacts to minor adverse.

7.3 Transportation

Transportation is common to all off-site disposal options. Road transport has the potential for the environmental impacts from noise, dust & fumes, and traffic congestion. These impacts would be most significant in close proximity to the access/departure points at the site.

The key to minimising the transportation impacts is traffic management. The CoCP requires the Concessionaire to devise a 'Traffic Management Plan' the content of which in combination with the requirements of the 'Spoil and Waste Management Plan' and 'Dust and Air Pollution Management Plan' should reduce the environmental impacts to minor adverse.

7.4 On-site Treatment and/or Storage

The most significant operation within this category in volume terms is the dewatering of the dredged materials. This is to take place in the western half of the former Mercantile Docks site. There are two types of material that will require dewatering:

- Contaminated unusable material (Dredged Silts, clays and made ground) judged unsuitable for sea disposal.
- The sands and gravels for replacing in the immersion trench.

The dewatering process consists of the placing of the material within a bunded area and the collection of the water as it drains from the material in a settlement pond.

The nature of a proportion of the unusable material may require treatment with a hydro-phyllic material (e.g. Cement or pfa) to speed up the dewatering process. As a potential contaminant itself, the hydro-phyllic material will require appropriate handling. This treatment

has the effect of increasing the bulk of the material. There will therefore be an increase in transportation impacts associated with the delivery of the hydro-phyllic material to the site and the increased bulk of the material to be despatched to landfill.

There is the potential for odour from the silt element of the dredged material as it dries. In the event this occurs it would be controlled by the standard landfill procedure of covering it with 'inert' materials and its removal from site at the earliest opportunity.

The surface water management system will include the monitoring of the collected water to ensure that it remains within the quality and quantity terms of the necessary discharge licence. In the event of unacceptable levels of contamination the liquid would be tinkered off-site to an appropriate liquid disposal facility.

The size of the stockpiles of dewatered sand and gravels awaiting re-use may require treatment to avoid windblow although the period of time that the stockpiles will be at their largest is relatively short. This would be achieved by sealing the surface or covering the stockpiles.

The movement of plant and machinery on the site could have the potential for noise impact. However, the distance to residential property and the topography of the site make this unlikely. In any event working hours limitations could be applied to minimise any impact.

It should be noted that the use of the former Mercantile Docks site is of relatively short duration, any impacts are therefore of a temporary nature even within the timescale of the NTC project programme.

Activities at the former Mercantile Docks would be regulated by the Traffic, Noise and Vibration, Dust and Air Pollution, Surface and Ground Water, and Spoil and Waste Management Plans. This should reduce the environmental impacts to minor adverse.

7.5 Strategic

The ES identified that to dispose of all of the surplus materials to landfill (330k m³) would have a moderate adverse impact on the Tyne & Wear Unitary Authorities landfill capacity (55%) in one year. The ES also concluded that the current licensing limits on quantity and 'quality' of inputs may not be sufficient to cater for this worst case volume.

The analysis set out in Section 5 (Appendix B figs. 1-7) identifies the maximum quantity of material that would have to be disposed of to landfill without any offsite re-use or recycling, and assuming that the option of at sea disposal is discounted, is 317.2k m³. However, analysis of the programme splits this total between Project Year 1 – 110.7k m³ and Project Year 2 – 206.5k m³. In percentage terms 18.9% and 35.3%

The analysis contained in Section 5 and Appendix B, figures 1 to 7 provides the following estimates of the potential minimum to landfill:

	Project Year 1	Project Year 2	Total
North	0.1k m ³	23.2k m ³	23.3k m ³
South (including dredged)	19.6k m ³	29.6k m ³	49.2k m ³
Total	19.7k m ³	52.8k m ³	72.5k m ³

I have examined a number of current Waste Management Licences (held on our files) and established that these typically allow for 50-75k m³ per annum of construction & demolition and/or 'difficult' wastes. If the 52.8k m³ was split between the 14 sites identified by the ES this would be an average of 3.77 km³ per site.

The Construction Code of Practice (Hierarchy of Sustainability) requires the production of a Spoil and Waste Management Plan. This envisages considerable efforts to minimise the quantity of material going to landfill. The currently available landfill capacity in the area is

therefore considered capable of absorbing this material and with the reasonably diligent application of the principles of the Hierarchy of sustainability the impact would be reduced to minor adverse.

8. CONCLUSION

The review of the work undertaken to prepare the Environmental Statement and subsequently in the ongoing refinement of the NTC project proposals has not identified anything which would cause the assessment of the overall environmental impact of the “Construction ‘Waste’ Generation and Disposal” to be changed from ‘Minor Adverse’.

Within the context of properly formulated and implemented environmental Management Plans as envisaged by the Construction Code of Practice, the identified environmental impacts are readily capable of mitigation.

Appendix A of Appendix
A

Terminology
Definitions

A1.1 THE SITE

The area of the NTC project contained within the TWO application

A1.2 DISPOSAL

The means by which materials generated by the project are finally dealt with within the project or externally.

A1.3 RE-USE

The beneficial use of 'as dug' or dry screened materials. In other words without any processing or mixing with imported materials

A1.4 RE-USE ON-SITE

Materials excavated on-site and either moved from its point of extraction, or from temporary stockpiles on-site, for a beneficial use on-site. This would include environmental uses – landscaping, visual or acoustic screening as well as construction or engineering uses. For the purposes of this study re-use on a site immediately adjacent to the Site is included in this category.

A1.5 RE-USE OFF-SITE

Materials excavated on-site and moved from its point of extraction or from temporary stockpiles on-site, for a beneficial use off-site.

A1.6 RECYCLE

The processing of materials from the Site for a beneficial use. This would include crushing, screening (except dry screening on its own, see A1.2) and/or mixing with imported materials.

A1.7 RECYCLE ON-SITE

As above (A1.6) on-site for an on-site use

A1.8 RECYCLE OFFSITE

As above (A1.6) offsite for an offsite use

A1.9 DEDICATED RECYCLING OPERATION

Temporary off-site recycling operation solely for materials from the site

A1.10 ON-SITE LANDFILL

The placing of material on part of the site for no other purpose than to dispose of it.

A1.11 DEDICATED LANDFILL SITE

A Greenfield landfill development solely for NTC project material or an existing landfill acquired solely for NTC project material.

Appendix B of Appendix
A

**Figures 1 to 7 -
Analysis of Quantities**

Figure 1 North Side Demolition and Site Clearance

Works Description	Potential Route	Type	Destination /Quantity	Description	
Demolition and Site Clearance 1.3 k m ³	On-site (To early for significant quantity)	INERT	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle – 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for onsite landfill	
		NON – HAZARDOUS	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle - 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for onsite Landfill	
		HAZARDOUS	N/A	No potential for use or Landfill onsite	
		Off-site 1.3 k m ³	INERT	Re-use – 0k m ³	Possible use as coarse fill
				Recycle – 0k m ³	Most likely as feed for recycled aggregates
	Landfill – 0k m ³			Least sustainable option	
	NON – HAZARDOUS 1.2 k m ³		Re-use – 0.4k m ³	Possible use as coarse fill	
			Recycle – 0.8k m ³	Most likely as feed for recycled aggregates	
			Landfill – 0k m ³	Least sustainable option	
	HAZARDOUS 0.1 k m ³		Re-use – N/A	No potential for reuse	
			Recycle – N/A	No potential for recycling	

Summary and Annual Apportionment

Total Estimate	1.3k m ³	
Project Year 1	1.3k m ³	0.1k m ³ to Landfill 1.2k m ³ to Re-use/Recycle Off-site
Project Year 2	Nil	

Figure 2 North Side Diaphragm Wall Material

Works Description	Potential Route	Type	Destination/Quantity	Description	
Diaphragm Wall Material 22.4k m ³	On-site (On-site opportunity limited by program)	INERT	Re-use - 0k m ³	Would require stockpile and would displace cut materials	
			Recycle - 0k m ³	Would require stockpile and would displace cut materials	
			Landfill - N/A	No potential for on-site Landfill	
		NON - HAZARDOUS	Re-use - 0k m ³	Would require stockpile and would displace cut materials	
			Recycle - 0k m ³	Would require stockpile and would displace cut materials	
			Landfill - N/A	No potential for on-site Landfill	
		HAZARDOUS	N/A	No potential for use or on-site Landfill	
			INERT 5.2 k m ³	Re-use - 5.2k m ³	Natural ground used for bulk fill
				Recycle - 0k m ³	Natural ground used in recycled aggregate production
	Landfill - 0k m ³	Least sustainable option			
	Off-site 22.4 k m ³	NON - HAZARDOUS 10.4k m ³	Re-use - 10.4 m ³	Made ground used for bulk fill	
			Recycle - 0k m ³	Made ground used in recycled aggregate production	
			Landfill - 0k m ³	Least sustainable option	
		HAZARDOUS 6.8k m ³	Re-use - N/A	No potential for reuse	
			Recycle - N/A	No potential for recycling	
Landfill - 6.8k m ³			Contaminated made ground		

Summary and Annual Apportionment

Total Estimate	22.4k m ³	
Project Year 1	Nil	
Project Year 2	22.4k m ³	6.8k m ³ to landfill 15.6k m ³ to Re-use/Recycle Off-site

Figure 4 South Side Demolition and Site Clearance

Works Description	Potential Route	Type	Destination/Quantity	Description	
Demolition and Site Clearance 4.7k m ³	On-site (To early for significant quantity)	INERT	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle – 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for on-site Landfill	
		NON – HAZARDOUS	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle – 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for on-site Landfill	
		HAZARDOUS	N/A	No potential for use or Landfill on-site	
		Off-site 4.7 k m ³	INERT	Re-use – 0k m ³	Possible use as coarse fill
				Recycle – 0k m ³	Most likely as feed for recycled aggregates
	Landfill – 0k m ³			Least sustainable option	
	NON – HAZARDOUS 4.2 k m ³		Re-use – 2.1k m ³	Possible use as coarse fill	
			Recycle – 2.1k m ³	Most likely as feed for recycled aggregates	
			Landfill – 0k m ³	Least sustainable option	
	HAZARDOUS 0.5 k m ³		Re-use – N/A	No potential for reuse	
			Recycle – N/A	No potential for recycling	
Landfill – 0.5k m ³			Contaminated and un-recyclable residue		

Summary and Annual Apportionment

Total Estimate	4.7k m ³	
Project Year 1	4.7k m ³	0.5k m ³ to landfill 4.2k m ³ to Re-use/Recycle Off-site
Project Year 2	Nil	

Figure 5 South Side Diaphragm Wall Material

Works Description	Potential Route	Type	Destination/Quantity	Description	
Diaphragm Wall 49.3k m ³	On-site (On-site opportunity limited by program)	INERT	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle – 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for on-site Landfill	
		NON – HAZARDOUS	Re-use – 0k m ³	Would require stockpile and would displace cut materials	
			Recycle – 0k m ³	Would require stockpile and would displace cut materials	
			Landfill – N/A	No potential for on-site Landfill	
		HAZARDOUS	N/A	No potential for use or Landfill on-site	
		Offsite 49.3k m ³	INERT 29.6k m ³	Re-use – 29.6k m ³	Natural ground used for bulk fill
				Recycle – 0k m ³	Natural ground used in recycled aggregate production
	Landfill – 0k m ³			Least sustainable option	
	NON – HAZARDOUS 14.8k m ³		Re-use – 14.8 m ³	Made ground used for bulk fill	
			Recycle – 0k m ³	Made ground used in recycled aggregate production	
			Landfill - 0k m ³	Least sustainable option	
	HAZARDOUS 4.9k m ³		Re-use – N/A	No potential for re-use	
			Recycle – N/A	No potential for recycling	
Landfill – 4.9k m ³			Contaminated made ground		

Summary and Annual Apportionment

Total Estimate	49.3k m ³		
Project Year 1	80.1%	4.7k m ³	3.9k m ³ to landfill 35.6k m ³ to Re-use/Recycle Off-site
Project Year 2	19.9%	9.8k m ³	1.0k m ³ to landfill 8.8k m ³ to Re-use/Recycle off-site

Figure 6 South Side Cut Materials

Works Description	Potential Route	Type	Destination/Quantity	Description	
Cut materials 185.0k m ³	On-site 115.0 k m ³	INERT 34.5k m ³	Re-use – 34.5k m ³	Tunnel cover	
			Recycle – 0k m ³	Limited potential for on-site recycling facility	
			Landfill - N/A	No potential for onsite Landfill	
		NON – HAZARDOUS 80.5k m ³	Re-use – 80.5k m ³	Tunnel cover	
			Recycle – 0k m ³	Limited potential for on-site recycling facility	
			Landfill – N/A	No potential for on-site Landfill	
		HAZARDOUS	N/A	No potential for use or Landfill on-site	
			INERT 17.2k m ³	Re-use – 8.6k m ³	Use as bulk fill
				Recycle – 8.6k m ³	Natural ground to recycled aggregates
	Landfill – 0k m ³	Least sustainable option			
	Off-site 70.0k m ³	NON – HAZARDOUS 34.3k m ³	Re-use – 17.1k m ³	Use as bulk fill	
			Recycle – 17.2k m ³	Natural/made ground to recycled aggregates	
			Landfill – 0k m ³	Least sustainable option	
HAZARDOUS 18.5k m ³		Re-use – N/A	No potential for reuse		
		Recycle – N/A	No potential for recycling		
		Landfill – 18.5k m ³	Contaminated made ground and surface materials		

Summary and Annual Apportionment

Total Estimate	185.0k m ³		
Project Year 1	58.0%	107.3k m ³	10.7k m ³ to Landfill 29.9k m ³ to Re-use/Recycle Off-site 66.7k m ³ to Re-use/Recycle On-site
Project Year 2	42.0%	77.7k m ³	7.8k m ³ to Landfill 21.6k m ³ to Re-use/Recycle Off-site 48.3k m ³ to Re-use/Recycle On-site

Figure 7 Dredged Materials

Works Description	Potential Route	Type	Destination/Quantity	Description	
Dredging 298.0k m ³	On-site 159.0 k m ³	INERT	Re-use - N/A	Cannot be re-used in saturated state	
			Recycle – 0k m ³	Lack of space. Limited potential	
			Landfill - N/A	No potential for onsite Landfill	
		NON – HAZARDOUS 159.0k m ³	Re-use – N/A	Cannot be re-used in saturated state	
			Recycle - 159k m ³	Dewatered and temporarily stocked	
			Landfill – N/A	No potential for on-site Landfill	
		HAZARDOUS	N/A	No potential for re-use or Landfill on-site	
			INERT 56.9k m ³	Re-use – N/A	Transportation in saturated state not viable
				Recycle – 0k m ³	Lack of space. Limited potential
	Landfill – 56.9k m ³	To sea			
	Off-site 139.0k m ³	NON – HAZARDOUS 56.8k m ³	Re-use –0k m ³	Cannot be re-used in saturated state	
			Recycle –0k m ³	Transportation in saturated state not viable	
			Landfill – 56.8 m ³	To sea	
		HAZARDOUS 25.3k m ³	Re-use – N/A	No potential for re-use	
			Recycle – N/A	No potential for recycling	
Landfill – 25.3 m ³			Dewatered and to landfill		

Summary and Annual Apportionment

Total Estimate	298.1 m ³		
Project Year 1-	17.7%	52.8k m ³	28.1k m ³ to stock Re-use/Recycle On-site 4.5k m ³ to Landfill 20.1k m ³ to sea
Project Year 2-	82.3%	245.3k m ³	130.9k m ³ to stock Re-use/Recycle On-site 20.8k m ³ to Landfill 93.6k m ³ to sea

Appendix C to Appendix
A

**Calculations of Dredge
Volumes**

NEW TYNE CROSSING - IMMERSSED TUBE TUNNEL**Calculations of dredge volumes for immersed tunnel (805 to 1183)****Volumes per section in m³**

chainage	805	850	910	945	1025	1090	1130*	1155	1183	
from	805	810	880	925	960	1080	1110	1130	1175	SUM
to	810	880	925	960	1080	1110	1130	1175	1183	
Top MG	1138						3388	3960	896	9381 m ³
Top AC	613	14700			31200	21330	7778		512	76132 m ³
Top AG			8663	27090	92880	12293				140925 m ³
Top GC1										0 m ³
Top LC1										0 m ³
Top GC2	994	13650	8775	2940						26359 m ³
Top GG		2573		1820	13680					18073 m ³
Top LC2								3960	384	4344 m ³
Top GC3						4043	1523	1800	256	7621 m ³
Top M&S			1654	158	3300	1901	1380	5580	1248	15221 m ³
Total	2744	30923	19091	32008	141060	39566	14068	15300	3296	298055 m³
Total/m'	549	442	424	915	1176	1319	703	340	412	789

*) volumes reduced by 50% to allow for "bowl shape" of excavation

Highlighted figures are the quantities from which the 'contaminated' volumes are derived.

Volumes for sections 805 to 925; 925 to 1130 and 1130 to 1183 (i.e. building dock, river and south cofferdam)

from	805	925	1130	SUM
to	925	1130	1183	
Top MG	1138	3388	4856	9381 m ³
Top AC	15313	60308	512	76132 m ³
Top AG	8663	132263	0	140925 m ³
Top GC1	0	0	0	0 m ³
Top LC1	0	0	0	0 m ³
Top GC2	23419	2940	0	26359 m ³
Top GG	2573	15500	0	18073 m ³
Top LC2	0	0	4344	4344 m ³
Top GC3	0	5565	2056	7621 m ³
Top M&S	1654	6739	6828	15221 m ³
Total	52758	226701	18596	298055 m³
Total/m'	440	1106	351	789

Elevation of boundaries in mOD

chainage	805	850	910	945	1025	1090	1130	1155	1183
Top MG	4.00						-4.00	-2.00	4.00
Top AC	-2.50	-2.00			-10.00	-7.00	-6.50		-3.00
Top AG			-6.50	-9.00	-12.00	-13.00			
Top GC1									
Top LC1									
Top GC2	-6.00	-8.00	-12.00	-18.00					
Top GG	-16.00	-14.50		-20.00	-21.00				
Top LC2								-7.50	-7.00
Top GC3						-18.50	-15.00	-13.00	-10.00
Top M&S	-22.00	-19.00	-18.50	-22.00	-24.00	-22.00	-18.50	-15.50	-12.00
excavation depth*	-13.50	-16.25	-20.25	-22.25	-25.25	-25.25	-24.25	-23.25	-21.75

Cross section

chainage	805	850	910	945	1025	1090	1130	1155	1183
from	805	810	880	925	960	1080	1110	1150	1175
to	810	880	925	960	1080	1110	1150	1175	1183
Level	width	width	width	width	width	width	width	width	width
4	35.00	--	--	--	--	--	--	--	16.00
3	35.00	--	--	--	--	--	--	--	16.00
2	35.00	--	--	--	--	--	--	--	16.00
1	35.00	--	--	--	--	--	--	--	16.00
0	35.00	--	--	--	--	--	--	--	16.00
-1	35.00	--	--	--	--	--	--	--	16.00
-2	35.00	35.00	--	--	--	--	--	16.00	16.00
-3	35.00	35.00	--	--	--	--	--	16.00	16.00
-4	35.00	35.00	--	--	--	--	143.50	16.00	16.00
-5	35.00	35.00	--	--	--	--	135.50	16.00	16.00
-6	35.00	35.00	--	--	--	--	127.50	16.00	16.00
-7	35.00	35.00	35.00	--	--	142.50	119.50	16.00	16.00
-8	35.00	35.00	35.00	--	--	134.50	111.50	16.00	16.00
-9	35.00	35.00	35.00	122.00	--	126.50	103.50	16.00	16.00
-10	35.00	35.00	35.00	114.00	138.00	118.50	95.50	16.00	16.00
-11	35.00	35.00	35.00	106.00	130.00	110.50	87.50	16.00	16.00
-12	22.00	33.00	35.00	98.00	122.00	102.50	79.50	16.00	16.00
-13	18.00	29.00	35.00	90.00	114.00	94.50	71.50	16.00	16.00
-14	--	25.00	35.00	82.00	106.00	86.50	63.50	16.00	16.00
-15	--	21.00	35.00	74.00	98.00	78.50	55.50	16.00	16.00
-16	--	17.00	33.00	66.00	90.00	70.50	47.50	16.00	16.00
-17	--	--	29.00	58.00	82.00	62.50	39.50	16.00	16.00
-18	--	--	25.00	50.00	74.00	54.50	31.50	16.00	16.00
-19	--	--	21.00	42.00	66.00	46.50	26.50	16.00	16.00
-20	--	--	17.00	34.00	58.00	38.50	24.50	16.00	16.00
-21	--	--	--	26.00	50.00	30.50	22.50	16.00	16.00
-22	--	--	--	18.00	42.00	22.50	20.50	16.00	--
-23	--	--	--	--	34.00	20.50	18.50	16.00	--
-24	--	--	--	--	26.00	18.50	16.50	--	--
-25	--	--	--	--	18.00	16.50	--	--	--
-26	--	--	--	--	--	--	--	--	--

Appendix D to Appendix
A

**Estimated Re-use,
Recycling and Disposal
of Hard C&D and
Excavation Waste for
the North-East**

ESTIMATED RE-USE, RECYCLING AND DISPOSAL OF HARD C&D AND EXCAVATION WASTE FOR THE NORTH-EAST

The following figures have been abstracted from Table 1 of the 'Survey of Arisings and Use of Construction and Demolition Waste in England and Wales 2001.

Category	North-East		England		
	M tonnes	%	M tonnes	%	
Used as recycled aggregate	1	3.59	48	36.47	41
Used as recycled soil	2	0.66	8.8	6.81	7.7
Used for landfill engineering or restoration	3	0.74	9.9	8.75	9.8
Used to backfill quarry voids	4	0.94	12.6	10.59	11.9
Spread on registered exempt sites	5	1.22	16.4	22.4	25.2
Disposed of at landfills	6	0.32	4.3	3.87	4.4
Total arisings		7.46	100	88.89	100

Appendix E to Appendix
A

**Calculation of
Demolition and Site
Clearance Volumes**

CALCULATIONS OF DEMOLITION AND SITE CLEARANCE VOLUMES

The calculation of the demolition arisings from the buildings and structures is based on a crude volumetric calculation as follows.

A 6m high building measuring 10m by 10m with 0.3m thick walls will yield approximately 70m³ of aggregate material. A further 20m³ is added to allow for eaves to ridge, solid internal walls, chimney stacks and outhouses etc.

For every 100m² of the floor area of each structure 90m³ of aggregate material has been allowed, adjusted for any relevant conditions where these are known (e.g. single storey structures).

The following list illustrates the approximate multipliers for each structure identified:

North

AMEC offices	6
Gatehouse/substation	5
Workshop	1

South

Gaslight Public House	2
Used Car Showroom	2
61-71 Commercial Road (6 flats)	2
St Peters Junior and Infant School	10
Grange Nursing Home	15
Electricity substation	0.5
280-290 High Street (6 flats)	3
207-219 High Street (4 flats, 1 house and a shop)	4
31-37 Salem Street (4 bungalows)	5

A further 20% was added to allow for bulking.

The final totals were:

North	4700m ³
South	1300m ³
Total	6000m ³

Appendix F to Appendix
A

**Dredging and the
Disposal of Dredged
Material at Sea -
Explanatory Notes
(MCU 3)**

Dredging and the Disposal of Dredged Material at Sea

Explanatory Notes for form MCU 3

The following notes should be read carefully, in conjunction with the accompanying Guidance Notes, before completing the application form MCU 3 for a licence under the Food and Environment Protection Act 1985 (FEPA) and/or a consent under the Coast Protection Act 1949 (CPA) (or approval under any other legislation) for dredging operations and the disposal at sea of dredged material.

The Marine Consents and Environment Unit (MCEU) is an alliance between DEFRA Marine Environment Branch and DTLR Ports Division which provides a central facility for receipt of applications and the subsequent administration of all marine works for which approval is necessary under the legislation listed overleaf. Form MCU 3 can be used for an application for one or more of the consents required. The MCEU maintains a database of all applications and licences issued. This data may be made available to DEFRA, DTLR and the National Assembly for Wales, and will be used in connection with the processing and administration of the consents to which it relates, including consultation with such bodies that the MCEU considers have an interest (see the Data Protection section of the Guidance Notes).

Prior to making an application under the CPA you are advised to approach any local bodies with navigational interests to discuss the proposals. In particular the applicant should consult any private individuals or bodies who may have moorings, jetties or other facilities in the area. Where the applicant has undertaken such consultations, it will assist the MCEU if details are enclosed with the application. If a local harbour works licence is required this should also be obtained prior to making an application and a complete copy forwarded to the MCEU with the application. The MCEU will not normally consider the CPA application until this has been provided.

Legislation

- **Coast Protection Act 1949, (Section 34)**
- **Food and Environment Protection Act 1985 Part II**
- **Any other legislation (where the Secretary of State's approval is required)**

These Acts have been amended by several pieces of legislation, full details of which can be found in the accompanying Guidance Notes. In particular, the Conservation (Natural Habitats &c.) Regulations 1994 have placed a general requirement on all licensing authorities to consult with the relevant conservation body over any licensable operation that may have an impact on a designated European conservation site.

Under Section 34 of the Coast Protection Act 1949 the consent of the Secretary of State for Transport, Local Government and the Regions is required for the following operations:

- (i) the construction, alteration or improvement of any works on, under or over any part of the seashore lying below the level of mean high water springs;
- (ii) the deposit of any object or materials below the level of mean high water springs;
- (iii) the removal of any object or materials from the seashore below the level of mean high water springs (e.g. dredging).

The Continental Shelf Act 1964 extends the requirements under i. and iii. above to any part of the seabed in designated areas outside the territorial waters.

The purpose of the control under Section 34 of the CPA is primarily to ensure that works do not endanger the safety of navigation. However, the potential environmental impacts of such works may also have to be considered under the Harbour Works (Environmental Impact Assessment) Regulations 1999. The Act does not apply to works in non-tidal inland waters.

Under the Food and Environment Protection Act 1985 (FEPA), a licence is required for:

- (i) the disposal of waste at sea (primarily dredged material including its use for beneficial purposes);
- (ii) the placement of material during construction and related activities; and

- (iii) the introduction of tracers and biocides and certain other activities in the marine environment.

FEPA licences are issued by the Secretary of State for the Department for Environment, Food and Rural Affairs, and for operations within Welsh waters by the National Assembly of Wales. Applications for such licences are administered on behalf of both Licensing Authorities by the MCEU. Under FEPA, the 'sea' includes any area that is submerged at mean high water spring tide (MHWS).

Applications that may have the potential to affect a designated European conservation site will also be subject to the provisions the Conservation (Natural Habitats &c.) Regulations 1994 (including sites proposed for designation).

Further details of the geographical scope, the objectives of such controls and the activities to which they are applied are given in the Guidance Notes. If you are in any doubt about whether or not your proposed work requires a licence, please contact the MCEU.

General consents information

Applications normally take at least 10 weeks to process, but often may take longer. If a licence is required urgently, please give full details in a covering letter with your application. We cannot guarantee to reach a licensing decision by a specific date. Whenever possible applications should be made in good time to allow the MCEU sufficient time to reach a licensing decision before the proposed commencement date of the works.

Consents or licences for the proposed works may also be required from other bodies including the local planning authority and the Crown Estate. It is the responsibility of the applicant to obtain any other consents or licences that may be required.

Failure to secure a licence or consent, or to comply with the conditions attached to such a licence or consent, may constitute an offence under the Acts; **it may also put lives at risk.**

7. **Duration of dredging operation**
Please provide dates indicating the expected duration of the dredging operations. You are reminded that we normally require a minimum of 8 weeks to process an application and, in the case of complex, sensitive or contentious projects, it may be substantially longer. Where difficulties arise which suggest that we will be unable to meet your target start date, we will advise you of the reasons and likely delays.

Licences/consents will normally be issued for up to 3 years, after which you may apply for replacement consent. It is the licensee's responsibility to apply for a replacement licence/consent. The MCEU will aim to write 3 months prior to the expiry date of any licence/consent to remind the licensee that a replacement licence/consent should be applied for.

8. **Details of dredging and disposal vessel(s)**
The name, operator and type of vessel (including the type of dredging plant e.g. cutter-suction) should be entered. We maintain a database of vessels but may need to ask you to complete a separate form (MCU 12) to provide details for any vessel for which we do not hold up-to-date information.

If vessel details are not available at the time of application please indicate this on the form. Vessel details are generally included within a licence/consent. The MCEU may issue a licence with a condition that the name and operator of any vessel to be used must be agreed in writing before any activity permitted by the licence/consent may commence. In such cases, a variation charge will usually be payable.

9. **Method statement**
Please provide a full method statement of the dredging operation. This should include details such as the rate of dredging, timing of the operation, order of the areas to be dredged, and the precautions taken to protect navigation and the environment.

10. **Details of areas to be dredged**
This section requires data to be provided about the source area to be dredged and the type of material to be deposited.

Area – an annotated chart should be provided of suitable scale to show the areas which it is proposed to dredge: these should be named and the names and latitude/longitude co-ordinates in degrees and decimal minutes (to 2 decimal places) given at columns 1 and 2 of the table.

Nature of dredge area – please provide a description of the type of area to be dredged i.e. river bed, sea, harbour.

Date area last dredged – please indicate the date (month and year) when the area was last dredged if known. This information will be taken into account by the MCEU in deciding whether the material for deposit is 'capital' or 'maintenance' – see Guidance Notes Annex 3.

If any of the areas have been dredged within the preceding 10 years, the applicant should provide supplementary information to show how the level to which it is now proposed to dredge (in relation to chart datum) compares to the level to which the area was previously dredged.

11. **Details of the material to be dredged**
Information is required in respect of each of the areas listed in the answers to question 9. The applicant should indicate whether the material to be dredged is considered to be 'capital' or 'maintenance' by reference to the definitions given in the Guidance Note (Annex 3). The type of material and its estimated specific gravity should be entered at columns 1 and 2 of the table.

Composition of the material – please indicate the approximate proportions by volume of the different types of dredgings which are expected to be removed from each area. For the purposes of this application the following descriptions should be used:

Average particle size (based on the Wentworth Table)		
Description	Lower range	Upper range
Boulders	256 mm+	
Cobbles	64 mm	256 mm
Pebbles	4 mm	64 mm
Granules	2 mm	4 mm
Sand	62 microns	2 mm
Silt and clay		62 microns

Depth to be removed – please indicate the maximum depth below the current seabed to which it is expected dredging is to be carried out.

Quantity – the amount of material to be dredged (per year if the works are expected to exceed 12 months) from each area should be given, either in metric tonnes or in-situ cubic metres.

12. Dredged material: additional information

Information should be given about any anticipated contamination in any area to be dredged e.g. waste discharges or man-made rubbish or industrial activity in close proximity.

Type of dredger – please indicate the type of dredging plant to be used within each area.

Beneficial uses – the table should indicate where it is intended that any material to be removed from each area may be used beneficially – including its redeposit to mitigate the impact of any dredging – or disposed of on land. More details of each should be given in the answer to question 13.

13. Dredged material quality

As part of the Unit's consideration of your application an assessment will be made of the chemical and physical characteristics of the material to be deposited at sea and its potential effects upon the marine environment.

You are likely to be asked to provide representative samples for analysis of the material to be dredged. In such cases, samples should be at specified locations and depths and placed in containers (which will be provided) and returned to our marine science laboratory. Please indicate in your answers to this question whether the material from any of the areas to be dredged has been chemically analysed within the past 3 years (if yes, please provide details (locations, dates, results) on a separate sheet).

Please indicate whether samples can be provided now if required and, if not, when they may be available, noting that any delay in providing samples is liable to extend the time required to consider your application.

14. Construction/land reclamation projects

Consents are also required for works which involve the placement of material in the sea during construction works – including beach nourishment, marine/harbour works, land reclamation, outfalls, sea walls etc. In such cases a separate application will need to be made on form MCU 5.

Please indicate in the answer to this question if the deposit of dredgings is associated with works that also involve some marine construction or land reclamation. If this is the case, please indicate if a separate licence application has been made for the construction element.

15. Alternative means of disposal

Section 8(2) of FEPA places a specific responsibility on the MCEU to have regard to the practical availability of alternatives of disposing of material at sea. **It is important that this question is answered fully otherwise your form is liable to be returned to you thereby delaying processing of the application.**

Apart from disposing of dredged material on land, there may be a variety of possible alternative uses, to which dredgings may be put. These options will depend upon a number of factors, including the physical nature of the material, the degree of any chemical contamination, geographical location, type and size of dredger used, availability and timing of any local schemes for coast defence, land reclamation etc.

Where an environmental impact assessment identifies the likelihood of an adverse impact from the dredging (i.e. excavation) operation, it may be necessary to consider using some of the material dredged to mitigate these effects. Equally, the MCEU policy is that maximum use should be made of any dredged material both to ensure that habitats are sustained or improved and that valuable resources, such as marine aggregate are not disposed of.

The accompanying Guidance Note (Annex 5) offers a means of identifying various options though these are not exhaustive. Potential available options should be examined and costed. Applicants are likely to need to establish contact with the Local Authority and/or the Environment Agency, for example, to consider flood defence and coast protection opportunities as well as landfill or reclamation. Nature conservation agencies should be approached regarding possible habitat enhancement.

It is recognised that some options would take a significant time to develop and this will be taken into account by the Unit in dealing with on-going maintenance schemes.

16. Consultation with Conservation bodies

Details of any consultation that has taken place with either English Nature (EN) or the Countryside Council for Wales (CCW) and, if appropriate, copies of any correspondence should be included with your application. This may speed up the processing of your application since the MCEU is likely otherwise to consult EN or CCW.

17. **Designated conservation area**

Please indicate whether any of the dredging or disposal operations falls within the boundaries of a designated conservation area.

18. **Applicant's statutory powers**

Please describe in the answer to this question what (if any) statutory responsibilities you (or your client) have to consent any aspect of the dredging works, including the deposit of material arising. This is particularly likely to apply to harbour or local authorities.

19. **Environmental assessment**

Please indicate whether any environmental assessment has been carried out in respect of the dredging/disposal works proposed, either under your own powers or as required by another authority. If such an assessment has been made, please indicate if a copy has been provided with your application and if and where a copy has been, or is being, made available for public inspection.

20. **Food and Environment**

Protection Act Public Register

The Deposits in the sea (Public Registers of Information) Regulations 1996 require that all information contained within or provided in support of an application for a consent will be accessible in the Public Register unless the Licensing Authority approves the applicant's reason(s) for seeking to withhold all or part of it.

If placing any or all the details of this application and any subsequent licence on this Register would, in your opinion, be contrary to the interests of national security or liable to prejudice to an unreasonable degree your or some other person's interests, please tick the appropriate box and provide full justification on a separate sheet. If your case for withholding this information is accepted by the Licensing Authority, an entry will be made on the Public Register to the effect that application and/or licence details have been withheld and on what basis. **Your application form will be returned if this question is not answered.**

The decision to support withholding information from the Register will be reviewed after a period not exceeding four years from the date of the decision.

Other Considerations

Applicants should also be aware of the need to pay due regard to archaeological matters and attention is drawn to the Code of Practice issued by the Joint Nautical Archaeological Policy Committee entitled "Heritage at Sea". Copies are obtainable from the National Monuments Records Centre, Kemble Drive, Swindon SN2 2GZ. For works proposed in Welsh waters, please contact the Royal Commission on Ancient and Historical Monuments of Wales, Crown Building, Plas Crug, Aberystwyth, Dyfed SY23 1NJ.

Please ensure that you have:

- completed all sections of the application form;
- signed and dated the declaration;
- provided the correct number of relevant charts, and continuation sheets; and
- enclosed the correct payment (together with the remittance slip) or paid by means of BACS (if appropriate).

Your application will otherwise be delayed or returned to you.

Appendix B

Figures

IL Fig. 1 Comparison of Environmental Statement and 2003 Report Quantities**NEW TYNE CROSSING**

Extraction			Backfill		To Sea		To Land Landfill/re- use/recycle	
Dredged	141 300	<i>298 000</i>	25 600	<i>159 000</i>	68 200	<i>113 700</i>	47 500	<i>25 300</i>
	140 900		132 200		8 700			
	18 100		15 500		2 600			
	46 200				46 200			
	15 200				15 200			
Sub total	361 700	<i>298 000</i>	173 300	<i>159 000</i>	140 900	<i>113 700</i>	47 500	<i>25 300</i>
North	54 000	<i>77 700*</i>	23 500	<i>23 500</i>			30 500	<i>54 200</i>
	10 800						10 800	
Sub total	64 800	<i>77 700*</i>	23 500	<i>23 500</i>			41 300	<i>54 200</i>
South	231 200	<i>239 000*</i>	143 700	<i>115 000</i>			87 500	<i>124 000</i>
	35 700						35 700	
Sub total	266 900	<i>239 000*</i>		<i>115 000</i>			123 200	<i>124 000</i>
Total	693 400	<i>614 700</i>	340 500	<i>297 500</i>	140 900	<i>113 700</i>	212 000	<i>203 500</i>
	340 500							
Minus Backfill		<i>297 500</i>						
Surplus	352 900	<i>317 200</i>			No at-sea disposal		140 900	<i>113 700</i>
					Maximum Re-use or	to landfill recycle	352 900	<i>317 200</i>

Notes

- 1) ES figures standard type
- 2) 2003 Report figures italics
- 3) *Includes demolition and site clearance materials
- 4) Highlighted figures illustrate the maximum to landfill if there is no at sea disposal or off-site re-use/recycling. (i.e. the total surplus)

IL fig. 2 Environmental Statement Tables 19.2 & 19.3

TABLE 19.2: WASTE ARISING FROM DREDGING				
Dredging	Dredged (m³)	Backfill Requirements (m³)	To Landfill (m³)	To Landfill/Sea (m³)
<i>Quantities if disposal to sea is permitted</i>				
Made Ground & Alluvial Clay	141,300	25,600	47,500	68,200
Alluvial Sands & Gravels	140,900	132,300		8,700
Glacial Sand & Gravel	18,000	15,500		2,600
Glacial Clay	46,200			46,200
Rock	15,200			15,200
	361,700	173,400	47,500	140,900
<i>Quantities if disposal to sea is not permitted (worst case for disposal to landfill)</i>				
			188,300	

TABLE 19.3: WASTE ARISING FROM LAND BASED ACTIVITY			
	Excavation (m³)	Backfill (m³) Requirements	To Landfill (m³)
North			
Cut and cover	54,000	23,500	30,500
Diaphragm wall	10,800		10,800
South			
Cut and Cover	231,200	143,700	87,500
Diaphragm wall	35,700		35,700
TOTAL	331,700	167,200	164,500

The demolition and site clearance materials are not included in the quantities as it is not anticipated that this material would result in a significant increase in the quantities identified in Table 19.3.

IL Fig. 3 Environmental Statement Table 19.1

TABLE 19.1 SIGNIFICANCE CRITERIA	
Level Of Significance	Criteria/Indicators
Severe adverse	<ul style="list-style-type: none"> • Significant traffic disruption within, and potentially extending beyond, the study area occurring over a lengthy period of time and outside normal 'peak' hours. • Significant noise and vibration nuisances over a lengthy period, and which cannot be removed by mitigation measures. • Uncontrolled dust emission occurring beyond the study area for a very long period of time • Inevitable risks to ecology, water courses, human health. • Permanent loss of large proportion of the Region's void space engineered for special or other controlled waste, potentially resulting in an imminent need to explore alternative disposal site or create new facilities elsewhere.
Major adverse	<ul style="list-style-type: none"> • Traffic disruption at a local or district level and potentially for a lengthy period of time. Mitigation measures can only remove a small part of the problem. • Noise and vibration nuisances affecting a wide area and over lengthy period of time. Future operation of the sensitive receptors can be severely disrupted even with mitigation. • Dust emission at a localised or district level. Mitigation measures can only control some of the dust emission. • Potential risks to ecology, water courses and human health. The implementation of mitigation measures can only remove some of these risks. The residual impact on the environment and human can be potentially significant. • Significant reduction in the Region's void space engineered for special or other controlled waste. There is a need to create a suitable disposal facility in the short/medium run.
Moderate adverse	<ul style="list-style-type: none"> • Traffic disruption affecting a localised area and occurring for a short period of time. Mitigation measures can only remove some but not all effects. Some minor residual traffic problems are anticipated. • Noise and vibration nuisances can be perceived. Mitigation measures cannot remove all nuisances. Minor residual noise and vibration nuisances are likely to be experienced by some, if not all, sensitive receptors. • Localised level of dust emission is anticipated despite the implementation of mitigation measures. • Potential risks to ecology, water courses and human health but these can be reduced to an extent by mitigation measures. However, some minor residual effects on ecology and water courses can be anticipated. • Slight reduction in the Region's void space engineered for special or other controlled waste. There is need to review to the waste disposal strategy. In the long run, it may be necessary to investigate the possibility of creating a new facility.
Minor adverse	<ul style="list-style-type: none"> • Traffic disruption affecting a localised area and occurring for a short period of time. Mitigation measures can remove all potentially adverse

TABLE 19.1 SIGNIFICANCE CRITERIA	
Level Of Significance	Criteria/Indicators
	<p>effects.</p> <ul style="list-style-type: none"> • Noise and vibration nuisances may be perceived but these can be dealt with quite easily by mitigation measures. • Dust emission can be controlled and minimised by mitigation measures. • Potential risks to ecology, water courses and human health can be prevented or minimised by the implementation of mitigation measures. • Only a marginal reduction to the Region's void space engineered for special or other controlled waste (i.e. no significant impact on the overall remaining capacity.)
Not significant	<ul style="list-style-type: none"> • Effect is not noticeable and usually within the margin of forecasting error.
Beneficial	<ul style="list-style-type: none"> • Encourage re-use and recycling of waste

IL Fig. 4 'Hierarchy of Sustainability' as contained in the Code of Construction Practice

Hierarchy of Sustainability
On-site use (including opportunities immediately adjacent to the project)
On-site process (recycle) and use
Offsite use/existing recycling facility (including registered exempt sites)
Offsite dedicated recycling facility
Existing landfill
Dedicated landfill
Sea disposal
(Note: The table as set out above is applicable to all the materials except the dredged material where Sea Disposal is placed before the Landfill).

IL Fig. 7 Abstract from Table 1 of the Survey of Arisings and Use of Construction and Demolition Waste in England and Wales 2001 – Northeast and England**ESTIMATED RE-USE, RECYCLING AND DISPOSAL OF HARD C&D AND EXCAVATION WASTE FOR THE NORTH-EAST**

The following figures have been abstracted from Table 1 of the 'Survey of Arisings and Use of Construction and Demolition Waste in England and Wales 2001

Category	North-East		England		
	M TONNES	%	M tonnes	%	
Used as recycled aggregate	1	3.59	48	36.47	41
Used as recycled soil	2	0.66	8.8	6.81	7.7
Used for landfill engineering or restoration	3	0.74	9.9	8.75	9.8
Used to backfill quarry voids	4	0.94	12.6	10.59	11.9
Spread on registered exempt sites	5	1.22	16.4	22.4	25.2
Disposed of at landfills	6	0.32	4.3	3.87	4.4
Total arisings		7.46	100	88.89	100

II Fig 8 Extract from CEFAS Silt Sample Test Results – Howden Yard/Jetty

Port of Tyne (Various Sites)											
LSN	Sample	Site	TS%	AS	CD	CR	CU	HG	NI	PN	ZN
2002/3004	9-10	AMEC Howden Yard	52.2	8.1	0.62	29	45	0.44	17	85	223

(mg/kg ppm) wet weight

DEFRA/DAS: 31352 Port of Tyne			
DC: 5940			
Samples taken: 20/08/2001			
LSN	Sample No.	Site	dry weight
			DBT
2001/2148	13	Howdon Jetty	0.029
2001/2153	19	AMEC Howdon Yard	0.088

dry weight

Port of Tyne											
LSN	Sample No.	Site	TS%	AS	CD	CR	CU	HG	NI	PN	ZN
2001/2148	13	Howdon Jetty	57.4	7.6	0.57	27	35	0.14	16	74	191
2001/2153	19	AMEC Howdon Yard	74.2	12	1.1	36	45	0.2	20	118	296

(mg/kg ppm) wet weight

Shaded figures are between CEFAS Sediment Action Levels 1 and 2

Appendix C

**Published Extracts
from M.Schratzberger,
H.L.Rees and S.E. Boyd**

Publication Abstract

Effects of the simulated deposition of dredged material on the structure of nematode assemblages - the role of burial

M. Schratzberger, H.L. Rees and S.E. Boyd

A microcosm experiment was designed to evaluate the effects of the simulated deposition of uncontaminated dredged material on nematode assemblages from intertidal mud. The main objective was to assess the ability of nematodes to migrate vertically into native muddy and non-native sandy sediment which was deposited in different amounts and frequencies. Results from univariate and graphical methods of data evaluation revealed that nematodes were capable of migrating over a wide depth range from the bottom mud layer into the top layer of deposited sand and mud. A diverse mud assemblage was able to survive in non-native fine sand for the experimental period of two months. Results from multivariate analyses showed that the amount of deposit and the frequency of deposition were interactive factors. A high amount of sediment deposited once at the beginning of the experiment caused more severe changes in assemblage structure than the same amount deposited in more frequent but smaller doses. The response of most species to the experimental treatments appeared to be an integrated response to the enhancing effect of food input accompanying the deposit and the negative effect of burial. Upward migration of nematodes is a process which has often been underestimated in its importance for recolonisation of areas where uncontaminated dredged material is deposited. Active migration of nematodes can significantly affect the recovery of a dredgings disposal site.

Reference:

M. Schratzberger, H.L. Rees and S.E. Boyd, 2000. Effects of the simulated deposition of dredged material on the structure of nematode assemblages - the role of burial. *Marine Biology*, 136(3): 519-530

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Publication Abstract

Effects of the simulated deposition of dredged material on the structure of nematode assemblages - the role of sediment type and contamination

M. Schratzberger, H.L. Rees and S.E. Boyd

Certain criteria 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 and its predicted impacts at the disposal site. Although chemical analyses of dredgings provide an indication of the relative degrees of contamination, they do not provide a measure of any resultant biological effects. A laboratory experiment was therefore designed to investigate the effects of the degree of contamination and the role of burial, associated with the deposition of dredged material on the meiofauna. Estuarine nematode assemblages were exposed to the simulated deposition of uncontaminated, oxic intertidal mud and anoxic sediments from the Mersey and the Tees estuaries, both of which were contaminated with heavy metals. The sediments, which differed little in terms of grain size, were deposited in two different frequencies. Nematodes showed a clear species-specific response to the experimental treatments depending on the frequency of deposition and the chemical quality of the deposited material (e.g. metal and oxygen concentrations). Migration and survival rates were higher in uncontaminated estuarine mud than in Tees and Mersey sediments. The response of nematode assemblages was mainly determined by the deposition frequency rather than the type of sediment or the degree of contamination. The deposition of sediment in one large dose at the beginning of the experiment caused more severe changes in assemblage structure than the same quantity deposited in several smaller doses. High migration and survival rates in the contaminated high-frequency treatments might have been due to reduced bioavailability of metals and the tolerance of estuarine nematodes to metal contamination and the deposition of small sediment volumes at regular intervals. The observed trends demonstrate the potential of microcosm experiments for testing the quality of contaminated dredged material at the licensing stage, i.e. prior to the issue of a disposal licence.

Reference:

M. Schratzberger, H.L. Rees and S.E. Boyd, 2000. Effects of the simulated deposition of dredged material on the structure of nematode assemblages - the role of sediment type and contamination. *Marine Biology*, 137(4):612-622

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Appendix D

**Responses to
Objectors**

OBJ – Standard Objection Letter

• Issue:	• Description :	• Response:
<ul style="list-style-type: none"> • Spoil Disposal 	<p>Concern is expressed as regards the quantity, nature and degree of contamination of the surplus dredged material to be disposed of at sea</p>	<p>The quantity of material likely to be disposed of at sea is not 'massive' when viewed in the light of the quantities of dredged material from the Tyne disposed of annually. (TWPTA 8 Para. 8.13). The sand and gravels and other suitable materials are re-used to infill the trench leaving predominantly clays and silts rather than 'rock' for disposal. ES Table 19.2 (CD4 and TWPTA 8A Appendix B ILfig. 2) illustrates this. The contamination is generally similar to or less than that found elsewhere on the Tyne and in any event should unacceptable contamination hotspots be identified these would be separately removed for disposal to landfill. (TWPTA 8 Para. 6.12 – 6.16)</p>

**OBJ21
Celeste Hicks, 2 Carlton Terrace**

• Issue:	• Description :	• Response:
<ul style="list-style-type: none"> • Spoil Disposal 	<p>Mrs Hicks concerns are essentially the same as the Standard Objection Letter. Concern is expressed as regards the quantity, nature and degree of contamination of the surplus dredged material to be disposed of at sea</p>	<p>The quantity of material likely to be disposed of at sea is not 'massive' when viewed in the light of the quantities of dredged material from the Tyne disposed of annually. (TWPTA 8 Para. 8.13). The sand and gravels and other suitable materials are re-used to infill the trench leaving predominantly clays and silts rather than 'rock' for disposal. ES Table 19.2 (CD4 and TWPTA 8A Appendix B ILfig. 2) illustrates this. The contamination is generally similar to or less than that found elsewhere on the Tyne and in any event should unacceptable contamination hotspots be identified these would be separately removed for disposal to landfill. (TWPTA 8 Para. 6.12 – 6.16)</p>

OBJ 382 and SOC

Tyne Crossings Alliance

• Issue:	• Description :	• Response:
<ul style="list-style-type: none"> • Spoil 	<p>The TCA are concerned about</p>	<p>The ES (CD4 para 19.8.3) refers to a theoretical requirement equivalent to 55% of the three Tyne &</p>

Disposal	the volume of existing landfill void space that may be required for the project	Wear Unitary Authorities annual voidspace consumption (1998-99). This relates to the gross quantity before mitigation. In actual fact the material will be generated over a 2 year period. The annual quantities will be substantially reduced as a result of the efforts of the Concessionaire to direct materials into beneficial uses as required by the CoCP. (TWPTA 8 Para. 8.1 – 8.8). In any event there will be a significant financial incentive in so doing in order to avoid Landfill Tax.
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**OBJ 396 and SOC
North East Combined Transport Activists Roundtable (NECTAR)
M. C. Murphy, 4 Gorseway, Kirkhill, Morpeth, NE61 2XR**

• Issue:	• Description :	• Response:
<ul style="list-style-type: none"> • Pollution 	<ul style="list-style-type: none"> • NECTAR briefly refer to concerns about major pollution could occur during construction 	<p>The risk of such pollution is no greater than for many such major infrastructure projects. There are well tried and tested procedures for minimising and controlling the risk. Strict monitoring and controls are required by the CoCP (TWPTA 9A) and will be enforced by the statutory authorities (LPA,EHO and EA).</p> <p>Specifically in respect of the potential for pollution associated with the disposal of dredged material at sea. This is a function of the level of contamination that may be contained in the material. However, the contamination is generally similar to or less than that found elsewhere on the Tyne and in any event should unacceptable contamination hotspots be identified these would be separately removed for disposal to landfill. (TWPTA 8 Para. 6.12 – 6.16).</p> <p>The presence of contamination is not the most significant potential cause of impact on the marine environment associated with the disposal of dredged material. The quantity and more importantly the frequency of deposition are more significant. (TWPTA 8 Para. 8.15 – 8.20). These would be addressed by Defra as part of the FEPA licensing process (TWPTA 8 Para. 7.11 – 7.22)</p>

**OBJ502 and SOC
Environment Agency, Rivers House, 21 Park Square South, Leeds LS1 2QG**

Issue:	Description :	Response:
<p>Waste Management & Contaminated Land</p>	<p>The Agency have submitted a holding objection (and SOC 30th October 2002) pending further discussions with the TWPTA. The concerns expressed by the Agency covered a number of points including waste management and contaminated land.</p>	<p>My colleague Paul Johnson has included details of the full response to the EA in his proof (TWPTA 9A Appendix D). The following is specific to the issue of waste and contaminated land. Prior to, and since submission by the EA of their Statement of Case (SoC) strenuous efforts have been made, in meetings and by supply of supplementary information, to satisfy their concerns. This has led to the recent issue by the EA of draft Protective Provisions and a side (legal) Agreement, which is still under discussion.</p> <p>Waste Management & Contaminated Land – significant additional work has been undertaken to consider the issue of spoil management and disposal, both to sea and land. Regular consultation has taken place with the EA and Defra throughout this work, and they have expressed their satisfaction with the approach.</p> <p>The Concessionaire will be obliged, through the Code of Construction Practice, to prepare and implement approved Environmental Management Plans The Management of Contaminated Land and Waste Disposal aspects for which the</p>
<ul style="list-style-type: none"> • 		