CONSTRUCTION

PROOF OF EVIDENCE OF
DOCTOR THOMAS WILLIAM CHAMBERS BENG (HONS) PHD MIHT
ON BEHALF OF WILTSHIRE COUNTY COUNCIL

PUBLIC INQUIRY INTO:

WILTSHIRE COUNTY COUNCIL PLANNING APPLICATION W07.09002
LAND TO THE EAST AND NORTH OF WESTBURY, WILTSHIRE,
DEVELOPMENT: CONSTRUCTION OF A SINGLE CARRIAGEWAY ROAD
WITH CLIMBING LANE OVER PART OF THE ROUTE, ROUNDABOUT
JUNCTIONS, ASSOCIATED INFRASTRUCTURE
CALLED IN FOR DETERMINATION BY THE SECRETARY OF STATE,
COMMUNITIES & LOCAL GOVERNMENT (SECTION 77 TOWN AND
COUNTRY PLANNING ACT 1990 AS AMENDED)

THE WILTSHIRE COUNTY COUNCIL (A350 WESTBURY BYPASS
CLASSIFIED ROAD) COMPULSORY PURCHASE ORDER 200'

THE WILTSHIRE COUNTY COUNCIL (A350 WESTBURY BYPASS
CLASSIFIED ROAD) SIDE ROAD ORDER 200'

Wiltshire
COUNTY COUNCIL

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1 Introduction

Qualifications and Experience

1.1 My name is Dr Thomas William Chambers. I am a member of the Institution of Highways and Transportation. I hold an Honours Degree; Bachelor of Engineering in Civil Engineering and a Doctor of Philosophy degree entitled “A computer aided total quality algorithm to assist in the management of construction operations”.

1.2 I am the proposed Project Manager for the scheme and have been employed by Geoffrey Osborne Limited, one of the largest privately owned construction companies in England since 1st June 1998. Previous to joining Geoffrey Osborne Limited I was employed by Alfred McAlpine Limited starting as a Site Engineer on my year out from my degree in 1986 progressing to a Structures Site Agent on my last job in 1998.

1.3 I have over 17 years of experience working on major road and bridge schemes across the country both in the public and the private sector; and have been involved with the development of road and bridges schemes through various stages including early contract involvement in my role as Framework Manager through the National Technology Framework with the Highways Agency inputting into buildability, alternative design, innovations and developing the target cost and risk registers including stakeholder liaison/ interface prior to fully developing a scheme. My experience includes planning and delivering projects on site, i dealing with local stakeholders, the travelling public and local fauna and flora. The major schemes I have worked on include:

i. A616 Stocksbridge Bypass (Highways Agency).
ii. M63- M66 Stockport (Highways Agency).
iii. Great Bridge Marl Pit Black Country Spine Route (Sandwell Metropolitan Borough Council).

iv. A5 Truck Road Improvement Fazeley Two Gates/ Wilencote Bypass (South Staffordshire County Council).

v. A465 Aberdulais to Glynneath (Neath Port Talbot County Borough Council).

vi. City Link and White City Interchange, Manchester. (Trafford Metropolitan Borough Council).

vii. M5 Junctions 8 to 9 (Highways Agency).

viii. M50 Junction 1 (Highways Agency).

ix. Midlands Road and Bridge Framework 1, 2 and 3 (Highways Agency).

x. National Technology Framework (Highways Agency).

Involvement with the A350 Westbury Bypass

1.4 As Geoffrey Osborne's proposed Project Manager for the scheme I have overall responsibility for ensuring that the scheme can be built economically, on time, on budget whilst minimising disruption to local stakeholders, and utilising methodologies which mitigate the affect of construction on local fauna and flora.

1.5 My initial involvement with the A350 Westbury Bypass was at tender where I was involved in the development of the quality submission, tender programme, and developing the presentation for the mid-tender quality meeting. The contract was awarded using an Early Contractor Involvement (ECI) form of procurement that has initially been pioneered by the Highways Agency. ECI is considered to have a number of benefits over traditional forms of procurement these are:

i. Enhanced certainty of outturn cost and contract programme.

ii. Greater scope to implement innovation.

iii. More opportunity to implement value-engineering solutions prior to agreeing the target cost.

iv. Early creation of the delivery team ensures that buildability forms an integral part of the design. Designers have input into design and the contractor has input to buildability.

v. Improved risk management.

vi. Mitigation measures to address stakeholders concerns are built into the design and form part of the construction methodology.
vii. More scope to reduce cost.

1.6 My involvement with the scheme post tender award has included:

i. Attending value engineering workshops which have resulted in achieving an earthworks balance reducing lorry movements by 11230 vehicular movements; the use of pre-cast concrete elements at Chalford Accommodation Bridge, Wellhead Underpass, Bere's Mill Underpass, Newtown Bridge and Bratton Road Bridge which further reduces lorry movements by 2017.
ii. Developments of the programme of work including the revisiting and refining the risk register.
iii. Supporting the production of the initial target cost.
iv. Attending progress meetings.
v. Attending meetings and orders exhibition with local stakeholders.

Scope of Evidence

1.7 This evidence provides an explanation of the construction aspects of the proposed A350 Westbury Eastern Bypass and the constraints and issues which have influenced the construction methodology.

Structure of the Evidence

1.8 The structure of the evidence given in the proof is described below:

i. Section 2: Construction sequencing.
ii. Section 3: Considering local stakeholders.
iii. Section 4: Objections.
iv. Section 5: Conclusions.

2 Construction Sequencing

Programme Overview

2.1 The methodology for the design and construction programme has been developed taking due account of seasonal and local

constraints. Having a buildable design leads to efficiency in construction and predictability of the time involved. The ECI form of procurement facilitates the early creation of the delivery team thus maximising the input of buildability and efficiency into the design.

2.2 The programme of works takes into account efficiencies achieved through the value engineering workshops. This includes the use of precast elements, which speed up on-site construction and reduces the impact that adverse weather conditions may have on the works. The programme maximises the use of a single summer earthworks season, to allow the best possible re-use of the chalk, which is weather susceptible. Possible inefficiencies of off-site disposal, of unacceptable material, have been mitigated by extending the site boundaries to include disposal areas adjacent to the main alignment. The programme of works takes into account all the contractual constraints including the design and construct interface, approval periods, notices to the statutory undertakers, application periods for environmental licences, protection/translocation of fauna and flora, site clearance within defined periods, the interface with Network Rail, road works, structures works, and maintaining rights of way and traffic management.

Programme of Works

2.3 The construction programme sequences identify the activities/notices required prior to and during the construction phase. These include the Public Inquiry, the Secretary of States decision and any challenges to that decision. Detailed design will be undertaken by Geoffrey Osborne and our consultants Capita Symond's, prior to any major construction activities on site. The design period of 21 weeks includes reviewing the existing design, undertaking detailed design, liaison with Network Rail as regards the cement works railway bridge and the Glenmore rail bridge, preparation of approval in principles, agreements of approvals of principles, preparation of specification, preparation of contract

drawings, check certificate submission, design certificate submission and final design completion. (Programme No 024152/opt 1 Appendix A)

2.4 Prior to commencing major construction works on site there is a requirement to undertake certain works in order to mitigate any impact on the construction programme. These advance works deal with environmental mitigation and Statutory Undertakers diversions.

2.5 There are protected species and protected habitats within the area identified as the highway boundary and its immediate environment. Species identified within the Wildlife and Countryside Act 1981 and associated legislation require specific mitigation measures to be employed. Hence prior to the commencement of works on site licenses will be applied for with DEFRA (Department for Environment, Food and Rural Affair) for the translocation amphibians, and the closure and relocation of a badger sett. Issues pertaining to mitigation measures to protect bats, water voles and the possibility of dormice will be agreed with the ecologist and included in the Construction Environmental Management Plan. Prior to the commencement of any construction works on site the Construction Environmental Management Plan will be approved by the client, this will take account of all environmental and social constraints including all planning constraints.

2.6 The replacement badger sett must be constructed and allowed to mature for six months prior to the badgers being excluded from their original sett. The programming of the works takes into account and operates around the recognised closed season for badgers. A 30m protection zone will be maintained until the badgers cane excluded under the terms of the DEFRA license. Monitoring of the badgers will continue through site construction and beyond.

2.7 Prior to the commencement of construction works on site, amphibian and reptile fencing will be erected to prevent newts, slow worms and other species from entering the site. This fencing will ensure that any creatures present on site can be correctly translocated to a suitable area off site; this will be covered by and in accordance with the DEFRA licence. Core document DD01 figure number 9.5a and 9.5b (Appendix B) identify the extent of both reptile and amphibian fencing. Reptile fencing will be required at the northern end of the site at Glenmore Railway Bridge, Glenmore roundabout and to an area east of Hawkeridge road. Areas requiring amphibian protective fencing included Bratton Road, south of Chalford Accommodation Bridge and Madbrook farm roundabout.

2.8 Habitats for water voles will be removed from the work area outside of the key breeding period. In line with DEFRA requirements there will be a need to strim vegetation in the work area and to provide fencing for water voles at Bitham Bridges (DD01 figure 9.5b Appendix B). This work will be completed prior to starting construction works on site.

2.9 The site clearance will be undertaken as advance works in February 2009 due to the seasonal environmental constraints pertaining to the fauna and flora. The Wildlife and Countryside Act 1981 prevents the disturbance of all nesting birds, including pest species. All vegetation will be removed from site outside of the recognised breeding season for birds. Additional, visual verification will be carried out to confirm the absence of nesting birds, if there is any doubt about their presence on site. As part of the site clearance process, trees and hedgerows will be trimmed and/or removed in a systemic manner in order maintain flight paths for bats and to protect existing trees in accordance with British Standard BS5837: 2005.

2.10 In order to construct the road some of the existing hedgerows , which provide flight line for bats, will have to be removed. These are predominantly located near the proposed structures along the

length of the carriageway. On removal of flight paths there will be a requirement to erect temporary crossings until such time they can be removed once the final mitigation measures are in place. The temporary screens consist of a 2m high Heras (fencing) panel draped with camouflage netting; this methodology has been approved by the ecologist. The panels will be removed during the day to allow access for construction traffic and sequencing of operations, as required. At night the panels will be replaced and secured. A bat ecologist will monitor the bats using the crossing points and the results of their studies will be made available to the team. Regular meetings will be held to discuss the success of the screens and determine if any alterations or amendments are required to their design or location.

2.11 Tree protection is an important consideration throughout the construction period. The most vulnerable part of a tree is its roots system, which may suffer from compaction or severance if not protected. The trunk and branches of trees must also be protected from abrasion, wounds and severance. After site clearance a number of trees will remain within the site boundary, there are heavy concentrations of existing trees west of the Madbrook Roundabout, Chalford Accommodation Bridge, Wellhead Underpass, and South of the Cement Works Railway Bridge, East of the Cement Works Roundabout, Bitham Bridge West, Glenmore Railway Bridge and Hawkeridge Road. The existing trees will be protected and maintained in accordance with British Standard BS 5837:2005. Construction Issue drawings will be utilised to clearly identify which trees within the demarcation will be retained and protected and which will be removed.

2.12 The planning of statutory undertakers' works is vital in achieving an efficient construction programme. In order to develop this construction programme a series of meetings have been held with the respective statutory undertakers in order to establish the cost of the works, payment periods, notice periods, design periods,

procurement periods and their programmed duration of the works on site. These periods have been incorporated into the construction programme and their methodologies incorporated into our planning in order to minimise the impact of these works. During the preconstruction period we have agreed constraints and timings with Wessex Water, Scottish and Southern Energy, Transco and BT. (Programme No 024152/opt1 (Appendix A) and drawing Number 40916-D024 to D030 version E (Appendix C))

2.13 Bridleway diversion will commence on site prior to the main construction works and as such will be regarded as advanced accommodation works (Programme of Works 024152/opt 1 (Appendix A)). These advanced diversion works are required in order to provide continued access to the general public and to construct the works. Nine footpath/bridleways cross the works, and these are all accommodated as part of the permanent works. In the case of Bridleway West 35, the permanent diversion from CH1740 to Newtown Road will be installed before the existing track is severed.

2.14 All temporary crossings will be of a similar standard to the existing crossings using granular material or road planings as the surface course. During the construction works these crossings will be maintained to a suitable standard for equestrian and foot traffic. Adequate signage will be provided at all crossings to safeguard members of the public. Details pertaining to temporary arrangements at rights of way crossings are detailed on the “Public Interface Schedule” (Appendix D).

2.15 On completion of the advanced works, the main construction works on site will commence. Using the planned methodology as detailed on programme 024152/opt 1 the on-site construction will take 86 calendar weeks to complete. In developing the construction programme the affect of works traffic on local roads has been recognised and methodologies and protocols developed to reduce any impact. These methodologies have been developed via the

value engineering workshops to mitigate the impact the affect of construction work on the general public. This includes but is not limited to achieving an earthworks balance on site, hence reducing lorry movements by 11230 with the use of pre-cast concrete elements reducing vehicular movements by a further 2017. At the commencement of works on site defined access points will be provided at the following locations:

i. 1 Warminster Road at Madbrook Roundabout
ii. 2&3 Bratton Road at the bridge site (to access the site in both directions)
iii. 4&5 Trowbridge Road at the site of the proposed roundabout (in both directions)
iv. 6 Hawkeridge Road at the site of the Glenmore Roundabout

Temporary signage will be in place directing site vehicles to these access points and in addition signs will be erected on other affected roads defining routes which are closed for access to site vehicles. All signage will be in place before major construction works start on site, and will remain in place until the works are complete.

2.16 An earthworks balance has been achieved on the section of new road south of the railway line at the Cement Works Railway Bridge. Fill material for the area north of the railway line and Glenmore Link will be imported. Delivery vehicles will be directed to access the works via points 4, 5 and 6 from the north to avoid travelling through the town centre. Deliveries to access point 1 will be directed to access the works from the south and deliveries to access points 2 and 3 off Bratton Road will be routed via Bitham Park from the north. All suppliers and subcontractors will be briefed and given details of routings and these will be enforced by the site team.

2.17 Prior to commencing the earthworks operations on site topsoil will need to be stripped.. This will be phased to tie in with the general earthworks and structures operations and is detailed in the

construction programme 024152/opt 1 (Appendix A). Details pertaining to archaeological remains will be dealt with in the archaeological evidence. In consultation with the archaeologist, we will implement methodologies which mitigate the impact of the bypass on any archaeological remains and the historical environment. These method include protective fencing, watching briefs when removing the topsoil or keeping the topsoil insitu.

2.18 When the vegetation and topsoil have been stripped from the site, the ground becomes less permeable and water will, if not managed, tend to run off, carrying silt, rather than penetrating the ground. Water will be prevented from running across the exposed ground by installing grips and sumps. At no time will these be linked to controlled waters. Topsoil will be stored within close proximity to the area where it was stripped with a further grip excavated at the foot of the topsoil bund. This will enable run-off from the slope to settle into the grip and then to penetrate the ground.

2.19 The programme methodology has developed in order to undertake the majority of earthworks operations in the first earthworks season (spring and summer). During this period the weather historically is more suited to earth work operations and the days a longer thus minimising any light pollution. In periods of inclement weather earthworks operations will stop thus minimising rutting. The overall earthworks quantities have been calculated and the earthworks materials won categorised as “acceptable”, “acceptable with treatment” and “unacceptable”. In order to reduce the area required on site for the disposal of unacceptable material, a significant quantity of “marginally-unacceptable” material has been identified as being suitable for soil improvement treatment. This will change the properties of the material from unacceptable to acceptable fill material.

2.20 During the first earthworks season there will be a requirement to install haul roads in order to gain access to the Bitham Bridges, and

Glenmore Railway Bridge. This will facilitate speedy construction of the structures in these locations.

2.21 The old ironstone quarry on the Glenmore Link has been identified as an area which is potentially contaminated, although no such contamination has been identified to date, In order to recognise and limit any problems associated with removing unknown materials from the quarry and the associated environmental testing/classification and health and safety implications we have developed our methodology to confine rather than remove this material. Compaction of the existing ground will be achieved by surcharging the surface. Monitoring points will be established above the existing ground in order to record the rate of settlement. These points will be monitored at least once a week and compaction deemed to have been achieved once settlement ceases. All new drainage will be above this contaminated layer. The approach will prevent the risks associated with the removal of contaminated from site and prevents the transportation of potential hazardous material through local towns and villages.

2.22 The new rail bridges at the Cement Works and Glenmore have been designed and methodologies developed to comply with Network Rail standards. To date discussion/meetings have been held to discuss our proposed methodologies and design constraints. Methods employed include booking track possessions, recognising design constraints due to the kinetic envelope and submitting work package plans, for the installation of temporary screening, installing bridge beams, permanent soffits, and P6 parapets which will require railways possession both l at night and weekends.

2.23 New structures at Chalford, Wellhead, Beres Mere, Newtown and Bratton Road have been designed using precast concrete elements which will speed on site construction, reduce the impact that adverse weather conditions could have on the work schedule and minimise disruption to the general public. Work will commence on all structures during the first earthworks season.

2.24 The primary drainage works will be complete prior to commencing the second stage earthworks. The majority of these works will be complete during the first earthworks season.

2.25 Once the second stage earthworks is complete the road formation will be constructed in a traditional manner with all road markings complete by week 86 as per the construction programme 024152/opt 1 (Appendix A).

2.26 The proposed design deals with permanent mitigation proposals for bats. These permanent solutions have been agreed with the bat ecologists and will be covered in the bat ecologist evidence. The mitigation measures will include construction of an underpass at Beres Mere and construction of seven gantries with bat screens and tree planting.

3 Considering Local Stakeholders

3.1 The construction operation will inevitably attract additional vehicular movements; such additional movements can often be of concern to local residents and businesses. We appreciate this and will utilise construction best practise solutions to minimise the impact of vehicular movements. Best practise solutions include:

i. Use of on site unsuitable material as opposed to carting away to tip, hence reducing vehicular movements.

ii. Using precast concrete elements in order to reduce the number of lorry movements and to accelerate on-site construction operations, thus minimising disruption to road users and pedestrians.

iii. Engaging with the local community via the Considerate Constructors Scheme and our own stakeholder liaison procedures. The Considerate Constructors Scheme is a national scheme which monitors performance three main areas namely the environment, workforce and the general public.

3.2 We will keep the local community informed about future works and progress by distributing regular newsletters. These newsletters will

invite feedback and will hopefully enable us to be proactive in responding to any stakeholders concerns.

3.3 Noise and dust levels are frequently of concern to residents during the construction programme. During dry periods, dust will be damped down using a mobile water bowser. During periods of wet weather, silt migration will be prevented by the use of “grips” which will divert it to designated settlement areas. Subsoil cut and fill operations, have been planned to be carried out very close to their original position on the site rather than being transported to other areas of the site. This will reduce on-site haulage and associated dust, noise and run-off problems associated with long haulage distance.

3.4 The River Biss system (Bitham Brook and Biss Brook), aquifer and Wellhead Springs Groundwater Source Protection Zone are within the envelope of the planned construction works. The main impacts associated with the works are potential pollution incidents such as spillages of hydrocarbons or silt run off. The construction environmental management plan will provide methodologies and process to safer guard the environment. This will cover the following:

i. Diesel or chemical storage will be separated, whenever possible, from sensitive hydrological receptors by a distance of 10m. (If they have to be stored within 10m of these receptors, the Environment Manager will be consulted prior to placement.)
ii. All diesels will be stored within double-skinned (bunded) tanks.
iii. No substance will be discharged to a surface water drain.
iv. Foul water drains may be used to dispose of some silty or foul water but only with the consent of the relevant statutory undertaker.
v. Good practice dictates that all active drain covers within the site boundary are spray-painted – red for foul, blue for surface water – to highlight their locations.

vi. Where surface water drains are located within the compound – and are highlighted as being potential transfer routes for contamination – they shall either be temporarily blocked or sealed with emergency drain seals, which will be stored on site.

vii. Potentially polluting substances will be stored in suitably bunded areas in order to reduce the potential for ground contamination and, therefore, groundwater contamination.

viii. If polluting substances penetrate the ground, that area of ground will be dug up and replaced with a suitable material. The polluted, excavated material will be disposed of according to legislative requirements.

ix. Absorbent material will be stored on site for use on minor spillages.

x. Oil booms will be stored at identified locations on Bitham Brook so that they are instantly available to prevent pollutants from spreading into the wider water system.

xi. Water monitoring will be undertaken at Wellhead Springs at a frequency agreed with the EA and Wessex Water. This will be detailed in the Wellhead Springs Environmental Management Plan.

xii. Concrete chutes and wheels will be washed down before leaving the site. Dedicated, signed wash-down areas will be designated at all site exits and the details of these will be sent (with other subcontractor information) to all subcontractors.

xiii. Grips will be dug, where appropriate, to facilitate penetration of the ground by surface water run-off. At no time will these be linked to watercourses or drains nor will foul or dirty water be directed into them.

4 Objection

Wellhead Springs – Protection of Water Source

RULE 6 STATEMENT ON BEHALF WHITE HORSE ALLAINCE 4.3.2 "CONTAMINATION DURING ROAD CONSTRUCTION"

4.1 Concern has been expressed over the potential for pollution of the aquifer during construction works. The nature of the source, a shallow groundwater table and its rapid response to precipitation

suggests that the area may be susceptible to suspended solid and/or hydrocarbon contamination.

4.2 The Wellhead Spring Groundwater Source Protection Zone (SPZ) extends from Chainage 750 to 1280 and the period of highest risk is during the removal of vegetation and topsoil prior to the installation of the impermeable membrane. Throughout this period "Best Practise" management tools will be employed:

i. All plant to be used within the SPZ will be thoroughly inspected for leaks, on a daily basis. And will be regularly maintained.
ii. No plant will be left unattended within the SPZ.
iii. Only plant directly required for the works will be allowed into the SPZ.
iv. Refuelling of plant will only take place outside of the SPZ.
v. No plant will be allowed to travel through the SPZ.
vi. A specific Method Statement will be produced for any works that have to be carried out within the SPZ.
vii. Osborne supervisory staff will oversee all works affecting the SPZ
viii. Machinery (including vehicles) will not be left running when not in use. (NOTE: this is a requirement for all machinery within an Osborne site.)

4.3 Silt pollution created during spoil movement, compaction and excavation when combined with a rainfall event, will be managed by creating "grips". These will direct the silt water to safe areas directly outside the spring's area where it will be allowed to collect in settlement ponds and to filter into the ground. Water will be moved over the surface of the area as quickly as possible using a series of grips to prevent the build up of silt. Grips will be removed once the permanent drainage is installed, as part of the lining works. In periods of particularly inclement weather, work will be suspended or re-programmed.

4.4 The settlement lagoons will be placed immediately outside the spring's area but within the site boundary. The precise location of

these lagoons will be agreed with the Environment Agency prior to work beginning. Monitoring of the outfall for silt will also be in agreement with the Environment Agency and monitoring of the boreholes will be in line with the communications received from Wessex Water. When construction begins in this area – and prior to the installation of the membrane – daily monitoring will be undertaken to an agreed list of conditions.

Facts

4.5 The programme minimises the amount of work that will have to be carried out in the area prior to the installation of the membrane and liner. The only works that will be undertaken, prior to installing the membrane and liner, will be formation preparation.

4.6 The Environment Agency has been consulted and is satisfied with the proposed methodology, with the caveat that no grips are to be created without their approval. Wessex Water is also satisfied with the proposed methodology and precautions and operates a "continual turbidity monitor" at the borehole. This will automatically switch off the abstraction should turbidity increase beyond the acceptable limits.

4.7 Concrete used within this area will generally be of the "pre-cast" variety and will not have any impact upon the potential pollution of the surface or groundwater. If "wet" concrete is required (kerbing, drainage etc), this will be used after the installation of the impermeable membrane. However, all washout waste from the chute will be conducted to a safe location on the site outside the spring's area. This instruction will be included in the subcontract agreement with the concrete supplier.

4.8 There will be no storage of materials within the SPZ until the membrane and liner are completely installed. After this, temporary storage will be limited to clean road construction materials on top of the impermeable membrane.

Opinion

4.9 In my opinion, the risk of pollution to the Source Protection Zone is minimal. During early construction, the protective measures and tools that will be employed are exemplary for ensuring that pollution risk is minimal. After the membrane is installed, the level of risk is zero.

The Ironstone Quarry on Glenmore Link

RULE 6 STATEMENT ON BEHALF WHITE HORSE ALLIANCE 4.3.3 "POLLUTION RISKS CAN BE PREVENTED DURING CONSTRUCTION AND IN THE LONGER TERM"

4.10 Methodology pertaining to this is discussed in section 2.21 of this evidence.

Facts

4.11 By using surcharge technology there is no need to excavate and cart away contaminated material. This approach will prevent risks associated with the removal of contaminated material from site, health and safety of the workforce and prevents the transportation of hazardous material through local towns and villages.

Option

4.12 By obviating the requirement for moving the quarry contents, the risk of causing direct, local pollution has been avoided and any additional pollution risks have been minimised.

5 Conclusions

5.1 The construction programme 024152/opt 1 (Appendix A) has taken into account seasonal constraints, protection to the local fauna and flora, local issues, and environmental issues in order to build a cost affective and efficient programme. The construction project will adopt best practices in order to achieve our project goals for excellence in buildability, efficiency, customer care and environmental management.

5.2 The methodologies and approval process employed will ensure that the Source Protection Zone is not polluted during the construction process.

5.3 The methodology of containment adopted for Glenmore Link will prevent the risk associated with removal of contaminated material from site.

5.4 Best practice recommendations and the legal framework supported by excellent stakeholder liaison has greatly reduced the risk of noise and dust being perceived as a nuisance by local residents.

5.5 The risk of construction damage to trees has been minimised through the use of British Standard BS 5837 2005 supported by site-specific environmental procedures.

5.6 The temporary bat crossings do not present a construction problem. They will be implemented in accordance with the experts' recommendations.