TARMAC Trading Ltd

Wasing Quarry, Wasing Lane, Aldermaston, Reading, RG7 4LY

Environmental Risk Assessment

Project no. 11655 – R02 (03)

RSK GEOSCIENCES

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RSK GENERAL NOTES

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Title: Environmental Risk Assessment: Wasing Quarry, Wasing Lane, Aldermaston, Reading, RG7 4LY

Client: Tarmac Trading Ltd

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1 INTRODUCTION

RSK Environment Limited (RSK) was commissioned by Tarmac Trading Limited (the 'Client') to produce an Environmental Risk Assessment (ERA) for land at Wasing Quarry off Wasing Lane, Aldermaston, in Reading, hereafter referred to as the 'Site'.

The ERA has been produced to form a package of supporting documentation for the application for a Bespoke Environmental Permit for the site which will be used for the importation of Inert waste materials to restore the land following several phases of mineral extraction.

This Environmental Risk Assessment (ERA) is a simple assessment of the risks to the environment and human health from emissions and accidents that may be associated with site recovery operations. It has been completed in accordance with Environment Agency (EA) guidance.

The comments given in this report are subject to RSK's 'Service Constraints' provided in **Appendix A**.

1.1 Background

Land at Wasing Quarry has been considered suitable for the extraction of sand and gravel deposits to meet commercial demand for mineral workings within the Kennet Valley.

Proposals will comprise the excavation and removal of the sand and gravel across three Phase areas ('A', 'B' and 'C'), with timescales for the working of each phase estimated between three to five years on a progressive basis over a 13-year period.

Areas will be excavated and restored before moving to the next phase, minimising the area of disturbance.

Restoration of the Site will commence with the importation of inert materials following extraction within Phase A, to eventually return the majority of the area back to farmland with some water bodies, contributing to biodiversity and flood storage capacity within the valley.

Planning conditions require that extraction of minerals shall cease no later than the 13 years from the date upon which operations commenced and that the deposit of reclamation materials shall cease no later than 15 years upon which operations commenced.

Site access will be via the construction of a new access road from the A340 and on to Area C. Material destined for restoration of the Site will be transported via this route. Once on Site, vehicle movements will be via internal haul roads, one that traverses from A to C and the other from C to B.

The majority of the area will be restored back to enhanced agricultural land, by infilling with an estimated total 1,153,000 m^3 of imported inert materials (including an additional 161,100 m^3 of silt recovered from processing).

3D modelling and volumetric assessment estimates the void as 1,314,100 m^3. Plans showing the working 'Phases' and future Restoration are presented in **Appendix B**.

Site levels will broadly remain the same as original site levels, with the development and reshaping of several settlement lagoon's, (used during the excavation works) into water bodies with peripheral planting contributing to local biodiversity.

The restoration proposals will ecologically enhance the Site and also provide an additional 15,000 m^3 of flood storage capacity through the lowering of land across large areas of the Site. There are not considered to be any direct point source emissions, and will not produce any waste.

Further details on the proposed excavation and restoration (including volumetrics and planning obligations) for the Site can be found within D.K. SYMES Associates, Environmental Statement (detailed in **Section 1.4**) and RSK's Waste Recovery Plan, produced to support the application of a Bespoke Environmental Permit.

1.2 Objective

The main objective of this ERA is to identify any significant risks and demonstrate that the proposed Waste Recovery Scheme including the re-use of suitable Inert materials to restore the Site will not cause a risk of pollution or harm to the environment and human health. It will identify appropriate measures to manage any unacceptable risk or harm to ensure the scheme provides a sustainable and environmentally beneficial approach by recovering local wastes, avoiding landfill disposal and reducing the use of virgin material.

1.3 Scope

The scope of this report is to identify potential receptors which could be affected by the proposed operations on Site and demonstrate that all necessary measures are in place to ensure that the scheme does not present an unacceptable risk to the surrounding environment.

The purpose of this document is to:-

1. Identify potential risks that the scheme may present to the environment.
2. Screen out the risks that are insignificant and do not require additional assessment.
3. Where appropriate, identify potential significant risks.
4. Specify the suitable control measures for any significant impacts that are identified.
5. Report the findings of the assessment and incorporate the risk assessment into the site's Environmental Management System (EMS) once the site is operational.

1.4 Information Sources

Information for this report has been taken from available online information sources in addition to the following reports provided by the Client and information cited within.

This ERA should be read in conjunction with the below reports, some of which are presented in the appendix.

- Acoustics Noise and Vibration Ltd - Proposed Minerals Extraction and Restoration On Land At Lower Farm, Wasing, dated November 2011.
- Smith Grant LLP - Wasing Estate Propose Sand and Gravel Extraction Revised Air Quality Assessment, dated April 2012.
- Envireau Water, Wasing Quarry: Hydrological Impact Assessment (HIA), reference P21-253 Tarmac Wasing/Woolhampton\ RPT Wasing Quarry HIA, dated 31/3/2022.
- D.K. SYMES Associates, Environmental Statement for Lower Farm Wasing, dated May 2012.
- Environment Agency Pre-Application Screening Report dated 1 March 2022 (centred on Nation Grid Reference (NGR) SU 57992 65659).

2 SITE DETAILS

2.1 Site Location and Description

This section summarises the site setting and features in the surrounding area.

2.1.1 Site Setting

The Site is located at Lower Farm on Wasing Lane in Aldermaston in Reading as identified on **Figure 1**. The Site, owned by the Wasing Estate, extends to 104 hectares of greenfield land. Ordnance Survey Maps and site survey data indicate that site levels range from c.63 m AOD in the southwest, sloping gently down to c.55 m AOD in the northeast.

The Site is currently characterised by agricultural farmland, comprising fields lined by various trees, wooded areas (to the north and northeast) and hedgerows. There are no residential properties or farms present within the site boundary, however an airstrip and associated storage sheds are located towards the south of the site area.

The River Enbourne flows eastwards across the centre of the site area, with several foot bridge crossing points and is fed from several smaller drains towards the north and west.

A temporary raised office building and small compound area with weighbridge has been constructed on the eastern side of the Site, close to an area proposed as a new access route into the Site. Layout of the Site is presented in **Figure 2**.

2.1.2 Surrounding area

The area surrounding the Site is as detailed in **Table 1**.

Table 1: Site setting

To the north:	Woodland (designated as a Local Wildlife Site), dense reedbeds (c.170 m north of the excavation area) and marshland areas are present along numerous parts of the northern boundary (some are designated SSSIs). The Kennet & Avon Canal and River Kennet flow as one watercourse directly north of the site (100 m), joined by a number of tributaries, however some 400/500 m up and downstream, the river and canal are separate features. A small marina is present c.450 m to the northeast of the site at this junction. A Sewage Works is present c.25 m from the north-western boundary. Midgham train station, is located approximately 480 m northwest.
To the east:	Agricultural land bounds the east of the Site with residential properties and a garden centre adjacent to Basingstoke Road (A340) with wooded area to the northeast. Residential properties c.210 m southeast, with Aldermaston Primary School c.210 m southeast of the Site boundary and Aldermaston village 500 m to the east.
To the south:	Wasing Lane bounds the south, with buildings associated to the Brampton Airfield (located on the southern side of the Site). Further sporadic residential and farm buildings are present to the south of the Site on Wasing Lane (c.25 m to 55 m south) with further agricultural land and wooded areas beyond.

To the west:	Station Road is present along the north-western boundary with lakes beyond (a former extraction area c.400 m west) used for recreation and wildlife. Agricultural landforms the remainder of the western boundary and a residential property close to the western boundary (c.150 m west) identified as Bottle Cottage. Solar panel farm located c.780 m to the west.

Figure 3 identifies some of the main features discussed above in relation to the site. An Environment Agency Pre-Application Screening Report is presented in **Appendix C**.

3 RISK ASSESSMENT PROCESS

3.1 Risk Assessment Process

This risk assessment has been conducted in accordance with the Environment Agency guidance published online (2016). It details five key steps to the risk assessment process prior to its submission with a permit application. These are:

1. **Identify risks from the activity** (those activities which present different types of risk to the environment associated with the proposed operation)
    - accidental emissions including spills, vandalism, flooding and fire etc
    - noise and vibration
    - fugitive emissions such as dust, vehicle emissions and surface run-off etc
    - mud
    - odour; and
    - litter.
2. **Identify the relevant receptors** (these include all relevant environmental aspects such as people, vegetation, animals, properties and water bodies)
3. **Identify pathways** (any medium by which a pollutant could travel to one of the identified receptors. It is possible for a particular feature to be both a receptor and a pathway)
4. **Assess the risks** (acceptable risks within environmental limits may be screened out. The level of risk presented can be indicatively assessed using a scoring matrix. These serve to act as a means to identify which risk, if any, are significant, and will require additional consideration in a more detailed assessment)
5. **State methods of risk control** (for any risks which are identified as part of the assessment process as being too high without additional management, this section of the report details how those risks can be controlled via management and mitigation to be within acceptable limits)
6. **Present the assessment** (the risk assessment is presented in **Section 7** of this report)

Further information on each stage of the risk assessment is set out below.

4 IDENTIFIED RISKS

4.1 Environmental Risks

The key environmental risks associated with the operations at the site are set out below:-

4.1.1 Accidental Release/Emissions

Spills

A low risk of accidental release of contamination (fuel, oils, lubricants) could occur during recovery operation at the site including ground (soil), surface water (run-off) and groundwater (leaching) impacts as a result of equipment or machine/vehicle malfunction or human error.

Tarmac has implemented an accredited Environmental Management System (EMS) across all of the company's UK sites, which will be implemented at the Wasing Quarry site. The EMS will detail procedures and training for staff to minimise risk of spills (i.e. during vehicle re-fuelling) and chemical storage and handling on site.

Vandalism

There is unlikely to be a risk of vandalism at the site due to the boundary being fenced and secured, including the compound and site office area. Security cameras will also minimise potential impact from this risk.

Flooding

The site is located within a Flood Zone and several areas are known to be water-logged during the winter/wetter months. A dewatering license (reference TH/39/0022/065) allows dewatering of the sand and gravel workings during operation. Artificial lowering of groundwater within operational phases will remain during restoration phases, which will reduce the risk of flooding. Machinery/fuel etc will not be stored in areas of potential flood risk, which will be detailed in the Environmental Management System.

Fire

The risk from fire is considered to be very low and limited to malfunction of machines on site. 'Hot Works' will be managed through a permitting system in line with Tarmac standard procedures.

The Environmental Management System will detail information on fire prevention procedures.

Unauthorised Waste

This includes the accidental acceptance of non-permitted (so-called "rogue" loads) which could have the potential to release potentially harmful substances to the surrounding environment if not correctly managed. A Waste Acceptance Plan will detail procedures for materials compliance, on-site management, checking and training for waste handling and acceptance to mitigate this risk.

4.1.2 Noise and Vibration

As a result of restoration operations, heavy machinery will be used at the site during the earth works. There will also be vehicle movements to and from the site and therefore a risk of noise disturbance may occur.

A Noise Assessment has been produced for the Site (by Acoustic Noise and Vibration in November 2011) which is presented in **Appendix D**. The report concludes the noise levels will be acceptable and would remain below the proposed noise criteria at the noise sensitive receptors surrounding the site (residential dwellings). To ensure that any potential disturbance was minimised, control measures and a noise monitoring scheme would be implemented to ensure that the proposed limits were not exceeded.

Given the distance of the Phase areas to sensitive receptors surrounding the site, it is considered that the effects from vibrations produced during site restoration will be negligible and vibrations will be effectively mitigated through the Environmental Management System and appropriate selection of plant (i.e. non vibrating roller to track material in).

In addition, working hours at the site will be limited and effects or disturbance from both noise and/or vibration will be continually assessed by the site manager.

4.1.3 Fugitive Emissions including Dust, Vehicle Emissions and Run Off

Dust

The impact of fugitive dust at a receptor will depend on the inherent sensitivity of the receptor and the perception of the acceptability of the effects of dust. Receptors may vary in their sensitivity to nuisance dust for instance farm and certain industry would be classed as having a low sensitivity, whilst hospitals, food processing and retirement homes would be considered high risk.

Nuisance dust and fine particulate matter (PM10) arising during proposed restoration activities/phases and transported by wind could occur as a result of the following.

- wind whipping of newly stockpiled material and stripped ground
- placement/infill of voids (loading and tipping)
- road transport/site haulage.

The risk is heightened during particular weather condition i.e. a period of dry weather followed by wind/breeze.

An Air Quality Assessment produced by Smith Grant LLP (dated April 2012) for the site assessing the impacts of fugitive dust arising from site operation (including restoration) is presented in **Appendix E**. The report concluded that with the maintained application of standard good practices and management techniques, the residual risk of adverse effects outside the Site due to dust will be slight or negligible at all receptors. The assessment considered potential receptors within 250 m of the application Site.

The small airstrip will remain at a slight risk of dust deposition in the event of dry conditions and strong winds although the proposed soil bunds on the boundaries of working phases will reduce any impacts.

The control of dust forms an integral part of the Environmental Management System.

Air Pollution

The principal pollutants of concern with quarry-related HGV exhaust emissions are NO2 and PM_{10} on local air quality.

It is estimated that there will be 120 HGV movements per day at the quarry (40 in/40 out for mineral extraction; 20 in/20 out for infill/restoration assuming a 50% back-haul). The development is to be served by a single access/egress point from Basingstoke Road (A340).

An Air Quality Assessment produced by Smith Grant LLP (dated April 2012) for the Site assessing the impacts of Vehicle Emissions arising from Site operation is presented in **Appendix E**. The report concluded that effects, associated with PM10, Pm2.5 and HGV exhaust emissions have been shown to be either in compliance, or are likely to comply, with the respective Air Quality Strategy objectives.

The control of air quality impacts forms an integral part of the Environmental Management System.

Site Run Off

Any materials stockpiled on site will be of Inert classification and run off (water and sediment) will drain to an area that will allow direct soakage in to the ground and cause no environmental impact. Stockpiled material will only be stored in areas that have been risk assessed to ensure there are no direct pathways to the surface water system or local nature and heritage conservation sites. And ensure that silt mitigation measure are in place to avoid silt entering into water courses.

4.1.4 Mud on Roads

This risk will be particularly apparent following wet weather conditions. It is proposed that vehicles will enter and exit the site via a newly constructed access route onto the Basingstoke Road (A340) to the east of the Site, with a wheel wash in place at this exit.

All vehicle movements will be controlled via a Traffic Management Plan. All vehicles exiting the Site will be checked for mud of the wheels and undercarriage of the vehicles, and this will be cleaned manually as required by Site staff. Should any mud appear on roads as a result of the work, a road sweeper will be deployed.

4.1.5 Odour

There should be no odour associated with the incoming material as this will be purely Inert. Such emissions would be considered as accidental and appropriately managed under an Environmental Management System for the site. It is considered that an Odour Management Plan is not required for the site and only minimal odours may arise from vehicle and exhausts of large machines used on Site.

4.1.6 Litter

From the proposed operations on site, litter generation would be limited to site personnel only. Litter generation can therefore be controlled under adequate training and enforcement by managing personnel and suitable on-site storage facilities.

5 PATHWAYS

The main pathways for the migration of contamination are identified as:

5.1.1 Land (Soil)

The site area is located on fluvial deposits, with the south of the site area (including Phase A) underlain by the permeable Beenham Grange Gravel (Second Terrace deposits of the River Kennet), and Phases B and C (to the north of the site) predominantly comprising Alluvium with Beenham Grange Gravels beneath.

Boreholes drilled within the site area for mineral evaluation indicate that the Beenham Grange Gravels (the target economic mineral) to comprise sand and gravel, observed as being more silty (initially) within the south with a higher percentage of sand. Alluvium (initially underlying Phases B and C) comprises clayey, silty sand and flinty gravels with occasional peat layers.

The average thickness of the Beenham Grange Gravels across the three Phase areas varies between 2.75 m and 3.28 m. The deposits reach a thickness of almost 6.0 m in the centre and northern parts of Phase B. Evidence of a thick band of mineral running east from Phase A to Phase C and northwards towards the River Enbourne are believed to be paleochannels of the River Enbourne. A further channel (likely of the River Kennet) is believed to cross Phase B east to west. Localised deposits of up to 10 m thick have been recorded at Woolhampton Quarry to the west.

The London Clay is estimated to be around 10 m in thickness beneath the site area and overlies the Lambeth Group and Upper Chalk (present around a depth of 40 m bgl).

Overburden varies spatially across the site in thickness and composition. Boreholes drilled in the north of the site, around Phase B comprise topsoil and silt with peaty soil and layers present close to the River Kennet. Overburden to the North of the River Enborne, was recorded at its thickest (up to 2.08 m thick) when compared to the south of the site, which was detailed as a silty clay transitioning with depth to a gravel in a clay matrix and on average between 1.06 m and 1.59 m thick.

The permeability of the soils beneath the site could provide a pathway for mobile contamination; limited to leaks/spills associated with machinery used during the earthwork operations. More cohesive soil types (i.e. clayey overburden and alluvium) close to surface will hinder potential contamination pathways. In addition, the presence of London Clay Formation at depth beneath the site area will hinder vertical migration of potential contaminants to deeper groundwater resources. it is considered that mitigation measure will be in place at the site to prevent/or minimise impacts from accidental release.

5.1.2 Groundwater

The site is underlain by a shallow Secondary ‘A’ Aquifer (comprising both the Beenham Grange Gravels and Alluvium). Both of these superficial deposits are capable of providing a pathway for mobile contaminants to migrate laterally across and off site. It is considered that mobile contaminants are limited to leaks/spills associated with machinery used during the earthwork operations, although mitigation measure will be in place at the site to prevent/or minimise impacts from accidental release.

Groundwater levels are monitored on a monthly basis by Tarmac in 22No boreholes screened across the sand and gravel deposits that are installed at and around the Site and the former Woolhampton Quarry situated to the west. Groundwater levels in the area range from 52.1 – 62.8 m AOD, which is between <0.1 m and 4.5 m bgl, but locally at ground level or even recorded as flooded.

Groundwater flow has been determined to flow north-northwest. A degree of hydraulic connection exists between groundwater and local watercourses, with the potential for mobile contamination to migrate between these features. An exception to this would be the Kennet & Avon Canal, upstream of Woolhampton Lock, which is thought to be clay lined.

The Lambeth Group and Upper Chalk are designated a Secondary 'A' Aquifer and Principal Aquifer respectively and are likely to be in hydraulic continuity with each other.

The solid geology of the London Clay Formation is considered unproductive with the London Clay acting as an aquitard between the superficial deposits and bedrock beneath. The two aquifers are considered to be hydraulically separated by the London Clay and therefore vertical migration of mobile contaminants to deeper groundwater resources is not considered a potential pathway.

There are no licensed groundwater abstractions within the vicinity of the site (within 250 m) or close to excavation areas and therefore abstraction points would not be considered as a potential pathway for mobile contaminants into deeper groundwater resources.

5.1.3 Surface Water

The River Enborne flows in a northeastward's direction across the centre of the site area towards its confluence with the River Kennet (some 600 m downstream of the site boundary).

The drainage system to the north of the site between Phase B, C and the River Kennet/Kennet & Avon Canal was created in the 1950/60's as an overflow catchment to the river.

There are several small watercourses in the woodland north of the Site. Some of these have been developed to direct any overflowing water from the River Kennet/Kennet & Avon Canal to Spring Ditch (the main drain that flows eastwards through the woodlands).

Potential contaminants at the site are considered to be limited to leaks/spills associated with machinery used during the recovery operations. Although surface water could provide a pathway for the migration of contaminants, it is considered that mitigation measure will be in place at the site to prevent/or minimise impacts from accidental release and measure will be taken to protect water courses present.

5.1.4 Local Atmosphere

This is includes wind-blown pathways from the site; through the air (impacting the dispersal of dust, litter etc).

5.1.5 Local Roads and Vehicles

Vehicles exiting the site have the potential to transmit mud to the local road network following periods of rainfall if adequate control are not in place.

6 RECEPTORS

The main receptors are identified in the following sections below. Further detail regarding the surrounding area and each receptor will be provided in the Environmental Setting and Site Design Report.

6.1.1 Groundwater

Groundwater within the Secondary 'A' Aquifer beneath the site could be impacted by contamination arising from site operation.

EA information (dated January 2022) provided for Envireau Water's HIA report indicates that there are five active (at the time of the report) licensed groundwater abstractions within a 2 km radius of the site. The three nearest abstractions are circa 0.5 km from proposed excavation areas on site. Two are owned by the Environment Agency for non-remedial river/wetland support to the northwest and southwest of the site. As such, these are considered to be potential receptors.

The other is owned by the client Tarmac for mineral washing at the site.

Requests made by Envireau Water to both West Berkshire Council and Basingstoke & Deane Borough Council indicate that there are 11 private water supplies within 2 km of the sites excavation areas. One of the supplies located 500 m to the northeast of the Sites excavation area, is registered to Pyford Marina for public or commercial supply, abstracted from the sand and gravel deposits (depth of 3.2 m bgl) beneath this area.

In addition, a Water Well identified on OS mapping at Wasing Lodge (280 m south) is also considered a potential receptor.

The site falls entirely within the Total Catchment (Zone 3) of an EA Source Protection Zone (SPZ) for several abstractions to the north, east and west of the site. The nearest SPZ Zone 1 located 1.8 km northeast of the site is associated with an abstraction license held by Padworth Fish Farm.

Evidence of the monitoring and rainfall trends infers that there is a hydraulic connection between groundwater in the sand and gravel aquifer and the local watercourses.

6.1.2 Surface Water

The River Enborne flows in a north-eastwards direction across the centre of the site area towards its confluence with the River Kennet (some 600 m downstream of the site boundary). The River Kennett flow eastwards some 100 m from the site boundary. The site falls within a fluvial floodplain of both the River Enborne and River Kennet.

There are several tributaries of the River Enborne that flow through the Site. The largest of these originate on land to the south and flow northwards east of excavation Phase A and along the southeastern Site boundary. These are referred to as Stream A and Stream B, respectively.

Towards the north and west, there are six waterbodies located within the former quarry workings of Woolhampton, the closest being c.200 m from the site boundary.

Current licensed surface water abstractions present within a 2 km radius of the site includes one license for spray irrigation for the Wasing Farm Partnership approximately

1.2 km south of the excavation area on site. The abstraction is unlikely to be at risk from operations at the site.

6.1.3 Local Human Population

The nearest residential property to the site boundary is a small collection of large homes on Wasing Lane approximately 25 m south of the site boundary. Lower Farm, a single property located slightly west of the southern boundary (on Wasing Lane) is at a distance of approximately 55 m and marks the access point for Brimpton Airfield. Towards the eastern side of the southern boundary a collection of residential properties are present (approximately 210 m south-east of the site) and garden centre c.320 m to the southeast. It is considered that these receptors are too far from proposed working areas (greater than 250 m south) and with the addition of high soil bunds and vegetation screening, they are unlikely to be impacted by dust or air pollution arising from the works.

The air strip lies within 30 m of the Phase A and C extraction areas. Proposals include the creation of a 3-4 m high soil bund between the airstrip and the working areas to reduce potentially significant impacts from air pollution or dust deposition.

The garden centre and properties on the eastern boundary and A340 could be affected by dust raised by drying 'tracked-out' or escape from un-sheeted loads with long term use of the proposed new access route for the site unless mitigation measure and care is taken to reduce this.

The impacts of post-development traffic emissions on existing and proposed receptors (receptors to the east, on the A340) were estimated using the DMRB screening model, with interpolated baseline data from the LAQM website. The modelled concentrations of NO2 (and PM_{10}) with the site are all 'well below' (<30 µg/m3) the standard of 40 µg/m3 and the significance of the impacts at all the receptors is therefore negligible.

With respect to residential dwellings identified along the sites southern boundary, it is understood that the area nearest to these to be excavated (and restored) lies some 250/300 m to the north (Phase C5) encased behind a 3 m high topsoil storage bund therefore mitigating the migration of dust here. Aldermaston Primary School is also considered at a distance for which dust and air pollution arising from the working phases is unlikely to impact this area.

A sewage treatment works is located approximately 30 m southeast of the nearest working phase on site. A slight risk of adverse nuisance impact is predicted here from works with Phase B in the absence of mitigation measures. The site is considered of low sensitivity.

A statutory right of way crosses the site, from the north-west of the site and across Area B before running adjacent to the south-western boundary of Area B and then crosses the River Enborne using the farm access road bridge. It then follows the farm access road before turning southwest to leave the site by the runway and then onto Wasing Lane. It is understood that this footpath will be temporarily diverted to a follow a more westerly route, off-site and therefore is not considered a receptor.

6.1.4 Local Environmental Receptors

An Environment Agency Pre-application screening report has been provided (on the 1 March 2022) centred on NGR *SU 57992 65659* details records they currently hold on nature and heritage conservation sites and/or protected species and habitats identified

within the vicinity of the site (screening radius of up to 1 km), which must be considered as part of the Bespoke Permit Application. The screening report is presented in **Appendix C**.

Details within the Pre-application screening report includes the following sites of interest:

- **Woolhampton Reed Beds (170 m north),** an SSSI for dense reedbeds with fen vegetation and carr woodland. Supports various passerine and insect species. The SSSI is fully screened by extensive woodlands and it is considered that the quarry and restoration operations will have no significant effect in terms of air pollution or dust deposition at this SSSI It is also considered that there will be a low risk from noise or vibration produced from the restoration earthworks on site. Mobile contamination in groundwater will be given some consideration from site operation.
- **River Kennet (430 m north)** an SSSI for various species (river habitats) and dense floras. It is deemed to be at too greater distance to consider as a receptor for air pollution, dust deposition, noise and vibration risks and at too greater distance to be impacted from localised (mobile) contamination arising from the proposed works.
- **Brimpton Pit (560 m west)** an SSSI for geological interest (ice age). It is deemed to be at too greater distance to consider as a receptor for air pollution and dust deposition. Noise and vibration risks are not appropriate for this receptor as are risks from contaminated groundwater as the SSSI is non water dependent (and also the opposite direction to groundwater flow).

Protected Species within 500 m of the site (including fish and mollusca species) and Local Wildlife sites (within 500m of the site) are unlikely to be impacted by dust, air pollution, noise or vibrations however the accidental release of mobile contamination to groundwater and sediment laden run-off into surface waters will be given some consideration from site operation, although mitigation measures employed at the site should sufficiently reduce this risk.

A separate assessment of risk for Environmental Receptors (for both local and national/international designations) is discussed in **Section 8**.

7 ENVIRONMENTAL RISK ASSESSMENT

Accidental Release

Source/ Hazard	*Receptor*	*Pathway*	*Probability of exposure*	*Consequence*	*Risk Management*	*Overall Risk*
Spillages and Leakages	Harm to human health, pollution of land, groundwater and surface water.	Runoff across ground and via surface water drains, ditches. Migration into groundwater	Low	Significant quantities of potentially polluting liquids connected to the permitted activities will not be stored on site.	The EMS covers site procedures to manage accidents, inspections, and maintenance of tanks and spill kits. It is proposed to have a fuel storage tank on site which will be located within the weighbridge compound. This will be of a 'double skin' design to meet with E.A. regulations or be within a contained area 110% the capacity of the fuel tank. Should accidental fuel spillage occur, this will be cleared up using a recognised fuel spillage kit. Staff training and practice will mean the risk of spillage will be very low. Minor spillages associated with vehicle leaks will be cleaned up immediately, using spill kits to clean up liquids and placed in alternative containers. Materials suitable for absorbing and containing minor spillages will be maintained on site. In the event of major spillage, action will be taken to contain the spillage and prevent liquid from entering unsurfaced ground. The spillage will be cleared immediately and placed in containers for off-site disposal and the EA will be notified.	**Low**
Vandalism/ arson	Harm to human health, pollution of land and water, loss of amenity	Airborne, direct surface water runoff across ground and via surface water drains, ditches etc	Low	Risk of vandalism/ arson etc	Security measures including fencing (probably post and rail) and hedgerows around the majority of the site. A manned gate allows access and exit from the site. The site benefits from manned site security. Any security breaches or acts of vandalism will be reported to the police and any other relevant authority.	**Low**
Flooding	Harm to human health, pollution of land and	Across ground and via surface water drains, ditches etc	Medium	Storage of potentially polluting materials.	As part of site operation, dewatering of the sand and gravels will be undertaken thereby reducing the risks from flooding on site. Those areas within a Flood Zone 2 and Zone 3 will not be used for the storage of any	**Low**

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
	water, loss of amenity.				unaccepted/out of specification waste materials or other potentially polluting materials or fuel.	
Fire	Harm to human health, pollution of air, land and water, loss of amenity	Air transport of smoke, firewater contamination by runoff across land, groundwater, surface water	Low	Harm and nuisance to local population, emergency services and site staff	The nature of the material stored and deposited on site means that there should be no risk of fire. Regular inspections of the site will be undertaken. No potentially flammable materials will be stored on site for longer than necessary. Staff will be trained in the actions to take in the event of a fire. Fire extinguishers will be kept in appropriate locations. Site manager will be responsible for implementing risk management measures.	**Low**
Unauthorised waste (i.e., contaminated waste), accidental tipping of non-inert waste type leading to leaching into the ground	Groundwater (Secondary 'A' Aquifer in superficial deposits, River Kennet to the north)	Leaching through underlying soils	Low	Medium/high - Impact on aquifer in hydraulic connectivity to local rivers and potential impact on local abstraction (500 m north)	Incoming inert soils will be subject to strict pre-acceptance and acceptance procedures to identify, reject and/or quarantine any potentially non-conforming wastes. Only materials listed within the permit will be accepted. All soils arriving at the site will be subject to inspection and checking against the declaration on the accompanying waste transfer note. All site-won material will be tested regularly and subjected to visual checks to conform suitability for reuse on site. In the event that unauthorised waste is delivered to the site, the materials will be either immediately returned to the producer or segregated and stored in a designated quarantine area prior to export from site.	**Low**
	Harm to human health	Airborne/ inhalation	Low	Effect on humans		**Low**
	Surface Water (River Enbourne, local drains and tributaries)	Overland flow and sub-surface flow to watercourse	Low. Likely pathway for any pollutants to take fllowing deposit would be into the ground	Medium – no noted local surface water abstractions, though ecological receptors could be affected		**Low**

Noise and Vibration

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Noise – Plant, machinery	Harm to human health, nuisance	Airborne	Low – The working areas are not that close to residential homes or businesses	Low: Likelihood to lead to complaints from local residents	A noise assessment completed for the site (see **Appendix D**) has concluded the noise levels will be acceptable and would remain below the proposed noise criteria at the noise sensitive receptors surrounding the site (residential dwellings). To ensure that any potential disturbance was minimised, control measures and a noise monitoring scheme would be implemented to ensure that the proposed limits were not exceeded. These may include: All plant to be serviced and kept in good state of repair. Pre-use/daily inspection checklists are to be completed prior to operating plant or work equipment. Any excessive noises will be identified and reported. Defects are to be communicated to site manager and plant/equipment if unsafe to use, quarantined until repaired and safe to operate. Noisy work will only be undertaken Monday to Friday - 0800 and 1730 and Saturday - 0800 and 1200. Site manager to liaise with neighbours where required.	**Low**
	Local Ecological Receptors	Airborne	Medium to Low	Ecological disturbance	Ecological receptors will be sheltered in dense wooded areas which will absorb a lot of the daily noise which will comprise soil movement, tipping and tracking in. Given the duration of the works and limited number of vehicles, it is considered that there will be little disturbance to main ecological receptors including mammals and birds and likely no disturbance to reptiles and fish species.	**Low**
Vibration – Plant and machinery	Harm to human health, nuisance	Airborne/ground	Low	Effect on humans	Activities that create vibration will only be undertaken Monday to Friday between 0700 and 1800 and Saturday between 0700 and 1300. Continued dewatering will be needed outside these hours which is to be done by silenced pump. Alternative methods to be utilised where feasible. Site manager to liaise with neighbours where required.	**Low**

Fugitive Emissions

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Emissions to air: Airborne dust – from stockpiles and associated with soil handling and wind blowing across stripped ground.	Harm to human health, pollution of air, nuisance – to air strip and local commercial business, loss of amenity	Inhalation, windblown dust	Medium (depending upon weather)	Nuisance – dust in air, dust on cars, clothing etc. Localised deterioration of air quality Respiratory issues	Deposits are expected to be normally wet or damp. A water bowser will be kept at the site and will be regularly used to dampen areas where dust may occur. Drop heights will be minimised where appropriate to reduce the generation of dust. Deposits of dust on external parts of the plant shall be cleaned off at the end of each working day. Works will stop immediately if dust from operations on site is posing a risk to local residents, businesses and/or road traffic. When activities are moved within the site there will be a full risk assessment that will take into account the proximity of any neighbours. If risk to air from dust etc cannot be sufficiently mitigated the activities will be moved to a more appropriate location within the site. Site manager to liaise with neighbours where required.	**Low**
Emissions to air: Airborne dust – from movement of vehicles	Harm to human health, pollution of air, nuisance - loss of amenity	Inhalation, windblown dust	Medium/High (depending upon weather and traffic)	Nuisance – dust in air, dust on cars, clothing etc. Localised deterioration of air quality	Site pedestrian and vehicular routes to be kept clean, clear and in good repair. Pedestrian routes and vehicular routes will be wetted in dry weather. All vehicles will remain sheeted unless loading or unloading. Empty vehicles will also remain sheeted to prevent any emissions of residual dust, unless they have been cleaned out. Works will stop immediately if dust from operations on site is posing a risk to local road traffic. The site manager will liaise with neighbours where required.	**Low**
Emissions to air: Exhaust fumes from plant and machinery	Harm to human health, pollution of air.	Inhalation, discharge to air	Low (depending upon traffic)	Effect on humans/wildlife and atmospheric air quality	The maximum impacts due to quarry-related traffic may be experienced on the A430 to the east of the site and through to Aldermaston Wharf. The modelled increase in post development NO2 and PM10 concentrations can be perceived as imperceptible to small, with a small increase being predicted at residential properties along	**Low**

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
					Basingstoke Road. The significance to all receptors is considered negligible. All plant and machinery to be serviced and kept in good state of repair. Pre-use/daily inspection checklists are to be completed prior to operating plant or work equipment. Defects are to be communicated to site manager and plant/equipment if unsafe to use, quarantined until repaired and safe to operate.	
Emissions to Controlled Waters – Material stockpile runoff in surface water systems	Harm to human health, pollution of marine environment/ SSSI, nuisance - loss of amenity	Inhalation, ingestion, dermal contact. Infiltration into groundwater	Medium	Effect of suspended solids on humans and wildlife	Stockpiled material will only be stored in areas that have been risk assessed to ensure there are no direct pathways to the surface water system. All runoff from stockpiled Inert material will drain to an area that will allow it to soakaway to ground. When stockpile areas are moved within the site there will be a full risk assessment that will take into account the location of any drains and watercourses and the proximity of any neighbours. If risk cannot be sufficiently mitigated the activities will be moved to a more appropriate location within the site. Silt mitigation measure may also be employed. Where necessary, any open drains will be covered and sealed to prevent ingress of runoff and discharges to watercourses.	**Low**
Emissions to Ground	Harm to human health, pollution of ground and groundwater	Runoff, point source discharges to ground	Medium	All waste material stockpiles will be inert in nature. Small quantities of fuels and oils may be present on site for vehicle and plant maintenance.	All imported permitted material stored on site should be of inert classification. Due to the nature of this material any runoff should contain only water and sediment which should be absorbed into the ground with no environmental impact. In the event that any wastes require off-site disposal they will be managed in accordance with the procedure detailed in the EMS. All fuels and oils to be stored securely indoors or within bunded containers, Spill kits to be made available on site at all plant, machinery and stores.	**Low**

Mud

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Mud on roads	Impact to local traffic, pollution of water	Water runoff across ground and via surface water drains, ditches	Medium	The nature of the materials and the activities means that there is likely to be significant amounts of mud on site, especially in wet conditions. This can then be tracked off site on vehicles.	Incoming/outgoing vehicles carrying materials will be sheeted to prevent the release of materials onto the roads. In the event that mud, debris or waste arising from the site is deposited outside the site, the affected area will be cleaned through the use of the most appropriate means, i.e. brush and water or road sweeper. A wheel washing facility including a water bath and rumble strips will be present on site for all vehicles to use prior to leaving the site. Staff/drivers will be responsible for ensuring that all vehicles leaving the site have used the wheel-washing facilities when required.	**Low**

Odour

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Odour	Nuisance – loss of amenity	Airborne	Low	No odour generating material to be stored on site	The nature of the activities on site means that no odorous materials should be accepted on site. Should any odorous material be identified upon arrival, it will be refused and redirected to an appropriate site.	**Low**

Litter

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Litter	Surrounding land and adjacent sites. Reduction in visual amenity. Ingestion by local wildlife.	Airborne and over land	Low	The nature of the material stored on site means that there should be no litter present.	Regular inspections of the site and site boundary for litter will be undertaken. Personnel on site will be instructed to clear away any litter they observe on site immediately. Any litter on site will be disposed of in a designated skip or in bins and the waste acceptance procedure will ensure that there is no litter present in the wastes which are received at the site.	**Low**

Source/ Hazard	Receptor	Pathway	Probability of exposure	Consequence	Risk Management	Overall Risk
Pests – rats/vermin	Harm to human health, nuisance - loss of amenity	Airborne and over land	Low	Pests unlikely to be attracted to material stored on site	The operator will ensure good housekeeping is undertaken on site. If pests are identified, pest control contractors will be brought in to advise and implement any required techniques.	**Low**

8 HABITATS ASSESSMENT

The main environmental receptors around the site which could be impacted by the restoration earthworks on site are identified within this report section.

An Environment Agency Pre-application Nature and Heritage Conservation screening report has been provided (on the 1 March 2022) centred on NGR *SU 57992 65659.* The assessment details records they currently hold on nature and heritage conservation sites and/or protected species and habitats identified within the vicinity of the site (screening radius of up to 1 km), which must be considered as part of the Bespoke Permit Application. The screening report is presented in **Appendix C**.

Details within the Pre-application screening report include the following designations:

8.1 Special Protection Area (SPA) & RAMSAR

None identified within a 1 km distance from the site.

8.2 Sites of Special Scientific Interest (SSSI)

As discussed in **Section 6.1.4**, the following nature and heritage conservation site have been identified within a 1 km distance from the subject Site.

Site	Approximate distance from excavation areas on site.
Woolhampton Reed Bed	170 metres (north)
River Kennet	430 metres (north)
Brimpton Pit	560 metres (west)

It is considered that the restoration earthworks will have little to no significant effect on the SSSI's identified above in terms of noise and vibration generated by the works due to the distance of these features to the excavation areas on site. Restoration works would result in a maximum number of HGV movements as 20 in and 20 out, at the site, per day which is considered below the trigger threshold of 200 HGV movements per day and therefore vehicular fumes are not considered as a significant risk.

For the Woolhampton Reed Beds (nearest to the site), which supports various passerine and insect species, the coverage of trees and vegetations will naturally dampen or dissipate noise and vibration which is expected to be modest. The woodland screening will also aid in the dispersal of any dust generated by the works. It is consider that the River Kennet and Brimpton Pit are at too greater distance for dust or air pollution to cause a significant risk. Mitigation measure will be in place to ensure that impact as a result of accidental release of mobile contamination (leaks of fuel from machines) or sediment laden run-off (which could effect water quality) is effectively managed through the EMS, risk assessment and training of site personnel .

Dewatering will discharge into the River Enborne. Before final discharge, the water will be fully settled to eliminate the risk of any suspended solids that might cloud the water.

8.3 Local Wildlife Sites

The following nature and heritage conservation site have been identified within a 500 m distance from the site.

Site	Approximate distance from excavation areas on site.
Woodland near Woolhampton (wet woodands & reedbed habitats)	5 metres (north)

The design retains all established woodlands. The main risk to the woodland as a result of the operations is the indirect impact of dewatering the excavation area as this will draw down the level of the groundwater in the adjacent land.

A recharge ditch will be used to mitigate against impacts to the woodland. A ditch or trench outside the area of proposed excavation is to be cut into the ground. The ditch will be used as part of the discharge route for dewatering which will prevent or minimise the impact to the groundwater levels in the adjoining land. The groundwater levels are currently being monitored at a number of points and these will continue to be monitored throughout the period of site development. Further monitoring boreholes will also be installed as part of the environmental monitoring scheme and this information will ensure the mitigation is working.

8.4 Protected Species

The following protected species have been recorded as being present within 500 m of the site:

- European Eel *Anguilla anguilla* - migratory route;
- Atlantic Salmon *Salmo salar* - migratory route;
- Bullhead *Cottus gobio;*
- Brown Trout *Salmo trutta;*
- Unidentified Lamprey;
- Brook Lamprey *Brook lamprey;*
- Atlantic Salmon *Salmo salar; and*
- Fine-lined Pea Mussel *Pisidium tenuilineatum.*

All care will be taken to ensure that there is no impact to the environment from restoration activities on site. Mitigation measure will be employed to reduce any risks (i.e. accidental release of mobile contamination or sediment laden run-off) that could impact the site, groundwater quality and water quality within the local water systems which support the protected species details above. Details of appropriate measures/procedures will be included within the EMS for site operations and suitable training will be in place for site personnel.

It is expected that as a result of the restoration works, there will be an overall benefit to these species with improved habitats.

9 ASSESSMENT SUMMARY

9.1 Accidental Release

Procedures detailed within the EMS will be sufficient to mitigate potential risks that could arise from the storage of fuel on site and re-fuelling vehicles. Suitable training will be in place for site personnel to ensure accidental releases are handled appropriately and that immediate action will be taken should any major leak or spill occur. Security measures adopted at the site will prevent unauthorised accesses that could lead to vandalism (or arson) at the site.

Flooding of the site during operation is considered unlikely, however measures will be in place to ensure machinery/fuels or any quarantined soils are not stored within flood zones.

The waste acceptance procedures alongside suitable training of site personnel are considered sufficient to manage the risk of unauthorised waste and ensure that only materials of Inert classification are accepted at the site.

9.2 Noise and Vibration

A noise assessment for the site has concluded noise levels will be acceptable and would remain below the proposed noise criteria at sensitive receptors surrounding the site (residential dwellings). It is also considered that the works are unlikely to cause a disturbance to the main ecological receptors within the Phase areas. A noise monitoring scheme would be implemented to ensure the proposed limits were not exceeded.

Plant and equipment will be carefully considered and well maintained (i.e. use of a non-vibrating roller) to minimise vibration and ensure smooth operation on Site.

9.3 Dust, vehicle fumes and run off

As the operation period will span a number of summer seasons when ground conditions are ‘warmer’ a prolonged period of dry weather could give rise to emission of dust from the site. However, suitable techniques are in place to manage this, and site management will be aware of the risk and mitigation required through appropriate training and procedures detailed within the Environmental Management System.

It is considered that the impacts of traffic emissions on local receptors to the site access point (receptors to the east, on the A340) is ‘well below’ adopted assessment criteria, and the significance of the impacts at all the receptors is therefore negligible.

Stockpiling of soils will be risk assessed to mitigate sediment laden run-off into surface water systems.

9.4 Mud, Odour and Litter

Risks from Mud, Odour and Litter are either considered negligible or to be suitably managed through the adherence to procedures detailed within the EMS and through suitable training of site personnel and managed in accordance with good house-keeping principles.

10 CONCLUSION

The Environmental Risk Assessment has been undertaken as described by the EA guidance.

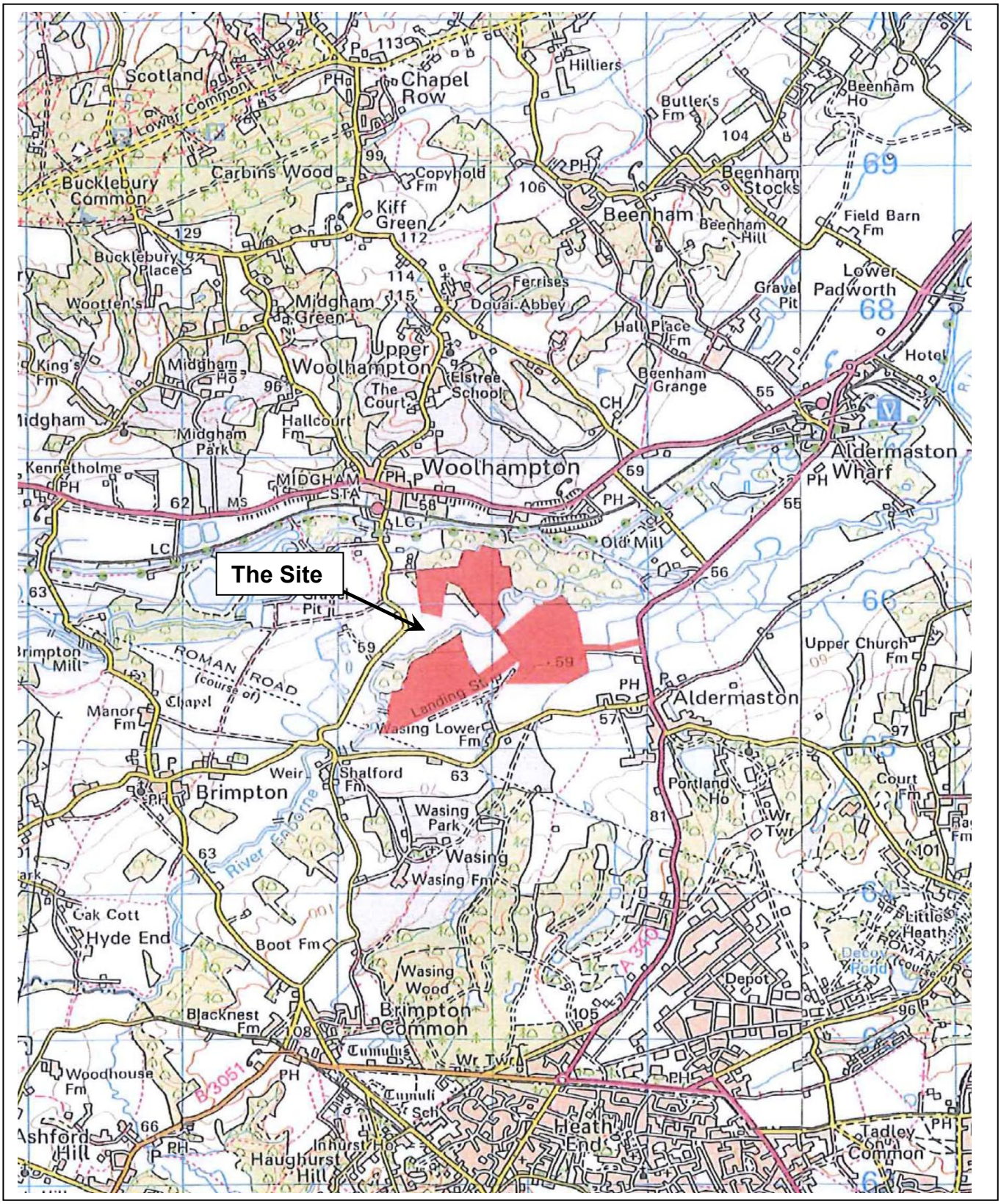
The risk assessment has considered emissions to air, land and water, odour, noise, dust, litter, and potential for accidents and incidents occurring at the site in relation to the proposed waste recovery works.

The assessment concludes that with the implementation of the risk management measures described above and strict adherence to appropriate waste acceptance procedures is sufficient to control potential hazards and risk of contamination from the proposed restoration works. The residual risk is assessed as being '*Low*' and therefore no further assessment is required.

Local impacts including noise, dust and litter can all be controlled by adherence to working procedures by site staff and are not considered to present a substantial pollution risk.

FIGURES

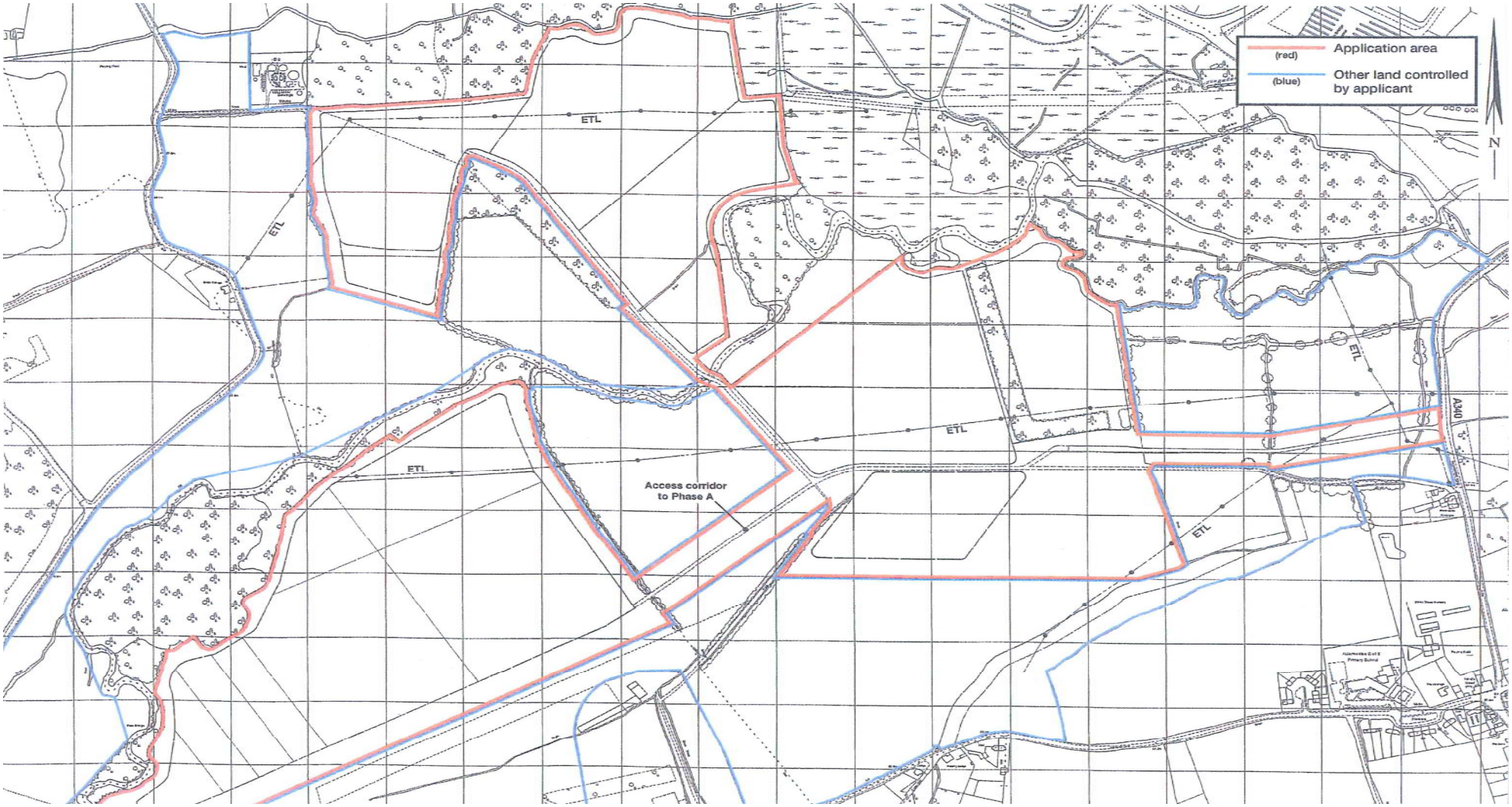
FIGURE 1
SITE LOCATION PLAN



Areas of proposed excavation are highlighted in red.

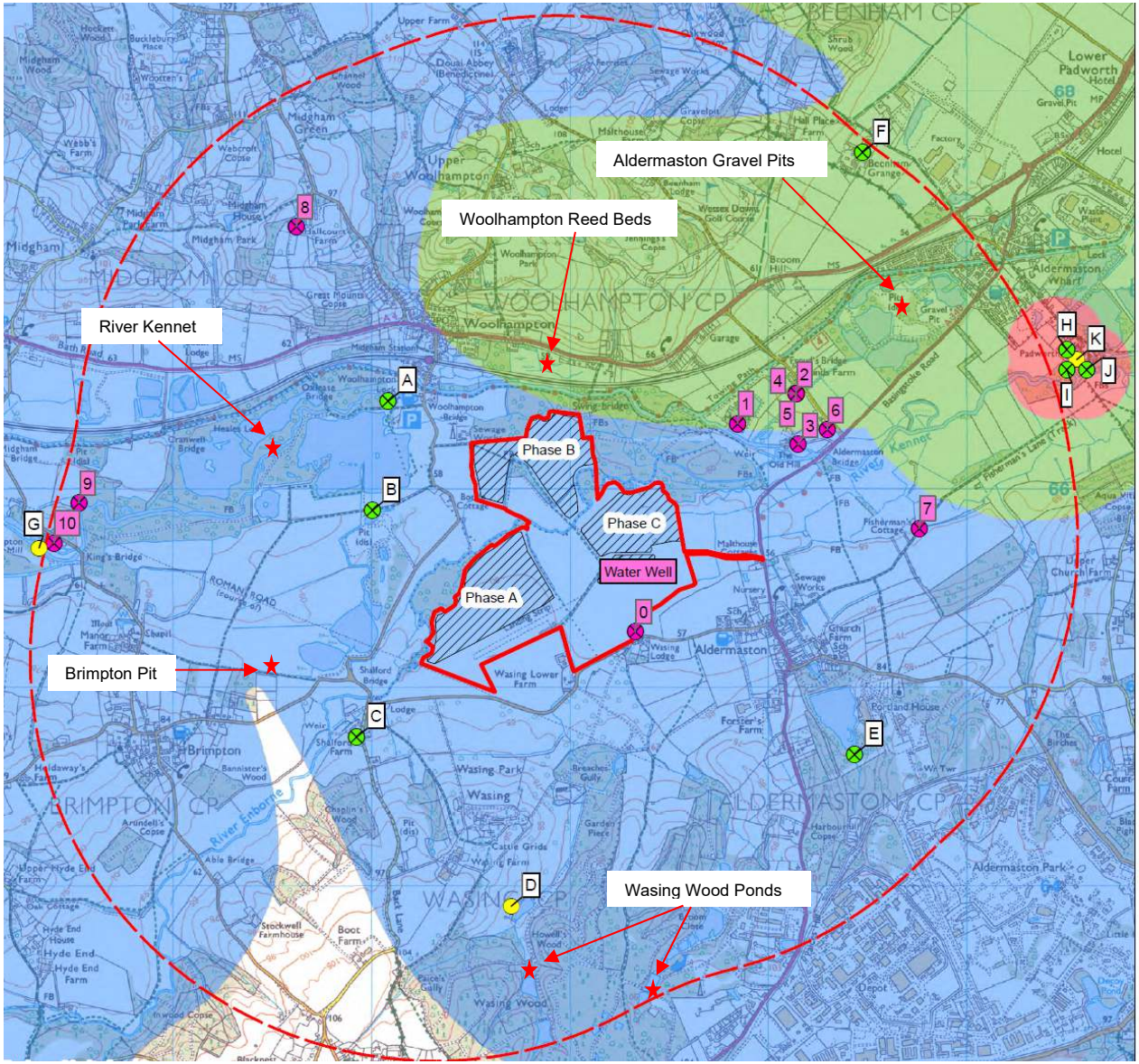
SITE LOCATION PLAN	**Client:** TARMAC Ltd	**Figure No:** 1
RSK GEOSCIENCES	**Site:** Lower Farm, Wasing Lane, Aldermaston	**Job No:** 11655
	Scale: Not reproduced to scale	**Source:** OS

FIGURE 2
SITE LAYOUT PLAN



RSK GEOSCIENCES	**Site Layout Plan**	**Client:** Tarmac Trading Ltd	**Figure No:** 2
		Site: Wasing Quarry, Wasing Lane, Aldermaston	**Job No:** 11655
		Scale: NTS	**Source:** client

FIGURE 3
LOCAL DESIGNATIONS TO THE SITE BOUNDARY



Site Boundary
Excavation Areas
2 km from Excavation Areas

Private Water Supplies

Private Water Supplies (PWS)

Licenced Abstractions

Groundwater
Surface Water

Source Protection Zone

Zone 1
Zone 2
Zone 3

Designated Sites

Sites of Special Scientific Interest (SSSI)

RSK GEOSCIENCES

Local Designations and Features

Client:	Tarmac Trading Ltd	**Figure No:**	3
Site:	Wasing Quarry, Wasing Lane, Aldermaston	**Job No:**	11655
Scale:	NTS	**Source:**	Client

APPENDICES

APPENDIX A
SERVICE CONSTRAINTS

1. Service Constraints

1.1. This Report (the “Report”) and any study, inspection, investigation, sampling, testing and or interpretation carried out in connection with the Report (together the "Services") were compiled and carried out by RSK Environment Limited (RSK) trading as Leap Environmental or RSK Geosciences, for the Client named in the first paragraph of the Report (the "Client") in accordance with the terms of an RSK Fee Proposal including RSK Environment Standard Terms and Conditions (the “Appointment”) between RSK and the Client, unless otherwise stated in the first paragraph of the Report. The Services were performed by RSK with the reasonable skill and care ordinarily exercised by a geo-environmental consultant at the time the Services were performed. Nothing in this Report shall be construed as imposing any fitness for purpose obligation. Further, and in particular, the Services were performed by RSK taking into account the limits of the scope of works required by the Client, the time scale involved and the resources, including financial and manpower resources, agreed between RSK and the Client.

1.2 Other than that, expressly contained in paragraph 1 above, RSK provides no other representation or warranty whether express or implied, in relation to the Services. RSK shall not be liable in respect of any action or proceedings arising out of or in connection with this Report whether in contract, in tort, for breach of statutory duty or otherwise after the expiry of six (6) years from either (i) the date of the Report or (ii) such earlier date as prescribed by law, unless varied in the terms of the Appointment.

1.3 Unless otherwise agreed in writing, the Services were performed by RSK exclusively for the purposes of the Client. RSK is not aware of any interest of or reliance by any party other than the Client in or on the Services. Unless expressly provided in writing, RSK does not authorise, consent, or condone any party, other than the Client relying upon the Services. Should this Report or any part of this Report, or details of the Services or any part of the Services, be made known to any such party, and such party relies thereon, that party does so wholly at its own and sole risk, and RSK disclaims any liability to such parties. Any such party would be well advised to seek independent advice from a competent geo-environmental consultant and/or lawyer.

1.4 The Client shall not, without the prior written consent of RSK, assign, transfer, charge, mortgage, subcontract, or deal in any other manner with all or any of the benefits provided in this Report. Unless specified in the Appointment, RSK shall not be obliged to assign the benefit of the Report whether by collateral warranty, third party rights pursuant to the Contracts (Rights of Third Parties) Act 1999, letter of reliance or otherwise. If RSK agrees to any assignment of the benefit of this Report, in whatever form, benefits to third parties through collateral warranties, third party rights or letters of reliance shall not be provided unless a fee for each right, warranty or letter is agreed. The form of wording used in the warranty or letter shall be provided by RSK for agreement by the Client. Any reasonable changes to the form of wording will be implemented by mutual agreement, however the terms in the warranty or letter cannot offer the third party any greater benefit than the Appointment offered to the Client.

1.5 It is the understanding of RSK that this Report is to be used for the purpose described in the introduction to the Report. That purpose was a significant factor in determining the scope and level of the Services. Should the purpose for which the Report is used, or the proposed use of the site change, this Report may no longer be valid and any further use of or reliance upon the Report in those circumstances by the Client without the review and advice of RSK shall be at the Client's sole and own risk. RSK shall not be liable for any use of this Report for any purpose other than that for which it was provided.

1.6 The passage of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the Report inaccurate or unreliable. The information and conclusions contained in this Report should not be relied upon in the future without the written advice of RSK. In the absence of such written advice of RSK, reliance on the Report in the future shall be at the Client's own and sole risk.

1.7 The observations and conclusions described in this Report are based solely upon the Services which were provided pursuant to the agreement between the Client and RSK. RSK has not performed any observations, investigations, studies or testing not specifically set out, or required by the Appointment between the Client and RSK. RSK is not liable for the existence of any condition, the discovery of which would require performance of services not otherwise contained in the Services. For the avoidance of doubt, unless otherwise expressly referred to in the introduction to this Report, RSK did not seek to evaluate the presence on or off site of asbestos, invasive plants, electromagnetic fields, lead paint, heavy metals, radon gas, fuel storage, persistent bio-accumulative or toxic chemicals (including PFAS and related compounds) or other radioactive or hazardous materials, unless specifically identified in the Services.

1.8 The Services are based upon RSK's observations of existing physical conditions at the Site gained from a visual inspection of the site together with RSK's interpretation of desk based publicly available information, including documentation, obtained from third parties and from the Client on the history and usage of the site, unless specifically identified in the Services and the limitations below:

a. The Services were based on information and/or analysis provided by independent testing and information services or laboratories upon which RSK was reasonably entitled to rely.

b. The Services were limited by the accuracy of the information, including documentation, reviewed by RSK and the observations possible at the time of the visual inspection.

c. The Services did not attempt to independently verify the accuracy or completeness of information, documentation or materials received from the Client or third parties, including laboratories and information services, during the performance of the Services.

d. The Client has identified in writing to RSK, the information, reports, findings, surveys and preliminary works RSK may not rely upon when providing the Services.

RSK is not liable for any inaccurate information or conclusions, the discovery of which inaccuracies required the doing of any act including the gathering of any information which was not reasonably available to RSK, and including the doing of any independent investigation of the information provided to RSK, save as otherwise provided in the terms of the Appointment between the Client and RSK.

1.9 Any site drawing(s) provided in this Report is (are) not meant to be an accurate base plan for scale measurement but is (are) used to present the general relative locations of features on, and surrounding, the site. Features (intrusive and sample locations etc) annotated on site plans are not drawn to scale but are centred over the approximate location. Such features should not be used for accurate setting out and should be considered indicative only.

1.10 Should RSK be requested to review the Report after the date of issue of this Report, RSK shall be entitled to additional payment at the existing rates, or such other terms as agreed between RSK and the Client.

2. Service Constraints where the Report provides an intrusive assessment of ground conditions:

2.1 The intrusive environmental ground investigation aspects of the Services are a limited sampling of soil from the site, at pre-determined locations based on the known historic / operational configuration of the site. The conclusions given in this Report are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around those locations. The extent

of the limited area depends on the properties of the materials adjacent and local conditions, together with the position of any current structures and underground utilities and facilities, and natural and other activities on site. In addition, chemical analysis was carried out for a limited number of parameters (as stipulated in the scope agreed between the Client and RSK, based on an understanding of the available operational and historical information) and it should not be inferred that other chemical species (not tested) are not present.

2.2 The comments given in this Report and the opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the field and in the laboratory. The extent of the exploratory holes, laboratory testing and monitoring undertaken may have been restricted due to a number of factors including accessibility, the presence of buried or overhead services, current development, site usage, timescales or the Client's specification. The exploratory holes only assess a small proportion of the site area with respect to the site as a whole, and as such may only provide an indicative assessment of ground conditions on site. There may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account. In particular, it should be noted that there may be areas of made ground not detected due to the limited nature of the investigation or the thickness and quality of made ground across the site may be variable. In addition, groundwater levels and ground gas concentrations and flows, may vary from those reported due to seasonal, or other, effects and the limitations stated in the data should be recognised. The presence of hotspots of undisclosed contamination or exceptional and unforeseen ground conditions cannot be discounted.

2.3 Where the Services include Investigation of an exploratory nature or relating to physical ground works, any costings and prices provided in the Report are estimated and provided for guidance purposes only. The actual cost and time quantities shall be remeasured and shall be dependent upon the ground or other conditions, constraints present, and number and depth of the investigation locations, which shall influence the number of samples and tests required, and the quantities of soil being classified.

2.4 Asbestos is often observed to be present in soils in discrete areas. Whilst asbestos-containing materials may have been locally encountered during the fieldworks or supporting laboratory analysis, the history of brownfield and demolition sites indicates that asbestos fibres may be present more widely in soils and aggregates, which could be encountered during more extensive ground works. However, this Report does not constitute an asbestos survey. On this basis, the presence of asbestos on site cannot be discounted and a full asbestos survey should be undertaken.

2.5 Unless stated otherwise, only preliminary geotechnical recommendations are presented in this Report and these should be verified in a Geotechnical Design Report, once proposed construction and structural design proposals are confirmed. Eurocode 7 gives guidance on the type of sampling, sample quality, number and spacing of intrusive investigations, and number of laboratory tests required. It is intended that the Geotechnical Information section of this Report will fulfil the general requirements of the Ground Investigation Report as set out in section 6 of Eurocode7, although this is subject to the restrictions imposed on the investigation, as listed above. For geotechnical design, Eurocode 7 requires the Geotechnical Design Report to address both the geotechnical and structural aspects of the geotechnical design for both the limit and serviceability states. The Geotechnical Appraisal section of this Report will not meet the requirements of a Geotechnical Design Report (GDR) and should therefore be used for preliminary guidance only.

3. Service Constraints where the Report relates to Surface Water Management:

3.1 The Surface Water Management Inspection (SWMI) Report, documents provided, observations, actions, and recommendations, with respect to the management of potential pollution issues to surface waters, made during the site Inspection visit, are those present at the time of the visit, and may not represent those recorded by others on the same day.

3.2 The comments given in this Report and the opinions expressed are based on the weather, ground and ground water conditions encountered during the site work and on the results of tests made in the field and in the laboratory. However, there may be conditions pertaining to the site that have not been disclosed by the inspection and therefore could not be taken into account. In addition, groundwater levels and flows, may vary from those Reported due to seasonal, or other, effects and the limitations stated in the data should be recognised.

3.3 RSK places a degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this Report was prepared.

3.4 This Report is a live document, to be continually reviewed and updated as the development progresses or other changes occur on site. RSK can only maintain the currency of this Report through the Client requesting support with supplementary site visits or attendance at meetings ahead of key stages of the development in relation to surface water management. Our risk rating assesses a number of risk factors in line with the source-pathway- receptor model and is therefore subject to constant change.

3.5 Standard design drawings are indicative. Material types, dimensions and construction details will need to be adjusted by the Client to suit the specific conditions / flows on Site.

3.6 The full responsibly for implementing the site-specific protection and maintenance measures to protect the surface water system as stated in this Report, remains with the Client and their site management team. Additional control measures may be required to achieve the objectives set out in the Surface Water Management Plan to be implemented and financed by the Client.

4. Service Constraints where the Report relates to Waste Management:

4.1 In accordance with the definition provided in the Waste Framework Directive (WFD), materials are only considered waste if 'they are discarded, intended to be discarded or required to be discarded, by the holder'. Naturally occurring soils are not considered waste if re-used on the site of origin for the purposes of development. Soils such as made ground that are not of clean and natural origin (irrespective of whether they are contaminated or not) and other materials such as recycled aggregate, do not necessarily become waste until the criteria above are met. Excavation arisings from the development may therefore be classified as waste if surplus to requirements and/or unsuitable for re-use.

4.2 It is the duty of the waste producer, to ensure that all waste is accurately classified prior to waste disposal. Technical Guidance WM3 (EA, 2018) sets out in its Appendix D requirements for waste sampling. It is a legal requirement to correctly assess and classify waste. The level of sampling should be proportionate to the volume of waste and its heterogeneity. Unless otherwise stated, the waste assessment presented in this Report should be considered as preliminary and further testing and assessment of the waste under the provisions of a Waste Sampling Plan may be required to obtain the necessary level of data required for basic characterisation of the waste in support of disposal.

4.3 Unless stated otherwise in the Report, information relating to historical operations at the site was not reviewed as part of the assessment by RSK. In addition, unless otherwise stated in the Services, RSK was not present during the collection of the samples nor had any input on the chemical testing suite. Therefore, the waste assessment and classification detailed in this Report are based solely on any information that were provided to RSK (e.g., laboratory chemical data, exploratory hole records) and were completed without prejudice for our Client.

4.4 RSK's assumes that any ground investigation data, chemical testing results etc., that were provided by the Client to inform the waste assessment and supporting review were carried out in accordance with current best practice and relevant guidance/ standards, where applicable. Thus, the

comments given in this Report and the opinions expressed are based solely on the information provided by the Client. However, it is noted that there may be conditions pertaining to the site that have not been disclosed by the investigation and therefore could not be taken into account as part of the RSK assessment.

5. Service Constraints for Construction Environmental Management Plan Reports:

5.1 This Report should be considered in the light of any changes in legislation, statutory requirement or industry practices that may have occurred subsequent to the date of issue.

5.2 The measures and comments outlined in this Report and any opinions expressed are based on the plans provided at the time and discussions with relevant parties. However, there may be conditions pertaining to the site that have not been disclosed by investigations and therefore could not be taken into account.

5.3 This CEMP is a live document and is subject to change throughout the project, as and when necessary, to ensure management of environmental aspects remains relevant, and to ensure continued compliance with legislation and commitments as they may change. RSK understands that this CEMP will be reviewed by the Client every six months and updated as and when necessary.

5.4 It is the full responsibility of the Principal Contractor/ Client to ensure that their works do not contravene legal requirements, and adherence to this CEMP alone cannot be a full defence regarding legal action against the Principal Contractor.

6. Service Constraints where the Report relates to Ground Gas Membrane Verification:

6.1 This Report is limited to the verification of the gas resistant membrane/vapour membrane/ radon barrier after installation and no inspections were undertaken of the substrate (i.e. prepared ground). The Report therefore does not constitute as a full verification of ground gas protection system.

6.2 The comments given in this Report and the opinions expressed, are based on the condition of the ground gas membrane as encountered at the time of inspection by suitably qualified personnel. RSK cannot accept liability for any subsequent change to the status of the gas membrane by follow-on trades or other construction activity.

6.3 Where not designed by RSK, the verification of protection measures is carried out with reference to the gas protection design provided by the Client. RSK assume the scope of gas protection measures as determined by third parties to be correct and to have achieved any required approval from authorities.

6.4 The Ground Gas Design Report/Remediation Strategy and Verification Plan contains details of the procedures to be adopted for inspection and validation of the works. However, it should be noted that responsibility for the correct implementation of the strategy lies with the appointed contractor. RSK cannot be held responsible for any remedial works that are carried out without the agreed procedures involving either direct supervision by RSK, or inspection and validation of the works by a representative from RSK.

7. Service Constraints for Environmental Due Diligence (EDD)Reports:

7.1 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the site, therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information.

7.2 This Report describes the results of the EDD exercise. The scope of this EDD Report, where appropriate, covers legal or regulatory compliance with respect to UK or international regulations associated with environmental matters.

7.3 As with any EDD exercise, there is a certain degree of dependence upon information provided by the target company. The EDD does not include a site walkover / visit or liaison with site representatives unless identified in the Services. Therefore, the assessment is based on the available desk study information. Also, there is a certain degree of dependence upon oral information provided by site representatives, which is not readily verifiable through visual inspection, or supported by any available written documentation. RSK shall not be held responsible for conditions or consequences arising from relevant facts that were not fully disclosed by facility or site representatives at the time this EDD exercise was performed.

7.4 This Report, including all supporting data and notes (collectively referred to hereinafter as "information"), was prepared or collected by RSK for the benefit of its Client.

7.5 The comments given in this Report and the opinions expressed are based on the information obtained and reviewed as part of the desk-based assessment and the site inspection visit. However, there may be conditions pertaining to the Site that have not been disclosed by the assessment and therefore could not be taken into account. Furthermore, no intrusive investigations, monitoring or sampling have been undertaken to confirm the environmental status of the Site therefore any comments relating to ground conditions and subsurface contamination are based solely on a review of desk-based information and observations collected during the site inspection visit.

8. Service Constraints for Ground source heat energy Reports:

8.1 It is understood that this is a desktop survey only and that there are no requirements for a site walkover, service utility survey, or provision of service plans. These services can be provided upon request if required.

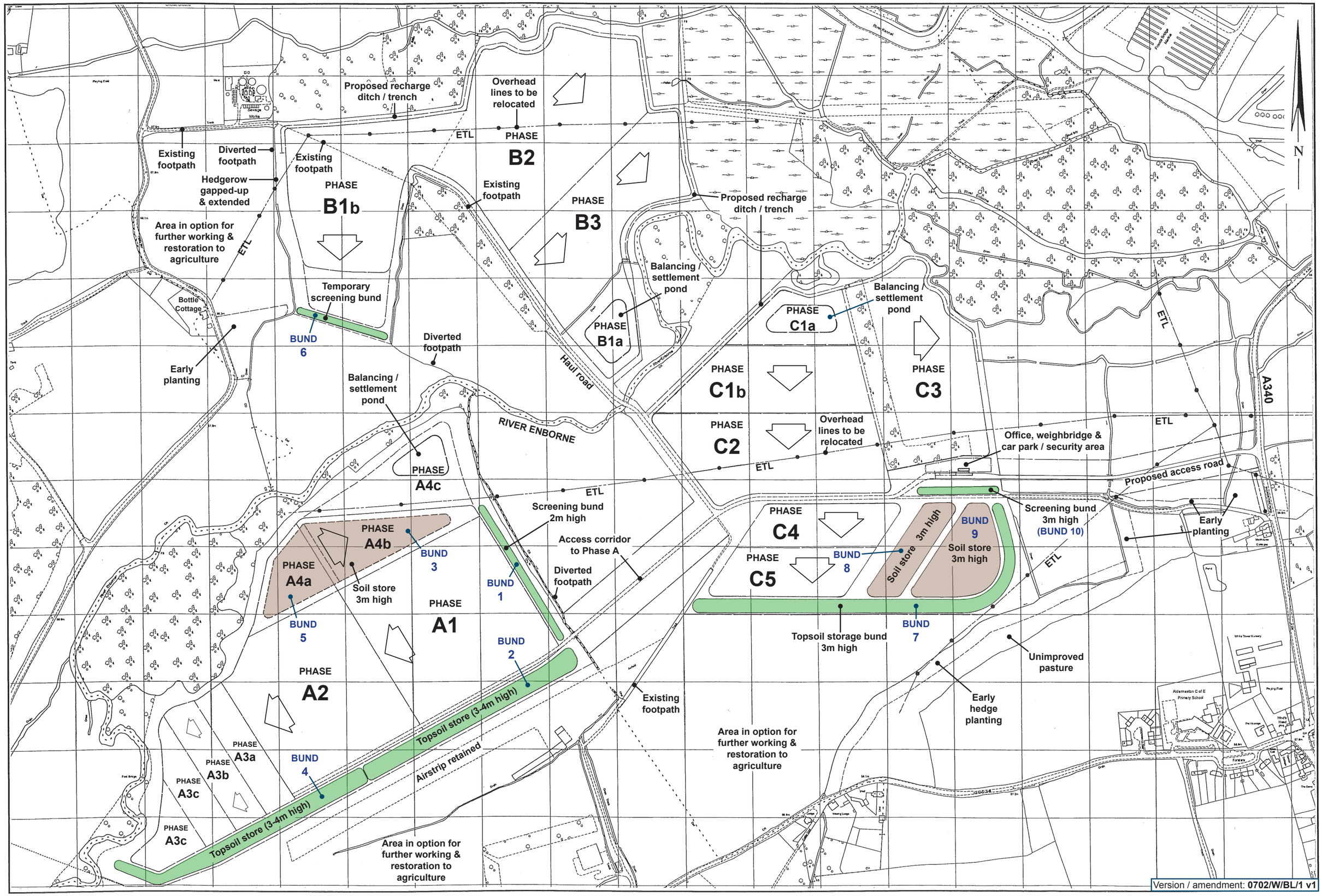
8.2 At a later stage, it is possible that a thermal response test (TRT) will need to be completed, for which a test borehole will have to be drilled, and these would be costed at the time. RSK can provide all aspects of subsequent site work for a GSHP system if required.

9. Service Constraints for Water Abstraction Borehole Reports:

9.1 The Report aims principally to only identify and assess the suitability of the site for a water abstraction borehole. This Report should be considered in the light of any changes in legislation, statutory requirements, and industry practices, that have occurred subsequent to the date of the Report.

9.2 Unless stated in the Report, the opinions expressed in this Report including all comments and recommendations provided are on the basis of the information obtained from a desk-based assessment.

APPENDIX B
WORKING PHASE LAYOUT AND RESTORATION PLANS



Version / amendment: **0702/W/BL/1 v1**

D.K. Symes Associates

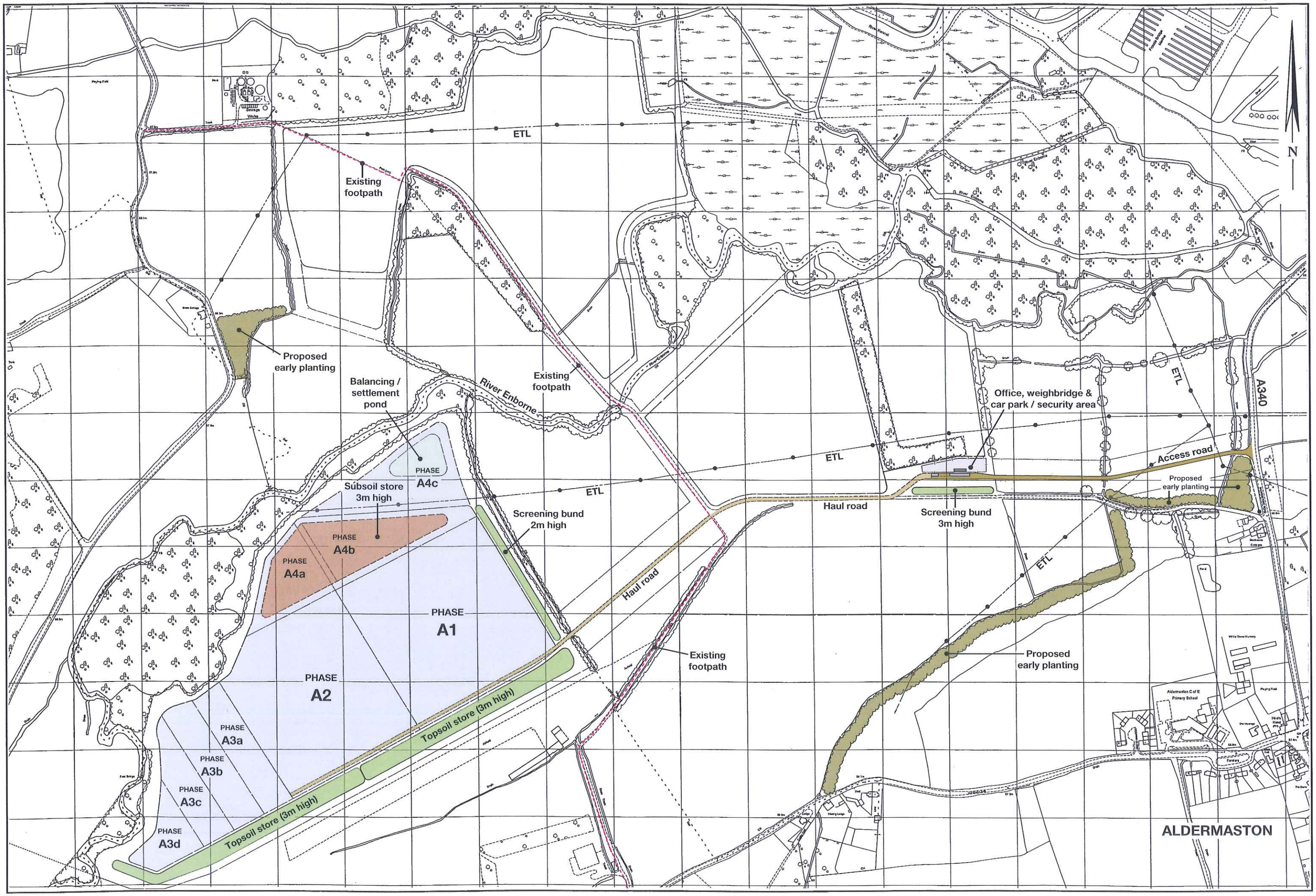
Bund Locations

Scale - **1:5,000** (at A3)

Date - **19-11-2012**

Plan No. **0702/W/BL/1**

Wasing Estate



D.K. Symes Associates

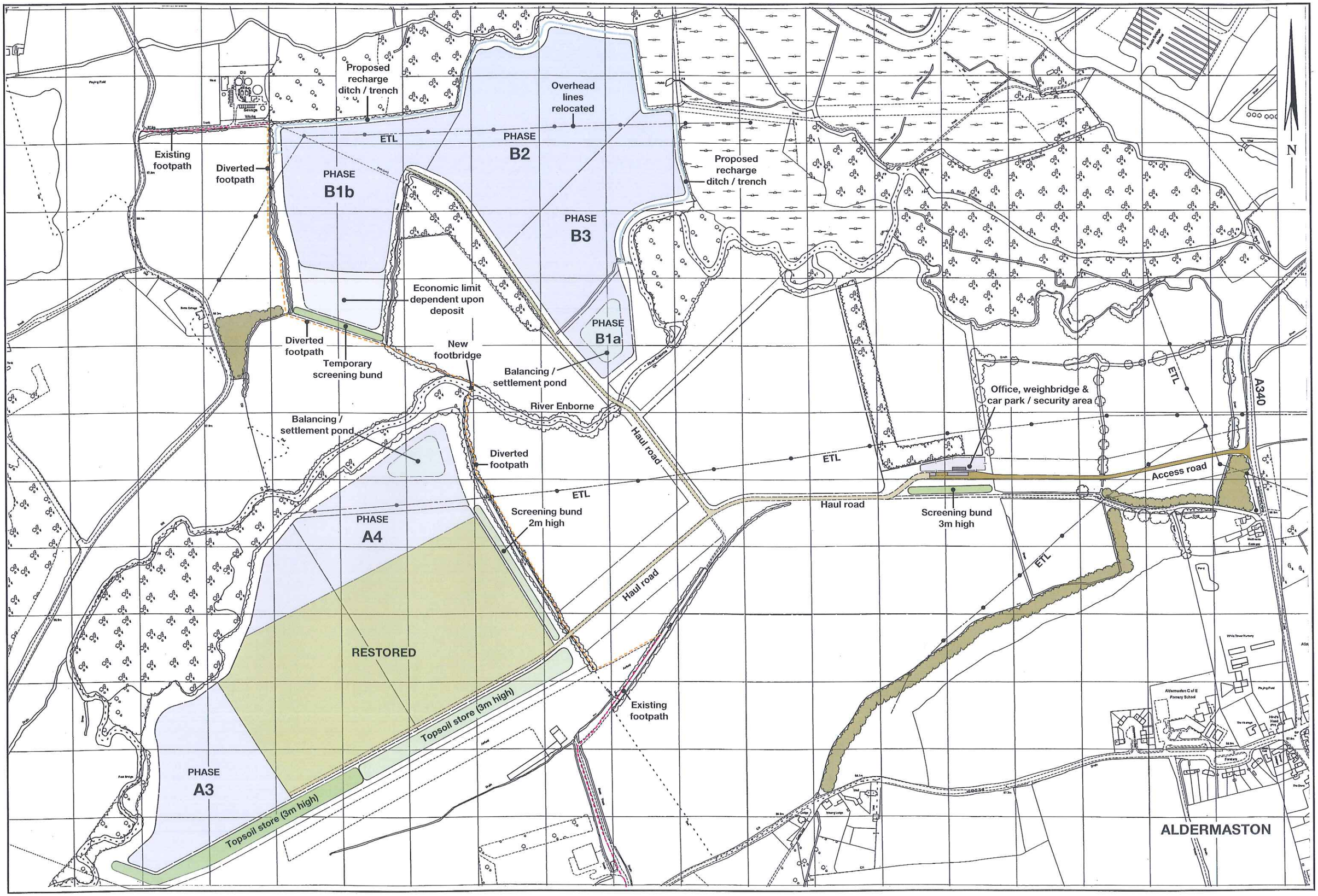
Illustrative Composite Operations - Phase A

Scale - **1:5,000** (at A3)

Date - **25-04-2012**

Plan No. **0702/W/CO/A/1**

Wasing Estate



D.K. Symes Associates

Illustrative Composite Operations - Phase B

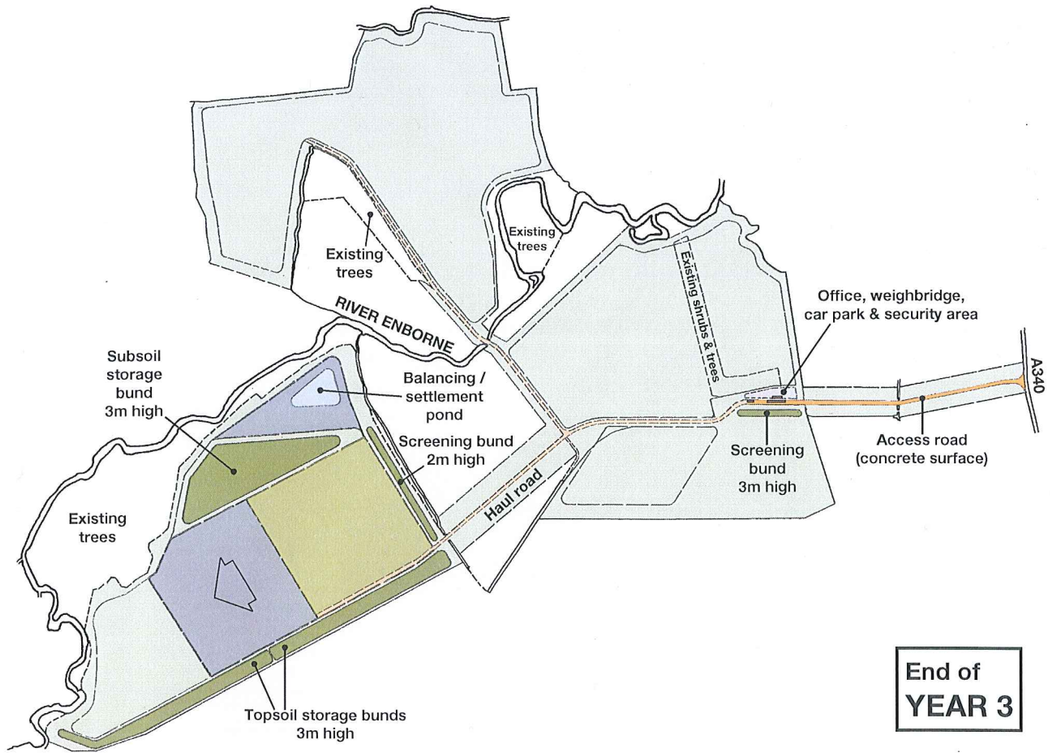
Scale - **1:5,000** (at A3)

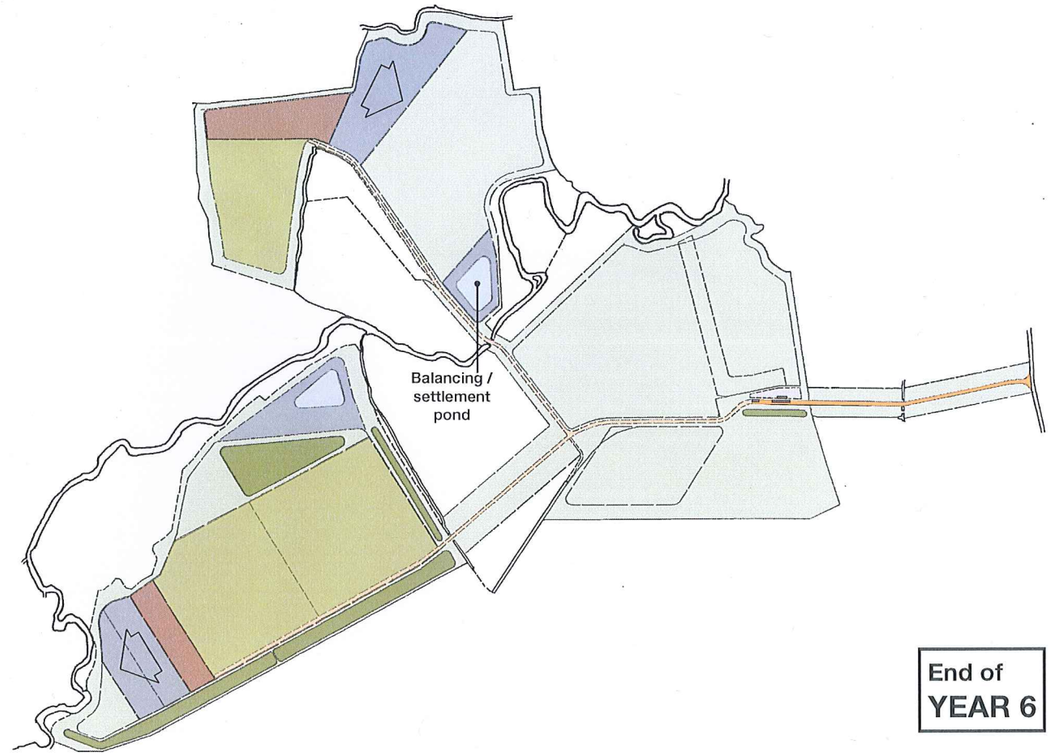
Date - **25-04-2012**

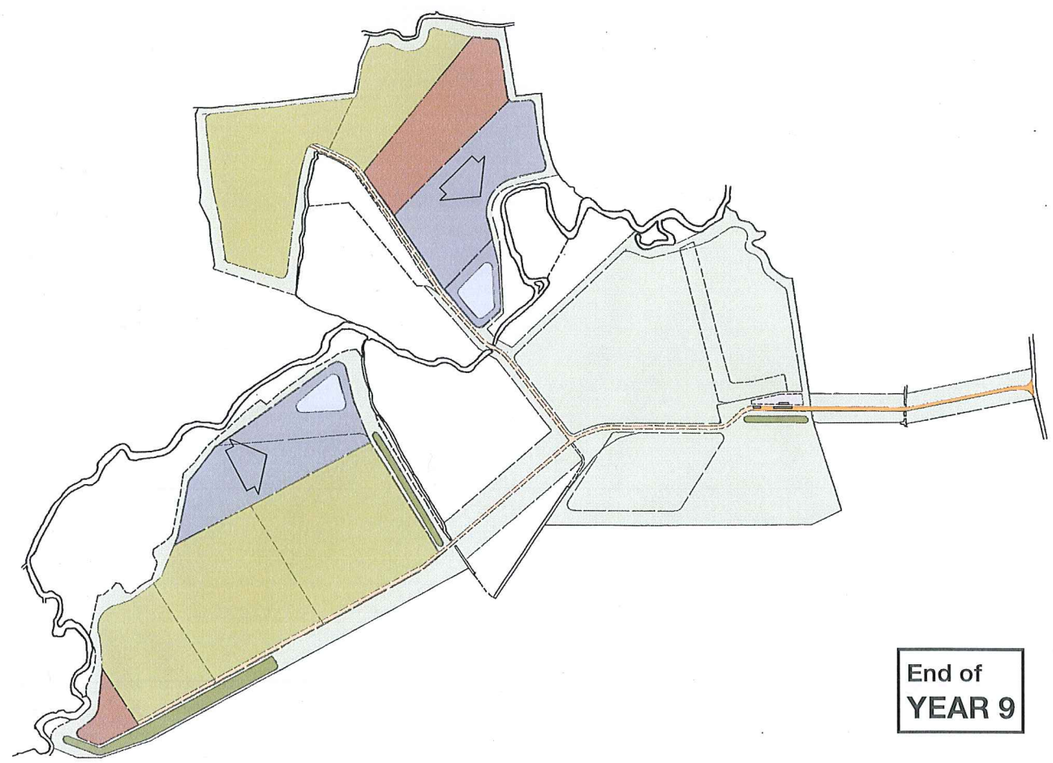
Plan No. **0702/W/CO/B/1**

Overhead lines relocated
RESTORED
Existing footpath
Diverted footpath
PHASE B3
Proposed recharge ditch / trench
Balancing / settlement ponds
PHASE B1a
PHASE C1a
Diverted footpath
New footbridge
River Enborne
Haul road
PHASE C1b
PHASE C3
Office, weighbridge & car park / security area
A340
Overhead lines relocated
PHASE C2
Access road
Pond
ETL
PHASE C4
Screening bund 3m high
Soil store 3m high
Soil store 3m high
PHASE C5
Diverted footpath
RESTORED
Topsoil storage bund 3m high
Existing footpath
ALDERMASTON
N

D.K. Symes Associates | **Illustrative Composite Operations - Phase C** | Scale - **1:5,000** (at A3) | Date - **25-04-2012** | Plan No. **0702/W/CO/C/1**







Existing land

Mineral phase

Reclamation phase

Restored

Soil bunds

Haul road / Access

General direction of operations

N

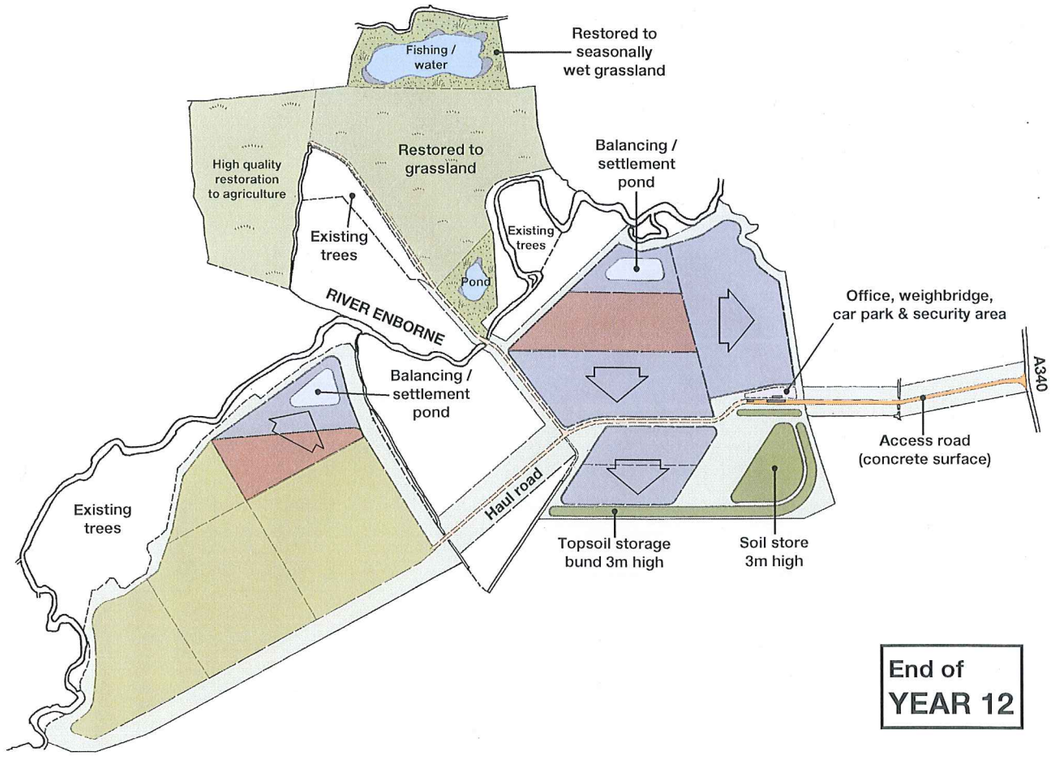
D.K. Symes Associates

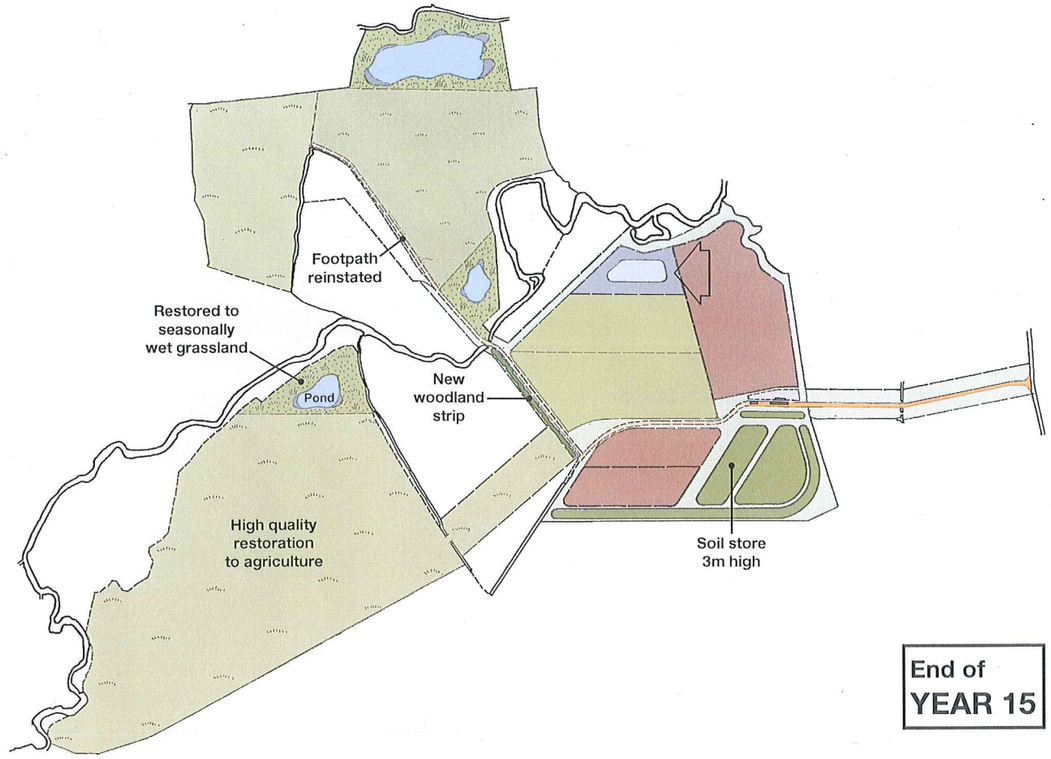
Illustrative Progressive Operations - Years 3-9

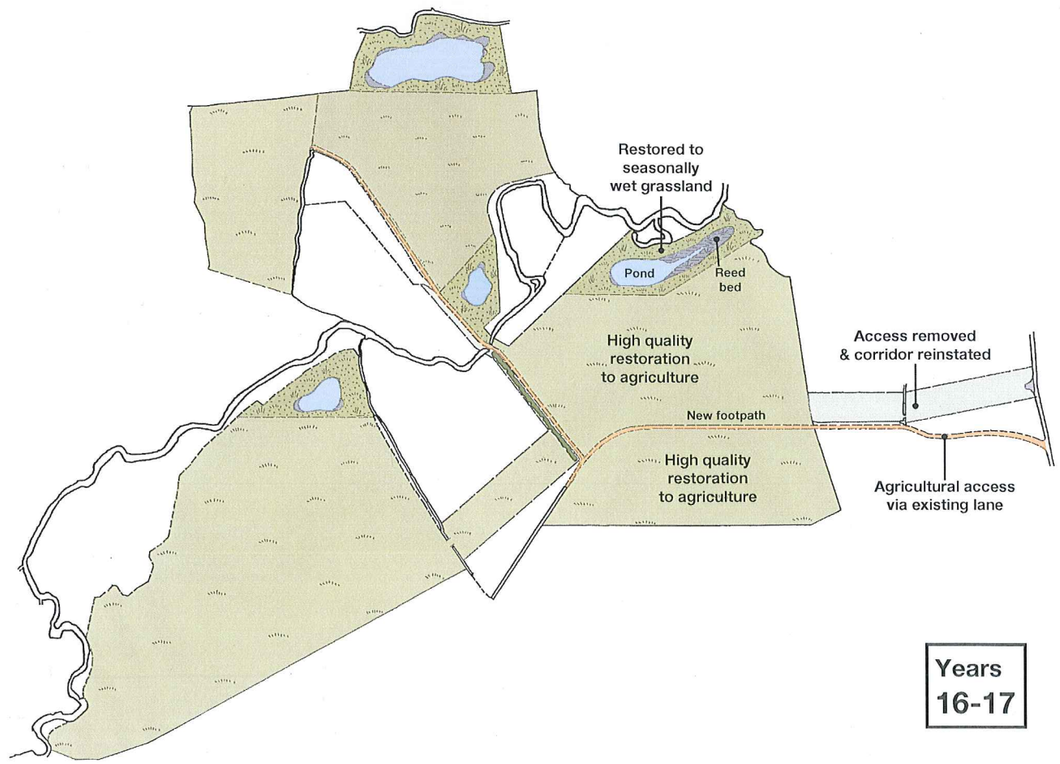
Not to scale

Date - **25-04-2012**

Plan No. **0702/W/PO/1**







Existing land

Mineral phase

Reclamation phase

Restored

Soil bunds

Haul road / Access

General direction of operations

N

D.K. Symes Associates

Illustrative Progressive Operations - Years 12-17

Not to scale

Date - **25-04-2012**

Plan No. **0702/W/PO/2**

Shallows
Fishing / water
Shallows
FP W/12/1
FP W/10/3
FP A/11/1
FP W/9/1
Footpath reinstated
Existing hedge thickened & extended (early planting)
High quality restoration to agriculture
Restored to grassland
FP W/16/1
FP W/17/1
FP BI27/1
New copse (early planting)
Hedgerow retained
Pond
Pond
Reed bed
Seasonally wet grassland
New hedgerow (early planting)
Retained river corridor
Seasonally wet grassland
RIVER ENBORNE
Footpath reinstated
High quality restoration to agriculture
Access removed & area reinstated
FP A/10/1
New hedge with trees (early planting)
New footpath (proposed permissive route)
Pond
Seasonally wet grassland
Retained river corridor
New hedgerow
Agricultural access via existing track
Access removed & area reinstated
High quality restoration to agriculture
Hedgerow thickened (early planting)
Small block of woodland (early planting)
High quality restoration to agriculture
FP WAS/6/1
Airstrip retained
New hedgerow with trees & small spinney (early planting)
Unimproved pasture
New hedge with trees (early planting)
New hedge with trees (early planting)
FP A/9/1
N
Public Footpath (with designation)
Permissive Route
Version / amendment: **0702/W/R/2 v2**

D.K. Symes Associates

Illustrative Restoration Plan

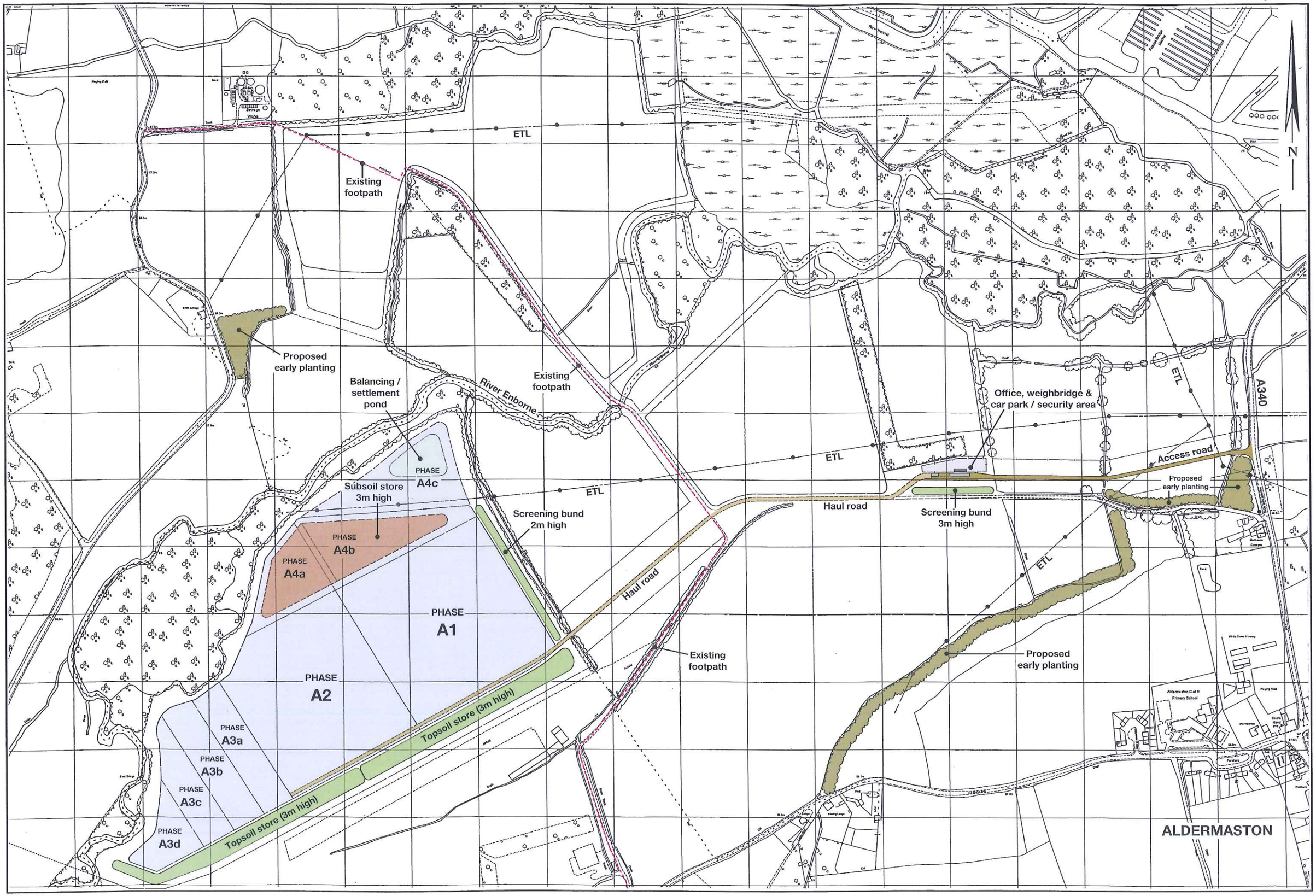
Scale - **1:5,000** (at A3)

Date - **04-12-2012**

Plan No. **0702/W/R/2**

APPENDIX C
EA SCREENING REPORT

Wasing Estate



D.K. Symes Associates

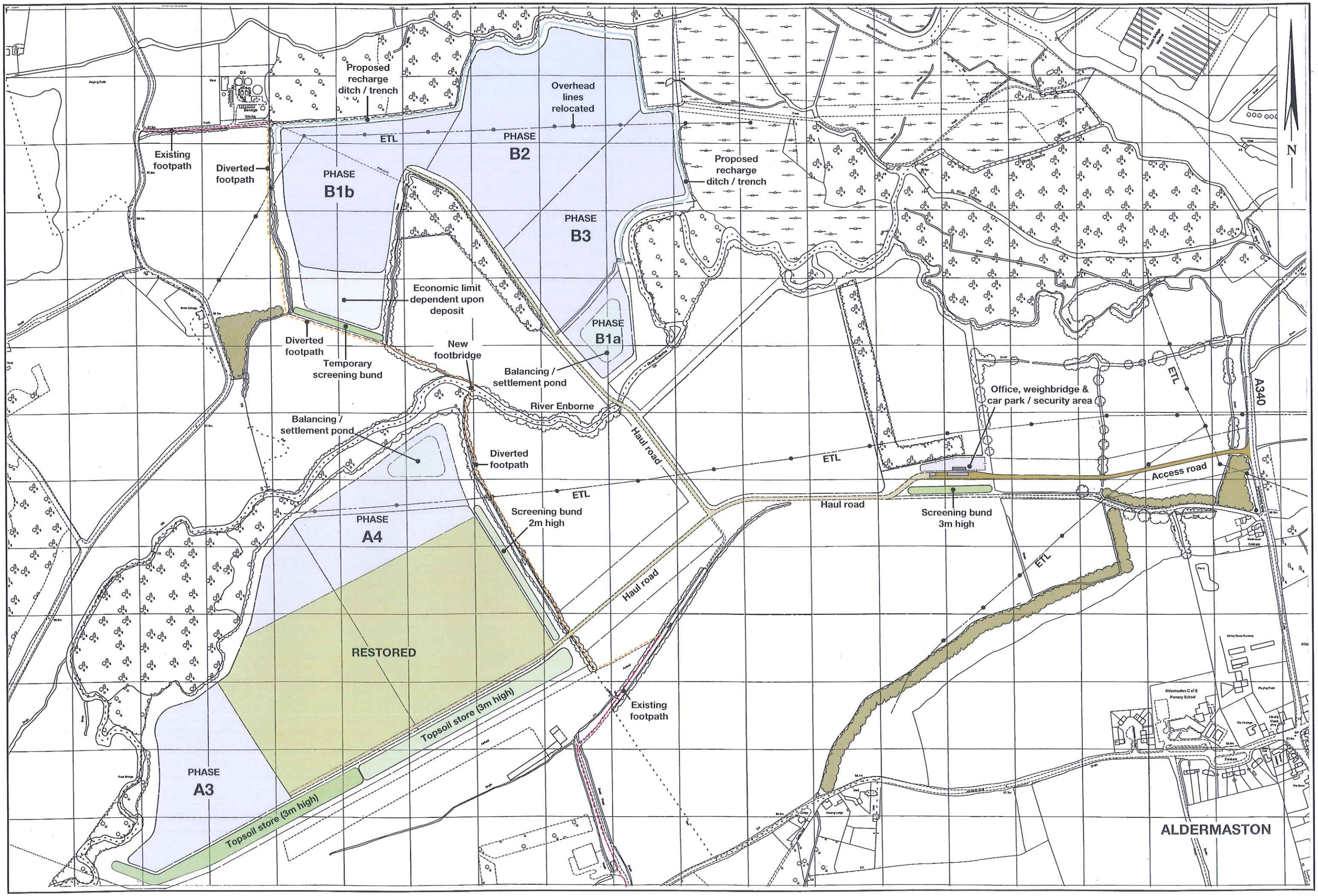
Illustrative Composite Operations - Phase A

Scale - **1:5,000** (at A3)

Date - **25-04-2012**

Plan No. **0702/W/CO/A/1**

Wasing Estate



D.K. Symes Associates

Illustrative Composite Operations - Phase B

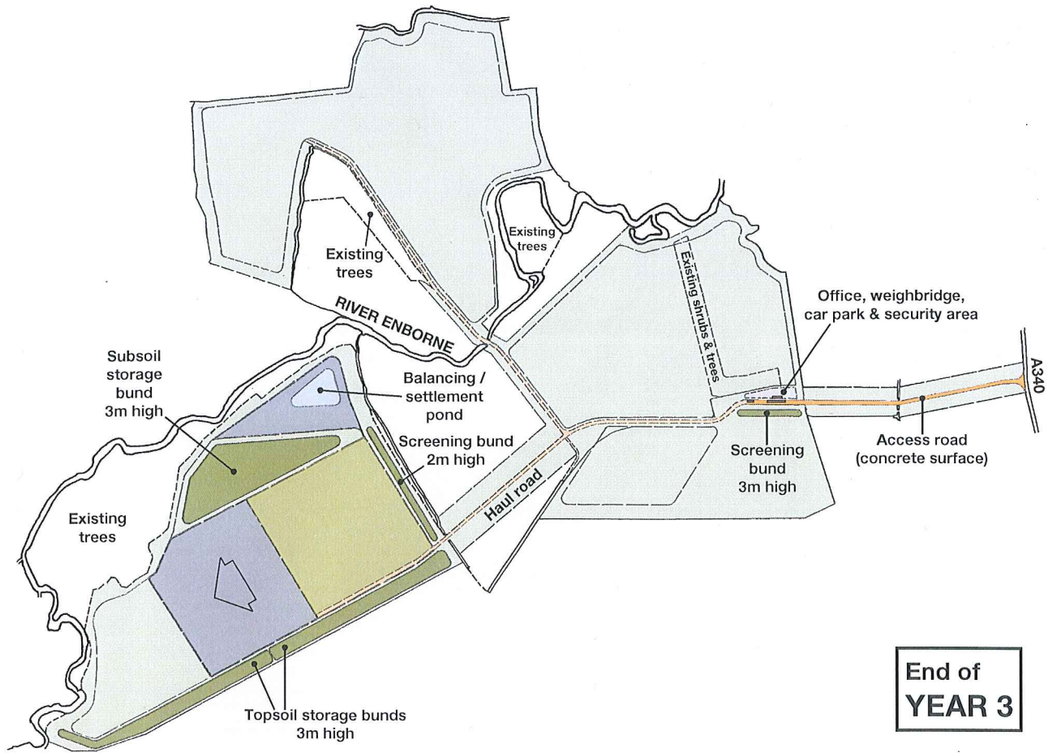
Scale - **1:5,000** (at A3)

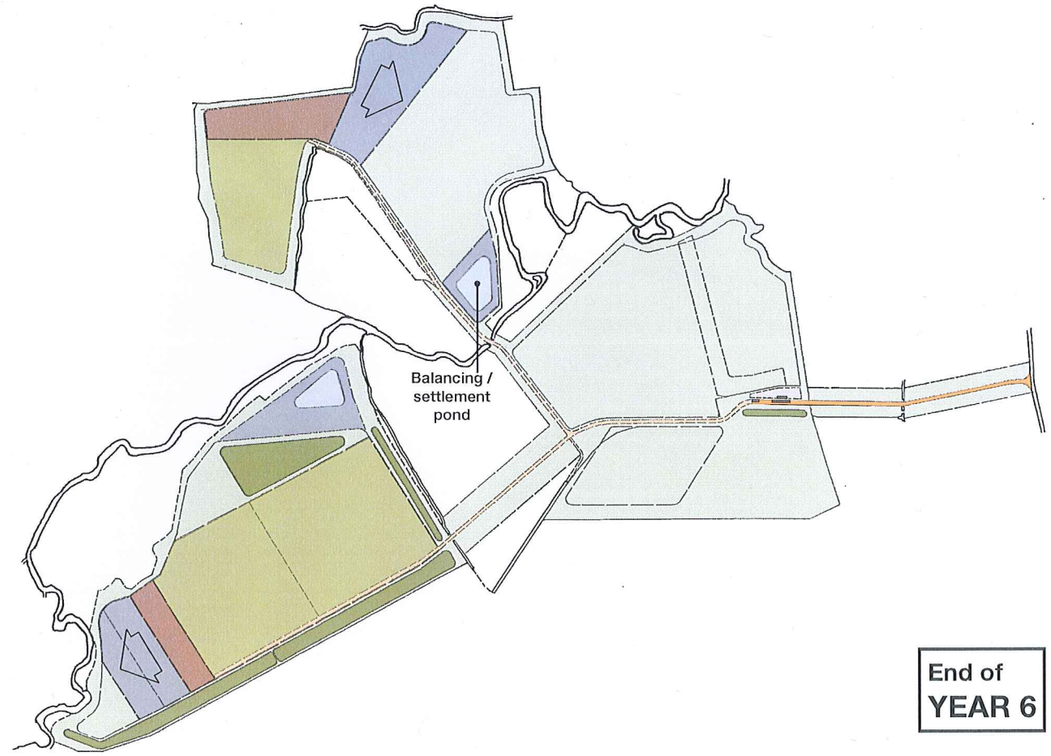
Date - **25-04-2012**

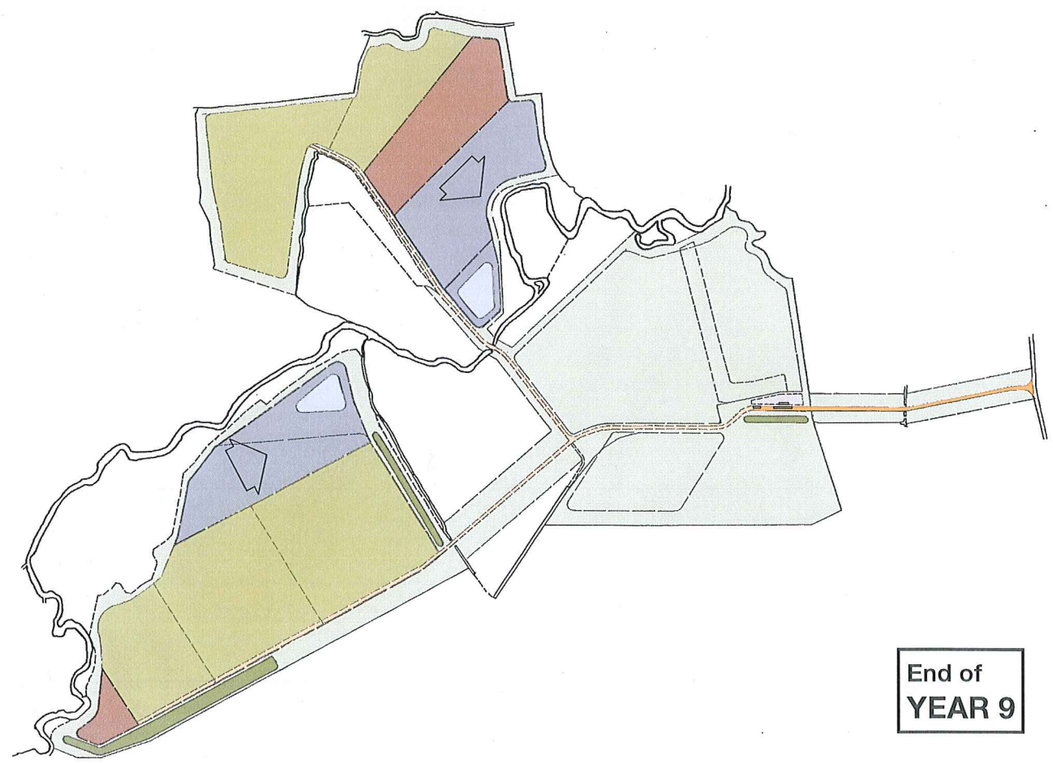
Plan No. **0702/W/CO/B/1**

Overhead lines relocated
RESTORED
Existing footpath
Diverted footpath
PHASE B3
Proposed recharge ditch / trench
Balancing / settlement ponds
PHASE B1a
PHASE C1a
Diverted footpath
New footbridge
River Enborne
Haul road
PHASE C1b
PHASE C3
Office, weighbridge & car park / security area
A340
Overhead lines relocated
PHASE C2
Access road
Pond
ETL
PHASE C4
Screening bund 3m high
Soil store 3m high
Soil store 3m high
PHASE C5
Diverted footpath
RESTORED
Topsoil storage bund 3m high
Existing footpath
ALDERMASTON
N

D.K. Symes Associates | **Illustrative Composite Operations - Phase C** | Scale - **1:5,000** (at A3) | Date - **25-04-2012** | Plan No. **0702/W/CO/C/1**







Existing land

Mineral phase

Reclamation phase

Restored

Soil bunds

Haul road / Access

General direction of operations

N

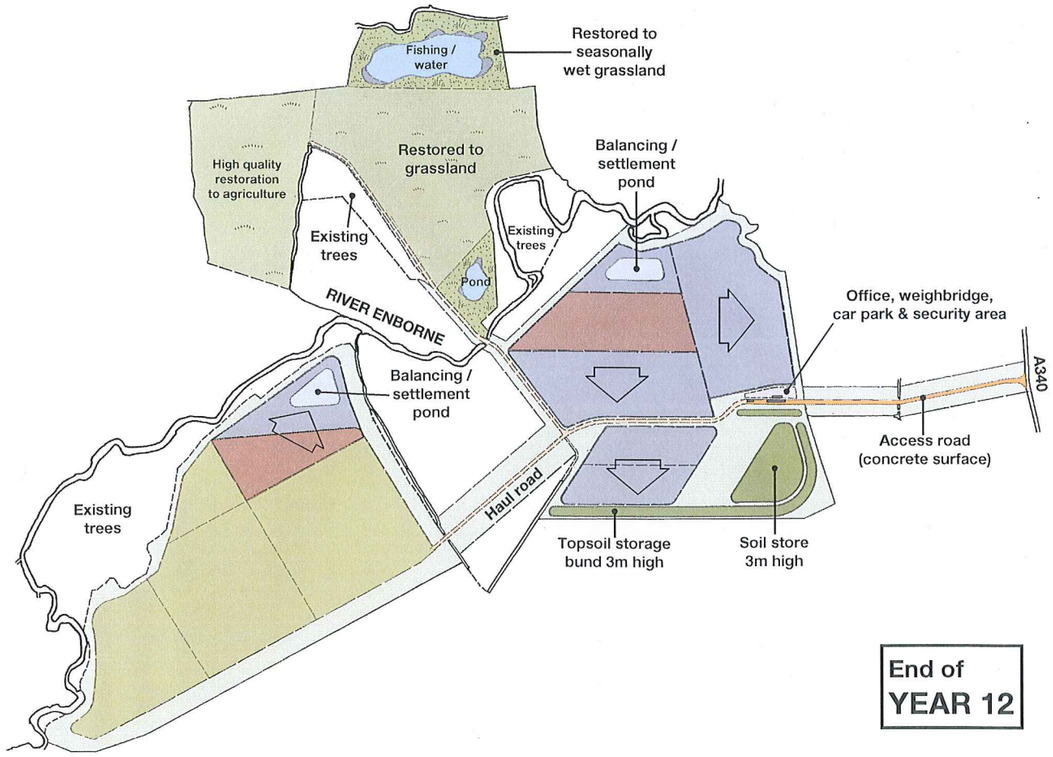
D.K. Symes Associates

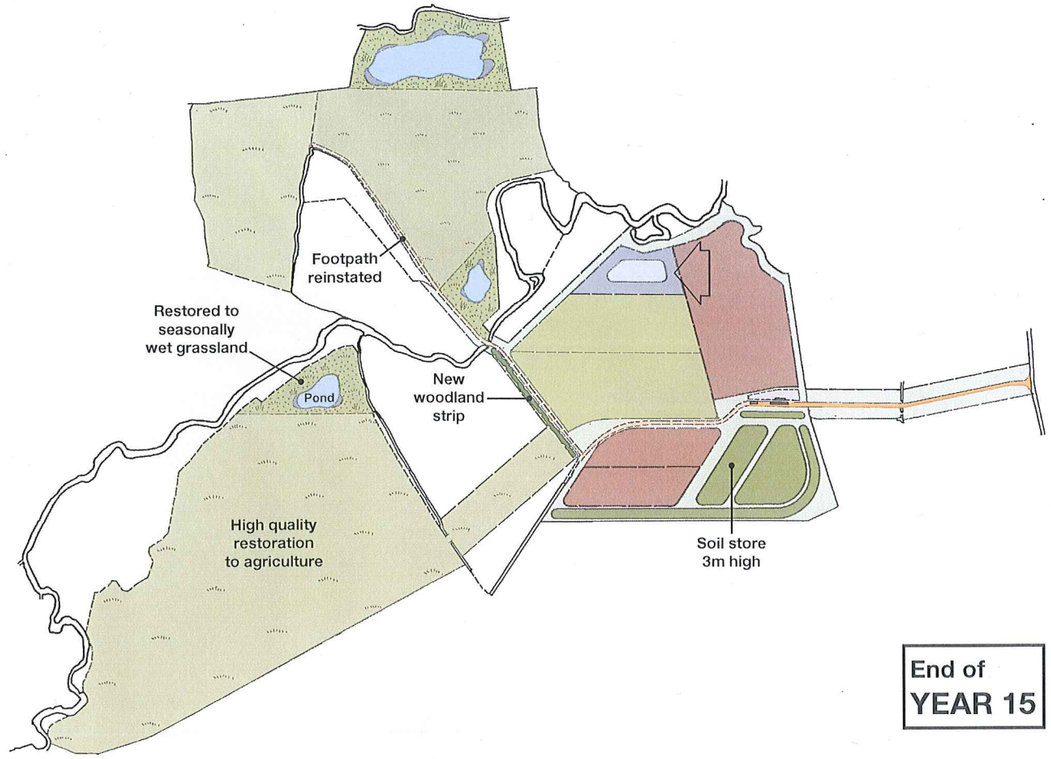
Illustrative Progressive Operations - Years 3-9

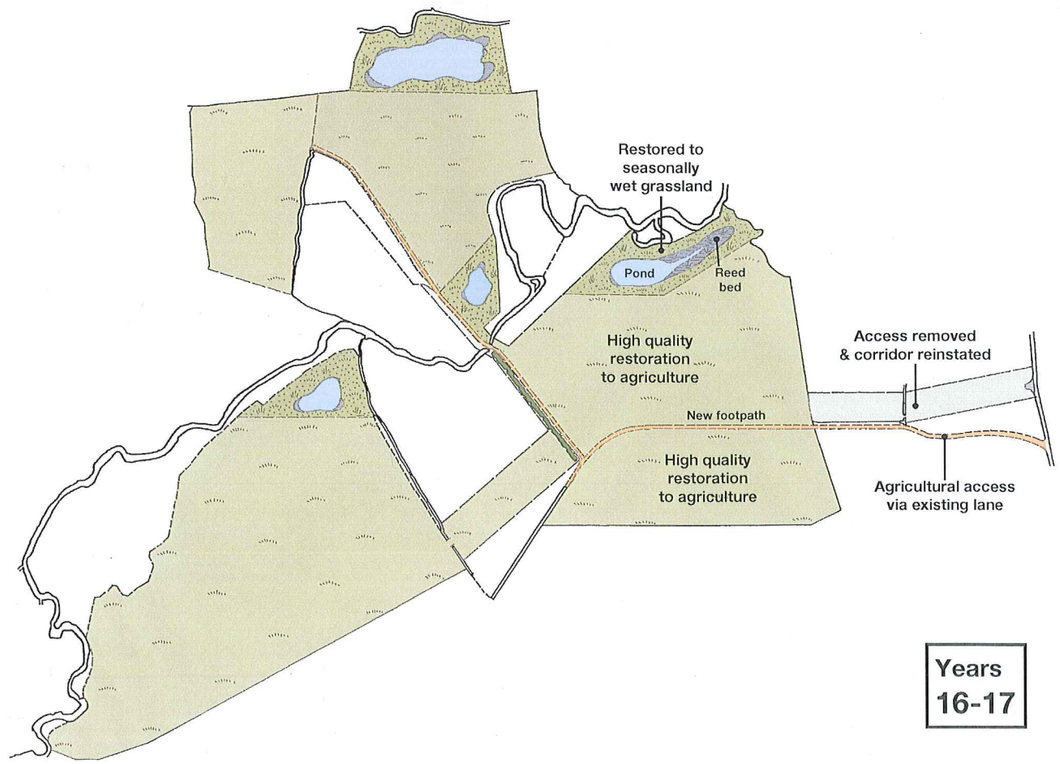
Not to scale

Date - **25-04-2012**

Plan No. **0702/W/PO/1**







Existing land

Mineral phase

Reclamation phase

Restored

Soil bunds

Haul road / Access

General direction of operations

N

D.K. Symes Associates

Illustrative Progressive Operations - Years 12-17

Not to scale

Date - **25-04-2012**

Plan No. **0702/W/PO/2**

APPENDIX D
ACOUSTIC NOISE AND VIBRATION REPORT

NOISE ASSESSMENT

PROPOSED MINERALS EXTRACTION AND RESTORATION ON LAND AT LOWER FARM, WASING

LAFARGE AGGREGATES LTD
AND MARLEY ETERNIT LTD

NOVEMBER 2011

This report has been prepared using all reasonable skill, care and diligence within the resources and brief agreed with the client.
Acoustics Noise and Vibration (ANV) accept no responsibility for matters outside the terms of the brief or for use of this report, wholly or in part, by third parties.

CONTENTS

1. INTRODUCTION

Acoustics Noise and Vibration (ANV) have been appointed by D. K. Symes Associates, acting on behalf of Lafarge Aggregates Ltd and Marley Eternit Ltd to carry out an assessment of the noise levels associated with a proposed minerals extraction, progressive infilling and restoration on land at Lower Farm, Wasing.

It is proposed to work the quarry in phases over a period of up to 12 years, with a further 4 years to complete the restoration. The operation of the quarry would be low scale, with no processing carried out on site.

Section 2 of this report describes the noise units adopted when assessing environmental noise, with a description of the relevant standards provided in Section 3. Section 4 presents the results of a noise monitoring exercise carried out to determine the existing noise environment at the potentially affected noise sensitive receptors. Section 5 presents the calculations of noise levels likely to be generated by the proposed operations and assesses the levels against the proposed criteria. Section 6 provides information on monitoring and control procedures to minimised noise levels during the works. Finally Section 7 provides a summary of the assessment.

2. NOISE UNITS AND STANDARDS

2.1 Noise Units

Decibels (dB)

Noise can be considered as 'unwanted sound'. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.

The dynamic range of the auditory system is generally taken to be 0 dB to 140 dB. Generally, the addition of noise from two sources producing the same sound pressure level will lead to an increase in sound pressure level of 3 dB. A 3 dB noise change is generally considered to be just noticeable, a 5 dB change is generally considered to be clearly discernible and a 10 dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness.

A-Weighting

The bandwidth of the frequency response of the ear is usually taken to be from about 18 Hz to 18,000 Hz. The auditory system is not equally sensitive throughout this frequency range. This is taken into account when making acoustic measurements by the use of A-weighting, a filter circuit that has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted.

Units Used to Describe Time-Varying Noise Sources (L_{Aeq}, L_{Amax}, L_{A10}, and L_{A90})

Instantaneous A-weighted sound pressure level is not generally considered as an adequate indicator of subjective response to noise because levels of noise usually vary with time.

For many types of noise the Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$) is used as the basis of determining community response. The $L_{Aeq,T}$ is defined as the A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.

The L_{Amax} is the maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax\ F}$, or Fast, is averaged over 0.125 of a second and $L_{Amax\ S}$, or Slow, is averaged over 1 second. All L_{Amax} values referred to in this report are Fast.

The L_{A10} is the noise level exceeded for 10% of the measurement period. It has been used in the UK for the assessment of road traffic noise.

The L_{A90} is the noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise that is present even during the quieter parts of measurement period.

3. APPLICABLE STANDARDS

3.1 Minerals Policy Statement 2

Annex 2 of Minerals Policy Statement 2 (MPS2) [1] advises that Mineral Planning Authorities should consider the environmental effects of proposals on the surrounding environment and communities and, where the effects cannot be adequately controlled or mitigated, permission should be refused. MPS 2 states that the Government looks to the minerals industry to keep noise emissions to a level that reflects the highest environmental standards. In this regard, MPS 2 quotes the following passage from the World Health Organisation Guidelines for Community Noise [2]:-

to protect the majority of people from being seriously annoyed during the daytime, the outdoor noise level from steady continuous noise should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB L_{Aeq}.

For normal daytime works MPS 2 advises that the following limits should not exceed:

- 10 dB above the background (L_{A90}) noise level; subject to
- a maximum value of 55 dB $L_{Aeq,\ 1\ hour}$ (free field).

Where background noise levels are low, it may be very difficult not to exceed the background noise level by more than 10 dB. This is recognised in MPS 2 which states:-

This will in many circumstances, be difficult to achieve without imposing unreasonable burdens on the mineral operator. In such cases, the limit set should be as near that level as practicable during normal working hours and should not exceed 55 dB LAeq, 1 hour (free field).

MPS 2 suggests that in the evening (19:00 – 22:00) $L_{Aeq,\ 1\ hour}$ noise levels should not exceed the background (L_{A90}) noise level by more than 10 dB and a night-time limit of 42 dB $L_{Aeq,\ 1\ hr}$.

In addition to the general daytime works, MPS 2 advises that all mineral operations will have some particularly noisy short-term activities that cannot meet the limits set for normal operations. These include soil-stripping, construction or removal of bunding or spoil heaps and construction of new permanent landforms. A level of 70 dB $L_{Aeq,\ 1\ hour}$ is suggested as a limit for these activities for periods of up to eight weeks in any one year. Where the duration of temporary works may exceed eight weeks it can be appropriate to apply a lower limit for a longer period. MPS 2 also recognises that, in wholly exceptional cases, where there is no viable alternative, a limit of more than 70 dB $L_{Aeq,\ 1\ hour}$ may be appropriate in order to obtain other environmental benefits.

4. EXISTING NOISE ENVIRONMENT

4.1 Identification of Potentially Affected Noise-Sensitive Locations

There are no noise-sensitive properties in close proximity to the proposed working areas. The properties identified as being potentially affected by the operations are as follows:

- Malthouse Cottages, located adjacent to the A340 and approximately 100 metres to the south of the proposed site access road;
- Dwellings within Dolphin Close, approximately 280 metres from the Phase C working area;
- Wasing Lodge and cottages on Wasing Lane to the south, 100 metres to the south of Phase C;
- Wasing Lower Farm to the south, located 100 metres from the Phase C area;
- Shalford Lodge, located approximately 325 metres from the Phase A working area;
- Bottle Cottage located 150 metres to the west of the Phase B working area; and
- Dwellings in Woolhampton Village, located approximately 300 metres to north of the Phase B working area.

These locations are shown on Figure 1.

4.2 Noise Measurements

A noise monitoring exercise was carried out between Thursday 14th and Wednesday 20th July 2011 to ascertain the existing noise environment at the properties identified above.

The measurement exercise comprised three unattended noise surveys located adjacent to Bottle Cottage (Position U1), Wasing Lodge (Position U2) and Malthouse Cottages (Position U3), which were supplemented with sample noise measurements carried out during Thursday 14th July 2011 at a further 4 positions around the site. The monitoring locations are indicated on Figure 1.

4.2.1 Unattended Noise Surveys

Unattended noise surveys were carried out at the following three locations between Thursday 14th and Wednesday 20th July 2011:

- Position U1 – Bottle Cottage, with the equipment located in the bushes in the field to the south east of the dwelling;
- Position U2 – Wasing Lodge, with the equipment located in the verge opposite the dwelling; and
- Position U3 – Malthouse Cottages, where the equipment was located in the field to the north of the property at a position equidistant from the A340.

The measurements were made using Rion NL-32 Class 1 Sound Level Meters, which were calibrated before and after the exercise using a Rion NC-74 Class 1 Acoustic Calibrator.

The instruments were all located freefield, with the microphones positioned at a height of 1.2 metres above local ground level.

Weather conditions during the survey were generally fine and dry with light winds (less than 5m/s), which were suitable for undertaking environmental measurements.

The instruments were configured to monitor noise levels over contiguous 15 minute periods during the survey. The results of the monitoring have been subsequently analysed into hourly periods for reporting purposes using the Rion AS-60 Data Analysis software.

The results of the unattended noise monitoring, summarised into hourly periods, are presented in Appendices A – C and on Figures 2 – 4.

The results, summarised into daily periods corresponding to the proposed operating hours of the site, are presented below.

Date	Period L_{Aeq} [dB]	Average L_{A90} [dB]
Friday 15th July 2011	50	37
Saturday 16th July 2011 (a.m.)	47	39
Monday 18th July 2011	46	38
Average	**47**	**38**

Table 4.1 Summary Results of Monitoring Carried Out at Bottle Cottage (Position U1)

Ambient noise levels monitored at Bottle Cottage were typically associated with vehicles travelling along the lane, with the distant railway movements on the line to the north audible. Background noise levels at this location were principally influenced by traffic on the A4, which runs to the north of Woolhampton village.

Due to an infestation of ants within the equipment housing, bugs within the instrument caused it to fail during the exercise, which resulted in some loss of data. Comparing the data with that obtained from the other surveys, indicated that the data obtained was typical of the noise environment at this dwelling.

Date	Typical L_{Aeq} [dB]	Average L_{A90} [dB]
Thursday 14th July 2011	61	41
Friday 15th July 2011	62	39
Saturday 16th July 2011 (a.m.)	60	40
Monday 18th July 2011	63	43
Tuesday 19th July 2011	62	41
Wednesday 20th July 2011	62	38
Average	**62**	**40**

Table 4.2 Summary Results of Monitoring Carried Out at Wasing Lodge (Position U2)

Ambient noise levels monitored at this location were principally associated with traffic travelling along the lane, with vehicles passing regularly during the daytime period. Background noise levels were generally associated with the traffic using the A4 to the north.

Date	Typical L_{Aeq} [dB]	Average L_{A90} [dB]
Thursday 14th July 2011	57	46
Friday 15th July 2011	57	46
Saturday 16th July 2011 (a.m.)	56	45
Monday 18th July 2011	57	47
Tuesday 19th July 2011	57	45
Wednesday 20th July 2011	58	44
Average	**57**	**45**

Table 4.3 Summary Results of Monitoring Carried Out at Malthouse Cottages (Position U3)

Ambient and background noise levels monitored at this location were principally associated with traffic using the A340.

4.2.2 *Attended Noise Monitoring*

To supplement the unattended noise surveys and to provide an indication of the variation in noise levels at the potentially affected dwellings surrounding the site, a series of attended noise measurements were carried out during Thursday 14th July 2011.

Two measurements, each of 15 minute duration were made at four positions representative of the remaining properties identified in Section 4.1 using a Rion NA-28 Class 1 Sound Level Analyser concurrent with the unattended surveys. At each position, the monitoring equipment was positioned freefield, with the microphone at a height of 1.2 metres above local ground level.

The results of the measurements are presented in Tables 4.4 – 4.7.

Woolhampton Village

This monitoring position was at the southern end of the village, located on the footpath adjacent to the car park of The Rowbarge. The results of the monitoring obtained at this location are provided below.

Monitoring Period	Measured Free-field Noise Levels [dB]			
	L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax,F}$
10:45 – 11:00	48.2	50.7	42.6	68.3
12:10 – 12:25	49.5	52.6	43.0	69.4

Table 4.4: Results of Sample Noise Measurements Made at Woolhampton (Position S1)

Road traffic was the main influence on measured noise levels at this location, with occasional vehicles using the lane and traffic on the A4 audible throughout the exercise. Trains travelling on the railway were also clearly audible as they passed.

Shalford Lodge

This monitoring location was positioned in the field access adjacent to the dwelling. The results of the monitoring obtained at this location are provided in Table 4.5 below.

Monitoring Period	Measured Free-field Noise Levels [dB]			
	L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax,F}$
11:05 – 11:20	55.4	53.2	38.3	76.3
12:30 – 12:45	56.3	58.0	39.0	76.7

Table 4.5: Results of Sample Noise Measurements Made at Shalford Lodge (Position S2)

Noise levels monitored at this location were influenced by a mix of sources: occasional vehicles travelling along the lane; traffic using the A4 to the north; birdsong; and the leaves rustling in the gentle breeze.

Wasing Lower Farm

This monitoring position was on the public footpath opposite the farm complex, with the monitoring position set back an equivalent distance from the lane. The monitoring results obtained at this position are as follows.

Monitoring Period	Measured Free-field Noise Levels [dB]			
	L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax,F}$
12:00 – 12:15	46.8	49.4	40.2	67.5
13:20 – 13:35	47.4	50.5	39.0	64.8

Table 4.6: Results of Sample Noise Measurements Made at Wasing Lower Farm (Position S3)

As with Shalford Lodge, noise levels monitored at this location were influenced by a mix of sources, including vehicles using the lane and distant road traffic travelling along the A4.

Dolphin Close

This monitoring location was within the field adjacent to the dwellings. The results obtained at this position are presented below.

Monitoring Period	Measured Free-field Noise Levels [dB]			
	L_{Aeq}	L_{A10}	L_{A90}	$L_{Amax,F}$
11:45 – 12:00	56.2	58.2	35.4	76.8
13:10 – 13:25	53.5	51.7	35.7	77.0

Table 4.7: Results of Sample Noise Measurements Made at Dolphin Close (Position S4)

Ambient (L_{Aeq}) noise levels at this location were principally influenced by vehicles travelling on the lane. Background (L_{A90}) noise levels were influenced by a mix of noise from traffic travelling along the A4 and A340.

5. ASSESSMENT

5.1 Proposed Noise Limits and Assessment Criteria

Based upon the results of the noise monitoring and the guidance contained within MPS 2, the following noise limits would be adopted for normal operations where they could be practically achieved.

Location	Typical Background Noise Level [dB L_{A90}]	MPS 2 Assessment Criteria [dB $L_{Aeq,\ 1\ hour}$]
U1 – Bottle Cottage	38	48
U2 – Wasing Lodge	40	50
U3 – Malthouse Cottages	45	55
S1 – Woolhampton	42	52
S2 – Shalford Lodge	38	48
S3 – Wasing Lower Farm	39	49
S4 – Dolphin Close	36	46

Table 5.1 Proposed Noise Limits for Normal Site Working

With regard to temporary operations, such as initial soil stripping or the construction or removal of bunding, the temporary work criterion of 70 dB $L_{Aeq,\ 1\ hour}$ would be adopted at all locations, subject to a maximum period of 8 weeks per year.

5.2 Potential Sources of Impact

The operation of the site would be generally of low scale, with a small amount of plant required for the extraction and infilling.

No processing is proposed to be carried out on site, as the mineral would be transported "raw" to the existing processing facility located at the Beenham Factory of Marley Eternit.

The development has been divided into three main phases, with each taking approximately three – five years to complete, giving an overall life of the extraction anticipated to be up to twelve years, with a further four years to complete the infilling and restoration.

It is anticipated that during the soil stripping and replacement operations, which would be short term and typically of 4 – 6 weeks duration per annum, would be carried out using 2 excavators, 3 to 4 articulated dump trucks and a low ground pressure dozer.

General extraction operations would be carried out using a single excavator and loaded directly onto a waiting lorry for transportation off site.

Imported materials would be tipped directly into the area undergoing restoration and would be spread using a small dozer.

To enable maximum recovery if the mineral, the extraction area would be dewatered using a hush packed diesel pump, which would be positioned away from surrounding residential properties.

HGV movements to and from the site would be minimised using back haul loads where possible. It is anticipated that daily HGV movements would be 120 (60 in / 60 out).

Normal hours of operation of the quarry would be between:

- 07:00 – 18:00 hours Monday to Friday;
- 07:00 – 13:00 hours Saturdays; and
- No working on Sundays or Bank Holidays.

Noise source terms for the items of plant operating on site have been obtained either from measurements carried out previously by ANV on similar items of plant or from data provided by DEFRA. Table 5.2 lists the plant assumed for the calculations along with the source term information

Item of Plant	Noise Level [dB(A)]	Distance [m]	Index
Dozer	76.0	10	L_{Aeq}
Articulated Dump Truck / HGV Movement on Hardcore	85.6	10	SEL
Hydraulic Excavator	74.5	10	L_{Aeq}
Dewatering Pump	68.0	10	L_{Aeq}

Table 5.2: Noise Source Terms for Plant Used on Site

5.3 Calculated Noise Levels

Noise levels have been predicted for the principal items of plant likely to be used on the site during normal operations using the methodology described in BS 5228:Part 1 [3]. Where barrier performances have been calculated, the methodology described in a 'Calculation of Road Traffic Noise' (CRTN) [4] has been adopted.

The surrounding dwellings are located some distance from the proposed working areas. The calculation procedures tend to be only accurate for distances of up to approximately 300 metres, beyond which they tend to overestimate the noise levels, thus the calculations are likely to represent very much a worst case, where the properties are located beyond this distance.

Calculations have been made at the dwelling positions for the extraction phases which would generate the highest levels of noise.

Estimated worst-case noise levels, based on a realistic operating scenario, have been carried out and compared to the criteria described in Section 5.1.

The predicted levels are worst case because:

i) it has been assumed that the main items of plant would operate 100% of the time;

ii) the shortest distance between plant and noise-sensitive receptor has been taken;

iii) no account of the existing land formation or intervening buildings has been taken into account, which may provide additional noise mitigation; and

iv) the need for mitigation has been determined on the basis of the shortest distance/minimum attenuation between the proposed areas of activity and the potentially most affected dwellings.

The proposed phasing is provided on Figure 5, with the calculation details presented in Appendix D.

5.4 Assessment of Noise from Site Operations

Woolhampton Village

Woolhampton Village is located to the north west of the quarry. Dwellings in the village will be some considerable distance from the main extraction areas and noise levels associated with site operations are anticipated to be low.

Noise levels would rise to a maximum during the working of the Phase B1b area. During a worst case operation, whilst soils stripping / restoration and extraction was occurring within Phase B, noise site levels within the village are anticipated to be 43 dB L_{Aeq}.

The calculations indicate that the site noise levels would remain substantially below the normal working limit of 52 dB L_{Aeq} derived from the MPS 2 guidance at this location and would therefore remain within acceptable limits.

Bottle Cottage

This dwelling is located to the west of the proposed extraction areas.

Noise levels during the initial soil strip and extraction within Phase A have been calculated to be between 40 – 44 dB L_{Aeq} at the dwelling, which would remain below the proposed normal working limit of 48 dB L_{Aeq} at this dwelling.

Noise levels would increase during the soil stripping for Phase B1b, with noise levels anticipated to increase to 52 dB L_{Aeq} during this period. However, the soil stripping operation is anticipated to take between 4 – 6 weeks to complete and is considered to be a temporary operation. Consequently, the site noise levels during this period would remain below the 70 dB L_{Aeq} temporary working limit and would therefore remain acceptable.

During the extraction within Phase B1b, noise levels are anticipated to be 46 dB L_{Aeq} whilst the excavator is working close to the western site boundary, with noise levels gradually decreasing as the extraction moves further east. Noise levels would be marginally higher during periods of soils stripping or restoration of the adjacent phases and consideration would be given to constructing a temporary bund along the western boundary of Phase B1b to a height of 3 metres should the stripping and restoration activities extend beyond 8 weeks in the year, whilst extraction progressed within this phase. The construction of the temporary bund, if required, would ensure that the normal working limit of 48 dB L_{Aeq} was not exceeded at this property.

Noise levels at the dwelling would gradually reduce, as the extraction progresses in the remaining Phase B and Phase C areas, with noise levels anticipated to be of the order of 39 dB L_{Aeq}, or lower, and thus remain substantially below the 48 dB L_{Aeq} limit.

Shalford Lodge

Shalford Lodge is located to the south west of the proposed extraction area, located approximately 350 metres from the closest phase, Phase A3.

Prior to extraction commencing in this area, a 3 – 4 metres high topsoil store would be created along the extraction boundary. During this stage, which is anticipated to take between 4 – 6 weeks to complete, noise levels would be at a maximum and anticipated to be of the order of 43 dB L_{Aeq}, which is 5 dB(A) below the 48 dB L_{Aeq} normal working limit at this property.

Noise levels associated with the normal working in this area would be 38 dB L_{Aeq}, and would remain substantially below the normal working limit.

With the bund constructed around Phase A3 during the working of this area, noise levels at this dwelling would remain substantially below the proposed noise limit.

Wasing Lower Farm

Wasing Lower Farm is located approximately 350 metres from the Phase A1 working area, which is the closest working phase to this property.

Noise levels at this property would be at a maximum during the initial soil strip of Phase A1 and the creation of the 3 – 4 metre high topsoil store, which would be constructed alongside the southern boundary of Phase A. Noise levels during this period are anticipated to be 43 dB L_{Aeq} and remain below the normal working limit of 49 dB L_{Aeq} at this dwelling.

During the extraction within Phase A, noise levels would be lower and anticipated to be of the order of 38 dB L_{Aeq}, 11 dB(A) below the normal working limit and would further reduce as the extraction moves further from the property during the latter phases.

Noise levels would increase again marginally during the soils stripping and restoration of Phase C4 up to 42 dB L_{Aeq} for a short period whilst the temporary operations were progressing on site.

Noise levels at this dwelling with the proposed mitigation in place would remain below the proposed noise limit at this dwelling and would therefore be acceptable.

Wasing Lodge

Wasing lodge and the adjacent cottages are located to the south of the Phase C4 extraction area. The dwellings are located approximately 190 metres from the southern boundary of this phase.

Noise levels at the commencement of operations on site, during the working of Phase A, noise levels are not anticipated to exceed 41 dB L_{Aeq} with the proposed mitigation in place and would remain substantially below the normal working limit of 50 dB L_{Aeq}.

Noise levels would then reduce for a number of years as Phase B and Phases C1 – C3 are worked.

Noise levels would be at a maximum during the initial soil strip and final restoration of Phase C4, with noise levels anticipated to peak at between 48 – 49 dB L_{Aeq} during temporary operations, which would not last for more than 4 – 6 weeks in any one year. Noise levels during this period are not, however, anticipated to exceed the normal working criteria.

During the working of Phase C4, with the boundary bunding in place, noise levels would reduce and are anticipated to be of the order of 42 dB L_{Aeq}, again remaining within the proposed criteria.

With the proposed mitigation constructed during the working of Phase C4, noise levels at these dwellings would remain within the normal working limit and are therefore considered to be acceptable.

Dolphin Close

These dwellings are situated at the western boundary of Aldermaston and are adjacent to the Aldermaston C of E Primary School.

Noise levels at these properties would be affected by vehicles travelling along the access road and working of the Phase C areas, as Phases A and B are located beyond 800 metres of the properties.

Noise levels associated with the vehicles travelling along the site access would be low and anticipated to be of the order of 26 dB L_{Aeq}. To further reduce any potential for disturbance, a 3 metre high screening bund would be constructed alongside the weighbridge area, to screen the vehicles whilst they are stood.

During the construction of the site access and at a later stage the soil stripping for Phases C1 – C3, noise levels are anticipated to be between 41 – 42 dB L_{Aeq} and would remain below the normal working limit of 46 dB L_{Aeq} at these properties. Noise levels associated with the general extraction and progressive restoration in these areas would be 37 dB L_{Aeq}.

Noise levels are expected to be at a maximum during the construction of the proposed 3 metres high topsoil storage bund, which would be constructed as a temporary operation during the soil stripping for Phase C4. Noise levels during this period are

anticipated to be 46 dB L_{Aeq}, and would be in the limit for normal working. However, given that this would be a temporary operation, intended to provide a longer term benefit, the 70 dB L_{Aeq} temporary working limit would apply, which would not be exceeded.

During the extraction and progressive restoration of Phase C4, noise levels are expected to remain below the normal working limit and are anticipated to be between 37 – 41 dB L_{Aeq}.

With the proposed boundary mitigation constructed, noise levels at these properties would remain within acceptable limits to minimise any potential disturbance.

Malthouse Cottages

These dwellings are located to the south east of the proposed weighbridge and access road and are situated adjacent to the A340.

The properties are some distance from the proposed extraction areas, with the closes phase, Phase C4, over 350 metres from the dwellings. It is also proposed that the site access road would be positioned 100 metres from the properties, with the aim of ensuring any potential disturbance is minimised.

Noise levels at this location are likely to be at a maximum during the initial works to construct the site access and are calculated to be of the order of 54 dB L_{Aeq} during this period. Given that these works would be carried out within a few weeks, it is considered that the temporary limit of 70 dB L_{Aeq} would apply, which would not be exceeded.

Noise levels associated with the HGV movements along the site access would be 39 dB L_{Aeq}, which would remain substantially below the normal working limit and existing ambient noise levels associated with the road traffic using the A340. To ensure any potential disturbance was minimised, the access road would be regularly inspected and any defects rectified to ensure that the likelihood of body slap from empty vehicles was also minimised.

As indicated above, noise levels associated during the working of Phases A and B would be likely to be associated with the vehicles using the site access, as the working areas for these phases would be beyond 1000 metres from the properties.

Noise levels would increase for a period of time, whilst the soils stripping of Phase C was carried out, with noise levels during these short term operations likely to increase to up to 45 dB L_{Aeq}. It is not anticipated that the 55 dB dB L_{Aeq} normal working limit would be exceeded from these operations.

During the general extraction and progressive restoration of these phases, noise levels are anticipated to be between 40 – 42 dB L_{Aeq} and would remain substantially below the normal working limit.

Noise levels associated with the operation of the site at these properties are not anticipated to exceed the proposed normal working limit of 55 dB L_{Aeq} and are therefore considered to be acceptable.

Dewatering Pump

There would be a requirement to use a dewatering pump to pump the extraction areas as they are worked, to ensure that the maximum amount of mineral can be extracted.

It is anticipated that a modern hush packed diesel pump would be used. The pump would be sited within the extraction area and located well away from the surrounding dwellings and would be sited to ensure that the pump was screened from the properties.

Calculations prepared on the basis of locating the pump closest to the dwelling indicate that noise levels associated from the operation of the pump would not exceed 35 dB L_{Aeq}, with appropriate mitigation.

By appropriate siting of the pump noise levels from its operation would remain substantially below the night-time MPS 2 limit of 42 dB L_{Aeq} and would therefore remain acceptable to ensure any potential disturbance was minimised.

6. MONITORING AND CONTROL REGIME

MPS 2 advises that noise monitoring should be carried out periodically to ensure that noise levels associated with site operations remain within acceptable limits.

It is recommended that a noise monitoring exercise is carried out within 3 months of commencement of full site operations to ascertain the site noise levels. It is recommended that at least one 15 minute noise measurement is made at each of the monitoring positions identified previously during normal working hours.

The results of the monitoring exercise should be compared to the proposed operating limits presented in Table 5.1. Should the results indicate that the limits are being exceeded, further mitigation measures should be considered and implemented where practical. The monitoring results should be presented to the MPA and any additional mitigation measures proposed should be discussed and implemented within a reasonable time.

As the assessment indicated that the criteria would not normally be exceeded, further monitoring should be carried out at intervals to be agreed with the MPA or following receipt of a justifiable complaint.

In general, however, plant and machinery operating on site should be well maintained at all times. Where possible, any plant fitted with reversing signals should use either background noise tracking systems or be non tonal to minimise any potential disturbance from these sources.

Vehicles travelling on the proposed access road also have potential to cause disturbance even at low noise levels. To ensure potential disturbance is minimised, the link road should be inspected at regular intervals (at least once every week) to ensure that the surface remains in good condition. Where defects are identified, these should be rectified immediately. This action seeks to ensure that empty vehicles travelling on the link road and passing over the defect do not give to body slap, which is potentially disturbing. Furthermore, the speed limit on the link road should be well enforced, this measure also seeks to minimise the likelihood of body slap from empty vehicles.

7. SUMMARY

Acoustics Noise and Vibration (ANV) have been appointed by Lafarge Aggregates Ltd and Marley Eternit Ltd to carry out an assessment of the noise levels associated with a proposed minerals extraction, progressive infilling and restoration on land at Lower Farm, Wasing.

An assessment of the potential noise impacts arising from the works have been carried out upon the basis of the most appropriate guidance contained in MPS 2.

The assessment indicated that noise levels associated with site operations would be acceptable and would remain below the proposed noise criteria at the noise-sensitive receptors surrounding the site.

To ensure that any potential disturbance was minimised, control measures and a noise monitoring scheme would be implemented to ensure that the proposed noise limits were not exceeded.

References

1. Communities and Local Government. Minerals Policy Statement 2. Controlling and mitigating the environmental effects of mineral extraction in England. Annex 2: Noise. March 2005.

2. Guidelines for Community Noise. The World Health Organisation, Geneva. 2000.

3. British Standards Institute. Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise. BS 5228: 2009.

4. Calculation of Road Traffic Noise (CRTN). Department of Transport. 1988.

Figures

Figure 1 : Site Location and Noise Monitoring Locations

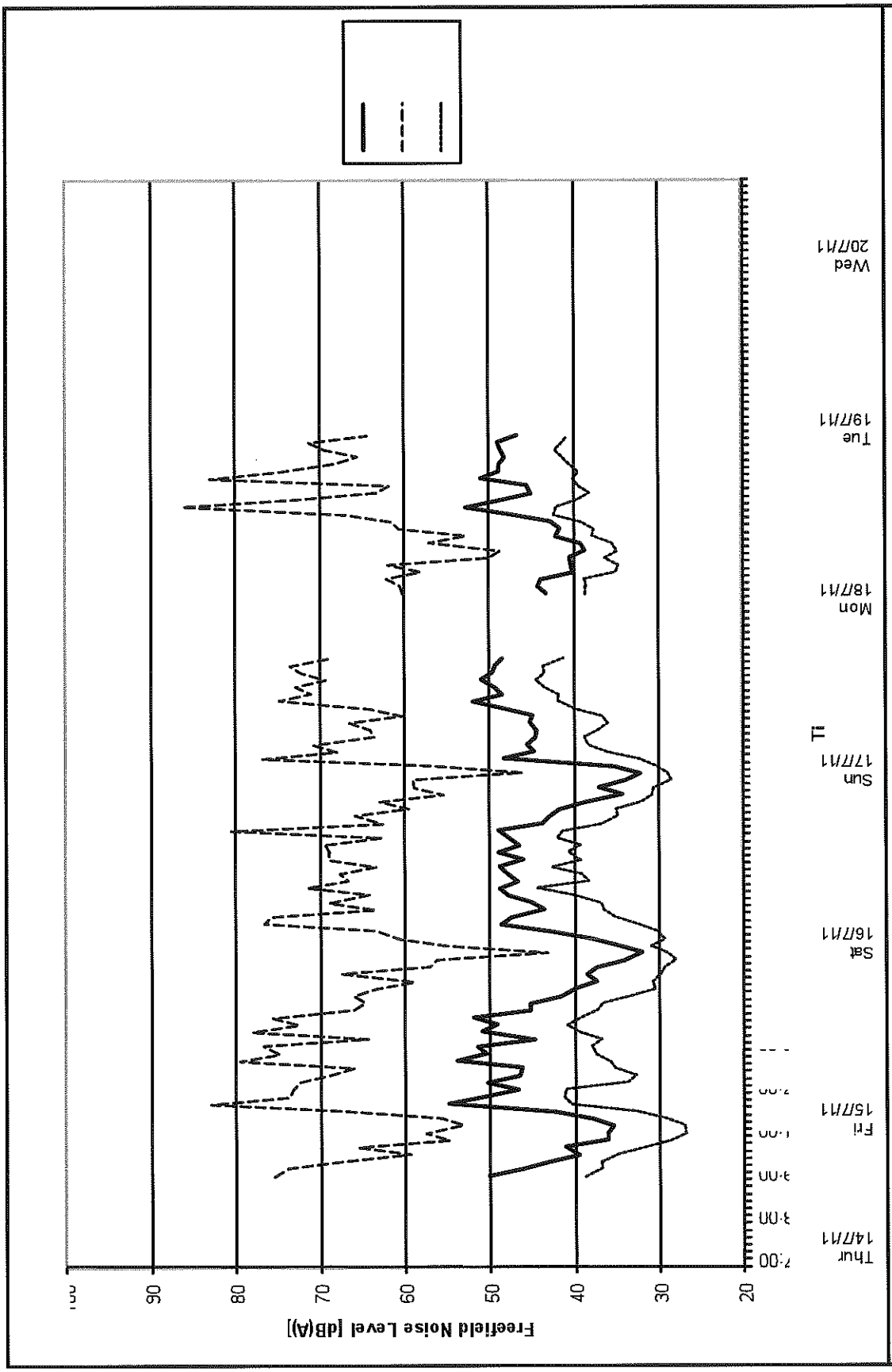


Figure 2 : Results of Unattended Noise Monitoring Obtained at Position U1 – Bottle Cottage

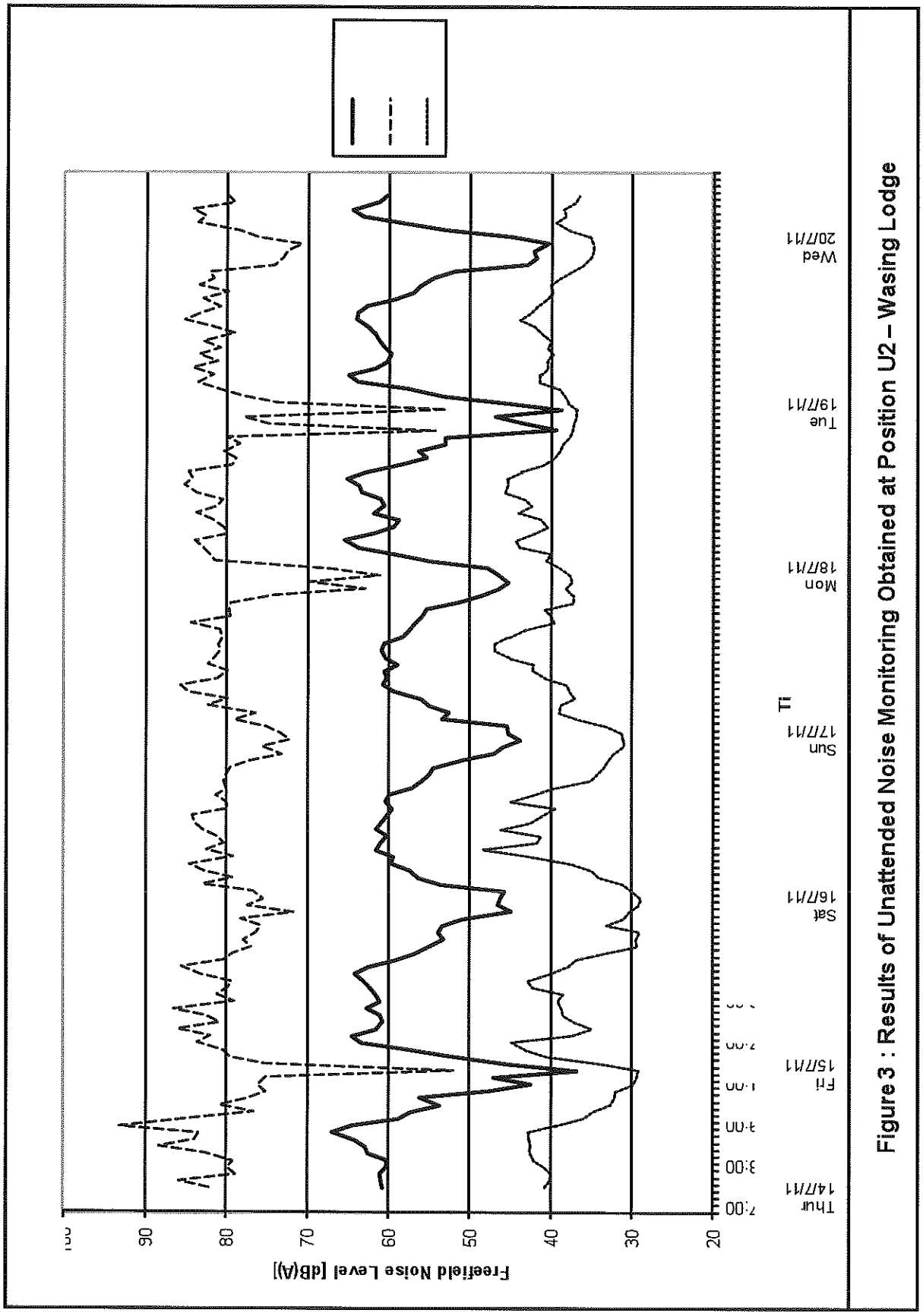


Figure 3 : Results of Unattended Noise Monitoring Obtained at Position U2 – Wasing Lodge

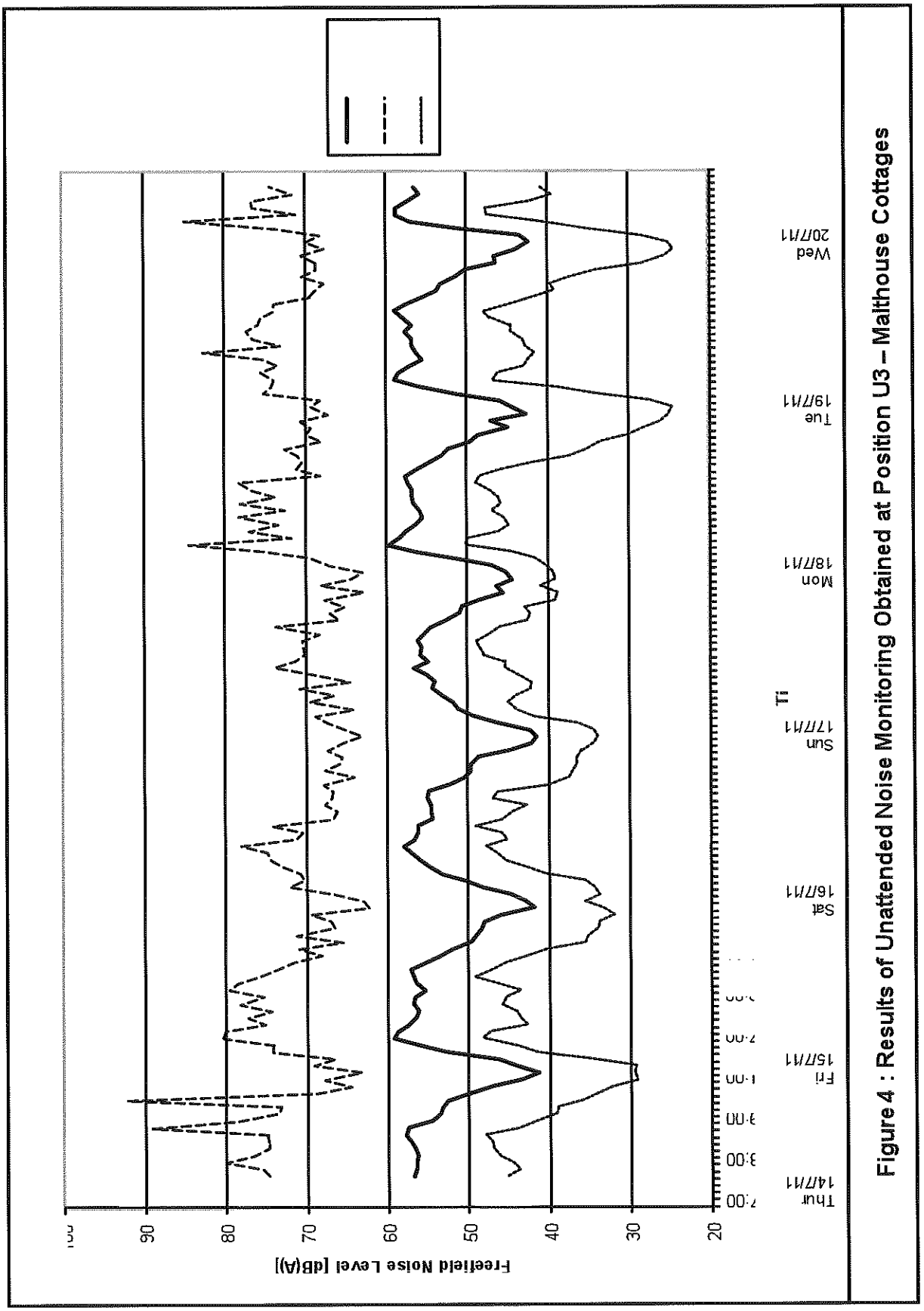


Figure 4 : Results of Unattended Noise Monitoring Obtained at Position U3 – Malthouse Cottages

Appendix A
Results of Unattended Noise Survey Carried Out at Bottle Cottage

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U1 - Bottle Cottage
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Thursday	19:00	50.1	75.5	52.2	38.9
14/07/2011	20:00	46.3	73.9	49.3	36.8
	21:00	43.1	67.2	45.3	36.9
	22:00	39.6	59.4	41.2	35.1
	23:00	41.1	65.5	42.1	31.8
Friday	0:00	36.2	54.8	38.8	28.7
15/07/2011	1:00	36.2	57.5	38.5	26.9
	2:00	35.4	53.2	39.0	27.1
	3:00	38.0	55.8	41.3	29.3
	4:00	42.4	66.8	44.3	32.8
	5:00	54.8	83.0	54.8	40.5
	6:00	50.7	73.7	49.5	41.3
	7:00	46.7	73.2	47.9	41.1
	8:00	50.3	72.4	50.5	33.7
	9:00	46.5	68.8	49.4	32.8
	10:00	46.2	66.0	48.9	35.3
	11:00	53.9	79.6	49.1	35.9
	12:00	50.4	74.9	49.3	37.5
	13:00	51.4	76.8	51.3	38.0
	14:00	44.8	64.4	47.8	36.8
	15:00	50.9	78.1	51.1	39.4
	16:00	49.2	72.5	51.0	41.0
	17:00	51.9	75.6	52.5	39.4
	18:00	45.2	66.0	48.2	37.4
	19:00	45.2	64.8	47.9	36.7
	20:00	41.6	66.1	43.6	33.4
	21:00	39.8	63.4	39.4	30.5
	22:00	37.4	58.9	38.5	30.8
	23:00	38.6	67.5	36.6	29.8
Saturday	0:00	37.5	57.1	39.1	29.4
16/07/2011	1:00	34.2	56.2	34.2	28.0
	2:00	32.0	43.2	34.5	29.1
	3:00	35.0	55.0	36.3	31.0
	4:00	38.2	60.7	37.7	29.4
	5:00	43.0	63.5	46.2	30.3
	6:00	48.7	76.6	44.8	32.6
	7:00	47.6	75.8	46.5	35.3
	8:00	43.7	63.5	45.9	36.5
	9:00	45.1	69.0	46.6	36.9
	10:00	47.8	64.3	50.6	40.3
	11:00	48.9	71.6	49.9	44.6
	12:00	46.7	66.6	48.7	38.3
	13:00	48.0	67.6	51.2	39.2
	14:00	48.9	63.5	52.1	42.8
	15:00	46.1	68.9	49.3	39.3
	16:00	49.0	68.9	52.5	40.8

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U1 - Bottle Cottage
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Saturday	17:00	46.5	69.3	49.5	39.3
16/07/2011	18:00	47.9	62.7	50.9	42.1
	19:00	49.0	80.5	49.9	41.4
	20:00	43.8	62.6	46.4	36.8
	21:00	42.9	65.8	45.5	34.9
	22:00	41.8	59.5	43.8	35.1
	23:00	38.9	63.0	38.4	32.1
Sunday	0:00	34.3	55.4	35.9	30.9
17/07/2011	1:00	37.1	58.9	36.6	30.6
	2:00	34.0	59.0	34.4	28.6
	3:00	32.2	46.2	34.6	29.1
	4:00	35.3	56.7	36.3	30.3
	5:00	48.4	76.8	46.3	32.3
	6:00	44.8	68.0	45.9	36.0
	7:00	45.6	70.8	46.8	38.3
	8:00	44.6	63.6	47.0	38.9
	9:00	44.4	64.0	46.7	37.2
	10:00	45.3	66.5	47.5	36.0
	11:00	44.9	60.4	47.7	36.7
	12:00	48.3	64.1	51.5	39.8
	13:00	52.0	74.8	51.9	41.9
	14:00	48.5	71.1	50.6	41.9
	15:00	49.4	72.8	51.3	43.5
	16:00	50.9	69.3	53.1	44.6
	17:00	49.7	72.3	51.6	43.5
	18:00	49.4	73.6	51.4	43.7
	19:00	48.5	68.4	50.6	41.2
	20:00				
	21:00				
	22:00				
	23:00				
Monday	0:00				
18/07/2011	1:00				
	2:00				
	3:00				
	4:00	43.3	60.2	46.1	38.6
	5:00	44.2	60.5	46.6	38.6
	6:00	43.9	62.1	46.1	38.8
	7:00	40.2	58.1	42.2	35.1
	8:00	40.4	61.9	41.7	34.7
	9:00	40.6	50.0	43.4	36.4
	10:00	38.7	48.7	41.1	34.9
	11:00	39.2	57.0	41.4	35.6
	12:00	42.2	52.7	44.8	37.8
	13:00	41.7	60.7	43.8	37.6
	14:00	42.8	61.4	44.9	39.1

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U1 - Bottle Cottage
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Monday	15:00	47.5	66.8	49.6	42.4
18/07/2011	16:00	52.7	86.2	50.0	42.1
	17:00	48.8	73.0	49.5	39.6
	18:00	45.1	63.2	47.9	38.1
	19:00	45.5	61.8	47.9	39.4
	20:00	50.9	83.0	49.8	40.1
	21:00	48.9	74.8	49.1	39.5
	22:00	48.8	68.2	51.6	40.6
	23:00	48.2	65.6	51.5	41.4
Tuesday	0:00	48.7	69.5	51.5	42.3
19/07/2011	1:00	49.0	71.2	51.9	41.4
	2:00	46.7	64.4	49.4	40.8

Appendix B
Results of Unattended Noise Survey Carried Out at Wasing Lodge

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U2 - Wasing Lodge
All Levels; Fast, Freefield, Mic Height 1.3 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Thursday	10:00	60.7	82.2	62.2	40.8
14/07/2001	11:00	60.9	85.9	62.7	40.1
	12:00	61.0	78.9	63.7	40.0
	13:00	60.2	79.8	61.9	40.7
	14:00	60.3	79.2	61.4	42.0
	15:00	62.5	82.6	66.1	42.5
	16:00	62.8	88.4	66.8	42.5
	17:00	64.2	83.9	69.2	42.7
	18:00	67.0	83.4	71.8	42.8
	19:00	64.5	93.2	64.7	39.4
	20:00	58.7	84.5	57.5	35.9
	21:00	57.3	76.6	54.6	34.8
	22:00	53.8	80.8	47.3	32.7
	23:00	56.1	77.4	51.9	32.2
Friday	0:00	47.6	75.2	40.0	31.9
15/07/2011	1:00	42.5	76.2	38.4	29.8
	2:00	47.1	75.1	39.2	29.4
	3:00	36.8	52.0	40.0	29.2
	4:00	45.3	75.2	42.6	34.0
	5:00	52.4	79.6	47.8	40.4
	6:00	57.7	80.3	54.2	43.0
	7:00	63.3	83.6	66.1	44.8
	8:00	64.5	82.0	69.2	37.4
	9:00	61.6	86.1	63.9	34.9
	10:00	60.7	80.9	63.6	37.1
	11:00	61.1	82.5	62.9	38.5
	12:00	62.7	86.5	65.6	38.6
	13:00	61.1	79.0	64.3	39.2
	14:00	61.5	81.1	64.5	38.5
	15:00	62.4	79.9	66.5	42.2
	16:00	63.2	79.4	67.9	42.9
	17:00	64.1	83.1	68.6	40.3
	18:00	62.6	85.5	65.3	37.9
	19:00	59.3	80.4	58.4	36.8
	20:00	56.8	79.2	53.0	33.3
	21:00	54.9	77.0	48.2	29.4
	22:00	53.2	77.9	44.9	29.5
	23:00	53.9	76.3	46.4	29.1
Saturday	0:00	53.4	75.8	48.9	33.1
16/07/2011	1:00	50.9	78.2	43.0	31.0
	2:00	44.9	71.7	41.2	30.3
	3:00	46.6	77.4	37.9	29.2
	4:00	46.2	75.4	37.6	28.8
	5:00	45.7	76.8	38.3	30.0
	6:00	53.5	83.0	44.6	31.1
	7:00	56.4	79.2	51.1	34.1

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U2 - Wasing Lodge
All Levels; Fast, Freefield, Mic Height 1.3 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Saturday	8:00	57.4	82.8	50.1	34.9
16/07/2011	9:00	59.7	84.6	58.1	37.3
	10:00	59.5	79.3	59.8	42.9
	11:00	61.5	82.5	62.5	48.5
	12:00	61.1	80.3	62.0	41.7
	13:00	60.3	81.1	60.3	41.2
	14:00	61.6	83.0	62.8	46.2
	15:00	60.9	83.9	60.5	42.5
	16:00	60.2	84.3	61.4	40.9
	17:00	59.6	79.9	58.7	39.4
	18:00	60.4	80.1	61.0	45.0
	19:00	59.9	81.3	60.2	42.2
	20:00	57.1	80.0	54.4	39.8
	21:00	56.0	80.3	48.3	35.1
	22:00	55.0	80.0	48.6	34.3
	23:00	54.5	79.6	46.0	33.5
Sunday	0:00	50.9	77.2	44.3	33.0
17/07/2011	1:00	47.1	73.2	41.5	32.3
	2:00	45.9	75.7	37.9	31.0
	3:00	43.8	72.3	38.9	31.0
	4:00	45.3	73.4	42.0	31.3
	5:00	45.4	75.1	44.0	33.1
	6:00	53.4	79.1	47.6	36.6
	7:00	52.6	76.5	51.4	39.0
	8:00	55.1	82.3	51.6	38.8
	9:00	56.0	79.9	52.9	37.0
	10:00	59.5	84.8	58.0	37.7
	11:00	60.8	85.8	60.4	38.0
	12:00	60.2	81.2	60.0	40.6
	13:00	60.6	79.9	61.8	42.2
	14:00	59.0	82.3	58.1	42.2
	15:00	60.4	81.5	62.2	45.2
	16:00	60.9	80.9	62.7	46.9
	17:00	60.5	81.0	62.2	46.9
	18:00	58.3	80.6	59.0	45.2
	19:00	57.4	80.8	56.4	43.0
	20:00	56.8	84.4	53.6	39.6
	21:00	55.8	79.6	53.5	40.0
	22:00	55.4	79.7	52.7	40.7
	23:00	51.5	79.5	49.0	37.2
Monday	0:00	48.6	74.1	49.5	37.2
18/07/2011	1:00	46.6	62.9	49.5	38.1
	2:00	45.3	69.8	47.9	37.4
	3:00	46.5	61.1	49.8	37.6
	4:00	47.9	67.2	51.1	38.9
	5:00	54.8	81.5	53.4	40.6

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U2 - Wasing Lodge
All Levels; Fast, Freefield, Mic Height 1.3 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Monday	6:00	59.1	82.2	56.8	40.0
18/07/2011	7:00	63.6	82.9	67.6	43.8
	8:00	65.4	84.0	70.1	44.3
	9:00	61.9	80.1	64.5	42.3
	10:00	59.5	80.3	60.7	40.5
	11:00	58.7	81.9	56.9	41.2
	12:00	61.8	83.8	64.6	44.0
	13:00	60.5	81.2	60.7	42.4
	14:00	61.0	80.5	63.3	43.2
	15:00	63.4	83.8	67.4	45.7
	16:00	63.7	85.3	67.9	45.4
	17:00	65.2	84.3	69.8	45.4
	18:00	62.8	84.7	64.7	43.7
	19:00	58.4	79.4	55.3	40.9
	20:00	55.4	78.9	50.3	39.6
	21:00	56.3	80.4	47.6	39.0
	22:00	53.1	78.4	46.7	38.5
	23:00	53.1	80.1	43.4	37.7
Tuesday	0:00	39.4	54.3	41.0	37.4
19/07/2011	1:00	43.4	74.9	41.7	37.2
	2:00	46.9	77.9	41.0	36.9
	3:00	38.7	53.0	40.2	36.8
	4:00	45.6	73.8	42.8	37.9
	5:00	53.2	78.1	45.6	38.4
	6:00	57.8	81.0	56.0	39.0
	7:00	63.9	83.7	67.1	41.5
	8:00	64.9	81.7	69.9	41.4
	9:00	61.7	84.2	64.4	40.4
	10:00	60.2	81.1	60.4	40.5
	11:00	59.8	83.4	59.9	39.8
	12:00	60.5	80.9	62.0	40.4
	13:00	61.3	83.0	63.5	40.0
	14:00	61.7	79.0	64.9	41.3
	15:00	62.6	81.9	66.0	42.1
	16:00	64.0	85.2	68.7	43.9
	17:00	63.9	83.3	68.0	42.6
	18:00	62.7	80.9	65.1	41.7
	19:00	59.2	82.9	58.0	40.5
	20:00	57.0	79.8	52.5	39.8
	21:00	56.1	83.4	50.7	40.2
	22:00	54.6	81.7	46.7	39.0
	23:00	51.9	82.1	44.8	37.5
Wednesday	0:00	42.9	74.1	40.9	36.1
20/07/2011	1:00	41.9	73.1	39.9	35.1
	2:00	42.1	72.5	40.4	34.8
	3:00	40.4	70.7	38.2	34.8

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U2 - Wasing Lodge
All Levels; Fast, Freefield, Mic Height 1.3 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Wednesday	4:00	44.9	76.1	39.9	35.1
20/07/2011	5:00	53.0	78.4	47.9	37.6
	6:00	58.2	83.6	54.9	39.5
	7:00	63.2	82.6	66.5	38.2
	8:00	64.5	84.2	69.3	38.5
	9:00	61.2	79.1	64.5	37.1
	10:00	60.2	79.8	62.0	36.6

Appendix C
Results of Unattended Noise Survey Carried Out at Malthouse Cottages

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U3 - Malthouse Cottages
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Thursday	11:00	56.8	74.7	60.6	45.2
14/07/2001	12:00	56.5	75.4	60.1	43.7
	13:00	56.5	80.0	59.9	44.6
	14:00	56.3	76.6	59.7	46.1
	15:00	56.6	74.7	59.8	46.9
	16:00	57.1	74.7	60.6	47.1
	17:00	57.8	74.9	60.9	47.9
	18:00	57.4	89.2	59.7	43.8
	19:00	54.5	78.8	58.4	41.8
	20:00	53.5	73.5	58.5	39.1
	21:00	53.2	73.2	57.7	39.0
	22:00	52.6	92.3	55.7	35.9
	23:00	49.6	68.8	53.8	34.1
Friday	0:00	47.0	64.6	48.1	32.3
15/07/2011	1:00	43.4	67.9	40.0	29.2
	2:00	41.4	63.3	39.7	29.5
	3:00	44.0	69.1	42.3	29.4
	4:00	46.2	66.5	45.5	34.8
	5:00	52.9	74.2	55.4	41.4
	6:00	56.1	74.1	60.2	43.8
	7:00	59.2	80.3	62.3	48.3
	8:00	58.7	80.0	62.0	47.3
	9:00	57.4	75.1	60.9	42.7
	10:00	56.5	77.3	59.8	43.5
	11:00	56.1	74.4	59.5	44.0
	12:00	56.9	78.2	60.2	45.8
	13:00	56.7	75.3	59.7	45.4
	14:00	55.4	79.5	58.6	43.6
	15:00	56.5	78.6	59.5	46.3
	16:00	56.9	75.9	59.8	49.2
	17:00	57.2	73.8	60.4	47.3
	18:00	55.3	71.5	59.2	45.3
	19:00	53.6	68.1	57.9	42.8
	20:00	52.1	70.9	56.5	40.3
	21:00	49.7	65.5	54.7	35.5
	22:00	49.0	71.3	53.9	35.3
	23:00	48.4	66.5	53.3	33.9
Saturday	0:00	48.0	67.0	51.4	33.8
16/07/2011	1:00	46.1	69.4	46.7	31.9
	2:00	41.9	62.2	42.4	33.3
	3:00	42.9	63.0	43.6	35.6
	4:00	44.7	66.4	43.6	33.8
	5:00	48.2	72.0	50.1	34.4
	6:00	50.3	70.2	54.1	35.5
	7:00	53.3	70.7	57.9	40.5
	8:00	54.9	72.9	59.0	42.8

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U3 - Malthouse Cottages
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Saturday	9:00	56.0	74.3	59.8	45.3
16/07/2011	10:00	57.0	74.8	60.8	46.4
	11:00	57.9	78.1	61.6	47.8
	12:00	56.7	71.3	60.9	45.1
	13:00	56.1	70.4	59.8	45.8
	14:00	56.2	74.1	59.4	49.1
	15:00	54.3	66.7	58.4	45.8
	16:00	54.6	66.2	58.8	44.6
	17:00	54.5	67.7	58.9	42.8
	18:00	55.1	66.8	58.9	46.9
	19:00	54.8	66.6	58.7	46.3
	20:00	52.3	67.9	57.4	40.2
	21:00	50.5	64.0	55.6	37.5
	22:00	49.7	67.6	54.6	37.0
	23:00	49.6	65.8	54.6	36.5
Sunday	0:00	48.7	65.5	52.2	36.5
17/07/2011	1:00	44.7	67.4	43.8	35.9
	2:00	42.2	65.3	40.8	34.4
	3:00	41.5	63.1	39.5	33.9
	4:00	42.4	65.2	41.0	34.5
	5:00	46.6	67.3	47.1	36.3
	6:00	49.4	68.8	52.1	41.7
	7:00	51.1	64.1	55.1	43.9
	8:00	51.7	69.5	55.2	45.0
	9:00	53.1	66.5	57.4	44.0
	10:00	54.3	70.8	58.7	42.3
	11:00	54.0	64.5	58.6	42.1
	12:00	55.1	68.5	59.4	43.5
	13:00	56.6	73.9	60.1	45.4
	14:00	54.8	71.2	59.0	45.4
	15:00	55.8	70.1	59.1	48.0
	16:00	55.7	70.3	59.2	48.5
	17:00	56.1	70.4	59.6	48.9
	18:00	55.3	68.3	59.0	47.5
	19:00	54.5	73.7	58.5	46.0
	20:00	52.7	65.8	57.6	42.5
	21:00	50.9	67.0	55.2	42.2
	22:00	50.7	65.2	54.6	42.9
	23:00	48.4	67.7	51.1	39.1
Monday	0:00	45.5	62.8	47.1	38.9
18/07/2011	1:00	46.4	68.2	48.4	41.0
	2:00	44.5	64.4	45.6	39.1
	3:00	45.3	62.9	46.9	39.3
	4:00	47.1	67.0	48.1	40.2
	5:00	51.4	69.4	54.1	41.6
	6:00	56.4	75.3	60.1	44.5

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U3 - Malthouse Cottages
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Monday	7:00	59.8	84.5	62.0	50.2
18/07/2011	8:00	58.3	71.7	61.3	49.9
	9:00	57.5	77.0	60.9	46.1
	10:00	56.4	73.4	60.1	44.8
	11:00	55.6	78.2	59.4	45.5
	12:00	55.8	72.5	59.2	46.9
	13:00	56.6	78.1	59.9	45.9
	14:00	56.9	73.7	60.6	46.2
	15:00	56.8	76.7	60.3	47.1
	16:00	57.3	78.3	60.4	49.0
	17:00	57.7	68.2	61.0	48.4
	18:00	56.3	71.0	60.0	45.8
	19:00	54.6	70.4	59.1	42.0
	20:00	53.1	70.9	57.6	37.4
	21:00	52.3	72.6	56.9	35.3
	22:00	49.6	68.0	54.2	33.5
	23:00	48.6	69.9	50.4	30.1
Tuesday	0:00	44.9	69.3	40.1	28.3
19/07/2011	1:00	47.1	70.6	41.8	26.1
	2:00	42.6	67.2	36.3	25.2
	3:00	44.2	69.3	36.5	24.6
	4:00	45.9	68.1	42.0	27.4
	5:00	51.2	75.2	54.3	34.0
	6:00	56.0	74.2	60.1	38.8
	7:00	58.9	73.9	62.2	46.8
	8:00	58.4	75.5	61.6	46.2
	9:00	57.1	73.3	60.9	42.9
	10:00	55.6	75.3	59.4	42.4
	11:00	56.3	82.6	60.1	41.6
	12:00	56.8	73.1	60.6	42.7
	13:00	56.8	76.5	60.4	43.0
	14:00	57.7	77.3	61.4	44.5
	15:00	56.9	75.8	60.5	44.6
	16:00	57.9	75.4	61.1	47.1
	17:00	59.0	73.8	62.2	48.0
	18:00	57.4	73.8	61.2	45.0
	19:00	55.6	69.4	60.1	41.8
	20:00	53.8	68.7	58.6	39.2
	21:00	53.3	67.7	58.4	39.7
	22:00	51.3	70.4	55.9	37.2
	23:00	50.1	68.6	52.6	34.1
Wednesday	0:00	46.4	68.7	44.0	28.4
20/07/2011	1:00	46.6	70.4	41.4	25.4
	2:00	44.0	67.6	39.0	24.5
	3:00	42.3	69.9	36.5	25.1
	4:00	43.4	68.2	41.1	28.4

Lower Farm, Wasing
Results of Noise Measurements Carried Out Between
14 - 20 July 2010

Equipment Used: Rion NL-32 Class 1 Sound Level Meter
Location: U3 - Malthouse Cottages
All Levels; Fast, Freefield, Mic Height 1.2 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Wednesday	5:00	51.2	73.6	54.8	34.7
20/07/2011	6:00	57.0	85.0	60.4	41.1
	7:00	58.8	71.0	62.1	47.4
	8:00	58.8	76.4	62.0	47.6
	9:00	57.1	76.6	60.8	42.3
	10:00	55.8	71.6	59.8	39.5
	11:00	56.5	74.3	60.3	41.0

Appendix D
Calculation Details

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Malthouse Cottages Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Dozer	76.0	1	100	2	110			-20.8	-24.0	0.0	-24.0	**52.0**	
Hydraulic Excavator	74.5	1	100	2	110			-20.8	-24.0	0.0	-24.0	**50.5**	
Dump Truck/ HGV Movements	50.0	12	-	2	110			-20.8	-24.0	0.0	-24.0	**36.8**	**54.4**
Soil Strip and Extraction Phase A													
Phase A working area beyond 1000m, no calculations made.													
HGV Movements on Site Access	50.0	20	-	2	110			-20.8	-24.0	0.0	-24.0	**39.0**	**39.0**
Soil Strip and Extraction Phase B													
Phase B working area beyond 1000m, no calculations made.													
HGV Movements on Site Access	50.0	20	-	2	110			-20.8	-24.0	0.0	-24.0	**39.0**	**39.0**
Soil Strip Phases C1 - C3													
Excavator	74.5	1	100	2	420			-32.5	-38.6	0.0	-38.6	**35.9**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Dozer	76.0	1	100	2	450			-33.1	-39.3	0.0	-39.3	**36.7**	
Dump Truck Movements	50.0	10	-	2	420			-32.5	-38.6	0.0	-38.6	**21.5**	
HGV Movements on Site Access	50.0	20	-	2	110			-20.8	-24.0	0.0	-24.0	**39.0**	**42.8**
Extraction and Restoration Phases C1 - C3													
Excavator	74.5	1	100	1	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Dozer	76.0	1	100	1	600			-35.6	-42.5	0.0	-42.5	**33.5**	
HGV Movements on Site Access	50.0	20	-	1	110			-20.8	-24.0	0.0	-24.0	**39.0**	**41.3**
Soil Strip Phase C4 & Extraction C3													
Excavator (C3)	74.5	1	100	1	420			-32.5	-38.6	0.0	-38.6	**35.9**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Excavator	74.5	1	100	2	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Dozer	76.0	1	100	2	360			-31.1	-36.9	0.0	-36.9	**39.1**	
Dump Truck Movements	50.0	10	-	2	360			-31.1	-36.9	0.0	-36.9	**23.1**	
HGV Movements on Site Access	50.0	20	-	2	110			-20.8	-24.0	0.0	-24.0	**39.0**	**44.2**
Extraction Phase C4													
Excavator	74.5	1	100	1	600	3	230	-35.6	-42.5	-6.6	-42.5	**32.0**	
Dozer	76.0	1	100	1	700	3	330	-36.9	-44.1	-6.3	-44.1	**31.9**	
HGV Movements on Site Access	50.0	20	-	1	110			-20.8	-24.0	0.0	-24.0	**39.0**	**40.5**
Restoration Phase C4													
Dozer	76.0	1	100	1	700			-36.9	-44.1	0.0	-44.1	**31.9**	
HGV Movements on Site Access	50.0	20	-	1	110			-20.8	-24.0	0.0	-24.0	**39.0**	**39.8**
Pumping - Worst Case Location (Phase 3C)													
De-Watering Pump	68.0	1	100	1	450			-33.1	-39.3	0.0	-39.3	**28.7**	

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Dolphin Close — Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels

	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Dozer	76.0	1	100	2	350			-30.9	-36.6	0.0	-36.6	**39.4**	
Hydraulic Excavator	74.5	1	100	2	350			-30.9	-36.6	0.0	-36.6	**37.9**	
Dump Truck/ HGV Movements	50.0	12	-	2	350			-30.9	-36.6	0.0	-36.6	**24.2**	**41.8**
Soil Strip and Extraction Phase A													
Phase A working area beyond 800m, no calculations made.													
HGV Movements on Site Access	50.0	20	-	2	350			-30.9	-36.6	0.0	-36.6	**26.4**	**26.4**
Soil Strip and Extraction Phase B													
Phase B working area beyond 800m, no calculations made.													
HGV Movements on Site Access	50.0	20	-	2	350			-30.9	-36.6	0.0	-36.6	**26.4**	**26.4**
Soil Strip Phases C1 - C3													
Excavator	74.5	1	100	2	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Dozer	76.0	1	100	2	430			-32.7	-38.8	0.0	-38.8	**37.2**	
Dump Truck Movements	50.0	10	-	2	430			-32.7	-38.8	0.0	-38.8	**21.2**	
HGV Movements on Site Access	50.0	20	-	2	350			-30.9	-36.6	0.0	-36.6	**26.4**	**40.6**
Extraction and Restoration Phases C1 - C3													
Excavator	73.5	1	100	1	450			-33.1	-39.3	0.0	-39.3	**34.2**	
Dozer	76.0	1	100	1	600			-35.6	-42.5	0.0	-42.5	**33.5**	
HGV Movements on Site Access	50.0	20	-	1	350			-30.9	-36.6	0.0	-36.6	**26.4**	**37.3**
Soil Strip Phase C4 & Extraction C3													
Excavator (C3)	74.5	1	100	1	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Excavator	74.5	1	100	2	330			-30.4	-36.0	0.0	-36.0	**38.5**	
Excavator	74.5	1	100	2	400			-32.0	-38.1	0.0	-38.1	**36.4**	
Dozer	76.0	1	100	2	250			-28.0	-32.9	0.0	-32.9	**43.1**	
Dump Truck Movements	50.0	10	-	2	250			-28.0	-32.9	0.0	-32.9	**27.1**	
HGV Movements on Site Access	50.0	20	-	2	350			-30.9	-36.6	0.0	-36.6	**26.4**	**45.6**
Extraction Phase C4													
Excavator	74.5	1	100	1	460	3	160	-33.3	-39.6	-6.9	-40.1	**34.4**	
Dozer	76.0	1	100	1	600	3	280	-35.6	-42.5	-6.5	-42.5	**33.5**	
HGV Movements on Site Access	50.0	20	-	1	350			-30.9	-36.6	0.0	-36.6	**26.4**	**37.4**
Restoration Phase C4													
Dozer	76.0	1	100	1	300			-29.5	-34.9	0.0	-34.9	**41.1**	
HGV Movements	50.0	20	-	1	350			-30.9	-36.6	0.0	-36.6	**26.4**	**41.2**
Pumping - Worst Case Location (Phase C4)													
De-Watering Pump	68.0	1	100	1	450			-33.1	-39.3	0.0	-39.3	**28.7**	

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Wasing Lodge — Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Dozer	76.0	1	100	2	530			-34.5	-41.1	0.0	-41.1	**34.9**	
Hydraulic Excavator	74.5	1	100	2	530			-34.5	-41.1	0.0	-41.1	**33.4**	
Dump Truck/ HGV Movements	50.0	12	-	2	530			-34.5	-41.1	0.0	-41.1	**19.7**	**37.3**
Soil Strip and Formation of Bund Phase A													
Excavator	74.5	1	100	2	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Dozer	76.0	1	100	2	430			-32.7	-38.8	0.0	-38.8	**37.2**	
Dump Truck Movements	50.0	10	-	2	430			-32.7	-38.8	0.0	-38.8	**21.2**	**40.5**
Extraction and Progressive Restoration Phase A													
Excavator	74.5	1	100	1	630	3	130	-36.0	-43.0	-7.0	-43.0	**31.5**	
Dozer	76.0	1	100	1	520	3	70	-34.3	-40.9	-7.6	-41.9	**34.1**	
HGV Movements	50.0	10	-	1	520	3	70	-34.3	-40.9	-7.6	-41.9	**18.1**	**36.1**
Soil Strip Phase B & Extraction Phase A													
Excavator (Phase A)	74.5	1	100	1	700	2	180	-36.9	-44.1	-5.2	-44.1	**30.4**	
Excavator	74.5	1	100	2	720			-37.1	-44.4	0.0	-44.4	**30.1**	
Excavator	74.5	1	100	2	750			-37.5	-44.9	0.0	-44.9	**29.6**	
Dozer	76.0	1	100	2	750			-37.5	-44.9	0.0	-44.9	**31.1**	
Dump Truck Movements	50.0	10	-	2	750			-37.5	-44.9	0.0	-44.9	**15.2**	
HGV Movements	50.0	20	-	1	700	2	180	-36.9	-44.1	-5.2	-44.1	**18.9**	**36.5**
Extraction Phase B & Soils Strip Phase C4													
Excavator (Phase B)	74.5	1	100	1	720			-37.1	-44.4	0.0	-44.4	**30.1**	
Excavator	74.5	1	100	2	250			-28.0	-32.9	0.0	-32.9	**41.6**	
Excavator	74.5	1	100	2	300			-29.5	-34.9	0.0	-34.9	**39.6**	
Dozer	76.0	1	100	2	190			-25.6	-30.0	0.0	-30.0	**46.0**	
Dump Truck Movements	50.0	10	-	2	190			-25.6	-30.0	0.0	-30.0	**30.1**	
HGV Movements	50.0	20	-	1	720			-37.1	-44.4	0.0	-44.4	**18.6**	**48.2**
											Extraction Only =		**30.4**
Extraction Phase C4 & Restoration C1-C3													
Excavator (C4)	74.5	1	100	1	250	3	50	-28.0	-32.9	-8.1	-36.0	**38.5**	
Excavator	74.5	1	100	2	480	3	300	-33.6	-40.0	-6.2	-40.0	**34.5**	
Dozer	76.0	1	100	2	480	3	300	-33.6	-40.0	-6.2	-40.0	**36.0**	
Dump Truck Movements	50.0	10	-	2	480	3	300	-33.6	-40.0	-6.2	-40.0	**20.0**	
HGV Movements	50.0	20	-	1	250	3	50	-28.0	-32.9	-8.1	-36.0	**27.0**	**41.6**
Restoration Phase C4													
Dozer	76.0	1	100	1	250			-28.0	-32.9	0.0	-32.9	**43.1**	
HGV Movements	50.0	20	-	1	250			-28.0	-32.9	0.0	-32.9	**30.1**	**43.3**
Pumping - Worst Case Location (Phase C4)													
De-Watering Pump	68.0	1	100	1	250	3	50	-28.0	-32.9	-8.1	-36.0	**32.0**	

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Wasing Lower Farm Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Beyond 800m - no calculations made													
Soil Strip and Formation of Bund Phase A													
Excavator	74.5	1	100	2	350			-30.9	-36.6	0.0	-36.6	**37.9**	
Excavator	74.5	1	100	2	400			-32.0	-38.1	0.0	-38.1	**36.4**	
Dozer	76.0	1	100	2	350			-30.9	-36.6	0.0	-36.6	**39.4**	
Dump Truck Movements	50.0	10	-	2	350			-30.9	-36.6	0.0	-36.6	**23.4**	**42.9**
Extraction and Progressive Restoration Phase A													
Excavator	74.5	1	100	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**34.4**	
Dozer	76.0	1	100	1	500	3	150	-34.0	-40.5	-6.9	-40.9	**35.1**	
HGV Movements	50.0	10	-	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**20.0**	**37.9**
Soil Strip Phase B & Extraction Phase A													
Excavator (Phase A)	74.5	1	100	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**34.4**	
Excavator	74.5	1	100	2	800			-38.1	-45.6	0.0	-45.6	**28.9**	
Excavator	74.5	1	100	2	800			-38.1	-45.6	0.0	-45.6	**28.9**	
Dozer	76.0	1	100	2	800			-38.1	-45.6	0.0	-45.6	**30.4**	
Dump Truck Movements	50.0	10	-	2	800			-38.1	-45.6	0.0	-45.6	**14.5**	
HGV Movements	50.0	20	-	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**23.0**	**37.5**
Extraction Phase B & Soils Strip Phase C4													
Excavator (Phase B)	74.5	1	100	1	800			-38.1	-45.6	0.0	-45.6	**28.9**	
Excavator	74.5	1	100	2	400			-32.0	-38.1	0.0	-38.1	**36.4**	
Excavator	74.5	1	100	2	450			-33.1	-39.3	0.0	-39.3	**35.2**	
Dozer	76.0	1	100	2	400			-32.0	-38.1	0.0	-38.1	**37.9**	
Dump Truck Movements	50.0	10	-	2	400			-32.0	-38.1	0.0	-38.1	**22.0**	
HGV Movements	50.0	20	-	1	800			-38.1	-45.6	0.0	-45.6	**17.5**	**41.7**
											Extraction Only =		**29.2**
Extraction Phase C4 & Restoration C1-C3													
Excavator (C4)	74.5	1	100	1	450	3	50	-33.1	-39.3	-8.0	-41.1	**33.4**	
Excavator	74.5	1	100	2	700	3	300	-36.9	-44.1	-5.6	-44.1	**30.4**	
Dozer	76.0	1	100	2	700	3	300	-36.9	-44.1	-5.6	-44.1	**31.9**	
Dump Truck Movements	50.0	10	-	2	700	3	300	-36.9	-44.1	-5.6	-44.1	**15.9**	
HGV Movements	50.0	20	-	1	450	3	50	-33.1	-39.3	-8.0	-41.1	**22.0**	**37.0**
Restoration Phase C4													
Dozer	76.0	1	100	1	450			-33.1	-39.3	0.0	-39.3	**36.7**	
HGV Movements	50.0	20	-	1	450			-33.1	-39.3	0.0	-39.3	**23.7**	**36.9**
Pumping - Worst Case Location (Phase C4)													
De-Watering Pump	68.0	1	100	1	450	3	50	-33.1	-39.3	-8.0	-41.1	**26.9**	

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Shalford Lodge — Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Beyond 1000m - no calculations made													
Soil Strip and Formation of Bund Phase A													
Excavator	74.5	1	100	2	350			-30.9	-36.6	0.0	-36.6	**37.9**	
Excavator	74.5	1	100	2	400			-32.0	-38.1	0.0	-38.1	**36.4**	
Dozer	76.0	1	100	2	325			-30.2	-35.8	0.0	-35.8	**40.2**	
Dump Truck Movements	50.0	10	-	2	325			-30.2	-35.8	0.0	-35.8	**24.2**	**43.3**
Extraction and Progressive Restoration Phase A													
Excavator	74.5	1	100	1	500	3	150	-34.0	-40.5	-6.9	-40.9	**33.6**	
Dozer	76.0	1	100	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**35.9**	
HGV Movements	50.0	10	-	1	400	3	150	-32.0	-38.1	-7.0	-39.0	**21.0**	**38.0**
Extraction and Restoration Phases B & C													
Beyond 1000m - no calculations made													
Pumping - Worst Case Location (Phase A3)													
De-Watering Pump	68.0	1	100	1	400	3	50	-32.0	-38.1	-8.0	-40.1	**27.9**	

Land at Lower Farm, Wasing - Proposed Mineral Extraction and Infilling

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Bottle Cottage — Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Initial Soil Strip / Formation of Access, Weighbridge Area and Screening Bund													
Beyond 1000m - no calculations made													
Soil Strip Phase A													
Excavator	74.5	1	100	2	330			-30.4	-36.0	0.0	-36.0	**38.5**	
Excavator	74.5	1	100	2	350			-30.9	-36.6	0.0	-36.6	**37.9**	
Dozer	76.0	1	100	2	350			-30.9	-36.6	0.0	-36.6	**39.4**	
Dump Truck Movements	50.0	10	-	2	330			-30.4	-36.0	0.0	-36.0	**24.1**	**43.5**
Extraction and Progressive Restoration Phase A													
Excavator	74.5	1	100	1	330			-30.4	-36.0	0.0	-36.0	**38.5**	
Dozer	76.0	1	100	1	500			-34.0	-40.5	0.0	-40.5	**35.5**	
HGV Movements	50.0	10	-	1	330			-30.4	-36.0	0.0	-36.0	**24.1**	**40.4**
Soil Strip Phase B & Extraction Phase A													
Excavator (Phase A)	74.5	1	100	1	330			-30.4	-36.0	0.0	-36.0	**38.5**	
Excavator	74.5	1	100	2	150			-23.5	-27.4	0.0	-27.4	**47.1**	
Excavator	74.5	1	100	2	200			-26.0	-30.5	0.0	-30.5	**44.0**	
Dozer	76.0	1	100	2	150			-23.5	-27.4	0.0	-27.4	**48.6**	
Dump Truck Movements	50.0	10	-	2	150			-23.5	-27.4	0.0	-27.4	**32.6**	
HGV Movements	50.0	20	-	1	330			-30.4	-36.0	0.0	-36.0	**27.1**	**52.0**
Extraction Phase B1b & Restoration Phase A4													
Excavator (Phase B)	74.5	1	100	1	170			-24.6	-28.8	0.0	-28.8	**45.7**	
Dozer	76.0	1	100	2	330			-30.4	-36.0	0.0	-36.0	**40.0**	
Dump Truck Movements	50.0	10	-	2	330			-30.4	-36.0	0.0	-36.0	**24.1**	
HGV Movements	50.0	20	-	1	170			-24.6	-28.8	0.0	-28.8	**34.3**	**47.0**
												Extraction Only =	**46.0**
Extraction Phase B1b & Soils Strip Phase B3													
Excavator (B1b)	74.5	1	100	1	170			-24.6	-28.8	0.0	-28.8	**45.7**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Excavator	74.5	1	100	2	550			-34.8	-41.5	0.0	-41.5	**33.0**	
Dozer	76.0	1	100	2	470			-33.4	-39.8	0.0	-39.8	**36.2**	
Dump Truck Movements	50.0	10	-	2	470			-33.4	-39.8	0.0	-39.8	**20.2**	
HGV Movements	50.0	20	-	1	170			-24.6	-28.8	0.0	-28.8	**34.3**	**46.9**
Extraction Phase B3 & Soils Strip Phase C1b													
Excavator (B3)	74.5	1	100	1	470			-33.4	-39.8	0.0	-39.8	**34.7**	
Excavator	74.5	1	100	2	700			-36.9	-44.1	0.0	-44.1	**30.4**	
Excavator	74.5	1	100	2	650			-36.3	-43.3	0.0	-43.3	**31.2**	
Dozer	76.0	1	100	2	650			-36.3	-43.3	0.0	-43.3	**32.7**	
Dump Truck Movements	50.0	10	-	2	650			-36.3	-43.3	0.0	-43.3	**16.7**	
HGV Movements	50.0	20	-	1	470			-33.4	-39.8	0.0	-39.8	**23.2**	**38.7**
Pumping - Worst Case Location (Phase B1b)													
De-Watering Pump	68.0	1	100	1	250			-28.0	-32.9	0.0	-32.9	**35.1**	
De-Watering Pump (locally screened)	68.0	1	100	1	250	2	5	-28.0	-32.9	-9.3	-37.3	**30.7**	

Calculated Noise Levels from Site Operations

01-Nov-2011

Receptor: Woolhampton Uses BS5228
Height 1.5 m

Predicted Freefield Noise Levels	Ref LAeq @10m	No. (/hr)	% On Time	Source Ht	Dist S-R	Barrier Ht	Dist S-B	Distance Attenuation Hard	Distance Attenuation Soft	CRTN Barrier Attenuation	Max Attenuation	LAeq [dB]	Total LAeq [dB]
Phase B Working Only Area Likely to Influence Noise Levels in Village													
Phases A & C beyond 900 metres from village.													
Extraction Phase B1b & Soils Strip Phase B2 (Worst Case)													
Excavator (B1b)	74.5	1	100	1	300			-29.5	-34.9	0.0	-34.9	**39.6**	
Excavator	74.5	1	100	2	500			-34.0	-40.5	0.0	-40.5	**34.0**	
Excavator	74.5	1	100	2	550			-34.8	-41.5	0.0	-41.5	**33.0**	
Dozer	76.0	1	100	2	500			-34.0	-40.5	0.0	-40.5	**35.5**	
Dump Truck Movements	50.0	10	-	2	500			-34.0	-40.5	0.0	-40.5	**19.6**	
HGV Movements	50.0	20	-	1	300			-29.5	-34.9	0.0	-34.9	**28.1**	**42.5**

APPENDIX E
AIR QUALITY REPORT

Contaminated Land
Air Quality
Environmental Audit

SMITH GRANT
Environmental Consultancy
LLP

Partnership No: OC 300776

WASING ESTATE
PROPOSED SAND AND GRAVEL EXTRACTION

REVISED AIR QUALITY ASSESSMENT

For: Marley Eternit / Lafarge Aggregates

April 2012

R1619-R01-v4

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Client:	Marley Eternit / Lafarge Aggregates
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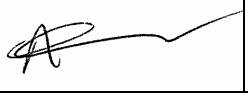
for: Smith Grant LLP

	Name	Position	Signature	Date
Author	K Hawkins BSc MSc CEnv MIEMA	Partner		19.04.12
Checked	A F Smith BSc PhD MCIWM SiLC	Chairman		19.04.12

Document Revision Record:

Version	Report Status	Date	Details of Revision
v1	Draft	25.08.11	original draft, issued for client comments
v2	Revised Draft	08.10.11	revised draft incorporating client comments and alteration to site boundaries and working areas
v3	Revised draft	31.01.12	revised draft incorporating client comments
V4	Final	19.04.12	final version, incorporating minor amendment

WASING ESTATE
PROPOSED SAND AND GRAVEL EXTRACTION

AIR QUALITY ASSESSMENT

For: Marley Eternit / Lafarge Aggregates

Contents

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Appendices

1 Introduction

1.1 Marley Eternit and Lafarge Aggregates Ltd propose the extraction of sand and gravel at an area of land, Wasing Estate, located between Aldermaston and Woolhampton, Berkshire. Smith Grant LLP (SGP) previously prepared an airborne dust assessment of the proposed sand and gravel quarry on behalf of Lafarge Redland Aggregates Ltd (ref: R392-R01, July 2000) in support of an Environmental Statement submitted for an earlier planning application.

1.2 This following report updates and supplements the previous assessment taking into account changes to the proposed working methods and extraction areas. The revised assessment also incorporates an assessment of the potential impacts of emissions from HGV movements associated with the development.

2 Technical and Legislative Context

2.1 Public Health

2.1.1 The protection of public health with respect to quarry and related process emissions is provided by means of the Air Quality Strategy (AQS) and associated regulations, along with specific emissions standards applicable to any Environmental Permits to be provided for the site where particular processes will be carried out. The Air Quality Regulations (AQR) prescribe air quality objectives to be achieved for a range of key pollutants. Local authorities are required to review the existing and projected airborne concentrations of these pollutants. If exceedance of any AQS objective appears likely then an Air Quality Management Area (AQMA) must be declared with the aim of achieving the objective by the specified date.

2.1.2 The pollutants of principal concern in connection with quarrying and associated activities, including road transport, for which the AQS objectives have been established for nitrogen oxides (NO_x), nitrogen dioxide (NO_2) and particulate matter with a size of less than 10 µm (PM_{10}).

2.1.3 The AQS objectives for these pollutants are detailed below:

Table 2.1: AQS Objectives

pollutant	objective	date	comment
NO_2	40 µg/m^3, annual mean	31 December 2005	
	200 µg/m^3, hourly mean, not to be exceeded more than 18 times per annum	31 December 2005	
NO_x	30 µg/m^3, annual mean	31 December 2000	protection of vegetation and ecosystems
PM_{10}	40 µg/m^3, annual mean	31 December 2004	
	50 µg/m^3, 24 hour mean, not to be exceeded more than 35 times per annum	31 December 2004	
$PM_{2.5}$	25 µg/m^3, annual mean	2020	new, not legally binding
	15% reduction, urban background	2010 - 2020	target, UK urban areas

2.1.4 Technical guidance is provided to English local authorities in implementing their local air quality management duties by DEFRA.[1]. The local authority responsible for local air quality monitoring and management is West Berkshire Council (WBC).

2.2 Dust Deposition

2.2.1 Coarse particulates (>10 µm) arising from fugitive dust from quarrying operations can give rise to nuisance, where nuisance is defined as *'any **dust**, steam, smell or other effluvia arising on industrial or trade or business premises and being prejudicial to health or a nuisance*' under the Environmental Protection Act 1990 Part III. There are no UK statutory or recommended levels of dust deposition which constitute an acknowledged nuisance. Public concerns in relation to dust include the rate of deposition and / or the level of resultant dustiness. Nuisance may be alleged when the dust coverage on surfaces is visible in contrast with other cleaner areas, especially if the coverage occurs regularly. Severe nuisance is likely to be alleged when dust is perceptible without reference to a clean surface. Complaints about dust may occur when the monthly deposition rate is about 2.5 times the median rate, and are likely if the monthly rate is about 3.5 times the median rate [2].

2.2.2 Previously, some Mineral Planning Authorities (MPAs) have accepted a deposition rate of 200 mg/m^2/day as a default guideline for residential areas and at the edge of towns, above which level the need for cleaning is said to become excessive.

[1] DEFRA Local Air Quality Management Technical Guidance LAQM.TG[09], February 2009

[2] Vallack HW and Shillito DE, 1998, *Suggested Guidelines for Deposited Ambient Dust*, Atmospheric Environment **30**, pp2737-2744

2.2.3 The onset of potential nuisance due to soiling is generally considered to occur when the daily effective area coverage exceeds 0.5% at a sensitive property. The effective are coverage (EAC) is a measure of the degree of soiling visible to the eye, and will depend on the quantity of dust and its colour which will determine visibility on a surface.

2.3 Planning Controls

2.3.1 Guidance to MPAs is set out in a series of Minerals Policy Statements, with details with respect to environmental effects outlined in MPS2[3]. Modern planning consents for surface mineral workings and associated processes feature conditions to prevent or control environmental impacts. Invariably, these now include conditions relating to airborne dust, in accordance with guidance provided in Annex 1 of MPS2. Although a deposition rate has been suggested below which it is unlikely that dust will constitute a nuisance, current guidance is to the effect that it is inadvisable to set definitive standards or guidelines by condition. The essence of the guidance is the control of emissions through good site management.

2.3.2 Accordingly, it is the practice of MPAs to set conditions relating to the control of dust at source. Typically these include a requirement to submit for approval a scheme of measures for the management of dust emissions. MPAs may also require the submission of a programme for monitoring dust emissions.

2.4 Pollution Control

2.4.1 The extraction processes to be carried out at Wasing Estate do not include potentially polluting activities that fall within the Environmental Permitting regime, for example size-reduction of minerals (crushing) or concrete batching. An Environmental Permit will be required in respect of the inert filling operations during the restoration works. Environmental Permits relating to waste management typically include conditions addressing air quality including dust emissions. During the period of the licence the Environment Agency (EA) will ensure that the licenced activities are carried out in accordance with the conditions and do not cause nuisance, pollution of the environment or harm to human health.

2.5 Environmental Management System (EMS)

2.5.1 Lafarge has implemented an accredited EMS across all of the company's UK sites, and which will be implemented at the Wasing Estate site. The control of dust and air quality impacts forms an integral part of the EMS. This accords with PGN 3/8 (04) which notes the desirability of a structured approach to environmental management.

[3] Office of the Deputy Prime Minister (ODPM), Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, 2005

3 Methodology

3.1 Scope of the Assessment

3.1.1 The assessment has been undertaken in accordance with the framework outlined in current guidance for minerals and related operations[4]. The principal aspects identified as requiring consideration during the assessment were:

- **fugitive dust emissions**: nuisance dust and fine particulate matter (PM_{10}) arising during construction and operational phases;
- **vehicle exhaust emissions**: potential impacts of HGV exhaust emissions (NO_2 and PM_{10}) on local air quality during the operation phase.

3.1.2 The mineral planning authority is West Berkshire Council. In undertaking the revised air quality assessment, SGP undertook the following activities:

- site visit to view the proposed site,
- walkover of the surrounding area to confirm the current site setting,
- site visit to nearby, similar operations at Midgham Quarry,
- review of baseline air quality and weather conditions,
- assessment of dust and traffic emissions,
- provision of recommendations for mitigation, and
- assessment of residual effects.

3.1.3 The site visit was undertaken by K Hawkins, Partner, SGP on 16th August 2011. The weather was dry, warm and slightly breezy with some cloud cover.

Nuisance Dust

3.1.4 A semi-qualitative assessment of the impacts of fugitive dust on potentially sensitive receptors has been undertaken taking into account meteorological data, topography, site activities, screening and proximity to receptors.

Road Traffic Emissions

3.1.5 The impact of traffic emissions has been assessed using Version 1.03 of the Design Manual for Roads and Bridges (DMRB) screening model which has been developed to predict the distribution of key pollutants from vehicles. The use of the model is recommended in DEFRA guidance provided to Local Authorities in undertaking air quality assessments [6].

[4] OPDM: Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Appendix C: Dust Assessment

3.2 Identification of Receptors

3.2.1 The assessment has predicted air quality impacts upon a range of representative receptors. In identifying potential receptors to be considered in the assessment reference has been made to Environment Agency[5] and DEFRA[6] guidance. Potential receptors have been considered on the following basis:

Table 3.1: Identification of Receptors

Human Receptors	
Houses / groups of houses	identified based on distance from site boundaries, operational areas and haulage distances, sensitivity and likely duration of exposure
Schools, hospitals, shops, factories	
Public rights of way, recreational areas	
Allotments	
Conservation Sites	
SPAs, SACs and RAMSAR sites	within 1 km of site boundaries
SSSIs, National Nature Reserves, Local Nature reserves, local wildlife and ancient woodland	

Nuisance Dust

3.2.2 The impact of fugitive dust at a receptor will depend on the inherent sensitivity of the receptor and the perception of the acceptability of the effects of dust. Receptors may vary in their sensitivity to nuisance dust as follows:

Table 3.2: Sensitivity of receptors to nuisance dust (MPS2)

sensitivity		
high	**medium**	**low**
hospitals and clinics	schools	farms
retirement homes	residential areas	light and heavy industry
hi-tech industries	food retailers	outdoor storage
painting and furnishing	glasshouses and nurseries	
food processing	horticultural land	
painting and furnishing	offices	

3.2.3 Large dust particles, which make up the greatest proportion of dust emitted from mineral workings (>30 µm), will largely deposit within 100m of the source. Intermediate sized particles (10-30 µm) may travel up to 200-500m. Adverse impacts due to fugitive dust from surface mineral sites are therefore uncommon at distances greater than 250m from the source and, as advised in MPS2, residents concerns are most likely to be experienced within 100m of the dust source. As the proposed activities at the site do not include any processing operations the dust assessment only considers potential receptors within 250m of the application site.

[5] Environment Agency Horizontal Guidance Note EPR–H1 Environmental Risk Assessment, March 2008

Road Traffic Emissions

3.2.4 For AQS pollutants sensitive receptors are defined as those where members of the public are regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. For buildings the location of relevant exposure is taken as the building façade nearest to the source.

3.2.5 The DMRB model for assessment of air quality impacts from traffic indicates that only properties within 200m of the source are considered relatively vulnerable. The assessment of traffic emissions therefore only considers potential receptors within 200m of the site entrance and key road access network.

3.3 Significance Evaluation Methodology

3.3.1 A range of approaches and methods are described in the guidance for determining whether air quality effects of a development are significant. The significance evaluation methodologies for nuisance dust and road traffic emissions are derived from relevant DEFRA (TG09), EPUK[7], IAQM[8] and ODPM (MPS2) guidance.

Nuisance Dust

3.3.2 For fugitive dust emissions the assessment for each representative receptor takes into account the likely activities and duration, distance over which impacts may occur, degree of screening afforded at the time, and long-term frequency of wind directions.

3.3.3 The probability that dust, and wind blown dust, will be carried towards receptors is based upon the frequency of winds, as follows:

Table 3.3: Indicative Estimate of Probability of Nuisance Dust Impact

probability of impact	frequency of winds blowing towards receptor
negligible	<5%
low	5-10%
medium	10-20%
high	>20%

3.3.4 The magnitude of potential impacts is estimated by reference to the level of screening by vegetation, bunds etc., together with judgements of the emission strength and distance to the receptor; screening effects are estimated as follows:

6 Local Air Quality Management Technical Guidance LAQM.TG[09]: DEFRA (February 2009)
7 EPUK: Development Control: Planning for Air Quality (2010 Update)
8 IAQM: Position on the Description of Air Quality Impacts and the Assessment of their Significance, 2010

Table 3.4: Indicative Estimate of Magnitude of Nuisance Dust Impact

	source - receptor distance			
Screening	**0-100m**	**100-250m**	**250-500m**	**>500m**
no screening	large	medium	small	small / imperceptible
partial screening	medium	small	small / imperceptible	imperceptible
full screening	small	small / imperceptible	imperceptible	imperceptible

3.3.5 The impact significance for each receptor is assessed taking into account the probability of impact and magnitude of impact, as detailed below:

Table 3.5: Impact Significance Matrix for Nuisance Dust

probability of impact	**impact magnitude - change in concentration (adverse)**			
	large	**medium**	**small**	**imperceptible**
high	substantial	moderate	slight	negligible
medium	moderate	moderate	slight	negligible
low	slight	slight	negligible	negligible
negligible	slight	negligible	negligible	negligible

Note: risk matrix derived from guidance provided by EPUK and IAQM

3.3.6 Once the impact has been described at each specific receptor the overall significance of the air quality impacts is assessed. The overall assessment takes into account a number of aspects, including the number of properties / people affected, potential duration of the impact, and the nature of the source.

Fine Particulate and Nitrogen Dioxide Emissions

3.3.7 The magnitude and significance of the potential effects of PM_{10} emissions from traffic or general quarry activities upon air quality are assessed through reference to guidance issued by the IAQM and EPUK. The guidance provides an approach for defining the magnitude of changes and describing the air quality impacts at specific receptors, and is also used for NO_2 with respect to quarry traffic.

3.3.8 The magnitude of an impact at a receptor is described as follows, based on the change in concentration of a pollutant brought about by the scheme as a percentage of the assessment level:

Table 3.6: Definition of Impact Magnitude

magnitude of impact	**description**
large	increase / decrease in predicted concentration > 10% of the assessment criterion
medium	increase / decrease in predicted concentration 5 – 10% of the assessment criterion
small	increase / decrease in predicted concentration 1 – 5% of the assessment criterion
imperceptible	increase / decrease in predicted concentration <1% of the assessment criterion

Note: the use of 1% criterion for an 'imperceptible' change is consistent with the screening method described by the EA in their H1 Risk Assessment Guidance

3.3.9 The probability of impact is assessed on comparison of the resulting predicted concentration with the concentration with or without the scheme as follows:

Table 3.7: Probability of Impact

probability of impact	**description – absolute concentration in relation to objective / limit value**
	increase / decrease with scheme
high	above objective / limit value *with* / *without* scheme
medium	just below objective / limit value *with / without* scheme (90-100% of the assessment level)
low	below objective / limit value *with /without* scheme (≤75% of the assessment level)
negligible	well below objective / limit value *with / without* scheme

3.3.10 The predicted impact at each relevant receptor is assessed taking into account the probability of impact and the magnitude of impact as detailed above in the preceding Table 3.5.

3.3.11 Once the impact has been described at each specific receptor the overall significance of the air quality impacts is assessed. This takes into account a number of aspects, including but not limited to, the number of properties / people affected; whether or not an exceedance of an objective or limit value is predicted; the extent to with which an objective or limit value is exceeded and the degree of uncertainty.

4 Baseline Conditions

4.1 General Site Setting

4.1.1 The site is located in a rural setting with the village centres of Aldermaston 412m to the southeast, and Woolhampton 600m to the northwest beyond the River Kennett. Arable farmland land lies to the immediate east, west and south of the site. To the north lie wetlands associated within the floodplain around the confluence of the River Kennett to the north and the River Enbourne which bisects the site. To the south beyond Wasing Lane, lies Wasing Park, and to the west, beyond Station Road, lies an area of previous sand and gravel extraction, Woolhampton Quarry. Scattered residential properties lie in the vicinity of the site as detailed in Section 6 and shown on Drawing D01.

4.1.2 The A340 Basingstoke Road runs northeast-south to the immediate east of the site and the A4 runs east-west 285m to the north of the site beyond the River Kennett.

4.1.3 The site occupies gently undulating agricultural land currently primarily under arable uses. The fields are generally large and open, with boundary hedges, and scattered trees or copses. An airstrip is located in the southern part of the estate boundary.

4.1.4 Footpath FP10 runs at present in a southeast direction from Station Road across the western part of the site towards Wasing Lower Farm.

4.2 Wind Speed and Direction

4.2.1 Wind roses for the Meteorological Office weather station at Heathrow, which lies about 50 km to the northwest of the site, and forms the closest appropriate weather station, for the period January 1986 to December 1995, are attached as Appendix A. Given the relatively undeveloped nature of the area surrounding the site the data is considered appropriate. The wind roses depict percentage wind speeds and directions for the whole year and for the summer season when conditions tend to be drier and therefore potentially dustier. Data derived from the wind roses are summarised in the following table.

Table 4.1 Summary Wind Data, Heathrow

Direction	Annual percentage occurrence		Summer percentage occurrence	
	All winds	Winds >10 knots	All winds	Winds >10 knots
N	11	1	12	0
NE	9	2	8	1
E	7	1	6	2
SE	6	1	4	0
S	15	3	14	2
SW	23	6	25	5
W	16	2	18	2
NW	9	1	11	0
Calm / Variable	2	-	2	-

Note: Annual “All winds” % occurrence does not total 100 due to rounding

4.2.2 The data show that, as an annual average, winds predominate in an arc from the south to th west, accounting for 54% of all winds.

4.2.3 Winds greater than 10 knots (5 m/s) blow from the south to west for 11% of the time annually. Wind speeds in excess of 10 knots are important as the onset of potentially significant airborne dust emissions due to wind-raising of loose dry dusts from bare ground and stockpiles.

4.2.4 During the summer months, taken as June to August, the wind distribution skews further towards the west with a corresponding reduction in winds from the east. There is a small reduction in the frequency of winds greater than 10 knots, with those from the southwest quadrant blowing for 9% of the season.

4.3 Air Quality Review

4.3.1 Reference has been made to the reports prepared by WBC in fulfilment of the Local Air Quality Management (LAQM) reporting requirements, including the 2009 Air Quality Updating and

Screening Assessment. WBC has not declared any AQMAs in the vicinity of the site or road access network.

4.4 Interpolated Airborne Pollutant Concentrations

4.4.1 The mapped LAQM background data for 2011 for the grid squares covered by the quarry and access roads are summarised in the following table:

Table 4.2: Summary Background Air Quality Data

Location	NGR	Mean pollutant concentration (µg/m^3)			
		NO_2	NO_x	PM_{10}	$PM_{2.5}$
		2011	2011	2011	2011
west	457500 165500	8.9	11.6	15.1	9.1
northwest	457500 166500	10.4	13.9	15.3	9.4
east + access	458500 165500	9.3	12.2	15.4	9.2
northeast	458500 166500	10.5	14.0	15.0	9.4
average		9.8	12.9	15.2	9.3
% AQS objective		24.4%	43.0%	38.0%	37.2%

4.4.2 The data indicate that in 2011, the key pollutant concentrations are all predicted to be substantially less than the respective AQS mean objectives.

4.5 Monitored Air Quality

4.5.1 WBC carries out diffusion tube monitoring for NO_2 at 33 locations within the district and at one automatic monitoring site within Newbury. The nearest monitoring to the site is undertaken at 37 The Street, Aldermaston (NGR: 459102 165126) as shown on Drawing D01 and provides the only monitoring data within the vicinity of the site and associated transport routes. No monitoring for NO_2 is undertaken along the proposed HGV transport route to the north of the site. This monitoring location represents a 'roadside' location being 1.25m from the nearest kerb. Annual average NO_2 results for 2009 and 2010 (bias adjusted) were 25.45 µg/m^3 and 25.83 µg/m^3, both below the air quality objective[9].

4.5.2 Monitoring of PM_{10} is not undertaken within the district.

4.6 Dust Deposition

4.6.1 Typical dust deposition rates range from 10 to 50 mg/m^2/day in rural areas, 30 to 80 mg/m^2/day in suburban areas and 80 to 160 mg/m^2/day in town centre or industrial areas.

4.6.2 The site setting is rural, with a trunk road to the east. The surface soils are generally sandy and will be potentially dusty during dry weather. Potential dust sources in the area include the busy

[9] West Berkshire Council, data provided by WBC

transport corridor to the east and agricultural operations on the light soils. These factors suggest that dust deposition rates in the area may lie in the middle of the above range, i.e. about 30 mg/m^2/day. In accordance with Section 2.2 therefore nuisance due to dust could arise if dust deposition exceeding about 70-100 mg/m^2/day were to occur on a sustained basis at a neighbouring property.

4.7 Other Activities

4.7.1 Apart from agriculture, and traffic on the A340, no other potentially significant sources of air pollutants have been identified in the vicinity of the site.

5 Proposed Development

5.1 General Site Description

5.1.1 Full descriptions of the quarrying and associated processes are provided in the planning application and only those aspects of relevance to dust and air quality are described here.

5.1.2 The site office, welfare facilities, car park and weighbridge will be established in the eastern part of the site and will be accessed via an internal hard surfaced road from the A340.

5.1.3 The quarry will be worked in three phases over a period of about 12 years with a further 4 years to complete restoration by infilling. The anticipated output is 200,000 tonnes per year. Prior to mineral extraction surface soils will be stripped and used to create screen banks on some of the perimeters of the extraction areas. Extraction will commence in Phase A in the southwest corner of the site and progress to Phase B in the north and then Phase C in the east. The total extraction area amounts to about 46.5ha. In order to maintain operations through the winter period, small parts of Phase A will be active each year beyond the principal working / infilling period.

5.1.4 Existing footpaths across the site will be temporarily diverted.

5.1.5 The soils and overburden average about 1.3m in depth and the mineral deposit ranges up to 4.3m in depth. The deposit comprises generally silty sand and gravel with occasional substantial lenses of peat, silt and clay. In Phases B and C the water level typically lies within 1m of the ground surface and dewatering will be necessary during mineral operations.

5.1.6 Soils, overburden and mineral will be excavated by hydraulic excavator directly loading articulated dump trucks. Where necessary, the workings will be de-watered by pumping in advance of the extraction. Occasionally excavated mineral will be temporarily stockpiled on site awaiting off-site transportation.

5.1.7 There will be no processing plant operational at the quarry in association with this application.

5.1.8 Restoration to agriculture (Phase A) will be carried out immediately behind the excavation face by filling with overburden and imported inert materials and replacing the soils to original ground levels. Phase B will be restored to agriculture and a lake with wet grassland and Phase C to agriculture. Reclamation material is tipped directly from articulated lorries into the void and then spread and compacted by a small bulldozer.

5.1.9 Aggregates will be distributed by road transport and access to the quarry is to be at a new access point off the A340 Basingstoke Road. A fully surfaced road will provide access to the weighbridge. It is estimated that there will be approximately 80 vehicle movements a day (40 in / 40 out) for mineral extraction, and a similar number for infill. All HGV vehicles departing the site with mineral will travel northwards on the A340 to the A4 via Aldermaston Wharf and thence to Beenham. It is anticipated that at least 50% of HGV movements will be on a back-haul basis resulting in a total 120 movements per day (60 in / 60 out). The remaining 50% of infill HGV movements are expected to be from the south via Aldermaston resulting in 40 movements (20 in / 20 out) via this route.

6 Assessment of Impacts – Airborne Dust

6.1 General Observations

6.1.1 Airborne dust occurs when fine particles are disturbed and loosened by physical activity such as breaking, excavating, loading, tipping and transport, or by an airstream passing over such materials. Dust is defined as having particles sizes in the range 1 to 75 µm. Wind speeds greater than 10 knots (~5 m/s) across loose fine materials can cause windblown dust emissions.

6.1.2 Light winds will transport fine particles already suspended in the atmosphere due to disturbance. In calm conditions, any raised dust tends to settle out in the vicinity of the source. In windier conditions, the dust may be carried for a greater distance before settling out. The distance the dust will be carried depends on the wind speed, the particle size, the topography of the site and its surroundings.

6.1.3 Guidance for the minerals industry[10] states that large dust particles, greater than 30 µm, which constitute the greatest proportion of dust emitted from mineral workings will largely deposit within 100m of the source. Finer particles, which constitute a small proportion of the dust emitted from most operations, are only deposited slowly, although their concentrations decrease

[10] *The Environmental Effects of Dust from Surface Mineral Workings*, DoE, 1995

rapidly from the source due to dispersion and dilution. It is however uncommon for adverse impacts due to dust from sand and gravel quarries, or associated processes, to be experienced at distances greater than 250m from the source.

6.2 Sources of Dust

6.2.1 The principal potential sources of airborne dust associated with the quarrying operations at Wasing Estate include:

- soils stripping, storage and restoration,
- overburden excavation, storage and restoration,
- mineral excavation and handling,
- loading and tipping,
- site haulage,
- road transport,
- wind blow across bare ground and stockpiles,
- inert waste handling.

6.2.2 Stripping, stockpiling and replacing soils will be required to be carried out when the soils are friable. The soils in the area are silty and potentially dusty. Dust emissions could therefore be generated, and these could have an adverse effect when operations take place close to, and the wind blows towards, the site boundaries. However the duration of any impacts will be reduced by the need to strip or restore only a small area at any one time and will be short-lived within any locality. Dust emissions from soil striping are unlikely to be significantly different in terms of potential dust generation compared to agricultural operations such as cultivation and harvesting.

6.2.3 The overburden is sandy but heavier and generally more cohesive than the soils. Consequently, dust emissions will tend to be less significant. The silt, clay and peat lenses within the mineral deposits will be naturally moist and will be unlikely to produce dust. All such materials will be placed directly in the void space behind the working face. Double-handling will therefore not take place thus reducing further the impacts. These operations are unlikely to cause significant airborne dust emissions.

6.2.4 The mineral deposits will be dewatered ahead of extraction, but will remain moist. Significant dust emissions from the extraction processes are unlikely to occur. Moisture levels will increase as the excavations approach the water table which is within 1m of the starting ground level in Phases B and C. Freshly dug mineral is therefore likely to damp and unlikely to give rise to dust although drying of exposed sand surfaces could be rapid in warm dry weather.

6.2.5 The inert waste which is to be backfilled will typically comprise excavation and demolition arisings from construction sites. Concrete, bricks and rubble are expected to have been removed at source, in accordance with Environment Agency requirements, and the resulting materials tend to be heavy and cohesive will little tendency to generate dust. The potential for significant dust generation during back-filling operations is therefore low.

6.2.6 Loading and tipping, particularly those involving soils and imported back-fill, can lead to dust emissions if care is not taken to minimise drop heights. These may have an occasional impact near the site boundaries.

6.2.7 Site haulage is potentially the greatest source of fugitive dust on mineral sites. Due to the size of the site, the haulage distances for mineral and imported back-fill will be considerable and, in the absence of adequate mitigation, could result in the prolonged generation of visible dust. Where this occurs close to site boundaries adverse impacts are likely to occur.

6.2.8 Wagons carrying sand and gravel out of the site will be sheeted. In wet conditions vehicles may leave track-out on the access road leading to dust emissions in dry conditions. However, the length of the surfaced access road will reduce the scale of any impact at the site entrance.

6.2.9 Stockpiles of mineral will be kept to a minimum and will typically be damp.

6.2.10 The amount of stripped ground at any one time will be kept to a minimum and possible impacts will be further reduced by the heavy overburden. However, any disturbance at the surface could result in the release of wind blown dust and which might be carried towards sensitive boundaries. Further wind blown dust could be generated from the surfaces of newly constructed haul roads and soil bunds. As the bunds will generally be located near the site boundaries as amenity or screening bunds, any wind blown dust may be carried towards any property near the boundaries.

6.2.11 Saltation, the migration of particles by bouncing across firm surfaces, may occur in windy conditions along the access road. However the downwind side of the access road will be largely screening by the existing hedgerows and a 3m high soil screening bund and any sand blowing from the quarry surfaces is most likely to be trapped by the foliage at ground level within the surrounding vegetation. Impacts due to saltation are therefore unlikely to be significant.

6.2.12 In summary, in the absence of mitigation measures, the most significant source of airborne dust is site haulage. Soil and inert waste handling, haulage of incoming back-fill, track-out carried by waste vehicles on to the access road and wind blow across stripped ground and soil bunds provide moderately significant sources of dust.

6.2.13 To assist in preparation of the assessment a site visit was undertaken to Midgeham Quarry, where similar operations to those proposed at Wasing Estate are presently undertaken. At the time of the site visit stockpiled material was being loaded into dump trucks. No visible dust emissions were observed from either the loading or haulage and track-out was not evident on the main highway. Residential properties are located in close proximity to the site. SGP was advised that dust complaints had not been received from these properties.

6.3 Assessment of Impacts

6.3.1 Potentially sensitive properties and landuses that are representative of the local community within 250m of the extraction and access road areas at Wasing Estate are noted in the following table, together with their distance and direction from the nearest source of principal potential quarry sources of emissions to the atmosphere:

Table 6.1: Representative Potentially Sensitive Receptors

Ref	Receptor	Type	Minimum distance and direction to working areas	Nearest potential source	Existing Screening
DR1	Malthouse Cottages	residential	86m N-NW 385m NNW	access road Phase C	partial (low hedgerow)
DR2	allotment gardens	horticultural activities	203m NNW	access road	full (trees & hedgerows)
DR3	White Tower Nursery	nursery	150m N-NW 327m NNW	access road Phase C	partial (hedgerows, trees & Malthouse Cottages)
DR4	Dolphin Close	residential	225m NW	Phase C	partial (hedgerows)
DR5	Aldermaston C of E School	school	214m NW	Phase C	partial (hedgerows)
DR6	Wasing Lodge	residential (isolated)	152m N	Phase C	partial (hedgerows)
DR7	Wasing Lower Farm	farm buildings / commercial	240m NW 230m NE	Phase A Phase C	partial (hedgerows, trees)
DR8	airstrip	leisure	30m W-N 30m E-NE	Phase A Phase C	none / partial none / partial
DR9	Bottle Cottage	residential (isolated property)	130m NW-W	Phase B	partial (hedgerow)
DR10	Sewage Treatment Works	industrial	30m SE	Phase B	partial (woodland)
DR11	Hill Foot Farm	residential	220m S-SW	Phase B	full (dense woodland)

Ref	Receptor	Type	Minimum distance and direction to working areas	Nearest potential source	Existing Screening
DR12	Woolhampton Reed Beds	nature conservation	214m S-SE	Phase B	full (dense woodland)

6.3.2 The identified receptors are shown on Drawing D01. Other potentially sensitive receptors are either more than 250m distant from the site boundaries or are effectively subsumed by the locations identified above. Residential properties within Woolhampton, at Wasing Lower Farm to the south and Shalford Lodge to the southwest all lie beyond 250m of the boundary of the extraction, haul road and access road areas. Other than those on Dolphin Close, all residential properties within Aldermaston lie beyond the 250m boundary.

6.3.3 The boundary of Aldermaston C of E Primary School lies 225m distant from the boundary of the southern edge of Phase C. By reference to Table 3.2, no other high sensitivity receptors have been identified within the 250m boundary. The residential and other receptors are classified as medium sensitivity, with the agricultural land and sewage treatment works adjacent to the site, and the farm buildings at Wasing Lower Farm within 250m of the extraction area boundary, being of low sensitivity.

6.3.4 A public footpath crosses the site and will require temporary diversion around the workings. Parts of public roads (Wasing Lane and Station Road) lie within 250m of the boundary of Phases A, B and C. Both are reasonably well screened by hedgerows along these stretches.

6.3.5 A Site of Special Scientific Interest (SSSI), Woolhampton Reed Beds, is located 214m to the north of the site, beyond the River Kennett and railway line. The site is listed as a consequence due to its' notable nesting birds and diversity of insects. The site is fully screened by extensive woodland present and it is considered that the quarry proposals would have no significant effect in terms of air pollution or dust deposition at the SSSI. There are no other designated wildlife or conservation interests likely to be affected by the proposals with respect to air quality.

6.3.6 In the absence of mitigation measures, the probability of dust being carried towards the key potentially sensitive receptors, and the probability of wind-raised dust being generated, based on the wind data for Heathrow, has been assessed in accordance with Section 3. In practice, the probability of winds carrying dust may be reduced particularly outside the summer months, when rainfall can be typically expected to suppress fugitive dust emissions over more than one third of the time. Assessment results are summarised as follows:

Table 6.2: Summary Estimated Risks (in absence of mitigation)

Receptor	Magnitude of Impacts	Operational Dust		Wind-Raised Dust	
		Probability	Risk	Probability	Risk
DR1	medium	high	moderate	negligible	negligible
DR2	small	low	negligible	negligible	negligible
DR3	medium	high	moderate	negligible	negligible
DR4	medium	low	slight	negligible	negligible
DR5	medium	low	slight	negligible	negligible
DR6	small	high	slight	negligible	negligible
DR7	small	high	slight	negligible	negligible
DR8	large	high	substantial	low	slight
DR9	small	medium	slight	negligible	negligible
DR10	medium	low	slight	negligible	negligible
DR11	imperceptible	high	negligible	low	negligible
DR12	imperceptible	high	negligible	low	negligible

Note: assessment based on distance of receptor to nearest working area of site, including the site access road

6.3.7 A substantial risk of significant nuisance impact is predicted at the air strip, with a slight risk of adverse impacts dust to wind-blown dust. The air strip lies within 30m of the Phase A and C extraction areas within the boundary of Wasing Estate and there is presently limited screening. The proposals include provision of a 3-4m high topsoil screening bund between the airstrip and Phases A and C which will serve to reduce potential impacts on the airstrip.

6.3.8 A moderate risk of significant nuisance impact is predicted at the Malthouse Cottages and White Tower Nursery in the absence of mitigation. Malthouse Cottages, beyond which lie the White Tower Nursery, form the nearest properties to the site access road and could be affected by dust raised by drying track-out on the access road and escaping from haulage of unsheeted incoming loads. Malthouse Cottages lie at the end of the access road which is some 200m long, by which point the potential impact of track-out will be minimal. The majority of back-fill will tend to be more cohesive soils and the prevailing winds will carry the majority of any airborne dust away from the properties. However, haulage will take place over the life of the quarry and care will be required to ensure that even minor impacts do not persist.

6.3.9 A slight risk of significant nuisance impact is predicted at Aldermaston C of E School, Dolphin Close, Wasing Lodge, Wasing Lower Farm and Bootle Cottage, without any use of specific dust control measures. Given the nature of the quarry operations and damp nature of the extracted materials the risk of significant impacts, in the absence of mitigation, is likely to be limited to sustained periods of dry weather. The proposals however include for provision of 3-4m high soil screening bunds around the southern and eastern boundaries of Phase C which will serve to reduce potential impacts on those properties located to the south of the site. The extent of

extraction operations in Phase B towards Bootle Cottage are dependant on the nature of the deposit in this area.

6.3.10 The risk from wind-blown dust affecting the above receptors under strong winds is considered to be negligible in all cases.

6.3.11 On the diverted FP10 footpath, should any of the potential sources give rise to visible dust upwind of the footpath, walkers could be exposed to the effects of dust. However, this will be reduced by the presence of trees and soil bunds providing screening along the eastern edge of Phase A and a soil screening bund along the southern edge of Phase 31b. People boating and walking along the River Kennett are unlikely to be affected by airborne dust at any time on account of the dense woodland between the site and river.

6.3.12 The A340 road passes the entrance to the proposed quarry. However the road is 385m distant from the extraction areas of the site at the closest point and therefore sources of dust are limited to drying track-out on the access road and A340 and escaping from the haulage of unsheeted incoming loads. As noted in para. 6.3.8 the potential for track-out is minimal given the length of the access road. The passage time for motorists will be brief and discernible impacts are unlikely to occur.

6.3.13 A sight risk of adverse nuisance impacts is predicted at the sewage treatment works (STW) to the immediate northwest of Phase B in the absence of mitigation measures. The STW is of low sensitivity.

6.4 Fine Particulates

6.4.1 PM_{10} will make up a small proportion of any dust emitted, but may travel 1,000m or more. Concentrations will however decrease rapidly on moving away from a source due to dispersion and dilution.

6.4.2 Very little data is presently available on potential PM10 concentrations in the vicinity of sand and gravel quarries. The wet sand and gravel extraction operations themselves are likely to give rise to negligible PM10 concentrations, the greatest potential source of PM10 being haul roads, soil stripping and earthworks. Guidance for air quality review and assessment suggests that sources such as quarries (undefined), stockpiles and landfill sites[11] could add up to 5 $\mu g/m^3$ to annual mean background PM_{10} concentrations at locations immediately local to the source, and up to 3 $\mu g/m^3$ within 200 to 400m of the source. Other studies of air quality around large quarries (undefined) have found a more likely range of around 2 $\mu g/m^3$ increase in PM_{10} concentrations.

[11] DEFRA *Review and assessment technical guidance*, LAQM.TG(02), 2002

6.4.3 Recent guidance on construction dust[12] indicates that the earthworks and haulage of a large construction site (>10 vehicle movements / day; total of >100,000 tonnes of material moved), and to which the site operations can be broadly compared, poses a high risk with regards to PM10 emissions to receptors within 50m, a medium risk to receptors within 200m and low risk to those beyond 200m, in the absence of mitigation.

6.4.4 Section 5.92E of LAQM guidance TG[09] outlines the updating and screening assessment process for fugitive and uncontrolled sources, including quarrying. PM_{10} is identified as the relevant pollutant and detailed assessment is required where relevant receptors (houses, schools, etc.) are within:

- 1000m where the background PM_{10} concentration is >28 µg/m^3
- 400m where the background PM_{10} concentration is >26 µg/m^3
- 200m for any background
- 50m of off-site roads used to access the site where the background PM_{10} concentration is > 25 µg/m^3

6.4.5 Given that the predicted background PM_{10} concentrations in the area of the site are <16 µg/m^3, a semi-qualitative assessment of PM_{10} concentrations with the quarry has been undertaken for those receptors within 200m of the site boundaries. There are no receptors within 50m of the site boundaries or access road. A worst case assessment has therefore been undertaken assuming a conservative 3 µg/m^3 contribution from the site to the background concentration for those receptors within 200m. The assessment has predicted the magnitude and probability of impact as detailed in Tables 3.6-3.7.

Table 6.3: Assessment of Potential Significance of PM10s from Quarrying (without mitigation)

ref	background concentration (µg/m^3)	potential increase (µg/m^3)	predicted concentration (µg/m^3)	% AQO	change in concentration	significance
worst case	15.6	3.0	18.6	46.5	medium increase	negligible

6.4.6 The worst case assessment predicts a negligible impact at the residential receptors within 200m of the site boundary (Malthouse Cottages, Bottle Cottages, Wasing Lodge and the plant nursery at White Tower Nursery) due to PM_{10} arising from quarry dust, in the absence of mitigation, and assuming a worst case level of emissions, and no attenuation between the site and receptors. The assessment makes no direct allowance for the reduction in PM_{10} emissions as a result of the suspension of agricultural activities on the site, and for emissions from traffic on the A340. Taking the above factors into account, there is no likelihood of significant increases in PM_{10} concentrations for local air quality as a result of the proposals.

[12] Institute of Air Quality Management (IAQM): Guidance on the Assessment of the Impacts of Construction of Air Quality and the Determination of their Significance, December 2011

7 Assessment of Impacts - HGV Exhaust Emissions

7.1 Vehicle Emissions

7.1.1 The principal pollutants of concern with quarry-related HGV exhaust emissions are fine PM_{10} and NO_2. It is estimated that there will be 120 HGV movements per day at the quarry (40 in / 40 out for mineral extraction; 20 in / 20 out for infill assuming a 50% back-haul). The development is to be served by a single access / egress point from Basingstoke Road. The maximum impacts due to quarry-related traffic may be experienced on the A430 Basingstoke Road to the east of the site and through Aldermaston Wharf. A proportion of the infill delivery (estimated as 40 one-way movements per day) will be via Aldermaston village to the south.

7.1.2 Traffic data for Basingstoke Road close to the proposed access point and the Basingstoke Road / Bath Road junction to the northeast has been provided by David Tucker Associates (DTA). Traffic data is not available for all the roads within Aldermaston, although it is considered Basingstoke Road forms the primary transport route through the village.

7.1.3 The impacts of post-development traffic emissions on existing and proposed receptors in 2011 and 2016 were estimated using the DMRB screening model[13], with interpolated baseline data from the LAQM website.

7.1.4 The receptors were chosen to provide a worst case assessment and are shown in Drawing D02 and detailed below.

Table 7.1: Details of DMRB Receptors

Receptor Ref	Receptor Type	Details	Road Links
TR1	residential	Malthouse Cottages	Basingstoke Road and site access
TR2	residential	nominal property in Aldermaston Village	Basingstoke Road
TR3	residential	nominal property in Aldermaston Wharf	Basingstoke Road
TR4	residential	nominal property at junction of Basingstoke Road / bath Road	Basingstoke Road and Bath Road

7.1.5 The pollutant concentrations at the receptors in 2011 and 2016, with and without development, were modelled using traffic flow data provided by DTA. The traffic flows on the relevant links utilised in the DMRB modelling are detailed below:

[13] Design Manual for Roads and Bridges, version 1.03, Highways Agency, 2007

Table 7.2: 2011 Traffic Flows

receptor	link	2011 without development		2011 with development		distance CL (m)	average speed (km/hr)
		AADT	% HGV	AADT	% HGV		
TR1	Basingstoke Road	9228	15.2	9268	15.6	7.5	80
	site access road	0	0	120	100	105	32
TR2	Basingstoke Road	9228	15.2	9268	15.6	4.82	40
TR3	Basingstoke Road	9228	15.2	9268	16.0	5.0	40
TR4	Basingstoke Road	7498	9.43	7639	11.01	29.0	32
	Bath Road East	23770	8.02	23770	8.02	27.0	32

Traffic data calculated from that provided by DTA; average speeds based on speed limits and site observations

Table 7.3: 2016 Traffic Flows

receptor	link	2016 without development		2016 with development		distance CL (m)	average speed (km/hr)
		AADT	% HGV	AADT	% HGV		
TR1	Basingstoke Road	9598	15.2	9638	15.6	7.5	80
	site access road	0	0	120	100	105	32
TR2	Basingstoke Road	9598	15.2	9638	15.6	4.82	40
TR3	Basingstoke Road	9598	15.2	9678	16.3	5.0	40
TR4	Bath Road East	24724	8.02	24724	8.02	29.0	32
	Basingstoke Road	7798	9.43	7939	10.39	27.0	32

7.1.6 The DMRB model estimates oxides of nitrogen (NO_x) levels, which are then converted into NO_2. An updated approach has been adopted for deriving NO_2 from NO_X for road traffic sources[14]. In accordance with TG[09] the 'NO_x to NO_2 calculator' provided on the LAQM website[15] has been used to provide a robust assessment of NO_2 concentrations resulting from traffic emissions in the vicinity of the site.

7.1.7 Given the current uncertainty regarding predicted decreases in background NO_2 concentrations[16], to provide a conservative assessment, the building façade concentrations have been calculated using the 2011 background NO_2 data for the grid squares in which the receptors are located (LAQM data) and 2011 traffic emissions data (contained within the DMRB model) for all model runs. PM10 concentrations have been estimated using the predicted LAQM data for the relevant year.

7.1.8 The output spreadsheets are attached as Appendix B and are summarised in the following tables.

[14] Deriving NO_2 from NO_X for Air Quality Assessments of Roads", Air Quality Consultants Ltd, 2006
[15] AEA, NO_x to NO_2 Calculator, Version 2.1, released 22 January 2010, published on DEFRA LAQM website
[16] Prepared for DEFRA, Trends in NO_x and NO_2 emissions and ambient measurements in the UK; 3rd March 2011, AEA, Kings College, London and University of Leeds

Table 7.4: Summary Mean Pollutant Concentrations, 2011

ref	receptor	mean pollutant concentration (µg/m^3)			
		without development		with development	
		NO_2	PM_{10}	NO_2	PM_{10}
TR1	Malthouse Cottages	19.06	16.86	19.29	16.90
TR2	Aldermaston	20.03	16.31	20.26	16.35
TR3	Aldermaston Wharf	22.08	16.87	22.50	16.93
TR4	Bath Road / Basingstoke Road junc.	23.01	17.43	23.47	17.50

Table 7.5: Summary Mean Pollutant Concentrations, 2016

ref	receptor	mean pollutant concentration (µg/m^3)			
		without development		with development	
		NO_2	PM_{10}	NO_2	PM_{10}
TR1	Malthouse Cottages	19.39	16.92	19.68	16.96
TR2	Aldermaston	20.41	15.88	20.69	15.92
TR3	Aldermaston Wharf	22.45	16.42	22.92	16.49
TR4	Bath Road / Basingstoke Road junc.	23.29	16.97	23.56	17.02

7.1.9 The modelled increases in post-development NO_2 and PM_{10} concentrations at the receptors are assessed in accordance with the guidance provided by EPUK[17] and are summarised below.

Table 7.6: Impacts of development in 2011

Receptor	Changes in Annual Mean Concentration (µg/m^3)		Magnitude of Change		Significance	
	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}
R1	+0.23	+0.04	imperceptible	imperceptible	negligible	negligible
R2	+0.23	+0.04	imperceptible	imperceptible	negligible	negligible
R3	+0.42	+0.06	small	imperceptible	negligible	negligible
R4	+0.46	+0.07	small	imperceptible	negligible	negligible

Table 7.7: Impacts of development in 2016

Receptor	Changes in Annual Mean Concentration (µg/m^3)		Magnitude of Change		Significance	
	NO_2	PM_{10}	NO_2	PM_{10}	NO_2	PM_{10}
R1	+0.29	+0.04	imperceptible	imperceptible	negligible	negligible
R2	+0.28	+0.04	imperceptible	imperceptible	negligible	negligible
R3	+0.47	+0.07	small	imperceptible	negligible	negligible
R4	+0.27	+0.05	imperceptible	imperceptible	negligible	negligible

[17] EPUK: Development Control: Planning for Air Quality. 2010 Update.

7.1.10 The modelled increase in post development NO_2 and PM10 concentrations in 2011 and 2016 at the existing receptors can be described as imperceptible to small, with small increases being predicted at residential properties along Basingstoke Road to the north of the site and at the junction with Bath Road.

7.1.11 The modelled concentrations of NO_2 and PM10 with the development are all 'well below' (<30 $\mu g/m^3$) the standard of 40 $\mu g/m^3$ and the significance of the impacts at all the receptors is therefore **negligible**.

7.1.12 The modelled concentration of NO_2 in Aldermaston in 2011 is lower than that measured over the 2009-2010 period at 20 $\mu g/m^3$ compared to 25 $\mu g/m^3$. This may be due to the lack of detailed traffic data for the junction at which the diffusion tube is located, and hence underestimation of the concentration by DMRB. However, the incremental increase in NO_2 concentrations due to the HGVs passing this route is estimated as 0.43 $\mu g/m^3$ (DMRB spreadsheet included in Appendix B) resulting in a small increase (in the range 0.4 – 2 $\mu g/m^3$) and a **negligible** impact (existing monitored concentration is below the objective).

7.1.13 In summary the modelling predicts negligible impacts on the residential properties located along the HGV transport routes to the north and south of the site due to HGV exhaust emissions.

8 Mitigation

8.1 Dust Control Methods

8.1.1 On account of their low impact, sand and gravel quarries do not fall under Environmental Permitting requirements. However, to minimise any potential impacts, it is recommended that the proposed quarry be operated in accordance with the guidance provided by DEFRA in PG3/8(04), *Secretary of State's Guidance – Quarry Processes*, and the Best Practice Guide appended to the *Environmental Effects of Dust from Surface Mineral Workings*[18]. These identify standard good working practices for the minimisation of dust emissions from minerals operations. The essence of the guidance is that dust emissions can be controlled by effective site management.

8.1.2 The principal potential source of airborne dust has been identified as site haulage. Additional impacts may also be caused by soils handling, back-filling with inert waste, haulage of inert waste, track-out carried out by waste vehicles on to the access road and wind blow across the stripped ground.

[18] Best Practice Guide, *Dust and Mineral Operations*, appended to *The Environmental Effects of Dust from Surface Mineral Workings*, DoE, 1995

8.1.3 Particular care will be required to ensure that visible dust emissions, which might be carried towards a sensitive boundary, do not occur. Standard good practices include:

- locating main haul routes towards the centre of the site;
- compaction, grading and maintenance of haul routes;
- setting an appropriate speed limit;
- fitting all vehicles and plant with upswept exhausts and radiator fan shields;
- even loading vehicles to avoid spillages;
- regular removal of spilled material from haul routes; and
- dust suppression by regular spraying in dry conditions.

8.1.4 The potential impacts due to soils handling will be reduced by the minimisation of drop heights. If necessary during adverse winds, operations near sensitive boundaries will be suspended until conditions improve.

8.1.5 The potential impacts due to back-filling will also be reduced by the minimisation of drop heights. Loose dusty rubble will be damped prior to tipping and will be covered immediately by more cohesive materials. Incoming loads will be sheeted to minimise any impacts on the public highway.

8.1.6 Any deposits on the access road will be removed by the regular deployment of a road sweeper. If required during sustained dry periods, or when deemed necessary by the site manager due to excessive dust being generated, the access road will be maintained in a damp condition by bowser.

8.1.7 Wind blow across stripped ground will be controlled by ensuring only the minimum area is open at any one time. The formation of a surface crust will be prompted by the avoidance of its subsequent disturbance. During periods of prolonged dry windy weather, consideration will be given to the application of a soil stabiliser to any areas likely to remain bare temporarily and if likely to generate significant dust.

8.1.8 To minimise wind blow from soils bunds, these will be shaped to give smooth profiles and their surfaces will be consolidated to reduce the availability of fine material. The bunds will be seeded at the earliest possible opportunity to establish rough grass cover.

8.1.9 Other more general matters and the management of the site can affect the likelihood of significant dust emissions. These include:

- use of water for dust suppression, to avoid re-circulating fine materials;
- high standards of house-keeping to minimise track-out and wind blown dust,

- a preventative maintenance programme, including readily available spares, to ensure the efficient operation of plant and equipment, including fixed and mobile dust suppression plant, and
- effective staff training in respect of the causes and prevention of dust.

8.1.10 The measures for dust avoidance, suppression and control will be set down in a dust management scheme for agreement with the MPA. The scheme will accord with DEFRA guidance and Lafarge Aggregates Environmental Management System. The Quarry Manager will refer to the planning conditions and dust management scheme, to determine his response to potential or actual dust emissions, taking into account current and forecast weather conditions and operational plans.

8.1.11 The foregoing standard good working practices and additional mitigation measures are generally accepted by DEFRA and the surface minerals industry as providing effective protection against airborne dust. Their adoption will ensure that operation of the quarry will not cause unacceptable impacts due to airborne dust emissions at any property in the vicinity of the site.

8.1.12 The mitigation of fine particulates emissions will be achieved primarily by means of the standard mitigation measures for general dust outlined above. Guidelines for the anticipatory measures to prevent the onset of dust generation are set out further below, together with a monitoring regime for the site.

8.1.13 No additional measures are required in respect of HGV exhaust emissions.

9 Residual Effects and Conclusions

9.1 The foregoing standard good working practices and additional mitigation measures are generally accepted by the Government and the surface minerals industry as providing effective control against the impact of airborne dust.

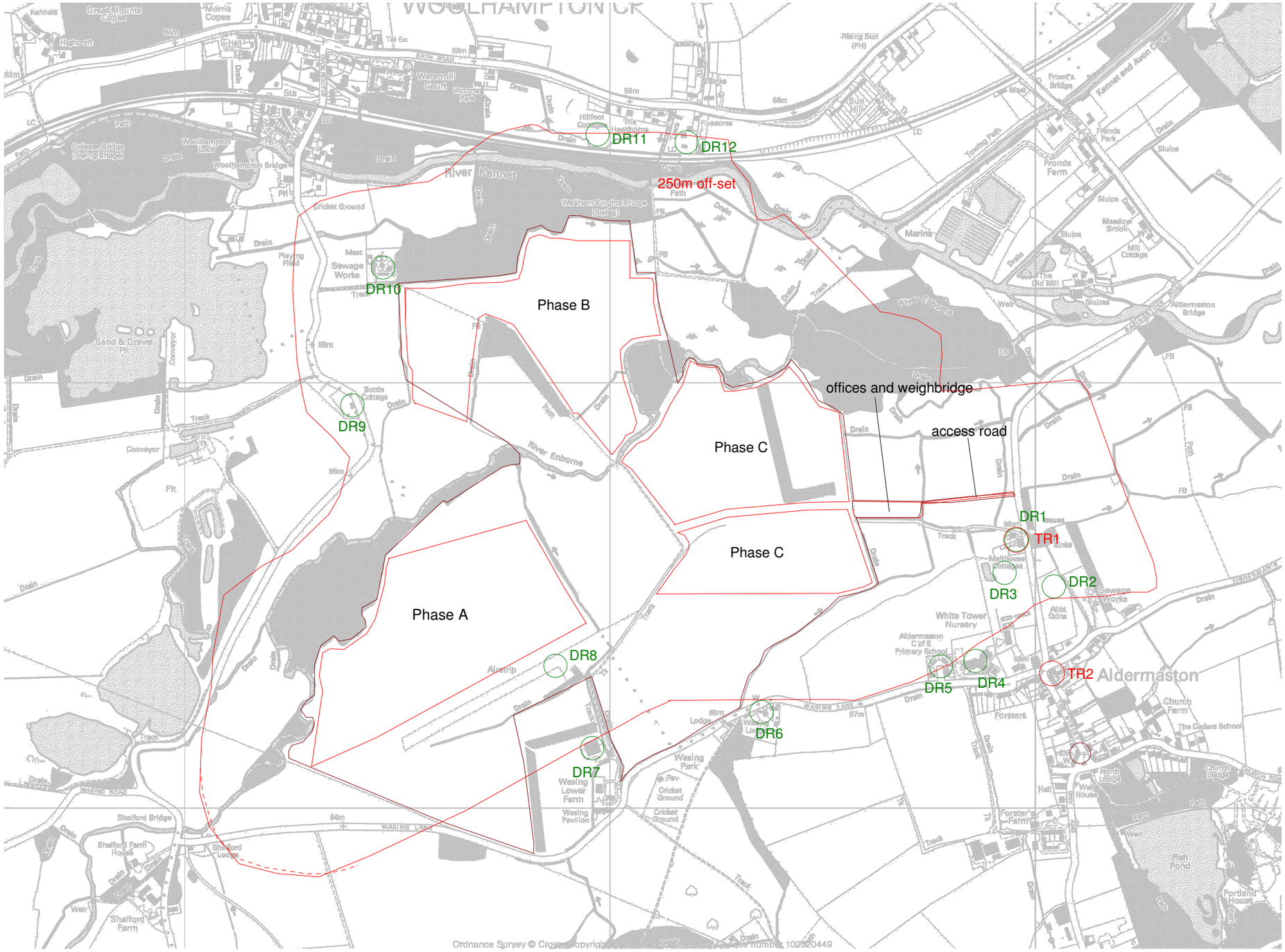
9.2 The proximity of the small airstrip to the extraction areas in the south inevitably means that the airstrip will remain at slight risk of dust deposition in the event of dry conditions and strong winds from the relatively infrequent northerly to easterly directions although the proposed soil bunds will reduce any impacts.

9.3 Overall, with the maintained application of standard good practices, the residual risk of adverse effects outside the site due to dust will be slight or negligible at all receptors. Similar risks are considered to be present in any case as a result of the intensive arable farming taking place in

the area, and potentially dry dusty conditions that are likely to exist in the area during warm dry weather.

9.4 Other effects, associated with PM10, Pm2.5 and HGV exhaust emissions have been shown to be either in compliance, or are likely to comply, with the respective AQS objectives.

DRAWINGS



N

Wasing Estate boundary

Operational area boundary

250m off-set of operational area boundary (including access road)

Dust receptors

DMRB Receptors

NO2 Diffusion Tube Location

Boundaries approximate; based on Illustrative Composite Operations Plan, 0702/W/CO 1, dated 19.01.12 provided by D K Symes Associates

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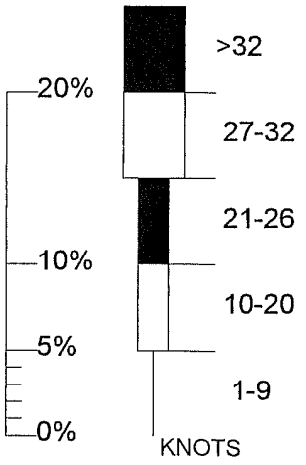
Project: Wasing Estate Woolhampton	
Drawing: Potentially Sensitive Receptors	
Drawn: KEH	Checked: AFS
Date: 19.04.12	Scale: 1:10,000 @ A3
Job No: R1619	Drg No: D01rev2

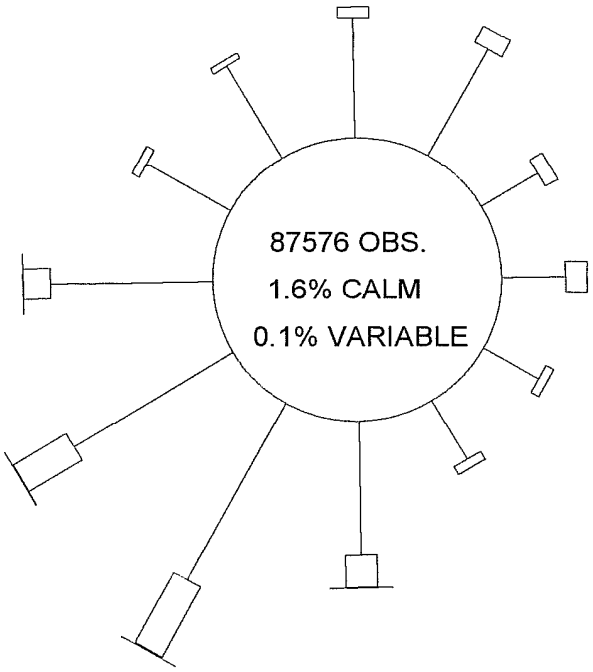
APPENDIX A

WIND ROSES, HEATHROW

WIND ROSE FOR HEATHROW

N.G.R: 5077E 1767N ALTITUDE: 25 metres a.m.s.l.





SEASON: ANNUAL
Period of data: Jan 1986 - Dec 1995

APPENDIX B

DMRB WORK SHEETS

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR1	Receptor number	1
Step 2	Year	2011		
Step 3	Number of links	1		

Step 6

Step 7

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	15.4

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	7.5	9228	80	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR1	Receptor number	1
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.03	0.03	mg/m^3	Annual mean*	0.03	mg/m^3
Benzene	0.00	0.03	0.03	$\mu g/m^3$	Annual mean	0.03	$\mu g/m^3$
1,3-butadiene	0.00	0.07	0.07	$\mu g/m^3$	Annual mean	0.07	$\mu g/m^3$
NO_x	0.0	19.3	19.3	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.3	6.3	$\mu g/m^3$	Annual mean*	6.3	$\mu g/m^3$
PM_{10}	15.4	1.46	16.86	$\mu g/m^3$	Annual mean	16.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.03	0.03	0.07	19.27	1.46
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
1	TR1	2011	0.03	0.03	0.07	19.27	6.31	16.86	0.67

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR2	Receptor number	2	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.42

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	4.82	9228	40	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR2	Receptor number	2
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.05	0.05	mg/m^3	Annual mean*	0.05	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.09	0.09	$\mu g/m^3$	Annual mean	0.09	$\mu g/m^3$
NO_x	0.0	21.6	21.6	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.9	6.9	$\mu g/m^3$	Annual mean*	6.9	$\mu g/m^3$
PM_{10}	14.4	1.89	16.31	$\mu g/m^3$	Annual mean	16.3	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.05	0.05	0.09	21.55	1.89
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
2	TR2	2011	0.05	0.05	0.09	21.55	6.89	16.31	0.42

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality

INPUT SHEET

Step 1	Receptor name	TR3	Receptor number	3	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.98

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	5	9228	40	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR3	Receptor number	3
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.05	0.05	mg/m^3	Annual mean*	0.05	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.09	0.09	$\mu g/m^3$	Annual mean	0.09	$\mu g/m^3$
NO_x	0.0	21.6	21.6	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.9	6.9	$\mu g/m^3$	Annual mean*	6.9	$\mu g/m^3$
PM_{10}	15.0	1.89	16.87	$\mu g/m^3$	Annual mean	16.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.05	0.05	0.09	21.55	1.89
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
3	TR3	2011	0.05	0.05	0.09	21.55	6.89	16.87	0.67

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality

INPUT SHEET

Step 1	Receptor name	TR4	Receptor number	4	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	14.98

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	29	7498	32	A			90.57				9.43
2	27	23770	32	A			91.98				8.02
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR4	Receptor number	4
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.09	0.09	mg/m^3	Annual mean*	0.09	mg/m^3
Benzene	0.00	0.12	0.12	$\mu g/m^3$	Annual mean	0.12	$\mu g/m^3$
1,3-butadiene	0.00	0.14	0.14	$\mu g/m^3$	Annual mean	0.14	$\mu g/m^3$
NO_x	0.0	23.6	23.6	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.4	7.4	$\mu g/m^3$	Annual mean*	7.4	$\mu g/m^3$
PM_{10}	15.0	2.45	17.43	$\mu g/m^3$	Annual mean	17.4	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.03	0.03	0.04	7.21	0.73
2	0.07	0.09	0.11	16.41	1.72
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
4	TR4	2011	0.09	0.12	0.14	23.62	7.41	17.43	1.00

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality

INPUT SHEET

Step 1	Receptor name	TR1	Receptor number	1	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	15.4

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	7.5	9268	80	A			84.4				15.6
2	105	120	32	C			0				100
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR1	Receptor number	1
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.04	0.04	mg/m^3	Annual mean*	0.04	mg/m^3
Benzene	0.00	0.03	0.03	$\mu g/m^3$	Annual mean	0.03	$\mu g/m^3$
1,3-butadiene	0.00	0.07	0.07	$\mu g/m^3$	Annual mean	0.07	$\mu g/m^3$
NO_x	0.0	19.8	19.8	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.5	6.5	$\mu g/m^3$	Annual mean*	6.5	$\mu g/m^3$
PM_{10}	15.4	1.50	16.90	$\mu g/m^3$	Annual mean	16.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.04	0.03	0.07	19.72	1.49
2	0.00	0.00	0.00	0.12	0.01
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
1	TR1	2011	0.04	0.03	0.07	19.84	6.46	16.90	0.69

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR2	Receptor number	2	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.42

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	4.82	9268	40	A			84.4				15.6
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR2	Receptor number	2
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.05	0.05	mg/m^3	Annual mean*	0.05	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	22.1	22.1	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.0	7.0	$\mu g/m^3$	Annual mean*	7.0	$\mu g/m^3$
PM_{10}	14.4	1.93	16.35	$\mu g/m^3$	Annual mean	16.3	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.05	0.05	0.10	22.08	1.93
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
2	TR2	2011	0.05	0.05	0.10	22.08	7.02	16.35	0.44

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality

INPUT SHEET

Step 1	Receptor name	TR3	Receptor number	3	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.98

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	5	9268	40	A			84				16
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR3	Receptor number	3
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.05	0.05	mg/m^3	Annual mean*	0.05	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	22.5	22.5	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.1	7.1	$\mu g/m^3$	Annual mean*	7.1	$\mu g/m^3$
PM_{10}	15.0	1.95	16.93	$\mu g/m^3$	Annual mean	16.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.05	0.05	0.10	22.51	1.95
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
3	TR3	2011	0.05	0.05	0.10	22.51	7.13	16.93	0.71

* See Footnote 32 in DMRB Volume 11 Chapter 3

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INPUT SHEET

Step 1	Receptor name	TR4	Receptor number	4	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	14.98

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	29	7639	32	A			88.99				11.01
2	27	23770	32	A			91.98				8.02
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR4	Receptor number	4
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.10	0.10	mg/m^3	Annual mean*	0.10	mg/m^3
Benzene	0.00	0.12	0.12	$\mu g/m^3$	Annual mean	0.12	$\mu g/m^3$
1,3-butadiene	0.00	0.15	0.15	$\mu g/m^3$	Annual mean	0.15	$\mu g/m^3$
NO_x	0.0	24.6	24.6	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.6	7.6	$\mu g/m^3$	Annual mean*	7.6	$\mu g/m^3$
PM_{10}	15.0	2.52	17.50	$\mu g/m^3$	Annual mean	17.5	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.03	0.03	0.04	8.18	0.80
2	0.07	0.09	0.11	16.41	1.72
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
4	TR4	2011	0.10	0.12	0.15	24.59	7.64	17.50	1.05

* See Footnote 32 in DMRB Volume 11 Chapter 3

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INPUT SHEET

Step 1	Receptor name	TR1	Receptor number	1	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	15.4

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	7.5	9598	80	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

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OUTPUT SHEET

Current receptor

Receptor Name	TR1	Receptor number	1
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.04	0.04	mg/m^3	Annual mean*	0.04	mg/m^3
Benzene	0.00	0.03	0.03	$\mu g/m^3$	Annual mean	0.03	$\mu g/m^3$
1,3-butadiene	0.00	0.07	0.07	$\mu g/m^3$	Annual mean	0.07	$\mu g/m^3$
NO_x	0.0	20.0	20.0	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.5	6.5	$\mu g/m^3$	Annual mean*	6.5	$\mu g/m^3$
PM_{10}	15.4	1.52	16.92	$\mu g/m^3$	Annual mean	16.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.04	0.03	0.07	20.04	1.52
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
1	TR1	2011	0.04	0.03	0.07	20.04	6.51	16.92	0.70

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR2	Receptor number	2
Step 2	Year	2011		
Step 3	Number of links	1		

Step 6

Step 7

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	13.92

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	4.82	9598	40	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

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OUTPUT SHEET

Current receptor

Receptor Name	TR2	Receptor number	2
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.06	0.06	mg/m^3	Annual mean*	0.06	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	22.4	22.4	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.1	7.1	$\mu g/m^3$	Annual mean*	7.1	$\mu g/m^3$
PM_{10}	13.9	1.96	15.88	$\mu g/m^3$	Annual mean	15.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.06	0.05	0.10	22.41	1.96
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
2	TR2	2011	0.06	0.05	0.10	22.41	7.11	15.88	0.28

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR3	Receptor number	3	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.46

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	5	9598	40	A			84.8				15.2
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

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OUTPUT SHEET

Current receptor

Receptor Name	TR3	Receptor number	3
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.06	0.06	mg/m^3	Annual mean*	0.06	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	22.4	22.4	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.1	7.1	$\mu g/m^3$	Annual mean*	7.1	$\mu g/m^3$
PM_{10}	14.5	1.96	16.42	$\mu g/m^3$	Annual mean	16.4	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.06	0.05	0.10	22.41	1.96
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
3	TR3	2011	0.06	0.05	0.10	22.41	7.11	16.42	0.47

* See Footnote 32 in DMRB Volume 11 Chapter 3

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INPUT SHEET

Step 1	Receptor name	TR4	Receptor number	4	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	14.46

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	29	7798	32	A			90.57				9.43
2	27	24724	32	A			91.98				8.02
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

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OUTPUT SHEET

Current receptor

Receptor Name	TR4	Receptor number	4
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.10	0.10	mg/m^3	Annual mean*	0.10	mg/m^3
Benzene	0.00	0.12	0.12	$\mu g/m^3$	Annual mean	0.12	$\mu g/m^3$
1,3-butadiene	0.00	0.15	0.15	$\mu g/m^3$	Annual mean	0.15	$\mu g/m^3$
NO_x	0.0	24.2	24.2	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.5	7.5	$\mu g/m^3$	Annual mean*	7.5	$\mu g/m^3$
PM_{10}	14.5	2.51	16.97	$\mu g/m^3$	Annual mean	17.0	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.03	0.03	0.04	7.50	0.76
2	0.07	0.10	0.11	16.66	1.75
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
4	TR4	2011	0.10	0.12	0.15	24.17	7.54	16.97	0.72

* See Footnote 32 in DMRB Volume 11 Chapter 3

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INPUT SHEET

Step 1	Receptor name	TR1	Receptor number	1	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	15.4

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	7.5	9638	80	A			84.4				15.6
2	105	120	32	C			0				100
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR1	Receptor number	1
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.04	0.04	mg/m^3	Annual mean*	0.04	mg/m^3
Benzene	0.00	0.03	0.03	$\mu g/m^3$	Annual mean	0.03	$\mu g/m^3$
1,3-butadiene	0.00	0.07	0.07	$\mu g/m^3$	Annual mean	0.07	$\mu g/m^3$
NO_x	0.0	20.6	20.6	$\mu g/m^3$	Not applicable		
NO_2	0.0	6.7	6.7	$\mu g/m^3$	Annual mean*	6.7	$\mu g/m^3$
PM_{10}	15.4	1.56	16.96	$\mu g/m^3$	Annual mean	17.0	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.04	0.03	0.07	20.51	1.55
2	0.00	0.00	0.00	0.12	0.01
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
1	TR1	2011	0.04	0.03	0.07	20.63	6.66	16.96	0.72

* See Footnote 32 in DMRB Volume 11 Chapter 3

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Step 1	Receptor name	TR2	Receptor number	2
Step 2	Year	2011		
Step 3	Number of links	1		

Step 6

Step 7

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	13.92

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	4.82	9638	40	A			84.4				15.6
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

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OUTPUT SHEET

Current receptor

Receptor Name	TR2	Receptor number	2
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.06	0.06	mg/m^3	Annual mean*	0.06	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	23.0	23.0	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.2	7.2	$\mu g/m^3$	Annual mean*	7.2	$\mu g/m^3$
PM_{10}	13.9	2.00	15.92	$\mu g/m^3$	Annual mean	15.9	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.06	0.05	0.10	22.96	2.00
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
2	TR2	2011	0.06	0.05	0.10	22.96	7.24	15.92	0.29

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality — INPUT SHEET

Step 1	Receptor name	TR3	Receptor number	3	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	1			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene (µg/m^3)	1,3-butadiene (µg/m^3)	NO_x (µg/m^3)	NO_2 (µg/m^3)	PM_{10} (µg/m^3)
0	0	0	0	0	14.46

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	5	9678	40	A			84.1				15.9
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR3	Receptor number	3
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.06	0.06	mg/m^3	Annual mean*	0.06	mg/m^3
Benzene	0.00	0.05	0.05	$\mu g/m^3$	Annual mean	0.05	$\mu g/m^3$
1,3-butadiene	0.00	0.10	0.10	$\mu g/m^3$	Annual mean	0.10	$\mu g/m^3$
NO_x	0.0	23.4	23.4	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.3	7.3	$\mu g/m^3$	Annual mean*	7.3	$\mu g/m^3$
PM_{10}	14.5	2.03	16.49	$\mu g/m^3$	Annual mean	16.5	$\mu g/m^3$
					Days >50$\mu g/m^3$	0	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.06	0.05	0.10	23.39	2.03
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
3	TR3	2011	0.06	0.05	0.10	23.39	7.35	16.49	0.50

* See Footnote 32 in DMRB Volume 11 Chapter 3

DMRB: Assessment of Local Air Quality

INPUT SHEET

Step 1	Receptor name	TR4	Receptor number	4	*Step 6*
Step 2	Year	2011			*Step 7*
Step 3	Number of links	2			

Step 4

Background concentrations for 2011					
CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
0	0	0	0	0	14.46

Step 5

Link number	Distance from link centre to receptor (m)	Traffic flow & speed		Traffic composition							
		AADT (combined, veh/day)	Annual average speed (km/h)	Road type (A,B,C,D)	Vehicles <3.5t GVW (LDV)			Vehicles>3.5t GVW (HDV)			
					% passen-ger cars	% light goods vehicles	Total % LDV	% buses and coaches	% rigid HGV	% articulated HGV	Total % HDV
1	29	7939	32	A			89.61				10.39
2	27	24724	32	A			91.98				8.02
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											

DMRB: Assessment of Local Air Quality

OUTPUT SHEET

Current receptor

Receptor Name	TR4	Receptor number	4
Assessment year	2011		

Results

Pollutant	Annual mean				For comparison with Air Quality Standards		
	Background concentration	Road traffic component	Total	Units	Metric	Value	Units
CO	0.00	0.10	0.10	mg/m^3	Annual mean*	0.10	mg/m^3
Benzene	0.00	0.12	0.12	$\mu g/m^3$	Annual mean	0.12	$\mu g/m^3$
1,3-butadiene	0.00	0.15	0.15	$\mu g/m^3$	Annual mean	0.15	$\mu g/m^3$
NO_x	0.0	24.8	24.8	$\mu g/m^3$	Not applicable		
NO_2	0.0	7.7	7.7	$\mu g/m^3$	Annual mean*	7.7	$\mu g/m^3$
PM_{10}	14.5	2.56	17.02	$\mu g/m^3$	Annual mean	17.0	$\mu g/m^3$
					Days >50$\mu g/m^3$	1	Days

* See Footnote 32 in DMRB Volume 11 Chapter 3

Contribution of each link to annual mean

Link number	CO (mg/m^3)	Benzene ($\mu g/m^3$)	1,3-butadiene ($\mu g/m^3$)	NOx ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)
1	0.03	0.03	0.04	8.16	0.81
2	0.07	0.10	0.11	16.66	1.75
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

All receptors

Receptor number	Name	Year	Pollutant concentrations at receptor						
			CO *	Benzene	1,3-butadiene	NO_x	NO_2 *	PM_{10}	
			Annual mean mg/m^3	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Annual mean $\mu g/m^3$	Days >50$\mu g/m^3$
4	TR4	2011	0.10	0.12	0.15	24.83	7.70	17.02	0.75

* See Footnote 32 in DMRB Volume 11 Chapter 3

This spreadsheet calculates the nitrogen dioxide concentration from the modelled oxides of nitrogen concentrations

1). Confirm that the General inputs spreadsheet has been completed

The input selections are shown at the head of the Table below.

2.) Type in (or paste and copy from another spreadsheet)

1) the receptor identifier (Receptor ID) and its Easting and Northing. [Optional]

2) the modelled contribution from roads to oxides of nitrogen concentrations (Road increment NO_x)

3) the local background concentration as NO_2

You may alternatively enter the local background as NO_x, for example, if you have modelled a regional background.

Leave the redundant background NO_x or NO_2 columns blank as appropriate

3). The default set-up is to use the fraction of oxides emitted as NO_2 from the General Inputs spreadsheet
Leave the "Fraction emitted as NO_2" column empty to use the default set up.
However, you can overwrite the defaults by typing appropriate values (0-1) into this column.
The fNO2 spreadsheet provides additional values.

4) Click the mouse on the run button to run the model.

Run NO_x to NO_2

The model will calculate:

a) the total nitrogen dioxide concentration at the receptor (Total NO_2)

b) the incremental contribution to nitrogen dioxide concentrations from the road vehicle emissions (Road NO_2)

Copy and paste the results to another spreadsheet.

5) Click the mouse on the Clear button to clear the spreadsheet

Clear spreadsheet

Local Authority:		**West Berkshire**				**Year:**	**2011**		
						Traffic Mix:	**All UK traffic**		
Receptor ID	**Easting,m**	**Northing, m**	**Road increment NO_x µg m^{-3}**	**Background µg m^{-3}**		**Fraction emitted as NO_2**	**Total NO_2 µg m^{-3}**	**Road NO_2 µg m^{-3}**	**Notes**
				NO_x	**NO_2**				
2011 TR1 wo			19.3		9.3		19.06	9.76	
2011 TR2 wo			21.6		9.17		20.03	10.86	
2011 TR3 wo			21.6		11.34		22.08	10.74	
2011 TR4 wo			23.6		11.34		23.01	11.67	
2011 TR1 w			19.8		9.3		19.29	10	
2011 TR2 w			22.1		9.17		20.26	11.09	
2011 TR3 w			22.5		11.34		22.5	11.16	
2011 TR4 w			24.6		11.34		23.47	12.13	
2016 TR1 wo			20		9.3		19.39	10.09	
2016 TR2 wo			22.4		9.17		20.41	11.24	
2016 TR3 wo			22.4		11.34		22.45	11.11	
2016 TR4 wo			24.2		11.34		23.29	11.95	
2016 TR1 w			20.6		9.3		19.68	10.38	
2016 TR2 w			23		9.17		20.69	11.52	
2016 TR3 w			23.4		11.34		22.92	11.58	
2016 TR4 w			24.8		11.34		23.56	12.22	
2011 TR2 NO2			0.5		1		1.43	0.43	