A303 Amesbury to Berwick Down

TR010025

6.3 Environmental Statement Appendices

Volume 6

Appendix 12.1 Tunnel Arisings Management Strategy

APFP Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

October 2018

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1.1 Context

1.1.1 The A303 Scheme includes an approximately 2.2 mile (approximately 3.3 km) tunnel, which is expected to be constructed using a tunnel boring machine (TBM.

1.1.2 The tunnelling works would generate approximately 900,000 million cubic metres (m^3) of arisings, comprising almost entirely of chalk.

1.1.3 As part of the TBM operation, the tunnel arisings are generated by the action of the cutting face. Various additives are introduced at the cutting face (primarily bentonite[1]) in order to provide lubrication. The arisings are then transported back through the tunnel to a processing area, where they are processed to remove and recycle the fluids.

1.1.4 The treatment process produces a caked chalk material which because of the lack of consistent grading and moisture content, may not be suitable for use as engineering fill in road embankments.

1.1.5 It is therefore necessary to consider how these tunnel arisings can best be managed.

1.2 Purpose of report

1.2.1 This report identifies and describes the options for managing the tunnel arisings, assesses these options, and recommends the preferred option.

[1] Bentonite is an absorbent aluminium phyllosilicate clay consisting mostly of montmorillonite, used in drilling and tunnelling fluids.

2 Policy and regulatory context

2.1.1 Waste management regulations and policy for England which are considered relevant to the management of materials arising from nationally significant infrastructure projects are set out in the following documents.

2.2 Relevant policy and regulations

Waste (England and Wales) Regulations 2011 (as amended)

2.2.1 These regulations transpose the Waste Framework Directive 2008/98/EC in England and Wales, including the definition of what constitutes waste, and require the Secretary of State and Welsh Ministers to establish waste prevention programmes and waste management plans that apply the waste hierarchy. The regulations require businesses to apply the waste hierarchy when transferring waste, and introduce a system for waste carrier and broker registration. The regulations also amend the hazardous waste controls and exclude some categories of waste from waste controls.

The Environmental Permitting (England and Wales) Regulations 2016

2.2.2 These regulations provide a system of environmental permitting for a wide range of potentially polluting activities. These include certain types of waste operations for recovering or disposing of waste. The type of permit required depends upon the nature of the waste activity. Landfills, hazardous waste plants and waste incinerators require bespoke permits. Standard permits can be issued for lower risk operations such as waste storage and transfer stations. Exemptions from permitting are issued for certain low risk activities depending upon the type of waste and how it is processed. Each exemption must be registered with the Environment Agency and applies a specific set of limits and conditions that must be observed to ensure the exempted operation remains outside of the scope of the permitting regime. Some exemptions do not need to be registered and these are called Non Waste Framework Directive (NWFD) exemptions. The most commonly used is NWFD2 which allows a waste producer to temporarily store any waste at the place of production pending collection.

Environmental Protection Act 1990 (as amended)

2.2.3 Section 34 of the Environmental Protection Act 1990 imposes a duty of care on anyone who produces, imports, keeps, stores, transports, treats or disposes of waste, who must take all reasonable steps to ensure that waste is managed properly. It also applies to anyone who acts as a broker and has control of waste.

Waste Management Plan for England (2013)

2.2.4 The Waste Management Plan for England is a high-level document which is non-site specific. It draws on the Government Review of Waste Policy and provides an analysis of the current waste management situation in England, evaluating how it will support implementation of the objectives and provisions of the revised Waste Framework Directive (European Commission, 2008) (the Directive) as transposed in to UK legislation by way of the Waste (England and Wales) Regulations 2011 (as amended).

2.2.5 This Plan sets out an overview of waste management in England to fulfil the revised Waste Framework Directive Article 28 mandatory requirements, and other required content as set out in Schedule 1 to the 2011 Regulations.

National Planning Policy for Waste (2014)

2.2.6 The National Planning Policy for Waste sets out the Government's ambition to work towards a more sustainable and efficient approach to resource use and management. Positive planning plays a pivotal role in delivering this country's waste ambitions through:

- delivery of sustainable development and resource efficiency, including provision of modern infrastructure, local employment opportunities and wider climate change benefits, by driving waste management up the waste hierarchy;
- ensuring that waste management is considered alongside other spatial planning concerns, such as housing and transport, recognising the positive contribution that waste management can make to the development of sustainable communities;
- providing a framework in which communities and businesses are engaged with and take more responsibility for their own waste, including by enabling waste to be disposed of or, in the case of mixed municipal waste from households, recovered, in line with the proximity principle;
- helping to secure the re-use, recovery or disposal of waste without endangering human health and without harming the environment; and
- ensuring the design and layout of new residential and commercial development and other infrastructure (such as safe and reliable transport links) complements sustainable waste management, including the provision of appropriate storage and segregation facilities to facilitate high quality collections of waste.

2.2.7 With respect to managing waste from non-waste developments, the National Planning Policy for Waste states that:

2.2.8 "When determining planning applications for non-waste development, local planning authorities should, to the extent appropriate to their responsibilities, ensure that:

- the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities;

- the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal."

National Policy Statement for National Networks (December 2014)

2.2.9 The National Policy Statement for National Networks (NPSNN) sets out the following requirements with respect to waste management for national networks nationally significant infrastructure projects:

- The applicant should set out the arrangements that are proposed for managing any waste produced. The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome.

2.2.10 NPSNN requires that the waste management arrangements describe:

- How any such waste will be properly managed, both on-site and off-site;

- How the waste from the proposed project can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area; and

- That adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal, except where an alternative is the most sustainable outcome overall.

Local planning policy

2.2.11 Wiltshire Council is the waste disposal authority for the area within which the Scheme lies. Wiltshire Council's "Core Strategy" (adopted 2015) does not include any specific policies on waste management, but instead refers to the "Wiltshire and Swindon Waste Core Strategy 2006-2026", which was jointly prepared by Wiltshire Council and Swindon Borough Council.

2.2.12 Policy WCS6 of the Wiltshire and Swindon Waste Core Strategy 2006-2026 describes the policy relating to waste auditing and recycling. It sets out detailed requirements for residential and commercial developments, which are not relevant to the Scheme, but for other developments states that:

"Development proposals…will be required to demonstrate that they have had sufficient regard to minimising waste produced as part of the development process and to the waste hierarchy in identifying a chosen management method for wastes that are produced as part of the development process."

2.2.13 Subsequent to publication of the Waste Core Strategy, the councils published the Development Plan Document "Wiltshire and Swindon Submission Draft Waste Site Allocations" (February 2012), which allocated sites for waste management. This Development Plan Document was supported by the report "Evidence base part B: Waste" which discussed current and future arisings of waste and the treatment capacity within the County, including for construction, demolition and excavation waste.

2.3 Status of tunnel arisings

2.3.1 Depending on a number of factors, excavated material from development sites may be considered as a waste (in which case it will require management in accordance with the relevant waste management regulations) or as a non-waste. The regulator for waste management in England is the Environment Agency.

2.3.2 A voluntary Code of Practice (CoP) has been prepared by the organisation "Contaminated Land: Applications in Real Environments" (CL:AIRE) to:

- set out good practice for the development industry to use when:
  - i. Assessing on a site specific basis whether excavated materials are classified as waste or not; and
  - ii. Determining on a site specific basis when treated excavated waste can cease to be waste for a particular use.
- describe an auditable system to demonstrate that the CoP has been adhered to.

2.3.3 It is the responsibility of the holder of a material to form their own view on whether that material is waste or not. The CoP allows the holder to come to that view and to demonstrate how they did so having regard to current law.

2.3.4 The Environment Agency (EA) will take account of the CoP in deciding whether to regulate the materials as waste.

2.3.5 If material is considered as waste, then its placement on land would be regulated by the EA as either a waste recovery or waste disposal operation and would require either an environmental permit or an exemption.

2.3.6 If the material is not considered as a waste, then it could be deposited within the Scheme boundary without needing an environmental permit or exemption.

2.3.7 Under the preferred option described in this strategy, the tunnel arisings would be classified as a non-waste. Appendix E presents the justification for managing the tunnel arisings as a non-waste under the CL:AIRE CoP.

2.3.8 The EA has been consulted, and has responded that it has no objection to this approach (see Appendix E). Management of the tunnel arisings (and other excavated material) would be controlled by means of a Materials Management Plan (MMP) prepared by a Designated Person under the CL:AIRE CoP. If material is deposited as part of the Scheme as a non-waste under a MMP, there are no waste-related policy impediments that would apply.

2.4 Summary of policy drivers

2.4.1 The two main policy drivers enshrined in EU Waste Framework Directive 2008/98/EC and expressed in UK policy and regulations which are considered relevant for the management of the tunnel arisings are:

- The waste hierarchy, which prioritises waste minimisation, followed by re-use and recycling, followed by recovery, and with disposal (e.g. to landfill) as the least-favoured option.
- The proximity principle, which favours the management of waste using the closest appropriate facility.

2.4.2 Even though it is intended to manage the tunnel arisings as a non-waste, these policy drivers relate to the need to avoid waste generation, and to minimising the transportation of waste – both of which are relevant to this strategy for managing tunnel arisings.

2.4.3 With respect to these policy drivers, Wiltshire Council's Waste Core Strategy requires that developers of non-waste projects should:

"demonstrate that they have had sufficient regard to minimising waste produced as part of the development process and to the waste hierarchy in identifying a chosen management method for wastes that are produced as part of the development process"

2.4.4 The National Planning Policy for National Networks (NPSNN) states that the application should demonstrate that:

"waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area; and

2.4.5 That adequate steps have been taken to minimise the volume of waste arisings, and of the volume of waste arisings sent to disposal"

2.4.6 The National Planning Policy for Waste states that:

"When determining planning applications for non-waste development, local planning authorities should, to the extent appropriate to their responsibilities, ensure that:

- the likely impact of proposed, non-waste related development on existing waste management facilities, and on sites and areas allocated for waste management, is acceptable and does not prejudice the implementation of the waste hierarchy and/or the efficient operation of such facilities;

- the handling of waste arising from the construction and operation of development maximises reuse/recovery opportunities, and minimises off-site disposal."

3 Primary options assessment

3.1 General

3.1.1 There are two primary options for managing the tunnel arisings:

- Deposition at a new receptor site adjacent to or in the immediate vicinity of the Scheme, avoiding the use of public highways; and
- Transport to an existing off-site receptor location for re-use, recovery or disposal.

3.1.2 This section assesses the advantages and disadvantages of these options, with reference to the guidance published in NPSNN and other relevant publications.

3.2 Assessment criteria

3.2.1 The criteria as set out in Table 3-1 are used to assess the primary options for managing tunnel arisings. These criteria are based largely on those topics in the NPSNN which are relevant to a comparison of the primary options, and omit topics which are not relevant (such as civil aviation), or which would require detailed site-specific information to assess (such as flood risk and landscape impacts).

Table 3-1: Assessment Criteria

Topic	Criteria	Justification
Traffic	Increase in traffic on the public road network.	The NPSNN recommends proportionate assessment of the transport impacts of a scheme on other networks.
Air Quality	Impacts on Air Quality Management Areas (AQMAs).	The NPSNN recommends consideration of air quality impacts over the wider area likely to be affected, as well as in the near vicinity of the scheme, and states that air quality considerations are likely to be particularly relevant where changes are sufficient to bring about the need for new AQMAs or change the size of an existing AQMA; or bring about changes to exceedances of the Limit Values, or where they may have the potential to impact on nature conservation sites.

Topic	Criteria	Justification
Carbon Emissions	CO_2 emissions from transport of tunnel arisings	The NPSNN recommends that carbon impacts be considered as part of the appraisal of scheme options. Since the tunnel arisings are not biodegradable, the primary carbon impacts from management of this material are associated with transport emissions.
Biodiversity	Impacts on protected habitats or species and opportunities to create new habitats.	The NPSNN recommends that development should avoid significant harm to biodiversity and identifies the potential for enhancing existing habitats and, where practicable, creating new habitats of value.
Waste Management	Minimise the requirement to use existing waste disposal capacity in the region.	The NPSNN recommends that schemes should seek to minimise the volume of waste produced and the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental outcome, and that waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arisings in the area.
Cultural Heritage	Impact on heritage assets and their setting.	The NPSNN recommends an assessment of any likely significant heritage impacts and that the significance of any heritage assets affected, including any contribution made by their setting, should be considered.
Land Use	Loss of best and most versatile agricultural land.	The NPSNN recommends taking into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification).

Topic	Criteria	Justification
Noise	Changes in noise levels on transport networks.	The NPSNN recommends that the potential noise impact elsewhere that is directly associated with the development, such as changes in road and rail traffic movements elsewhere on the national networks, should be considered as appropriate. Potential noise levels at the point of deposition are not used as an assessment criterion since the noise generated by placement of arisings would be similar for each option.
Operational Viability	Degree of control and certainty of availability for deposition site.	Not a requirement of the NPSNN, but important to ensure the practical deliverability of the Scheme.

3.2.2 The primary options are assessed against each of the criteria and classified using the approach set out in Table 3-2.

Table 3-2: Options Assessment Classification Scheme

Impacts	Description
Major adverse (- -)	May cause major adverse impacts with respect to the topic.
Small adverse (-)	May cause adverse impacts but these are unlikely to be significant for that particular topic alone.
Neutral (0)	No impacts expected.
Small positive (+)	May provide net benefits with respect to the topic.
Major positive (++)	May provide major net benefits with respect to the topic.

3.3 Assumptions

3.3.1 This section describes the main assumptions regarding the primary options for tunnel arisings management.

Transport of tunnel arisings

3.3.2 The deposition of tunnel arisings within the immediate vicinity of the Scheme would not require the use of public highways. Tunnel arisings would be moved by truck along site haul roads from the tunnel arisings processing area to the receptor site.

3.3.3 The use of haulage on public roads is the only viable option for transporting tunnel arisings away from the Scheme. There is a railway line passing through Salisbury (approximately 11 km south of the Scheme) and running along the Wylye valley, within 5km of Winterbourne Stoke at its closest point. There are no existing aggregates depots or sidings on this line in the vicinity of the Scheme, other than the disused sidings serving former Quidhampton quarry.

3.3.4 Use of rail for the transport of tunnel arisings would therefore require either:

- Initial transport of tunnel arisings by road to Quidhampton quarry followed by onwards transport to another destination by rail. This option would require the existing rail sidings to be upgraded as they are in a poor condition. The road access to the site is poor and it would be difficult to widen the bridge over the main line railway which is the site's only road access, since this would require extensive highways realignment work and track possessions from Network Rail. The current planning permission for this site relates to backfilling using material imported by rail, which would not require local road transport and it is considered likely that the traffic, noise and air quality impacts of using Quidhampton as a multimodal transfer site would be unacceptably high.

- Construction of a new rail siding in the Wylye valley. This is considered to be unfeasible since it would require multi-modal transport of arisings (i.e. by road to the siding and then by rail) and would extend the impacts of the Scheme to the valley of the River Wylye which is, like the River Till, a SSSI. This option would require a new siding at least 200 metres long to be constructed adjacent to an existing rail line. It would also require a stockpiling area of approximately 10,000 m^2. A means of vehicular access would need to be constructed from the nearest public highway, together with the associated access road to the stockpile area. Use of these sidings would require road vehicles to bring the tunnel arisings from the processing plant during the day from 07.00 to 18.00, with freight trains likely to run during the night and requiring loading shovels to load the rail wagons. The impacts of such a facility in terms of noise, dust, ecology and visual amenity would likely be high and it is considered likely that it would be strenuously opposed by local residents. This option would also entail significant additional cost.

3.3.5 Even if a railhead could be provided, this option would also require identifying a deposition site which already has rail sidings and which can accept the material; this cannot be guaranteed at this stage in the development of the Scheme.

3.3.6 Ultimately, the environmental impacts, additional costs and logistical complexity of developing a multimodal rail and road transfer system for the deposition of tunnel arisings makes the option of rail transport unattainable.

Location of off-site receptor sites

3.3.7 At this early stage in the development of the Scheme, it is not possible to specify exactly which sites would be used in the event of off-site deposition of tunnel arisings. The potential off-site receptor sites are owned and operated by third-party commercial operators, and the choice of which site to use would generally be made by the construction contractor. Although potential sites can be identified at this stage, it is not possible to confirm whether any specific site would still be available at the time of construction – for example, there could be changes in ownership, or the site could be used for other purposes prior to commencement of construction.

3.3.8 To allow for comparison between the primary options, a site identification exercise was carried out to identify a series of potential off-site receptor sites. From this list of sites, five nominal off-site receptor sites were identified, each of which lies in a different direction from the Scheme. Although these would not necessarily be the actual sites selected for off-site material deposition, they allow for a realistic assessment of the impacts of transporting tunnel arisings off-site.

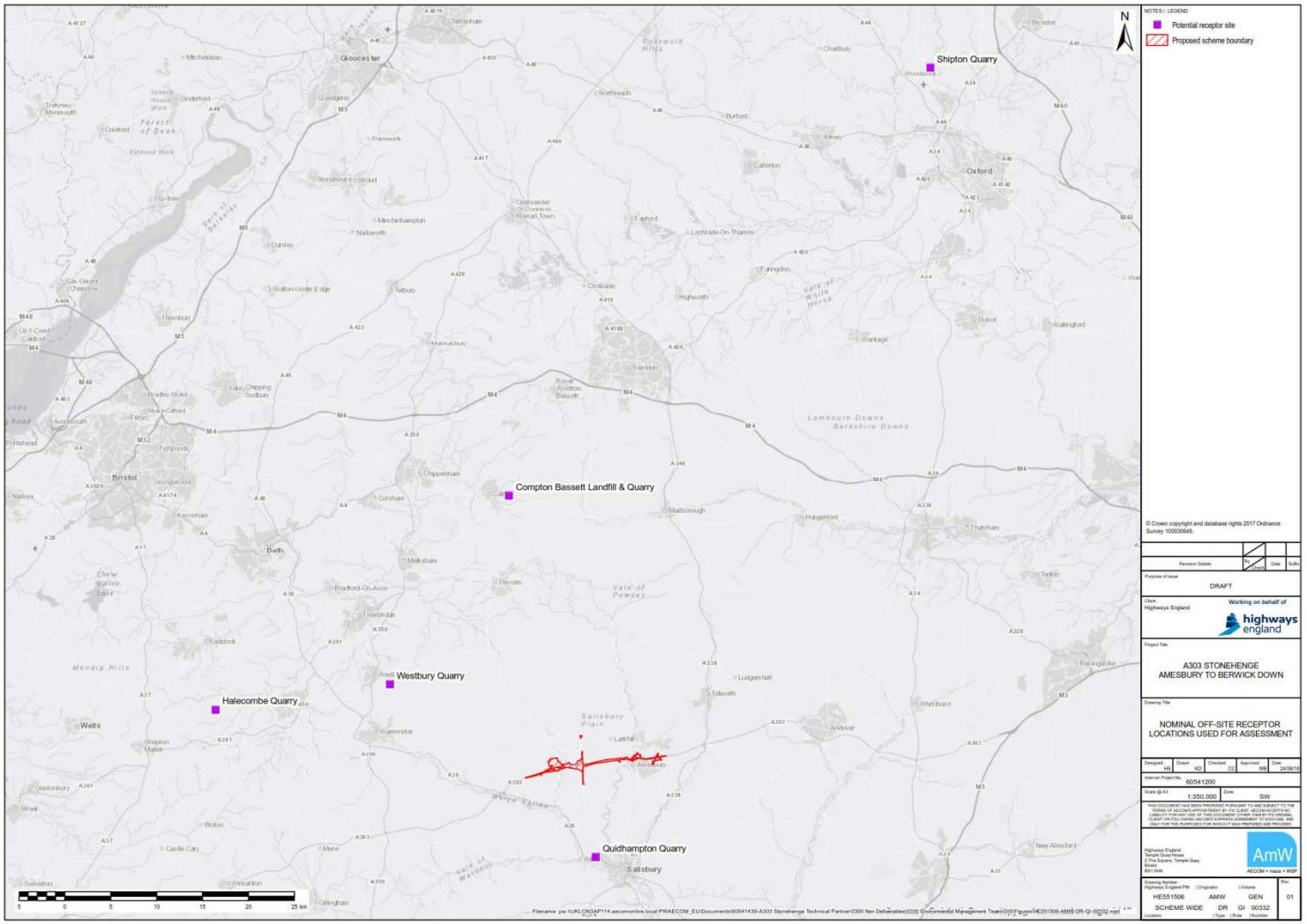
3.3.9 It is further assumed that, at any given time, all of the daily quantity of tunnel arisings is sent to a single site. Although in theory it would be possible to split the movement between multiple sites in different directions from the site which may reduce the impacts, this would pose considerable logistical and commercial constraints on the works and may not be technically or commercially feasible. It is not possible at this stage to guarantee that multiple receptor sites in different directions from the site would be available at the required time, and it is therefore considered that assessing transport to a single site represents a realistic option for assessment purposes.

3.3.10 The nominal receptor sites used in the assessment are listed below and their locations shown in Figure 3-1:

- Quidhampton Quarry, Salisbury, Wiltshire
- Compton Bassett Landfill & Quarry, Calne, Wiltshire
- Westbury Quarry, Westbury, Wiltshire
- Halecombe Quarry, Frome, Somerset
- Shipton Quarry, Kidlington, Oxfordshire

3.3.11 Each of these sites has been identified as a potentially viable alternative via the short-listing process for off-site options.

Figure 3-1: Nominal Off-site Receptor Locations Used for Assessment



Mitigation for landscape integration

3.3.12 Due to the height of the highway embankments for the Winterbourne Stoke bypass, a large amount of tunnel arisings (approximately 400,000 m^3) are required for blending the embankment into the surrounding topography, and this is considered to be essential mitigation from a landscape integration perspective.

3.3.13 The total quantity of tunnel arisings generated from the tunnelling work is estimated at 900,000 m^3. The quantity of additional tunnel arisings which needs to be managed (in addition to that used for essential landscape mitigation) is therefore approximately 500,000 m^3.

3.4 Comparative assessment

3.4.1 Table 3-3 presents a comparative assessment of the two primary options against the assessment criteria described previously.

3.4.2 Consideration of the results of this comparative assessment indicates that deposition in the vicinity of the Scheme is strongly preferred.

3.4.3 Supporting evidence for these assessments is included in Appendices A to D.

Table 3-3: Comparative Assessment of Primary Options

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
Traffic	Increase in traffic on the public road network.	Deposition in the immediate vicinity of the Scheme removes the need for truck movements on the public road network under normal circumstances.	**(0)**	At the peak of tunnelling activity, up to 78 vehicles movements per hour are estimated to be required in order to transport tunnel arisings off-site. Although the ultimate destination of these vehicles is not certain, the increases in HGV traffic on routes to the nominal sites used for assessment purposes vary from 10% to 300% (see Appendix A for details).	**(-)**
Air Quality	Impacts on AQMAs.	There are no AQMAs likely to be affected by deposition in the immediate vicinity of the Scheme.	**(0)**	The preliminary assessment indicates that there is potential for significant adverse air quality effects where the routes for the HGVs to access the deposition sites go through AQMAs or areas of poor air quality. HGV routes to the nominal off-site receptor sites would pass through AQMAs: - Compton Bassett (Marlborough AQMA) - Quidhampton (Salisbury AQMAs) - Westbury (Westbury AQMA) - Shipton (Botley and Oxford AQMAs)	**(--)**

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
Carbon Emissions	CO2 emissions from transport of tunnel arisings	Deposition in the immediate vicinity of the Scheme conforms with the proximity principle in that the tunnel arisings are managed at the shortest possible distance from their point of generation, which means that greenhouse gas emissions associated with arisings transport are minimised.	**(0)**	The short-listed off-site receptor sites are within southern England, but are all some distance from the site. Since the final choice of receptor site would rest with the contractor, there is no guarantee that the nearest suitable receptor site would be used since it may be commercially unavailable or may be less favourable for reasons other than distance.	**(-)**
Biodiversity	Impacts on protected habitats or species and opportunities to create new habitats.	Deposition in the immediate vicinity of the Scheme has the potential to result in creation of habitats of high conservation value from land currently under arable cultivation.	**(+)**	Although the use of tunnel arisings in quarry or landfill restoration may result in habitat creation, the provision of any such habitat is uncertain, because the final restoration would be wholly independent of the Scheme. If habitat creation was carried out it would not represent any net gain of habitat. The quarry or landfill void would simply be filled sooner than it would be without the Scheme and hence planned restoration would occur sooner than without the Scheme.	**(0)**
Waste	Minimise the	On the basis that tunnel arisings	**(0)**	If the tunnel arisings are deposited off-site,	**(-)**

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
Management	requirement to use existing waste disposal capacity in the region.	deposition can be undertaken under the CL:AIRE CoP, then the arisings would not be classified as a waste. This constitutes waste minimisation, which is the most preferable option under the waste hierarchy. Regardless of whether the material is considered as a waste or non-waste, on-site deposition maintains the existing regional capacity for inert waste management, since it does not make use of any existing permitted or potential capacity.		then depending on where the tunnel arisings are deposited, it would constitute either a waste recovery or waste disposal operation. The site which is used for off-site deposition would then be unavailable for other material, resulting in an overall reduction in regional waste management capacity. Discussions with operators of processes which use chalk (e.g. cement manufacturing) suggest that it is unlikely that operators would be prepared to use the tunnel arisings. These operators typically require a consistent source of well-characterised material from a long-term supplier. Although reuse of tunnel arisings as an input to a manufacturing process cannot be ruled out and may be explored further by a contractor during construction, at this stage it seems unlikely to be feasible. Off-site deposition would therefore require up to 500,000 m^3 of the existing regional capacity. Whilst this forms only a relatively	

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
				small proportion of the 104,000,000 m^3 regional inert waste capacity in the South East and South West (based on Environment Agency data), it is still considered beneficial to avoid using this capacity where possible	
Cultural Heritage	Impact on heritage assets and their setting.	Although archaeological remains and other designated heritage assets may be present at sites within the vicinity of the Scheme, this is unlikely to preclude placement of tunnel arisings since mitigation measures (including avoiding features of importance) can be incorporated into the design of the deposition scheme if necessary. Areas within or in close proximity to the World Heritage Site would not be used for deposition of tunnel arisings.	**(-)**	Since the off-site receptors are likely to be existing quarries or landfills, it is very unlikely that there would be any impacts on cultural heritage from placing tunnel arisings in these locations since any such impacts would already be mitigated under the permissions granted to these sites.	**(0)**
Land Use	Loss of best and most versatile agricultural land.	Deposition of tunnel arisings in the vicinity of the scheme has the potential to impact on best and most versatile agricultural land.	**(-)**	Since the off-site receptors are likely to be existing quarries or landfills, it is very unlikely that there would be any loss of agricultural land from placing tunnel arisings in these locations.	**(0)**

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
Noise	Changes in noise levels on transport networks.	Noise issues associated with movement of tunnel arisings on public highways would be avoided, since arisings would be moved on internal haul roads only. .	(0)	Noise impacts would depend on the receptor sites used and the routes chosen. An initial assessment of likely sites and routes suggests that the transfer of material off site via HGV would potentially result in significant adverse effects on traffic noise levels experienced at a small number of locations along the affected routes. Smaller magnitude (non-significant) adverse effects are likely to be experienced along a much greater number of routes.	(--)
Operational Viability	Degree of control and certainty of availability for deposition site.	Within the vicinity of the Scheme there is capacity to accept all of the tunnel arisings, and there are unlikely to be significant constraints on the rate of arisings placement, other than those arising from adverse weather conditions (which would similarly affect the placement rate at off-site receptors). This option has the advantage of being under the control of Highways England and therefore offers a greater degree of certainty than the off-site receptors, whose availability would be subject to contractual agreements with third-party site	(++)	A short-list of potentially viable receptor sites in the wider region has been identified. However, given the timeframe of the Scheme development and the nature of the waste and materials market, it is not possible at this stage to commit to using any specific site and the actual receptor site would need to be determined during the procurement and construction process. Given the large quantities of tunnel arisings, it may be necessary to use multiple sites in order to ensure that all arisings can be accommodated at the rate at which they are generated, without the	(-)

Topic	Criteria	Deposition adjacent to or in the immediate vicinity of the Scheme		Transport to an existing off-site receptor location for re-use, recovery or disposal	
		owners/occupiers.		need for large stockpiles. Off-site deposition is therefore operationally viable, but with a lower degree of control and certainty since the deposition site is not within the direct control of Highways England.	

Summary of Assessment

3.4.4 There are nine criteria and deposition in the immediate vicinity of the scheme is preferred for seven of these criteria: for two criteria (cultural heritage and land use) the off-site option is preferable. For this reason, deposition adjacent to or in the immediate vicinity of the scheme is considered the strongly preferred option.

4 Deposition within the vicinity of the scheme – options assessment

4.1 Objective

4.1.1 This section describes how the various options for deposition of tunnel arisings within the vicinity of the Scheme have been screened and how a preferred option has been selected. A two-stage process has been followed:

- Initial screening, to identify potentially suitable sites for assessment, followed by;
- Comparative assessment of the potentially suitable sites.

4.2 Screening approach

4.2.1 The initial screening is used to rule out those sites which are obviously unsuitable on the grounds of practicality or insurmountable environmental impacts (i.e. in that the physical location of the works is such that any impacts from them would be very significant and could not be mitigated, such that they would not be realistic options).

4.2.2 The criteria used for screening are based on:

- Engineering feasibility; and
- Direct impacts on protected sites of environmental or cultural heritage value.

4.2.3 The screening criteria for assessing engineering feasibility are described in Table 4-1, and the screening criteria for assessing impacts on protected sites of environmental or cultural heritage value are described in Table 4-2.

Table 4-1: Criteria for Screening Sites for Deposition within the Vicinity of the Scheme based on Engineering Feasibility

Criteria	Description
Proximity to the Scheme	Only sites that are contiguous with the Scheme alignment have been considered, since sites further away would require either use of the public highway network or off-line haul routes crossing private land in order to transport tunnel arisings. For the purposes of screening, this criterion is defined as including land within 1km of the Scheme alignment.

Criteria	Description
Direction of Tunnelling	Due to operational and environmental constraints (including availability of space for supporting facilities), the tunnel boring machine would need to be launched from the western tunnel portal and would initially work from west to east, before being turned around and deployed from east to west to form the second tunnel or transported back to the western end to again bore from west to east. In both cases, this means that tunnel arisings would emerge at the western portal, and the tunnel arisings processing plant would need to be located to the west of the western portal. Transporting the arisings from the tunnel arisings processing plant to receptor sites to the east of the World Heritage Site would require either: a) Transport through the World Heritage Site, which should be avoided where possible and which would add to congestion on the existing road; or b) Transport via a lengthy route on public roads outside the World Heritage Site, which is costly, impractical and likely to cause noise, traffic and air quality impacts. For these reasons, **all areas to the east of the western portal** have been screened out.
Location of Tunnel Arisings Processing Plant	An area east of the River Till valley has been identified as the most practical location for processing tunnel arisings. Processing is necessary in order to re-circulate tunnelling fluids back to the cutting head of the TBM and to produce tunnel arisings in a form that can be easily handled and deposited. This area has therefore also been screened out of potential use for placement of tunnel arisings on the grounds that it is required for other essential construction operations.
Size of Receptor Site	The total amount of tunnel arisings requiring deposition (in addition to that required for essential landscaping) is approximately 500,000 m^3. Whilst in theory this could be accommodated in a small area by placing a very deep layer of material, in practical terms (and in the absence of quarries or borrow pits contiguous with the Scheme) it would be preferable on

Criteria	Description
	landscape and engineering grounds to limit the depth of filling. Assuming a nominal average depth of 2m, the area required to accommodate 500,000 m3 of tunnel arisings (i.e. excluding the 400,000 of arisings that would be used for landscape integration to the east of Parsonage Down) would be 250,000 m^2 (i.e. 25 hectares). It is also preferable, for reasons of construction operations and environmental impacts, to limit the tunnel arisings deposition to a single location. Potential sites smaller than 25 ha have therefore been screened out.
Topography	In order to minimise visual impacts and avoid slope stability issues it is preferable to deposit tunnel arisings in valleys rather than on ridgelines. For this reason, potential sites that are on ridgelines or high ground have been screened out.

4.2.4 Although environmental and cultural heritage impacts need careful consideration for any site, there are certain areas which, because of their level of statutory protection, can be screened out as being unsuitable for further consideration. This analysis has been undertaken using the screening criteria set out in Table 4-2.

Table 4-2: Criteria for Screening Sites for Deposition within the Vicinity of the Scheme based on Environmental and Cultural Heritage Impacts

Criteria	Description
Impact on Designated Heritage Assets	NPSNN states that harm affecting a designated heritage asset requires clear and convincing justification. Deposition of tunnel arisings within the World Heritage Site (WHS) cannot be justified, and hence the WHS is screened out
Impact on Protected Biodiversity Sites	NPSNN states that developments should avoid significant harm to biodiversity interests, and that appropriate weight should be attached to designated sites. The River Till is an SSSI and forms part of the River Avon SAC. Placement of tunnel arisings **within the River Till**

Criteria	Description
	valley is likely to have a significant adverse effect on the River Till SSSI and this area has therefore been screened out. The area screened out is based on the Environment Agency's Flood Zones 2 and 3 for the River Till valley, in order to provide an adequate buffer zone around the River Till itself. Placement of tunnel arisings **within Parsonage Down SSSI** (SAC) would have a significant adverse effect on the interest features for which the SAC and SSSI are designated, and hence the SSSI has been screened out. Following discussions with Natural England, the areas immediately adjacent to Parsonage Down SSSI (including some areas that are outside the SSSI but within the NNR) have not been screened out, since deposition of tunnel arisings in this area would not cause significant adverse impacts on the SSSI itself: the area which is within the NNR but outside the SSSI is currently used as arable land.

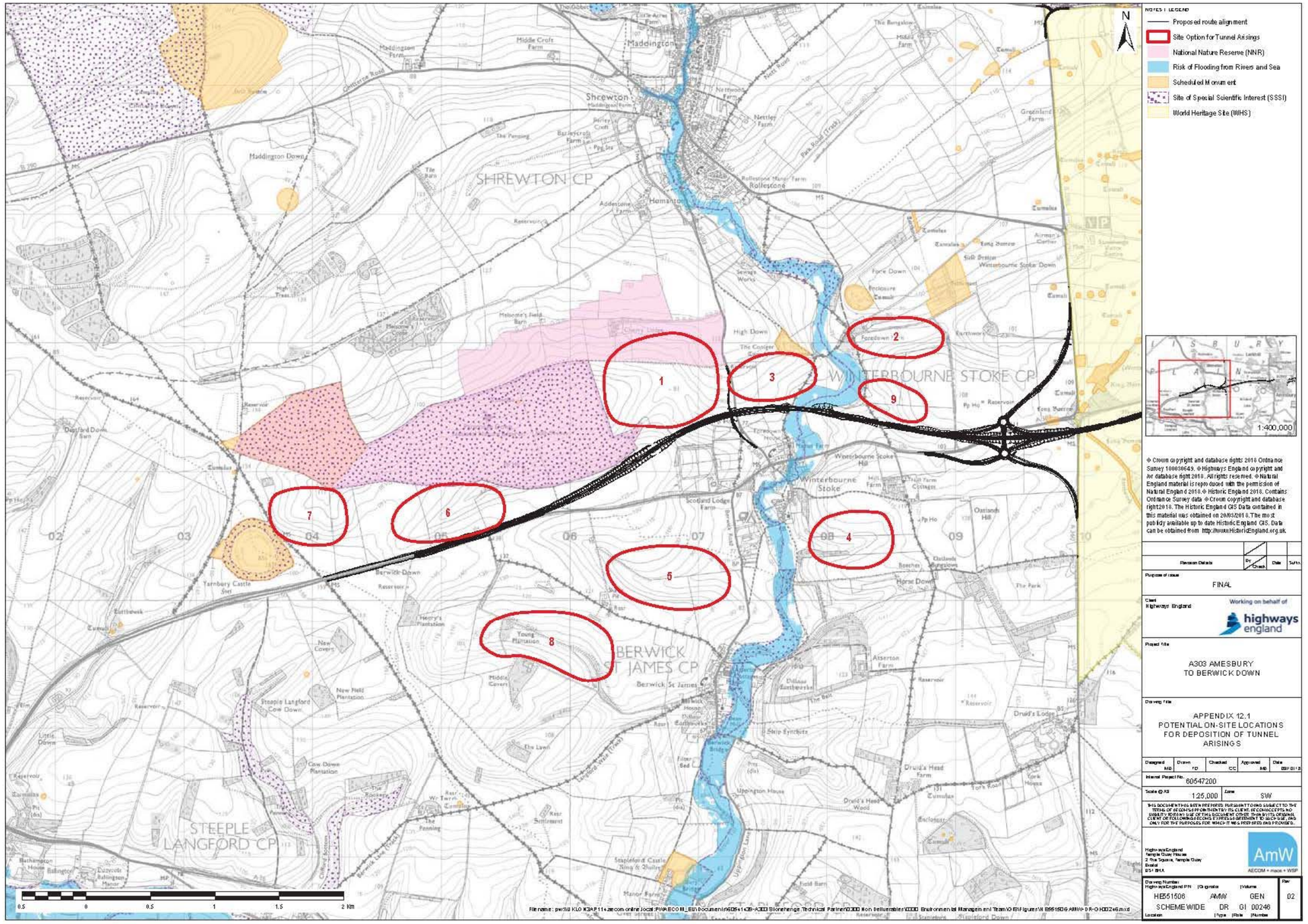
4.3 Potentially suitable sites

4.3.1 Inspection of the areas which have not been screened out has identified the following sites which may be potentially suitable for depositing tunnel arisings.

1) East of Parsonage Down
2) South of Foredown Barn (a)
3) High Down
4) West of Hill Farm
5) West of Berwick Road
6) South of Parsonage Down
7) East of Yarnbury Castle
8) South of Berwick Down
9) South of Foredown Barn (b)

4.3.2 The locations of these potential sites are illustrated on Figure 4-1. The figure shows the general location of each potential site, but does not precisely delineate the potential boundaries of each site. The order of numbering of the sites has no bearing on the subsequent assessment.

Figure 4-1: Potential On-site Locations for Deposition of Tunnel Arisings



4.4 Comparative assessment

4.4.1 The potentially suitable sites have been assessed using a modified version of the criteria that were used for the primary options assessment in Chapter 3, as shown in Table 4-3.

4.4.2 The criteria were modified to take into account the specific factors relevant to a comparison of the alternative options within the vicinity of the site – for example, since none of the options require transport on public roads or are in proximity to noise sensitive areas or AQMAs, the noise and air quality criteria have been modified by combining them and assessing by reference to the proximity of specific sensitive receptors.

4.4.3 Those topics shown in grey italics in Table 4-3 are those which, due to the nature of the potential sites being considered, are not considered further in this comparative assessment.

4.4.4 The assessment is based on the information collected as part of the environmental impact assessment of the Scheme.

Table 4-3: Criteria for Comparative Assessment of Potentially Suitable Options

Topic	Criteria	Justification
Traffic	*Increase in traffic on the public road network.*	*Since none of the options require tunnel arisings to be transported on the public road network, traffic is not considered further in this comparative assessment.*
Air Quality & Noise	Proximity to sensitive receptors.	There are no road traffic related air quality and noise impacts for any of the on-site options (since material would not be transported via public roads) and instead the air and noise impacts are considered in conjunction having regard to the proximity to sensitive receptors.
Carbon Emissions	*CO2 emissions from transport of tunnel arisings*	*Since the differences in transport distances between the potentially suitable sites are very small, carbon emissions are not considered further in this comparative assessment.*

Topic	Criteria	Justification
Biodiversity	Impacts on protected habitats or species and opportunities to create new habitats.	The NPSNN recommends that development should avoid significant harm to biodiversity and identifies the potential for enhancing existing habitats and, where practicable, creating new habitats of value.
Waste Management	*Minimise the requirement to use existing waste disposal capacity in the region.*	*Since none of the options would require use of existing waste facilities, waste management is not considered further in this comparative assessment.*
Cultural Heritage	Impact on heritage assets and their setting.	The NPSNN recommends an assessment of any likely significant heritage impacts and that the significance of any heritage assets affected, including any contribution made by their setting, should be considered.
Land Use	Loss of best and most versatile agricultural land.	The NPSNN recommends taking into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification).
Landscape and visual impacts	Impacts on landscape character and visual receptors	The NPSNN recommends an assessment of landscape impacts relevant to the proposed project and that projects need to be designed carefully, taking account of the potential impact on the landscape, specifically having regard to siting, operational and other relevant constraints, the aim should be to avoid or minimise harm to the landscape, providing reasonable mitigation where possible and appropriate.

Topic	Criteria	Justification
Operational Viability	Ease of practical implementation and proximity to other areas of earthwork.	Not a requirement of the NPSNN, but important to ensure the practical and cost effective delivery of the Scheme.

4.4.5 The potentially viable options are assessed against each of the criteria and classified using the approach set out in Table 4-4. This is a comparative approach for the purpose of option selection and is not directly aligned with the assessment of significant effects in the ES.

Table 4-4: Options Assessment Classification Scheme

Impacts	Description
Major adverse	May cause major adverse impacts with respect to the topic.
Minor adverse	May cause adverse impacts but these are unlikely to be significant for that particular topic alone.
Negligible	Unlikely to cause adverse impacts with respect to the topic.
Minor beneficial	May provide small potential benefits with respect to the topic.
Major beneficial	May provide major potential benefits with respect to the topic.

Table 4-5: Comparative Assessment of Potential On-site Locations

4.4.6 For the purposes of legibility, the comparative assessment is presented in two parts: the first part assesses sites 1 to 5, and the second part assesses sites 6 to 9.

Part 1 (Sites 1 to 5)

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
Biodiversity	Impacts on designated sites, protected habitats or species.	No direct impact on protected sites, habitats or species. Adjacent to Parsonage Down SSS/SAC, but fill area is downhill from it and potential indirect impact of dust fully mitigable by dust control measures in the Outline Environmental Management Plan (OEMP) (Application Document 6.3, Appendix 2.2).	No direct impact on protected sites but need to protect Till SSSI/SAC. May cause loss of a lane which is a north-south route for bats . Fill site is above the Till valley. Potential impact of surface runoff mitigable by control measures in the OEMP.	No direct impact on designated sites. Possible loss of semi-improved grassland and scrub of potential value for bat foraging.	No direct impact on designated sites. Loss of woodland which is likely to be of value for feeding and roosting bats. Loss of hedges. Possible loss/disturbance of stone curlew plot(s) which form part of the supporting population of the SPA. Loss could be compensated for by alternative provision, but only if suitable alternative site (s) can be found elsewhere locally.	No direct impact on designated sites. Likely direct loss or disturbance of existing stone curlew plot(s), which form part of the supporting population of the SPA. Loss could be compensated for by alternative provision, but only if suitable alternative site(s) can be found elsewhere locally.

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
	Location and connectivity (ecological network)[2]	Site is directly adjacent to Parsonage Down SSSI, so would be colonised by species. Potential major benefit of habitat creation to complement the adjoining SSSI/SAC/NNR and link the NNR directly to new habitats created by the Scheme. The westward extension of chalk grassland and associated habitats would bring these closer to the Till valley (SSSI), this in conjunction with the soft estate would improve the ecological network.	Site is isolated from other similar habitat and would remain surrounded by intensive agriculture. It could not connect directly to habitat in the Till valley without loss of a lane used by commuting bats.	Site is isolated from any other similar habitat at present, but would provide a 'stepping stone' between Parsonage Down and the Till valley, widening the ecological network connection that would be provided by the Scheme.	Site is isolated from other similar habitat and would remain surrounded by intensive agriculture.	Site is isolated from other similar habitat and would remain surrounded by intensive agriculture.
	Overall rating for Biodiversity	Major beneficial	Negligible	Minor adverse	Major adverse	Major adverse

[2] The comparative assessment of biodiversity impacts includes the potential benefits if the receptor site is restored as calcareous grassland and other habitats of conservation value

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
Cultural Heritage	Impact on heritage assets and their setting.	**Works impacts:** Works may impact on archaeological features including three potential non-designated Bronze Age (BA) barrows and a non-designated unenclosed settlement as well as field systems and possible lynchets identified from aerial photographs and recent geophysical surveys. Mitigation measures (including avoiding features of importance) can be incorporated into the design of the deposition scheme to ensure these remains can be retained and preserved in situ.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley immediately south of two scheduled monuments (Winterbourne Stoke East round barrow cemetery and earthwork enclosure on Fore Down and Romano-British settlement on Winterbourne Stoke Down) affecting their settings. Works would impact a non-designated linear Bronze Age land boundary and associated trackways and probable lynchets observed on aerial photographs.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley immediately south of a scheduled monument (Winterbourne Stoke West round barrow cemetery, The Coniger enclosure and section of linear boundary earthwork) affecting its setting. Works would impact a non-designated unenclosed settlement as well as field systems and a probable BA linear boundary observed on aerial photographs.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley. Works would impact non-designated field systems observed on aerial photographs, along with possible lynchets and fields associated with medieval settlement at Winterbourne Stoke. There may also be potential for prehistoric sequences in coiluviated dry valleys.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley. Works would impact non-designated field systems and lynchets observed on aerial photographs, which may be of later prehistoric or medieval date.
		Impacts on historic buildings: No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** The works would impact the setting of the Grade II* Church of St	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
					Peter's in Winterbourne Stoke and adjacent Grade II listed buildings and the southern end of the Conservation Area.	
		Historic Landscape Character: (defined in the Wiltshire and Swindon Historic Landscape Characterisation (WSHLC) project as re-organised fields created from downland for agriculture) would not substantially change if returned to agriculture. There would be some benefit if chalk grassland habitat was created as this would restore the previous downland character, which is retained within the adjacent NNR.	**Historic Landscape Character:** (defined in the WSHLC as re-organised fields created from downland for agriculture) would not substantially change if returned to agriculture. The adjacent scheduled monuments are currently under chalk grassland and there would be some benefit if chalk grassland habitat was created as this would restore the previous downland character over a wider area.	**Historic Landscape Character:** (defined in the WSHLC as re-organised fields created from downland for grazing) would not substantially change if returned to agriculture. The adjacent scheduled monuments are currently under chalk grassland and there would be some benefit if chalk grassland habitat was created as this would restore the previous downland character over a wider area.	**Historic Landscape Character:** (defined in the WSHLC as re-organised fields created from downland) would not substantially change if returned to agriculture. Any benefit from chalk grassland habitat creation in terms of HLC would be negligible within the context of a modernised field structure and remodelled landscape.	**Historic Landscape Character:** (defined in the WSHLC as re-organised fields created from downland and forming very large prairie-style agricultural fields) would not substantially change if returned to agriculture. Any benefit from chalk grassland habitat creation in terms of HLC would be negligible within the context of a modernised field structure and remodelled landscape.
		Impacts on monuments: There	**Impacts on monuments:** There	**Impacts on monuments:** There	**Impacts on monuments:** There	**Impacts on monuments:** There

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
		would be no impacts on monuments that contribute to the Oustanding Universal Value (OUV) of the WHS.	would be no impacts on monuments that contribute to the OUV of the WHS.	would be no impacts on monuments that contribute to the OUV of the WHS.	would be no impacts on monuments that contribute to the OUV of the WHS.	would be no impacts to monuments that contribute to the OUV of the WHS.
	Overall rating for Cultural Heritage	Minor adverse	Major adverse	Major adverse	Major adverse	Minor adverse
Land Use	Loss of best and most versatile agricultural land.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey data confirms presence of best and most versatile (BMV) (Grade 3a) quality present[3] – which is afforded a measure of protection in planning policy.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey suggests strong possibility that the majority of the land would be mapped as BMV (Grade 3a) quality.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey suggests increasing likelihood of lower quality Grade 3b agricultural land – which is not afforded a measure of protection in planning policy.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey data confirms presence of best and most versatile (BMV) (Grade 3a) quality present.	**Land quality:** provisionally mapped by MAGIC as Grade 3. No coverage by definitive 2004 RAC survey data – however, cropping suggests high likelihood of BMV agricultural land present.
		Land use: intensively farmed with arable crops.	**Land use:** intensively farmed with arable crops.	**Land use:** intensively farmed with arable crops and grassland grazed by beef cattle.	**Land use:** intensively farmed with arable crops and grassland understood to be utilised by dairy cattle.	**Land use:** intensively farmed with arable crops.

[3] The Grade 3 shown on MAGIC is the Provisional Agricultural Land Classification at 1:250,000 which is suitable only for strategic purposes and not for classifying individual sites, for which a detailed on-site survey is required (Natural England's Technical Information Note 049). The RAC classification is the result of the detailed surveys undertaken and is the definitive classification for the land.

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
	Overall rating for Land Use	Minor adverse	Minor adverse	Negligible	Minor adverse	Minor adverse
Noise and Air Quality	Proximity to noise sensitive receptors primarily residential properties though also educational buildings, medical buildings, community facilities and designated sites such as SSSI.	Potential for noise impacts due to works to distribute tunnel arisings. Approx. 300m from Cherry Lodge and 500m from northern edge of Winterbourne Stoke (Scotland Lodge and High Street). Immediately adjacent to Parsonage Down SSSI and NNR and so there is the potential for dust deposition at this habitat (within 200m).	Potential for noise impacts due to works to distribute tunnel arisings. Approx. 1km from northern edge of Winterbourne Stoke. Assume no sensitive receptors at Foredown Barn. Close to River Till SSSI and 2 scheduled monuments.	Potential for noise impacts due to works to distribute tunnel arisings. Approx. 250m from northern edge of Winterbourne Stoke. Assume no sensitive receptors at Foredown Barn. Immediately adjacent to River Till SSSI and one scheduled monument, Parsonage Down NNR on opposite side of B3083 and so there is the potential for dust deposition at this habitat (within 200m).	Potential for noise impacts due to works to distribute tunnel arisings. Approx. 100m from eastern edge of Winterbourne Stoke and approx. 150m from properties around Hill Farm.	Potential for noise impacts due to works to distribute tunnel arisings. Approx. 100m from western edge of Winterbourne and approximately 450m from northern edge of Berwick St James.
	Overall rating for Noise and Air Quality	Minor adverse	Negligible	Minor adverse	Major adverse	Major adverse

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
Landscape and Visual Impacts	Impacts on landscape character and visual receptors[4] Note: None of the locations are covered by statutory landscape designations, all are within a locally designated Special Landscape Area. .	**Landform / Watercourses:** This location is a dry valley landform, which is generally well contained in relation to the wider landscape by ridgelines along Cherry Lodge access lane, Parsonage Down NNR, Scotland Lodge and the B3083.	**Landform / Watercourses:** This location is one of the spurs of the River Till consisting of a narrow valley forming part of the wider Till valley landscape	**Landform / water courses:** This location is elevated, forming part of the upper River Till valley system sides and consists of rising and elevated land, such that it is open in relation to the wider landscape.	**Landform / watercourses:** This location is part of the River Till upper valley sides, forming a rolling landscape pattern along the length of the valley within the River Till and consists of a narrow spur.	**Landform / watercourses:** This location is part of a narrow valley to the west of Berwick Road.
		Vegetation Pattern: There are small areas of trees and roadside hedgerows, but generally open in character.	**Vegetation Pattern:** There are intermittent hedgerows but overall open in character.	**Vegetation Pattern:** There are a few narrow hedgerow belts but otherwise open in character.	**Vegetation Pattern:** The location consists of small woodland clumps but is otherwise open in character.	**Vegetation Pattern:** Narrow rectangular woodland plantations and hedgerows. Remainder of the area is open in character.
		Land Use: This is an area of arable land use.	**Land Use:** This is an area of arable land use.	**Land Use:** This is an area of arable land use.	**Land Use**: This is an area of arable land use.	**Land Use:** This is an area of arable land use.
		PRoW: The area is not crossed by any designated PRoW. There is a permissive path between the B3083 and Parsonage	**PRoW:** The western edge of the area is crossed by Byway WSTO6B	**PRoW:** The eastern edge of the area is crossed by Byway WST04.	**PRoW:** The area is not crossed by any PRoW.	**PRoW:** The area is not crossed by any PRoW.

[4] Assessment of long-term impacts is based on the potential for the site to be restored as calcareous grassland.

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
		Down NNR.				
		Designations: The area is covered by a Special Landscape Area designation.	**Designations:** The area is covered by a Special Landscape Area designation.	**Designations:** The area is covered by a Special Landscape Area designation.	**Designations:** The area is covered by a Special Landscape Area designation.	**Designations:** The area is covered by a Special Landscape Area designation.
		Visual: Limited views of the area due to the ridgelines and vegetation. Close range views from motorists, residents in Winterbourne Stoke, those at Cherry Lodge and Byway BSJA4.	**Visual:** There are close range views from PRoW and Foredown Barn, as well as from the opposite valley sides and middle distance views from the western edge of the WHS.	**Visual:** As an elevated area, it is visible from a number of receptors, including East Parsonage Down NNR, PRoW within the Till valley, the B3083, Winterbourne Stoke and the WHS.	**Visual:** The area is visible from the Cranborne Chase and West Wiltshire Area of Outstanding Natural Beauty (AONB), footpath WST01 and residential properties adjacent to Berwick Road.	**Visual:** The area is visible from footpath BSJA3, residents adjacent to Berwick Road, and the northern part of the Cranborne Chase and West Wiltshire Area of Outstanding Natural Beauty (AONB).
		Likely impacts: Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform. Adverse visual impacts to local road users, visitors to Parsonage Down NNR, Winterbourne Stoke, Cherry Lodge, Byway BSJA4 and	**Likely impacts:** Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform. Visual impacts to users of public rights of way in and around the Till valley, and those in the western part of the WHS.	**Likely impacts:** Adverse impacts during the construction phase due to the deposition of arisings and direct change to surface landform. There would be adverse landscape impacts due to the limitations of sympathetically re-grading arisings across the elevated	**Likey impacts:** Adverse impacts during the construction phase due to the deposition of arisings, and direct changes to surface landform. Additional impacts from the removal of existing vegetation. Visual impact to PRoW users including those in the AONB.	**Likely impacts:** Adverse impacts during the construction phase due to the deposition of arisings and direct changes to surface landform including removal of vegetation. Visual impact from residential properties, PRoW and AONB. At year 1 of operation

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
		Scotland Lodge. At year 1 of operation, the re-profiled landform would reflect the existing dry valley pattern. The area would be largely bare chalk resulting in localised landscape and visual adverse effects. By year 15 of operation, the chalk grassland would have established to cover the bare chalk. This is beneficial in comparison to the existing agricultural land use. The re-profiled landform would be integrated into the valley landform thereby minimising any potential for adverse impacts. .	At year 1 of operation, the re-profiled landform would have infilled a narrow valley and spur of the River Till, changing the pattern of the landform. The area would be largely bare chalk resulting in localised adverse landscape and extensive visual adverse effects. By year 15 of operation, chalk grassland would have established to cover the bare chalk. Whilst beneficial in terms of land use change, the infilling of the valley spur would retain a permanent alteration to the landform and thereby not integrate the arisings fully within the landscape. Adverse landscape effects would remain.	landform pattern. There would be adverse visual impacts on users of public rights of way in the Till valley, residents at Winterbourne Stoke, visitors to Stonehenge and local road users, due to views of the deposition of arisings and the early years of the establishment of the new landscape due to the bare chalk. At year 1 of operation the re-profiled landform would not be successfully integrated across the rising valley side. The area would be largely bare chalk resulting in localised adverse landscape effects and extensive visual	At year 1 of operation the re-profiled landform would infill a valley spur, resulting in adverse landscape effects by changing the pattern of the valley system. The area would be largely bare chalk resulting in localised adverse landscape and visual effects, including from within the AONB. By year 15 of operation, chalk grassland would have established to cover the bare chalk. . Whilst beneficial in land use change, the re-profiled landform and infilling of the valley spur would retain a permanent alteration to the landform. Adverse landscape effects would remain.	the re-profiled landform would have infilled a narrow valley, therefore changing the pattern of the valley system. The area would be largely bare chalk, resulting in localised adverse landscape and visual effects. By year 15 of operation, chalk grassland would have established to cover the bare chalk. Whilst beneficial in land use change, the re-profiled landform and infilling of the narrow valley would retain a permanent alteration to the landform. Adverse landscape effects would remain.

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
				effects. By year 15 of operation, chalk grassland would have established to cover the bare chalk. Whilst beneficial in land use change, the re-profiled landform in an elevated position would retain a permanent alteration to the landform. Adverse landscape effects would remain.		
	Overall for Landscape and Visual Impact	Minor adverse	Major adverse	Major adverse	Major adverse	Major adverse
Operational Viability	Ease of practical implementation and proximity to other areas of earthwork.	A large quantity of material would be placed in this area for essential landscaping, meaning that the necessary infrastructure such as haul roads would already be in place and there would be adequate working space to allow for	This site is not directly adjacent to the scheme and hence additional haul roads would be required to deliver arisings to this location. . The site is relatively small, and hence would require a thicker depth of fill and provides less	The site is relatively small, and hence would require a thicker depth of fill and provides less space for drying. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down,	This site is south of the existing A303 and the tunnel arisings would need to be taken across the highway from the tunnel arisings processing plant. Additional haul roads would also be required to deliver arisings to this	This site is south of the existing A303 and the tunnel arisings would need to be taken across the highway from the tunnel arisings processing plant. Additional haul roads would also be required to deliver arisings to this

Topic	Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road
		spreading of material over a large area for drying. It is on the same side of the new alignment as the tunnel arisings processing plant, meaning there is no requirement for trucks or conveyors to cross the live highway once it is operational.	space for drying. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	and the use of this site for the remainder of the arisings would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	location. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	location. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.
	Overall for Operational Viability	Major beneficial	Minor adverse	Minor adverse	Major adverse	Major adverse

Part 2 (Sites 6 to 9)

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
Biodiversity	Impacts on designated sites, protected habitats or species.	No direct impact on protected sites or habitats. Adjacent to Parsonage Down SSSI/SAC, but potential indirect impact of dust can be mitigated by dust control measures in the OEMP.	No direct impact on protected sites or habitats. Adjacent to Parsonage Down SSSI/SAC. Adjacent to Parsonage Down SSS/SAC, but potential indirect impact of dust can be mitigated by dust control measures in the OEMP.	No direct impact on protected sites. Potential for loss of woodland and scrub, which is likely to be of value for bats and birds (not surveyed).	No direct impact on protected sites or habitats or species. Existing hedged byway used by several bat species may be lost in extensive section depending on landform. Fill site is above the Till valley. Potential impact of surface runoff can be mitigated by control measures in the OEMP.
	Location and connectivity (ecological network)[5]	The site is directly adjacent to Parsonage Down SSSI, so would be colonised by species. It would provide a new point of contact between the SSSI and the soft estate of the Scheme west of green bridge 1 and so would provide some improvement in ecological network, but there would be no direct connection to Yarnbury Castle SSSI.	The site is directly adjacent to Parsonage Down SSSI, so would be colonised by species. It would not connect directly to Yarnbury Castle SSSI, but would approach closely enough to be a 'stepping stone' between the two SSSI.	Site is isolated from other similar habitat and would remain surrounded by intensive agriculture. It would potentially complement a retained area of adjacent woodland.	Site is isolated from other similar habitat and would remain surrounded by intensive agriculture. It would likely connect directly to the habitats of the Scheme and so widen the ecological network east of the Till valley. There would be no direct connection to the semi-natural habitats of the Till valley, but it would be near enough to provide a 'stepping stone' for some of the species.

[5] The comparative assessment of biodiversity impacts includes the potential benefits if the receptor site is restored as calcareous grassland and other habitats of conservation value.

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
	Overall rating for biodiversity	Minor beneficial	Minor beneficial	Minor adverse	Minor adverse
Cultural Heritage	Impact on heritage assets and their setting.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley. Works would impact a complex network of non-designated field systems observed on aerial photographs.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley immediately east of the Scheduled Yarnbury Camp and south of a further scheduled monument (Parsonage Down Camp earthwork enclosure and associated field system) adversely affecting the settings of the designated monuments. Works may also impact associated non-designated field systems observed on aerial photographs.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley. Works would impact non-designated field systems observed on aerial photographs.	**Works impacts:** The positioning of the tunnel arisings at this location would infill a dry valley to the south of two scheduled monuments (Winterbourne Stoke East round barrow cemetery and earthwork enclosure on Fore Down and Romano-British settlement on Winterbourne Stoke Down) and southeast of a further scheduled monument (Winterbourne Stoke West round barrow cemetery, The Coniger enclosure and section of linear boundary earthwork) potentially affecting their settings. The works would impact a non-designated linear BA land boundary and associated trackways and possible lynchets observed on aerial photographs.
		Impacts on historic buildings: No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.	**Impacts on historic buildings:** No impacts on historic buildings are anticipated.
		Historic Landscape Character: (defined in the WSHLC as re-organised fields	**Historic Landscape Character:** (defined in the WSHLC as re-organised fields	**Historic Landscape Character:** (defined in the WSHLC as fields and	**Historic Landscape Character:** (defined in the WSHLC as fields and

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
		created from downland for agriculture) would not substantially change if returned to agriculture. There would be some benefit if chalk grassland habitat was created as this would restore the previous downland character, which is retained within the adjacent NNR.	created from downland for agriculture) would not substantially change if returned to agriculture. There would be some benefit if chalk grassland habitat was created as this would restore the previous downland character, which is retained over the adjacent Yarnbury Camp scheduled monuments.	enclosed land created from downland for stock grazing) would not substantially change if returned to agriculture. Any benefit from chalk grassland habitat creation in terms of HLC would be negligible within the context of a modernised field structure and remodelled landscape.	enclosed land created from downland for agriculture) would not substantially change if returned to agriculture. Any benefit from chalk grassland habitat creation in terms of HLC would be negligible within the context of a modernised field structure and remodelled landscape.
		Impacts on monuments: There would be no impacts to monuments that contribute to the OUV of the WHS.	**Impacts on monuments:** There would be no impacts on monuments that contribute to the OUV of the WHS.	**Impacts on monuments:** There would be no impacts to monuments that contribute to the OUV of the WHS.	**Impacts on monuments:** There would be no impacts on monuments that contribute to the OUV of the WHS.
	Overall for Cultural Heritage	Minor adverse	Major adverse	Minor adverse	Major adverse
Land Use	Loss of best and most versatile agricultural land.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey suggests strong possibility that the majority of the land would be mapped as BMV (Grade 3a) quality.	**Land quality:** provisionally mapped by MAGIC as Grade 3. No definitive RAC survey coverage. Subject to gradient there is a strong possibility that the land would be mapped as BMV (Grade 3a) quality.	**Land quality:** provisionally mapped by MAGIC as Grade 3. No definitive RAC survey coverage. Subject to gradient there is a strong possibility that the land would be mapped as BMV (Grade 3a) quality.	**Land quality:** provisionally mapped by MAGIC as Grade 3 but definitive 2004 RAC survey suggests a mixture of Grade 3a and Grade 3b agricultural land.
		Land use: intensively farmed with arable crops.	**Land use:** (not included in RAC 2004 surveys) - appears intensively farmed with arable crops and possibly grassland.	**Land use:** (not included in RAC 2004 surveys) - appears intensively farmed with arable crops and possibly grassland.	**Land use:** – intensively farmed with arable crops and grassland grazed by beef cattle.
	Overall for Land Use	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Noise and Air	Proximity to noise	Potential for noise impacts	Potential for noise impacts	Potential for noise impacts	Potential for noise impacts

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
Quality	sensitive receptors primarily residential properties though also educational buildings, medical buildings, community facilities and designated sites such as SSSI.	due to works to distribute tunnel arisings. Immediately adjacent to Parsonage Down SSSI and so there is the potential for dust deposition at this habitat (within 200m). Over 1km from any residential properties.	due to works to distribute tunnel arisings. Immediately adjacent to Parsonage Down SSSI and two Scheduled Monuments and so there is the potential for dust deposition at this habitat (within 200m). Over 1km from any residential properties.	due to works to distribute tunnel arisings. Addressbase has identified a residential property within the circled area (though looks like sheds on aerial photography), otherwise approx. 800m from eastern edge of Berwick St James.	due to works to distribute tunnel arisings. Immediately adjacent to River Till SSSI and so there is the potential for dust deposition at this habitat (within 200m). Approx. 450m to Hill Farm Cottages and approx. 700m to northern/eastern edge of Winterbourne Stoke.
	Overall Noise and Air Quality	Negligible	Negligible	Negligible	Minor adverse
Landscape and visual impacts	Impacts on landscape character and visual receptors Note: None of the locations are covered by statutory landscape designations, all are within a locally designated Special Landscape Area	**Landform / Watercourses:** The location is at the upper part of an elongated dry valley system situated between the existing A303 and Parsonage Down NNR.	**Landform / Watercourses:** The location is on the elevated side of a dry valley, and in close proximity to Yarnbury Castle.	**Landform / Watercourses:** The location is within a dry valley.	**Landform / Watercourses:** The location is part of the upper Till valley consisting of a rolling and sloping rising landform.
		Vegetation Patterns: Occasional small scale tree belts but otherwise open in character.	**Vegetation Patterns:** Open in character.	**Vegetation:** Woodland clumps dividing open small scale field pattern.	**Vegetation:** Linear hedgerows dividing open field pattern.
		Land Use: Agricultural	**Land Use:** Agricultural	**Land Use:** Agricultural with woodland.	**Land Use:** Agricultural
		PRoW: The area is not crossed by any PRoW.	**PRoW:** Byway BSJA4 crosses the western edge of the area.	**PRoW:** The area is not crossed by any PRoW.	**PRoW:** The western edge of the area is crossed by WST06B.
		Designations: The area is covered by a Special	**Designations:** The area is covered by a Special	**Designations:** The area is covered by a Special	**Designations:** The area is covered by a Special

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
		Landscape Area designation.	Landscape Area designation.	Landscape Area designation.	Landscape Area designation
		Visual: Close range views from Parsonage Down NNR and Byway BSJA4, the existing A303.	**Visual:** Close range views from Byway BSJA4, Parsonage Down NNR and Yarnbury Camp and the A303, as well as longer views from the upper parts of the Till valley.	**Visual:** close range views from PRoW and Cranborne Chase AONB, agricultural buildings.	**Visual:** Close range views from PRoW WST06B, A303, Hill Farm and Hill Farm Cottages, River Till valley and western edge of WHS.
		Likely impacts: Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform along with removal of vegetation. Adverse visual impacts to visitors to Parsonage Down NNR, BSJA4 and A303 and River Till valley sides. At year 1 of operation, the re-profiled landform would reflect the existing elongated dry valley pattern. The area would be largely bare chalk resulting in localised landscape adverse effects. Adverse visual effects also to close range receptors, as well as in mid-range views from River	**Likely impacts:** There are potential impacts to the landscape character due to the reduced ability to successfully integrate the earthworks, because of the elevated location. Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform. Adverse visual impacts to visitors to Parsonage Down NNR, BSJA4 and A303. At year 1 of operation, the re-profiled landform would not reflect the elevated valley pattern. The area would be largely bare chalk resulting in localised landscape and visual	**Likely impacts:** Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform. Potential impacts to setting and dark skies of AONB. Adverse visual impacts to visitors recreational users on PRoW and within AONB. At year 1 of operation, the re-profiled landform would not reflect the elevated valley pattern. The area would be largely bare chalk resulting in localised landscape and visual adverse effects. By year 15 of operation, the chalk grassland would have established to cover the bare	**Likely impacts:** Adverse landscape impacts during the construction phase due to the deposition of arisings and direct changes to surface landform. Adverse visual impacts to visitors recreational users on PRoW and Hill Farm. At year 1 of operation, the re-profiled landform would not reflect the elevated valley pattern. The area would be largely bare chalk resulting in localised landscape and visual adverse effects. By year 15 of operation, the chalk grassland would have established to cover the bare chalk. Whilst beneficial in land use change, the re-profiled landform would not be

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
		Till valley sides. By year 15 of operation, the chalk grassland would have established to cover the bare chalk. This is beneficial in comparison to the existing agricultural land use. The re-profiled landform would be integrated into the elongated valley landform thereby minimising any potential for adverse impacts.	adverse effects. By year 15 of operation, the chalk grassland would have established to cover the bare chalk. Whilst beneficial in land use change, the re-profiled landform would not be integrated within the landscape. Adverse landscape effects would remain.	chalk. Whilst beneficial in land use change, the re-profiled landform would not be integrated within the landscape. Adverse landscape effects would remain.	integrated within the landscape. Adverse landscape effects would remain.
	Overall Landscape and Visual Impact	Minor adverse	Major adverse	Major adverse	Major adverse
Operational Viability	Ease of practical implementation and proximity to other areas of earthwork.	Use of this site would potentially require an additional length of haul road alongside the new highway to deliver tunnel arisings once this stretch of the new highway was opened (this is programmed to occur prior to the tunnelling works). Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings	Use of this site would potentially require an additional length of haul road alongside the new highway to deliver tunnel arisings once this stretch of the new highway was opened (this is programmed to occur prior to the tunnelling works). Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings	This site is south of the existing A303 and the tunnel arisings would need to be taken across the highway from the tunnel arisings processing plant. Additional haul roads would also be required to deliver arisings to this location. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the remainder of the arisings	Site is adjacent to the tunnel arisings processing plant. The site is relatively small and hence would require a thicker depth of fill and provides less space for drying. . There is very limited space available in this location in which tunnel arisings could be deposited. Tunnel arisings would be deposited for essential landscape mitigation to the east of Parsonage Down, and the use of this site for the

Topic	Criteria	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
		would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.	remainder of the arisings would require deposition in two separate locations, thereby introducing impacts into an additional location that would be otherwise unaffected.
	Overall Operational Viability	Minor adverse	Minor adverse	Major adverse	Minor adverse

Table 4-6 Summary of options assessment for potential sites within the vicinity of the Scheme

Assessment Criteria	1. East of Parsonage Down	2. South of Foredown Barn (a)	3. High Down	4. West of Hill Farm	5. West of Berwick Road	6. South of Parsonage Down	7. East of Yarnbury Castle	8. South of Berwick Down	9. South of Foredown Barn (b)
Biodiversity	Major beneficial	Negligible	Minor adverse	Major adverse	Major adverse	Minor beneficial	Minor beneficial	Minor adverse	Minor adverse
Cultural Heritage	Minor adverse	Major adverse	Major adverse	Major adverse	Minor adverse	Minor adverse	Major adverse	Minor adverse	Major adverse
Land Use	Minor adverse	Minor adverse	Negligible	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse	Minor adverse
Noise & AQ	Minor adverse	Negligible	Minor adverse	Major adverse	Major adverse	Negligible	Negligible	Negligible	Minor adverse
Landscape and visual impacts	Minor adverse	Major adverse	Major adverse	Major adverse	Major adverse	Minor adverse	Major adverse	Major adverse	Major adverse
Operational viability	Major beneficial	Minor adverse	Minor adverse	Major adverse	Major adverse	Minor adverse	Minor adverse	Major adverse	Minor adverse
Score*	**0**	**-6**	**-7**	**-11**	**-10**	**-3**	**-5**	**-7**	**-8**
Ranking:	1st	4th	=5th	9th	8th	2nd	3rd	=5th	7th

** Scored as follows:*
Major beneficial: *+2*
Minor beneficial: *+1*
Negligible: *0*
Minor adverse: *-1*
Major adverse: *-2*

4.4.7 Table 4-7 summarises the main potential impacts for each site

Table 4-7: Summary of Impacts

Site	Summary
1. East of Parsonage Down	The use of this site would not give rise to any impacts on protected habitats or species, and the proximity to the NNR and Till Valley offers the potential to create habitats which link directly to existing habitats of conservation value, which would also help to achieve the scheme's objective to improve biodiversity. Works may impact on archaeological features including three potential non-designated Bronze Age barrows and a non-designated unenclosed settlement as well as field systems and possible lynchets identified from aerial photographs. The site is contained in relation to the wider landscape by ridgelines. The arable land use results in an open field pattern such that there is likely to be limited or no loss to vegetation patterns. Therefore very limited impacts to landscape character, beyond technical alteration in landform. Some tunnel arising placement would be necessary in part of this area as essential landscaping work to integrate the Scheme into the existing landform, and hence there are good operational reasons to use this site for placement of the remaining tunnel arisings, since haul routes would already have been established, and disturbance would be contained to a single location. This site is therefore a **POTENTIAL OPTION**.
2. South of Foredown Barn (a)	The use of this site would affect the settings of two scheduled monuments, and may have impacts on the landscape character of the Till Valley. Furthermore, there are no strong operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
3. High Down	The use of this site would affect the setting of a scheduled monument (Winterbourne Stoke West round barrow cemetery, The Coniger enclosure and section of linear boundary earthwork) and would also impact a non-designated unenclosed settlement as well as field systems and a probable Bronze Age linear boundary observed on aerial photographs. It would also have impacts on the landscape character of the Till Valley. In addition, there are no strong operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
4. West of Hill Farm	The use of this site would impact the setting of the Grade II* Church of St Peter's in Winterbourne Stoke and adjacent Grade II listed buildings and the southern end of the Conservation Area, as well as non-designated field systems observed on aerial photographs, along with possible lynchets and fields associated with medieval settlement at Winterbourne Stoke. The location approximately 100m from the eastern edge of Winterbourne Stoke and 150m from properties around Hill Farm may cause noise and air quality impacts. This location would be visible from the Cranborne Chase AONB, with a wide visual impact to PRoW routes in the area, and is part of the River Till upper valley sides, such that there would be impacts to the pattern of the landform within the valley, as well as potential loss of woodland, or additional constraints to re-grading the arisings due to the telegraph poles and woodlands. In addition there are no strong

Site	Summary
	operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
5. West of Berwick Road	The use of this site would potentially cause disturbance to stone curlew plots, and would impact non-designated field systems and lynchets observed on aerial photographs, which may be of later prehistoric or medieval date. The location of the site approximately 100m from western edge of Winterbourne Stoke means there is potential for noise and air quality impacts, and the use of this site may alter the narrow characteristic of the valley, resulting in a broader rolling landform, therefore with the potential to impact landscape character. In addition there are no strong operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
6. South of Parsonage Down	This site is adjacent to the NNR and hence could have potential for habitat creation, although without the benefits of interconnection with the habitats of the Till Valley. Works would impact a complex network of non-designated field systems observed on aerial photographs. The location of the site at the head of a dry valley system would limit any impacts on landscape character, and hence is considered as a **POTENTIAL OPTION**.
7. East of Yarnbury Castle	The use of this site would affect the setting and landscape character of the scheduled monuments of Yarnbury Castle and Parsonage Down Camp earthwork enclosure and associated field system, and may also impact associated non-designated field systems observed on aerial photographs. Although this site is contiguous with Parsonage Down NNR and hence offers some scope for habitat creation, it provides less opportunity for creation of habitats and less interconnection with habitats in and near Till valley than the site east of Parsonage Down. In addition there are no strong operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
8. South of Berwick Down	The use of this site would cause the loss of woodland, which is likely to be of value for bats (although has not been surveyed since it is outside the area of scheduled biodiversity surveys). It is isolated from Parsonage Down and from the Till valley so offers reduced benefits for habitat creation. The loss of woodland and proximity to Cranborne Chase AONB may cause landscape and visual impacts. There are no strong operational reasons which would support the use of this site, and hence it is **NOT PREFERRED.**
9. South of Foredown Barn (b)	This site is adjacent to the River Till SSSI/SAC and includes an existing hedged byway used by several bat species which may be lost. The use of this site would potentially affect the settings of scheduled monuments to the north (Winterbourne Stoke East round barrow cemetery and earthwork enclosure on Fore Down and Romano-British settlement on Winterbourne Stoke Down) and northeast (Winterbourne Stoke West round barrow cemetery, The Coniger enclosure and section of linear boundary earthwork) and would impact a non-designated linear Bronze Age land boundary and associated trackways and possible lynchets observed on aerial photographs. The site is part of upper Till valley landform and there are likely to be adverse landscape impacts as a result of integrating the arisings into the valley landform, as well as adverse impacts from localised vegetation removal. There are likely to be adverse visual impacts on PRoW users, residents at Winterbourne Stoke, and local

Site	Summary
	road users, principally during construction. Land adjacent to the east of this site has been identified for temporarily locating the tunnel arising process facility, and this would significantly constrain the availability of land which could be used for deposit of the tunnel arisings themselves, and hence it is **NOT PREFERRED**.

4.4.8 Based on this assessment, the only two potential options are the sites east and south of Parsonage Down.

4.4.9 There is a requirement to deposit tunnel arisings in part of the area to the east of Parsonage Down for essential landscape mitigation, and therefore there would be impacts on landscape, land use, cultural heritage and air and noise in this area. Any additional impacts from placement of the remaining amount of tunnel arisings in this area would be incremental, whereas if tunnel arisings were also placed to the south of Parsonage Down this would introduce impacts into a location that would be otherwise unaffected.

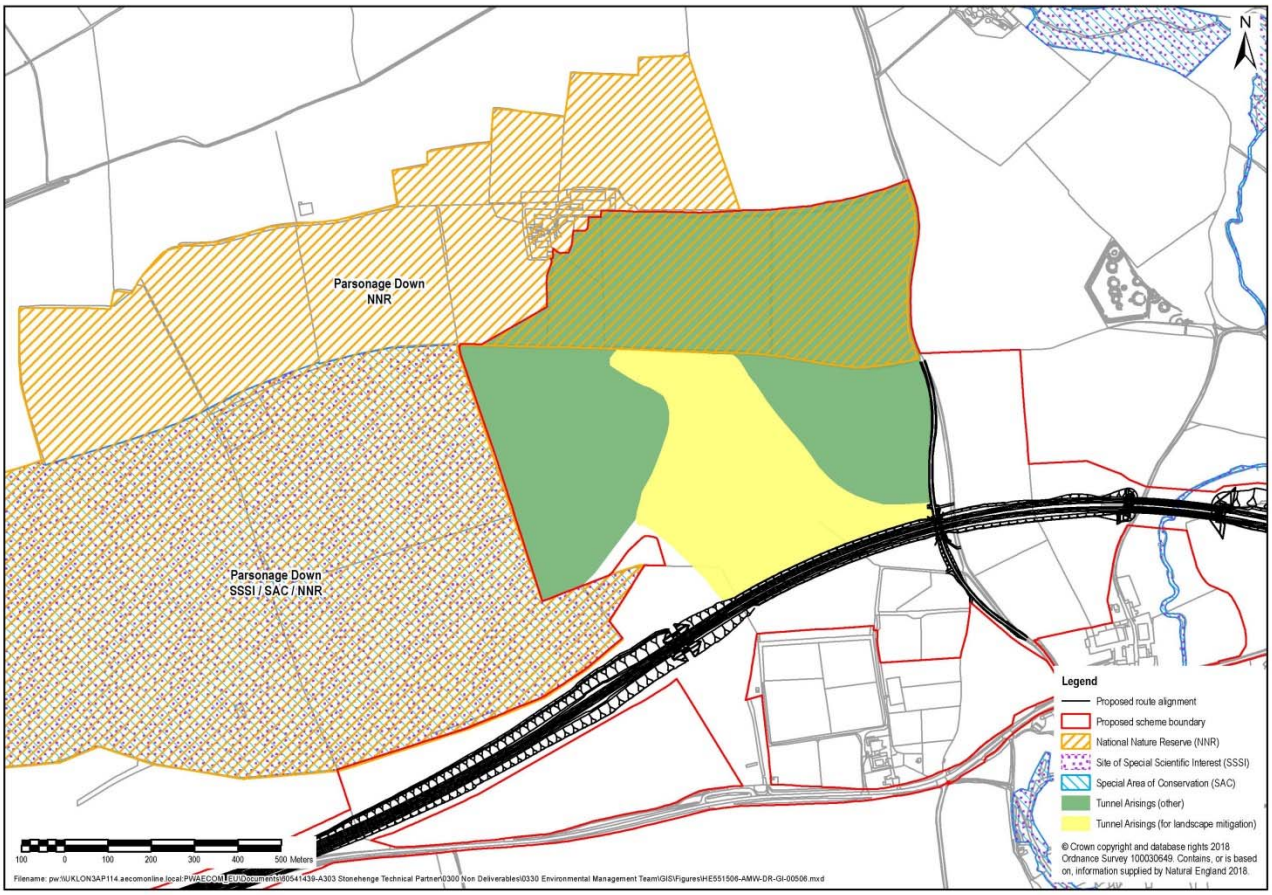
4.4.10 From an operational perspective, it is simpler and more efficient to deposit tunnel arisings in a single large area to the east of Parsonage Down rather than having to split the deposition between the two locations: this reduces the need for additional haul roads and increases flexibility and space for drying of the arisings.

4.4.11 The site east of Parsonage Down has better potential for habitat creation that could expand and augment the existing habitats at Parsonage Down NNR and link with the habitats in the Till Valley.

4.4.12 For these reasons, the site east of Parsonage Down has been selected as the preferred location for placement of tunnel arisings.

4.4.13 Figure 4-2 shows an indicative layout for the proposed tunnel arisings placement area on land to the east of Parsonage Down.

Figure 4-2: Proposed Location of Tunnel Arisings Deposition East of Parsonage Down



5 Conclusions

5.1.1 Deposition of approximately 400,000 m^3 of tunnel arisings in an area to the east of Parsonage Down NNR is essential landscape integration mitigation in order to avoid significant adverse landscape effects.

5.1.2 Off-site disposal of the remaining 500,000 m^3 of tunnel arisings would lead to significant adverse effects with regard to noise, air quality and traffic, and together these could also combine to have potentially significant cumulative effects on receptors alongside the disposal route. These adverse effects would be mitigated by depositing the tunnel arisings in the immediate vicinity of the Scheme to the greatest extent possible.

5.1.3 Deposition of tunnel arisings in the immediate vicinity of the Scheme would also provide a net benefit to biodiversity – a scheme objective - and provides increased certainty for the deliverability of the Scheme (since there would not be any dependency on third-party off-site receptor sites).

5.1.4 Deposition of tunnel arisings within the Scheme boundary performs better against the assessment criteria (as shown in Table 3-3) and thus NPSNN policy requirements than off-site disposal.

5.1.5 An assessment of the potential sites within the immediate vicinity of the Scheme has shown that the area to the east of Parsonage Down is the most suitable site for the deposition of tunnel arisings. It confines all the activity for deposition of tunnel arisings to one area that would already be affected by the Scheme. It has lower impacts compared to other options, and provides the greatest opportunity for provision of enhancement for biodiversity.

5.1.6 Taking into account the cumulative benefits of on-site as opposed to off-site management of tunnel arisings, and compliance with the NPSNN, the option of deposition within the Scheme boundary to the East of Parsonage Down is considered to be the preferred option for the management of tunnel arisings associated with the Scheme.

Appendix A – Traffic Movements for Off-site Transport of Tunnel Arisings

A.1 Off-Site Deposition

A.1.1.1 The estimated number of vehicle movements for off-site transport of tunnel arisings has been estimated based on likely arisings generation rate and vehicle capacity, and is presented in Table A-1 and Table A-2. The hourly vehicle movements are based on a 9-hour working day during which vehicle movements are allowed, for 7 days per week. Any timing restrictions on vehicle movements (e.g. at weekends or public holidays) would increase the need for on-site stockpiling and increase the daily and hourly vehicle movements.

Table A-1: Peak Tunnel Arisings Generation Rate

Peak tunnel drive length per day	Peak Arisings production rate	Duration of 1 tunnel drive at peak rate	Vehicle movements per day*	Vehicle movements per hour required
m/day	tonnes/day	Days	no. of movements per day	no. of movements per hour
25	6946	122	694	78

*Includes outbound journeys transporting tunnel arisings and return journeys of empty vehicles

Table A-2: Average Tunnel Arisings Generation Rate

Tunnelling length average	Average arisings production rate	Duration of 1 tunnel drive	Vehicle movements per day*	Vehicle movements per hour required*
m/day	tonnes/day	Days	no. of movements per day	no. of movements per hour
16	4446	190	444	50

*Includes outbound journeys transporting tunnel arisings and return journeys of empty vehicles

A.1.1.2 In order to estimate the potential impacts of this additional travelling, preliminary traffic modelling has been carried out.

A.1.1.3 For the purposes of this modelling, five nominal off-site receptor sites were identified, each of which lies in a different direction from the site. Although these would not necessarily be the actual sites selected for off-site material deposition, they allow for a realistic assessment of the impacts of transporting tunnel arisings off-site.

A.1.1.4 In each case, the modelling assumed that, at any given time, all of the daily quantity of tunnel arisings is sent to a single site. Although in theory it would be feasible to split the movement between multiple sites in different directions from the site, this would pose considerable logistical and commercial constraints on the works.

A.1.1.5 The nominal receptor sites used in the assessment were:

- Quidhampton Quarry, Salisbury, Wiltshire
- Compton Bassett Landfill & Quarry, Calne, Wiltshire
- Westbury Quarry, Westbury, Wiltshire
- Halecombe Quarry, Frome, Somerset
- Shipton Quarry, Kidlington, Oxfordshire

A.1.1.6 Traffic modelling shows that the percentage increase in HGV traffic from tunnel arisings transport on some of the transport routes is high. The approximate increases in HGV traffic on the likely main routes to each site are:

- Quidhampton Quarry – up to 300% increase.
- Compton Bassett Landfill & Quarry: 200 – 300% increase.
- Westbury Quarry, Westbury, Wiltshire: 40 – 60% increase.
- Halecombe Quarry, Frome, Somerset: - 40 – 60% increase.
- Shipton Quarry: 10 – 15% increase.

Appendix B - Noise

B.1 Off-Site Deposition

B.1.1.1 Preliminary air quality and noise modelling has been carried out for the off-site disposal option.

B.1.1.2 The transfer of material off site by lorry to these receptor sites would result in an increase in HGV traffic, and therefore traffic noise, along the relevant routes used to access the sites. A high level analysis of the potential impacts on existing traffic noise levels along the relevant routes has been completed. This is based on calculating the 'Basic Noise Level' (BNL) as defined in the 'Calculation of Road Traffic Methodology' (CRTN). This effectively estimates the traffic noise level ($L_{A10,18h}$) at a free-field position 10m from the kerb based solely on the flow, composition and speed. No account of the ground type, topography, gradient, road surface etc. is included. Comparison of the baseline BNL (without construction traffic) with the 'with construction traffic' BNL gives an indication of the likely magnitude of the change in traffic noise level which would be experienced at any sensitive receptors (such as residential properties) in close proximity to the route. DMRB defines a change of 1dB as the screening criteria to be used to identify potentially significant changes in traffic noise levels. This process may over-estimate the impact, particularly on roads with lower traffic flows, as each road is considered in isolation. A large change in traffic noise from a minor road may in reality be masked by the noise from a nearby more major road. In addition, the CRTN methodology is not applicable at 18 hour flows below 1000, therefore such links have been excluded from the analysis.

B.1.1.3 An initial analysis of the results is provided in the Table B-1 using the DMRB magnitude of impact scale. Negligible and minor increases are generally classed as not significant whilst moderate and major increases are generally classed as significant, subject to the presence of sensitive receptors.

Table B-1: Estimated Number of Traffic Links with Increased Traffic Noise

Change in BNL (dB)	Magnitude of Impact	Split between sites	Compton Bassett	Shipton Quarry	Quid-hampton	Halecom-be Quarry	Westbury inactive quarry
0<1 dB increase	negligible	245	6	121	16	19	13
1<3 dB increase	minor	6	23	8	29	21	17
3<5 dB increase	moderate	2	2	4	1	1	0
>=5 dB increase	major	0	3	1	1	1	1
Links with flows <1000 excluded from analysis		3	0	0	0	2	0
Total number of links		256	34	134	47	46	31

B.1.1.4 As would be expected the least impact occurs with the ‘split between sites’ scenario, only 6 links are predicted to experience a minor increase and 2 a moderate increase. However, as described previously the operational and commercial constraints associated with this approach would be very difficult to manage in practice,

B.1.1.5 For each individual site considered in isolation, all the sites except Shipton result in a fairly large number of links experiencing a minor increase in traffic noise. A relatively small number of links experience a moderate or major increase, varying between 1 and 5 links. For Shipton quarry, of the 134 links on the route 121 experience a negligible increase.

B.1.1.6 To conclude, the transfer of material off site via HGV would potentially result in significant adverse effects on traffic noise levels experienced at a small number of locations along the affected routes. Smaller magnitude (non-significant) adverse effects are likely to be experienced along a much greater number of routes if Compton Bassett, Quidhampton, Halecombe Quarry and Westbury inactive quarry are used in isolation.

Appendix C - Air Quality

C.1 Off-site Deposition

C.1.1.1 With respect to air quality, the preliminary assessment indicates that there is potential for significant adverse air quality effects where the routes for the HGVs to access the off-site deposition sites go through AQMAs or areas of poor air quality.

C.1.1.2 Four of the sites have routes that pass through AQMAs:

- Compton Bassett (Marlborough AQMA)
- Quidhampton (Salisbury AQMAs)
- Westbury (Westbury AQMA)
- Shipton (Botley and Oxford AQMAs)

C.1.1.3 The assessment has been prepared in accordance with the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 1 'Air Quality' (HA207/07) and associated Interim Advice Notes (IANs) with the DMRB screening method (DMRB V5_EFTV7) used to make the predictions.

C.1.1.4 Initial predictions identify that the risk of significant adverse effects is particularly pronounced for the Quidhampton and Compton Bassett Quarries. For these two locations, there is a risk of significant effects on air quality if they are used either as a single receptor site or even in combination with other sites.

C.1.1.5 There is also a risk of significant adverse effects for the Westbury site.

C.1.1.6 Whilst the above areas are those that, based on Highways England guidance (i.e. close to and greater than the 40 µg/m3 air quality objective value), the Local Authorities would probably be more sensitive to any changes in air quality due to this option, particularly in the AQMA areas.

C.1.1.7 In summary, the preliminary air quality assessment has identified the potential for significant impacts at several of the nominal off-site receptor sites, which indicates more generally the potential impacts on AQMA’s resulting from the large increase in HGV traffic that would be associated with any off-site option.

C.1.1.8

Appendix D - Climate Change

D.1 Deposition within the Immediate Scheme Vicinity

D.1.1.1 The tunnel arisings are inert material and therefore would not give rise to methane or carbon dioxide generation if landfilled.

D.1.1.2 Climate change impacts are predominantly associated with the transport of material.

D.1.1.3 In the case of on-site deposition, tunnel arisings would be transported a short distance (between 1 and 2km) by tipper trucks on site haul roads.

D.2 Off-site Deposition

D.2.1.1 In the case of off-site deposition, arisings would be transported using standard eight-wheeled rigid tipper trucks on public roads. The distance travelled would depend on the site location. To allow comparison between on-site and off-site deposition, a number of indicative locations have been selected, and the associated transport-related greenhouse gas emissions have been estimated.

D.2.1.2 A worst case scenario for GHG emissions from the transportation of tunnel arisings is estimated to be around 8600 tCO2e based on approximately 84,000 journeys travelling to a site located 56km away. Data published by National Statistics indicates that in 2013 total emissions from vehicles using ‘A’ roads in Wiltshire was 580,700 tCO2e, and hence the total GHG arisings from transporting tunnel arisings off-site would amount to approximately 1.5% of this total. Expressed in alternative terms, 8600 tCO2e is equivalent to the amount of carbon sequestered by 1600 hectares of UK woodland in a year.

D.2.1.3 These GHG calculations are based on transport of all tunnel arisings off-site, although in practice some of the arisings are required for essential landscape mitigation within the scheme.

Table D-1: Estimated Carbon Dioxide Emissions from Off-site Tunnel Arisings Transport

		Outbound Journey			Return Journey			
Distance to deposition site	**Number of vehicle movements**	**Emissions factor (100% laden)**	**Distance (100% laden)**	**Emissions (100% laden)**	**Emissions factor (0% laden)**	**Distance (0% laden)**	**Emissions (0% laden)**	**Total Emissions**
km	No.	kg CO2e/km	km	tonnes CO2e	kg CO2e/km	km	tonnes CO2e	tonnes CO2e
16 (e.g. Quidhampton Quarry, Wilts)	84,413	1.07844	1,350,613	1,457	0.75337	1,350,613	1,018	2,474
43 (e.g. Westbury Quarry, Wilts)	84,413	1.07844	3,629,772	3,914	0.75337	3,629,772	2,735	6,649
56 (e.g. Halecombe Quarry, Somerset)	84,413	1.07844	4,727,145	5,098	0.75337	4,727,145	3,561	8,659

Appendix E – Applicability of CL:AIRE Code of Practice

AECOM + mace + WSP

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Project name:
A303 Stonehenge

To: Environment Agency

Project ref: 60547200

CC: File

From: Mike Bains

Date: 15/03/2018

Applicability of CL:AIRE Code of Practice to Parsonage Down Landscape Area

Summary

This note assesses the potential applicability of the CL:AIRE Code of Practice to the proposed placement of tunnel arisings to the east of Parsonage Down National Nature Reserve (NNR), as part of the A303 Amesbury to Berwick Down Scheme. It is proposed that once approved, this note would form the basis of proposals to, and discussions with, the Environment Agency.

If the CL:AIRE CoP can be applied to the tunnel arisings placement, this will obviate the need for the placement activities to be deemed a waste disposal operation which would require an Environmental Permit.

The project, including the intended location for tunnel arisings placement, is a single site covered by the Development Consent Order which is being sought for the A303 Scheme, and therefore falls within the "Site of Origin" scenario under the CL:AIRE CoP.

The Scheme includes construction of a 3 km twin-bore tunnel in chalk rock using a tunnel boring machine. This will produce approximately 1 million cubic metres of tunnel arisings. The employer will be Highways England, and the contractor for the Scheme is yet to be determined. The Scheme is currently in design and consultation, and planning permission for the Scheme will be sought from the Planning Inspectorate under a Development Consent Order for nationally significantly infrastructure. A Materials Management Plan for the Scheme will be developed by a Qualified Person.

Based on AECOM's initial assessment set out in this document, we consider that the CL:AIRE CoP could apply to the placement of tunnel arisings to demonstrate that they are not waste – i.e. they are not detrimental to the environment; they are suitable for use; there is certainty over the intended use; and the estimated quantities are necessary for landscaping and to provide biodiversity and other environmental benefits.

Context

A303 Stonehenge Tunnel Arisings

As part of the Scheme, the A303 will pass through a tunnel at least 2.9km in length to reduce its impact on the Stonehenge stone circle and the wider World Heritage Site. It is currently anticipated that the main bores of the proposed tunnel will be carried out using Tunnel Boring Machines (TBM), with either Slurry or Earth Pressure Balance (EPB) techniques. Current estimates are that approximately 1 million cubic metres of tunnel arisings will be generated. This material will not be suitable for use as structural fill in highways embankments. The tunnel arising's will require some form of processing following excavation to reduce moisture content and improve the handling properties of the material, the specific process required being dependant on the tunnelling technique chosen.

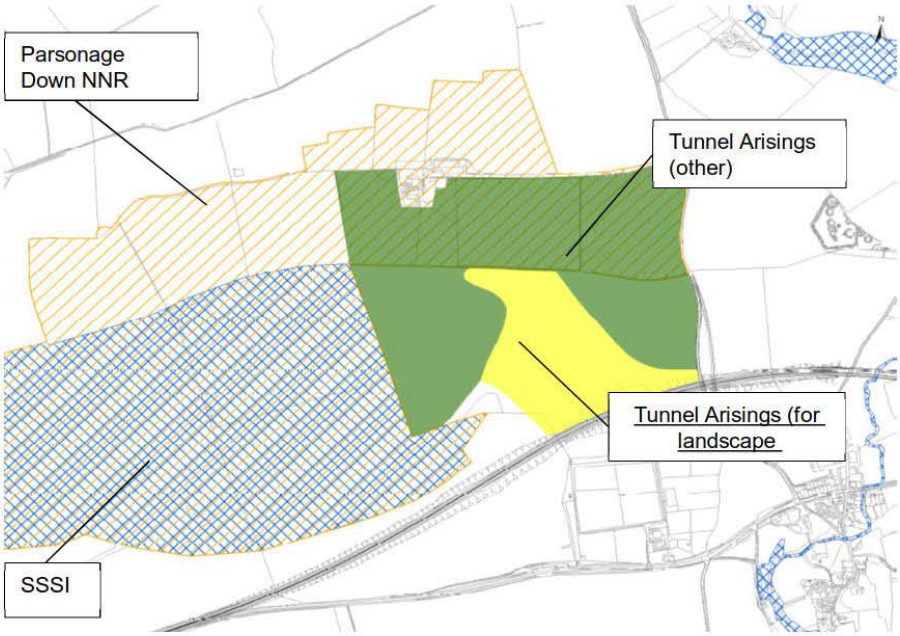
Parsonage Down Landscape Area

Parsonage Down is an existing NNR and part of the Salisbury Plain Special Area of Conservation (SAC). The majority of the NNR is a Site of Special Scientific Interest (SSSI), although part of the NNR is currently under cultivation. There is a plot of arable farmland that has been identified by Natural England as an area that could be used to create additional habitats of conservation value adjacent to the NNR..

The placement of tunnel arisings would act as a substrate for the creation of the new habitats. Natural England, which owns the NNR, are supportive of the scheme and have indicated that they see this as a good opportunity to increase the size and range of habitats associated with the NNR, and also allow for enhancing its accessibility to the public whilst not encroaching on the core chalk grassland habitats of the current NNR.

Part of the land identified for arisings placement lies within the NNR, but outside the SSSI. The remainder of the identified land is currently owned by Mr Moore and used for arable farming. Highways England is currently evaluating the options for acquisition of this land. If permanent acquisition of the land not currently under Natural England ownership is not possible, then this part of the land could be restored to agricultural use following placement of tunnel arisings, and new habitats created would be confined to land owned by Natural England.

Figure 1: Approximate location of the arisings placement areas in relation to Parsonage Down and Winterbourne Stoke



CL:AIRE Definition of Waste: Development Industry Code or Practice

Background

The Code of Practice is a voluntary framework for excavated materials management and re-use. Following this framework results in a level of information being generated which is reviewed by a qualified person and subject to verification report which enables the developer to demonstrate to the Environment Agency that the excavated material was either never discarded or subject to a recovery operation and completely recovered so that the material has ceased to be waste. . A Materials Management Plan (MMP) is required which details the procedures and measures that will be taken to classify, track, store, reuse and, if required, dispose of all excavated materials that will be encountered during the development works. Specifically, the MMP needs to demonstrate to a registered 'Qualified Person' that the plans fall within the defined material source scenarios, are supported by either a 'Design Statement' or 'Remediation Strategy' and that there is sufficient evidence to satisfy the four overarching factors established by the Code of Practice. The plan also needs to include a verification plan and provide for the production and keeping of a verification report.

Subsequent sections of this Technical Note summarise the requirements of the Code of Practice and how the re-use proposals identified for grassland reversion adjacent to Parsonage Down meet with the specified requirements.

Code of Practice Material Scenarios

The Code of Practice presents three potential material scenarios which would need to apply either in isolation or combination:

- Site of Origin – materials are used on the site from which they are excavated, either without treatment or after on site treatment as part of the development of that land. The site is defined as an area covered by a specified planning permission (e.g. within the provisional DCO boundary).
- Direct Transfer – materials transferred to another site,outside the DCO boundary (without treatment only).

- Cluster Project – materials transferred to another site, following treatment at a Hub site e.g. Soil Treatment Facility.

The Site of Origin scenario best applies to the proposed re-use of tunnel arisings adjacent to Parsonage Down, as the area proposed for habitat creation is within the DCO boundary. The Code of Practice defines the Site of Origin as a single readily identifiable site, which can include the area covered by a specified planning permission. Under the Site of Origin scenario any excavated material can be re-used, both made ground or natural ground, provided that the material and its proposed use meets the four overarching principles of the Code of Practice.

Principles for the Use of Materials as Non Waste at Parsonage Down

There are four factors that are described within the Code of Practice and these would need to be met:

- Factor 1: Protection of human health and protection of the environment – if the use of a material will create an unacceptable risk of pollution of the environment or harm to human health it is likely to be a waste.
- Factor 2: Suitability for use at point of use at Parsonage Down, without further treatment – material must be suitable for its intended purpose in all respects. Both a material's chemical and geotechnical properties have to be demonstrated to be suitable and the relevant agronomical specification for its use must be met.
- Factor 3: Certainty of use – the material holder must be able to prove that the material will be used (not just a probability but a certainty). Materials cannot be stockpiled indefinitely.
- Factor 4: Quantity of material – material should only be used in the quantities necessary for that use, and no more.

Factor 1: Protection of human health and protection of the environment

Demonstrating that the re-use of the tunnel arisings would not be to the detriment of human health or the environment at the receiving location requires that geo-environmental studies are undertaken. These will determine the geo-chemical and physical characteristics of the subject materials, and any risks that they may pose once placed. These studies also need to consider the types of additives that the tunnelling technique will introduce, the treatment processes available for the tunnel arisings and the typical residual concentrations of any contaminants of concern that these treatment processes can achieve.

The process of providing the required lines of evidence to meet Factor 1 requires a phased investigation approach that has already commenced:

- Investigation of existing ground conditions and the recovery and testing of soil samples to determine the current geo-chemical properties of the tunnel arisings;
- what additives may be introduced by the tunnelling process, and what treatment processes will be used and how effective these processes will be at rendering the treated arisings suitable for re-use at the proposed re-use location. This may be done through:
- A review of literature and case studies; and
- Use of laboratory bench scale trials to provide the level of confidence required in the treatment techniques proposed

Risk assessment of the residual geo-chemical concentrations within treated materials within the context of the re- use location and receptors in this area. The risk assessments would define threshold limits and form the basis for the screening of validation sample test results following the placement of the treated materials.

Risk assessments are currently being undertaken on the available and applicable ground investigation data and further investigations have been identified to supplement this information both through additional sampling and testing from cores held in storage and further ground investigations.

The risk assessments involve screening the recorded concentrations against UK compliant risk-based criteria that are designed to be both protective of human health, and the controlled waters environment. More detailed risk assessments will be undertaken to take specific account of the receptors at the receiving location with respect to the potential tunnel arisings. Reference will be made to other sites where chalk tunnel arisings has been used as a basis to habitat creation, such as Samphire Hoe (which used tunnel arisings from the Channel Tunnel).

Work to provide the lines of evidence for Factor 1, will need to be refined and developed as the design is further developed. Risk assessments will need to be developed as more information becomes available. The approach and methods will be discussed and agreed with the Local Authority and Environment Agency and initial discussions have already taken place with these Stakeholders. The tunnel arisings will comprise excavated chalk rock and there is no evidence to suggest that any of this material will be contaminated by historic land uses. Placement of tunnel arisings at Parsonage Down is likely to comply with the requirements of the Water Framework Directive since any impacts that are identified would be avoided or mitigated.

Factor 2: Suitability for use without further treatment

As part of the tunnel boring operation, the tunnel arisings will be transported (by pipe or conveyor) from the cutting face of the TBM to an arisings processing facility. At the processing facility, the arisings are dewatered and various fluids (such as bentonite) which are added to the arisings at the cutting face are removed and recirculated back to the cutting face.

The Code of Practice states that if material requires further processing prior to re-use, they would be considered to be waste but may cease to be waste once treated.

However, the arisings processing activity is an intrinsic part of the tunnel boring activity, which involves no points of discarding and would be required regardless of the final destination and use of the tunnel arisings. It is, therefore, considered that it is not indicative of the arisings being waste. Even if the arisings were characterised as a waste and the processing activity a waste treatment activity, the arisings after processing the arisings would be able to achieve "end of waste" and used as a non waste at Parsonage Down for the reasons set out in this note.

With regard to the material's suitability for use in habitat creation other chalk tunnel arisings placement schemes exist which demonstrate that TBM tunnel arisings can be used for good quality habitat creation (e.g. Samphire Hoe near Dover, which used tunnel arisings from the Channel Tunnel).

Factor 3: Certainty of use

It has been identified that the tunnel arisings from the A303 Stonehenge scheme could act as a suitable substrate for the creation of new habitats to the east of the NNR. Highways England will access the land at the time of the A303 Stonehenge construction with the consent of Natural England and intends to also obtain the consent of Mr Moore, in order to use the materials for this purpose.

Factor 4: Quantity of material

Preliminary landscape plans indicate that the area could accommodate approximately 1 million m^3 of tunnel arisings, with a landform that largely mirrors the existing topography.

The new highway passes to the south of Parsonage Down on an embankment. In order to blend this embankment into the surrounding topography, placement of material is required.

In addition to this landscape mitigation, the deposition of tunnel arisings to the east of Parsonage Down provides the following mitigation and benefits for the scheme:

- Allows for the creation of habitats of conservation value on current arable land that would not occur in the absence of this additional landscaping and which acts as mitigation for land loss elsewhere on the scheme as a result of the widening and construction of the A303, and may also create potential for increased public accessibility and greater range of habitats.
- Avoids noise and air quality impacts associated with off-site transport of arisings.
- Avoids greenhouse gas emissions associated with off-site transport of arisings.
- Avoids the need to place excess arisings in areas within or adjacent to the World Heritage Site
- Avoids the use of landfill void capacity in the wider region, thereby minimising any impacts on the waste management infrastructure capacity.

The use of the tunnel arisings to the east of Parsonage Down is therefore considered to be a sustainable and beneficial use of this material, and the quantities used are therefore necessary in order to secure these benefits and minimise the adverse impacts of off- site transport.

Other Requirements

A Design Statement or Remediation Strategy would be required to support the MMP at the pre-construction stage. Precisely which development route is followed is dependent upon the outcome of the activities described within the lines of evidence to support Factor 1.

The intention is that tunnel arisings would be transported from the processing facility to the point of deposition as they are produced, and therefore there would be no requirement for long-term storage of material. Some short term storage may be required in the event of equipment breakdown or adverse weather.

A Remediation Strategy is required where contamination is present or suspected, whereas a Design Statement is the development route to follow where contamination is not suspected. It is considered likely that a Remediation Strategy approach will be required because of the introduction of additives during the tunnelling process, their subsequent treatment and the need for validation to ensure that the residual materials generated meet with risk-based compliance criteria generated specifically for the area of re-use.

The Materials Management Plan and supporting information will require a Declaration from a registered Qualified Person under the Code of Practice.

Mr Mike Bains
Associate, Waste, Materials and Resources
AECOM
Royal Court Basil Close
Chesterfield
Derbyshire
S41 7SL

Our ref: WX/2018/131551/01-L01
Your ref: Email 15/03/2018

Date: 03 April 2018

Dear Mr Bains

CL:AIRE CODE OF PRACTICE - TECHNICAL NOTE.
A303 STONEHENGE (AMESBURY TO BERWICK DOWN) ROAD IMPROVEMENTS, WILTSHIRE

Thank you for your email dated the 15 March 2018, which attached 'Applicability of CL:AIRE Code of Practice to Parsonage Down Landscape Area' also dated 15 March 2018.

We consider that the CI:AIRE code of practice should work well with this project. As all material will be contained within the Development Consent Order boundary for the site, we see no reason that this project could not go ahead under CI:AIRE. However, we wish to make the following comments that should be taken into account.

Groundwater and contaminated land
In terms of groundwater and contaminated land issues, we understand that the tunnel arisings will contain additives used in the tunnelling process. The area covered by the proposed scheme is sensitive from a controlled waters perspective due to the underlying chalk being designated as a principle aquifer and the proximity to the River Till. Migration of contaminants leached from materials placed at the surface may travel rapidly downwards into groundwater through fracture networks in the chalk providing little time for natural attenuation. The remediation strategy and risk assessments should therefore ensure that these risks are adequately mitigated against.

We understand that investigation of potential residual risks is ongoing and that discussion with the Environment Agency is planned when the results are available and as the design progresses. We would welcome the opportunity to comment on the Remediation Strategy once this is available.

Environment Agency
Rivers House, Sunrise Business Park, Higher Shaftesbury Road, Blandford, Dorset, DT11 8ST.
Customer services line: 03708 506 506
www.gov.uk/environment-agency
Cont/d..

Biodiversity
With regard to comments that relate to biodiversity issues, we will defer our comments to Charles Routh at Natural England.

I hope this information is useful, but please contact me if you have any queries.

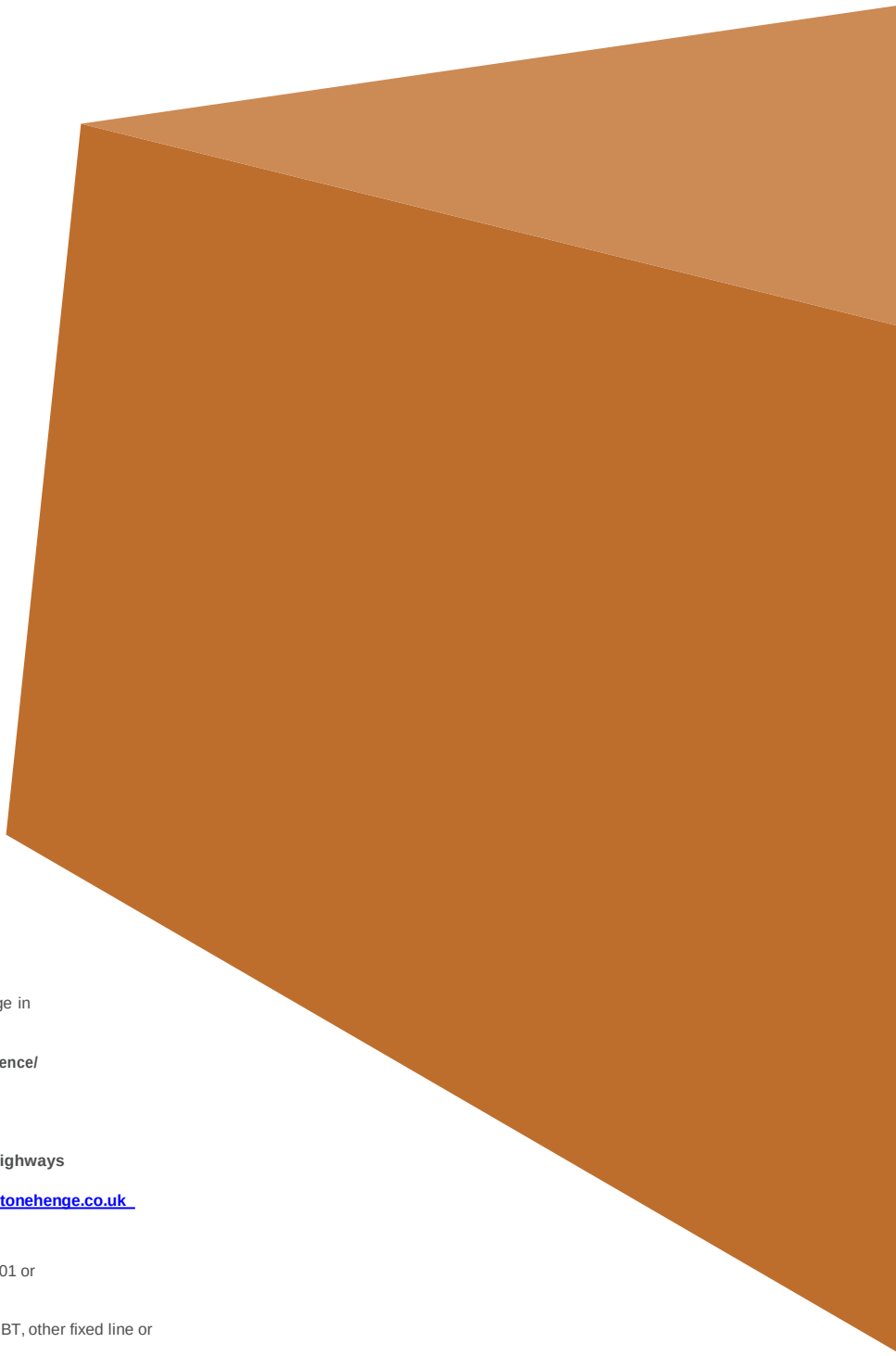
Yours sincerely

Miss Katherine Burt
Sustainable Places - Planning Specialist

Direct dial 02030 259339
Direct fax 01258 455998
Direct e-mail swx.sp@environment-agency.gov.uk

End 2

If you need help accessing this or any other Highways England information, please call **0300 123 5000** and we will help you.



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If you have any enquiries about this document email **info@a303stonehenge.co.uk** or call **0300 123 5000***.

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