The Sizewell C Project

6.6 Volume 5 Two Village Bypass

Chapter 10 Soils and Agriculture

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10 Soils and Agriculture

10.1 Introduction

10.1.1 This chapter of **Volume 5** of the **Environmental Statement** (**ES**) presents an assessment of the potential effects on soils and agriculture arising from the construction and operation of the two village bypass (referred to throughout this volume as the "*proposed development*"). This includes an assessment of potential impacts, the significance of effects, the requirements for mitigation and the residual effects.

10.1.2 Detailed descriptions of the two village bypass (referred to throughout this volume as the "*site*"), the proposed development and the different phases of development are provided in **Chapters 1** and **2** of this volume of the **ES**. A glossary of terms and list of abbreviations used in this chapter is provided in **Volume 1** of the **ES**.

10.1.3 This assessment has been informed by data from other assessments as follows:

- **Chapter 4** of this volume: Noise and vibration.
- **Chapter 5** of this volume: Air quality.
- **Chapter 7** of this volume: Terrestrial ecology and ornithology.
- **Chapter 11** of this volume: Geology and land quality.
- **Chapter 12** of this volume: Groundwater and surface water.

10.1.4 This assessment has been informed by data presented in the following appendix:

- **Appendix 10A** of this volume: Two Village Bypass Agricultural Land Classification (ALC) Report.

10.1.5 This assessment relates to the following key factors:

- the soil types and related ALC[1] grades likely to be affected by the proposed development;

[1] Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor quality land, with severe limitations due to adverse soil characteristics, relief, climate or a combination of these. Grade 3 land is

- the type of farm enterprises and farming or land management practices present, including any agri-environment schemes[2]; and
- the possible presence of crop, soil or animal diseases or noxious weeds, and the risk of spreading such disease or weeds.

10.1.6 The objectives of the assessment are to:

- characterise the baseline environmental conditions for soils, land-use and agriculture within the study area;
- identify all soils, land-use and agricultural receptors within and adjacent to the site that may be affected by the construction and operation of the site;
- assess the effects of the proposed development on soil, land-use and agriculture, taking account of temporary and permanent land-use requirements and reinstatement of land required temporarily for construction; and
- specify measures, if appropriate, to mitigate potential significant adverse residual effects on soil, land-use and agriculture; and
- determine residual effects, remaining after additional mitigation.

10.2 Legislation, policy and guidance

10.2.1 **Appendix 6M** of **Volume 1** of the **ES**, identifies and describes legislation, policy and guidance of relevance to the assessment of the potential agriculture and soil impacts associated with the Sizewell C Project.

10.2.2 This section provides an overview of the specific legislation, policy and guidance of relevance to the proposed development.

a) International

10.2.3 There is no international legislation or policy that is relevant to the soils and agriculture assessment of the proposed development.

subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grades 1, 2 and 3a are defined as best and most versatile (BMV) land.

[2] Agri-environment schemes are land management practices which protect and enhance the environment, for example planting field margins with food sources for insects and reduced management of hedgerows to provide more habitat for farmland birds.

b) National

10.2.4 As stated in **Volume 1, Chapter 3** of the **ES,** the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (Ref. 10.1) when combined with the NPS for Nuclear Power Generation (NPS EN-6) (Ref.10.2) provides the primary basis for decisions on applications for nuclear power generation developments. A summary of the relevant NPS EN-1 and EN-6 requirements, together with consideration of how these requirements have been taken into account in soils and agricultural assessment is provided in **Appendix 6M** of **Volume 1** of the **ES**.

10.2.5 In summary, these policies require the impacts on soils and best and most versatile (BMV) land to be considered in the assessment, including seeking to minimise impacts on BMV land and use areas of poorer quality land in preference.

10.2.6 Other national policies of relevance to the assessment include:

- The National Planning Policy Framework – this requires planning policies and decisions to recognise the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland (Ref. 10.3).
- Planning Practice Guidance – this refers to agricultural land and the requirement for consultation with Natural England where there is an impact on BMV land (Ref. 10.4).
- Government's 25 Year Environment Plan – this includes plans to tackle problems of soil degradation and to enhance our natural capital (which includes soils), with an ambition that by 2030 all of England's soils should be managed sustainably (Ref. 10.5).
- A Strategy for England; Safeguarding Our Soils – this sets out the Government's aim to protect agricultural soils, particularly where BMV land is present (Ref. 10.6).

10.2.7 The requirements of these, as relevant to the soils and agriculture assessment, are set out in **Appendix 6M** of **Volume 1** of the **ES**.

c) Regional

10.2.8 No regional policies are deemed relevant to the assessment of effects on soils and agriculture for this site.

d) Local

10.2.9 Local policies of relevance to the soils and agricultural assessment include:

- Suffolk Coastal District Council Local Plan Core Strategy and Development Management Polices (Ref. 10.7) – this makes reference to, where possible, preserving prime agricultural land for food production.
- Suffolk Coastal District Council Final Draft Local Plan – this highlights the presence of BMV land as a key issue (Ref. 10.8).

10.2.10 The requirements of these, as relevant to the soils and agricultural assessment are described in **Appendix 6M** of **Volume 1** of the **ES**.

e) Guidance

10.2.11 This assessment has been undertaken in accordance with the following guidance documents:

- Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, section 3, part 11, LA109 Geology and Soils (Ref. 10.9).
- Natural England Technical Information Note 049 (2012) (Ref. 10.10).
- Defra Construction Code of Practice for the sustainable re-use of soils on construction sites (Ref. 10.11).
- Good Practice Guide for Handling Soils (MAFF, 2000) (Ref. 10.12).
- British Standard Specification for Topsoil and requirements for use (BS3882:2015) (Ref. 10.13).

10.2.12 The requirements of these, as relevant to the soils and agriculture assessment, are set out in **Appendix 6M** of **Volume 1** of the **ES**.

10.3 Methodology

a) Scope of the assessment

10.3.1 The generic Environmental Impact Assessment (EIA) methodology is detailed in **Volume 1**, **Chapter 6** of the **ES**.

10.3.2 The full method of assessment for soils and agriculture that has been applied for the Sizewell C Project is included in **Appendix 6M** of **Volume 1** of the **ES**.

10.3.3 This section provides specific details of the soils and agriculture methodology applied to the assessment of the proposed development. The scope of assessment considers the impacts of the construction and operation of the proposed development.

10.3.4 The scope of this assessment has been established through a formal EIA scoping process undertaken with the Planning Inspectorate. A request for an EIA Scoping Opinion was initially issued to the Planning Inspectorate in 2014, with an updated request issued in 2019, see **Appendix 6A** of **Volume 1** of the **ES**.

10.3.5 Comments raised in the EIA Scoping Opinion received in 2014 and 2019 have been taken into account in the development of the assessment methodology. These are detailed in **Appendices 6A** to **6C** of **Volume 1** of the **ES**.

b) Consultation

10.3.6 The scope of the assessment has been informed by specific consultation and engagement with statutory consultees throughout the design and assessment process. This has been undertaken on a project-wide basis and details are included in **Appendix 6M** of **Volume 1** of the **ES**. No consultation with statutory consultees in relation to the scope of the soils and agriculture assessment has been undertaken with specific regards to the site.

c) Study area

10.3.7 The study area for the soils and agriculture assessment includes the land required for construction and operation phases of the proposed development. The location and extent of the site is described in **Figure 1.1** of this volume.

10.3.8 The site covers approximately 54.8 hectares (ha) and is located to the east of Farnham and Stratford St Andrew. Approximately 50.33ha of the site is agricultural land. The remainder of the site comprises sections of the A12, the A1094, Langham Road and sections of farm access tracks and woodland.

10.3.9 The two village bypass has been split into three main sections as follows for the purposes of describing the baseline where this provides greater clarity:

- Western section – A12 / Tinker Brook to Pond Wood.
- Central section - Pond Wood to north of Farnham Hall.
- Eastern section – north of Farnham Hall to A12 / A1094 (Friday Street).

10.3.10 In addition, the assessment of impacts on farm viability takes account of the extent of each affected land holding, so the impact can be considered in the context of the holding.

d) Assessment scenarios

10.3.11 The assessment of effects on soils and agriculture includes the assessment of both construction (including the reinstatement of land required temporarily) and operation phases of the proposed development, rather than specific assessment years.

10.3.12 For the purposes of this assessment, effects on BMV land and land holdings are considered to occur during the construction phase.

e) Assessment criteria

10.3.13 As described in **Volume 1**, **Chapter 6** of the **ES**, the EIA methodology considers whether impacts of the proposed development would have an effect on any resources or receptors. Assessments broadly consider the value or sensitivity of resources and receptors that could be affected and the magnitude of impacts in order to classify effects.

10.3.14 A detailed description of the assessment methodology used to assess the potential effects on soils and agriculture for the proposed development is provided in **Appendix 6M** of **Volume 1** of the **ES**. A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

i. Sensitivity

10.3.15 The approach to assigning levels of sensitivity to receptors is summarised in **Table 10.1**.

Table 10.1: Assessment of the value or sensitivity of receptors for soils and agriculture

Value and/or Sensitivity	Description
High	Grade 1, 2 and 3a land (i.e. best and most versatile (BMV) land);

Value and/or Sensitivity	Description
	irrigated agriculture; stock animals; higher level agri-environment schemes; soils with low or no wetness limitation affecting workability (Wetness Class I or II), where drought is not also a limitation; and soils with a high susceptibility to structural damage and soil erosion throughout the year, including heavily textured, poorly structured soils.
Medium	Grade 3b land; non irrigated agriculture; entry level agri-environment schemes and Woodland Grant schemes; soils with low wetness limitation affecting workability (wetness class II), where drought is not also a limitation; and soils with some seasonal susceptibility to structural damage and soil erosion.
Low	Grade 4 land; arable or grassland areas; soils with moderate wetness limitation affecting workability (wetness class III or IV); and soils with medium to course textures and some resistance to structural damage for most of the year.
Very Low	Grade 5 land; soils with high wetness limitation affecting workability (wetness class V or VI); soils in which susceptibility to drought is a limitation to crop growth; and course textured and stony soils with little potential for structural damage.

ii. Magnitude

10.3.16 The magnitude of impact is based on the consequences the proposed development would have upon soils and agricultural receptors. There is no published guidance on thresholds for assessing what scale of loss should be regarded as significant, but the presence of BMV land is a key factor in the consideration of the sustainability of development proposals as set out in the NPPF (Ref. 10.3). The criteria for the assessment of magnitude are shown in **Table 10.2**.

Table 10.2: Assessment of magnitude of impact on soils and agriculture

Magnitude	Criteria
High	Permanent or long-term loss or degradation of over 50ha of BMV land, or entire regional resource of BMV land (ALC Grades 1, 2, 3a). Loss of >20% of farmed land. Permanent loss of entire area of land under agri-environment or Woodland Grant scheme. No access possible to severed land. Existing land-use across land holding would not be able to continue.
Medium	Permanent or long-term loss or degradation of 20-50ha of BMV land, or large proportion of regional resource of BMV land. Loss of >10- 20% of farmed land. Long-term, reversible, loss of entire area or majority of land under agri-environment or Woodland Grant scheme. Access possible to severed land via the public highway. Existing land-use across land holding would be able to continue but with major changes such as loss of yield, additional land management or increased use of fertilisers and herbicides.
Low	Permanent or long-term loss or degradation of 10-20ha of BMV land, or small proportion of regional resource of BMV land. Loss of >5-10% of farmed land. Short to medium-term reversible loss, or permanent loss of small areas, of land area under agri-environment or Woodland Grant scheme. Access possible to severed land via private ways. Existing land-use across land holding would be able to continue but with some changes such as loss of yield, additional land management or increased use of fertilisers and herbicides.
Very Low	Permanent or long-term loss or degradation of <10ha of BMV land. Loss of <5% of farmed land. No severance. Short-term impacts to receptors with no impact on integrity. No material changes to existing land-use.

10.3.17 For the purposes of this assessment short-term is considered to include the timeframe of the construction phase of the proposed development.

iii. Effect definitions

10.3.18 The definitions of effect for agriculture and soils are shown in **Table 10.3**.

Table 10.3: Classification of effects

		Value / Sensitivity of Receptor			
		Very Low	Low	Medium	High
Magnitude	Very Low	Negligible	Negligible	Minor	Minor
	Low	Negligible	Minor	Minor	Moderate
	Medium	Minor	Minor	Moderate	Major
	High	Minor	Moderate	Major	Major

10.3.19 Following the classification of an effect as presented in **Table 10.3**, a clear statement is made as to whether the effect is significant or not significant. As a general rule, major and moderate effects are considered to be significant and minor and negligible effects are considered to be not significant. However, professional judgement is also applied where appropriate.

f) Assessment methodology

10.3.20 **Appendix 6M** of **Volume 1** of the **ES**, sets out the detailed methodology followed. A summary of the assessment criteria used in this assessment is presented in the following sub-sections.

i. Establishing the baseline

10.3.21 The principal agricultural and related resources are characterised by the quality of the agricultural land (i.e. the land grade according to the ALC system) and type of land use (e.g. arable land, presence of livestock etc.) including any diversified activities on farms (e.g. farm shops).

10.3.22 Soil and ALC surveys were undertaken in accordance with published guidelines (Ref. 10.14). A detailed ALC survey was undertaken in July and October 2019, examining soil properties to a depth of up to 1.2m below ground level at 58 locations, see **Appendix 10A** of this volume for further details.

10.3.23 Soil physical characteristics were recorded so that factors such as soil texture, structure, depth and stoniness could be assessed in terms of any limitation they pose to agricultural productivity. Site characteristics, such as micro-relief (topographical changes over short distances), flood risk and climate were also assessed in terms of potential limitations to agricultural productivity they may pose.

10.3.24 In addition, information has been gathered from landowners affected by the proposed development. A total of three agricultural holdings are affected.

Interviews have been conducted during 2019 with these using the interview pro-forma presented in **Appendix 6M** of **Volume 1** of the **ES**.

ii. Assessment

10.3.25 As set out above, the assessment of effects on soils and agriculture includes the assessment of both construction and operation phases of the proposed development, rather than specific assessment years.

g) Assumptions and limitations

10.3.26 The assessment is based on the permanent and temporary land requirements illustrated on **Figures 2.1** to **2.4** of this volume and shown on the **Land Plans** (Doc Ref. 2.1).

10.3.27 An area of 3.15ha (5.74% of the total site area) was not able to be surveyed. These areas are shown on **Figure 10.3**. However, given the overall proportion of land surveyed to a detailed level for the site, and given the extent of BMV land confirmed through these surveys, it is considered that the available information is sufficient to inform the assessment. All un-surveyed land is treated as being potentially BMV land for the purposes of this assessment in order to assess a worst-case scenario.

10.3.28 Part of the land required from Parkgate Farm and Farnham Hall is to create flood compensation areas within the River Alde floodplain, if required. The assessment assumes these land areas are permanently lost to the land holdings. However, it is likely that if the flood compensation areas are required, these areas would be returned to agricultural use in some form.

10.3.29 Information on land use is based on information publicly available, and as provided by landowners. In relation to the un-surveyed land, aerial photographs and landowner interviews have been used to inform the assessment relating to this land. Where land is tenanted it is assumed these will cease prior to the land being taken for the construction phase.

10.4 Baseline environment

10.4.1 This section presents a description of the baseline environment within the site and the surrounding area.

10.4.2 Further detail of the agricultural land quality is presented in **Appendix 10A** of this volume**.**

a) Current baseline

i. Geology

10.4.3 The western section of the site is underlain by Red Crag Formation (quaternary and neogene sands) and overlain by Lowestoft Formation and Alluvium (quaternary sedimentary superficial deposit of clay, silt, sand and gravel) (Ref. 10.15).

10.4.4 The central section of the site is underlain by Chillesford Church Sand Member (quaternary sedimentary bedrock) with overlying drift deposits of Lowestoft Formation.

10.4.5 The eastern section of the site is underlain by the Crag Group (quaternary shallow-water marine and estuarine sands, gravels, silts and clays), with overlying drift deposits of Lowestoft Formation (superficial diamicton deposits comprising an extensive sheet of poorly-sorted matrix-supported chalky till as well as outwash sands and gravels, silts and clays).

10.4.6 A full description of the geological characteristics of the site is provided in **Chapters 11** and **12** of this volume.

ii. Topography and drainage

10.4.7 The topography across the western section of the site varies between approximately 3 and 26m above ordnance datum (AOD). The land falls gently from the A12 towards the River Alde, rising up again more steeply to Pond Wood. The Central and eastern sections have flatter topography, lying at approximately 20m AOD.

10.4.8 Gradient and microtopography do not limit ALC grade within the site based on the ALC criteria (Ref. 10.14).

10.4.9 The River Alde runs north to south through the western section. A number of surface water drainage ditches are also present in the western section in the fields bordered by Tinker Brook and the A12. Land within the floodplain associated with the River Alde is shown on the Environment Agency flood maps as lying within Flood Zone 3, where there is a 1 in 100 or greater probability of fluvial flooding.

10.4.10 Further information on flood risk associated with the site is provided in **Chapter 12** of this volume. Whilst it is considered there is the potential that this could limit the ALC grade through the River Alde floodplain, information on flood frequency is not available and as such it is assumed that any limitation is minor and the grade as determined from the soil properties has not been downgraded.

iii. Climate

10.4.11 The main parameters used in the assessment of an overall climatic limitation are presented in **Appendix 10A** of this volume. These specifically refer to annual average rainfall as a measure of overall wetness, and accumulated temperature over the growing season as a measure of the warmth in the growing season. The site is considered to have both relatively low rainfall, and a long growing season, and thus climate does not impose an overall limitation on ALC grade at this site.

10.4.12 Climate has an important influence on the interactive limitations of soil wetness and soil droughtiness. The relatively low rainfall, and long growing season will act to decrease the severity of any potential soil wetness limitation (i.e. reducing the potential for waterlogging to occur which may restrict plant rooting and the ability of the land to be managed). However, these attributes increase the severity of any potential soil droughtiness limitation (i.e. reduced availability of water for plant uptake).

iv. Soil types

10.4.13 The distribution of soil types across the site is shown on **Figure 10.1**.

10.4.14 In the western part of the site (with the exception of the area around the floodplain associated with the River Alde) the soils are described as slightly acid loamy and clayey soils with impeded drainage (see **Figure 10.1**). These soils belong to the Burlingham 3 Soil Association[3]. The main land use associated with these soil types is cereals, sugar beet and other arable crops (Ref 10.16). Within the area of the River Alde floodplain, the soils are described as deep peat soils associated with clayey over sandy soils which in part are very acidic. These soils belong to the Mendham Soil Association. The main land use on these soils is permanent grassland, cereals, sugar beet and potatoes (where groundwater control (i.e. lowering) is possible).

10.4.15 For the rest of the site the soils are mapped as being freely draining slightly acid sandy soils. These are shown to belong to the Newport Soil Association. The main land use on these soils is described as being arable crops such as barley, other cereals and sugar beet, with some coniferous woodland and lowland heath habitats.

10.4.16 The soil survey confirmed the above range of soil types present on site. It was identified that the stone content often rises in the lower subsoil but the topsoil content of larger stones (above 2cm) is not enough to limit ALC grade.

[3] A Soil Associations represents a group of soil types which are typically found occurring together in the landscape.

v. Agricultural land quality and classification

10.4.17 Published ALC maps show the site to comprise a mix of Grades 2, 3 and 4 (**Figure 10.2**). These maps are published at a scale of 1:250 000 and are generally considered to be of value for strategic land use planning purposes and not site-specific assessments, although they do provide a guide as to the land grades which could be present. It should be noted also that these maps do not distinguish between the Sub-grades 3a and 3b.

10.4.18 Since the publication of the Provisional ALC, certain areas of the country have been surveyed in greater detail. However, there are no detailed ALC maps available for this site. Therefore, ALC surveys were undertaken on the agricultural land within the site. These surveys were undertaken in July 2019 with the results of the agricultural land quality at the site summarised in this chapter and further presented in **Appendix 10A** of this volume.

10.4.19 **Figure 10.3** illustrates the distribution of ALC grades across the site, determined by the ALC surveys.

10.4.20 Approximately 50% of the site comprises land which falls into a BMV land category (i.e. Grades 1, 2 and 3a). The remaining areas of the site comprise Grade 3b (19.5ha), Grade 4 (0.6ha) and non-agricultural land (4.5ha). In addition, 3.1ha is un-surveyed.

10.4.21 The ALC grade distribution and the corresponding percentages, are shown in **Table 10.4**.

Table 10.4: ALC grade distribution

ALC Grade	Area (ha)	Area (%)
1	0	0
2	2.0	3.65
3a	25.1	45.80
3b	19.5	35.58
4	0.6	1.10
5	0	0
Non-agricultural	4.5	8.21
Not surveyed	3.1	5.66
Total	**54.8**	**100**

10.4.22 All the areas of un-surveyed land lie adjacent to areas mapped as Grade 3b. It is considered likely that the un-surveyed land will also be Grade 3b, but for the purposes of this assessment it has been assumed that some of

this land may be a higher grade (i.e. BMV land) to ensure a reasonable worst case has been assessed.

10.4.23 Grade 2 land covers an area of 2.0ha (3.65% of the site), comprising soils with key characteristics including medium to light textured subsoils overlaying heavy textured subsoils limited to Grade 2 by wetness and/or droughtiness. These soils are located in close proximity to the River Alde.

10.4.24 Grade 3a land covers 25.1 ha in total (45.80% of the site). Grade 3a land is present throughout the proposed scheme within the eastern, western and central sections. The soil is mostly characterised by a medium textured topsoil overlaying a heavy textured subsoil resulting in low permeability in the soil, however low rainfall means soils are only occasionally waterlogged (Wetness Class[4] II and III) and instead soils are limited mostly by droughtiness. Grade 3a land in close proximity to the River Alde in the western section is characterised by heavy textured topsoil overlying light textured sands, these soil profiles are limited by droughtiness or droughtiness and wetness.

10.4.25 Grade 3b land comprises 19.5ha (35.58% of the site) characterised by main two soil profiles, the first being medium textured topsoil overlaying light textured subsoil found predominantly at the northernmost area of the eastern section. This permeable free draining profile limits the grade by droughtiness. The other profile type is characterised by a medium textured topsoil overlaying a heavy textured subsoil resulting in low permeability in the soil, however low rainfall means soils are only occasionally waterlogged (Wetness Class II and III) and instead soils are limited mostly by droughtiness. These are found in the western and eastern sections of the proposed scheme.

10.4.26 Grade 4 land covers 0.6ha (1.10% of the site). This small area in the western section bordering the A12 is characterised by a shallow soil comprising a light textured topsoil overlaying gravel, limited to Grade 4 by droughtiness.

vi. Land use and holding information

10.4.27 The agricultural land (approximately 50.3ha) on the site forms part of three separate land holdings.

10.4.28 When surveyed in July and October 2019 the site was mostly in use as grazing for cattle on land adjacent to the River Alde and arable (combinable crops) across the remainder of the site. The northern part of the site, adjacent to A1094 (Friday Street) comprised a car boot sale area and a

[4] Wetness Class defines the average duration of waterlogging at specified depths in the soil profile.

pick your own vegetable area. Details of the land uses present are shown in **Table 10.5**.

Table 10.5: Details of land holdings within the site

Holding Name	Description	Landholding Area within the Site Boundary	Total Landholding Area (Approx.)	Percentage of Landholding within the Site Boundary	Sensitivity to Change
Parkgate Farm (forming part of Glenham Hall Estate).	Predominantly arable production (cereals and some vegetables). Grazing land associated with the River Alde floodplain – cattle grazed by a tenant. Access to these fields is predominantly on farm tracks from Park Farm (which includes a bridge crossing of the river) which then provides access to land further south in the same ownership. The majority land within the site boundary is under Entry Level plus Higher Level Stewardship agreements (see **Figure 10.4**). Woodland blocks under English Woodland Grant schemes (see **Figure 10.5**).	28.61ha	1214ha	2.36%	High
Farnham Hall.	This land is used for arable (cereal) production. Access is provided on farm tracks from just south of Farnham. Land not under agri-environment schemes.	10.98ha	61.41ha	17.88%	Low

Holding Name	Description	Landholding Area within the Site Boundary	Total Landholding Area (Approx.)	Percentage of Landholding within the Site Boundary	Sensitivity to Change
Friday Street Farm.	The large field is under arable production (oil seed rape currently). The fields closest to the A12 are in use as a car boot sale venue and a pick your own vegetable area. Access is on farm tracks from the A12 and from Friday Street Farm. Land not under agri-environment schemes.	12.01ha	42.12ha	28.51%	Low

b) Future baseline

10.4.29 It is considered unlikely that the land quality baseline conditions would change. This is because the grade of agricultural land is determined predominantly by the soil's physical characteristics (in particular texture and related structure) which would be unlikely to change during the timeframes of the Sizewell C Project in the absence of the proposed development.

10.4.30 Climate change predictions indicate increased temperatures could result in increased drought. The soils which support higher grade land quality generally comprise light textured topsoil over heavy textured subsoil. These soils would have a good capacity to hold water in the subsoil and so would continue to be able to support deep rooted crops such as cereals. Drier climatic conditions may reduce periods of waterlogging which could extend the season when access to the land for agricultural operations is possible. However, this could be countered by more intense rainfall events limiting access at unpredictable times. Overall, it is considered there would be no material change in the baseline conditions in relation to land quality.

10.4.31 Parkgate Farm has plans to build a large irrigation pond to support future cropping irrigation requirements (under construction in 2019, Application Reference DC/18/0322/FUL). This would be located in the field adjacent to Pond Barn Cottages. There is also a full planning application submitted in relation to Pond Farm for the conversion of three existing agricultural barns to form two dwellings (Application Reference DC/17/1331/FUL).

10.4.32 The provision of additional irrigation water supplies has the potential to make alternative crops commercially viable from this land. However, overall the land is assumed to remain in arable production. This has the potential to counter any changes (in particular increased drought risk) resulting from climate change.

10.4.33 The proposed barn conversion is not considered likely to materially alter the baseline conditions in relation to soils and agriculture during the construction and operation phases of the proposed development.

10.5 Environmental design and mitigation

10.5.1 As detailed in **Volume 1**, **Chapter 6** of the **ES**, a number of primary mitigation measures have been identified through the iterative EIA process and have been incorporated into the design and construction planning of the proposed development. Tertiary mitigation measures are legal requirements or are standard practices that will be implemented as part of the proposed development.

10.5.2 The assessment of likely significant effects of the proposed development assumes that primary and tertiary mitigation measures are in place. These measures are summarised in this section so that it is clear where and why these measures have been included and the way in which they have contributed to the management and reduction of environmental effects.

a) Primary mitigation

10.5.3 Primary mitigation is often referred to as 'embedded mitigation' and includes modifications to the location or design to mitigate impacts; these measures become an inherent part of the proposed development.

10.5.4 As part of the design process, the site layout has been optimised to reduce the overall land take. This has resulted in a reduction in the land take required by approximately 15ha, see **Chapter 3** of this volume for further details on the design evolution of the site. This includes a reduction in the extent of BMV land affected. Agricultural land required temporarily during the construction phase will be returned to agricultural use upon completion of construction works.

10.5.5 The design includes elements to reduce the potential fragmentation and restrictions in terms of access to land and properties. This includes the following:

- Realignment of Tinker Brook to accommodate access to the south of the new road and to Parkgate Farm.

- Realignment of the accommodation access track connected to Parkgate Farm which would be diverted to pass under the new road on the western side of the River Alde. A livestock path would be provided to the west of the proposed River Alde overbridge to allow cattle to move north and south of the route of the bypass; the livestock path would cross beneath the route of the two village bypass, approximately 200m south-east from the existing A12, alongside an existing unnamed drain.

- On the east side of the river, east of the existing crossing, a diversion will be provided from the existing access to pass beneath the River Alde overbridge, and then directed east along the embankment until it meets its existing alignment. The bridge would maintain a headroom clearance of 6m from river bank level to the underside of the bridge, to allow its use by agricultural vehicles.

- Provision of staggered junctions between Nuttery Belt and Pond Wood to maintain access on both sides of the site. On the south side this includes the provision of an accommodation track to Pond Barn Cottages and access to Farnham Hall Farm House to maintain access to the properties.

- Provision of an overbridge (Foxborrow Wood footbridge) to allow access across the new road for non-motorised users (to include the existing Public Right of Way (Footpath E243/003/0) which would be upgraded to a bridleway).

b) Tertiary mitigation

10.5.6 Tertiary mitigation will be required regardless of any EIA assessment, as it is imposed, for example, as a result of legislative requirements and/or standard sectoral practices.

10.5.7 The sustainable re-use of the soil resource would be undertaken in line with the Construction Code of Practice for the Sustainable Use of Soil on Construction Sites (Ref. 10.11) and the MAFF Good Practice Guide for Soil Handling (Ref. 10.12).

10.5.8 An outline **Soil Management Plan** (SMP) has been developed and is provided in **Appendix 17C** of **Volume 2** of the **ES**. This would contain information on handling methods and measures which would be implemented including (but not limited to):

- development of a Soil Resources Plan (SRP) by the Contractor, which would include detail on existing soil information, proposed storage locations and management measures;
- ensuring soils are stripped and handled in the driest condition possible;
- ensuring topsoil and subsoil resources are stripped and stockpiled separately;
- protection of stockpiles from erosion through establishment of a grass cover and from tracking over through appropriate signage and/or fencing;
- confining vehicle movements to defined haul routes until all the soil resource has been stripped; and
- ensuring the physical condition of all restored soil profiles to at least 1.2m below ground level is sufficient for the post-reinstatement agricultural use.

10.5.9 The requirements of the Outline Soil Management Plan are included within the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11).

10.5.10 All soils would be stored 10m away from watercourses (or potential pathways to watercourses), and any potentially contaminated soil would be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters.

10.5.11 Industry standard measures would be put in place to control pollution, including from fuel or chemical stores, silt-laden runoff or dust as detailed in the air quality (**Chapter 5**), geology and land quality (**Chapter 11**), and groundwater and surface water (**Chapter 12**) assessments of this volume.

10.5.12 Toolbox talks would be used to inform all those working on the site of the requirements for soil handling and minimisation of disturbance to agricultural activities to minimise potential impacts on the remainder of the landholding and on neighbouring landholdings during the construction phase.

10.5.13 All fencing around the proposed development would be sufficient to resist damage by livestock (where appropriate) from adjacent land and will be regularly checked and maintained in a suitable condition. Any damage to boundary fencing would be repaired.

10.5.14 Measures contained in relevant Defra and Environment Agency best practice guidance on the control and removal of invasive weed species (Ref. 10.17) would be implemented where appropriate, such as through the appropriate use of herbicides or removal/burial of plant materials. These are detailed in the **CoCP** (Doc Ref. 8.11). During the operational phase, SZC Co. would maintain the scheme, including weed management, for a year post-construction. Following this period, the highway authority will be responsible for any necessary checks and subsequent actions.

10.5.15 During construction, should animal bones be discovered which may indicate a potential burial site, works would cease, and advice would be sought from the Animal Health Regional Office on how to proceed, relevant to the origin and age of the materials found.

10.5.16 All movement of plant and vehicles between fields would cease in the event of notification by Defra of a disease outbreak in the vicinity of the site requiring cessation of activities. Advice and guidance from Defra would be followed to minimise the biosecurity risk associated with the continuation of works.

10.6 Assessment

a) Introduction

10.6.1 This section presents the findings of the soils and agriculture assessment for the construction and operation of the proposed development.

10.6.2 This section identifies any likely significant effects that are predicted to occur and **section 10.7** of this chapter highlights any secondary mitigation and monitoring measures that are proposed to minimise any adverse significant effects (if required).

b) Construction

i. Agricultural land

10.6.3 During construction, the proposed development would affect a total of 50.3ha of primary agricultural land, and a further 4.5 ha which is not in agricultural use.

10.6.4 Of the land under agriculture use, 27.1ha is of Grade 2 and Grade 3a, which is considered to be BMV land.

10.6.5 In addition, 3.1ha of agricultural land which has not been surveyed. Provisional mapping shows the un-surveyed land to comprise a mix of Grades 3 and 4 and lies adjacent to land mapped from the detailed surveys

as Grade 3b. Whilst it is considered that the un-surveyed land could be Grade 3b, given the presence of BMV land within the site for the purposes of this assessment it has been assumed the un-surveyed land could include at least some BMV land. The remaining agricultural land affected is Grade 3b with a small amount of Grade 4 land.

10.6.6 The route of the proposed two village bypass (including verges Drainage System such as swales), bridge embankments and road tie-ins would be permanent. The remaining land would not be required permanently.

10.6.7 The areas of land at each grade required temporarily and permanently are presented in **Table 10.6** below.

Table 10.6: ALC grade distribution

ALC Grade	Total area (ha)	Area required permanently (ha)	Area required temporarily (ha)
1	0	0	0
2	2.0	1.9	0.1
3a	25.1	18.8	6.3
3b	19.5	15.3	4.2
4	0.6	0.2	0.4
5	0	0	0
Non-agricultural.	4.5	3.9	0.6
Not surveyed.	3.1	3.0	0.1
Total	**54.8**	**43.1**	**11.7**

10.6.8 During construction, a total of at least 27.1ha of BMV land would be affected, and this could be up to 30.3ha if the un-surveyed area consists of all BMV land.

10.6.9 The BMV land affected is a receptor of high value. The magnitude of this impact would be assessed as medium. Therefore, this is considered to be a major adverse effect which would be **significant.**

10.6.10 An area of at least 6.4ha of BMV land would only be affected temporarily (which could be 6.5ha if the un-surveyed land required temporarily is also BMV land). This land would be required on a temporary basis during the construction of the road (required for up to 24 months) and returned to agricultural use at the end of the construction phase. With this land returned the magnitude of the overall impact would still be assessed as medium and therefore remains as a major adverse effect which would be **significant.**

ii. Land holdings

10.6.11 Three agricultural land holdings are associated with this site. Temporary and permanent land requirement will occur simultaneously at the start of the construction period, and it is the combined impact of both that would have the most impact on the holding. During the construction period some land will be restored to agricultural use and thus the impact on individual holdings would reduce.

10.6.12 The effects on each holding during construction are summarised in **Table 10.7**. This shows the proportion of each holding required during construction. The effects of severance are based on the ease to which land remains accessible with the implementation of the measures outlined previously. Part of the land required from Parkgate Farm and Farnham Hall includes allowances to create flood compensation areas within the River Alde floodplain. The assessment assumes these land areas are permanently lost to the land holdings. However, if required, it is likely these would be returned to agricultural use in some form.

Table 10.7: Summary of effects on holdings

Holding Name	Sensitivity to change	Area of Holding Required	Percentage of Holding Required During Construction	Impact due to severance	Magnitude of Impact	Classification of Effect During Construction
Parkgate Farm (forming part of Glenham Hall Estate)	High	28.61ha	2.36%	Low	Low	Minor adverse **(not significant)**
Farnham Hall	Low	10.98ha	17.88%	Low	Medium	Minor adverse **(not significant)**
Friday Street Farm	Low	12.01ha	28.51%	High	High	Moderate adverse **(significant)**

10.6.13 Approximately 11.6ha of the land required for construction will be returned to agricultural use at the end of the construction phase. The effect on each land holding at the end of the construction phase as a result of land being returned to agricultural use is summarised in **Table 10.8** below.

Table 10.8: Summary of effects on holdings following reinstatement of land required temporarily

Holding Name	Sensitivity to change	Area of Holding to be Returned to Agricultural Use	Area of Holding Required Permanently	Percentage of Holding Required Permanently	Magnitude of Impact	Classification of Effect Once Land Required Temporarily has been Reinstated
Parkgate Farm (forming part of Glenham Hall Estate)	High	5.34ha	23.27ha	1.92%	Low	Minor adverse **(not significant)**
Farnham Hall	Low	1.42ha	9.56ha	15.57%	Medium	Minor adverse **(not significant)**
Friday Street Farm	Low	4.87ha	7.14ha	16.95%	Medium	Minor adverse **(not significant)**

10.6.14 With the reinstatement of land at the end of the construction phase the effects remain the same for Parkgate Farm and Farnham Hall. However, the effects on Friday Street would reduce from moderate to minor.

10.6.15 Parkgate Farm is a receptor of high sensitivity, due to the land being under an agri-environmental scheme and in part comprising stock animals. The magnitude of impact is low due to the limited land take required as a proportion of the land holding and some permanent loss of land under agri-environment schemes. Access to the remaining landholding would be maintained through the inclusion of a permanently diverted accommodation track, minimising the risk of fragmentation. The magnitude of impact in relation to severance would be low, with all areas of the landholding remaining accessible (although slightly different access routes may need to be used). Overall, this results in a minor adverse effect which is **not significant**.

10.6.16 Farnham Hall is a receptor of low sensitivity as it comprises arable land. The magnitude of impact is medium due to the land take required as a proportion of the land holding. Access to the remaining landholding would be maintained through the inclusion of the new junction south of Pond Wood and the accommodation track to Farnham Hall Farm House, minimising the risk of fragmentation, although it is likely that journey times

to the fields within the landholding east of the new road would be slightly longer. The magnitude of impact in relation to severance would be low. Overall, this results in a minor adverse effect which is **not significant**.

10.6.17 For Friday Street Farm, a receptor of low sensitivity, the magnitude of the impact is reduced from high to medium as a result of a proportion of the land being returned to agricultural use. However, severance impacts are also identified below and there would be limited impacts on access to the majority of the remaining landholding. An area adjacent to the proposed new roundabout on the A12 with the A1094, required as a construction compound, would remain accessible during the operational phase from the A12.

10.6.18 However, a small area (approximately 1.9ha in size) lying immediately to the east of Mollett's Farm would be isolated from the main landholding. Whilst it could still be accessed from adjacent landholdings (for example using the old A12 alignment and Mollett's Farm access) its small size may result in it being not commercially viable to farm as arable land, although it could still be kept under agricultural use. For the purposes of this assessment it is assumed this would no longer be effective to farm the total land area lost from this land holding which would equate to 21.46% of the land holding.

10.6.19 Overall, the magnitude of this impact on this land holding would be assessed as high. Therefore, this is considered to be a moderate adverse effect which would be **significant**.

iii. Inter-relationship effects

10.6.20 There are anticipated to be inter-relationship effects between geology and land quality; landscape; noise; air quality and groundwater and surface water in relation to potential receptors which could be impacted by ground contamination, poor ground conditions resulting from soil handling and noise or dust affecting adjacent land holdings.

10.6.21 There is the potential for effects on agricultural land to increase due to effects arising on land quality as construction activities could result in ground contamination, soil erosion and silt-laden runoff affecting land outside the site boundary or soils required for reinstatement of land required temporarily. The **CoCP** (Doc Ref. 8.11) outlines measures which will be used to control runoff, erosion and pollution. The assessment presented in **Chapter 11** of this volume determined that the impact would be low and as such it is considered there is limited potential for effects arising from geology and land quality to increase the effects reported on agricultural land.

10.6.22 In relation to landscape, the ability to create and maintain elements of landscape planting will require soils with appropriate characteristics. The SMP sets out how soils will be stripped, stockpiled and re-used to ensure they are suitable for the required end use. These are established methods, based on published guidance, and as such it is considered there is limited potential for inter-relationship effects with landscape.

10.6.23 During the construction phase there is the potential for effects on agricultural land to increase as result of noise generated by construction activities. The assessment presented in **Chapter 4** of this volume identifies the potential for impacts from noise and vibration as a result of construction activities, although these are generally considered to be of short duration and not in a single location for the full duration of the construction phase. The **CoCP** (Doc Ref. 8.11) includes a range of measures, including construction working methods, which would be implemented to reduce impacts from noise on adjacent receptors, which would limit potential impacts on any livestock present, and as such it is considered there is limited potential for inter-relationship effects with noise and vibration.

10.6.24 There is the potential for the effects on agricultural land to increase due to effects arising on air quality as construction activities would result in the emission of dust which could be deposited on adjacent agricultural land surrounding the site. This has the potential to result in smothering of vegetation and soil contamination, impacting agricultural productivity. A dust impact assessment was undertaken for the site at **Appendix 5A** of this volume**,** which identified dust generating activities during the earthworks, construction and trackout phase. The risk of dust impacts was determined to be high. The **CoCP** (Doc Ref. 8.11) outlines the control measures that will be applied on site to reduce the risk of dust impacts such that the effect on air quality is considered to be negligible. On this basis, it is considered there is limited potential for effects arising from air quality to increase the effects reported on agricultural land quality.

10.6.25 Changes to surface and groundwater flows as a result of construction activities has the potential to increase effects on agricultural land and soils required for reinstatement of land and landscape planting areas (for example altered groundwater regime or flood risk). The **CoCP** (Doc Ref. 8.11) outlines measures to be implemented to reduce the risk of hydrological or hydrogeological changes which could affect agricultural land such that the effects are considered to be minor adverse or negligible. The assessment presented in **Chapter 12** of this volume determined that the impact would be low and as such it is considered that there is limited potential for effects arising from groundwater and surface water to increase the effects reported on agricultural quality.

c) Operation

10.6.26 During operation of the proposed development no additional land would be required beyond that reported for the construction phase, and no further effects on BMV or agricultural land holdings over and above those already assessed in respect of the construction phase are anticipated.

10.6.27 Other potential impacts include potential for invasive weed species to grow within the site. However, this would be controlled using an appropriate management regime, as summarised in **section 10.5** of this chapter that would remove weed growth that might threaten adjoining agricultural land. The impact during operation is therefore assessed as being of low magnitude which would be a minor adverse effect and **not significant**.

i. Inter-relationship effects

10.6.28 There are anticipated to be inter-relationship effects between noise; air quality and groundwater and surface water in relation to potential receptors which could be impacted by noise, dust or pollution incidents affecting adjacent land holdings. Potential impacts would include the contamination of soils, disturbance (noise) and dust. However, given the mitigation measures proposed in relation to these disciplines it is expected that there would be only minor inter-relationship effects (**not significant**).

10.7 Mitigation and monitoring

10.7.1 Where possible, mitigation measures have been proposed where a significant effect is predicted to occur. Primary and tertiary mitigation measures which have been accounted for as part of the assessment are summarised in **section 10.5** of this chapter. Where other mitigation is required to reduce or avoid an adverse significant effect, this is referred to as secondary mitigation.

10.7.2 There are no secondary mitigation measures available over and above those already identified as primary and tertiary mitigation measures (which have sought to reduce these impacts as far as practicable) for the permanent loss of BMV land which is assessed as a major adverse effect, on the basis of a worst case scenario where un-surveyed land is assessed as BMV land. Therefore, no additional mitigation or monitoring measures have been proposed.

10.7.3 The effects on one of the land holdings prior to the reinstatement of land required temporarily (Friday Street Farm) is considered to be significant, whilst the other two land holdings (Parkgate Farm and Farnham Hall) are considered to be not significant. Following the reinstatement of land

required temporarily at the end of construction, significant effects would not remain in relation to any of the three land holdings.

10.7.4 Further consultation with the land owners will be undertaken to reduce the impacts on the farm businesses, as far as practicable, especially during the construction phase. This will include agreement of assurances and obligations that SZC Co. will accept upon entering the land and compensation, where applicable.

10.7.5 It is considered that this would reduce the magnitude of impact to very low, which would result in either minor adverse or negligible effects and **not significant**.

10.8 Residual effects

10.8.1 **Table 10.9** and **Table 10.10** present a summary of the residual effects identified through the soils and agriculture assessment. They identify the receptor/s likely to be impacted, the level of effect and, where the effect is deemed to be significant, the tables include the mitigation proposed and the resulting residual effect.

Table 10.9: Summary of effects for the construction phase

Receptor	Impact	Primary or Tertiary Mitigation	Assessment of Effects	Additional Mitigation	Residual Effects
BMV land.	Loss of at least 20.7ha of BMV land (potentially up to 23.7ha).	Scheme design optimisation. Temporary land take returned to agricultural use.	Major adverse (**Significant**).	None proposed.	Major adverse (**Significant**).
Land holding – Parkgate Farm.	Permanent loss of land from agricultural production.	Minimisation of land take, inclusion of accommodation works/access points.	Minor adverse (**Not significant**).	Impacts on the farm business resulting from the loss of agricultural land from production will be addressed, as far as practicable, directly with the landowner.	Minor adverse (**Not significant**).
Land holding – Farnham	Permanent loss of land	Minimisation of land take,	Minor adverse (**Not**	Impacts on the farm business	Negligible (**Not significant**).

Receptor	Impact	Primary or Tertiary Mitigation	Assessment of Effects	Additional Mitigation	Residual Effects
Hall.	from agricultural production.	inclusion of accommodation works/access points.	**significant**).	resulting from the loss of agricultural land from production will be addressed, as far as practicable, directly with the landowner.	
Land holding – Friday Farm.	Permanent loss of land from agricultural production.	Minimisation of land take, inclusion of accommodation works/access points.	Moderate adverse (**Significant**).	Impacts on the farm business resulting from the loss of agricultural land from production will be addressed, as far as practicable, directly with the landowner.	Friday Street Farm – Negligible (**Not significant**).

Table 10.10: Summary of effects for the operational phase

Receptor	Impact	Primary or Tertiary Mitigation	Assessment of Effects	Additional Mitigation	Residual Effects
Agricultural holding.	Constraints to land use due to weed growth.	General good maintenance of the site and appropriate weed management as required.	Minor adverse.	None.	Minor adverse (**Not significant**).

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